TEMU

API Reference

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Chapter 1. API

This is a placeholder.

Most API docs will be extracted with Doxygen

1.1. Functions

1.1.1. temu_aarch64GetExtensionSize

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
size_t temu_aarch64GetExtensionSize(const char * extName)
```

Description

The number of instructions of a registered extension (0 if there is none).

Result

1.1.2. temu_aarch64GetVReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
temu_U128 temu_aarch64GetVReg(temu_Object * cpu, unsigned int reg)
```

Description

Read a full 128-bit SIMD/FP register of an AArch64 CPU, for ISA extension handlers that operate on whole vector registers.

Result

The register, low half in Lo

Parameters

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Table 1. temu_aarch64GetVReg Parameters

Parameter	Type	Description
cpu	temu_Object *	An AArch64 CPU
reg	unsigned int	Register number, 0 to 31 (V0 to V31)

1.1.3. temu_aarch64SetVReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_aarch64SetVReg(temu_Object * cpu, unsigned int reg, temu_U128 value)
```

Description

Write a full 128-bit SIMD/FP register of an AArch64 CPU.

Parameters

Table 2. temu_aarch64SetVReg Parameters

Parameter	Type	Description
cpu	temu_Object *	An AArch64 CPU
reg	unsigned int	Register number, 0 to 31 (V0 to V31)
value	temu_U128	The new register value, low half in Lo

1.1.4. temu_addArrayProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addArrayProperty(temu_Class * Cls, const char * Name, int offset, temu_Type
T, int NumElems, const char * Doc)
```

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Description

Add a fixed length array property without setters / getters

Result

0 if the property was added

Parameters

Table 3. `temu_addArrayProperty` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer
Name	const char *	Name of property
offset	int	Offset from object pointer
T	temu_Type	Property type
NumElems	int	Array length
Doc	const char *	Documentation string

1.1.5. temu_addArrayPseudoProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addArrayPseudoProperty(temu_Class * Cls, const char * Name, temu_Type T, int
NumElems, const char * Doc)
```

Description

Add an array pseudo-property

Result

0 if the property was added

Parameters

Table 4. `temu_addArrayPseudoProperty` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer

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Parameter	Type	Description
Name	const char *	Name of property
T	temu_Type	Property type
NumElems	int	Array length
Doc	const char *	Documentation string

1.1.6. temu_addClassAlias

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addClassAlias(temu_Class * Cls, const char * Name)
```

Description

Register an alternative name for a class.

This can be used to keep old class names working after a rename.

Result

0 on success, non-zero otherwise.

Parameters

Table 5. `temu_addClassAlias` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class object returned from `temu_registerClass`.
Name	const char *	The alias to resolve to the class.

1.1.7. temu_addInterfaceArray

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

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```
void temu_addInterfaceArray(temu_Class * Cls, const char * IfaceName, const char *
IfaceType, void * Iface, size_t Count, size_t Size, const char * Doc)
```

Description

Add an array of interfaces to a class

Interface arrays are especially useful when e.g. multiple "network ports" are available, although they can be added manually with distinct names (e.g. uartaiface, uartbiface, etc), the interface array registration allows for the addition of several interfaces at once. Individual interfaces are then referred to with normal index syntax, e.g. obj:uartiface[0].

Parameters

Table 6. `temu_addInterfaceArray` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer
IfaceName	const char *	name of interface
IfaceType	const char *	name of interface type
Iface	void *	Pointer to array of interfaces
Count	size_t	Number of interfaces in array
Size	size_t	Size of one interface (e.g. sizeof(uartiface[0]))
Doc	const char *	Documentation comment for interface

1.1.8. temu_addInterfaceReference

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_addInterfaceReference(temu_Class * Cls, const char * PropName, int Offset,
const char * TypeName, int Count, unsigned int Flags, temu_PropWriter Wr,
temu_PropReader Rd, const char * Doc)
```

Description

Add a interface reference property.

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Parameters

Table 7. `temu_addInterfaceReference` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class object
PropName	const char *	Name of the property to add.
Offset	int	Offset in bytes from the start of the class to the value the property refers to.
TypeName	const char *	Interface type name.
Count	int	Set to > 1 to indicate that the property is an array, the value is the length of the array.
Flags	unsigned int	Flags for property, 1 implies property is mandatory to set.
Wr	temu_PropWriter	Property write function. This function can have side-effects.
Rd	int),temu_PropReader	Property read function. This function can have side-effects.
Doc	const char *	Documentation string

1.1.9. temu_addLoggingCategory

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addLoggingCategory(temu_Class * Cls, unsigned int CategoryId, const char *
Category)
```

Description

temu_addLogginCategory adds a logging category to the class

Result

0 for success, 1 indicates failure.

Parameters

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Table 8. `temu_addLoggingCategory` Parameters

Parameter	Type	Description
Cls	temu_Class *	the class
CategoryId	unsigned int	The category id. Valid range is [8,16)
Category	const char *	The category name

1.1.10. temu_addObjectAlias

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addObjectAlias(temu_Object * Obj, const char * Name)
```

Description

Register an alternative name for an object.

This can be used to keep old object names working after moving an object under a component namespace.

Result

0 on success, non-zero otherwise.

Parameters

Table 9. `temu_addObjectAlias` Parameters

Parameter	Type	Description
Obj	temu_Object *	The target object.
Name	const char *	The alias to resolve to the object.

1.1.11. temu_addPort

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
int temu_addPort(temu_Class * C, const char * IfaceRefName, const char * IfaceName,
const char * Doc)
```

Description

Make interface reference property and an interface inverses

A port is a bidirectional interface. Thus, if an interface reference is connected to another objects interface, the remote object will be told to issue a reverse connection. This is convenient as it simplifies device connection during system configuration and construction. That is, instead of calling the connect two times with the inverse connections explicitly, only one call is needed.

Result

0 on success, non-zero otherwise.

Parameters

Table 10. `temu_addPort` Parameters

Parameter	Type	Description
C	temu_Class *	The class object
IfaceRefName	const char *	the name of the interface reference property
IfaceName	const char *	Name of interface that is the inverse of the interface ref property.
Doc	const char *	Documentation string

1.1.12. temu_addProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_addProperty(temu_Class * Cls, const char * PropName, int Offset, temu_Type
Typ, int Count, temu_PropWriter Wr, temu_PropReader Rd, const char * Doc)
```

Description

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Add a property to a class.

Parameters

Table 11. `temu_addProperty` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class object
PropName	const char *	Name of the property to add.
Offset	int	Offset in bytes from the start of the class to the value the property refers to.
Typ	temu_Type	Type of the property.
Count	int	Set to > 1 to indicate that the property is an array, the value is the length of the array.
Wr	temu_PropWriter	Property write function. This function can have side-effects.
Rd	int),temu_PropReader	Property read function. This function can have side-effects.
Doc	const char *	Documentation string

1.1.13. temu_addPseudoInterfaceReference

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_addPseudoInterfaceReference(temu_Class * Cls, const char * PropName, const
char * TypeName, int Count, unsigned int Flags, temu_PropWriter Wr, temu_PropReader
Rd, temu_PropWriter Set, temu_PropReader Get, const char * Doc)
```

Description

Add a interface reference property.

Parameters

Table 12. `temu_addPseudoInterfaceReference` Parameters

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Parameter	Type	Description
Cls	temu_Class *	The class object
PropName	const char *	Name of the property to add.
TypeName	const char *	Interface type name.
Count	int	Set to > 1 to indicate that the property is an array, the value is the length of the array.
Flags	unsigned int	Flags for property, 1 implies property is mandatory to set.
Wr	temu_PropWriter	Property write function. This function can have side-effects.
Rd	int),temu_PropReader	Property read function. This function can have side-effects.
Set	temu_PropWriter	Property set function. Non-semantic.
Get	int),temu_PropReader	Property get function. Non-semantic.
Doc	const char *	Documentation string

1.1.14. temu_addPseudoProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_addPseudoProperty(temu_Class * Cls, const char * PropName, temu_Type Typ,
int Count, temu_PropWriter Wr, temu_PropReader Rd, temu_PropWriter Set,
temu_PropReader Get, const char * Doc)
```

Description

Add property without storage

A pseudo property does not have backing storage (and therefore no offset). They exist to provide access to computed properties.

Pseudo properties also work fine with C++ types with non-standard layout.

Pseudo properties are snapshotted if the set and get functions are implemented. The set and get

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should implement read and write without semantic effect. That is, if the property is a register, then the read and write should have the effect of an actual register access (including event rescheduling etc), while for a get/set, only the value of the register is modified, event restoration is done differently.

Parameters

Table 13. `temu_addPseudoProperty` Parameters

Parameter	Type	Description
Cls	temu_Class *	class to add pseudo property to
PropName	const char *	name of pseudo property
Typ	temu_Type	Type of property
Count	int	number of elements, 1 for a scalar.
Wr	temu_PropWriter	Property write function (semantic effect)
Rd	int),temu_PropReader	Property read function (semantic effect)
Set	temu_PropWriter	Property set function (non-semantic)
Get	int),temu_PropReader	Property get function (non-semantic)
Doc	const char *	Documentation string

1.1.15. temu_addScalarProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addScalarProperty(temu_Class * Cls, const char * Name, int offset, temu_Type
T, const char * Doc)
```

Description

Add a scalar (one element) property without setters / getters

Result

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0 if the property was added

Parameters

Table 14. `temu_addScalarProperty` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer
Name	const char *	Name of property
offset	int	Offset from object pointer
T	temu_Type	Property type
Doc	const char *	Documentation string

1.1.16. temu_addScalarPseudoProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_addScalarPseudoProperty(temu_Class * Cls, const char * Name, temu_Type T,
const char * Doc)
```

Description

Add a scalar (one element) pseudo-property

Result

0 if the property was added

Parameters

Table 15. `temu_addScalarPseudoProperty` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer
Name	const char *	Name of property
T	temu_Type	Property type
Doc	const char *	Documentation string

1.1.17. temu_armGetAPSR

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Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_armGetAPSR(void * Cpu)
```

Description

Get the ARM processor state register

Result

APSR value

Parameters

Table 16. temu_armGetAPSR Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer

1.1.18. temu_armGetExecMode

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
unsigned int temu_armGetExecMode(void * Cpu)
```

Description

Get the ARM execution mode

Result

Execution mode

Parameters

Table 17. temu_armGetExecMode Parameters

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Parameter	Type	Description
Cpu	void *	ARM CPU pointer

1.1.19. temu_armGetFPEXC

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_armGetFPEXC(void * Cpu)
```

Description

Get the ARM FPEXC register

Result

FPEXC value

Parameters

Table 18. `temu_armGetFPEXC` Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer

1.1.20. temu_armGetFPINST

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_armGetFPINST(void * Cpu, int Idx)
```

Description

Get the ARM FPINST register

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

FPINST value

Parameters

Table 19. temu_armGetFPINST Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer
Idx	int	FPINST register number

1.1.21. temu_armGetFPSCR

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_armGetFPSCR(void * Cpu)
```

Description

Get the ARM FPSCR register

Result

FPSCR value

Parameters

Table 20. temu_armGetFPSCR Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer

1.1.22. temu_armSetAPSR

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_armSetAPSR(void * Cpu, uint32_t Value)
```

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Description

Set the ARM processor state register

Parameters

Table 21. `temu_armSetAPSR` Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer
Value	uint32_t	Value to set the APSR to

1.1.23. temu_armSetExecMode

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_armSetExecMode(void * Cpu, unsigned int Mode)
```

Description

Set the ARM execution mode

Parameters

Table 22. `temu_armSetExecMode` Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer
Mode	unsigned int	Execution mode

1.1.24. temu_armSetFPEXC

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_armSetFPEXC(void * Cpu, uint32_t Value)
```

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Description

Set the ARM FPEXC register

Parameters

Table 23. `temu_armSetFPEXC` Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer
Value	uint32_t	FPEXC value

1.1.25. temu_armSetFPINST

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_armSetFPINST(void * Cpu, int Idx, uint32_t Value)
```

Description

Set the ARM FPINST register

Parameters

Table 24. `temu_armSetFPINST` Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer
Idx	int	FPINST register number
Value	uint32_t	FPINST value

1.1.26. temu_armSetFPSCR

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

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```
void temu_armSetFPSCR(void * Cpu, uint32_t Value)
```

Description

Set the ARM FPSCR register

Parameters

Table 25. `temu_armSetFPSCR` Parameters

Parameter	Type	Description
Cpu	void *	ARM CPU pointer
Value	uint32_t	FPSCR value

1.1.27. temu_asDouble

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
double temu_asDouble(temu_Propval Pv)
```

Description

Converts the given property to double

Result

Returns the property as an unsigned integer

Parameters

Table 26. `temu_asDouble` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be converted

1.1.28. temu_asInteger

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
int64_t temu_asInteger(temu_Propval Pv)
```

Description

Converts the given propery to integer

Result

Returns the property as integer

Parameters

Table 27. `temu_asInteger` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be converted

1.1.29. temu_asUnsigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint64_t temu_asUnsigned(temu_Propval Pv)
```

Description

Converts the given property to unsigned integer

Result

Returns the property as an unsigned integer

Parameters

Table 28. `temu_asUnsigned` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be converted

1.1.30. temu_assemble

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Include

```
#include "temu-c/Support/Assembler.h"
```

Signature

```
uint32_t temu_assemble(void * Cpu, const char * AsmStr)
```

Description

Assemble an instruction

Result

Instruction bitpattern.

Parameters

Table 29. `temu_assemble` Parameters

Parameter	Type	Description
Cpu	void *	processor for which to assemble.
AsmStr	const char *	String with instruction in the CPUs assembler.

1.1.31. temu_assembleToMemory

Include

```
#include "temu-c/Support/Assembler.h"
```

Signature

```
void temu_assembleToMemory(void * Cpu, const char * AsmStr, uint64_t Addr)
```

Description

Assemble an instruction to memory

Parameters

Table 30. `temu_assembleToMemory` Parameters

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Parameter	Type	Description
Cpu	void *	processor for which to assemble.
AsmStr	const char *	String with instruction in the CPUs assembler.
Addr	uint64_t	Physical address of where to put the instruction.

1.1.32. temu_asyncSocketAdd

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int temu_asyncSocketAdd(temu_TimeSource * TS, int Sock, unsigned int Flags, void (*
)(void *) CB, void * Data)
```

Description

Add asynchronous event triggered by file descriptor changes

Result

Returns the file descriptor (Sock) if successful, otherwise -1.

Parameters

Table 31. `temu_asyncSocketAdd` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	the synchronous queue or time source object (normally a CPU object)
Sock	int	File descriptor for the socket. This can also be a pipe FD. Note that the function is likely to be renamed. Note that in case you are intending to read from the socket, make sure it is non-blocking.

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Parameter	Type	Description
Flags	unsigned int	TEMU_ASYNC_READ in case you wish to be notified about data available to read.
CB	void (*)(void *)	Callback when event is triggered.
Data	void *	Data pointer passed to callback.

1.1.33. temu_asyncSocketRemove

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_asyncSocketRemove(int Fd, unsigned int Flags)
```

Description

Remove an asynchronous event triggered by file descriptor changes

Parameters

Table 32. `temu_asyncSocketRemove` Parameters

Parameter	Type	Description
Fd	int	The ID of the socket to remove
Flags	unsigned int	The flags of removing

1.1.34. temu_asyncStop

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_asyncStop()
```

Description

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Stop the current scheduler

The function returns immediately, before the scheduler has stopped. The function is suitable for use in e.g. signal handlers.

1.1.35. temu_asyncTimerAdd

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int temu_asyncTimerAdd(temu_TimeSource * TS, double T, unsigned int Flags, void (*
)(void *) CB, void * Data)
```

Description

Add asynchronously activated wall-clock timed events

The callback function will be called synchronously by the emulator core associated with Q. That means that when CB is executing it is safe to do anything that can be done from a normal event or MMIO handler.

Note that the event is only called when a CPU core or machine is running. When the timer has triggered, it is temporarily disabled and the CB is posted on the synchornous event queue as an async event. This will be executed when the next normal event expires (e.g. at the end of the current quanta). After the event has been called, depending on wether the timer is cyclic or not, it will be reactivated. This means that if the emulator is paused, at most one call to the event handler will be issued, and this will be done when the emulator is resumed.

Result

Returns a file descriptor or timer ID.

Parameters

Table 33. `temu_asyncTimerAdd` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
T	double	Delta seconds in the future for the first event to be posted.

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Parameter	Type	Description
Flags	unsigned int	Set to TEMU_ASYNC_CYCLIC if the event should be executed as a cyclic event.
CB	void (*)(void *)	Call back function on when timer expires
Data	void *	Context data to be passed to the callback function

1.1.36. temu_asyncTimerRemove

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_asyncTimerRemove(int Fd)
```

Description

Remove an async timer

Parameters

Table 34. `temu_asyncTimerRemove` Parameters

Parameter	Type	Description
Fd	int	Timer ID to remove

1.1.37. temu_bitreverse16

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint16_t temu_bitreverse16(uint16_t Word)
```

Description

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Reverses bits in a 16 bit word.



that this should be replaced with __buintin_bitreverse16(), but that is only supported in clang at present, not GCC.

Result

Word with reversed bits.

Parameters

Table 35. `temu_bitreverse16` Parameters

Parameter	Type	Description
Word	uint16_t	The word to reverse the bits in

1.1.38. temu_bitreverse32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_bitreverse32(uint32_t Word)
```

Description

Reverses bits in a 32 bit word.



that this should be replaced with __buintin_bitreverse32(), but that is only supported in clang at present, not GCC.

Result

Word with reversed bits.

Parameters

Table 36. `temu_bitreverse32` Parameters

Parameter	Type	Description
Word	uint32_t	The word to reverse the bits in

1.1.39. temu_buffCopy

Include

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```
#include "temu-c/Support/Buffer.h"
```

Signature

```
temu_Buff temu_buffCopy(const temu_Buff * B)
```

Description

Copy COW buffer. This will make a new buff object, but the underlying data will not be copied.

Result

Buffer object referring to the same data as B.

Parameters

Table 37. `temu_buffCopy` Parameters

Parameter	Type	Description
B	const temu_Buff *	The buffer to copy.

1.1.40. temu_buffCreate

Include

```
#include "temu-c/Support/Buffer.h"
```

Signature

```
temu_Buff temu_buffCreate(uint32_t size)
```

Description

Create a new COW buffer of size bytes.

Result

Buffer object.

Parameters

Table 38. `temu_buffCreate` Parameters

Parameter	Type	Description
size	uint32_t	Size of buffer in bytes

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1.1.41. temu_buffDispose

Include

```
#include "temu-c/Support/Buffer.h"
```

Signature

```
void temu_buffDispose(temu_Buff * B)
```

Description

Delete buffer. The buffer B will be deleted. If there are no more copies of the buffer data anywhere, the data will be deallocated.

Parameters

Table 39. `temu_buffDispose` Parameters

Parameter	Type	Description
B	temu_Buff *	buffer to delete.

1.1.42. temu_buffLen

Include

```
#include "temu-c/Support/Buffer.h"
```

Signature

```
uint32_t temu_buffLen(const temu_Buff * B)
```

Description

Get buffer length

Result

Length of buffer in bytes

Parameters

Table 40. `temu_buffLen` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
B	const temu_Buff *	buffer

1.1.43. temu_buffReadableData

Include

```
#include "temu-c/Support/Buffer.h"
```

Signature

```
const uint8_t * temu_buffReadableData(const temu_Buff * B)
```

Description

Get a pointer to readable buffer data

The pointer to the readable data will be returned.

Result

Pointer to data buffer.

Parameters

Table 41. `temu_buffReadableData` Parameters

Parameter	Type	Description
B	const temu_Buff *	Buffer to get read pointer from

1.1.44. temu_buffRemoveHead

Include

```
#include "temu-c/Support/Buffer.h"
```

Signature

```
void temu_buffRemoveHead(temu_Buff * B, uint32_t len)
```

Description

Remove len bytes from the start of the buffer.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Removing bytes from the buffer start will not change the underlying buffer object. And is not seen as a write for the purpose of the data block.

This does not affect other copies of this buffer.

Parameters

Table 42. `temu_buffRemoveHead` Parameters

Parameter	Type	Description
B	temu_Buff *	buffer to remove data from
len	uint32_t	Number of bytes to remove.

1.1.45. temu_buffRemoveTail

Include

```
#include "temu-c/Support/Buffer.h"
```

Signature

```
void temu_buffRemoveTail(temu_Buff * B, uint32_t len)
```

Description

Remove len bytes from the end of the buffer.

Removing bytes from the buffer tail will not change the underlying buffer object. And is not seen as a write for the purpose of the data block.

This does not affect other copies of this buffer.

Parameters

Table 43. `temu_buffRemoveTail` Parameters

Parameter	Type	Description
B	temu_Buff *	buffer to remove data from
len	uint32_t	Number of bytes to remove.

1.1.46. temu_buffWritableData

Include

```
#include "temu-c/Support/Buffer.h"
```

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Signature

```
uint8_t * temu_buffWritableData(temu_Buff * B)
```

Description

Get a pointer to writable data.

If the data have more than one reference, a new copy of the data will be created.

Result

Pointer to writable data.

Parameters

Table 44. `temu_buffWritableData` Parameters

Parameter	Type	Description
B	temu_Buff *	Buffer to get data pointer from.

1.1.47. temu_checkSanity

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_checkSanity(int Report)
```

Description

Check object system sanity.

The function traverses all objects and their properties and ensures that all (scalar) interface properties are connected. An object can override the default check by implementing the checkSanity function in the ObjectIface.

Result

Returns 0 if the object system is connected. Returns non-zero if the object system is not properly connected.

Parameters

Table 45. `temu_checkSanity` Parameters

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Parameter	Type	Description
Report	int	set to 1 to have the function report connectivity issues on stdout, 2 to report on stderr, and 0 to not report at all.

1.1.48. temu_checkpointGetLength

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_checkpointGetLength(void * Ctxt, const char * Name)
```

Description

Get number of entries for the serialized property

Result

Length of the property in elements. Negative on error.

Parameters

Table 46. `temu_checkpointGetLength` Parameters

Parameter	Type	Description
Ctxt	void *	Context passed to deserialise function
Name	const char *	Name of property / key in the serialized file

1.1.49. temu_checkpointGetValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_checkpointGetValue(void * Ctxt, const char * Name, int Idx)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get value for named snapshot value

Result

Property value with the contents saved to the snapshot

Parameters

Table 47. `temu_checkpointGetValue` Parameters

Parameter	Type	Description
Ctxt	void *	Context is passed to deserialise interface function
Name	const char *	Name of the saved value
Idx	int	Index of the saved value (if array)

1.1.50. temu_classCmdAddParam

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_classCmdAddParam(void * Cmd, const char * Name, temu_CmdOptionKind Type, int
Required, const char * Doc)
```

Description

Add parameter to command

Result

0 on success, other values indicates errors

Parameters

Table 48. `temu_classCmdAddParam` Parameters

Parameter	Type	Description
Cmd	void *	Command handle
Name	const char *	Name of parameter to add

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Parameter	Type	Description
Type	temu_CmdOptionKind	Type of the parameter
Required	int	Set to 1 if the parameter must be set for the command
Doc	const char *	Documentation string for the parameter

1.1.51. temu_classCmdGetOption

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
const temu_CmdArg * temu_classCmdGetOption(int argc, const temu_CmdArg * args, const
char * OptName)
```

Description

Get named command option

Result

Pointer to command argument or NULL in case it is not found.

Parameters

Table 49. `temu_classCmdGetOption` Parameters

Parameter	Type	Description
argc	int	Number of arguments
args	const temu_CmdArg *	Argument vector
OptName	const char *	Name of parameter / option to get

1.1.52. temu_classCmdGetOptionAsInteger

Include

```
#include "temu-c/Support/CommandLine.h"
```

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Signature

```
int64_t temu_classCmdGetOptionAsInteger(int argc, const temu_CmdArg * args, const char
* OptName)
```

Description

Get named command option as signed integer

Can only get valid numeric parameters. The function will never fail if the type is numeric and the option is required. For optional arguments, use the generic access function `temu_classCmdGetOption()`

Result

The value of the parameter converted to an integer.

Parameters

Table 50. `temu_classCmdGetOptionAsInteger` Parameters

Parameter	Type	Description
argc	int	Number of arguments
args	const temu_CmdArg *	Argument vector
OptName	const char *	Name of parameter / option to get

1.1.53. temu_classCmdGetOptionAsUnsigned

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
uint64_t temu_classCmdGetOptionAsUnsigned(int argc, const temu_CmdArg * args, const
char * OptName)
```

Description

Get named command option as unsigned integer

Can only get valid numeric parameters. The function will never fail if the type is numeric and the option is required. For optional arguments, use the generic access function `temu_classCmdGetOption()`

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

The value of the parameter converted to an unsigned integer.

Parameters

Table 51. `temu_classCmdGetOptionAsUnsigned` Parameters

Parameter	Type	Description
argc	int	Number of arguments
args	const temu_CmdArg *	Argument vector
OptName	const char *	Name of parameter / option to get

1.1.54. temu_classForName

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Class * temu_classForName(const char * ClsName)
```

Description

Get the class pointer for the named class

Result

Pointer to the class if found, otherwise NULL

Parameters

Table 52. `temu_classForName` Parameters

Parameter	Type	Description
ClsName	const char *	The name of the class

1.1.55. temu_classForObject

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
temu_Class * temu_classForObject(const temu_Object * Obj)
```

Description

Get the class for the given object.

Result

Pointer to the class type object

Parameters

Table 53. `temu_classForObject` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object

1.1.56. temu_classGetCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void * temu_classGetCmd(temu_Class * Cls, const char * Name)
```

Description

Get an already registered command handle from class

This function can be used to for example get commands registered in the metaclass, such as the new command. The command can then have arguments added.

Result

Opaque handle to command. NULL in case of failure.

Parameters

Table 54. `temu_classGetCmd` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer

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Parameter	Type	Description
Name	const char *	Name of command to get

1.1.57. temu_classGetPluginMetaData

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const temu_PluginMetaDataV1 * temu_classGetPluginMetaData(temu_Class * Cls)
```

Description

Metadata of the plugin a class was registered by.

Result

The metadata, or NULL for some builtin classes or a plugin did not provide metadata.

Parameters

Table 55. `temu_classGetPluginMetaData` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class

1.1.58. temu_classHasCommand

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_classHasCommand(const temu_Class * Cls, const char * CmdName)
```

Description

Query whether the class has a specific command implemented

Result

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0 if command is not implemented by class, 1 if implemented.

Parameters

Table 56. `temu_classHasCommand` Parameters

Parameter	Type	Description
Cls	const temu_Class *	class to query for a command.
CmdName	const char *	Command name class is expected to implement.

1.1.59. temu_classPropChildCount

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_classPropChildCount(const temu_Class * Cls, const char * Path)
```

Description

Number of names directly below a property path.

Result

The number of immediate children, 0 if there are none.

Parameters

Table 57. `temu_classPropChildCount` Parameters

Parameter	Type	Description
Cls	const temu_Class *	The class to query.
Path	const char *	Dot-separated path. NULL or "" is the root.

1.1.60. temu_classPropChildName

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
const char * temu_classPropChildName(const temu_Class * Cls, const char * Path, int
Idx)
```

Description

Name of one child of a property path, for listing a namespace.

Ordered by name, not by registration order. The result is the segment, not the whole path; join it and call temu_classPropPathKind to find out what the child is.

Result

The child’s name segment, NULL if Idx is out of range. Owned by the class.

Parameters

Table 58. `temu_classPropChildName` Parameters

Parameter	Type	Description
Cls	const temu_Class *	The class to query.
Path	const char *	Dot-separated path. NULL or "" is the root.
Idx	int	Child index, in [0, temu_classPropChildCount).

1.1.61. temu_classPropPathKind

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_classPropPathKind(const temu_Class * Cls, const char * Path)
```

Description

Query what a class registers at a dotted property path.

A property name may be a path - "config.linkSpeedBps" - whose leading segments name a namespace rather than a property. This resolves a path one segment at a time, so a mistyped segment is caught where it is rather than at the end of the path.

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Result

A bitwise or of temu_PropPathKind values.

Parameters

Table 59. `temu_classPropPathKind` Parameters

Parameter	Type	Description
Cls	const temu_Class *	The class to query.
Path	const char *	Dot-separated path. NULL or "" is the root.

1.1.62. temu_clearLeftmostBit32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_clearLeftmostBit32(uint32_t Word)
```

Description

Clear lower set bit in word

Result

A copy of Word with ther lowest set bit cleared

Parameters

Table 60. `temu_clearLeftmostBit32` Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which the lower set bit will be cleared

1.1.63. temu_clearLeftmostBit64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

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Signature

```
uint64_t temu_clearLeftmostBit64(uint64_t Word)
```

Description

Clear lower set bit in word

Result

A copy of Word with ther lowest set bit cleared

Parameters

Table 61. `temu_clearLeftmostBit64` Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which the lower set bit will be cleared

1.1.64. temu_clearMemAttr

Include

```
#include "temu-c/Memory/Memory.h"
```

Signature

```
void temu_clearMemAttr(void * Obj, uint64_t Addr, uint64_t Len, temu_MemoryAttr Attr)
```

Description

Clear attribute on memory space location

Parameters

Table 62. `temu_clearMemAttr` Parameters

Parameter	Type	Description
Obj	void *	The memory space object
Addr	uint64_t	Physical address where to map the device
Len	uint64_t	Length in bytes of area where the attribute should be set.

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Parameter	Type	Description
Attr	temu_MemoryAttr	The attribute to clear.

1.1.65. temu_clearRightMostBits32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_clearRightMostBits32(uint32_t Word)
```

Description

Clear right most bit in a word

Result

A copy of Word, in which right most bit to be cleared

Parameters

Table 63. `temu_clearRightMostBits32` Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which right most bit to be cleared

1.1.66. temu_clearRightMostBits64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_clearRightMostBits64(uint64_t Word)
```

Description

Clear right most bit in a word

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

A copy of Word, in which right most bit to be cleared

Parameters

Table 64. temu_clearRightMostBits64 Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which right most bit to be cleared

1.1.67. temu_clz16

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_clz16(uint16_t Word)
```

Description

Count leading zeroes

Result

Number of leading zeros in Word

Parameters

Table 65. temu_clz16 Parameters

Parameter	Type	Description
Word	uint16_t	the word, in which leading zeros to be counted

1.1.68. temu_clz32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

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```
int temu_clz32(uint32_t Word)
```

Description

Count leading zeroes

Result

Number of leading zeros in Word

Parameters

Table 66. `temu_clz32` Parameters

Parameter	Type	Description
Word	uint32_t	the word, in which leading zeros to be counted

1.1.69. temu_clz64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_clz64(uint64_t Word)
```

Description

Count leading zeroes

Result

The number of leading zeros in Word

Parameters

Table 67. `temu_clz64` Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which leading zeros to be counted

1.1.70. temu_cmdAddOption

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Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void temu_cmdAddOption(void * Cmd, const char * OptName, temu_CmdOptionKind Type, int
Required, const char * Doc, const char * Default)
```

Description

Add named argument to command

Parameters

Table 68. `temu_cmdAddOption` Parameters

Parameter	Type	Description
Cmd	void *	Pointer to the command object
OptName	const char *	Option name
Type	temu_CmdOptionKind	Option type
Required	int	Pass 0 if the option is not required, otherwise required
Doc	const char *	Option documentation
Default	const char *	Default value of the option

1.1.71. temu_cmdComplete

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_cmdComplete(const char * cmd, const char *** completions)
```

Description

Get possible completions for a command

The function returns an array with possible completions. The array is thread local and is borrowed to the caller. It is valid until the next call in the calling thread. The resulting completions provide

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completions, and not the full command.

Result

Number of strings in the completions array

Parameters

Table 69. `temu_cmdComplete` Parameters

Parameter	Type	Description
cmd	const char *	Command to be completed
completions	const char *	Set to a pointer to an array of C-strings

1.1.72. temu_cmdGetData

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void * temu_cmdGetData(void * Ctxt)
```

Description

Get data pointer from command context This function shall be called in a command handler on the passed context.

Result

data pointer

Parameters

Table 70. `temu_cmdGetData` Parameters

Parameter	Type	Description
Ctxt	void *	Pointer to the context of the command

1.1.73. temu_cmdGetInterpreter

Include

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```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void * temu_cmdGetInterpreter(void * Ctxt)
```

Description

Get pointer to the command interpreter This function shall be called in a command handler on the passed context.

Result

Pointer to interpreter

Parameters

Table 71. `temu_cmdGetInterpreter` Parameters

Parameter	Type	Description
Ctxt	void *	Pointer to the context of the command

1.1.74. temu_cmdGetOptionAsInteger

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int64_t temu_cmdGetOptionAsInteger(void * Ctxt, const char * OptName)
```

Description

Get named option as integer from command context This function shall be called in a command handler on the passed context.

Result

The integer bound to the named argument

Parameters

Table 72. `temu_cmdGetOptionAsInteger` Parameters

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Parameter	Type	Description
Ctxt	void *	Command context
OptName	const char *	Option name

1.1.75. temu_cmdGetOptionAsObject

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void * temu_cmdGetOptionAsObject(void * Ctxt, const char * OptName)
```

Description

Get named option as object pointer from command context This function shall be called in a command handler on the passed context.

Result

Pointer to the option object

Parameters

Table 73. `temu_cmdGetOptionAsObject` Parameters

Parameter	Type	Description
Ctxt	void *	Command context
OptName	const char *	Option name

1.1.76. temu_cmdGetOptionAsReal

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
double temu_cmdGetOptionAsReal(void * Ctxt, const char * OptName)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Get named option as double from command context This function shall be called in a command handler on the passed context.

Result

The real value of the option as double

Parameters

Table 74. `temu_cmdGetOptionAsReal` Parameters

Parameter	Type	Description
Ctxt	void *	Command context
OptName	const char *	Option name

1.1.77. temu_cmdGetOptionAsString

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
const char * temu_cmdGetOptionAsString(void * Ctxt, const char * OptName)
```

Description

Get named option as string from command context This function shall be called in a command handler on the passed context.

Result

C-string of the name of the option

Parameters

Table 75. `temu_cmdGetOptionAsString` Parameters

Parameter	Type	Description
Ctxt	void *	Command context
OptName	const char *	Option name

1.1.78. temu_cmdGetPosOpt

Include

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```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
const char * temu_cmdGetPosOpt(void * Ctxt, size_t Idx)
```

Description

Get positional option at index This function shall be called in a command handler on the passed context.

Result

The option at position Idx as a C-string

Parameters

Table 76. `temu_cmdGetPosOpt` Parameters

Parameter	Type	Description
Ctxt	void *	Command context
Idx	size_t	Index of the option

1.1.79. temu_cmdGetPosOptSize

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
size_t temu_cmdGetPosOptSize(void * Ctxt)
```

Description

Get number of positional options given This function shall be called in a command handler on the passed context.

Result

The number of position optionals in Ctxt

Parameters

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Table 77. `temu_cmdGetPosOptSize` Parameters

Parameter	Type	Description
Ctxt	void *	Command context

1.1.80. temu_cmdGetVariable

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
const char * temu_cmdGetVariable(const char * Key)
```

Description

Get a variable in the command line

Result

In case the variable is not found NULL, otherwise a borrowed string.

Parameters

Table 78. `temu_cmdGetVariable` Parameters

Parameter	Type	Description
Key	const char *	Variable name

1.1.81. temu_cmdOptionIsValid

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_cmdOptionIsValid(void * Ctxt, const char * OptName)
```

Description

Return 1 if the option is valid, 0 if invalid / not set This function shall be called in a command handler on the passed context.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

1 if the option is valid, 0 if invalid / not set

Parameters

Table 79. `temu_cmdOptionIsValid` Parameters

Parameter	Type	Description
Ctxt	void *	Command context
OptName	const char *	Option name

1.1.82. temu_cmdOptionKind

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_cmdOptionKind(const char * Name, const char * OptName, temu_CmdOptionKind *
Kind)
```

Description

Look up the declared kind of a global command's option.

Needed to build a temu_CmdArg correctly: a command that declares an option as teCOK_Object reads the Obj member, so passing the object's name as a teCOK_String would have it read an unrelated union member. Callers that accept loosely typed values - bindings, in particular - should ask for the declared kind and convert to it.

Result

Non-zero if the command declares an option of that name.

Parameters

Table 80. `temu_cmdOptionKind` Parameters

Parameter	Type	Description
Name	const char *	Command name
OptName	const char *	Option name
Kind	temu_CmdOptionKind *	Set to the declared kind on success

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1.1.83. temu_cmdSetVariable

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_cmdSetVariable(const char * Key, const char * Value)
```

Description

Set a variable in the command line

Result

Non-zero on errors

Parameters

Table 81. `temu_cmdSetVariable` Parameters

Parameter	Type	Description
Key	const char *	Variable name (must match [A-Za-z_][A-Za-z0-9_]*)
Value	const char *	Value to assign to variable

1.1.84. temu_cmdTakeError

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
const char * temu_cmdTakeError()
```

Description

Take and clear the error a failed global command raised.

Result

The message (valid until the next call in this thread), or NULL.

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1.1.85. temu_componentAddDelegateIface

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
void temu_componentAddDelegateIface(temu_Component * Comp, const char * Name,
temu_IfaceRef Iface)
```

Description

Add delegate interface to component

Delegate interfaces are interfaces in objects internal in the component. It is possible to use the connect function to attach directly to a component delegated interface (although, in practice the connection is done to the internal object's interface).

Note that delegate interface do not support interface arrays, and can only expose a single interface instance at present.

Parameters

Table 82. `temu_componentAddDelegateIface` Parameters

Parameter	Type	Description
Comp	temu_Component *	the component to add the delegate interface to.
Name	const char *	name of the delegate interface
Iface	temu_IfaceRef	Interface reference which the delegated interface is resolved to

1.1.86. temu_componentAddDelegateProp

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
void temu_componentAddDelegateProp(temu_Component * Comp, const char * Name,
```

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```
temu_Object * Obj, const char * PropName)
```

Description

Add delegate property to component

Delegate property are properties in objects internal in the component. It is possible to use the connect function to connect from a delegated property directly using the component instead of the underlying object.

Parameters

Table 83. temu_componentAddDelegateProp Parameters

Parameter	Type	Description
Comp	temu_Component *	the component to add the delegate interface to.
Name	const char *	name of the delegate property
Obj	temu_Object *	Object to which the property resolves to.
PropName	const char *	Name of property in Obj

1.1.87. temu_componentCreate

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_Component * temu_componentCreate(const char * Name)
```

Description

Allocate a component object.

The component create shall be called in the component constructor/create function (the create function passed to the registerComponent function). It will allocate an opaque component object with the relevant name.

The returned component is what the component constructor should return.

Result

Component pointer

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Parameters

Table 84. `temu_componentCreate` Parameters

Parameter	Type	Description
Name	const char *	Name of component

1.1.88. temu_componentDispose

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
void temu_componentDispose(void * Comp)
```

Description

Deallocate a component object

The component dispose shall be called by the component destructor/dispose function registered in the registerComponent call.

Note that a component is seen as owning all the objects created with createComponentObject, and subsequently, all objects created will be recursively deleted when deleting the component.

Parameters

Table 85. `temu_componentDispose` Parameters

Parameter	Type	Description
Comp	void *	Component to dispose.

1.1.89. temu_componentGetContext

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
void * temu_componentGetContext(temu_Component * comp)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get component context

Result

Context pointer

Parameters

Table 86. `temu_componentGetContext` Parameters

Parameter	Type	Description
comp	temu_Component *	Component pointer

1.1.90. temu_componentGetDelegateIface

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_IfaceRef temu_componentGetDelegateIface(temu_Component * Comp, const char * Name)
```

Description

Query the component for a delegated interface

Normally this function is not needed for the end user, however some usecases can be seen for exposing this. It returns the IfaceRef that has been added as a delegate interface. The main use is to redelegate delegated interfaces in a component of components.

Result

Interface reference associated with Name, if none is found, iref type will be teTY_Invalid.

Parameters

Table 87. `temu_componentGetDelegateIface` Parameters

Parameter	Type	Description
Comp	temu_Component *	The component to query the IfaceRef from
Name	const char *	Name of the interface reference.

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1.1.91. temu_componentGetDelegateProp

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_PropName temu_componentGetDelegateProp(temu_Component * Comp, const char * Name)
```

Description

Query the compontent for a delegated property

Normally this should not be called by the user. But is useful in case the user constructs components of components in which case a component can redelegate delegated properties.

Result

Object name pair with the target object and property name.

Parameters

Table 88. temu_componentGetDelegateProp Parameters

Parameter	Type	Description
Comp	temu_Component *	The componten to query
Name	const char *	Name of delegated property

1.1.92. temu_componentGetNumberOfObjects

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
size_t temu_componentGetNumberOfObjects(temu_Component * Comp)
```

Description

Get number of objects in component

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Number of objects in component.

Parameters

Table 89. `temu_componentGetNumberOfObjects` Parameters

Parameter	Type	Description
Comp	temu_Component *	Component pointer

1.1.93. temu_componentGetNumberOfProcessors

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
size_t temu_componentGetNumberOfProcessors(temu_Component * Comp)
```

Description

Get number of processors in component

Result

Number of processors in component.

Parameters

Table 90. `temu_componentGetNumberOfProcessors` Parameters

Parameter	Type	Description
Comp	temu_Component *	Component pointer

1.1.94. temu_componentGetObject

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_Object * temu_componentGetObject(temu_Component * Comp, const char * Name)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get named object in component

Result

NULL if the object is not a member in the component

Parameters

Table 91. `temu_componentGetObject` Parameters

Parameter	Type	Description
Comp	temu_Component *	Component pointer
Name	const char *	String without the component prefix (i.e. local name)

1.1.95. temu_componentGetObjectByIndex

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_Object * temu_componentGetObjectByIndex(temu_Component * Comp, unsigned int
Index)
```

Description

Get indexed object in component

Result

NULL if the object is not a member in the component

Parameters

Table 92. `temu_componentGetObjectByIndex` Parameters

Parameter	Type	Description
Comp	temu_Component *	Component pointer
Index	unsigned int	Index of object to get

1.1.96. temu_componentGetProcessor

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Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_Object * temu_componentGetProcessor(temu_Component * Comp, unsigned int index)
```

Description

Get processor in component

Result

NULL if index is out of bounds.

Parameters

Table 93. `temu_componentGetProcessor` Parameters

Parameter	Type	Description
Comp	temu_Component *	Component pointer
index	unsigned int	Index of processor in component

1.1.97. temu_componentSetContext

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
void temu_componentSetContext(temu_Component * comp, void * ctxt)
```

Description

set component context

Parameters

Table 94. `temu_componentSetContext` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
comp	temu_Component *	Component pointer
ctxt	void *	Context pointer

1.1.98. temu_configGetBool

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
_Bool temu_configGetBool(const char * path, _Bool defaultValue)
```

Description

Get boolean config entry

Result

The highest-priority configured value from the active configuration sources, or the defaultValue if not found.

Parameters

Table 95. `temu_configGetBool` Parameters

Parameter	Type	Description
path	const char *	'/' separated path in the config file E.g. "custom/foo"
defaultValue	_Bool	The default value returned if path is not found in

1.1.99. temu_configGetDouble

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
double temu_configGetDouble(const char * path, double defaultValue)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get double config entry

Result

The highest-priority configured value from the active configuration sources, or the defaultValue if not found.

Parameters

Table 96. temu_configGetDouble Parameters

Parameter	Type	Description
path	const char *	'/' separated path in the config file E.g. "custom/foo"
defaultValue	double	The default value returned if path is not found in

1.1.100. temu_configGetSigned

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
int64_t temu_configGetSigned(const char * path, uint64_t defaultValue)
```

Description

Get signed config entry

Result

The highest-priority configured value from the active configuration sources, or the defaultValue if not found.

Parameters

Table 97. temu_configGetSigned Parameters

Parameter	Type	Description
path	const char *	'/' separated path in the config file E.g. "custom/foo"

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Parameter	Type	Description
defaultValue	uint64_t	The default value returned if path is not found in

1.1.101. temu_configGetString

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
const char * temu_configGetString(const char * path, const char * defaultValue)
```

Description

Get string config entry

Result

A pointer to a thread local copy of the highest-priority configured value from the active configuration sources, or the defaultValue if not found. The returned string is valid until the next invocation only.

Parameters

Table 98. `temu_configGetString` Parameters

Parameter	Type	Description
path	const char *	'/' separated path in the config file E.g. "custom/foo"
defaultValue	const char *	The default value returned if path is not found in

1.1.102. temu_configGetStringList

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
const char *const * temu_configGetStringList(const char * path, size_t * count)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get string/path list config entry

Result

A pointer to a thread-local array of thread-local string pointers for the highest-priority configured list value from the active configuration sources, or nullptr if not found. The returned array and strings are valid until the next invocation of this function in the same thread.

Parameters

Table 99. `temu_configGetStringList` Parameters

Parameter	Type	Description
path	const char *	'/' separated path in the config file E.g. "custom/foo"
count	size_t *	Output parameter set to the number of returned entries.

1.1.103. temu_configGetUnsigned

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
uint64_t temu_configGetUnsigned(const char * path, uint64_t defaultValue)
```

Description

Get unsigned config entry

Result

The highest-priority configured value from the active configuration sources, or the defaultValue if not found.

Parameters

Table 100. `temu_configGetUnsigned` Parameters

Parameter	Type	Description
path	const char *	'/' separated path in the config file E.g. "custom/foo"

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
defaultValue	uint64_t	The default value returned if path is not found in

1.1.104. temu_configPathListAppend

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
void temu_configPathListAppend(const char * path, const char * value)
```

Description

Append a path to a config path list. Modifications are not persisted into a TEMU config file.

Parameters

Table 101. `temu_configPathListAppend` Parameters

Parameter	Type	Description
path	const char *	The key of the config entry (e.g. "components/paths").
value	const char *	The actual path to append to that list.

1.1.105. temu_configPathListPrepend

Include

```
#include "temu-c/Support/Configuration.h"
```

Signature

```
void temu_configPathListPrepend(const char * path, const char * value)
```

Description

Prepend a path to a config path list. Modifications are not persisted into a TEMU config file.

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 102. `temu_configPathListPrepend` Parameters

Parameter	Type	Description
path	const char *	The key of the config entry (e.g. "components/paths").
value	const char *	The actual path to prepend to that list.

1.1.106. temu_connect

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_connect(temu_Object * A, const char * PropName, temu_Object * B, const char *
IfaceName)
```

Description

Connect an interface property in object A to the interface in object B. If A.PropName is an interface array, B,B:IfaceName will be appended to it. For dynamic arrays, it is pushed to the end, for static arrays, it is placed in the first null slot (unless, the indexing syntax is used in the property name).

Result

0 on success, otherwise non-zero

Parameters

Table 103. `temu_connect` Parameters

Parameter	Type	Description
A	temu_Object *	The object to connect.
PropName	const char *	The name of the property in object A
B	temu_Object *	The object to connect to.
IfaceName	const char *	The name of the interface in object B

1.1.107. temu_cpuDisableTraps

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuDisableTraps(void * Cpu)
```

Description

Disable traps on processor

Parameters

Table 104. `temu_cpuDisableTraps` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer

1.1.108. temu_cpuEnableTraps

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuEnableTraps(void * Cpu)
```

Description

Enable traps on processor

Parameters

Table 105. `temu_cpuEnableTraps` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer

1.1.109. temu_cpuGetFpr32

Include

```
#include "temu-c/Support/Cpu.h"
```

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Signature

```
float temu_cpuGetFpr32(void * Cpu, unsigned int Reg)
```

Description

Get a 32 bit floating point register

Result

Host float with the content of the FPU register

Parameters

Table 106. `temu_cpuGetFpr32` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	FPU register number

1.1.110. temu_cpuGetFpr32Bits

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_cpuGetFpr32Bits(void * Cpu, unsigned int Reg)
```

Description

Get a 32 bit floating point register

Result

Floating point register contents

Parameters

Table 107. `temu_cpuGetFpr32Bits` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	FPU register number

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1.1.111. temu_cpuGetFpr64

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
double temu_cpuGetFpr64(void * Cpu, unsigned int Reg)
```

Description

Get 64 bit floating point register as double

Result

FPU register value

Parameters

Table 108. temu_cpuGetFpr64 Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	FPU register number

1.1.112. temu_cpuGetFpr64Bits

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuGetFpr64Bits(void * Cpu, unsigned int Reg)
```

Description

Get 64 bit floating point register contents

Result

FPU register value

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 109. `temu_cpuGetFpr64Bits` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	FPU register number

1.1.113. temu_cpuGetFreq

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuGetFreq(void * Cpu)
```

Description

Get the clock frequency for the CPU

Result

The configured clock frequency in Hz.

Parameters

Table 110. `temu_cpuGetFreq` Parameters

Parameter	Type	Description
Cpu	void *	The CPU object

1.1.114. temu_cpuGetMemorySpace

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
temu_Object * temu_cpuGetMemorySpace(temu_Object * cpu)
```

Description

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Get memory space for processor



This queries for memory space with string key at the moment. should not be used in performance critical code.

Result

Primary memory space associated with processor

Parameters

Table 111. `temu_cpuGetMemorySpace` Parameters

Parameter	Type	Description
cpu	temu_Object *	CPU pointer

1.1.115. temu_cpuGetPc

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuGetPc(void * Cpu)
```

Description

Get the program counter

The program counter will be returned.

Result

The value of the program counter register

Parameters

Table 112. `temu_cpuGetPc` Parameters

Parameter	Type	Description
Cpu	void *	The CPU object

1.1.116. temu_cpuGetReg

Include

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```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuGetReg(void * Cpu, unsigned int Reg)
```

Description

Gets the register in the processor

Result

Register value

Parameters

Table 113. `temu_cpuGetReg` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	Register number

1.1.117. temu_cpuGetSpr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuGetSpr(void * Cpu, unsigned int RegId)
```

Description

Get the PowerPC SPR register

Result

Value of SPR specified in `RegId`.

Parameters

Table 114. `temu_cpuGetSpr` Parameters

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Parameter	Type	Description
Cpu	void *	Processor pointer
RegId	unsigned int	SPR register number

1.1.118. temu_cpuGetStat

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuGetStat(void * Obj, int Stat)
```

Description

Get processor statistics

Result

Statistics value

Parameters

Table 115. `temu_cpuGetStat` Parameters

Parameter	Type	Description
Obj	void *	Processor pointer
Stat	int	Statistics ID

1.1.119. temu_cpuIsMmuEnabled

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_cpuIsMmuEnabled(void * cpu)
```

Description

Check if MMU is enabled

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Result

1 if the MMU is enabled (if available), otherwise 0

Parameters

Table 116. `temu_cpuIsMmuEnabled` Parameters

Parameter	Type	Description
cpu	void *	CPU pointer

1.1.120. temu_cpuPostEventBreakpointExit

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuPostEventBreakpointExit(void * Cpu, int UseStack)
```

Description

Post a CPU-local event that requests a breakpoint exit after currently executing event handlers have been drained.

This is intended for models that detect an event breakpoint from an MMIO access or from another event handler. The helper does not abort the current handler. Instead, it posts a stack or immediate event on the CPU time source; once event dispatch returns to the CPU core, the core exits with teCER_Break.

Parameters

Table 117. `temu_cpuPostEventBreakpointExit` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer.
UseStack	int	Non-zero posts the event on the stack queue, zero posts on the immediate queue.

1.1.121. temu_cpuPrivilegeLevel

Include

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```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_cpuPrivilegeLevel(void * cpu)
```

Description

Get current privilege level Result is target dependant.

Result

Privilege level

Parameters

Table 118. temu_cpuPrivilegeLevel Parameters

Parameter	Type	Description
cpu	void *	CPU pointer

1.1.122. temu_cpuRaiseTrap

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuRaiseTrap(void * Cpu, int Trap, unsigned int Flags)
```

Description

Raise a trap The function simulates a trap being raised at the current PC.

Parameters

Table 119. temu_cpuRaiseTrap Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Trap	int	Trap ID. This is target dependent, for the SPARC this is the TT value of the trap.

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Parameter	Type	Description
Flags	unsigned int	set flag 1 to enable longjmp trap (this is useful in MMIO handlers to force a trap while a core is running). Set to 0 if called from outside the core or in e.g. an event handler.

1.1.123. temu_cpuReset

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuReset(void * Cpu, int ResetType)
```

Description

Reset the processor.

Resetting the CPU will result in a reset cascade where all connected devices are also reset.

Parameters

Table 120. `temu_cpuReset` Parameters

Parameter	Type	Description
Cpu	void *	The CPU object
ResetType	int	The type of reset, by convention 0 means cold reset, and 1 indicates a warm reset.

1.1.124. temu_cpuResetStat

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

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```
void temu_cpuResetStat(void * Obj, int Stat)
```

Description

Clear processor statistics

Parameters

Table 121. `temu_cpuResetStat` Parameters

Parameter	Type	Description
Obj	void *	Processor pointer
Stat	int	Statistics ID

1.1.125. temu_cpuRun

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuRun(void * Cpu, uint64_t Cycles)
```

Description

Run the processor for a number of cycles

The function runs the processor for a number of cycles. If you wish to run the processor with another time unit, you can compute the cycles from the clock frequency of the emulated processor.

In case the processor halts or enters idle mode and there are no pending events the function will return early.

Result

The number of executed cycles.

Parameters

Table 122. `temu_cpuRun` Parameters

Parameter	Type	Description
Cpu	void *	The CPU object

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Parameter	Type	Description
Cycles	uint64_t	The number of cycles to run the processor for.

1.1.126. temu_cpuSetFpr32

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuSetFpr32(void * Cpu, unsigned int Reg, float Value)
```

Description

Set floating point register value

Parameters

Table 123. temu_cpuSetFpr32 Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	Floating point register number
Value	float	Floating point value to set

1.1.127. temu_cpuSetFpr32Bits

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuSetFpr32Bits(void * Cpu, unsigned int Reg, uint32_t Value)
```

Description

Set 32 bit floating point register value

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 124. temu_cpuSetFpr32Bits Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	Floating point register number
Value	uint32_t	Floating point value to set

1.1.128. temu_cpuSetFpr64

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuSetFpr64(void * Cpu, unsigned int Reg, double Value)
```

Description

Set FPU register value

Parameters

Table 125. temu_cpuSetFpr64 Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	FPU register number
Value	double	Value to set to register

1.1.129. temu_cpuSetFpr64Bits

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuSetFpr64Bits(void * Cpu, unsigned int Reg, uint64_t Value)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Set FPU register value

Parameters

Table 126. `temu_cpuSetFpr64Bits` Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	FPU register number
Value	uint64_t	Value to set to register

1.1.130. temu_cpuSetPc

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuSetPc(void * Cpu, uint64_t Pc)
```

Description

Set the program counter

The program counter will be set to the supplied value.



For targets with delay slots (SPARC, MIPS etc), the function will also set the next PC to PC + sizeof(instruction).

Parameters

Table 127. `temu_cpuSetPc` Parameters

Parameter	Type	Description
Cpu	void *	The CPU object
Pc	uint64_t	The program counter.

1.1.131. temu_cpuSetReg

Include

```
#include "temu-c/Support/Cpu.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_cpuSetReg(void * Cpu, unsigned int Reg, uint64_t Value)
```

Description

Set the register in the processor

Parameters

Table 128. temu_cpuSetReg Parameters

Parameter	Type	Description
Cpu	void *	CPU pointer
Reg	unsigned int	Register number
Value	uint64_t	Value to write to register

1.1.132. temu_cpuSetSpr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_cpuSetSpr(void * Cpu, unsigned int RegId, uint64_t Value)
```

Description

Set the PowerPC SPR register

Parameters

Table 129. temu_cpuSetSpr Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
RegId	unsigned int	SPR register number
Value	uint64_t	New SPR value

1.1.133. temu_cpuStep

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_cpuStep(void * Cpu, uint64_t Steps)
```

Description

Run the processor for a number of steps

This function is different from temu_cpuRun, which runs for a time. The steps here indicates instructions executed (including trapping instructions). This can be contrasted to the run function which may advance the cycle counter by more than one for an instruction (depending on the timing models).

The function may return early in case the processor halts its execution or has entered idle mode and there are no events pending.

Result

The number of steps not executed.

Parameters

Table 130. temu_cpuStep Parameters

Parameter	Type	Description
Cpu	void *	The CPU object
Steps	uint64_t	The number of steps to run the processor for.

1.1.134. temu_cpuTranslateAddress

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_cpuTranslateAddress(void * Cpu, uint64_t Va, uint32_t flags, uint64_t *
physAddressResult)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Uses the MMU to translate the given virtual address Va to the physical address in the emulator

Result

error code. 0 on success, non-zero otherwise,

Parameters

Table 131. `temu_cpuTranslateAddress` Parameters

Parameter	Type	Description
Cpu	void *	the CPU object
Va	uint64_t	the virtual address to be translated
flags	uint32_t	flags for the translation (CPU specific)
physAddressResult	uint64_t *	the result in a uint64_t pointer

1.1.135. temu_cpuTranslateAddressWithRootPointer

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_cpuTranslateAddressWithRootPointer(void * cpu, uint64_t va, uint32_t flags,
uint64_t * physAddressResult, uint64_t pageTableRoot)
```

Description

Uses the an explicit page table pointer to translate a virtual address to physical address.

The routine is dependent on the processor having hardware managed page tables. Hence this works e.g. for SPARC and ARM processors, but not for PowerPC.

Note that the translator does not check for privileges, it only return failures if the page walk does not find valid mappings.

Result

error code. 0 on success, non-zero otherwise,

Parameters

Table 132. `temu_cpuTranslateAddressWithRootPointer` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
cpu	void *	the CPU object
va	uint64_t	the virtual address to be translated
flags	uint32_t	flags for the translation (CPU specific)
physAddressResult	uint64_t *	the result in a uint64_t pointer
pageTableRoot	uint64_t	The page table to use for the translation

1.1.136. temu_cpuTranslateAddressWithTwoLevelPointer

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_cpuTranslateAddressWithTwoLevelPointer(void * cpu, uint64_t va, uint32_t
flags, uint64_t * physAddressResult, uint64_t pageTableRoot, uint64_t hypervisorRoot)
```

Description

ses the an explicit page table pointer to translate a virtual address o physical address.

his is a variant similar to temu_cpuTranslateAddressWithRootPointer, but it ccepts a second hypervisorRoot, to execute two way page table translations.

he routine is dependent on the processor having hardware managed page tables. ence this works e.g. for RISC-V, SPARC and ARM processors, but not for PowerPC.

n processors without two level page tables, this collapses to be identical to emu_cpuTranslateAddressWithRootPointer but with an ignored argument.

ote that the translator does not check for privileges, t only return failures if the page walk does not find valid mappings.

Result

error code. 0 on success, non-zero otherwise,

Parameters

Table 133. `temu_cpuTranslateAddressWithTwoLevelPointer` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
cpu	void *	the CPU object
va	uint64_t	the virtual address to be translated
flags	uint32_t	flags for the translation (CPU specific)
physAddressResult	uint64_t *	the result in a uint64_t pointer
pageTableRoot	uint64_t	The page table to use for the translation
hypervisorRoot	uint64_t	The hypervisor root (i.e. first stage page table)

1.1.137. temu_createClassCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void * temu_createClassCmd(temu_Class * Cls, const char * Name, const char * Doc,
temu_ObjectCommandFunc F)
```

Description

Register a class command

Result

Opaque handle to command. NULL in case of failure.

Parameters

Table 134. `temu_createClassCmd` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer
Name	const char *	Name of command
Doc	const char *	Documentation string for command
F	temu_ObjectCommandFunc	Command handler function

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1.1.138. temu_createCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void * temu_createCmd(const char * Name, temu_CommandFunc F, const char * Doc, void *
Data)
```

Description

Create and register global command

Result

Parameters

Table 135. temu_createCmd Parameters

Parameter	Type	Description
Name	const char *	Name of command
F	temu_CommandFunc	Command function to invoke
Doc	const char *	Documentation string
Data	void *	Data pointer. Some commands e.g. disassemble will increase the address between invocations. This must be saved in some data object which can be provided when the command is created.

1.1.139. temu_createComponentObject

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_Object * temu_createComponentObject(temu_Component * Comp, const char * Class,
const temu_CreateArg * Args, const char * ObjNameFmt, ...)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Create an object in a component.

This function works as the temu_createObject, except that the object created is inserted in the component.

The function is indended to be used in the component constructor.

Object names are uniqued using the objnamefmt paramters and following varargs. Plus, that the name of the component itself is prefixed as '[compname]-'.

Result

Pointer to created object.

Parameters

Table 136. `temu_createComponentObject` Parameters

Parameter	Type	Description
Comp	temu_Component *	The component under which the object is to be created.
Class	const char *	class of the created object
Args	const temu_CreateArg *	NULL terminated array of create arguments for the constructor.
ObjNameFmt	const char *	Name of created object, but it allows for printf style string names, simplifying the creation of multiple objects of the same type.

1.1.140. temu_createGdbServer

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
void * temu_createGdbServer(uint16_t Port)
```

Description

Create a new GDB server

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

Opaque handle to GDB server.

Parameters

Table 137. `temu_createGdbServer` Parameters

Parameter	Type	Description
Port	uint16_t	TCP port to start server on.

1.1.141. temu_createObject

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Object * temu_createObject(const char * ClsName, const char * ObjName, const
temu_CreateArg * Args)
```

Description

Create object with class and name.

Result

Allocated object. Result is NULL in case of: class does not exist, object already allocated with the given name, out of memory.

Parameters

Table 138. `temu_createObject` Parameters

Parameter	Type	Description
ClsName	const char *	Name of class used for instantiation
ObjName	const char *	Name of object in object system
Args	const temu_CreateArg *	Named argument pairs to pass into constructor. The list of args should be terminated by a TEMU_NULL_ARG. In case no arguments are passed, pass in NULL.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.142. temu_createScheduler

Include

```
#include "temu-c/Scheduler/Init.h"
```

Signature

```
temu_TimeSource * temu_createScheduler(temu_SchedVariant variant)
```

Description

Create global scheduler

Shall be called after temu_initScheduler()

Result

Parameters

Table 139. `temu_createScheduler` Parameters

Parameter	Type	Description
variant	temu_SchedVariant	Type of scheduler to create

1.1.143. temu_crossesBoundary32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
_Bool temu_crossesBoundary32(uint32_t A, uint32_t L, uint32_t Size)
```

Description

Checks whether A + L crosses power of 2 boundary (e.g. page)

Result

True if boundary is crossed. False otherwise.

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 140. temu_crossesBoundary32 Parameters

Parameter	Type	Description
A	uint32_t	Address value
L	uint32_t	Length / offset value
Size	uint32_t	boundary size (power of 2 size)

1.1.144. temu_crossesBoundary64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
_Bool temu_crossesBoundary64(uint64_t A, uint64_t L, uint64_t Size)
```

Description

Checks whether A + L crosses power of 2 boundary (e.g. page)

Result

True if boundary is crossed. False otherwise.

Parameters

Table 141. temu_crossesBoundary64 Parameters

Parameter	Type	Description
A	uint64_t	Address value
L	uint64_t	Length / offset value
Size	uint64_t	boundary size (power of 2 size)

1.1.145. temu_ctz16

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

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```
int temu_ctz16(uint16_t Word)
```

Description

Count trailing zeroes, this can be used as a square root on a power of 2 word.

Result

Number of trailing zeros in Word

Parameters

Table 142. temu_ctz16 Parameters

Parameter	Type	Description
Word	uint16_t	the word, in which trailing zeros to be counted

1.1.146. temu_ctz32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_ctz32(uint32_t Word)
```

Description

Count trailing zeroes, this can be used as a square root on a power of 2 word.

Result

Number of trailing zeros in Word

Parameters

Table 143. temu_ctz32 Parameters

Parameter	Type	Description
Word	uint32_t	the word, in which trailing zeros to be counted

1.1.147. temu_ctz64

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_ctz64(uint64_t Word)
```

Description

Count trailing zeroes

Result

The number of trailing zeros in Word

Parameters

Table 144. `temu_ctz64` Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which trailing zeros to be counted

1.1.148. temu_cyclesToNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_cyclesToNanos(int64_t Cycles, int64_t Freq)
```

Description

Convert cycles to nanoseconds

Result

Cycles converted to nanoseconds

Parameters

Table 145. `temu_cyclesToNanos` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Cycles	int64_t	Cycle count to convert
Freq	int64_t	Frequency in Hz

1.1.149. temu_cyclesToOtherFreqRoundedUp

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_cyclesToOtherFreqRoundedUp(int64_t Cycles, int64_t SourceFreq, int64_t
TargetFreq)
```

Description

Convert cycles to another frequency base, rounding upwards

Result

Cycles, converted from source frequency to target frequency

Parameters

Table 146. temu_cyclesToOtherFreqRoundedUp Parameters

Parameter	Type	Description
Cycles	int64_t	Cycle count in source frequency ticks
SourceFreq	int64_t	Frequency in Hz of the source
TargetFreq	int64_t	Frequency in Hz for the converted value

1.1.150. temu_cyclesToOtherFreqTruncated

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_cyclesToOtherFreqTruncated(int64_t Cycles, int64_t SourceFreq, int64_t
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
TargetFreq)
```

Description

Convert cycles to another frequency base, with truncated result

Result

Cycles, converted from source frequency to target frequency

Parameters

Table 147. `temu_cyclesToOtherFreqTruncated` Parameters

Parameter	Type	Description
Cycles	int64_t	Cycle count in source frequency ticks
SourceFreq	int64_t	Frequency in Hz of the source
TargetFreq	int64_t	Frequency in Hz for the converted value

1.1.151. temu_cyclesToSecs

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
double temu_cyclesToSecs(int64_t Cycles, int64_t Freq)
```

Description

Convert cycles to seconds

Result

Cycles converted to seconds

Parameters

Table 148. `temu_cyclesToSecs` Parameters

Parameter	Type	Description
Cycles	int64_t	Cycle count to convert

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Freq	int64_t	Frequency in Hz

1.1.152. temu_cyclesToSteps

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
uint64_t temu_cyclesToSteps(temu_TimeSource * TS, uint64_t Cycles)
```

Description

Convert cycles to steps

Result

Cycles converted to steps given the time source IPC/CPI configuration.

Parameters

Table 149. `temu_cyclesToSteps` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object
Cycles	uint64_t	Cycle count to convert to steps

1.1.153. temu_cyclesToStepsRoundedUp

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
uint64_t temu_cyclesToStepsRoundedUp(temu_TimeSource * TS, uint64_t Cycles)
```

Description

Convert cycles to steps, rounding upwards

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

Cycles converted to steps given the time source IPC/CPI configuration.

Parameters

Table 150. `temu_cyclesToStepsRoundedUp` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object
Cycles	uint64_t	Cycle count to convert to steps

1.1.154. temu_debuggerAttach

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
void temu_debuggerAttach(void * debugger, temu_DebuggerIface * debuggerIface)
```

Description

Attach a debugger to the current scheduler

This attaches a debugger to the scheduler, ensuring it is notified about events such as breakpoints and watchpoints.

1.1.155. temu_debuggerCanAttach

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
int temu_debuggerCanAttach()
```

Description

Whether there is a scheduler this API can drive.

The Multi-Level Debugger is currently unsupported.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

1.1.156. temu_debuggerConnected

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
void temu_debuggerConnected()
```

Description

Notify debugger infrastructure that a remote connection has been made

1.1.157. temu_debuggerCont

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
void temu_debuggerCont()
```

Description

Resume the scheduler from a debugger

Resumes the scheduler after a stop or breakpoint. Note the function returns immediately. The debugger server is expected to listen for events through the debugger interface instead.

1.1.158. temu_debuggerDetach

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
void temu_debuggerDetach(void * debugger)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Detach the debugger from the current scheduler

This attaches a debugger to the scheduler, ensuring it is notified about events such as breakpoints and watchpoints.

1.1.159. temu_debuggerGetCurrentProcessor

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
int temu_debuggerGetCurrentProcessor()
```

Description

Return current processor number

Returns -1 when running, or stopped CPU number after breakpoint hit.

Result

1.1.160. temu_debuggerStep

Include

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
void temu_debuggerStep(temu_TimeSource * cpu, int steps)
```

Description

Step the given processor.

The debugger must be attached, and the function will block until the scheduler is running using temu_run*() functions.

1.1.161. temu_debuggerStop

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Debugger.h"
```

Signature

```
void temu_debuggerStop()
```

Description

Stop the scheduler from a debugger

This function is intended to be used by the GDB server. It stops the scheduler as soon as possible, without returning from the temu_run*() functions.

The function is blocking until the core has been stopped. If the core is currently not running, this function waits until someone calls temu_run*().

1.1.162. temu_deinitTimeSource

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_deinitTimeSource(temu_TimeSource * TS)
```

Description

De-init time source Disposes event queues.

Parameters

Table 151. `temu_deinitTimeSource` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source

1.1.163. temu_deserialiseJSON

Include

```
#include "temu-c/Support/Objsys.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
int temu_deserialiseJSON(const char * FileName)
```

Description

De-serialise the simulation state.

The function clears the whole internal object system, reads the JSON file FileName and creates all the objects.

If a class implements the ObjectIface, the (optional) deserialise procedure will be called.

Result

0 on success, otherwise non-zero

Parameters

Table 152. `temu_deserialiseJSON` Parameters

Parameter	Type	Description
FileName	const char *	The filename that contains the JSON data

1.1.164. temu_deserialiseProp

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_deserialiseProp(void * Ctxt, temu_Object * Obj, const char * Name)
```

Description

temu_deserialiseProp Deserialize a serialized property

Parameters

Table 153. `temu_deserialiseProp` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Ctxt	void *	An opaque context, this is the same context as is passed to the deserialise interface function.
Obj	temu_Object *	Object being deserialised
Name	const char *	The name of the property

1.1.165. temu_dictClear

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_dictClear(temu_Dict * dict)
```

Description

Clear dictionary

Parameters

Table 154. temu_dictClear Parameters

Parameter	Type	Description
dict	temu_Dict *	Dictionary

1.1.166. temu_dictCreate

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Dict * temu_dictCreate()
```

Description

Creates a dictionary object

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

A pointer to the dictionary object

1.1.167. temu_dictDispose

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_dictDispose(temu_Dict * Dict)
```

Description

Delete a dictionary object

Parameters

Table 155. `temu_dictDispose` Parameters

Parameter	Type	Description
Dict	temu_Dict *	Pointer to the dictionary object to be deleted

1.1.168. temu_dictForEach

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_dictForEach(temu_Dict * dict, void * ctxt, void (*)(const char *,
temu_Propval *, void *) f)
```

Description

Iterate over each value in the dictionary

Calls f with each key and property in the dictionary. Ctxt is passed to the function as an arbitrary context pointer.

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 156. `temu_dictForEach` Parameters

Parameter	Type	Description
dict	temu_Dict *	The dictionary that contains the keys
ctxt	void *	Context pointer to pass to callback
f	void (*)(const char *, temu_Propval *, void *)	Function to invoke for every key value pair

1.1.169. temu_dictGetNextKey

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_dictGetNextKey(temu_Dict * Dict, const char * Key)
```

Description

Given a specific key of a dictionary, the next key is provided by this function

Result

The key that comes after Key, or nullptr on failure

Parameters

Table 157. `temu_dictGetNextKey` Parameters

Parameter	Type	Description
Dict	temu_Dict *	The dictionary that contains the keys
Key	const char *	The key, whose next value in the dict to be provided

1.1.170. temu_dictGetValue

Include

```
#include "temu-c/Support/Objsys.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
temu_Propval temu_dictGetValue(temu_Dict * Dict, const char * Name)
```

Description

Retrieve a dictionary value by name

Result

The value

Parameters

Table 158. `temu_dictGetValue` Parameters

Parameter	Type	Description
Dict	temu_Dict *	Pointer to the dictionary object
Name	const char *	The name associated with the value to be retrieved

1.1.171. temu_dictInsertValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_dictInsertValue(temu_Dict * Dict, const char * Name, temu_Propval Val)
```

Description

Inserts a name/value pair to a dictionary

Result

0 on success. Other values indicate failures (e.g. the key is already used)

Parameters

Table 159. `temu_dictInsertValue` Parameters

Parameter	Type	Description
Dict	temu_Dict *	Pointer to the dictionary object

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Name	const char *	The name to be inserted
Val	temu_Propval	The value to be inserted

1.1.172. temu_dictRemoveValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_dictRemoveValue(temu_Dict * Dict, const char * Name)
```

Description

Erase a name/value pair from a dictionary by name

Result

0 on success. Other values indicate errors (e.g. key was unavailable in the dictionary)

Parameters

Table 160. `temu_dictRemoveValue` Parameters

Parameter	Type	Description
Dict	temu_Dict *	Pointer to the dictionary object
Name	const char *	The name of the pair to be removed

1.1.173. temu_dictSize

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
size_t temu_dictSize(temu_Dict * dict)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Get number of key-value pairs in dictionary

Result

Dictionary size

Parameters

Table 161. `temu_dictSize` Parameters

Parameter	Type	Description
dict	temu_Dict *	Dictionary

1.1.174. temu_disassemble

Include

```
#include "temu-c/Support/Assembler.h"
```

Signature

```
char * temu_disassemble(void * Cpu, uint32_t Instr)
```

Description

Disassemble an instruction.

Result

A pointer to a malloced instruction string or null incase of failure.

1.1.175. temu_disassembleAuto

Include

```
#include "temu-c/Support/Assembler.h"
```

Signature

```
const char * temu_disassembleAuto(void * Cpu, uint32_t Instr)
```

Description

Disassemble an instruction.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

A pointer to a a thread local instruction string or null incase of failure.

1.1.176. temu_disassembleMemory

Include

```
#include "temu-c/Support/Assembler.h"
```

Signature

```
char * temu_disassembleMemory(void * Cpu, uint64_t Addr)
```

Description

Disassemble an instruction in memory

The function dissasmbles an instruction and retuns a string allocated on the heap. You are responsible for its release using free().

Result

A pointer to a malloced instruction string or null incase of failure.

Parameters

Table 162. `temu_disassembleMemory` Parameters

Parameter	Type	Description
Cpu	void *	CPU whose memory space will be used for disasembling.
Addr	uint64_t	Physical address of instruction to dissassemble.

1.1.177. temu_disposeGdbServer

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
void temu_disposeGdbServer(void * Gdb)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Dispose a GDB server

Parameters

Table 163. `temu_disposeGdbServer` Parameters

Parameter	Type	Description
Gdb	void *	Pointer returned by `temu_createGdbServer()`

1.1.178. temu_disposeObject

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_disposeObject(temu_Object * Obj)
```

Description

Dispose object. The function will call the Objects dispose function.

Parameters

Table 164. `temu_disposeObject` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object to delete.

1.1.179. temu_disposeSymtab

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
void temu_disposeSymtab(temu_Symtab * Sym)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Dispose (deallocate) the symbol table

Parameters

Table 165. temu_disposeSymtab Parameters

Parameter	Type	Description
Sym	temu_Symtab *	Symbol table pointer to free.

1.1.180. temu_elfHasDwarf

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_elfHasDwarf(const char * file)
```

Description

Return non-zero if file has DWARF data

Result

0 if file does not contain DWARF, 1 if the file contains DWARF.

Parameters

Table 166. temu_elfHasDwarf Parameters

Parameter	Type	Description
file	const char *	Path to file to check for DWARF-info.

1.1.181. temu_ethGetEthTypeSizeField

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Signature

```
uint16_t temu_ethGetEthTypeSizeField(temu_EthFrame * Frame)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get length / EtherType field. By ethernet standard, the size field which is 16 bit, will be a length if it is

1500 and an ethertype tag if it is >= 1536.

Result

1.1.182. temu_ethGetPayload

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Signature

```
const uint8_t * temu_ethGetPayload(temu_EthFrame * Frame)
```

Description

Get a readable pointer to the payload. Note that the first bytes will often be an LLC header, it may not be your actual data payload.

Result

1.1.183. temu_eventDepublish

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventDepublish(int64_t EvID)
```

Description

It is possible to depublish events explicitly, but this is rarely needed as it is managed at termination time automatically.

Parameters

Table 167. `temu_eventDepublish` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
EvID	int64_t	Event ID

1.1.184. temu_eventDeschedule

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventDeschedule(int64_t EvID)
```

Description

Deschedule event

Parameters

Table 168. `temu_eventDeschedule` Parameters

Parameter	Type	Description
EvID	int64_t	The event ID of the event to deschedule.

1.1.185. temu_eventDeserialise

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventDeserialise(temu_TimeSource * TS, void * Ctxt)
```

Description

De-serialize events from the legacy JSON snapshot format

Parameters

Table 169. `temu_eventDeserialise` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
TS	temu_TimeSource *	Time source
Ctxt	void *	Context pointer from the custom snapshot callbacks

1.1.186. temu_eventGetCycles

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventGetCycles(temu_TimeSource * TS, int64_t EvID)
```

Description

Get delta time in cycles for the given event and queue

Result

Number of simulated cycles in the future the event will trigger

Parameters

Table 170. `temu_eventGetCycles` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	the event to get the cycles for.

1.1.187. temu_eventGetNanos

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventGetNanos(temu_TimeSource * TS, int64_t EvID)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get delta time in nanoseconds for the given event and queue

Result

Number of simulated nanoseconds in the future when the event will trigger

Parameters

Table 171. `temu_eventGetNanos` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	the event to get the nanoseconds for.

1.1.188. temu_eventGetNextEventSteps

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventGetNextEventSteps(temu_TimeSource * TS)
```

Description

Get step target for next event

Result

Absolute time to next event in steps

Parameters

Table 172. `temu_eventGetNextEventSteps` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source

1.1.189. temu_eventGetSecs

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Events.h"
```

Signature

```
double temu_eventGetSecs(temu_TimeSource * TS, int64_t EvID)
```

Description

Get delta time in seconds for the given event and queue

Result

Number of simulated seconds in the future when the event will trigger

Parameters

Table 173. `temu_eventGetSecs` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	the event to get the seconds for.

1.1.190. temu_eventIsScheduled

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int temu_eventIsScheduled(int64_t EvID)
```

Description

Check if event is scheduled

Result

Zero (0) in case the event is not scheduled, otherwise non-zero for scheduled events.

Parameters

Table 174. `temu_eventIsScheduled` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
EvID	int64_t	The event ID to check whether it is scheduled.

1.1.191. temu_eventPostAsync

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostAsync(temu_TimeSource * TS, temu_ThreadSafeCb CB, void * Data,
temu_SyncEvent Sync)
```

Description

Post an event to an asynchronous queue

Parameters

Table 175. `temu_eventPostAsync` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	the asynchronous queue or time source object (normally a CPU object)
CB	temu_ThreadSafeCb	The callback function to call when the event happens
Data	void *	The context data to be passed to the callback function
Sync	temu_SyncEvent	Execute on CPU or machine level.

1.1.192. temu_eventPostCycles

Include

```
#include "temu-c/Support/Events.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_eventPostCycles(temu_TimeSource * TS, int64_t EvID, int64_t Delta,
temu_SyncEvent Sync)
```

Description

Post events with a relative time in cycles in the future

Note that if posting a scheduled event, a warning will be printed and the event will be automatically descheduled before being inserted in the event queue.

Parameters

Table 176. `temu_eventPostCycles` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
Delta	int64_t	The number of CPU clock cycles in the future to post the event. This should be > 0.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.193. temu_eventPostCyclesAbsolute

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostCyclesAbsolute(temu_TimeSource * TS, int64_t EvID, int64_t AbsTime,
temu_SyncEvent Sync)
```

Description

Post events with an absolute time in cycles The function is only well defined for times >= current time. Timestamps

current time will have undefined behaviour.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 177. `temu_eventPostCyclesAbsolute` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
AbsTime	int64_t	The absolute time stamp to run the event at, this should be > current time.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.194. temu_eventPostImmediate

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostImmediate(temu_TimeSource * TS, int64_t EvID, temu_SyncEvent Sync)
```

Description

Post events in the immediate event queue

Immediate events are executed either after the current instruction is finished or when the machine quanta expires in case of machine synchronised events. This is the same as for stacked events, however immediate events are executed in FIFO order.

Parameters

Table 178. `temu_eventPostImmediate` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.195. temu_eventPostNanos

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostNanos(temu_TimeSource * TS, int64_t EvID, int64_t Delta,
temu_SyncEvent Sync)
```

Description

Post events with a relative time in nanoseconds in the future

Parameters

Table 179. temu_eventPostNanos Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
Delta	int64_t	The number of nanoseconds in the future to post the event. This should be > 0.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.196. temu_eventPostNanosAbsolute

Include

```
#include "temu-c/Support/Events.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_eventPostNanosAbsolute(temu_TimeSource * TS, int64_t EvID, int64_t AbsTime,
temu_SyncEvent Sync)
```

Description

Post events with an absolute time in nanoseconds The function is only well defined for times >= current time. Timestamps

current time will have undefined behaviour.

Parameters

Table 180. `temu_eventPostNanosAbsolute` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
AbsTime	int64_t	The absolute time stamp to run the event at, this should be > current time.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.197. temu_eventPostSecs

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostSecs(temu_TimeSource * TS, int64_t EvID, double Delta,
temu_SyncEvent Sync)
```

Description

Post events with a relative time in seconds in the future

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 181. temu_eventPostSecs Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
Delta	double	The number of seconds in the future to post the event. This should be > 0.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.198. temu_eventPostStack

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostStack(temu_TimeSource * TS, int64_t EvID, temu_SyncEvent Sync)
```

Description

Post events in the event queue stack

Stacked events are executed either after the current instruction is finished or when the machine quanta expires in case of machine synchronised events.

Parameters

Table 182. temu_eventPostStack Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.199. temu_eventPostSteps

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventPostSteps(temu_TimeSource * TS, int64_t EvID, int64_t Delta,
temu_SyncEvent Sync)
```

Description

Post events with a relative trigger in steps

Posting an event in steps is not effected by the IPC/CPI setting of the clock.

Parameters

Table 183. temu_eventPostSteps Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
Delta	int64_t	The number of CPU steps in the future to post the event. This should be > 0.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.200. temu_eventPublish

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventPublish(const char * EvName, void * Obj, void (*)(temu_Event *)
Func)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Publish an event.

The function will allocate an event structure in the global event heap and return the event ID.

A typical use is to call the function in the object constructor and assign the event id to a field in the object. This field should not be snapshotted (i.e. it will be reassigned in the constructor) when restoring an object anyway.

The event name must be unique per object, but the C-string will be copied so that a temporary one can be passed.



This function is non thread safe. Object construction is expected to be done in a single thread (e.g. the main thread).

Result

The event ID >= 0 in case of success. Negative values indicate errors.

Parameters

Table 184. `temu_eventPublish` Parameters

Parameter	Type	Description
EvName	const char *	Name of the event
Obj	void *	The object associated with the event
Func	void (*)(temu_Event *)	The event callback function.

1.1.201. temu_eventPublishStruct

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventPublishStruct(const char * EvName, temu_Event * Ev, void * Obj, void
(*)(temu_Event *) Func)
```

Description

Publish a preallocated event object.

The event objects can be embedded in your own class if needed.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

The event ID.

Parameters

Table 185. `temu_eventPublishStruct` Parameters

Parameter	Type	Description
EvName	const char *	Name of the event
Ev	temu_Event *	Pointer to the event struct
Obj	void *	The object associated with the event
Func	void (*)(temu_Event *)	The event callback function.

1.1.202. temu_eventQueueGetFreq

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
uint64_t temu_eventQueueGetFreq(temu_TimeSource * TS)
```

Description

Get the frequency in Hz of the given time source.

Result

Parameters

Table 186. `temu_eventQueueGetFreq` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source

1.1.203. temu_eventRemoveAsync

Include

```
#include "temu-c/Support/Events.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_eventRemoveAsync(temu_TimeSource * TS, temu_ThreadSafeCb CB, void * Data,
temu_SyncEvent Sync)
```

Description

Remove a pending event posted with temu_eventPostAsync.

The queue outlives the model, so a model owning Data must call this before freeing it.

Parameters

Table 187. temu_eventRemoveAsync Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Asynchronous queue or time source, normally a CPU object.
CB	temu_ThreadSafeCb	Callback the event was posted with.
Data	void *	Context the event was posted with.
Sync	temu_SyncEvent	Execute on CPU or machine level.

1.1.204. temu_eventRescheduleCycles

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventRescheduleCycles(temu_TimeSource * TS, int64_t EvID, int64_t Delta,
temu_SyncEvent Sync)
```

Description

Reschedule event with relative time in cycles

This function automatically deschedules the event before scheduling it again. The function ensures only one lock is taken for the pattern:

- is scheduled?

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

- de-schedule
- post

Parameters

Table 188. `temu_eventRescheduleCycles` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The time source object (normally a CPU object)
EvID	int64_t	The even ID returned by one of the event publish functions.
Delta	int64_t	The number of CPU clock cycles in the future to post the event. This should be > 0.
Sync	temu_SyncEvent	whether the event should be executed on the CPU queue or the machine queue.

1.1.205. temu_eventSerialise

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventSerialise(temu_TimeSource * TS, void * Ctxt)
```

Description

Serialize events for legacy JSON snapshot format

Parameters

Table 189. `temu_eventSerialise` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source
Ctxt	void *	Context pointer from the custom snapshot callbacks

1.1.206. temu_eventSetPeriodCycles

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Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventSetPeriodCycles(int64_t EvID, int64_t Period)
```

Description

Set the cycles property on an event.

Periodic events have the advantage that they do not slip due to reposting of event with respect to the event triggering time and behaves as if the reposting is 1, automatic and 2, is relative to the event schedule time. which differ from the triggering time by possibly a few cycles. Note, calling this function does not reschedule the event.

Parameters

Table 190. `temu_eventSetPeriodCycles` Parameters

Parameter	Type	Description
EvID	int64_t	Event ID
Period	int64_t	Cycles to add as period.

1.1.207. temu_eventSetRTPeriodNanos

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventSetRTPeriodNanos(int64_t EvID, int64_t Period)
```

Description

Set the RT period (nanoseconds), this should be the same as the cycle period, but it should be in nanoseconds and tno cycles

Parameters

Table 191. `temu_eventSetRTPeriodNanos` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
EvID	int64_t	Event ID
Period	int64_t	Period in nanoseconds

1.1.208. temu_eventSetRTTime

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_eventSetRTTime(int64_t EvID, int64_t Time)
```

Description

Set the RT time (nanoseconds absoulute time computed from temu_timeGetMonotonicWct()). This time is used by events flagged with TEMU_EVENT_RT to delay the execution of the event handler function.

Parameters

Table 192. temu_eventSetRTTime Parameters

Parameter	Type	Description
EvID	int64_t	Event ID
Time	int64_t	Absolute time to trigger event at in WCT

1.1.209. temu_eventSetRealTime

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int temu_eventSetRealTime(int64_t EvID)
```

Description

Mark an event as real-time.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

With a real-time event, it is meant that the event will execute at roughly real-time. In the case when the event is posted, it will compute a rough triggering time in wall clock. When the event is executed it will do two things:

1. Check if the event wall-clock time is before the current time, if so emit a TEMU_NOTIFICATION_REALTIME_SLIP notification.
2. Check if the event is triggered in the future (with respect to wall clock), if so sleep until the wall-clock has caught up.

Due to the behaviour, the real-time events are suitable only for relatively short event times, as long sleep times may make the emulator non responsive. Especially at present, this will block the execution of async events as the event queue is halted until the wall-clock catches up to the simulated time.

Note that RT event support is primarily used to slow down the emulator artificially, this is accomplished by enabling real-time mode on the relevant model.

This function should only be called on in-flight events.

Result

0 On success.

Parameters

Table 193. `temu_eventSetRealTime` Parameters

Parameter	Type	Description
EvID	int64_t	Event ID to make real-time

1.1.210. temu_eventTrigger

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventTrigger(temu_TimeSource * TS, int64_t Time)
```

Description

Trigger events for timesource and time

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Absolute time to next event in steps

Parameters

Table 194. `temu_eventTrigger` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source
Time	int64_t	Time in time source steps

1.1.211. temu_eventTriggerFirst

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
int64_t temu_eventTriggerFirst(temu_TimeSource * TS)
```

Description

Trigger first event for timesource

Result

Absolute time to next event in steps

Parameters

Table 195. `temu_eventTriggerFirst` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source

1.1.212. temu_execCommand

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_execCommand(const char * Cmd)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Executes a single command

Result

0 on success, otherwise a non-zero value

Parameters

Table 196. `temu_execCommand` Parameters

Parameter	Type	Description
Cmd	const char *	The command to be executed

1.1.213. temu_execCommandFile

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_execCommandFile(const char * File)
```

Description

Executes the commands in the file "File"

Result

0 on success, otherwise a non-zero value

Parameters

Table 197. `temu_execCommandFile` Parameters

Parameter	Type	Description
File	const char *	Path to the file with the commands to be executed

1.1.214. temu_floatingPointPropval

Include

```
#include "temu-c/Support/Objsys.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
temu_Propval temu_floatingPointPropval(temu_Type T, double V)
```

Description

Create a floating point propval of the given type

Result

Property value with the given type and value.

Parameters

Table 198. `temu_floatingPointPropval` Parameters

Parameter	Type	Description
T	temu_Type	Type ID, must be a teTY_Float or teTY_Double
V	double	Value

1.1.215. temu_fluxSetSnapshotLimit

Include

```
#include "temu-c/Flux/Flux.h"
```

Signature

```
void temu_fluxSetSnapshotLimit(temu_FluxContext * ctx, uint32_t maxSnapshots, uint64_t
maxBytes)
```

Description

Configure snapshot window limits.

Parameters

Table 199. `temu_fluxSetSnapshotLimit` Parameters

Parameter	Type	Description
ctx	temu_FluxContext *	Flux context
maxSnapshots	uint32_t	Maximum number of snapshots, 0 = infinite

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Parameter	Type	Description
maxBytes	uint64_t	Maximum number of bytes, 0 = infinite

1.1.216. temu_foreachClass

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachClass(void (*)(temu_Class *, void *) Func, void * Arg)
```

Description

Call function on every class in the object system The function is called with the metaclass pointer and the argument. NOTE: This function is experimental.

Parameters

Table 200. `temu_foreachClass` Parameters

Parameter	Type	Description
Func	void (*)(temu_Class *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.217. temu_foreachClassCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void temu_foreachClassCmd(temu_Class * Cls, temu_CmdNameFunc F, void * Arg)
```

Description

Call F for every command of class Cls (see temu_createClassCmd()).

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1.1.218. temu_foreachClassCmdOption

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_foreachClassCmdOption(temu_Class * Cls, const char * CmdName,
temu_CmdOptionFunc F, void * Arg)
```

Description

Call F for every argument of class command CmdName of class Cls.

Result

Non-zero if the class has that command.

1.1.219. temu_foreachCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void temu_foreachCmd(temu_CmdNameFunc F, void * Arg)
```

Description

Call F for every registered global command, in name order, without aliases.

1.1.220. temu_foreachCmdAlias

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void temu_foreachCmdAlias(temu_CmdAliasFunc F, void * Arg)
```

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Description

Call F for every alias of a global command, in alias order.

1.1.221. temu_foreachCmdOption

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_foreachCmdOption(const char * Name, temu_CmdOptionFunc F, void * Arg)
```

Description

Call F for every option of global command Name.

Result

Non-zero if the command exists.

1.1.222. temu_foreachComponent

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
void temu_foreachComponent(void (*)(temu_Component *, void *) Func, void * Arg)
```

Description

Iterate over all components and call a function on them

Parameters

Table 201. `temu_foreachComponent` Parameters

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Parameter	Type	Description
Func	void (*)(temu_Component *, void *)	The function to be called on each component, with the signature **Func)(temu_Component**,void*)
Arg	void *	The second argument to be passed to the function, for passing context

1.1.223. temu_foreachInterface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachInterface(temu_Class * C, void (*)(temu_Class *, const char *, void *) Func, void * Arg)
```

Description

Call function on every interface in a class. The function is called with the class pointer, interface name and the argument. NOTE: This function is experimental.

Parameters

Table 202. `temu_foreachInterface` Parameters

Parameter	Type	Description
C	temu_Class *	Class to iterate properties
Func	void (*)(temu_Class *, const char *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.224. temu_foreachMemorySpace

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
void temu_foreachMemorySpace(void (*)(temu_Object *, void *) Func, void * Arg)
```

Description

Call function on every memoryspace in the object system The function is called with the memory space pointer and the argument.

Parameters

Table 203. `temu_foreachMemorySpace` Parameters

Parameter	Type	Description
Func	void (*)(temu_Object *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.225. temu_foreachObject

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachObject(void (*)(temu_Object *, void *) Func, void * Arg)
```

Description

Call function on every object in the object system The function is called with the object pointer and the argument.

Parameters

Table 204. `temu_foreachObject` Parameters

Parameter	Type	Description
Func	void (*)(temu_Object *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.226. temu_foreachObjectOfType

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Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachObjectOfType(const char * ClassName, void (*)(temu_Object *, void *)
Func, void * Arg)
```

Description

Call function on every object belonging to the named class. The list is maintained incrementally at object create/dispose, not rebuilt per call.

Parameters

Table 205. `temu_foreachObjectOfType` Parameters

Parameter	Type	Description
ClassName	const char *	Class name to match
Func	void (*)(temu_Object *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.227. temu_foreachObjectWithIface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachObjectWithIface(const char * IfaceName, void (*)(temu_Object *, void
*) Func, void * Arg)
```

Description

Call function on every object whose class exposes the interface named IfaceName. The list is maintained incrementally at object create/dispose.

Parameters

Table 206. `temu_foreachObjectWithIface` Parameters

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Parameter	Type	Description
IfaceName	const char *	Interface name to match
Func	void (*)(temu_Object *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.228. temu_foreachObjectWithIfaceType

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachObjectWithIfaceType(const char * IfaceTypeName, void (*)(temu_Object
*, void *) Func, void * Arg)
```

Description

Call function on every object whose class has an interface of the given interface TYPE name. The list is maintained incrementally at object create/dispose.

Parameters

Table 207. `temu_foreachObjectWithIfaceType` Parameters

Parameter	Type	Description
IfaceTypeName	const char *	Interface type name to match
Func	void (*)(temu_Object *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.229. temu_foreachProcessor

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachProcessor(void (*)(temu_Object *, void *) Func, void * Arg)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Call function on every processor in the object system The function is called with the CPU pointer and the argument.

Parameters

Table 208. `temu_foreachProcessor` Parameters

Parameter	Type	Description
Func	void (*)(temu_Object *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.230. temu_foreachProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_foreachProperty(temu_Class * C, void (*)(temu_Class *, const char *, void *)
Func, void * Arg)
```

Description

Call function on every property in a class. The function is called with the class pointer, property name and the argument. NOTE: This function is experimental.

Parameters

Table 209. `temu_foreachProperty` Parameters

Parameter	Type	Description
C	temu_Class *	Class to iterate properties
Func	void (*)(temu_Class *, const char *, void *)	Function to call
Arg	void *	Argument passed as the last parameter to Func

1.1.231. temu_foreachRootComponent

Include

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```
#include "temu-c/Support/Component.h"
```

Signature

```
void temu_foreachRootComponent(void (*)(temu_Component *, void *) Func, void * Arg)
```

Description

Iterate over all root components and call a function on them

Parameters

Table 210. `temu_foreachRootComponent` Parameters

Parameter	Type	Description
Func	void (*)(temu_Component *, void *)	The function to be called on each component, with the signature **Func)(temu_Component**,void*)
Arg	void *	The second argument to be passed to the function, for passing context

1.1.232. temu_gdbAddCpu

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
void temu_gdbAddCpu(void * Gdb, const char * CpuName)
```

Description

Add named CPU to GDB server

Parameters

Table 211. `temu_gdbAddCpu` Parameters

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Parameter	Type	Description
Gdb	void *	Pointer returned by `temu_createGdbServer()`
CpuName	const char *	Name of processor object.

1.1.233. temu_gdbAsyncStop

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
void temu_gdbAsyncStop(void * Gdb)
```

Description

Tell GDB server to stop at next safe point in time.

Parameters

Table 212. `temu_gdbAsyncStop` Parameters

Parameter	Type	Description
Gdb	void *	Pointer returned by `temu_createGdbServer()`

1.1.234. temu_gdbRun

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
int temu_gdbRun(void * Gdb)
```

Description

Run the GDB server loop

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 213. temu_gdbRun Parameters

Parameter	Type	Description
Gdb	void *	Pointer returned by temu_createGdbServer()

1.1.235. temu_gdbWaitForConnection

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
void temu_gdbWaitForConnection(void * Gdb)
```

Description

Wait current thread for a user to connect

Parameters

Table 214. temu_gdbWaitForConnection Parameters

Parameter	Type	Description
Gdb	void *	Pointer returned by temu_createGdbServer()

1.1.236. temu_generateObjectGraph

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_generateObjectGraph(const char * Path, int Display)
```

Description

Print the current object graph as a dot file

Pass NULL (or nullptr) to generate to stdout. And set Display to non-zero to automatically display

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the generated dot-file.

Result

0 if the generation was successful. Non-zero in case of failure.

Parameters

Table 215. `temu_generateObjectGraph` Parameters

Parameter	Type	Description
Path	const char *	Destination file to write the graph to. NULL indicates stdout.
Display	int	If non-zero, the function will attempt to display the graph by running it through dot and .

1.1.237. temu_getComponentCount

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
size_t temu_getComponentCount()
```

Description

temu_getComponentCount Get the number of components in the current simulation

Result

The number of components in the current simulation

1.1.238. temu_getComponents

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Component ** temu_getComponents()
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

temu_getComponents Get the number of components in the current simulation

Result

An array of the pointers to the components in the current simulation, the length of the array can be obtained from temu_getComponentCount()

1.1.239. temu_getConfDir

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
const char * temu_getConfDir()
```

Description

The user's TEMU config directory (~/.config/temu), or "" without a home.

Result

1.1.240. temu_getCycles

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_getCycles(temu_TimeSource * TS)
```

Description

Get current time in cycles.

Result

Current cycles as it is understood by the object.

Parameters

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Table 216. `temu_getCycles` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

1.1.241. temu_getEpochNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_getEpochNanos(temu_TimeSource * TS)
```

Description

Get the simulated UNIX epoch offset in nanoseconds.

The value is deterministic scheduler state: by default, simulated time zero maps to 1970-01-01T00:00:00Z. It is not initialized from host wall-clock time.

Result

UNIX epoch nanoseconds corresponding to simulated time zero.

Parameters

Table 217. `temu_getEpochNanos` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

1.1.242. temu_getExecutionState

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
temu_ExecutionState temu_getExecutionState()
```

Description

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Get the current execution status of TEMU

Result

Current execution status

1.1.243. temu_getInterfaceName

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_getInterfaceName(temu_Object * Obj, void * Iface)
```

Description

temu_getInterfaceName Get Interface Name of the Obj

Result

The name of the interface

Parameters

Table 218. `temu_getInterfaceName` Parameters

Parameter	Type	Description
Obj	temu_Object *	Pointer to the object containing the interface
Iface	void *	Interface to be find w.r.t. Object

1.1.244. temu_getInterfaceRef

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_IfaceRef temu_getInterfaceRef(temu_Object * Obj, const char * IfaceName, int Idx)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Retrieve a reference to an interface identified by its name and index

Result

The interface reference as a temu_IfaceRef object

Parameters

Table 219. `temu_getInterfaceRef` Parameters

Parameter	Type	Description
Obj	temu_Object *	Pointer to the object containing the interface
IfaceName	const char *	Name of the interface
Idx	int	Interface index

1.1.245. temu_getLoggingCategory

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_getLoggingCategory(temu_Class * Cls, unsigned int CategoryId)
```

Description

temu_getLogginCategory adds a logging category to the class

Result

Pointer to the category string, NULL for failure.

Parameters

Table 220. `temu_getLoggingCategory` Parameters

Parameter	Type	Description
Cls	temu_Class *	the class
CategoryId	unsigned int	The category id. Valid range is [8,16)

1.1.246. temu_getMajorVersion

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Include

```
#include "temu-c/Support/Version.h"
```

Signature

```
unsigned int temu_getMajorVersion()
```

Description

Get TEMU major version as number.

Result

Major version number

1.1.247. temu_getMinorVersion

Include

```
#include "temu-c/Support/Version.h"
```

Signature

```
unsigned int temu_getMinorVersion()
```

Description

Get TEMU minor version as number.

Result

Minor version number

1.1.248. temu_getNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_getNanos(temu_TimeSource * TS)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get current time in nanoseconds

Result

Current nanoseconds as it is understood by the object.

Parameters

Table 221. `temu_getNanos` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

1.1.249. temu_getPatchVersion

Include

```
#include "temu-c/Support/Version.h"
```

Signature

```
unsigned int temu_getPatchVersion()
```

Description

Get TEMU patch version as number.

Result

Patch version number

1.1.250. temu_getPositionalCommandLineArg

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
const char * temu_getPositionalCommandLineArg(size_t Idx)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Positional (non-option) command line argument Idx, or NULL past the last.

Result

1.1.251. temu_getProcessorCount

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
size_t temu_getProcessorCount()
```

Description

temu_getProcessorCount Get the number of processors in the current simulation

Result

The number of processors in the current simulation

1.1.252. temu_getProcessors

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Object ** temu_getProcessors()
```

Description

temu_getProcessors Get the list of processors in the current simulation

Result

An array of processor pointers, the length can be obtained from temu_getProcessorCount()

1.1.253. temu_getPropAccessor

Include

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```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_PropAccessor temu_getPropAccessor(temu_Object * Obj, const char * PropName, int
PropIdx)
```

Description

Get a reference to the named property

This is useful as a replacement of temu_getPropref and temu_getPropName. The resulting data structure lets you automatically disambiguate between properties and pseudo properties.

The index used will be PropIdx, or K if the PropName string has an array suffix `[K]`.

Result

A struct containing prop accessor data.

Parameters

Table 222. `temu_getPropAccessor` Parameters

Parameter	Type	Description
Obj	temu_Object *	An object of a class with the relevant property registered.
PropName	const char *	The name of the property to be queried.
PropIdx	int	Index in property array.

1.1.254. temu_getPropDynLength

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_getPropDynLength(const temu_Object * Obj, const char * PropName)
```

Description

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Get the dynamic length of the property

Normally, the `temu_getPropLength()` would return 1 for a dynamic array. This means that there is one dynamic array. In case the length of the dynamic array is needed, this function can be used.

Result

Dynamic length of property

Parameters

Table 223. `temu_getPropDynLength` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object of the property
PropName	const char *	Name of the property

1.1.255. temu_getPropLength

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_getPropLength(const temu_Object * Obj, const char * PropName)
```

Description

Returns property length/size if a property is an array

Result

The length of the property

Parameters

Table 224. `temu_getPropLength` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object of the property
PropName	const char *	Name of the property

1.1.256. temu_getPropName

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Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_PropName temu_getPropName(const temu_Object * Obj, const char * PropName)
```

Description

Get a reference to a named property.

Result

Prop name object, note that the returned name string is not the same as the passed string. The returned string has a lifetime bound to the class, hence it can be returned without any problems.

Parameters

Table 225. `temu_getPropName` Parameters

Parameter	Type	Description
Obj	const temu_Object *	An object of a class with the relevant property registered.
PropName	const char *	The name of the property to be queried.

1.1.257. temu_getPropType

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Type temu_getPropType(const temu_Object * Obj, const char * PropName)
```

Description

Get the type of a property

Result

Property type

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Parameters

Table 226. `temu_getPropType` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object of the property
PropName	const char *	Name of the property

1.1.258. temu_getPropref

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propref temu_getPropref(const temu_Object * Obj, const char * PropName)
```

Description

Get a reference to the named property. The propref is a typetag and a pointer to the raw value, as such it does not work with delegated properties in components, nor with pseudo properties.

Result

Object of the property reference

Parameters

Table 227. `temu_getPropref` Parameters

Parameter	Type	Description
Obj	const temu_Object *	An object of a class with the relevant property registered.
PropName	const char *	The name of the property to be queried.

1.1.259. temu_getRootTimeSource

Include

```
#include "temu-c/Support/Time.h"
```

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Signature

```
temu_TimeSource * temu_getRootTimeSource(temu_TimeSource * TS)
```

Description

Get the root time source for a scheduler hierarchy.

Result

Highest parent time source, or TS if there is no parent.

Parameters

Table 228. temu_getRootTimeSource Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

1.1.260. temu_getScheduledProcessor

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
temu_TimeSource * temu_getScheduledProcessor(unsigned int cpu)
```

Description

Get processor in global scheduler

Result

Processor pointer as a time source.

Parameters

Table 229. temu_getScheduledProcessor Parameters

Parameter	Type	Description
cpu	unsigned int	Processor number to get

1.1.261. temu_getScheduledProcessorCount

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Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
unsigned int temu_getScheduledProcessorCount()
```

Description

Get the number of processors in the global scheduler.

Result

Number of processors in global scheduler.

1.1.262. temu_getSecs

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
double temu_getSecs(temu_TimeSource * TS)
```

Description

Get current time in seconds

Result

Current seconds as it is understood by the object.

Parameters

Table 230. `temu_getSecs` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

1.1.263. temu_getSteps

Include

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```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_getSteps(temu_TimeSource * TS)
```

Description

Get current step count

Result

Current steps as it is understood by the object.

Parameters

Table 231. `temu_getSteps` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

1.1.264. temu_getUnixNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_getUnixNanos(temu_TimeSource * TS)
```

Description

Get current deterministic simulated UNIX time in nanoseconds.

Result

UNIX epoch nanoseconds for the current simulated scheduler time.

Parameters

Table 232. `temu_getUnixNanos` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object

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1.1.265. temu_getVTable

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void * temu_getVTable(const temu_Object * Obj)
```

Description

Get the VTable pointer for an object. This only works for internal objects that inherits from temu_Object.

Result

Pointer to the vtable in question

Parameters

Table 233. `temu_getVTable` Parameters

Parameter	Type	Description
Obj	const temu_Object *	The object in question

1.1.266. temu_getVTableForClass

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void * temu_getVTableForClass(temu_Class * Cls)
```

Description

Get the VTable pointer for a class

Result

Pointer to the vtable in question

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 234. `temu_getVTableForClass` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class, for which the vtable is to be retrieved

1.1.267. temu_getValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_getValue(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object

Result

The value of the property

Parameters

Table 235. `temu_getValue` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.268. temu_getValueDouble

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
double temu_getValueDouble(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get property (without side effects)

Result

The property value converted to double

Parameters

Table 236. `temu_getValueDouble` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Idx	int	Index in property array (set to 0 if scalar)

1.1.269. temu_getValueI16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int16_t temu_getValueI16(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an int16

Result

The value of the property

Parameters

Table 237. `temu_getValueI16` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.270. temu_getValueI32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int32_t temu_getValueI32(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an int32

Result

The value of the property

Parameters

Table 238. `temu_getValueI32` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.271. temu_getValueI64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int64_t temu_getValueI64(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an int64

Result

The value of the property

Parameters

Table 239. `temu_getValueI64` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.272. temu_getValueI8

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int8_t temu_getValueI8(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an int8

Result

The value of the property

Parameters

Table 240. `temu_getValueI8` Parameters

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Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.273. temu_getValueSigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int64_t temu_getValueSigned(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get property (without side effects)

Result

The property value converted to signed

Parameters

Table 241. `temu_getValueSigned` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Idx	int	Index in property array (set to 0 if scalar)

1.1.274. temu_getValueU16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
uint16_t temu_getValueU16(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an uint16

Result

The value of the property

Parameters

Table 242. `temu_getValueU16` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.275. temu_getValueU32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint32_t temu_getValueU32(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an uint32

Result

The value of the property

Parameters

Table 243. `temu_getValueU32` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.276. temu_getValueU64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint64_t temu_getValueU64(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an uint64

Result

The value of the property

Parameters

Table 244. `temu_getValueU64` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.277. temu_getValueU8

Include

```
#include "temu-c/Support/Objsys.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
uint8_t temu_getValueU8(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get the value of a property from an object if it is an uint8

Result

The value of the property

Parameters

Table 245. `temu_getValueU8` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	Property name
Idx	int	Index of the property. Set to 0 if the property is not an array

1.1.278. temu_getValueUnsigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint64_t temu_getValueUnsigned(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Get property (without side effects)

Result

The property value converted to unsigned

Parameters

Table 246. `temu_getValueUnsigned` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Idx	int	Index in property array (set to 0 if scalar)

1.1.279. temu_getVersionString

Include

```
#include "temu-c/Support/Version.h"
```

Signature

```
const char * temu_getVersionString()
```

Description

Get TEMU version string.

Result

Version string in format like: MAJOR . MINOR . PATCH (REVISION)

1.1.280. temu_gfxBytesPerPixel

Include

```
#include "temu-c/Graphics/PixelFormat.h"
```

Signature

```
uint32_t temu_gfxBytesPerPixel(temu_PixelFormat Fmt)
```

Description

Bytes occupied by a single pixel in the given format.

Result

1.1.281. temu_gfxConvert

Include

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```
#include "temu-c/Graphics/PixelFormat.h"
```

Signature

```
void temu_gfxConvert(void * Dst, uint32_t DstStride, temu_PixelFormat DstFmt, const
void * Src, uint32_t SrcStride, temu_PixelFormat SrcFmt, uint32_t Width, uint32_t
Height, const uint32_t * Palette)
```

Description

Convert a p x p region from p (p to p (p via the ARGB8888 pivot. Strides are in bytes. p is used only for an L8 source and may be NULL otherwise.

1.1.282. temu_gfxDecodePixel

Include

```
#include "temu-c/Graphics/PixelFormat.h"
```

Signature

```
uint32_t temu_gfxDecodePixel(temu_PixelFormat SrcFmt, const void * Src, const uint32_t
* Palette)
```

Description

Decode one source pixel at p to canonical ARGB8888 (0xAARRGGBB).

p is a 256-entry ARGB8888 CLUT, used only for L8; may be NULL (L8 then decodes as grayscale).

Result

1.1.283. temu_gfxEncodePixel

Include

```
#include "temu-c/Graphics/PixelFormat.h"
```

Signature

```
void temu_gfxEncodePixel(temu_PixelFormat DstFmt, void * Dst, uint32_t Argb)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Encode canonical ARGB8888 p into one destination pixel at p Luminance formats derive L from a standard luma weighting; encoding to a CLUT index is approximate.

1.1.284. temu_hasCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_hasCmd(const char * Name)
```

Description

Check whether a global command of this name is registered.

Result

Non-zero if the command exists.

Parameters

Table 247. temu_hasCmd Parameters

Parameter	Type	Description
Name	const char *	Command name

1.1.285. temu_identifyTrailingZeroes32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_identifyTrailingZeroes32(uint32_t Word)
```

Description

Get word with all trailing zeroes set

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

A copy of word, with trailing zeros set

Parameters

Table 248. temu_identifyTrailingZeroes32 Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which trailing zeros to be set

1.1.286. temu_identifyTrailingZeroes64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_identifyTrailingZeroes64(uint64_t Word)
```

Description

Get word with all trailing zeroes set

Result

A copy of word, with trailing zeros set

Parameters

Table 249. temu_identifyTrailingZeroes64 Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which trailing zeros to be set

1.1.287. temu_identifyTrailingZeroesAndFirst32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
uint32_t temu_identifyTrailingZeroesAndFirst32(uint32_t Word)
```

Description

Get word with all trailing zeroes set, and the fist bit set

Result

Word, with all trailing zeroes set, and the fist bit set

Parameters

Table 250. `temu_identifyTrailingZeroesAndFirst32` Parameters

Parameter	Type	Description
Word	uint32_t	Word to get trailing zero mask from

1.1.288. temu_identifyTrailingZeroesAndFirst64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_identifyTrailingZeroesAndFirst64(uint64_t Word)
```

Description

Get word with all trailing zeroes set, and the fist bit set

Result

Word, with all trailing zeroes set, and the fist bit set

Parameters

Table 251. `temu_identifyTrailingZeroesAndFirst64` Parameters

Parameter	Type	Description
Word	uint64_t	Word to get trailing zero mask from

1.1.289. temu_ifaceRefArrayAlloc

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Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_IfaceRefArray temu_ifaceRefArrayAlloc(unsigned int Reserve)
```

Description

Allocate interface array.

Result

The allocated interface array.

Parameters

Table 252. `temu_ifaceRefArrayAlloc` Parameters

Parameter	Type	Description
Reserve	unsigned int	Number of entries to reserve initially.

1.1.290. temu_ifaceRefArrayGet

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_IfaceRef temu_ifaceRefArrayGet(temu_IfaceRefArray * Arr, unsigned int idx)
```

Description

Get the index of the interface reference array.

Result

The interface array with in bounds.

Parameters

Table 253. `temu_ifaceRefArrayGet` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Arr	temu_IfaceRefArray *	The interface reference array
idx	unsigned int	is the index of the array

1.1.291. temu_ifaceRefArrayPush

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_ifaceRefArrayPush(temu_IfaceRefArray * Arr, temu_IfaceRef Iface)
```

Description

Push an interface reference to the interface array.

Parameters

Table 254. `temu_ifaceRefArrayPush` Parameters

Parameter	Type	Description
Arr	temu_IfaceRefArray *	The interface reference array
Iface	temu_IfaceRef	The interface reference (object-interface pointer pair)

1.1.292. temu_ifaceRefArrayPush2

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_ifaceRefArrayPush2(temu_IfaceRefArray * Arr, temu_Object * Obj, void *
Iface)
```

Description

Push an object and raw interface pointer to an interface array.

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Parameters

Table 255. `temu_ifaceRefArrayPush2` Parameters

Parameter	Type	Description
Arr	temu_IfaceRefArray *	The interface reference array.
Obj	temu_Object *	The object implementing the relevant interface
Iface	void *	Pointer to the interface struct.

1.1.293. temu_ifaceRefArraySize

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
unsigned int temu_ifaceRefArraySize(temu_IfaceRefArray * Arr)
```

Description

Get the length of a dynamically allocated interface array.

Result

The length in number of entries.

Parameters

Table 256. `temu_ifaceRefArraySize` Parameters

Parameter	Type	Description
Arr	temu_IfaceRefArray *	The interface array to get the size from.

1.1.294. temu_imageIsELF

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int temu_imageIsELF(const char * file)
```

Description

Return non-zero if file is an ELF file

Result

0 if file is not an ELF file, 1 if the file is an ELF file.

Parameters

Table 257. `temu_imageIsELF` Parameters

Parameter	Type	Description
file	const char *	Path to file to check for ELFiness.

1.1.295. temu_indexForInterface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_indexForInterface(const temu_Object * Obj, const void * Iface)
```

Description

Get index for interface

Result

Index of interface if it is in an iface array. Otherwise it returns -1. Consequently the function only have valid result for interface arrays.

Parameters

Table 258. `temu_indexForInterface` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object that contains the interface
Iface	const void *	Pointer to the interface

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1.1.296. temu_initConfigDirs

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
void temu_initConfigDirs()
```

Description

Create the temu config directories (typically ~/.config/temu/)

This function is invoked by the init function normally, but it is useful in some cases to create the config dirs without calling init.

1.1.297. temu_initGdbServerLib

Include

```
#include "temu-c/GdbServer/GdbServer.h"
```

Signature

```
void temu_initGdbServerLib()
```

Description

Initialise the GDB Server Library

1.1.298. temu_initLicense

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
int temu_initLicense()
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Init only license system.

Initialise the license manager only. This can be used to check for whether the license is valid before proceeding with rest of the system initialisation. The function does not terminate the application on invalid license, but returns a non-zero value.

Result

0 if the license is valid, other values indicate errors.

1.1.299. temu_initPathSupport

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
void temu_initPathSupport(const char * Argv0)
```

Description

Initialise path finding support

This function initialises auxillary path support needed by TEMU for locating supporting tools (e.g. stuff in libexec) and automatically appending of scripting search paths.

In the future, this will likely be merged into initSupportLib for a unified init function, but this will break API compatibility, so this change is deferred to TEMU 3.

Call the Function passing Argv0 of whatever you would do to invoke the temu command line tool. E.g. if temu is in your path and this is the installation you wish to use, the parameter should be "temu". However, if you wish to use a custom installation, pass the full path to the temu program. The base path can contain ~ for the current home dir and ~foo for the home dir of user foo.

Note that it is not an error to omit this initialisation, but omitting it will imply that temu cannot launch UI models such as the ConsoleUI model.

Parameters

Table 259. `temu_initPathSupport` Parameters

Parameter	Type	Description
Argv0	const char *	Name of TEMU executable (typically passed as argv[0] to main)

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1.1.300. temu_initPathSupportAuto

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
void temu_initPathSupportAuto()
```

Description

Initialise path finding support from the loaded support library.

This is suitable for library embedding and unit tests where the TEMU executable is not involved. `temu_initSupportLib()` invokes this function automatically.

1.1.301. temu_initProfilerLib

Include

```
#include "temu-c/Profiler/Init.h"
```

Signature

```
void temu_initProfilerLib()
```

Description

Init profiler library. Shall be called after temu_initSupport() NOTE: The profiler lib init is defined in libTEMUProfiler, not the support lib.

1.1.302. temu_initScheduler

Include

```
#include "temu-c/Scheduler/Init.h"
```

Signature

```
void temu_initScheduler()
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Init scheduler library.

Shall be called after temu_initSupport()

1.1.303. temu_initSupportLib

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
void temu_initSupportLib()
```

Description

Initialisation of TEMU support library.

Call this function before any other use of TEMU. The function does not return failures, but halts on failed initialisation.

The function should be called as early as possible in the application's execution. Preferably in the main function (though there is no strict requirement for this).

The initialisation function is at present not thread safe, call it in the main thread only!

Note that after calling `temu_initSupportLib()`, it is necessary to call: `temu_initScheduler()` in the Scheduler library and `temu_initProfilerLib()` in the profiler library

1.1.304. temu_initTimeSource

Include

```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_initTimeSource(temu_TimeSource * TS, uint64_t freq, temu_SyncEvent level)
```

Description

Initialize time source Creates event queues and set frequency and sync level.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 260. `temu_initTimeSource` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source
freq	uint64_t	Frequency in Hz
level	temu_SyncEvent	Sync level of time source

1.1.305. temu_inlineDeserialiseJSON

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_inlineDeserialiseJSON(const char * FileName)
```

Description

De-serialise the simulation state.

This function directly restores properties on already created objects. It does not clear the objects system. Thus pointers to objects remains stable after a snapshot restore.

If a class implements the ObjectIface, the (optional) deserialise procedure will be called.

Result

0 on success, otherwise non-zero

Parameters

Table 261. `temu_inlineDeserialiseJSON` Parameters

Parameter	Type	Description
FileName	const char *	The filename that contains the JSON data

1.1.306. temu_invokeCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

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Signature

```
int temu_invokeCmd(const char * Name, int Argc, const temu_CmdArg * Argv)
```

Description

Invoke a global command with typed arguments.

This is the typed counterpart to temu_execCommand(), which has to be handed a command line as text and therefore leaves the caller to format and quote every value. Bindings and other programmatic callers should use this.

An argument with a Name is passed as that option; one with a null or empty Name is passed positionally, in order. The interpreter is supplied internally, so unlike temu_objectInvokeCmd() there is nothing to pass.

Result

Command result. 0 means success, and -1 that no such command is registered or the arguments do not match its options.

Parameters

Table 262. `temu_invokeCmd` Parameters

Parameter	Type	Description
Name	const char *	Command name
Argc	int	Number of arguments
Argv	const temu_CmdArg *	Argument vector

1.1.307. temu_isComponent

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isComponent(const temu_Object * Obj)
```

Description

temu_isComponent Checks if an object is a component

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

0 for false, non-zero for true

Parameters

Table 263. `temu_isComponent` Parameters

Parameter	Type	Description
Obj	const temu_Object *	The object to test

1.1.308. temu_isCpu

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isCpu(const temu_Object * Obj)
```

Description

Predicate for identifying CPU classes. In release without assert builds this runs in O(1) time.

Result

0 for false, non-zero for true

Parameters

Table 264. `temu_isCpu` Parameters

Parameter	Type	Description
Obj	const temu_Object *	The object to test

1.1.309. temu_isDiscrete

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isDiscrete(temu_Propval Pv)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Checks whether the numeric property is an integer-like

Result

0 for false, non-zero for true

Parameters

Table 265. `temu_isDiscrete` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be checked

1.1.310. temu_isMachine

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isMachine(const temu_Object * Obj)
```

Description

Predicate for identifying CPU classes. In release without assert builds this runs in O(1) time..

Result

0 for false, non-zero for true

Parameters

Table 266. `temu_isMachine` Parameters

Parameter	Type	Description
Obj	const temu_Object *	The object to test

1.1.311. temu_isMemory

Include

```
#include "temu-c/Support/Objsys.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
int temu_isMemory(const temu_Object * Obj)
```

Description

temu_isMemory Checks whether an object is a memory object

Result

0 for false, non-zero for true

Parameters

Table 267. `temu_isMemory` Parameters

Parameter	Type	Description
Obj	const temu_Object *	The object to test

1.1.312. temu_isNormalProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isNormalProperty(temu_Object * Obj, const char * PropName)
```

Description

temu_isNormalProperty Checks whether a property is a normal property (not a pseudo-property)

Result

0 for false, non-zero for true

Parameters

Table 268. `temu_isNormalProperty` Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	The property name

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1.1.313. temu_isNumber

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isNumber(temu_Propval Pv)
```

Description

Checks whether a property is a number

Result

0 for false, non-zero for true

Parameters

Table 269. `temu_isNumber` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be checked

1.1.314. temu_isPow2_32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_isPow2_32(uint32_t Word)
```

Description

Predicate for checking if word is a power of 2 See Hacker's Delight, 1st edition, p11

Result

0 for false, otherwise true

Parameters

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Table 270. temu_isPow2_32 Parameters

Parameter	Type	Description
Word	uint32_t	The word to be checked

1.1.315. temu_isPow2_64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_isPow2_64(uint64_t Word)
```

Description

Predicate for checking if word is a power of 2

Result

0 for false, otherwise true

Parameters

Table 271. temu_isPow2_64 Parameters

Parameter	Type	Description
Word	uint64_t	The word to be checked

1.1.316. temu_isPseudoProperty

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isPseudoProperty(temu_Object * Obj, const char * PropName)
```

Description

temu_isPseudoProperty Checks whether a property is a pseudo-property

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

0 for false, non-zero for true

Parameters

Table 272. temu_isPseudoProperty Parameters

Parameter	Type	Description
Obj	temu_Object *	The object that contains the property
PropName	const char *	The property name

1.1.317. temu_isQualifiedAs

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isQualifiedAs(const temu_Object * Obj, unsigned int Qualifier)
```

Description

temu_isQualifiedAs Check if an object is qualified as Qualifier

Result

0 for false, non-zero for true

Parameters

Table 273. temu_isQualifiedAs Parameters

Parameter	Type	Description
Obj	const temu_Object *	The object to be checked
Qualifier	unsigned int	The qualification to be checked

1.1.318. temu_isReal

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
int temu_isReal(temu_Propval Pv)
```

Description

Checks whether a property is a real number

Result

0 for false, non-zero for true

Parameters

Table 274. `temu_isReal` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be checked

1.1.319. temu_isString

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_isString(temu_Propval Pv)
```

Description

Checks whether a property is a string

Result

0 for false, non-zero for true

Parameters

Table 275. `temu_isString` Parameters

Parameter	Type	Description
Pv	temu_Propval	The property to be checked

1.1.320. temu_isolateLeftmostBit32

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Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_isolateLeftmostBit32(uint32_t Word)
```

Description

Isolate left most bit

Result

A copy of word, in which the right most set bit will be cleared

Parameters

Table 276. `temu_isolateLeftmostBit32` Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which the right most set bit will be cleared

1.1.321. temu_isolateLeftmostBit64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_isolateLeftmostBit64(uint64_t Word)
```

Description

Isolate left most bit

Result

A copy of word, in which the right most set bit will be cleared

Parameters

Table 277. `temu_isolateLeftmostBit64` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Word	uint64_t	The word, in which the right most set bit will be cleared

1.1.322. temu_isolateRightMostZeroBit32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_isolateRightMostZeroBit32(uint32_t Word)
```

Description

Isolate right most bit with value zero (it will be 1 in the result)

Result

A copy of Word, in which the right most bit with value zero will be isolated

Parameters

Table 278. `temu_isolateRightMostZeroBit32` Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which the right most bit with value zero will be isolated

1.1.323. temu_isolateRightMostZeroBit64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_isolateRightMostZeroBit64(uint64_t Word)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Isolate right most bit with value zero (it will be 1 in the result)

Result

A copy of Word, in which the right most bit with value zero will be isolated

Parameters

Table 279. `temu_isolateRightMostZeroBit64` Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which the right most bit with value zero will be isolated

1.1.324. temu_lineDataGetLine

Include

```
#include "temu-c/Support/DataLoggers.h"
```

Signature

```
const char * temu_lineDataGetLine(void * Obj, uint64_t Line)
```

Description

Get line with number.

Result

A string that is borrowed.

Parameters

Table 280. `temu_lineDataGetLine` Parameters

Parameter	Type	Description
Obj	void *	Data-logging object
Line	uint64_t	Line number to read out

1.1.325. temu_lineDataGetLineCount

Include

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```
#include "temu-c/Support/DataLoggers.h"
```

Signature

```
uint64_t temu_lineDataGetLineCount(void * Obj)
```

Description

Get number of lines in log.

Result

Number of logged lines

Parameters

Table 281. `temu_lineDataGetLineCount` Parameters

Parameter	Type	Description
Obj	void *	Data-logging object

1.1.326. temu_listAppend

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_listAppend(temu_List * List, temu_Propval Val)
```

Description

Add an element to the end of a linked-list

Parameters

Table 282. `temu_listAppend` Parameters

Parameter	Type	Description
List	temu_List *	The list, to which the element to be added
Val	temu_Propval	The element to be added

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1.1.327. temu_listCreate

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_List temu_listCreate(temu_Type Typ)
```

Description

Create a linked-list object

Result

A newly created list.

Parameters

Table 283. `temu_listCreate` Parameters

Parameter	Type	Description
Typ	temu_Type	The type to be stored in the elements of the linked list

1.1.328. temu_listDispose

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_listDispose(temu_List * List)
```

Description

Delete a linked-list object

Parameters

Table 284. `temu_listDispose` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
List	temu_List *	The list to be deleted

1.1.329. temu_listGetHead

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_ListNode * temu_listGetHead(temu_List * List)
```

Description

Get the first element of a linked-list

Result

Pointer to the first element of the linked-list

Parameters

Table 285. `temu_listGetHead` Parameters

Parameter	Type	Description
List	temu_List *	The list, whose first element is requested

1.1.330. temu_listGetNext

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_ListNode * temu_listGetNext(temu_ListNode * Node)
```

Description

Get the next element of a linked list

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

The next element if available, otherwise nullptr

Parameters

Table 286. `temu_listGetNext` Parameters

Parameter	Type	Description
Node	temu_ListNode *	The node, whose next element is requested

1.1.331. temu_listGetPrev

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_ListNode * temu_listGetPrev(temu_ListNode * Node)
```

Description

Get the previous element of a linked list

Result

The previous element if available, otherwise nullptr

Parameters

Table 287. `temu_listGetPrev` Parameters

Parameter	Type	Description
Node	temu_ListNode *	The node, whose next element is requested

1.1.332. temu_listGetTail

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
temu_ListNode * temu_listGetTail(temu_List * List)
```

Description

Get the last element of a linked-list

Result

Pointer to the last element of the linked-list

Parameters

Table 288. `temu_listGetTail` Parameters

Parameter	Type	Description
List	temu_List *	The list, whose last element is requested

1.1.333. temu_listNodeGetVal

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_listNodeGetVal(temu_ListNode * Node)
```

Description

Get value of a linked-list node

Result

The value extracted from the node

Parameters

Table 289. `temu_listNodeGetVal` Parameters

Parameter	Type	Description
Node	temu_ListNode *	The node, from which the value to be extracted

1.1.334. temu_listPrepend

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Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_listPrepend(temu_List * List, temu_Propval Val)
```

Description

Add an element to the beginning of a linked-list

Parameters

Table 290. `temu_listPrepend` Parameters

Parameter	Type	Description
List	temu_List *	The list, to which the element to be added
Val	temu_Propval	The element to be added

1.1.335. temu_listRemoveHead

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_listRemoveHead(temu_List * List)
```

Description

Removes the first element of a linked-list

Result

The element that was removed from the list

Parameters

Table 291. `temu_listRemoveHead` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
List	temu_List *	The list, from which the first element to be removed

1.1.336. temu_listRemoveTail

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_listRemoveTail(temu_List * List)
```

Description

Removes the last element of a linked-list

Result

The element that was removed from the list

Parameters

Table 292. `temu_listRemoveTail` Parameters

Parameter	Type	Description
List	temu_List *	The list, from which the last element to be removed

1.1.337. temu_loadBinaryImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadBinaryImage(void * mem, const char * file, uint64_t pa)
```

Description

Loads a raw binary image to the memory object at the given address.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

The function will assume that the file is a raw binary. This way you can load an ELF file as is to memory (e.g. where it is expected by the boot loader).

Result

0 on success, other values indicates errors.

Parameters

Table 293. `temu_loadBinaryImage` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
file	const char *	Path to file to load.
pa	uint64_t	Physical address where to load the image.

1.1.338. temu_loadElfImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadElfImage(void * mem, const char * file, uint64_t pa)
```

Description

Loads an ELF file without going through filetype detection

Result

0 on success, other values indicates errors

Parameters

Table 294. `temu_loadElfImage` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
file	const char *	Path to file to load.
pa	uint64_t	Unused argument

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.339. temu_loadElfImageAndStartAddr

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadElfImageAndStartAddr(void * Mem, const char * FileName, uint64_t *
StartAddr)
```

Description

Loads an ELF file without going through filetype detection

Result

0 on success, 1 for successful load but without valid StartAddr, negative values indicate error.

Parameters

Table 295. `temu_loadElfImageAndStartAddr` Parameters

Parameter	Type	Description
Mem	void *	Memory object, must conform to the memory access interface.
FileName	const char *	Path to file to load.
StartAddr	uint64_t *	Pointer where to place the start address of the elf file

1.1.340. temu_loadElfImagePhys

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadElfImagePhys(void * Mem, const char * FileName, uint64_t * StartAddr)
```

Description

Loads an ELF file without going through filetype detection. Unlike the normal ELF image loader, this uses the physical addresses in the ELF program headers to load the file.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

0 on success, 1 for successful load but without valid StartAddr, negative values indicate error.

Parameters

Table 296. `temu_loadElfImagePhys` Parameters

Parameter	Type	Description
Mem	void *	Memory object, must conform to the memory access interface.
FileName	const char *	Path to file to load.
StartAddr	uint64_t *	Pointer where to place the start address of the elf file

1.1.341. temu_loadImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadImage(void * mem, const char * file)
```

Description

Loads a binary image to the memory object.

The function will autodetect the file type (based on extensions and magic headers in the file).

Binary images will be placed at address 0.

The image can be one of the supported file formats.

Result

0 on success, other values indicates errors.

Parameters

Table 297. `temu_loadImage` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
file	const char *	Path to file to load.

1.1.342. temu_loadImageAndStartAddr

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadImageAndStartAddr(void * Mem, const char * FileName, uint64_t *
StartAddr)
```

Description

Loads a binary image to the memory object.

The function will autodetect the file type (based on extensions and magic headers in the file).

Binary images will be placed at address 0.

The image can be one of the supported file formats.

This specific variant, will return the start address of the binary, the StartAddr is typically embedded in the ELF or SREC files. The function therefore allows you to set the program counter to the correct start address after the function has been called.

Result

0 on success, 1 for successful load but without valid StartAddr, negative values indicate error.

Parameters

Table 298. `temu_loadImageAndStartAddr` Parameters

Parameter	Type	Description
Mem	void *	Memory object, must conform to the mem interface.
FileName	const char *	Path to file to load.
StartAddr	uint64_t *	Pointer to location to store the start address.

1.1.343. temu_loadImagePhys

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadImagePhys(void * Mem, const char * FileName, uint64_t * StartAddr)
```

Description

Loads a binary image to the memory object.

The function will autodetect the file type (based on extensions and magic headers in the file).

Binary images will be placed at address 0.

The image can be one of the supported file formats.

This specific variant, will for file formats that have physical load addresses as well as virtual prefer the physical addresses. This is the case for e.g. ELF files. Other files are loaded with whatever address they define.

Result

0 on success, 1 for successful load but without valid StartAddr, negative values indicate error.

Parameters

Table 299. `temu_loadImagePhys` Parameters

Parameter	Type	Description
Mem	void *	Memory object, must conform to the memory access interface.
FileName	const char *	Path to file to load.
StartAddr	uint64_t *	Pointer to location to store the start address.

1.1.344. temu_loadIntelHexImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int temu_loadIntelHexImage(void * mem, const char * fileName, uint64_t * startAddr)
```

Description

Loads an Intel HEX file without going through filetype detection.

Result

0 on success, 1 for successful load but without valid StartAddr, negative values indicate error.

Parameters

Table 300. `temu_loadIntelHexImage` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
fileName	const char *	Path to file to load.
startAddr	uint64_t *	Start address, will be set if result is 0

1.1.345. temu_loadPlugin

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_loadPlugin(const char * PluginName)
```

Description

Load a plugin. When a plugin is loaded the temu_pluginInit function will be called. This function should create and define any classes that the plugin provides.

The function loads plugins following the operating system's loading rules. This means in particular that first, the plugin will be found in the RPATH location of libTEMUSupport (which refers to the TEMU lib directory). Secondly, it will look in the LD_LIBRARY_PATH and other standard load directories.

In practice, it will look for lib Plugin .so in the TEMU plugin paths, or libTEMU Plugin .so in the same paths. It will then fallback on attempting to load libTEMU Plugin .so from the system load paths. If the plugin name contains a slash '/' it will be treated as a path and not a plugin name.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

0 on success, non-zero otherwise.

Parameters

Table 301. `temu_loadPlugin` Parameters

Parameter	Type	Description
PluginName	const char *	A path or plugin name

1.1.346. temu_loadPluginGlobal

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_loadPluginGlobal(const char * PluginName)
```

Description

Load a plugin. When a plugin is loaded the temu_pluginInit function will be called. This function should create and define any classes that the plugin provides.

The plugin will be made available globally for the linker (e.g. using RTLD_GLOBAL).

This is not recommended for normal TEMU plugins.

The function loads plugins following the operating system's loading rules. This means in particular that first, the plugin will be found in the RPATH location of libTEMUSupport (which refers to the TEMU lib directory). Secondly, it will look in the LD_LIBRARY_PATH and other standard load directories.

In practice, it will look for lib Plugin .so in the TEMU plugin paths, or libTEMU Plugin .so in the same paths. It will then fallback on attempting to load libTEMU Plugin .so from the system load paths. If the plugin name contains a slash '/' it will be treated as a path and not a plugin name.

Result

0 on success, non-zero otherwise.

Parameters

Table 302. `temu_loadPluginGlobal` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
PluginName	const char *	A path or plugin name

1.1.347. temu_loadProject

Include

```
#include "temu-c/Support/Project.h"
```

Signature

```
int temu_loadProject(const char * path, const char * target)
```

Description

Load a TEMU project file and execute its configured startup scripts.

The function applies project configuration values with project priority, resolves project-relative paths against the project file directory, and then runs configured startup scripts.

Result

0 on success, non-zero on error.

Parameters

Table 303. `temu_loadProject` Parameters

Parameter	Type	Description
path	const char *	Path to the project file.
target	const char *	Optional target name within the project. May be NULL or empty.

1.1.348. temu_loadSrecImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadSrecImage(void * mem, const char * file, uint64_t pa)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Loads an SREC file without going through filetype detection.

Result

0 on success, other values indicates errors

Parameters

Table 304. `temu_loadSrecImage` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
file	const char *	Path to file to load.
pa	uint64_t	Unused argument

1.1.349. temu_loadSrecImageAndStartAddr

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadSrecImageAndStartAddr(void * mem, const char * fileName, uint32_t *
startAddr)
```

Description

Loads an SREC file without going through filetype detection.

Result

0 on success, 1 for successful load but without valid StartAddr, negative values indicate error.

Parameters

Table 305. `temu_loadSrecImageAndStartAddr` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
fileName	const char *	Path to file to load.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
startAddr	uint32_t *	Start address, will be set if result is 0

1.1.350. temu_loadSymtab

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_loadSymtab(const char * FileName, temu_Symtab ** Sym)
```

Description

Loads the symbol table from a given ELF file.

The symbol table is allocated and the pointer of the allocated symbol table is placed in Sym. The user is responsible for disposing the symbol table with temu_disposeSymtab().

Result

0 on success, other values indicates errors.

Parameters

Table 306. `temu_loadSymtab` Parameters

Parameter	Type	Description
FileName	const char *	Name of ELF file
Sym	temu_Symtab **	Address of your symtab pointer.

1.1.351. temu_logClearSinks

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logClearSinks()
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Remove all logging sinks.

1.1.352. temu_logConfigError

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logConfigError(const void * Obj, const char * Msg, ...)
```

Description

Log configuration error

Parameters

Table 307. `temu_logConfigError` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.353. temu_logConfigFatal

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logConfigFatal(const void * Obj, const char * Msg, ...)
```

Description

Log configuration fatal error

Parameters

Table 308. `temu_logConfigFatal` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.354. temu_logConfigInfo

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logConfigInfo(const void * Obj, const char * Msg, ...)
```

Description

Log configuration info

Parameters

Table 309. `temu_logConfigInfo` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.355. temu_logConfigWarning

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logConfigWarning(const void * Obj, const char * Msg, ...)
```

Description

Log configuration warning

Parameters

Table 310. `temu_logConfigWarning` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.356. temu_logDebugFunc

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logDebugFunc(const void * Obj, const char * Msg, ...)
```

Description

Log a message with debug severity

Parameters

Table 311. `temu_logDebugFunc` Parameters

Parameter	Type	Description
Obj	const void *	is the source of the log message
Msg	const char *	The message to log

1.1.357. temu_logError

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logError(const void * Obj, const char * Msg, ...)
```

Description

Log a message with error severity

Parameters

Table 312. `temu_logError` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	const void *	is the source of the log message
Msg	const char *	The message to log

1.1.358. temu_logFatal

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logFatal(const void * Obj, const char * Msg, ...)
```

Description

Log a message with fatal severity; The program will terminate after calling this

Parameters

Table 313. `temu_logFatal` Parameters

Parameter	Type	Description
Obj	const void *	is the source of the log message
Msg	const char *	The message to log

1.1.359. temu_logInfo

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logInfo(const void * Obj, const char * Msg, ...)
```

Description

Log a message with info severity

Parameters

Table 314. `temu_logInfo` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	const void *	is the source of the log message
Msg	const char *	The message to log

1.1.360. temu_logOnceToCategoryVA

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logOnceToCategoryVA(const void * Obj, unsigned int Category, unsigned int
MessageID, temu_LogLevel Severity, const char * Msg, struct __va_list_tag * Args)
```

Description

Log a message at most once per object and message id.

`MessageID` maps to one bit in the source object's `LogMessageFlags`. Valid ids are 0-63. After the first successful emission, the corresponding bit is set and later calls with the same id are suppressed.

1.1.361. temu_logRemoveSink

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logRemoveSink(temu_LogSinkHandle Handle)
```

Description

Remove a previously added logging sink.

Parameters

Table 315. `temu_logRemoveSink` Parameters

Parameter	Type	Description
Handle	temu_LogSinkHandle	Sink handle returned by one of the temu_logAdd* functions.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.362. temu_logSetAdvancedFunc

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetAdvancedFunc(void (*)(void *, temu_Object *, unsigned int,
temu_LogLevel, const char *) LogFunc, void * UserData)
```

Description

Set advanced logging function.

It is possible to provide a custom function for handling logging messages from TEMU. This can be used by a simulator that provides a centralized logging facility to also handle TEMU logging messages. By default, the messages will be printed to stderr using fputs.

The advanced logging function does not get messages with a terminating linefeed. In addition, the function receives the object, category and log level as its own parameters.

The message does not contain object name / time stamps. The integrator would be expected to extract the time stamp from the objects time source if set.

LogFunc will take the following parameters:

User data

Void pointer passed to UserData parameter (may be NULL).

Object pointer

Pointer to object issuing the log message (may be NULL).

Category

Category id of log message.

Log level

Severity of logging message.

Message

The log message, as a '

' terminated string.

Parameters

Table 316. `temu_logSetAdvancedFunc` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
LogFunc	void (*)(void *, temu_Object *, unsigned int, temu_LogLevel, const char *)	Logging function to use. NULL to restore the default.
UserData	void *	User data to pass to the logging functions first parameter.

1.1.363. temu_logSetColour

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetColour(int Enable)
```

Description

Enable colours on logging

Parameters

Table 317. `temu_logSetColour` Parameters

Parameter	Type	Description
Enable	int	0 to disable colours, 1 to enable

1.1.364. temu_logSetDefaultFile

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetDefaultFile(FILE * FP)
```

Description

Set the logging file for the default logging function. Pass NULL to restore default (stderr).

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 318. temu_logSetDefaultFile Parameters

Parameter	Type	Description
FP	FILE *	Logging file pointer, NULL to restore default.

1.1.365. temu_logSetFunc

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetFunc(void (*)(const char *) LogFunc)
```

Description

Set logging function.

It is possible to provide a custom function for handling logging messages from TEMU. This can be used by a simulator that provides a centralized logging facility to also handle TEMU logging messages. By default, the messages will be printed to stderr using fputs. Note that messages will be terminated by "\n\0", so if your logging system adds a linefeed, the message may need to be transformed.

Parameters

Table 319. temu_logSetFunc Parameters

Parameter	Type	Description
LogFunc	void (*)(const char *)	Logging function to use. NULL to restore the default.

1.1.366. temu_logSetLevel

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetLevel(temu_LogLevel LogLevel)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Set logging level. Messages will be logged if they are of the set level or higher priority.

Parameters

Table 320. `temu_logSetLevel` Parameters

Parameter	Type	Description
LogLevel	temu_LogLevel	The logging level.

1.1.367. temu_logSetReplayLevel

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetReplayLevel(temu_LogLevel LogLevel)
```

Description

Set replay logging level globally for all categories.

This is the replay-time counterpart to `temu_logSetLevel()`. It is primarily useful for messages logged without an object pointer, where only the global replay filter applies.

Parameters

Table 321. `temu_logSetReplayLevel` Parameters

Parameter	Type	Description
LogLevel	temu_LogLevel	The replay logging level.

1.1.368. temu_logSetReplaySeverity

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetReplaySeverity(void * Obj, unsigned int Category, temu_LogLevel
Severity)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Set severity for specific category during replay.

Parameters

Table 322. `temu_logSetReplaySeverity` Parameters

Parameter	Type	Description
Obj	void *	Object for which to modify replay logging severity
Category	unsigned int	Category to change severity for
Severity	temu_LogLevel	The log level for which messages shall be emitted during replay.

1.1.369. temu_logSetSeverity

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSetSeverity(void * Obj, unsigned int Category, temu_LogLevel Severity)
```

Description

Set severity for specific category.

Parameters

Table 323. `temu_logSetSeverity` Parameters

Parameter	Type	Description
Obj	void *	Object for which to modify logging severity
Category	unsigned int	Category to change severity for (e.g. teLC_DefaultCat)
Severity	temu_LogLevel	The log level for which messages shall be emitted.

1.1.370. temu_logSimError

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSimError(const void * Obj, const char * Msg, ...)
```

Description

Log simulation error

Parameters

Table 324. `temu_logSimError` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.371. temu_logSimFatal

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSimFatal(const void * Obj, const char * Msg, ...)
```

Description

Log fatal issue Fatal messages result in termination of the program after the message.

Parameters

Table 325. `temu_logSimFatal` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.372. temu_logSimInfo

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSimInfo(const void * Obj, const char * Msg, ...)
```

Description

Log simulation info

Parameters

Table 326. `temu_logSimInfo` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.373. temu_logSimWarning

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logSimWarning(const void * Obj, const char * Msg, ...)
```

Description

Log simulation warning

Parameters

Table 327. `temu_logSimWarning` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.374. temu_logTargetError

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logTargetError(const void * Obj, const char * Msg, ...)
```

Description

Log target error

Parameters

Table 328. `temu_logTargetError` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.375. temu_logTargetFatal

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logTargetFatal(const void * Obj, const char * Msg, ...)
```

Description

Log target fatal error This should typically never happen, but it may be convenient in some cases.

Parameters

Table 329. `temu_logTargetFatal` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.376. temu_logTargetInfo

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logTargetInfo(const void * Obj, const char * Msg, ...)
```

Description

Log target info

Parameters

Table 330. `temu_logTargetInfo` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.377. temu_logTargetWarning

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logTargetWarning(const void * Obj, const char * Msg, ...)
```

Description

Log target warning

Parameters

Table 331. `temu_logTargetWarning` Parameters

Parameter	Type	Description
Obj	const void *	Object
Msg	const char *	Printf formatted message string

1.1.378. temu_logToCategory

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logToCategory(const void * Obj, unsigned int Category, temu_LogLevel
Severity, const char * Msg, ...)
```

Description

Log message in the numbered category

Parameters

Table 332. `temu_logToCategory` Parameters

Parameter	Type	Description
Obj	const void *	Object that is the source of the log message
Category	unsigned int	Category of message (e.g. `teLC_DefaultCat`)
Severity	temu_LogLevel	The log level for which the message shall be emitted.
Msg	const char *	Printf formatted message string.

1.1.379. temu_logToCategoryMessageVA

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logToCategoryMessageVA(const void * Obj, unsigned int Category,
temu_LogLevel Severity, uint64_t MessageFlag, const char * Msg, struct __va_list_tag *
Args)
```

Description

Log message in the numbered category with an optional per-object message suppression flag.

If `MessageFlag` is non-zero and the same bit is set in the source object's `LogMessageFlags`, the message is suppressed.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.380. temu_logTrace

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logTrace(const void * Obj, const char * Msg, ...)
```

Description

Log a message with trace severity

Parameters

Table 333. `temu_logTrace` Parameters

Parameter	Type	Description
Obj	const void *	is the source of the log message
Msg	const char *	The message to log

1.1.381. temu_logWarning

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_logWarning(const void * Obj, const char * Msg, ...)
```

Description

Log a message with warning severity

Parameters

Table 334. `temu_logWarning` Parameters

Parameter	Type	Description
Obj	const void *	is the source of the log message
Msg	const char *	The message to log

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.382. temu_makePropU128Parts

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_makePropU128Parts(uint64_t Lo, uint64_t Hi)
```

Description

Convenience for the common case of a 128-bit value built from its halves.

Result

1.1.383. temu_mapMemorySpace

Include

```
#include "temu-c/Memory/Memory.h"
```

Signature

```
int temu_mapMemorySpace(void * Obj, uint64_t Addr, uint64_t Len, temu_Object * MemObj)
```

Description

Map memory object into address space

Result

Zero on success, other values indicates that the mapping failed

Parameters

Table 335. temu_mapMemorySpace Parameters

Parameter	Type	Description
Obj	void *	The memory space object
Addr	uint64_t	Physical address where to map the device
Len	uint64_t	Length in bytes of area where the object is mapped.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
MemObj	temu_Object *	The memory object. This object must correspond to the MemAccessIface

1.1.384. temu_mapMemorySpaceFlags

Include

```
#include "temu-c/Memory/Memory.h"
```

Signature

```
int temu_mapMemorySpaceFlags(void * Obj, uint64_t Addr, uint64_t Len, temu_Object *
MemObj, uint32_t Flags)
```

Description

Map memory object into address space with flags

Result

Zero on success, other values indicates that the mapping failed

Parameters

Table 336. temu_mapMemorySpaceFlags Parameters

Parameter	Type	Description
Obj	void *	The memory space object
Addr	uint64_t	Physical address where to map the device
Len	uint64_t	Length in bytes of area where the object is mapped.
MemObj	temu_Object *	The memory object. This object must correspond to the MemAccessIface
Flags	uint32_t	Sticky flags for memory accesses to that object (e.g. cachable)

1.1.385. temu_memoryClearAttr

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
void temu_memoryClearAttr(void * Obj, uint64_t Addr, uint64_t Len, temu_MemoryAttr
Attr)
```

Description

Clears an attribute on the given memory range

Parameters

Table 337. `temu_memoryClearAttr` Parameters

Parameter	Type	Description
Obj	void *	Memory space object
Addr	uint64_t	Physical address of start
Len	uint64_t	Length of memory range
Attr	temu_MemoryAttr	Attribute to clear

1.1.386. temu_memoryGetAttrs

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
temu_MemoryAttrs temu_memoryGetAttrs(void * Obj, uint64_t Addr)
```

Description

Get memory attributes for address

Result

Memory attributes for the address

Parameters

Table 338. `temu_memoryGetAttrs` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical addres

1.1.387. temu_memoryInstallTrampoline

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryInstallTrampoline(void * Obj, uint64_t Addr, void (*)(void *) Tramp)
```

Description

Install trampoline function in PDC cache

Result

0 on success

Parameters

Table 339. `temu_memoryInstallTrampoline` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Tramp	void (*)(void *)	Trampoline function, takes CPU pointer as first argument.

1.1.388. temu_memoryMap

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryMap(void * Obj, uint64_t Addr, uint64_t Len, void * MemObj, uint32_t
Flags)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

temu_memoryMap Maps an object into a memory space. The object must have an interface named MemAccessIface, of the type defined as TEMU_MEM_ACCESS_IFACE_TYPE

Result

Zero on success

Parameters

Table 340. `temu_memoryMap` Parameters

Parameter	Type	Description
Obj	void *	is the memory space object
Addr	uint64_t	the physical address
Len	uint64_t	the length in bytes
MemObj	void *	is the object that is mapped into the memory space it needs to be of a class that follows the rules above
Flags	uint32_t	are flags that are copied into the memory transaction object's flag field when a transaction reaches an object

1.1.389. temu_memoryMapNamedIface

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryMapNamedIface(void * Obj, uint64_t Addr, uint64_t Len, void * MemObj,
const char * IfaceName, uint32_t Flags)
```

Description

temu_memoryMapNamedIface Maps an object into a memory space using the named memory access interface. The interface named by IfaceName must be of the type TEMU_MEM_ACCESS_IFACE_TYPE

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Zero on success

Parameters

Table 341. `temu_memoryMapNamedIface` Parameters

Parameter	Type	Description
Obj	void *	is the memory space object
Addr	uint64_t	the physical address
Len	uint64_t	the length in bytes
MemObj	void *	is the object that is mapped into the memory space it needs to be of a class that follows the rules above
IfaceName	const char *	Name of the memory access interface
Flags	uint32_t	are flags that are copied into the memory transaction object's flag field when a transaction reaches an object

1.1.390. temu_memoryRead

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryRead(void * mem, uint8_t * buff, uint64_t addr, uint32_t size, int
unitSize)
```

Description

Read block of data via large transactions

If the object is a processor, the endianess flags are automatically set, based on the CPU configuration. Access in that case is done using physical addresses.

Result

Negative on failures. Other values indicate success. The convention is to return the number of bytes read which should be == size.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 342. `temu_memoryRead` Parameters

Parameter	Type	Description
mem	void *	Pointer to memory space object or cpu
buff	uint8_t *	The buffer to which the memory should be stored
addr	uint64_t	The address of the memory block to be read
size	uint32_t	The size to be read
unitSize	int	Log size of transaction unit size (0 = u8, 1 = u16, 2 = u32, 3 = u64)

1.1.391. temu_memoryReadData

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadData(void * obj, uint64_t addr, uint8_t * buff, unsigned int
unitSize, uint32_t size, unsigned int flags)
```

Description

Read block of data via large memory transactions.

If the object is a CPU, access is done using physical addresses.

Result

Negative on failures. Other values indicate success.

Parameters

Table 343. `temu_memoryReadData` Parameters

Parameter	Type	Description
obj	void *	Memory space object
addr	uint64_t	Physical address inside memory space

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
buff	uint8_t *	Data buffer
unitSize	unsigned int	Log size of transaction unit size (0 = u8, 1 = u16, 2 = u32, 3 = u64)
size	uint32_t	Number of units to transfer
flags	unsigned int	Memory transaction flags (e.g. TEMU_MT_LITTLE_ENDIAN)

1.1.392. temu_memoryReadPhys16

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys16(void * Obj, uint64_t Addr, uint16_t * Word)
```

Description

Issue a big endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 344. `temu_memoryReadPhys16` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint16_t *	16 bit word that is read

1.1.393. temu_memoryReadPhys16Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int temu_memoryReadPhys16Little(void * Obj, uint64_t Addr, uint16_t * Word)
```

Description

Issue a little endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 345. temu_memoryReadPhys16Little Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint16_t *	16 bit word that is read

1.1.394. temu_memoryReadPhys32

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys32(void * Obj, uint64_t Addr, uint32_t * Word)
```

Description

Issue a big endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 346. temu_memoryReadPhys32 Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Word	uint32_t *	32 bit word that is read

1.1.395. temu_memoryReadPhys32Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys32Little(void * Obj, uint64_t Addr, uint32_t * Word)
```

Description

Issue a little endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 347. `temu_memoryReadPhys32Little` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint32_t *	32 bit word that is read

1.1.396. temu_memoryReadPhys64

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys64(void * Obj, uint64_t Addr, uint64_t * Word)
```

Description

Issue a big endian memory read transaction (without initiator)

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 348. `temu_memoryReadPhys64` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint64_t *	64 bit word that is read

1.1.397. temu_memoryReadPhys64Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys64Little(void * Obj, uint64_t Addr, uint64_t * Word)
```

Description

Issue a little endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 349. `temu_memoryReadPhys64Little` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint64_t *	64 bit word that is read

1.1.398. temu_memoryReadPhys8

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys8(void * Obj, uint64_t Addr, uint8_t * Word)
```

Description

Issue a big endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 350. temu_memoryReadPhys8 Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint8_t *	8 bit word that is read

1.1.399. temu_memoryReadPhys8Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryReadPhys8Little(void * Obj, uint64_t Addr, uint8_t * Word)
```

Description

Issue a little endian memory read transaction (without initiator)

Result

0 on success, other values imply failure and will not update the word.

Parameters

Table 351. temu_memoryReadPhys8Little Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint8_t *	8 bit word that is read

1.1.400. temu_memorySetAttr

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
void temu_memorySetAttr(void * Obj, uint64_t Addr, uint64_t Len, temu_MemoryAttr Attr)
```

Description

Sets an attribute on the given memory range

Parameters

Table 352. `temu_memorySetAttr` Parameters

Parameter	Type	Description
Obj	void *	Memory space object
Addr	uint64_t	Physical address of start
Len	uint64_t	Length of memory range
Attr	temu_MemoryAttr	Attribute to set

1.1.401. temu_memorySpaceCollectGarbage

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memorySpaceCollectGarbage(void * Obj)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Run garbage collection / maintenance for a memory space object.

The object must implement `MemorySpaceIface`.

Result

Non-zero if any state was reclaimed/purged, zero otherwise.

Parameters

Table 353. `temu_memorySpaceCollectGarbage` Parameters

Parameter	Type	Description
Obj	void *	Memory space object

1.1.402. temu_memoryWrite

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWrite(void * mem, uint64_t addr, uint8_t * buff, uint32_t size, int
unitSize)
```

Description

Write block of data via large transactions

If the object is a processor, the endianess flags are automatically set, based on the CPU configuration. Access in that case is done using physical addresses.

Result

Negative on failure. Other values indicate success. The convention is to return the number of bytes written, which should be == size.

Parameters

Table 354. `temu_memoryWrite` Parameters

Parameter	Type	Description
mem	void *	Pointer to memory space object or cpu

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
buff	uint8_t *	The buffer to which the memory should be stored
addr	uint64_t	The address, at which the write should be done
size	uint32_t	The size to be read
unitSize	int	Log size of transaction unit size (0 = u8, 1 = u16, 2 = u32, 3 = u64)

1.1.403. temu_memoryWriteData

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWriteData(void * obj, uint64_t addr, const uint8_t * buff, unsigned int unitSize, uint32_t size, unsigned int flags)
```

Description

Write block of data via large memory transactions.

Result

Negative on failures. Other values indicate success.

Parameters

Table 355. `temu_memoryWriteData` Parameters

Parameter	Type	Description
obj	void *	Memory space object
addr	uint64_t	Physical address inside memory space
buff	const uint8_t *	Data buffer
unitSize	unsigned int	Log size of transaction unit size (0 = u8, 1 = u16, 2 = u32, 3 = u64)
size	uint32_t	Number of units to transfer
flags	unsigned int	Memory transaction flags (e.g. TEMU_MT_LITTLE_ENDIAN)

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.404. temu_memoryWritePhys16

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys16(void * Obj, uint64_t Addr, uint16_t Word)
```

Description

Issue a big endian memory write transaction (without initiator)

Result

0 on success

Parameters

Table 356. temu_memoryWritePhys16 Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint16_t	16 bit word to write

1.1.405. temu_memoryWritePhys16Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys16Little(void * Obj, uint64_t Addr, uint16_t Word)
```

Description

Issue a little endian memory write transaction (without initiator)

Result

0 on success

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 357. `temu_memoryWritePhys16Little` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint16_t	16 bit word to write

1.1.406. temu_memoryWritePhys32

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys32(void * Obj, uint64_t Addr, uint32_t Word)
```

Description

Issue a big endian memory write transaction (without initiator)

Result

0 on success

Parameters

Table 358. `temu_memoryWritePhys32` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint32_t	32 bit word to write

1.1.407. temu_memoryWritePhys32Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int temu_memoryWritePhys32Little(void * Obj, uint64_t Addr, uint32_t Word)
```

Description

Issue a little endian memory write transaction (without initiator)

Result

0 on success

Parameters

Table 359. temu_memoryWritePhys32Little Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint32_t	32 bit word to write

1.1.408. temu_memoryWritePhys64

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys64(void * Obj, uint64_t Addr, uint64_t Word)
```

Description

Issue a big endian memory write transaction (without initiator)

Result

0 on success

Parameters

Table 360. temu_memoryWritePhys64 Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Word	uint64_t	64 bit word to write

1.1.409. temu_memoryWritePhys64Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys64Little(void * Obj, uint64_t Addr, uint64_t Word)
```

Description

Issue a little endian memory write transaction (without initiator)

Result

0 on success

Parameters

Table 361. `temu_memoryWritePhys64Little` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint64_t	64 bit word to write

1.1.410. temu_memoryWritePhys8

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys8(void * Obj, uint64_t Addr, uint8_t Word)
```

Description

Issue a big endian memory write transaction (without initiator)

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

0 on success

Parameters

Table 362. `temu_memoryWritePhys8` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint8_t	8 bit word to write

1.1.411. temu_memoryWritePhys8Little

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
int temu_memoryWritePhys8Little(void * Obj, uint64_t Addr, uint8_t Word)
```

Description

Issue a little endian memory write transaction (without initiator)

Result

0 on success

Parameters

Table 363. `temu_memoryWritePhys8Little` Parameters

Parameter	Type	Description
Obj	void *	Memory space
Addr	uint64_t	Physical address
Word	uint8_t	8 bit word to write

1.1.412. temu_nameForClass

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_nameForClass(temu_Class * Cls)
```

Description

temu_nameForClass Get the class name from its object

Result

The name of the class as a C-string

Parameters

Table 364. `temu_nameForClass` Parameters

Parameter	Type	Description
Cls	temu_Class *	Pointer to the object of the class in question

1.1.413. temu_nameForInterface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_nameForInterface(const temu_Object * Obj, const void * Iface)
```

Description

Get name for interface

Result

The name of the interface as C-string

Parameters

Table 365. `temu_nameForInterface` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object that contains the interface
Iface	const void *	Pointer to the interface

1.1.414. temu_nameForObject

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_nameForObject(const temu_Object * Obj)
```

Description

Get the name of an object

Result

Name of the object as C-string

Parameters

Table 366. `temu_nameForObject` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object

1.1.415. temu_nanosToCycles

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_nanosToCycles(int64_t Nanos, int64_t Freq)
```

Description

Convert nanoseconds to cycles

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

This function truncates the result in case of non-exact conversion.

Result

Nanoseconds converted to cycles

Parameters

Table 367. `temu_nanosToCycles` Parameters

Parameter	Type	Description
Nanos	int64_t	Nanoseconds to convert
Freq	int64_t	Frequency in Hz

1.1.416. temu_nanosToCyclesRoundedUp

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_nanosToCyclesRoundedUp(int64_t Nanos, int64_t Freq)
```

Description

Convert nanoseconds to cycles rounded upwards

This function rounds up the result in case of non-exact conversion.

Result

Nanoseconds converted to cycles

Parameters

Table 368. `temu_nanosToCyclesRoundedUp` Parameters

Parameter	Type	Description
Nanos	int64_t	Nanoseconds to convert
Freq	int64_t	Frequency in Hz

1.1.417. temu_nanosToSecs

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Time.h"
```

Signature

```
double temu_nanosToSecs(int64_t Nanos)
```

Description

Convert nanoseconds to seconds

Result

Nanoseconds converted to seconds

Parameters

Table 369. temu_nanosToSecs Parameters

Parameter	Type	Description
Nanos	int64_t	Nanoseconds to convert

1.1.418. temu_normaliseRead16

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
uint16_t temu_normaliseRead16(uint16_t Value, int Sz, int Off)
```

Description

Normalise a value for reads where only 16 bit transactions are supported by the device model, but the target is allowed to read non-16 bit quantities.

Given a 32 bit register value, the function extracts the bits from it that was actually requested.

Result

Parameters

Table 370. temu_normaliseRead16 Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Value	uint16_t	Register value
Sz	int	Size in log number of bytes (0 or 1)
Off	int	Offset in bytes within the 32 bit word of the transaction (0 or 2)

1.1.419. temu_normaliseRead32

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
uint32_t temu_normaliseRead32(uint32_t Value, int Sz, int Off)
```

Description

Normalise a value for reads where only 32 bit transactions are supported by the device model, but the target is allowed to read non-32 bit quantities.

Given a 32 bit register value, the function extracts the bits from it that was actually requested.

Result

Parameters

Table 371. `temu_normaliseRead32` Parameters

Parameter	Type	Description
Value	uint32_t	Register value
Sz	int	Size in log number of bytes (0, 1, or 2)
Off	int	Offset in bytes within the 32 bit word of the transaction (0-3)

1.1.420. temu_normaliseWrite16

Include

```
#include "temu-c/Support/Memory.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
uint16_t temu_normaliseWrite16(uint16_t OldVal, uint16_t NewVal, int Sz, int Off)
```

Description

Normalise a value for writes where only 16 bit transactions are supported by the device model, but the target is allowed to write non-16 bit quantity. The function mixes the old register value with the new one based on the size and offset parameter. The problem exists because the memory access interface has a value entry, which always ends up in the lower bits, so if we write to the higher bits in in a 16 bit register, then by just forwarding the the value as is to the write handler, will result in a write of the lower bits and a clear of the upper bits (for a store unsigned).

Thus a normalisation is neded where we mix the written word with the old bits. So for transaction size of 8, and an offset of8, the resulting word is (old

0x00ff) | (new

8)

Result

Parameters

Table 372. `temu_normaliseWrite16` Parameters

Parameter	Type	Description
OldVal	uint16_t	Old regiseter value.
NewVal	uint16_t	Content in memory transaction (new value).
Sz	int	Size in log number of bytes
Off	int	Offset in bytes within the 16 bit word of the transaction.

1.1.421. temu_normaliseWrite32

Include

```
#include "temu-c/Support/Memory.h"
```

Signature

```
uint32_t temu_normaliseWrite32(uint32_t OldVal, uint32_t NewVal, int Sz, int Off)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Normalise a value for writes where only 32 bit transactions are supported by the device model, but the target is allowed to write non-32 bit quantity. The function mixes the old register value with the new one based on the size and offset parameter. The problem exists because the memory access interface has a value entry, which always ends up in the lower bits, so if we write to the higher bits in in a 32 bit register, then by just forwarding the the value as is to the write handler, will result in a write of the lower bits and a clear of the upper bits (for a store unsigned).

Thus a normalisation is needed where we mix the written word with the old bits. So for transaction size of 16, and an offset of 16, the resulting word is (old

0x0000ffff) | (new

16)

Result

Parameters

Table 373. `temu_normaliseWrite32` Parameters

Parameter	Type	Description
OldVal	uint32_t	Old regiseter value.
NewVal	uint32_t	Content in memory transaction (new value).
Sz	int	Size in log number of bytes
Off	int	Offset in bytes within the 32 bit word of the transaction.

1.1.422. temu_notify

Include

```
#include "temu-c/Support/Notifications.h"
```

Signature

```
void temu_notify(int64_t Id, void * NotInfo)
```

Description

Call event subscriber, EvInfo is a per event specific struct the event handler must cast this to the appropriate type.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 374. `temu_notify` Parameters

Parameter	Type	Description
Id	int64_t	Notification ID
NotInfo	void *	Ponter to pass to notification handlers

1.1.423. temu_notifyFast

Include

```
#include "temu-c/Support/Notifications.h"
```

Signature

```
void temu_notifyFast(int64_t * Id, void * NotInfo)
```

Description

Quick inline call macro that do not call the function for an invalid event id. This saves the function call to the notify function, minimising the cost for unset event handlers.

Parameters

Table 375. `temu_notifyFast` Parameters

Parameter	Type	Description
Id	int64_t *	Notification ID
NotInfo	void *	Pointer to pass to notification handlers

1.1.424. temu_objectCmdOptionKind

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_objectCmdOptionKind(temu_Object * Obj, const char * CmdName, const char *
OptName, temu_CmdOptionKind * Kind)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Look up the declared kind of an object command's option.

The counterpart of temu_cmdOptionKind() for commands registered on a class with temu_createClassCmd(), and needed for the same reason: the union member a command reads is chosen by the declared kind.

Result

Non-zero if that command declares an option of that name.

Parameters

Table 376. `temu_objectCmdOptionKind` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object whose class declares the command
CmdName	const char *	Command name
OptName	const char *	Option name
Kind	temu_CmdOptionKind *	Set to the declared kind on success

1.1.425. temu_objectForName

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Object * temu_objectForName(const char * Name)
```

Description

Get object for name

Result

Pointer to the object

Parameters

Table 377. `temu_objectForName` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Name	const char *	The name of the object

1.1.426. temu_objectGetLogLevel

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
temu_LogLevel temu_objectGetLogLevel(void * Obj, unsigned int Category)
```

Description

Get object specific logging level for category

Result

Logging level for the given `Category`

Parameters

Table 378. `temu_objectGetLogLevel` Parameters

Parameter	Type	Description
Obj	void *	Object
Category	unsigned int	Category

1.1.427. temu_objectGetLogMessageFlags

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
uint64_t temu_objectGetLogMessageFlags(const void * Obj)
```

Description

Get the per-object message suppression bitmask.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

When a bit is set in the returned mask, matching messages passed to `temu_logToCategoryMessage()` are suppressed for that object.

Result

1.1.428. temu_objectHasCmd

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_objectHasCmd(const temu_Object * Obj, const char * CmdName)
```

Description

Check if object has a command

Result

0 in case command does not exist. Otherwise 1.

Parameters

Table 379. `temu_objectHasCmd` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Object pointer
CmdName	const char *	Name of command

1.1.429. temu_objectHasIface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_objectHasIface(const temu_Object * Obj, const char * IfaceName)
```

Description

Check if the object has a named interface

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

0 if the interface does not exist, otherwise the interface exists

Parameters

Table 380. `temu_objectHasIface` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object to query
IfaceName	const char *	Interface name to look for

1.1.430. temu_objectHasProp

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_objectHasProp(const temu_Object * Obj, const char * PropName)
```

Description

Check if the object has a named property

Result

0 if the property does not exist, otherwise the property is valid

Parameters

Table 381. `temu_objectHasProp` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object of the property
PropName	const char *	Name of the property

1.1.431. temu_objectInvokeCmd

Include

```
#include "temu-c/Support/CommandLine.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
int temu_objectInvokeCmd(temu_Object * Obj, void * I, const char * Name, int Argc,
temu_CmdArg * Argv)
```

Description

Invoke command on object

Result

Command result. 0 means success.

Parameters

Table 382. `temu_objectInvokeCmd` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object
I	void *	Interpreter context
Name	const char *	Name of command
Argc	int	Number of arguments
Argv	temu_CmdArg *	Argument vector

1.1.432. temu_objectSetLogLevel

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_objectSetLogLevel(void * Obj, unsigned int Category, temu_LogLevel LogLevel)
```

Description

Set object specific logging level for category

Parameters

Table 383. `temu_objectSetLogLevel` Parameters

Parameter	Type	Description
Obj	void *	Object

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Parameter	Type	Description
Category	unsigned int	Category
LogLevel	temu_LogLevel	Level to set for the given `Category`

1.1.433. temu_objectSetLogMessageFlag

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_objectSetLogMessageFlag(void * Obj, uint64_t Flag, int Enable)
```

Description

Set or clear a specific per-object message suppression bit.

When `Enable` is non-zero the bit is set, suppressing matching messages.

1.1.434. temu_objectSetLogMessageFlags

Include

```
#include "temu-c/Support/Logging.h"
```

Signature

```
void temu_objectSetLogMessageFlags(void * Obj, uint64_t Flags)
```

Description

Replace the per-object message suppression bitmask.

Any message logged with a matching `MessageFlag` bit set will be suppressed for that object.

1.1.435. temu_objsysAddClassRegistrar

Include

```
#include "temu-c/Support/Objsys.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_objsysAddClassRegistrar(void (*)(void) Registrar)
```

Description

Register a function that registers built-in classes.

Plugins can be re-loaded, but some core TEMU classes like the schedulers would not if e.g. a snapshot is loaded in after a `temu_objsysClear()` call.

Registering the same function twice has no effect, so a registration function may register itself.

1.1.436. temu_objsysClear

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_objsysClear()
```

Description

Erase all classes, interfaces, properties and objects registered in the object system.

1.1.437. temu_objsysClearObjects

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_objsysClearObjects()
```

Description

Erase all objects, but do not delete classes.

1.1.438. temu_parity32

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_parity32(uint32_t Word)
```

Description

Compute parity of word

Result

The parity of the word

Parameters

Table 384. `temu_parity32` Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which parity to be computed

1.1.439. temu_parity64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_parity64(uint64_t Word)
```

Description

Compute parity

Result

The parity of word

Parameters

Table 385. `temu_parity64` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Word	uint64_t	The word, in which parity to be computed

1.1.440. temu_parseCommandLineOptions

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
int temu_parseCommandLineOptions(int argc, const char ** argv)
```

Description

Parses command line options The TEMU command supports a number of built in command line options. A simulator embedding TEMU may want initialise these options in the same way that the TEMU CLI does. Note that not all options are supported this way as some options will only be registered by the temu CLI application itself.

In general interactive options will not work (options that can be interpreted as a command). It is possible to use temu_printCommandLineHelp() to list currently registered options from an application that embedds temu.

Result

0 on success, otherwise non-zero value.

Parameters

Table 386. `temu_parseCommandLineOptions` Parameters

Parameter	Type	Description
argc	int	Number of arguments
argv	const char **	Command line arguments

1.1.441. temu_pluginPathAppend

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_pluginPathAppend(const char * Path)
```

Description

temu_pluginPathAppend Add a path to the list of paths, where TEMU searches for plugins

Parameters

Table 387. temu_pluginPathAppend Parameters

Parameter	Type	Description
Path	const char *	The path to append

1.1.442. temu_pluginPathPrepend

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_pluginPathPrepend(const char * Path)
```

Description

temu_pluginPathPrepend Add a path to the front of the list of paths, where TEMU searches for plugins

Parameters

Table 388. temu_pluginPathPrepend Parameters

Parameter	Type	Description
Path	const char *	The path to prepend

1.1.443. temu_pluginPathPrint

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_pluginPathPrint()
```

Description

temu_pluginPathPrint Print the list of paths, where TEMU searches for plugins

1.1.444. temu_pluginPathRemove

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_pluginPathRemove(const char * Path)
```

Description

temu_pluginPathRemove Remove a path from the list of paths, where TEMU searches for plugins

Parameters

Table 389. temu_pluginPathRemove Parameters

Parameter	Type	Description
Path	const char *	to remove

1.1.445. temu_popcount32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_popcount32(uint32_t Word)
```

Description

Count number of bits set in word

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

The number of bits

Parameters

Table 390. temu_popcount32 Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which bits to be counted

1.1.446. temu_popcount64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
int temu_popcount64(uint64_t Word)
```

Description

Count number of bit set

Result

The number of bits set in Word

Parameters

Table 391. temu_popcount64 Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which bits to be counted

1.1.447. temu_postCallback

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_postCallback(void * Obj, temu_SafeCb Cb, void * Arg)
```

Description

Post a callback in a time source

The posting will be thread-safe and the callback will be excuted by the main thread (the one calling the cpu or machine run / step functions). The main thread is the thread calling cpu run if there is only a single cpu in the system, and the thread calling machine run if there are multiple CPUs in the system.

The callback will be executed as soon as possible, when the even queue is checked for events. Which in practice mean:

- At the end of the current time quanta for multi-cpu systems.
- At regular intervals for single CPU systems (a CPU runs a null-event periodically. Note that the callback will be called as soon as either a normal or the null event is executed.

The posting of this callback is thread-safe but not async / signal safe. I.e. do not do this from signal handler or async io callbacks.

When the event is executed, it is safe to do most emulator operations, including posting of events, calling API functions, etc.

The callback must however not:

- Manipulate the object system meta state (i.e. creating or modifying classes)
- Replace signal handlers (e.g. SIGINT)
- Run or step the emulator in any way (e.g. by calling machineRun(), cpuRun() or using the CpuIface or MachineIface interfaces.

Parameters

Table 392. `temu_postCallback` Parameters

Parameter	Type	Description
Obj	void *	Time source
Cb	temu_SafeCb	Callback
Arg	void *	Argument passed to callback

1.1.448. temu_ppcClearAddressReservation

Include

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```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_ppcClearAddressReservation(void * Cpu)
```

Description

Clear the PowerPC reserve address used by `lwarx` and `stwcx`

Parameters

Table 393. `temu_ppcClearAddressReservation` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.449. temu_ppcGetCrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_ppcGetCrReg(void * Cpu)
```

Description

Get the PowerPC CR register

Result

CR value

Parameters

Table 394. `temu_ppcGetCrReg` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.450. temu_ppcGetCtrReg

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Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_ppcGetCtrReg(void * Cpu)
```

Description

Get the PowerPC CTR register

Result

The CTR value

Parameters

Table 395. `temu_ppcGetCtrReg` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.451. temu_ppcGetFpscrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_ppcGetFpscrReg(void * Cpu)
```

Description

Get the PowerPC FPSCR register

Result

The FPSCR value

Parameters

Table 396. `temu_ppcGetFpscrReg` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.452. temu_ppcGetLrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_ppcGetLrReg(void * Cpu)
```

Description

Get the PowerPC LR register

Result

The LR value

Parameters

Table 397. temu_ppcGetLrReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.453. temu_ppcGetMsrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_ppcGetMsrReg(void * Cpu)
```

Description

Get the PowerPC MSR register

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

MSR value

Parameters

Table 398. temu_ppcGetMsrReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.454. temu_ppcGetReserveAddress

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_ppcGetReserveAddress(void * Cpu)
```

Description

Get the PowerPC reserve address used by `lwarx` and `stwcx`

Result

The reserved address value

Parameters

Table 399. temu_ppcGetReserveAddress Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.455. temu_ppcGetXerReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_ppcGetXerReg(void * Cpu)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Get the PowerPC XER register

Result

XER value

Parameters

Table 400. `temu_ppcGetXerReg` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.456. temu_ppcIsReservationBitSet

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_ppcIsReservationBitSet(void * Cpu)
```

Description

Check if PowerPC reserve address is set `lwarx` and `stwcx`

Result

1 if reservation is set, 0 if cleared.

Parameters

Table 401. `temu_ppcIsReservationBitSet` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer

1.1.457. temu_ppcSetCrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_ppcSetCrReg(void * Cpu, uint32_t Value)
```

Description

Set the PowerPC CR register

Parameters

Table 402. temu_ppcSetCrReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Value	uint32_t	New CR value

1.1.458. temu_ppcSetCtrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_ppcSetCtrReg(void * Cpu, uint32_t Value)
```

Description

Set the PowerPC CTR register

Parameters

Table 403. temu_ppcSetCtrReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Value	uint32_t	New CTR value

1.1.459. temu_ppcSetFpscrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_ppcSetFpscrReg(void * Cpu, uint32_t Value)
```

Description

Set the PowerPC FPSCR register

Parameters

Table 404. temu_ppcSetFpscrReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Value	uint32_t	New FPSCR value

1.1.460. temu_ppcSetLrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_ppcSetLrReg(void * Cpu, uint64_t Value)
```

Description

Set the PowerPC LR register

Parameters

Table 405. temu_ppcSetLrReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Value	uint64_t	New LR value

1.1.461. temu_ppcSetMsrReg

Include

```
#include "temu-c/Support/Cpu.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_ppcSetMsrReg(void * Cpu, uint64_t Value)
```

Description

Set the PowerPC MSR register

Parameters

Table 406. `temu_ppcSetMsrReg` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Value	uint64_t	New MSR value

1.1.462. temu_ppcSetReserveAddress

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_ppcSetReserveAddress(void * Cpu, uint64_t reserveAddress)
```

Description

Set the PowerPC reserve address used by `lwarx` and `stwcx`

Parameters

Table 407. `temu_ppcSetReserveAddress` Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
reserveAddress	uint64_t	New reserved address value

1.1.463. temu_ppcSetXerReg

Include

```
#include "temu-c/Support/Cpu.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Signature

```
void temu_ppcSetXerReg(void * Cpu, uint32_t Value)
```

Description

Set the PowerPC XER register

Parameters

Table 408. temu_ppcSetXerReg Parameters

Parameter	Type	Description
Cpu	void *	Processor pointer
Value	uint32_t	New XER value

1.1.464. temu_printCommandLineHelp

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
void temu_printCommandLineHelp()
```

Description

Print command line help to temu stderr stream.

1.1.465. temu_printDiagnosticError

Include

```
#include "temu-c/Support/Console.h"
```

Signature

```
int temu_printDiagnosticError(const char * fileName, unsigned int line, unsigned int
col, const char * fmt, ...)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Print a diagnostic error

The function prints a message like "error:<filename>:<line>:<col>: <msg>" "error:<filename>:<line>: <msg>" "error:<filename>: <msg>" "error: <msg>" Depending on whether fileName, line or col is set.

Result

length of the message

Parameters

Table 409. `temu_printDiagnosticError` Parameters

Parameter	Type	Description
fileName	const char *	Optional file name, set ton nullptr to skip
line	unsigned int	Optional line number, set to zero for no line number
col	unsigned int	Optional column number, set to zero for no column number
fmt	const char *	printf formatted string.

1.1.466. temu_printDiagnosticWarning

Include

```
#include "temu-c/Support/Console.h"
```

Signature

```
int temu_printDiagnosticWarning(const char * fileName, unsigned int line, unsigned int col, const char * fmt, ...)
```

Description

Print a diagnostic warning

The function prints a message like "warning:<filename>:<line>:<col>: <msg>" "warning:<filename>:<line>: <msg>" "warning:<filename>: <msg>" "warning: <msg>" Depending on whether fileName, line or col is set.

Result

length of the message

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 410. `temu_printDiagnosticWarning` Parameters

Parameter	Type	Description
fileName	const char *	Optional file name, set ton nullptr to skip
line	unsigned int	Optional line number, set to zero for no line number
col	unsigned int	Optional column number, set to zero for no column number
fmt	const char *	printf formatted string.

1.1.467. temu_printerr

Include

```
#include "temu-c/Support/Console.h"
```

Signature

```
int temu_printerr(const char * Fmt, ...)
```

Description

fprintf(stderr, ...) wrapper. The function prints a formatted message to what TEMU considers to be the standard error. This function respects internal rerouting rules. Unlike plain fprintf, which writes to an explicit file.

Result

Number of bytes written

1.1.468. temu_printf

Include

```
#include "temu-c/Support/Console.h"
```

Signature

```
int temu_printf(const char * Fmt, ...)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Printf wrapper. The function prints a formatted message to what TEMU considers to be the standard output. This function respects internal rerouting rules. Unlike plain printf, which writes only to stdout.

Result

Number of bytes written

1.1.469. temu_propInfoForClass

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_propInfoForClass(temu_Class * Cls, unsigned int PIIndex, unsigned int
PICount, temu_PropInfo * PI)
```

Description

Get property info for class

It is possible to extract low level property info data using this function. This can be useful if integrating in another simulator or if integrating the system in e.g. a GUI in which you need to provide object introspection.

The function can be called with the PI array set to NULL to return the number of properties in the class.

You can read out all property fields using the following sequence:

Result

Number of read PI entries. In case PI is NULL, the total number of PIs for the class.

Parameters

Table 411. `temu_propInfoForClass` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class to inspect
PIIndex	unsigned int	The property index to read from.

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Parameter	Type	Description
PICount	unsigned int	Size of PI array in number of entries.
PI	temu_PropInfo *	Pointer to an array of prop info objects to fill in.

1.1.470. temu_propagateRightMostBit32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_propagateRightMostBit32(uint32_t Word)
```

Description

Propagate the right most set bit to the bits below it

Result

Word with lower zero-bits set

Parameters

Table 412. temu_propagateRightMostBit32 Parameters

Parameter	Type	Description
Word	uint32_t	Word to propagate bits

1.1.471. temu_propagateRightMostBit64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_propagateRightMostBit64(uint64_t Word)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Propagate the right most set bit to the bits below it

Result

Word with lower zero-bits set

Parameters

Table 413. `temu_propagateRightMostBit64` Parameters

Parameter	Type	Description
Word	uint64_t	Word to propagate bits

1.1.472. temu_publishNotification

Include

```
#include "temu-c/Support/Notifications.h"
```

Signature

```
int64_t temu_publishNotification(const char * NotName, temu_Object * Obj)
```

Description

Publish a notification source A notification source is identified by an event name and an object pointer

Result

Notification ID of the published event.

Parameters

Table 414. `temu_publishNotification` Parameters

Parameter	Type	Description
NotName	const char *	Name of the notification
Obj	temu_Object *	Pointer to the object or NULL for global notifications

1.1.473. temu_publishTimeSource

Include

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```
#include "temu-c/Support/Events.h"
```

Signature

```
void temu_publishTimeSource(temu_Class * Class)
```

Description

Publish time source fields Publishes standard time source fields, assuming class is a time source.

Parameters

Table 415. `temu_publishTimeSource` Parameters

Parameter	Type	Description
Class	temu_Class *	TEMU object system class

1.1.474. temu_qualifyAs

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_qualifyAs(temu_Class * Cls, unsigned int Qualifier)
```

Description

Bless the class so that the isQualified predicate returns 1. Qualifiers with the MSb cleared are reserved for TEMU internals.

Parameters

Table 416. `temu_qualifyAs` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class to be blessed

1.1.475. temu_qualifyAsCpu

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_qualifyAsCpu(temu_Class * Cls)
```

Description

Bless the class so that the isCpu predicate returns 1. There are certain assumptions that CPU classes must meet. These assumptions are not stable yet, so do not use this in user code.

Parameters

Table 417. `temu_qualifyAsCpu` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class to be blessed

1.1.476. temu_qualifyAsMachine

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_qualifyAsMachine(temu_Class * Cls)
```

Description

Bless the class so that the isMachine predicate returns 1. There are certain assumptions that machine classes must meet. These assumptions are not stable yet, so do not use this in user code.

Parameters

Table 418. `temu_qualifyAsMachine` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class to be blessed

1.1.477. temu_qualifyAsMemory

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_qualifyAsMemory(temu_Class * Cls)
```

Description

Bless the class so that the isMemory predicate returns 1

Parameters

Table 419. `temu_qualifyAsMemory` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class to be blessed

1.1.478. temu_readPCIeConfigRegister

Include

```
#include "temu-c/Support/PCIeHelper.h"
```

Signature

```
temu_Propval temu_readPCIeConfigRegister(temu_PCIExpressDevice * DevConf, uint32_t
offset)
```

Description

Read register value from PCIe configuration

Result

return register value.

Parameters

Table 420. `temu_readPCIeConfigRegister` Parameters

Parameter	Type	Description
DevConf	temu_PCIExpressDevice *	PCIe configuration
offset	uint32_t	register offset in memory map.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.1.479. temu_readProp

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_readProp(temu_Object * Obj, const char * Name, int idx)
```

Description

Read property (with side effects)

Result

The read value, set to teTY_Invalid for failures

Parameters

Table 421. `temu_readProp` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
Name	const char *	Name of property
idx	int	Index in property array (set to 0 if scalar)

1.1.480. temu_readValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_readValue(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read a property value with side-effects

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

The property value corresponding to the name. In case of the property not being found, the Typ field of the returned property will be teTY_Invalid.

Parameters

Table 422. `temu_readValue` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.481. temu_readValueDouble

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
double temu_readValueDouble(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read property (with side effects)

Result

The property value converted to double

Parameters

Table 423. `temu_readValueDouble` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Idx	int	Index in property array (set to 0 if scalar)

1.1.482. temu_readValueI16

Include

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```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int16_t temu_readValueI16(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 424. `temu_readValueI16` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.483. temu_readValueI32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int32_t temu_readValueI32(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal

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error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 425. `temu_readValueI32` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.484. temu_readValueI64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int64_t temu_readValueI64(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 426. `temu_readValueI64` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer

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Parameter	Type	Description
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.485. temu_readValueI8

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int8_t temu_readValueI8(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 427. `temu_readValueI8` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.486. temu_readValueSigned

Include

```
#include "temu-c/Support/Objsys.h"
```

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Signature

```
int64_t temu_readValueSigned(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read property (with side effects)

Result

The property value converted to signed

Parameters

Table 428. temu_readValueSigned Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Idx	int	Index in property array (set to 0 if scalar)

1.1.487. temu_readValueU16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint16_t temu_readValueU16(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

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Table 429. temu_readValueU16 Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.488. temu_readValueU32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint32_t temu_readValueU32(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 430. temu_readValueU32 Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.489. temu_readValueU64

Include

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```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint64_t temu_readValueU64(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 431. temu_readValueU64 Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.490. temu_readValueU8

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint8_t temu_readValueU8(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read typed properties.

The readValue[U|I][8|16|32|64] function reads a typed property. The accessor will fail with a fatal

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error if the read type is not the same as the property type. If the property type is unknown, use the temu_readValue function instead.

Result

The read out property value.

Parameters

Table 432. `temu_readValueU8` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read
Idx	int	Index in property array, set to 0 if the property is not an array

1.1.491. temu_readValueUnsigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
uint64_t temu_readValueUnsigned(temu_Object * Obj, const char * PropName, int Idx)
```

Description

Read property (with side effects)

Result

The property value converted to unsigned

Parameters

Table 433. `temu_readValueUnsigned` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Idx	int	Index in property array (set to 0 if scalar)

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1.1.492. temu_registerClass

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Class * temu_registerClass(const char * ClsName, temu_ObjectCreateFunc Create,
temu_ObjectDisposeFunc Dispose)
```

Description

Register a class in the TEMU object system. With these classes, the TEMU object system is responsible for allocation and de-allocation.

Result

A pointer to the class object that can be further used to register properties and interfaces.

Parameters

Table 434. `temu_registerClass` Parameters

Parameter	Type	Description
ClsName	const char *	The name of the class that is to be created.
Create	temu_ObjectCreateFunc	A constructor, the constructor is responsible for allocation and initialisation of the object.
Dispose	temu_ObjectDisposeFunc	A destructor, this function is responsible for deleting the objects of the class.

1.1.493. temu_registerComponent

Include

```
#include "temu-c/Support/Component.h"
```

Signature

```
temu_Class * temu_registerComponent(const char * CompClass, temu_ObjectCreateFunc
```

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```
Create, temu_ObjectDisposeFunc Dispose)
```

Description

Register a new component class in

Result

Pointer to the new class

Parameters

Table 435. `temu_registerComponent` Parameters

Parameter	Type	Description
CompClass	const char *	Name of the component to be registered
Create	temu_ObjectCreateFunc	The constructor function that allocates the component
Dispose	temu_ObjectDisposeFunc	The destructor function

1.1.494. temu_replIsActive

Include

```
#include "temu-c/Support/CommandLine.h"
```

Signature

```
_Bool temu_replIsActive()
```

Description

Result

1 if the REPL is running, 0 otherwise.

1.1.495. temu_requireInterface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

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```
void temu_requireInterface(temu_Class * Cls, const char * PropName, const char *
IfaceType)
```

Description

Associate the interface reference property with an interface type.

Setting the type, prevents the connect command / function to assign the connection if the target interface type is not the same as the property interface reference type.

Parameters

Table 436. `temu_requireInterface` Parameters

Parameter	Type	Description
Cls	temu_Class *	Class pointer
PropName	const char *	Name of interface reference property
IfaceType	const char *	Type required to connect the property

1.1.496. temu_riscvPrivilegeLevel

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
temu_RiscVPrivilegeLevel temu_riscvPrivilegeLevel(void * cpu)
```

Description

Get the RISC-V privilege level

Result

RISC-V privilege level

Parameters

Table 437. `temu_riscvPrivilegeLevel` Parameters

Parameter	Type	Description
cpu	void *	RISC-V CPU pointer

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1.1.497. temu_roundDownNearestPow2_32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_roundDownNearestPow2_32(uint32_t Word)
```

Description

Round down to nearest power of 2

Result

A copy of Word rounded down to nearest power of 2

Parameters

Table 438. temu_roundDownNearestPow2_32 Parameters

Parameter	Type	Description
Word	uint32_t	The word to be round

1.1.498. temu_roundDownNearestPow2_64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_roundDownNearestPow2_64(uint64_t Word)
```

Description

Round up to nearest power of 2

Result

A copy of Word rounded down to nearest power of 2

Parameters

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Table 439. `temu_roundDownNearestPow2_64` Parameters

Parameter	Type	Description
Word	uint64_t	The word to be round

1.1.499. temu_roundDownToPow2_32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_roundDownToPow2_32(uint32_t Word, uint32_t Size)
```

Description

Round down to multiples of specified power of 2

Result

A rounded copy of Word

Parameters

Table 440. `temu_roundDownToPow2_32` Parameters

Parameter	Type	Description
Word	uint32_t	The word to be rounded
Size	uint32_t	Power of 2 sized block

1.1.500. temu_roundDownToPow2_64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_roundDownToPow2_64(uint64_t Word, uint64_t Size)
```

Description

Round down to multiples of specified power of 2

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Result

A rounded copy of Word

Parameters

Table 441. temu_roundDownToPow2_64 Parameters

Parameter	Type	Description
Word	uint64_t	The word to be rounded
Size	uint64_t	Power of 2 sided block

1.1.501. temu_roundUpNearestPow2_32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_roundUpNearestPow2_32(uint32_t Word)
```

Description

Round up to nearest power of 2

Result

A copy of Word rounded up to nearest power of 2

Parameters

Table 442. temu_roundUpNearestPow2_32 Parameters

Parameter	Type	Description
Word	uint32_t	The word to be round

1.1.502. temu_roundUpNearestPow2_64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

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```
uint64_t temu_roundUpNearestPow2_64(uint64_t Word)
```

Description

Round up to nearest power of 2

Result

A copy of Word rounded up to nearest power of 2

Parameters

Table 443. temu_roundUpNearestPow2_64 Parameters

Parameter	Type	Description
Word	uint64_t	The word to be round

1.1.503. temu_roundUpToPow2_32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_roundUpToPow2_32(uint32_t Word, uint32_t Size)
```

Description

Round up to multiples of specified power of 2

Result

A rounded copy of Word

Parameters

Table 444. temu_roundUpToPow2_32 Parameters

Parameter	Type	Description
Word	uint32_t	The word to be rounded
Size	uint32_t	Power of 2 sized block

1.1.504. temu_roundUpToPow2_64

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Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_roundUpToPow2_64(uint64_t Word, uint64_t Size)
```

Description

Round up to multiples of specified power of 2

Result

A rounded copy of Word

Parameters

Table 445. `temu_roundUpToPow2_64` Parameters

Parameter	Type	Description
Word	uint64_t	The word to be rounded
Size	uint64_t	Power of 2 sized block

1.1.505. temu_run

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_run()
```

Description

Run the current scheduler forever

1.1.506. temu_runForSteps

Include

```
#include "temu-c/Support/Scheduler.h"
```

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Signature

```
void temu_runForSteps(int64_t steps)
```

Description

Run the current scheduler for a fixed number of steps

Parameters

Table 446. `temu_runForSteps` Parameters

Parameter	Type	Description
steps	int64_t	Time in steps (in scheduler units).

1.1.507. temu_runForTime

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_runForTime(double secs)
```

Description

Run the current scheduler for a fixed time

Parameters

Table 447. `temu_runForTime` Parameters

Parameter	Type	Description
secs	double	Time in simulated seconds

1.1.508. temu_sanitizerSetHooks

Include

```
#include "temu-c/Debugging/SanitizersUnstable.h"
```

Signature

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```
void temu_sanitizerSetHooks(struct temu_Cpu * Cpu, const temu_SanitizerAccessHook (*
)[4] Access, temu_SanitizerPageHook Page, void * Data)
```

Description

Install or, with all NULL, remove the hooks of a processor.

Does not touch teCF_Sanitizer, and code decoded or translated with it set must be flushed before the hooks change.

1.1.509. temu_schedGetCommonQuanta

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Signature

```
uint64_t temu_schedGetCommonQuanta(temu_Sched * s, temu_Object * Obj1, temu_Object *
Obj2, _Bool * sameDomain)
```

Description

Finds the closest common ancestor domain of both objects and returns the quanta

Result

Quanta in cycles if the closest ancestor domain

Parameters

Table 448. `temu_schedGetCommonQuanta` Parameters

Parameter	Type	Description
s	temu_Sched *	The scheduler
Obj1	temu_Object *	Object 1 to check
Obj2	temu_Object *	Object 2 to check
sameDomain	_Bool *	Output: True if the objects are in the same leaf domain

1.1.510. temu_schedulerGetAccumulatedTime

Include

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```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
uint64_t temu_schedulerGetAccumulatedTime()
```

Description

Experimental function to get the accumulated nanoseconds for the scheduler.

To enable sampling the Scheduler-object's `measureTime` property must be set.

Result

Accumulated nanoseconds of which temu_run* functions have run.

1.1.511. temu_schedulerGetAffinity

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
int64_t temu_schedulerGetAffinity(unsigned int threadId)
```

Description

Experimental function to get the thread affinity for the scheduler.

Result

Affinity value, -1 implies not set. Other values indicate HOST CPUID.

Parameters

Table 449. `temu_schedulerGetAffinity` Parameters

Parameter	Type	Description
threadId	unsigned int	Thread ID starting with 0 to the number of threads set for the scheduler.

1.1.512. temu_schedulerGetSyncTime

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Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
uint64_t temu_schedulerGetSyncTime(unsigned int threadId)
```

Description

Experimental function to get the accumulated nanoseconds for the scheduler synchronization.

To enable sampling, the Scheduler-object's `measureTime` property must be set.

Result

Accumulated nanoseconds of which synchronisation code was run.

1.1.513. temu_schedulerGetWaitTime

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
uint64_t temu_schedulerGetWaitTime(unsigned int threadId)
```

Description

Experimental function to get the accumulated nanoseconds for the scheduler barrier waits.

The wait time, includes both the actual barrier and the synchronization time.

So the true wait time is the wait - sync time.

To enable sampling, the Scheduler-object's `measureTime` property must be set.

Result

Accumulated nanoseconds of which the wait was run.

1.1.514. temu_schedulerIsWaitingForDebugger

Include

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```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
int temu_schedulerIsWaitingForDebugger()
```

Description

Experimental function to check if the scheduler is waiting for debugger commands.

Result

1 if the scheduler is waiting.

1.1.515. temu_schedulerSetAffinity

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_schedulerSetAffinity(unsigned int threadId, int hostCore)
```

Description

Experimental function to set thread affinity for the scheduler.

The function should be called before setting the number of threads, as threads automatically set the affinity if the hostCore is zero or above.

Parameters

Table 450. `temu_schedulerSetAffinity` Parameters

Parameter	Type	Description
threadId	unsigned int	Thread ID starting with 0 to the number of threads set for the scheduler.
hostCore	int	Host core id to bind thread to. Negative to not set affintity.

1.1.516. temu_secsToCycles

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Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_secsToCycles(double Secs, int64_t Freq)
```

Description

Convert seconds to cycles

Result

Seconds converted to an integral number of cycles

Parameters

Table 451. `temu_secsToCycles` Parameters

Parameter	Type	Description
Secs	double	Seconds to convert
Freq	int64_t	Frequency in Hz

1.1.517. temu_secsToNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_secsToNanos(double Secs)
```

Description

Convert seconds to nanoseconds

Result

Seconds converted to an integral number of nanoseconds

Parameters

Table 452. `temu_secsToNanos` Parameters

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Parameter	Type	Description
Secs	double	Seconds to convert

1.1.518. temu_serialiseJSON

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_serialiseJSON(const char * FileName)
```

Description

Serialise the simulation state to the given file name.

The serialisation writes a JSON formatted file and calls the serialise procedure in the (optional) ObjectIface if it is implemented.

The serialisation interface can for example be used to write out memory buffers to separate files as such data should not be written to a JSON file.

Result

0 on success, otherwise non-zero

Parameters

Table 453. `temu_serialiseJSON` Parameters

Parameter	Type	Description
FileName	const char *	The filename, to which the JSON data is to be stored

1.1.519. temu_serialiseProp

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_serialiseProp(void * Ctxt, const char * Name, temu_Type Typ, int Count, void
```

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```
* Data)
```

Description

Serialise an explicit property, this can be called from the serialisiation interface. Note that the availability of pseudo properties makes this function and the serialise interface more or less obsolete.

Parameters

Table 454. temu_serialiseProp Parameters

Parameter	Type	Description
Ctxt	void *	The context object that has the property (same as passed to serialise function in the interface)
Name	const char *	The name of the property
Typ	temu_Type	The type of the property
Count	int	0 if the property is not an array, otherwise the element number in the property
Data	void *	Serialized data

1.1.520. temu_serializeOnNotification

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_serializeOnNotification(temu_Object * notificationSource, const char *
notificationName, double seconds)
```

Description

Serialize execution for some time when notification is triggered

Parameters

Table 455. temu_serializeOnNotification Parameters

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Parameter	Type	Description
notificationSource	temu_Object *	Object emitting notification.
notificationName	const char *	Name of notification to intercept.
seconds	double	Number of seconds (simulated time, for which to serialize execution).

1.1.521. temu_setEpochNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
void temu_setEpochNanos(temu_TimeSource * TS, int64_t EpochNanos)
```

Description

Set the simulated UNIX epoch offset in nanoseconds on the root time source.

Parameters

Table 456. temu_setEpochNanos Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object
EpochNanos	int64_t	UNIX epoch nanoseconds corresponding to simulated time zero.

1.1.522. temu_setMemAttr

Include

```
#include "temu-c/Memory/Memory.h"
```

Signature

```
void temu_setMemAttr(void * Obj, uint64_t Addr, uint64_t Len, temu_MemoryAttr Attr)
```

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Description

Set attribute on memory space location

Parameters

Table 457. `temu_setMemAttr` Parameters

Parameter	Type	Description
Obj	void *	The memory space object
Addr	uint64_t	Physical address where to map the device
Len	uint64_t	Length in bytes of area where the attribute should be set.
Attr	temu_MemoryAttr	The attribute to set.

1.1.523. temu_setRightmostZeoroBit64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_setRightmostZeoroBit64(uint64_t Word)
```

Description

Set right most bit that is zero

Result

A copy of Word, with the right most bit cleared

Parameters

Table 458. `temu_setRightmostZeoroBit64` Parameters

Parameter	Type	Description
Word	uint64_t	The word, in which the right most set bit will be set

1.1.524. temu_setRightmostZeroBit32

Include

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```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_setRightmostZeroBit32(uint32_t Word)
```

Description

Set right most bit that is zero

Result

A copy of Word, with the right most bit cleared

Parameters

Table 459. temu_setRightmostZeroBit32 Parameters

Parameter	Type	Description
Word	uint32_t	The word, in which the right most set bit will be cleared

1.1.525. temu_setTimeSource

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setTimeSource(temu_Object * Obj, temu_TimeSource * TS)
```

Description

Set time source object for models. Typically TS is a CPU. You can only set the time source for an internal class.

Parameters

Table 460. temu_setTimeSource Parameters

Parameter	Type	Description
Obj	temu_Object *	Object to set time source in.

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Parameter	Type	Description
TS	temu_TimeSource *	Time source object (CPU or clock model)

1.1.526. temu_setVTable

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_setVTable(temu_Class * Cls, void * VTable)
```

Description

Set the VTable pointer.

Temu classes, provides the ability to, for internal objects query for a VTable manually in O(1) time. In practice this can be any pointer, but it is typically used to register performance sensitive interfaces. E.g. the CPU and machine classes have their own VTable types that refer to a number of interfaces they implement.

Result

0 on success, non-zero otherwise.

Parameters

Table 461. `temu_setVTable` Parameters

Parameter	Type	Description
Cls	temu_Class *	The class, for which the vtable to be set
VTable	void *	Pointer to the vtable to be used

1.1.527. temu_setValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

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```
void temu_setValue(temu_Object * Obj, const char * PropName, temu_Propval Val, int
Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 462. `temu_setValue` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	temu_Propval	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.528. temu_setValueDouble

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueDouble(temu_Object * Obj, const char * PropName, double Val, int
Idx)
```

Description

Set floating point property (without side effects)

Parameters

Table 463. `temu_setValueDouble` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Val	double	The new property value

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Parameter	Type	Description
Idx	int	Index in property array (set to 0 if scalar)

1.1.529. temu_setValueI16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueI16(temu_Object * Obj, const char * PropName, int16_t Val, int Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 464. `temu_setValueI16` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int16_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.530. temu_setValueI32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueI32(temu_Object * Obj, const char * PropName, int32_t Val, int Idx)
```

Description

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Set a raw property value without side-effects

Parameters

Table 465. `temu_setValueI32` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int32_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.531. temu_setValueI64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueI64(temu_Object * Obj, const char * PropName, int64_t Val, int Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 466. `temu_setValueI64` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int64_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.532. temu_setValueI8

Include

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```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueI8(temu_Object * Obj, const char * PropName, int8_t Val, int Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 467. `temu_setValueI8` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int8_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.533. temu_setValueSigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueSigned(temu_Object * Obj, const char * PropName, int64_t Val, int
Idx)
```

Description

Set signed property (without side effects)

Parameters

Table 468. `temu_setValueSigned` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer

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Parameter	Type	Description
PropName	const char *	Name of property
Val	int64_t	The new property value
Idx	int	Index in property array (set to 0 if scalar)

1.1.534. temu_setValueU16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueU16(temu_Object * Obj, const char * PropName, uint16_t Val, int Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 469. `temu_setValueU16` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint16_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.535. temu_setValueU32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueU32(temu_Object * Obj, const char * PropName, uint32_t Val, int Idx)
```

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Description

Set a raw property value without side-effects

Parameters

Table 470. `temu_setValueU32` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint32_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.536. temu_setValueU64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueU64(temu_Object * Obj, const char * PropName, uint64_t Val, int Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 471. `temu_setValueU64` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint64_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.537. temu_setValueU8

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Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueU8(temu_Object * Obj, const char * PropName, uint8_t Val, int Idx)
```

Description

Set a raw property value without side-effects

Parameters

Table 472. `temu_setValueU8` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint8_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.538. temu_setValueUnsigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_setValueUnsigned(temu_Object * Obj, const char * PropName, uint64_t Val, int
Idx)
```

Description

Set unsigned property (without side effects)

Parameters

Table 473. `temu_setValueUnsigned` Parameters

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Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Val	uint64_t	The new property value
Idx	int	Index in property array (set to 0 if scalar)

1.1.539. temu_shutdownSupportLib

Include

```
#include "temu-c/Support/Init.h"
```

Signature

```
void temu_shutdownSupportLib()
```

Description

Tear down the support library's global state. Optional, only needed if e.g. searching for memory leaks.

Do not use any other TEMU API after this returns without calling `temu_initSupportLib()` again. Call it in the main thread only.

1.1.540. temu_signed32AddOverflows

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_signed32AddOverflows(uint32_t a, uint32_t b, uint32_t carry)
```

Description

Checks whether the addition of signed inputs with carry would overflow; a+b+carry

Result

true if it overflows, false otherwise

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Parameters

Table 474. `temu_signed32AddOverflows` Parameters

Parameter	Type	Description
a	uint32_t	is the first input
b	uint32_t	is the second input
carry	uint32_t	is the carry; can be either zero or one

1.1.541. temu_signedPropval

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_signedPropval(temu_Type T, int64_t I)
```

Description

Create a signed propval of the given type

Result

Property value with the given type and value.

Parameters

Table 475. `temu_signedPropval` Parameters

Parameter	Type	Description
T	temu_Type	Type ID, must be a signed integer type tag
I	int64_t	Integer value

1.1.542. temu_snapshotGetLength

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

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```
int temu_snapshotGetLength(void * Ctxt, const char * Name)
```

Description

Get number of entries for the serialized property

Result

Length of the property in elements. Negative on error.

Parameters

Table 476. temu_snapshotGetLength Parameters

Parameter	Type	Description
Ctxt	void *	Context passed to deserialise function
Name	const char *	Name of property / key in the serialized file

1.1.543. temu_snapshotGetValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_snapshotGetValue(void * Ctxt, const char * Name, int Idx)
```

Description

Get value for named snapshot value

Result

Property value with the contents saved to the snapshot

Parameters

Table 477. temu_snapshotGetValue Parameters

Parameter	Type	Description
Ctxt	void *	Context is passed to deserialise interface function

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Parameter	Type	Description
Name	const char *	Name of the saved value
Idx	int	Index of the saved value (if array)

1.1.544. temu_sparcGetAsr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_sparcGetAsr(void * Cpu, unsigned int Reg)
```

Description

Get ASR register value

Result

ASR register value

Parameters

Table 478. `temu_sparcGetAsr` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Reg	unsigned int	ASR register ID

1.1.545. temu_sparcGetNPc

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_sparcGetNPc(void * Cpu)
```

Description

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Get the nPC value

Result

nPC value

Parameters

Table 479. `temu_sparcGetNPc` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

1.1.546. temu_sparcGetPsr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_sparcGetPsr(void * Cpu)
```

Description

Get the Processor State Register

Result

PSR value

Parameters

Table 480. `temu_sparcGetPsr` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

1.1.547. temu_sparcGetTbr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
uint32_t temu_sparcGetTbr(void * Cpu)
```

Description

Get Trap Base Register value

Result

TBR value

Parameters

Table 481. temu_sparcGetTbr Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

1.1.548. temu_sparcGetWim

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_sparcGetWim(void * Cpu)
```

Description

Get window invalidation mask register

Result

WIM value

Parameters

Table 482. temu_sparcGetWim Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

1.1.549. temu_sparcGetWindowCount

Include

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```
#include "temu-c/Support/Cpu.h"
```

Signature

```
int temu_sparcGetWindowCount(void * Cpu)
```

Description

Get how many register windows are supported by the CPU

Result

Number of register windows

Parameters

Table 483. temu_sparcGetWindowCount Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

1.1.550. temu_sparcGetWindowedReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint32_t temu_sparcGetWindowedReg(void * Cpu, int Window, unsigned int Reg)
```

Description

Get a windowed SPARC register

Result

Register value

Parameters

Table 484. temu_sparcGetWindowedReg Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Window	int	Window number (-1 for current window)
Reg	unsigned int	Register number within window

1.1.551. temu_sparcGetY

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
uint64_t temu_sparcGetY(void * Cpu)
```

Description

Get the Y register of the CPU,

Result

Current Y register value

Parameters

Table 485. `temu_sparcGetY` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer

1.1.552. temu_sparcPrivilegeLevel

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
temu_SparcPrivilegeLevel temu_sparcPrivilegeLevel(void * cpu)
```

Description

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Get the SPARC privilege level

Result

SPARC privilege level

Parameters

Table 486. `temu_sparcPrivilegeLevel` Parameters

Parameter	Type	Description
cpu	void *	SPARC CPU pointer

1.1.553. temu_sparcSetAsr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetAsr(void * Cpu, unsigned int Reg, uint64_t Value)
```

Description

Set the ASR register

Parameters

Table 487. `temu_sparcSetAsr` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Reg	unsigned int	ASR register ID
Value	uint64_t	Value to write

1.1.554. temu_sparcSetAsrReader

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_sparcSetAsrReader(void * Cpu, unsigned int Asr, temu_SparcAsrHandler
Handler)
```

Description

Install the handler to be called when an ASR is read

Parameters

Table 488. temu_sparcSetAsrReader Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Asr	unsigned int	ASR register ID
Handler	temu_SparcAsrHandler	Function to call.

1.1.555. temu_sparcSetAsrWriter

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetAsrWriter(void * Cpu, unsigned int Asr, temu_SparcAsrHandler
Handler)
```

Description

Install the handler to be called when an ASR is written

Parameters

Table 489. temu_sparcSetAsrWriter Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Asr	unsigned int	ASR register ID
Handler	temu_SparcAsrHandler	Function to call.

1.1.556. temu_sparcSetNPc

Include

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```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetNPc(void * Cpu, uint32_t Value)
```

Description

Set the nPC value (next program counter)



When you use the setPC function, the NPC is also updated to PC+4. Use this to explicitly set NPC.

Parameters

Table 490. `temu_sparcSetNPc` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Value	uint32_t	Value to write to NPC

1.1.557. temu_sparcSetPsr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetPsr(void * Cpu, uint32_t Value)
```

Description

Set the Processor State Register

Parameters

Table 491. `temu_sparcSetPsr` Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Value	uint32_t	Value to write

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1.1.558. temu_sparcSetTbr

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetTbr(void * Cpu, uint32_t Value)
```

Description

Set the Trap Base Register

Parameters

Table 492. temu_sparcSetTbr Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer,
Value	uint32_t	Value for TBR register

1.1.559. temu_sparcSetWim

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetWim(void * Cpu, uint32_t Value)
```

Description

Set window invalidation mask register

Parameters

Table 493. temu_sparcSetWim Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Value	uint32_t	value to set in WIM

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1.1.560. temu_sparcSetWindowedReg

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetWindowedReg(void * Cpu, int Window, unsigned int Reg, uint32_t
Value)
```

Description

Set a windowed SPARC register

Parameters

Table 494. temu_sparcSetWindowedReg Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Window	int	Window number (-1 for current window)
Reg	unsigned int	Register number within window
Value	uint32_t	Register value

1.1.561. temu_sparcSetY

Include

```
#include "temu-c/Support/Cpu.h"
```

Signature

```
void temu_sparcSetY(void * Cpu, uint64_t Value)
```

Description

Set the Y register of the CPU,

Parameters

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Table 495. temu_sparcSetY Parameters

Parameter	Type	Description
Cpu	void *	SPARC CPU pointer
Value	uint64_t	Value to write to the Y register

1.1.562. temu_spfiConnect

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Signature

```
void temu_spfiConnect(temu_SpfiPortIfaceRef Dev1PortIface, temu_SpfiPortIfaceRef
Dev2PortIface)
```

Description

Connect two SpaceFibre ports.

1.1.563. temu_spfiDisconnect

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Signature

```
void temu_spfiDisconnect(temu_SpfiPortIfaceRef Dev1PortIface, temu_SpfiPortIfaceRef
Dev2PortIface)
```

Description

Disconnect two SpaceFibre ports.

1.1.564. temu_spiGetCyclesInMessage

Include

```
#include "temu-c/Bus/SPI.h"
```

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Signature

```
uint32_t temu_spiGetCyclesInMessage(const temu_SpiTransaction * t)
```

Description

Calculate the number of clock cycles the transmission took

Result

uint32_t Number of clock cycles

Parameters

Table 496. temu_spiGetCyclesInMessage Parameters

Parameter	Type	Description
t	const temu_SpiTransaction *	The SPI Transaction

1.1.565. temu_spwConnect

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
void temu_spwConnect(temu_SpwPortIfaceRef Dev1PortIface, temu_SpwPortIfaceRef
Dev2PortIface)
```

Description

Connect two SpaceWire ports.

1.1.566. temu_spwDisconnect

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
void temu_spwDisconnect(temu_SpwPortIfaceRef Dev1PortIface, temu_SpwPortIfaceRef
Dev2PortIface)
```

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Description

Disconnect two SpaceWire ports.

1.1.567. temu_spwLinkStateToStr

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
const char * temu_spwLinkStateToStr(uint8_t linkState)
```

Description

Returns the string name for the link state.

Result

1.1.568. temu_spwLsmInit

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
void temu_spwLsmInit(temu_SpwLinkState * StatePtr)
```

Description

Initialize the link state.

1.1.569. temu_spwLsmUpdate

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint8_t temu_spwLsmUpdate(temu_SpwLinkState * StatePtr, uint8_t AS, uint8_t LS,
```

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```
uint8_t LD, uint8_t PortConnect, temu_SpwLinkState otherSideLinkState)
```

Description

Updates the link state.

Result

1.1.570. temu_spwRmapCRC

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint8_t temu_spwRmapCRC(const uint8_t * Data, uint32_t DataSize)
```

Description

Calculates the CRC over the specified data.

Result

1.1.571. temu_spwRmapCRCNextCode

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint8_t temu_spwRmapCRCNextCode(uint8_t InCRC, uint8_t InByte)
```

Description

Provided the previous calculated crc and a the current byte returns the next CRC value.

Result

1.1.572. temu_spwRmapDecodeBuffer

Include

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```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
temu_SpwRmapDecodingOutcome temu_spwRmapDecodeBuffer(const temu_Buff * PktDataBuffer,
temu_SpwRmapDecodedPacket * PktDecoded)
```

Description

Provided a buffer containing a SpaceWire Rmap packet attempts to decode it.

Result

1.1.573. temu_spwRmapDecodePacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
temu_SpwRmapDecodingOutcome temu_spwRmapDecodePacket(const temu_SpwPacket * Pkt,
temu_SpwRmapDecodedPacket * PktDecoded)
```

Description

Provided a SpaceWire Rmap packet attempts to decode it.

Result

1.1.574. temu_spwRmapEncodeReadReplyHeaderForPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint32_t temu_spwRmapEncodeReadReplyHeaderForPacket(const temu_SpwRmapDecodedPacket *
DCmdPkt, uint8_t * Data, uint32_t AllocatedDataSize, uint8_t Status, uint32_t
DataLength)
```

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Description

Encodes the reply for a read command.

Result

1.1.575. temu_spwRmapEncodeRmwHeaderForPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint32_t temu_spwRmapEncodeRmwHeaderForPacket(const temu_SpwRmapDecodedPacket *
DCmdPkt, uint8_t * Data, uint32_t AllocatedDataSize, uint8_t Status, uint32_t
DataLength)
```

Description

Encodes the reply for a rmw command.

Result

1.1.576. temu_spwRmapEncodeWriteReplyHeaderForPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint32_t temu_spwRmapEncodeWriteReplyHeaderForPacket(const temu_SpwRmapDecodedPacket *
DCmdPkt, uint8_t * Data, uint32_t AllocatedDataSize, uint8_t Status)
```

Description

Encodes the reply for a write command.

Result

1.1.577. temu_spwRmapHeaderReplySize

Include

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```
#include "temu-c/Bus/Spacewire.h"
```

Signature

```
uint32_t temu_spwRmapHeaderReplySize(const temu_SpwRmapDecodedPacket * DCmdPkt)
```

Description

Returns the total packet-size required to reply to the command.

Result

1.1.578. temu_srtNanosToUnixNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
int64_t temu_srtNanosToUnixNanos(temu_TimeSource * TS, int64_t SrtNanos)
```

Description

Convert simulated relative time to deterministic UNIX epoch nanoseconds.

Result

UNIX epoch nanoseconds after applying the root epoch offset.

Parameters

Table 497. `temu_srtNanosToUnixNanos` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object
SrtNanos	int64_t	Simulated real-time nanoseconds relative to time zero.

1.1.579. temu_stateCreate

Include

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```
#include "temu-c/Support/StateUnstable.h"
```

Signature

```
temu_State * temu_stateCreate()
```

Description

EXPERIMENTAL AND UNSAFE!

Creates a new TEMU state instance (without making it the current one). Most users should never call this and just rely on `temu_initSupportLib()`, which handles the single-instance case.

Instance state is not copied from anywhere: A second instance is a second set-up, not a clone (only command definitions and command line flags are inherited). You need to call `temu_initSupportLib()` etc again.

Result

1.1.580. temu_stateDestroy

Include

```
#include "temu-c/Support/StateUnstable.h"
```

Signature

```
void temu_stateDestroy(temu_State * State)
```

Description

EXPERIMENTAL AND UNSAFE!

Destroys a TEMU state. Most users should never call this and just rely on `temu_shutdownSupportLib()`.

1.1.581. temu_stateGetCurrent

Include

```
#include "temu-c/Support/StateUnstable.h"
```

Signature

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```
temu_State * temu_stateGetCurrent()
```

Description

EXPERIMENTAL AND UNSAFE!

The process's current state, or NULL if it has none.

Result

1.1.582. temu_stateSetCurrent

Include

```
#include "temu-c/Support/StateUnstable.h"
```

Signature

```
temu_State * temu_stateSetCurrent(temu_State * State)
```

Description

EXPERIMENTAL AND UNSAFE!

Passing NULL detaches the process from any state. Only the pointer is swapped: nothing is created or destroyed.

Result

1.1.583. temu_step

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_step(temu_TimeSource * cpu, int steps)
```

Description

Step a processor in the current scheduler

Note that, the other processors may run if the step exceeds the quanta. The step function currently

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runs processors in sequence, it is not running processors in parallel. This means that stepping is always deterministic.

Parameters

Table 498. `temu_step` Parameters

Parameter	Type	Description
cpu	temu_TimeSource *	The processor to step
steps	int	The number of steps or instructions to execute

1.1.584. temu_stepsToCycles

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
uint64_t temu_stepsToCycles(temu_TimeSource * TS, uint64_t Steps)
```

Description

Convert steps to cycles

Result

Steps converted to cycles given the time source IPC/CPI configuration.

Parameters

Table 499. `temu_stepsToCycles` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object
Steps	uint64_t	Step count to convert to cycles

1.1.585. temu_stepsToCyclesRoundedUp

Include

```
#include "temu-c/Support/Time.h"
```

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Signature

```
uint64_t temu_stepsToCyclesRoundedUp(temu_TimeSource * TS, uint64_t Steps)
```

Description

Convert steps to cycles, rounding upwards

Result

Steps converted to cycles given the time source IPC/CPI configuration.

Parameters

Table 500. `temu_stepsToCyclesRoundedUp` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	Time source object
Steps	uint64_t	Step count to convert to cycles

1.1.586. temu_stop

Include

```
#include "temu-c/Support/Scheduler.h"
```

Signature

```
void temu_stop()
```

Description

Stop the current scheduler

The function signals the scheduler to stop, and then waits until the scheduler is in the stopped state.

1.1.587. temu_storeIntelHexImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

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```
int temu_storeIntelHexImage(void * mem, const char * file, temu_MemoryRegion *
regions)
```

Description

Writes an Intel HEX file with memory from the supplied regions.

Result

0 on success, other values indicates errors

Parameters

Table 501. `temu_storeIntelHexImage` Parameters

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
file	const char *	Path to file to store.
regions	temu_MemoryRegion *	Regions to write to file, end region should be {x,-1}

1.1.588. temu_storeSrecImage

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_storeSrecImage(void * mem, const char * file, temu_SrecRegion * regions)
```

Description

Writes an SREC file with memory from the supplied regions.

Result

0 on success, other values indicates errors

Parameters

Table 502. `temu_storeSrecImage` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
mem	void *	Memory object, must conform to the memory access interface.
file	const char *	Path to file to load.
regions	temu_SrecRegion *	Regins to write to file, end region should be {x,-1}

1.1.589. temu_subscribeNotification

Include

```
#include "temu-c/Support/Notifications.h"
```

Signature

```
int temu_subscribeNotification(const char * NotName, temu_Object * Source, void * Arg,
temu_NotificationHandler NotFunc)
```

Description

Install notification functions for the given event generated by source

Result

Parameters

Table 503. `temu_subscribeNotification` Parameters

Parameter	Type	Description
NotName	const char *	Name of the notification
Source	temu_Object *	If source is NULL, the event subscriber will be notified by all the sources for the given name.
Arg	void *	Context argument to be passed to the callback notification function
NotFunc	temu_NotificationHandler	The callback function on notification

1.1.590. temu_swap16

Include

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```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint16_t temu_swap16(uint16_t HWord)
```

Description

Swap bytes in 16 bit word

Result

the swapped word

Parameters

Table 504. `temu_swap16` Parameters

Parameter	Type	Description
HWord	uint16_t	The word to be swapped

1.1.591. temu_swap32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_swap32(uint32_t Word)
```

Description

Swap bytes in 32 bit word

Result

the swapped word

Parameters

Table 505. `temu_swap32` Parameters

Parameter	Type	Description
Word	uint32_t	The word to be swapped

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1.1.592. temu_swap32Half

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_swap32Half(uint32_t Word)
```

Description

Swap half words inside 32 bit word

Result

the swapped word

Parameters

Table 506. `temu_swap32Half` Parameters

Parameter	Type	Description
Word	uint32_t	The word to be swapped

1.1.593. temu_swap64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_swap64(uint64_t DWord)
```

Description

Swap bytes in 64 bit word

Result

the swapped word

Parameters

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Table 507. `temu_swap64` Parameters

Parameter	Type	Description
DWord	uint64_t	The word to be swapped

1.1.594. temu_swap64Word

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_swap64Word(uint64_t DWord)
```

Description

Swap words inside 64 bit word

Result

the swapped word

Parameters

Table 508. `temu_swap64Word` Parameters

Parameter	Type	Description
DWord	uint64_t	The word to be swapped

1.1.595. temu_swapBigHost16

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint16_t temu_swapBigHost16(uint16_t HWord)
```

Description

Swap between big endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use

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these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 509. temu_swapBigHost16 Parameters

Parameter	Type	Description
HWord	uint16_t	The word to be swapped

1.1.596. temu_swapBigHost32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_swapBigHost32(uint32_t Word)
```

Description

Swap between big endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 510. temu_swapBigHost32 Parameters

Parameter	Type	Description
Word	uint32_t	The word to be swapped

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1.1.597. temu_swapBigHost32Half

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_swapBigHost32Half(uint32_t Word)
```

Description

Swap between big endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 511. `temu_swapBigHost32Half` Parameters

Parameter	Type	Description
Word	uint32_t	The word to be swapped

1.1.598. temu_swapBigHost64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_swapBigHost64(uint64_t DWord)
```

Description

Swap between big endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use

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these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 512. `temu_swapBigHost64` Parameters

Parameter	Type	Description
DWord	uint64_t	The word to be swapped

1.1.599. temu_swapBigHost64Word

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_swapBigHost64Word(uint64_t DWord)
```

Description

Swap between big endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 513. `temu_swapBigHost64Word` Parameters

Parameter	Type	Description
DWord	uint64_t	The word to be swapped

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1.1.600. temu_swapLittleHost16

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint16_t temu_swapLittleHost16(uint16_t HWord)
```

Description

Swap between little endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 514. `temu_swapLittleHost16` Parameters

Parameter	Type	Description
HWord	uint16_t	The word to be swapped

1.1.601. temu_swapLittleHost32

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_swapLittleHost32(uint32_t Word)
```

Description

Swap between little endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use

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these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 515. `temu_swapLittleHost32` Parameters

Parameter	Type	Description
Word	uint32_t	The word to be swapped

1.1.602. temu_swapLittleHost32Half

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint32_t temu_swapLittleHost32Half(uint32_t Word)
```

Description

Swap between little endian to host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 516. `temu_swapLittleHost32Half` Parameters

Parameter	Type	Description
Word	uint32_t	The word to be swapped

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1.1.603. temu_swapLittleHost64

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_swapLittleHost64(uint64_t DWord)
```

Description

Swap between little endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 517. `temu_swapLittleHost64` Parameters

Parameter	Type	Description
DWord	uint64_t	The word to be swapped

1.1.604. temu_swapLittleHost64Word

Include

```
#include "temu-c/Support/Bitmanip.h"
```

Signature

```
uint64_t temu_swapLittleHost64Word(uint64_t DWord)
```

Description

Swap between little endian and host endian. Note that at present we only have little endian hosts, so these functions simply wrap. However, they declare intent and it is recommended that you use

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these for swapping when you want to go between little

>host and big

>host.

Result

the swapped word

Parameters

Table 518. `temu_swapLittleHost64Word` Parameters

Parameter	Type	Description
DWord	uint64_t	The word to be swapped

1.1.605. temu_symtabGetFuncName

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
void temu_symtabGetFuncName(temu_Symtab * Sym, const char ** LocalFile, const char **
Symbol, uint64_t Addr)
```

Description

Get the function name associated with the given address

The address can be any address within the range of the function, i.e. from the start to othe end of the function. Thus this serves as a way to find the name of the current function given a PC value.

The function first searches for local symbols (e.g. static symbols in C). It then searches for global symbols and last for weak symbols.

If a local symbol is found, the LocalFile pointer will point at a string with the file name it is associated to, otherwise the local file pointer will be set to null.

The returned pointers are valid until the symbol table is disposed.

Parameters

Table 519. `temu_symtabGetFuncName` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Sym	temu_Symtab *	Symboltable
LocalFile	const char **	The pointer it refers to will be set to NULL if the symbol found is global.
Symbol	const char **	The pointer will be set to NULL if a function cannot be found at the address.
Addr	uint64_t	Virtual address to find a function name for.

1.1.606. temu_symtabGetGlobalFuncRange

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_symtabGetGlobalFuncRange(temu_Symtab * Sym, const char * FuncName, uint64_t *
Addr, uint64_t * Size)
```

Description

Get the range of a global function

On success, the Addr and the Size references will be set to the starting virtual address of the function and the size in bytes respectively.

Result

0 on success (the function exists), other values indicate falures.

Parameters

Table 520. temu_symtabGetGlobalFuncRange Parameters

Parameter	Type	Description
Sym	temu_Symtab *	The Symbol table, from which the function is to be retrieved
FuncName	const char *	The function, whose range is required

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Addr	uint64_t *	On success, gives the address of the function
Size	uint64_t *	On success, gives the size of the function start from Addr

1.1.607. temu_symtabGetGlobalObjRange

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_symtabGetGlobalObjRange(temu_Symtab * Sym, const char * ObjectName, uint64_t
* Addr, uint64_t * Size)
```

Description

Get the range of a global object

On success, the Addr and the Size references will be set to the starting virtual address of the object and the size in bytes respecivelly.

Result

0 on success (the object exists), other values indicate falures

Parameters

Table 521. temu_symtabGetGlobalObjRange Parameters

Parameter	Type	Description
Sym	temu_Symtab *	The Symbol table, from which the object to be retrieved
ObjectName	const char *	Name of the object, whose address range is to be obtained
Addr	uint64_t *	On success, gives the address of the object
Size	uint64_t *	On success, gives the size of the object start from Addr

1.1.608. temu_symtabGetLocalFuncRange

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Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_symtabGetLocalFuncRange(temu_Symtab * Sym, const char * FileName, const char
* FuncName, uint64_t * Addr, uint64_t * Size)
```

Description

Get the range of a local/static function

On success, the Addr and the Size references will be set to the starting virtual address of the function and the size in bytes respectively.

Result

0 on success (the function exists in the given file), other values indicate falures

Parameters

Table 522. `temu_symtabGetLocalFuncRange` Parameters

Parameter	Type	Description
Sym	temu_Symtab *	The Symbol table, from which the function to be retrieved
FileName	const char *	The file/compilation unit that contains the function
FuncName	const char *	The function, whose range is required
Addr	uint64_t *	On success, gives the address of the function
Size	uint64_t *	On success, gives the size of the function start from Addr

1.1.609. temu_symtabGetLocalObjRange

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int temu_symtabGetLocalObjRange(temu_Symtab * Sym, const char * FileName, const char *
ObjectName, uint64_t * Addr, uint64_t * Size)
```

Description

Get the range of a local/static object

On success, the Addr and the Size references will be set to the starting virtual address of the object and the size in bytes respecivelly.

Result

0 on success (the object exists), other values indicate falures

Parameters

Table 523. temu_symtabGetLocalObjRange Parameters

Parameter	Type	Description
Sym	temu_Symtab *	The Symbol table, from which the object to be retrieved
FileName	const char *	The file/compilation unit that contains the function
ObjectName	const char *	The object, whose range is required
Addr	uint64_t *	On success, gives the address of the object
Size	uint64_t *	On success, gives the size of the object start from Addr

1.1.610. temu_symtabGetNextLocalFuncRange

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_symtabGetNextLocalFuncRange(temu_Symtab * Sym, const char * FuncName, const
char ** FileName, const char ** SymbolName, uint64_t * Addr, uint64_t * Size)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Iterate over local/static functions (optionally only those with a given name).

ileName and *SymbolName should be NULL for the first call. Each call writes the next hit to them (and to Addr and Size). Calling this function repeatedly feeding the previous value back in makes it work like a iterator. Any returned strings are owned by the symbol table and valid until it is disposed.

Result

0 on success, -1 if there are no more hits (FileName and SymbolName are then set back to NULL).

Parameters

Table 524. temu_symtabGetNextLocalFuncRange Parameters

Parameter	Type	Description
Sym	temu_Symtab *	Symbol table
FuncName	const char *	Only find functions with this name (or NULL for all)
FileName	const char **	In: file of the previous hit (NULL to start), Out: file of this hit.
SymbolName	const char **	In: name of the previous hit. Out: name of this hit.
Addr	uint64_t *	On success, gives the address of the function
Size	uint64_t *	On success, gives the size of the function start from Addr

1.1.611. temu_symtabGetNextLocalObjRange

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
int temu_symtabGetNextLocalObjRange(temu_Symtab * Sym, const char * ObjectName, const
char ** FileName, const char ** SymbolName, uint64_t * Addr, uint64_t * Size)
```

Description

Iterate over local/static objects (optionally only those with a given name).

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Works like temu_symtabGetNextLocalFuncRange().

Result

0 on success, -1 if there are no more hits (FileName and SymbolName are then set to NULL).

Parameters

Table 525. temu_symtabGetNextLocalObjRange Parameters

Parameter	Type	Description
Sym	temu_Symtab *	Symbol table
ObjectName	const char *	Only find objects with this name (or NULL for all)
FileName	const char **	In: file of the previous hit (NULL to start), Out: file of this hit.
SymbolName	const char **	In: name of the previous hit. Out: name of this hit.
Addr	uint64_t *	On success, gives the address of the object
Size	uint64_t *	On success, gives the size of the object start from Addr

1.1.612. temu_symtabGetObjName

Include

```
#include "temu-c/Support/Loader.h"
```

Signature

```
void temu_symtabGetObjName(temu_Symtab * Sym, const char ** LocalFile, const char **
Symbol, uint64_t Addr)
```

Description

Get the object name associated with the given address

The address can be any address within the range of the object. Thus this serves as a way to find the name of a global or static object given an address.

The function first searches for local symbols (e.g. static symbols in C). It then searches for global symbols and last for weak symbols.

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If a local symbol is found, the LocalFile pointer will point at a string with the file name it is associated to, otherwise the local file pointer will be set to NULL.

The returned pointers are valid until the symbol table is disposed.

Parameters

Table 526. `temu_symtabGetObjName` Parameters

Parameter	Type	Description
Sym	temu_Symtab *	Symboltable
LocalFile	const char **	The pointer it refers to will be set to NULL if the symbol found is global.
Symbol	const char **	The pointer will be set to NULL if an object cannot be found at the address.
Addr	uint64_t	Virtual address to find an object name for.

1.1.613. temu_timeGetCurrentSrtNanos

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
uint64_t temu_timeGetCurrentSrtNanos(temu_TimeSource * TS)
```

Description

Get the current simulated real-time in nanoseconds

Result

simulated time for the given object

Parameters

Table 527. `temu_timeGetCurrentSrtNanos` Parameters

Parameter	Type	Description
TS	temu_TimeSource *	The object in question

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1.1.614. temu_timeGetMonotonicWct

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
uint64_t temu_timeGetMonotonicWct()
```

Description

Get monotonic time in nanoseconds.

The monotonic time is relative since some epoch of undefined start, but it is monotonic, unaffected by adjustments due to leap seconds, setting of the system clock, etc.

This function is primarily useful for doing performance measurements since the time returned is relative to an undefined point (although that undefined point will be consistent while the program is running).

In practice, on systems with clock_gettime() implemented, this function returns the timespec converted to nanoseconds, but on systems without clock_gettime(), e.g. Darwin and Windows, the function will only ensure that some notion of monotonic nanoseconds are returned. In Darwin for example, this results in a monotonic time returned which is relative to the first call to the function.

Result

Wall clock nanoseconds since an unspecified epoch.

1.1.615. temu_timeGetThreadWct

Include

```
#include "temu-c/Support/Time.h"
```

Signature

```
uint64_t temu_timeGetThreadWct()
```

Description

Returns wall clock nanoseconds of thread time



This is how much time the thread this is called from has been scheduled.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Result

wall clock nanoseconds of thread time

1.1.616. temu_typeToName

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_typeToName(temu_Type Typ)
```

Description

Get a string representing the type tag.

Result

The name as a C-string

Parameters

Table 528. `temu_typeToName` Parameters

Parameter	Type	Description
Typ	temu_Type	The type, whose name is required

1.1.617. temu_typenameForInterface

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
const char * temu_typenameForInterface(const temu_Object * Obj, const void * Iface)
```

Description

Get type name for interface

Result

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

The name of the type as C-string

Parameters

Table 529. `temu_typenameForInterface` Parameters

Parameter	Type	Description
Obj	const temu_Object *	Pointer to the object that contains the interface
Iface	const void *	Pointer to the interface

1.1.618. temu_u128FromI64

Include

```
#include "temu-c/Support/Int128.h"
```

Signature

```
temu_U128 temu_u128FromI64(int64_t V)
```

Description

Sign-extends, so -1 becomes all ones rather than 0x00000000ffffffffffffffff.

Result

1.1.619. temu_u128ToU64

Include

```
#include "temu-c/Support/Int128.h"
```

Signature

```
uint64_t temu_u128ToU64(temu_U128 V)
```

Description

Truncates to the low 64 bits.

Result

1.1.620. temu_unsignedPropval

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Propval temu_unsignedPropval(temu_Type T, uint64_t U)
```

Description

Create an unsigned propval of the given type

Result

Property value with the given type and value.

Parameters

Table 530. `temu_unsignedPropval` Parameters

Parameter	Type	Description
T	temu_Type	Type ID, must be an unsigned integer type tag
U	uint64_t	Integer value

1.1.621. temu_unsubscribeNotification

Include

```
#include "temu-c/Support/Notifications.h"
```

Signature

```
int temu_unsubscribeNotification(const char * NotName, temu_Object * Source,
temu_NotificationHandler NotFunc)
```

Description

Remove notification handler for the given name and source. Note that this function runs in O(N) time. It is not meant for being used in performance critical code.

Result

Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Table 531. temu_unsubscribeNotification Parameters

Parameter	Type	Description
NotName	const char *	Name of the notification
Source	temu_Object *	If source is NULL, the event subscriber will be notified by all the sources for the given name.
NotFunc	temu_NotificationHandler	The callback function to be called on notification

1.1.622. temu_unsubscribeNotificationArg

Include

```
#include "temu-c/Support/Notifications.h"
```

Signature

```
int temu_unsubscribeNotificationArg(const char * NotName, temu_Object * Source,
temu_NotificationHandler NotFunc, void * Arg)
```

Description

Remove notification handler for the given name, source and arg. Note that this function runs in O(N) time. It is not meant for being used in performance critical code.

Result

zero on success, otherwise non-zero

Parameters

Table 532. temu_unsubscribeNotificationArg Parameters

Parameter	Type	Description
NotName	const char *	Name of the notification
Source	temu_Object *	If source is NULL, the event subscriber will be notified by all the sources for the given name.
NotFunc	temu_NotificationHandler	The callback function to be called on notification

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Parameter	Type	Description
Arg	void *	Context argument to be passed to the callback notification function

1.1.623. temu_vecClear

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_vecClear(temu_Vector * Vec)
```

Description

Clear a vector object

Parameters

Table 533. `temu_vecClear` Parameters

Parameter	Type	Description
Vec	temu_Vector *	The vector object to be deleted

1.1.624. temu_vecCreate

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
temu_Vector temu_vecCreate(temu_Type Typ)
```

Description

Create a vector object

Result

the vector object created

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 534. `temu_vecCreate` Parameters

Parameter	Type	Description
Typ	temu_Type	The type of the elements

1.1.625. temu_vecDispose

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_vecDispose(temu_Vector * Vec)
```

Description

Delete a vector object

Parameters

Table 535. `temu_vecDispose` Parameters

Parameter	Type	Description
Vec	temu_Vector *	The vector object to be deleted

1.1.626. temu_vecGetData

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void * temu_vecGetData(temu_Vector * Vec)
```

Description

Retrieve the array of elements of a vector

Result

Returns a pointer to the first element of the vector

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameters

Table 536. `temu_vecGetData` Parameters

Parameter	Type	Description
Vec	temu_Vector *	The vector, whose elements are requested

1.1.627. temu_vecGetElementSize

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
size_t temu_vecGetElementSize(temu_Vector * Vec)
```

Description

Retrieve the size of each element in the vector

Result

Returns number of bytes per element.

Parameters

Table 537. `temu_vecGetElementSize` Parameters

Parameter	Type	Description
Vec	temu_Vector *	The vector

1.1.628. temu_vecGetSize

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
size_t temu_vecGetSize(temu_Vector * Vec)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Get the number of elements of a vector

Result

The number of elements in Vec

Parameters

Table 538. temu_vecGetSize Parameters

Parameter	Type	Description
Vec	temu_Vector *	The vector, whose size to be retrieved

1.1.629. temu_vecPush

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_vecPush(temu_Vector * Vec, temu_Propval Val)
```

Description

Add an element to a vector object

Parameters

Table 539. temu_vecPush Parameters

Parameter	Type	Description
Vec	temu_Vector *	The vector, to which the element to be added
Val	temu_Propval	The element to be added

1.1.630. temu_writePCIeConfigRegister

Include

```
#include "temu-c/Support/PCIeHelper.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_writePCIeConfigRegister(temu_PCIExpressDevice * devConf, uint32_t offset,
uint32_t value)
```

Description

Write value to PCIe config to the register with given offset.

Parameters

Table 540. temu_writePCIeConfigRegister Parameters

Parameter	Type	Description
devConf	temu_PCIExpressDevice *	PCIe configuration
offset	uint32_t	register offset in memory map.
value	uint32_t	new value fot the register

1.1.631. temu_writeProp

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
int temu_writeProp(temu_Object * Obj, const char * Name, int idx, temu_Propval * PV)
```

Description

Write property (with side effects)

Result

0 if the property was written

Parameters

Table 541. temu_writeProp Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
Name	const char *	Name of property
idx	int	Index in property array (set to 0 if scalar)

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
PV	temu_Propval *	Pointer to propval

1.1.632. temu_writeValue

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValue(temu_Object * Obj, const char * PropName, temu_Propval Val, int
Idx)
```

Description

Write a property value with side-effects

Parameters

Table 542. `temu_writeValue` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	temu_Propval	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.633. temu_writeValueDouble

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueDouble(temu_Object * Obj, const char * PropName, double Val, int
Idx)
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Write floating point property (with side effects)

Parameters

Table 543. temu_writeValueDouble Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Val	double	The new property value
Idx	int	Index in property array (set to 0 if scalar)

1.1.634. temu_writeValueI16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueI16(temu_Object * Obj, const char * PropName, int16_t Val, int
Idx)
```

Description

Write a property value with side-effects

Parameters

Table 544. temu_writeValueI16 Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int16_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.635. temu_writeValueI32

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueI32(temu_Object * Obj, const char * PropName, int32_t Val, int
Idx)
```

Description

Write a property value with side-effects

Parameters

Table 545. `temu_writeValueI32` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int32_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.636. temu_writeValueI64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueI64(temu_Object * Obj, const char * PropName, int64_t Val, int
Idx)
```

Description

Write a property value with side-effects

Parameters

Table 546. `temu_writeValueI64` Parameters

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Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int64_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.637. temu_writeValueI8

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueI8(temu_Object * Obj, const char * PropName, int8_t Val, int Idx)
```

Description

Write a property value with side-effects

Parameters

Table 547. temu_writeValueI8 Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	int8_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.638. temu_writeValueObj

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
void temu_writeValueObj(temu_Object * Obj, const char * PropName, temu_Object * Val,
int Idx)
```

Description

Write a property value with side-effects

Parameters

Table 548. `temu_writeValueObj` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	temu_Object *	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.639. temu_writeValueSigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueSigned(temu_Object * Obj, const char * PropName, int64_t Val, int
Idx)
```

Description

Write signed property (with side effects)

Parameters

Table 549. `temu_writeValueSigned` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Val	int64_t	The new property value

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Idx	int	Index in property array (set to 0 if scalar)

1.1.640. temu_writeValueU16

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueU16(temu_Object * Obj, const char * PropName, uint16_t Val, int
Idx)
```

Description

Write a property value with side-effects

Parameters

Table 550. temu_writeValueU16 Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint16_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.641. temu_writeValueU32

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueU32(temu_Object * Obj, const char * PropName, uint32_t Val, int
Idx)
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Write a property value with side-effects

Parameters

Table 551. `temu_writeValueU32` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint32_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.642. temu_writeValueU64

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueU64(temu_Object * Obj, const char * PropName, uint64_t Val, int
Idx)
```

Description

Write a property value with side-effects

Parameters

Table 552. `temu_writeValueU64` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint64_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.643. temu_writeValueU8

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueU8(temu_Object * Obj, const char * PropName, uint8_t Val, int Idx)
```

Description

Write a property value with side-effects

Parameters

Table 553. `temu_writeValueU8` Parameters

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property to read.
Val	uint8_t	The value to set. It must be of the correct type.
Idx	int	Index of property, set to 0 if it is not an array.

1.1.644. temu_writeValueUnsigned

Include

```
#include "temu-c/Support/Objsys.h"
```

Signature

```
void temu_writeValueUnsigned(temu_Object * Obj, const char * PropName, uint64_t Val,
int Idx)
```

Description

Write unsigned property (with side effects)

Parameters

Table 554. `temu_writeValueUnsigned` Parameters

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Parameter	Type	Description
Obj	temu_Object *	Object pointer
PropName	const char *	Name of property
Val	uint64_t	The new property value
Idx	int	Index in property array (set to 0 if scalar)

1.1.645. xemu_getBranchCounter

Include

```
#include "temu-c/Support/Profiling.h"
```

Signature

```
uint64_t * xemu_getBranchCounter(uint64_t src, uint64_t tgt)
```

Description

Get a branch counter for the specific arc

Result

Pointer to the counter

Parameters

Table 555. `xemu_getBranchCounter` Parameters

Parameter	Type	Description
src	uint64_t	Source physical address
tgt	uint64_t	Target physical address

1.1.646. xemu_writeBranchCounters

Include

```
#include "temu-c/Support/Profiling.h"
```

Signature

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
int xemu_writeBranchCounters(const char * fileName)
```

Description

Write branch counters in YAML format

Coverage is stored using physical addresses.

Result

0 if successful

Parameters

Table 556. `xemu_writeBranchCounters` Parameters

Parameter	Type	Description
fileName	const char *	Name of file to write

1.2. Structs and Unions

1.2.1.

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct  {
  temu_SanitizerAccessHook[2][4] Access;
  void * Data;
  uint64_t Epoch;
}
```

Description

The guest sanitizer observing this processor; set whenever teCF_Sanitizer is. See temu-c/Debugging/SanitizersUnstable.h.

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Access	temu_SanitizerAccessHook[2][4]	
Data	void *	The observer's own per-processor state.
Epoch	uint64_t	The observer's word for its fast path.

1.2.2. temu_AArch64CpuIfaceRef

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_AArch64CpuIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.3. temu_AArch64CpuIfaceRefArray

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_AArch64CpuIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.4. temu_AArch64IsaExtension

Include

```
#include "temu-c/Support/Cpu.h"
```

Type

```
struct temu_AArch64IsaExtension {
}
```

Description

An instruction of an AArch64 ISA extension: words matching OpCode under OpMask call instruction() instead of being UNDEFINED.

Fields of AsmStr, for the assembler and disassembler: {Rd} {Rn} {Rm} general-purpose register in bits 4:0, 9:5, 20:16 {Vd} {Vn} {Vm} SIMD register in the same bits {Qd} {Qn} {Qm} 128-bit SIMD register in the same bits {Sd} {Sn} {Sm} 32-bit SIMD scalar register in the same bits {imm:start:width} unsigned immediate, e.g. {imm:10:6} is bits 15:10 {simm:start:width} signed immediate

Fields

Field	Type	Description

1.2.5. temu_ARMCoProcessorIfaceRef

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMCoProcessorIfaceRef {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.6. temu_ARMCoProcessorIfaceRefArray

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMCoProcessorIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.7. temu_ARMCpuIfaceRef

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMCpuIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.8. temu_ARMCpuIfaceRefArray

Include

```
#include "temu-c/Target/ARM.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_ARMCpuIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.9. temu_ARMCpuVTable

Include

```
#include "temu-c/Support/VTables.h"
```

Type

```
struct temu_ARMCpuVTable {
  temu_CpuVTable Cpu;
  temu_AArch64CpuIface * AArch64;
}
```

Description

ARM processors provide the ARMCpuVTable. It starts with the CpuVTable, so code that only knows the CpuVTable can use it as one.

Fields

Field	Type	Description
Cpu	temu_CpuVTable	Must be first
AArch64	temu_AArch64CpuIface *	AArch64 state, null without A64

1.2.10. temu_ARMMProfileClientIfaceRef

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMMProfileClientIfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.11. temu_ARMMProfileClientIfaceRefArray

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMMProfileClientIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.12. temu_ARMMProfileIfaceRef

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMMProfileIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.13. temu_ARMMProfileIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMMProfileIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.14. temu_ARPPacket

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_ARPPacket {
}
```

Description

Fields

Field	Type	Description

1.2.15. temu_ARPProtocol

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_ARPProtocol {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.16. temu_ARPResolution

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_ARPResolution {
}
```

Description

Fields

Field	Type	Description

1.2.17. temu_AclintCsrIfaceRef

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_AclintCsrIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.18. temu_AclintCsrIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_AclintCsrIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.19. temu_AhbIfaceRef

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_AhbIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.20. temu_AhbIfaceRefArray

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_AhbIfaceRefArray {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.21. temu_AhbPnpInfo

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_AhbPnpInfo {
}
```

Description

AHB bus plug and play record

Fields

Field	Type	Description

1.2.22. temu_AiaCsrIfaceRef

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_AiaCsrIfaceRef {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.23. temu_AiaCsrIfaceRefArray

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_AiaCsrIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.24. temu_AnalogIfaceRef

Include

```
#include "temu-c/Bus/Analog.h"
```

Type

```
struct temu_AnalogIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.25. temu_AnalogIfaceRefArray

Include

```
#include "temu-c/Bus/Analog.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_AnalogIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.26. temu_ApbIfaceRef

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_ApbIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.27. temu_ApbIfaceRefArray

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_ApbIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.28. temu_ApbPnpInfo

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_ApbPnpInfo {
}
```

Description

APB bus plug and play record

Fields

Field	Type	Description

1.2.29. temu_AssemblerIfaceRef

Include

```
#include "temu-c/Support/Assembler.h"
```

Type

```
struct temu_AssemblerIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.30. temu_AssemblerIfaceRefArray

Include

```
#include "temu-c/Support/Assembler.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_AssemblerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.31. temu_AudioFrame

Include

```
#include "temu-c/Bus/Audio.h"
```

Type

```
struct temu_AudioFrame {
  uint32_t SampleRate;
  uint8_t NumSlots;
  uint8_t DataBits;
  uint16_t ActiveSlots;
  int32_t[16] Slot;
}
```

Description

Fields

Field	Type	Description
SampleRate	uint32_t	Frame rate in Hz
NumSlots	uint8_t	Slots in the frame, 1..16
DataBits	uint8_t	Valid bits per slot sample, 8..32
ActiveSlots	uint16_t	Bit per slot carrying data
Slot	int32_t[16]	Sign-extended samples

1.2.32. temu_AudioIfaceRef

Include

```
#include "temu-c/Bus/Audio.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_AudioIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.33. temu_AudioIfaceRefArray

Include

```
#include "temu-c/Bus/Audio.h"
```

Type

```
struct temu_AudioIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.34. temu_BankMetaData

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_BankMetaData {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.35. temu_BinaryTranslationControlIfaceRef

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_BinaryTranslationControlIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.36. temu_BinaryTranslationControlIfaceRefArray

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_BinaryTranslationControlIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.37. temu_BlockDisassemblerIfaceRef

Include

```
#include "temu-c/HostDisassembler/HostDisassembler.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_BlockDisassemblerIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.38. temu_BlockDisassemblerIfaceRefArray

Include

```
#include "temu-c/HostDisassembler/HostDisassembler.h"
```

Type

```
struct temu_BlockDisassemblerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.39. temu_Buff

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_Buff {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.40. temu_CacheCtrlIfaceRef

Include

```
#include "temu-c/Memory/Cache.h"
```

Type

```
struct temu_CacheCtrlIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.41. temu_CacheCtrlIfaceRefArray

Include

```
#include "temu-c/Memory/Cache.h"
```

Type

```
struct temu_CacheCtrlIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.42. temu_CacheIfaceRef

Include

```
#include "temu-c/Memory/Cache.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_CacheIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.43. temu_CacheIfaceRefArray

Include

```
#include "temu-c/Memory/Cache.h"
```

Type

```
struct temu_CacheIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.44. temu_CallOp

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_CallOp {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.45. temu_CameraIfaceRef

Include

```
#include "temu-c/Bus/Camera.h"
```

Type

```
struct temu_CameraIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.46. temu_CameraIfaceRefArray

Include

```
#include "temu-c/Bus/Camera.h"
```

Type

```
struct temu_CameraIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.47. temu_CanBusIfaceRef

Include

```
#include "temu-c/Bus/Can.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_CanBusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.48. temu_CanBusIfaceRefArray

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanBusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.49. temu_CanBusStats

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanBusStats {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.50. temu_CanDevIfaceRef

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanDevIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.51. temu_CanDevIfaceRefArray

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanDevIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.52. temu_CanFDFrame

Include

```
#include "temu-c/Bus/Can.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_CanFDFrame {
}
```

Description

Fields

Field	Type	Description

1.2.53. temu_CanFrame

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanFrame {
}
```

Description

Fields

Field	Type	Description

1.2.54. temu_Class

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_Class {
  temu_Object Super;
  void * Impl;
  void * VTable;
  temu_ObjectCreateFunc Create;
  temu_ObjectDisposeFunc Dispose;
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Class object

The TEMU object system is a dynamic object system. Classes are themselves represented as objects (instanciated by meta-classes).

The TEMU class contains among other things the constructor/destructor. Internally, the hidden implementation provides more capabilities than is exposed by the `temu_Class` type.

Fields

Field	Type	Description
Super	temu_Object	Super class of the class instance.
Impl	void *	Internal pointer, do not touch.
VTable	void *	Internal pointer, do not touch.
Create	temu_ObjectCreateFunc	Constructor / create function for creating instances of the class.
Dispose	temu_ObjectDisposeFunc	Destructor / dispose function for disposing instances of the class.

1.2.55. temu_ClockIfaceRef

Include

```
#include "temu-c/Models/Clock.h"
```

Type

```
struct temu_ClockIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.56. temu_ClockIfaceRefArray

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Models/Clock.h"
```

Type

```
struct temu_ClockIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.57. temu_ClockVTable

Include

```
#include "temu-c/Models/Clock.h"
```

Type

```
struct temu_ClockVTable {
}
```

Description

Fields

Field	Type	Description

1.2.58. temu_CmdArg

Include

```
#include "temu-c/Support/CommandLine.h"
```

Type

```
struct temu_CmdArg {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.59. temu_CodePattern

Include

```
#include "temu-c/Target/CodePatterns.h"
```

Type

```
struct temu_CodePattern {
  uint64_t PhysicalAddress;
  uint64_t PhysicalAddressMask;
  uint64_t VirtualAddress;
  uint64_t VirtualAddressMask;
  uint8_t MatchContext;
  uint64_t ContextId;
  temu_PatternAction Action;
  void (*)(void *, void *) Callback;
  void * CallbackData;
  int Parameter;
  unsigned int PatternLength;
}
```

Description

Code pattern structure

The code pattern structure exists to make it possible to define a static list of code patterns. The patterns should be installed on a processor using the code pattern interface.

The code pattern can be used to attach custom actions, either at a specific physical address or when a sequence of instructions have been matched.

TEMU uses this mechanism internally to detect idle-loops.

A pattern is matched if the physical address of the start matches, and all instructions in the pattern match. Zero length patterns are legal if the physical address mask is non-zero. Normally, skip length and pattern length should be the same.

It is possible to skip backwards. It is also possible to skip more or less than the matched instructions.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

When the pattern is installed, it is injected into a trie. The injected structure is after that no longer used and can be disposed.

Patterns are matched at decode time, for both interpreter and binary translator.

For the interpreter, a pseudo instruction will be inserted to carry out the action.

In the case of processors with branch delay slots (e.g. SPARC), the pattern is only triggered if the nPC follows the PC.

Pattern entries match individual instruction chunks, i.e. for Thumb2 an entry matches a 16-bit part, meaning two entries will be needed for a 32-bit instruction.

Note that processors are expected to implement one pattern interface per instruction set.

Patterns are not matched if they cross page boundaries.

For newly installed or removed patterns to take effect, IR may need to be flushed if the CPU already executed.

Fields

Field	Type	Description
PhysicalAddress	uint64_t	Physical address matched in the decoder
PhysicalAddressMask	uint64_t	Physical address mask matched in the decoder, set to 0 to ignore address
VirtualAddress	uint64_t	Virtual address matched in the decoder
VirtualAddressMask	uint64_t	Virtual address mask matched in the decoder, set to 0 to ignore address
MatchContext	uint8_t	Set if contextId has to match
ContextId	uint64_t	ContextId to match
Action	temu_PatternAction	Action to take on this match
Callback	void (*)(void *, void *)	Function to call for actions tePA_Call and tePA_CallAndSkip, first argument is the processor pointer
CallbackData	void *	Data passed in second parameter to callback

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Parameter	int	Number of instructions to skip (in case of tePA_Skip), or tag for idle
PatternLength	unsigned int	Number of pattern entries

1.2.60. temu_CodePatternEntry

Include

```
#include "temu-c/Target/CodePatterns.h"
```

Type

```
struct temu_CodePatternEntry {
  uint32_t Instruction;
  uint32_t Mask;
}
```

Description

Fields

Field	Type	Description
Instruction	uint32_t	Instruction value
Mask	uint32_t	Instruction mask (use to ignore register numbers etc)

1.2.61. temu_CodePatternIfaceRef

Include

```
#include "temu-c/Target/CodePatterns.h"
```

Type

```
struct temu_CodePatternIfaceRef {
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Fields

Field	Type	Description

1.2.62. temu_CodePatternIfaceRefArray

Include

```
#include "temu-c/Target/CodePatterns.h"
```

Type

```
struct temu_CodePatternIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.63. temu_ContextSwitchInfo

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_ContextSwitchInfo {
  uint64_t OldAddress;
  uint64_t NewAddress;
}
```

Description

Fields

Field	Type	Description
OldAddress	uint64_t	Old context address
NewAddress	uint64_t	New context address

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.64. temu_Cpu

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_Cpu {
  uint32_t Flags;
  uint32_t CPUId;
  uint32_t CPUIndex;
  uint8_t DBTProfileSites;
  uint64_t IsaFeatures;
}
```

Description

Fields

Field	Type	Description
Flags	uint32_t	temu_CpuFlags.
CPUId	uint32_t	Local CPU core ID
CPUIndex	uint32_t	Global CPU ID
DBTProfileSites	uint8_t	temu_DBTProfileSite bits
IsaFeatures	uint64_t	Optional instruction set features the CPU implements, one bit per feature as defined by the architecture's TEMU_FEATURE_* macros. The decoders use these to select instructions and instruction variants.

1.2.65. temu_CpuIfaceRef

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_CpuIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.66. temu_CpuIfaceRefArray

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_CpuIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.67. temu_CpuInfo

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_CpuInfo {
  const char * ArchName;
  const char * ModelName;
  unsigned int VASize;
  unsigned int PASize;
  unsigned int VATypeSize;
  unsigned int PATypeSize;
  unsigned int GPRCount;
  unsigned int FPRCount;
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
    temu_Endian InstructionEndianess;
    temu_Endian DataEndianess;
    unsigned int NumInstructionSets;
    const char ** InstructionSetNames;
    unsigned int IREntriesPerPage;
    unsigned int EOPEntries;
    unsigned int IRShift;
    const temu_IRGeometry * IRGeometry;
    unsigned int IRGeometryCount;
    unsigned int DefaultIsa;
}
```

Description

CPU architecture info that can be queried by the user.

Fields

Field	Type	Description
ArchName	const char *	Architecture name
ModelName	const char *	Processor model name
VASize	unsigned int	Virtual address size in bits
PASize	unsigned int	Physical address size in bits
VATypeSize	unsigned int	Virtual address type size in bytes
PATypeSize	unsigned int	Physical address type size in bytes (i.e. 8 for 36 bit PA)
GPRCount	unsigned int	GPR register count
FPRCount	unsigned int	FPR register count
InstructionEndianess	temu_Endian	Instruction endianness
DataEndianess	temu_Endian	Data endianness
NumInstructionSets	unsigned int	Number of instruction sets
InstructionSetNames	const char **	Names of instruction sets
IREntriesPerPage	unsigned int	Internal
EOPEntries	unsigned int	Internal
IRShift	unsigned int	Internal
IRGeometry	const temu_IRGeometry *	Internal. IR layout per instruction set.
IRGeometryCount	unsigned int	Internal

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
DefaultIsa	unsigned int	Internal. The ISA number used by default for e.g. trampolines etc.

1.2.68. temu_CpuResult

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

```
struct temu_CpuResult {
}
```

Description

Fields

Field	Type	Description

1.2.69. temu_CpuTrace

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_CpuTrace {
}
```

Description

Fields

Field	Type	Description

1.2.70. temu_CpuTraceEntry

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_CpuTraceEntry {
}
```

Description

Fields

Field	Type	Description

1.2.71. temu_CpuVTable

Include

```
#include "temu-c/Support/VTables.h"
```

Type

```
struct temu_CpuVTable {
  temu_CpuIface * Cpu;
  temu_IrqCtrlIface * Irq;
  temu_MemAccessIface * InvalidAccess;
  temu_ClockIface * Clock;
  temu_BinaryTranslationControlIface * Translation;
  temu_MemAccessIface * VirtualMemAccess;
  temu_MemAccessIface * PhysicalMemAccess;
}
```

Description

All processors provide the CpuVTable

Fields

Field	Type	Description
Cpu	temu_CpuIface *	CPU interface
Irq	temu_IrqCtrlIface *	IRQ interface
InvalidAccess	temu_MemAccessIface *	Invalid memory access interface

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Clock	temu_ClockIface *	Clock interface
Translation	temu_BinaryTranslationControlIface *	Binary translator control interface
VirtualMemAccess	temu_MemAccessIface *	Memory access interface
PhysicalMemAccess	temu_MemAccessIface *	Bypass MMU

1.2.72. temu_CreateArg

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_CreateArg {
  const char * Key;
  temu_Propval Val;
}
```

Description

Generic constructor argument

The object constructors takes an array of key/value pairs as parameters. The values are passed using either:

- Registered argument in the `Class.new` command method.
- Explicitly to `temu_createObject()`.
- Args parameter to `object-create` global command.

The object create function would typically scan through the array, finding relevant matching keys.

Fields

Field	Type	Description
Key	const char *	Name of argument
Val	temu_Propval	Value of argument

1.2.73. temu_DMARequestIfaceRef

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/DMA.h"
```

Type

```
struct temu_DMARequestIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.74. temu_DMARequestIfaceRefArray

Include

```
#include "temu-c/Bus/DMA.h"
```

Type

```
struct temu_DMARequestIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.75. temu_DebuggerAttachIfaceRef

Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
struct temu_DebuggerAttachIfaceRef {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.76. temu_DebuggerAttachIfaceRefArray

Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
struct temu_DebuggerAttachIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.77. temu_DebuggerIfaceRef

Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
struct temu_DebuggerIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.78. temu_DebuggerIfaceRefArray

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Debugger.h"
```

Type

```
struct temu_DebuggerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.79. temu_DeviceIdIfaceRef

Include

```
#include "temu-c/Models/IntegrationSupport.h"
```

Type

```
struct temu_DeviceIdIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.80. temu_DeviceIdIfaceRefArray

Include

```
#include "temu-c/Models/IntegrationSupport.h"
```

Type

```
struct temu_DeviceIdIfaceRefArray {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.81. temu_DeviceIdMemAccessIfaceRef

Include

```
#include "temu-c/Models/IntegrationSupport.h"
```

Type

```
struct temu_DeviceIdMemAccessIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.82. temu_DeviceIdMemAccessIfaceRefArray

Include

```
#include "temu-c/Models/IntegrationSupport.h"
```

Type

```
struct temu_DeviceIdMemAccessIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.83. temu_DeviceIfaceRef

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Models/Device.h"
```

Type

```
struct temu_DeviceIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.84. temu_DeviceIfaceRefArray

Include

```
#include "temu-c/Models/Device.h"
```

Type

```
struct temu_DeviceIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.85. temu_DisplayIfaceRef

Include

```
#include "temu-c/Models/Display.h"
```

Type

```
struct temu_DisplayIfaceRef {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.86. temu_DisplayIfaceRefArray

Include

```
#include "temu-c/Models/Display.h"
```

Type

```
struct temu_DisplayIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.87. temu_DynCallIfaceRef

Include

```
#include "temu-c/Bus/DynamicInvocation.h"
```

Type

```
struct temu_DynCallIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.88. temu_DynCallIfaceRefArray

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/DynamicInvocation.h"
```

Type

```
struct temu_DynCallIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.89. temu_DynamicResetAddressIfaceRef

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_DynamicResetAddressIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.90. temu_DynamicResetAddressIfaceRefArray

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_DynamicResetAddressIfaceRefArray {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.91. temu_E500MMUIfaceRef

Include

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_E500MMUIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.92. temu_E500MMUIfaceRefArray

Include

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_E500MMUIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.93. temu_E500TLBEntry

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_E500TLBEntry {
}
```

Description

Fields

Field	Type	Description

1.2.94. temu_EthFrame

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_EthFrame {
  uint32_t Flags;
  temu_Buff Data;
  uint8_t[15] Preamble;
  uint8_t Sfd;
}
```

Description

Fields

Field	Type	Description
Flags	uint32_t	Error-injection flags; also carries the TTE traffic class and virtual link (see TEMU_ETH_TTE_*).
Data	temu_Buff	ETH frame data
Preamble	uint8_t[15]	Preamble bits, normally 0x[aa aa aa aa aa aa aa]

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Sfd	uint8_t	Start frame delimiter, normally 0xab

1.2.95. temu_EthMAC

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_EthMAC {
}
```

Description

Fields

Field	Type	Description

1.2.96. temu_EthernetIfaceRef

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_EthernetIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.97. temu_EthernetIfaceRefArray

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_EthernetIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.98. temu_Event

Include

```
#include "temu-c/Support/Events.h"
```

Type

```
struct temu_Event {
  int64_t Steps;
  int64_t Time;
  int64_t EventId;
  uint32_t Flags;
  int QueueIdx;
  temu_TimeSource * Queue;
  temu_Object * Obj;
  void (*)(struct temu_Event *) Func;
  int64_t Period;
  int64_t RTTime;
  int64_t RTPeriod;
  int64_t TriggerCount;
}
```

Description

Fields

Field	Type	Description
Steps	int64_t	Managed internally, do not touch

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Field	Type	Description
Time	int64_t	Managed internally, do not touch
EventId	int64_t	Managed internally, do not touch
Flags	uint32_t	Internal use, do not touch
QueueIdx	int	Managed internally, do not touch
Queue	temu_TimeSource *	Managed internally, do not touch
Obj	temu_Object *	Managed internally, only for reading
Func	void (*)(struct temu_Event *)	Event callback
Period	int64_t	Managed: Period (cycles) for cyclic events
RTTime	int64_t	Managed: Time (monotonic ns) for RT exec
RTPeriod	int64_t	Managed: Period (ns) for RT events
TriggerCount	int64_t	Managed: Number of time event has been triggered

1.2.99. temu_ExecutionStatistics

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_ExecutionStatistics {
}
```

Description

Fields

Field	Type	Description

1.2.100. temu_ExtIRInstruction

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_ExtIRInstruction {
}
```

Description

Fields

Field	Type	Description

1.2.101. temu_ExtendedIR

Include

```
#include "temu-c/Support/Extensions128.h"
```

Type

```
union temu_ExtendedIR {
}
```

Description

Fields

Field	Type	Description

1.2.102. temu_FieldEnum

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_FieldEnum {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.103. temu_FieldMetaData

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_FieldMetaData {
}
```

Description

Fields

Field	Type	Description

1.2.104. temu_FluxEventInfo

Include

```
#include "temu-c/Flux/Flux.h"
```

Type

```
struct temu_FluxEventInfo {
}
```

Description

Fields

Field	Type	Description

1.2.105. temu_GpioBusIfaceRef

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/Gpio.h"
```

Type

```
struct temu_GpioBusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.106. temu_GpioBusIfaceRefArray

Include

```
#include "temu-c/Bus/Gpio.h"
```

Type

```
struct temu_GpioBusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.107. temu_GpioClientIfaceRef

Include

```
#include "temu-c/Bus/Gpio.h"
```

Type

```
struct temu_GpioClientIfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.108. temu_GpioClientIfaceRefArray

Include

```
#include "temu-c/Bus/Gpio.h"
```

Type

```
struct temu_GpioClientIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.109. temu_I2CBusIfaceRef

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
struct temu_I2CBusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.110. temu_I2CBusIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
struct temu_I2CBusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.111. temu_I2CDevIfaceRef

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
struct temu_I2CDevIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.112. temu_I2CDevIfaceRefArray

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
struct temu_I2CDevIfaceRefArray {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.113. temu_ICMPPacket

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_ICMPPacket {
}
```

Description

Fields

Field	Type	Description

1.2.114. temu_IPv4NATIfaceRef

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_IPv4NATIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.115. temu_IPv4NATIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_IPv4NATIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.116. temu_IRGeometry

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_IRGeometry {
  unsigned int IREntriesPerPage;
  unsigned int EOPEntries;
  unsigned int IRShift;
}
```

Description

Predecoded code (IR) layout of one instruction set. Unstable internal.

Fields

Field	Type	Description
IREntriesPerPage	unsigned int	IR entries per page, end-of-page included
EOPEntries	unsigned int	End-of-page entries
IRShift	unsigned int	log2 of the bytes per IR entry

1.2.117. temu_IRInstruction

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_IRInstruction {
}
```

Description

Fields

Field	Type	Description

1.2.118. temu_IfaceRef

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_IfaceRef {
  temu_Object * Obj;
  void * Iface;
}
```

Description

Generic interface

In TEMU interfaces are referred to using an object / interface pointer pair. The object is in general passed as the first parameter to functions in the interface. This type provides a generic interface reference where the interface pointer itself is type erased.

While the type is rarely used by itself, it is commonly returned by the TEMU API. To convert to / from this type from / to typed interface references, it is possible to either memcopy or cast field by field.

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Obj	temu_Object *	Object pointer (first field of interface reference)
Iface	void *	Type erased interface pointer

1.2.119. temu_IfaceRefArray

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_IfaceRefArray {
  uint32_t Size;
  uint32_t Reserved;
  temu_IfaceRef * Ifaces;
}
```

Description

Dynamic interface reference array

In some cases, the number of objects we know about is unknown. To solve that TEMU provides a vector like type.



It is not the intention that the fields in the array are manipulated directly. Instead, use the `temu_ifaceRefArray*` functions.

Fields

Field	Type	Description
Size	uint32_t	Number of used items in array
Reserved	uint32_t	Number of slots allocated for array
Ifaces	temu_IfaceRef *	Interface references

1.2.120. temu_InstructionField

Include

```
#include "temu-c/Support/Assembler.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_InstructionField {
}
```

Description

Fields

Field	Type	Description

1.2.121. temu_InstrumenterIfaceRef

Include

```
#include "temu-c/EmulatorManager/Instrumenter.h"
```

Type

```
struct temu_InstrumenterIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.122. temu_InstrumenterIfaceRefArray

Include

```
#include "temu-c/EmulatorManager/Instrumenter.h"
```

Type

```
struct temu_InstrumenterIfaceRefArray {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.123. temu_IrqClientIfaceRef

Include

```
#include "temu-c/Models/IrqController.h"
```

Type

```
struct temu_IrqClientIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.124. temu_IrqClientIfaceRefArray

Include

```
#include "temu-c/Models/IrqController.h"
```

Type

```
struct temu_IrqClientIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.125. temu_IrqCtrlIfaceRef

Include

```
#include "temu-c/Models/IrqController.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_IrqCtrlIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.126. temu_IrqCtrlIfaceRefArray

Include

```
#include "temu-c/Models/IrqController.h"
```

Type

```
struct temu_IrqCtrlIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.127. temu_Leon5IfaceRef

Include

```
#include "temu-c/Target/Sparc.h"
```

Type

```
struct temu_Leon5IfaceRef {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.128. temu_Leon5IfaceRefArray

Include

```
#include "temu-c/Target/Sparc.h"
```

Type

```
struct temu_Leon5IfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.129. temu_LineDataLoggerIfaceRef

Include

```
#include "temu-c/Models/LineDataLogger.h"
```

Type

```
struct temu_LineDataLoggerIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.130. temu_LineDataLoggerIfaceRefArray

Include

```
#include "temu-c/Models/LineDataLogger.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_LineDataLoggerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.131. temu_LinkByteNotification

Include

```
#include "temu-c/Bus/LinkNotifications.h"
```

Type

```
struct temu_LinkByteNotification {
  temu_Object * SourceObject;
  temu_Object * DestinationObject;
}
```

Description

Fields

Field	Type	Description
SourceObject	temu_Object *	Endpoint object that produced the byte. This may differ from the notification publisher object passed to subscribers, for example when a SerialLink publishes notifications for its A/B-side serial devices.
DestinationObject	temu_Object *	Endpoint object that receives the byte, if known.

1.2.132. temu_List

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_List {
  temu_Type Typ;
  temu_ListNode * Head;
  temu_ListNode * Tail;
}
```

Description

Linked list type

Fields

Field	Type	Description
Typ	temu_Type	Element type in list
Head	temu_ListNode *	Managed pointer, do not use directly
Tail	temu_ListNode *	Managed pointer, do not use directly

1.2.133. temu_MACIfaceRef

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_MACIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.134. temu_MACIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_MACIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.135. temu_MDIOIfaceRef

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_MDIOIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.136. temu_MDIOIfaceRefArray

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_MDIOIfaceRefArray {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.137. temu_MemAccessCapabilities

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessCapabilities {
  uint16_t TransactionBaseSizes;
  temu_MemoryKind Kind;
  temu_MemoryEndianness Endianness;
}
```

Description

Fields

Field	Type	Description
TransactionBaseSizes	uint16_t	Flags indicating legal transaction sizes
Kind	temu_MemoryKind	Mapping type
Endianness	temu_MemoryEndianness	Endianess of transaction interface

1.2.138. temu_MemAccessIfaceRef

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessIfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.139. temu_MemAccessIfaceRefArray

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.140. temu_MemAccessPropertyIfaceRef

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessPropertyIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.141. temu_MemAccessPropertyIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessPropertyIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.142. temu_MemTransaction

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemTransaction {
  uint64_t Va;
  uint64_t Pa;
  uint64_t Value;
  uint64_t Size;
  uint64_t Offset;
  temu_InitiatorType InitiatorType;
  temu_Object * Initiator;
  void * Page;
  uint64_t Cycles;
  uint32_t Flags;
  void * IR;
}
```

Description

Generic memory transaction.

This type is kept in sync with the emulator core. The layout is guaranteed. and will remain as is, although more fields may be added (at the bottom).

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

When the emulator core issues a memory transaction (assuming no ATC hit), the core allocates this structure on the stack and fills in some of the fields with default values. The memory transaction is passed by pointer or reference. By filling in the different fields you can adapt the result of the memory transaction.

Fields

Field	Type	Description
Va	uint64_t	64 bit virtual for unified 32/64 bit interface.
Pa	uint64_t	64 bit physical address
Value	uint64_t	Resulting value (or written value). On MMIO Reads the model fills in this value, and on writes the written value will be stored here.

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Field	Type	Description
Size	uint64_t	Two-logarithm of the size of the transaction in bytes it is at most the size of the CPUs max bus size. In case of SPARCv8, this is 4 bytes (double words are issued as two accesses). As this is the 2-log of the size in bytes, a single byte access will have a size of 0, a 2 byte transaction will have size 1, a 4 byte transaction will have size 2 and an 8 byte transaction will have size 3. In TEMU3 this field was changed to an uint64_t from uint8_t. This as it does not add any additional space. And we can repurpose value and size as follows: - The lower 2 bits define the base unit of the transaction (same as before), 0 ⇒ 1 byte, 1 ⇒ 2 bytes, 2 ⇒ 4 bytes, 3 ⇒ 8 bytes. - The upper bits define the number of transferred units 0 implies one unit. If the transferred units is more than 0, we are dealing with a large transaction. These can be used by e.g. RAM models for block transfers etc. In that case the Value field is to be reinterpreted as a pointer to the location of the data. This means that we can use the memory access interface to e.g. read out send lists and similar items. The memory space must thus have a way of determining which type of transaction is legal. The MemoryAccessIface has been extended with a

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Field	Type	Description
Offset	uint64_t	Used for device models, this will be filled in with the offset from the start address of the device (note it is in practice possible to add a device at multiple locations (which happens in some rare cases)).
InitiatorType	temu_InitiatorType	InitiatorType identifies the type of object starting the transaction. this is only relevant when Initiator is set to non-null, and allows for the specification of device pointers in the initator. This field is new in TEMU 2.2. The field was introduced to support the implementation of I/O MMUs.
Initiator	temu_Object *	Initiator of the transaction (a CPU object). It can be null, which indicate that the transaction was not initiated by normal CPU activity (e.g. fetch, read or write). When the initiator is null, models should not attempt to stop the processor core, go to idle mode or raise traps (posting events is fine). An example when the initiator is null is when an MMU does a table walk. The MMU will normally special case handle table walks which access un-mapped memory.

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Field	Type	Description
Page	void *	Page pointer (for caching), this can be filled in by a memory model to have the emulator core inject the page translation in the ATC. If a model sets this, the page pointer will automatically be cleared if the page has attributes (breakpoints, etc). Models that implement normal memory mapped registers should NOT populate the page pointer.
Cycles	uint64_t	Cycle cost for memory access (initialised to 0).
Flags	uint32_t	Flags for use in the memory hierarchy.
IR	void *	Intermediate code for interpreter (internally managed do not modify)

1.2.143. temu_MemVTable

Include

```
#include "temu-c/Support/VTables.h"
```

Type

```
struct temu_MemVTable {
  temu_MemAccessIface * MemAccess;
  temu_MemAccessIface * NormalMemAccess;
  temu_PDCIface * PDC;
  temu_MemorySpaceIface * MemorySpace;
}
```

Description

Fast memory operations

Fields

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Field	Type	Description
MemAccess	temu_MemAccessIface *	Fast memory access interface
NormalMemAccess	temu_MemAccessIface *	Standard memory access interface
PDC	temu_PDCIface *	Pre-decode cache interface
MemorySpace	temu_MemorySpaceIface *	Optional memory space interface (null for RAM/ROM)

1.2.144. temu_MemoryIfaceRef

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemoryIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.145. temu_MemoryIfaceRefArray

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemoryIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

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1.2.146. temu_MemorySpaceIfaceRef

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_MemorySpaceIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.147. temu_MemorySpaceIfaceRefArray

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_MemorySpaceIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.148. temu_Mil1553BusIdleInfo

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_Mil1553BusIdleInfo {
}
```

Description

Fields

Field	Type	Description

1.2.149. temu_Mil1553BusIfaceRef

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553BusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.150. temu_Mil1553BusIfaceRefArray

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553BusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.151. temu_Mil1553DevIfaceRef

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553DevIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.152. temu_Mil1553DevIfaceRefArray

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553DevIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.153. temu_Mil1553Msg

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_Mil1553Msg {
}
```

Description

Fields

Field	Type	Description

1.2.154. temu_Mil1553Stats

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553Stats {
}
```

Description

Fields

Field	Type	Description

1.2.155. temu_ModeSwitchInfo

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_ModeSwitchInfo {
  uint32_t OldMode;
  uint32_t NewMode;
}
```

Description

Fields

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Field	Type	Description
OldMode	uint32_t	Old processor privilege level
NewMode	uint32_t	New processor privilege level

1.2.156. temu_NvmArrayIfaceRef

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmArrayIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.157. temu_NvmArrayIfaceRefArray

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmArrayIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.158. temu_NvmBusLayout

Include

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```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmBusLayout {
}
```

Description

Fields

Field	Type	Description

1.2.159. temu_NvmGeometry

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmGeometry {
}
```

Description

Fields

Field	Type	Description

1.2.160. temu_NvmImageSegment

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmImageSegment {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.161. temu_NvmNandGeometry

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmNandGeometry {
}
```

Description

Fields

Field	Type	Description

1.2.162. temu_Object

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_Object {
  temu_Class * Class;
  char * Name;
  char * LocalName;
  void * DebugInfo;
  temu_TimeSource * TimeSource;
  temu_Component * Component;
  uint64_t LoggingFlags;
  uint64_t ReplayLoggingFlags;
  uint64_t LogMessageFlags;
  int64_t WillDisposeNotification;
  int64_t DisposedNotification;
  void * UserData;
  uint64_t ObjectID;
```

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```
    uint64_t IsClassObject;
    uint64_t IsCheckpointable;
    uint64_t IsTimeSource;
    uint64_t TraceMemoryReads;
    uint64_t TraceMemoryWrites;
    uint64_t BreakOnMemoryRead;
    uint64_t BreakOnMemoryWrite;
    uint64_t IsOwnedByOtherObject;
}
```

Description

Root object type for all TEMU objects.

The TEMU object system is used for defining models in TEMU. All models must derive from `temu_Object`.

Inheritance in C is done by placing a `temu_Object` field as the first field in the derived struct.

TEMU by convention use the name `Super` for the parent field name.

The type contains a `UserData` void pointer that can be used by for example simulator integrators. The `UserData` field can be written by the user. The field is guaranteed to not be modified by the TEMU runtime.



While the convention in C is safe, in C++ it is the responsibility of the user to ensure that the derived type is a *standard layout type*.

Fields

Field	Type	Description
Class	temu_Class *	Class pointer
Name	char *	Object name
LocalName	char *	Local name in component
DebugInfo	void *	Used by debuggers integrations, not snapshotted
TimeSource	temu_TimeSource *	Timesource object
Component	temu_Component *	Parent component (null for root comp)
LoggingFlags	uint64_t	Log category enabled/disabled
ReplayLoggingFlags	uint64_t	Log category levels during replay
LogMessageFlags	uint64_t	Per-object message suppression bits

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Field	Type	Description
WillDisposeNotification	int64_t	Notification emitted before object is deleted
DisposedNotification	int64_t	Notification emitted after object has been deleted
UserData	void *	User data pointer. This is not saved in snapshots.
ObjectID	uint64_t	Object ID that is sequentially assigned for created objects. Note that ObjectID is snapshotted and restored.
IsClassObject	uint64_t	The object is a class object
IsCheckpointable	uint64_t	The object is snapshottable
IsTimeSource	uint64_t	The object is a time source (can be safely casted to temu_TimeSource)
TraceMemoryReads	uint64_t	Memory read accesses to this object will be traced by memory space
TraceMemoryWrites	uint64_t	Memory write accesses to this object will be traced by memory space
BreakOnMemoryRead	uint64_t	Memory read accesses to this object will trigger break
BreakOnMemoryWrite	uint64_t	Memory write accesses to this object will trigger break
IsOwnedByOtherObject	uint64_t	Object is owned/managed by

1.2.163. temu_ObjectIfaceRef

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_ObjectIfaceRef {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.164. temu_ObjectIfaceRefArray

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_ObjectIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.165. temu_PCIBridgeIfaceRef

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIBridgeIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.166. temu_PCIBridgeIfaceRefArray

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIBridgeIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.167. temu_PCIBusIfaceRef

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIBusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.168. temu_PCIBusIfaceRefArray

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIBusIfaceRefArray {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.169. temu_PCIConfig

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIConfig {
}
```

Description

Fields

Field	Type	Description

1.2.170. temu_PCIDevice

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIDevice {
}
```

Description

Fields

Field	Type	Description

1.2.171. temu_PCIDeviceIfaceRef

Include

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```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIDeviceIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.172. temu_PCIDeviceIfaceRefArray

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIDeviceIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.173. temu_PCIDeviceVTable

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIDeviceVTable {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.174. temu_PCIExpressBridge

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBridge {
}
```

Description

Fields

Field	Type	Description

1.2.175. temu_PCIExpressBridgeIfaceRef

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBridgeIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.176. temu_PCIExpressBridgeIfaceRefArray

Include

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```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBridgeIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.177. temu_PCIExpressBus

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBus {
}
```

Description

Fields

Field	Type	Description

1.2.178. temu_PCIExpressBusIfaceRef

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBusIfaceRef {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.179. temu_PCIExpressBusIfaceRefArray

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.180. temu_PCIExpressDevice

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressDevice {
}
```

Description

Fields

Field	Type	Description

1.2.181. temu_PDCIfaceRef

Include

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```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_PDCIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.182. temu_PDCIfaceRefArray

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_PDCIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.183. temu_PHYIfaceRef

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_PHYIfaceRef {
}
```

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Description

Fields

Field	Type	Description

1.2.184. temu_PHYIfaceRefArray

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_PHYIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.185. temu_PluginMetaDataV1

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_PluginMetaDataV1 {
  unsigned int MDVersion;
  const char * Vendor;
  const char * PluginName;
  unsigned int Major;
  unsigned int Minor;
  unsigned int Patch;
  unsigned int ABI_MAJOR;
  unsigned int ABI_MINOR;
  unsigned int ABI_PATCH;
  unsigned int Flags;
  const char * Revision;
  const char * License;
  const char * Description;
```

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```
    const char * Copyright;
    const char * ExportControl;
}
```

Description

Plugin metadata struct

The plugin metadata struct can be defined in a plugin using the TEMU_PLUGIN_MD_DEF_V1 macro. The first field is the metadata version, it should be set to 1 in this case.

Fields

Field	Type	Description
MDVersion	unsigned int	Metadata version, first field, set this to 1.
Vendor	const char *	Vendor of plugin
PluginName	const char *	Name of plugin
Major	unsigned int	Major version number of plugin
Minor	unsigned int	Minor version number of plugin
Patch	unsigned int	Patch version number of plugin
ABI_MAJOR	unsigned int	TEMU version compiled against
ABI_MINOR	unsigned int	TEMU version compiled against
ABI_PATCH	unsigned int	TEMU version compiled against
Flags	unsigned int	Flags
Revision	const char *	Revision tag (e.g. GIT-hash)
License	const char *	License info
Description	const char *	General description.
Copyright	const char *	Copyright notice
ExportControl	const char *	Export control notice

1.2.186. temu_PointerIfaceRef

Include

```
#include "temu-c/Models/Display.h"
```

Type

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```
struct temu_PointerIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.187. temu_PointerIfaceRefArray

Include

```
#include "temu-c/Models/Display.h"
```

Type

```
struct temu_PointerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.188. temu_PowerIfaceRef

Include

```
#include "temu-c/Models/Power.h"
```

Type

```
struct temu_PowerIfaceRef {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.189. temu_PowerIfaceRefArray

Include

```
#include "temu-c/Models/Power.h"
```

Type

```
struct temu_PowerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.190. temu_PowerLineIfaceRef

Include

```
#include "temu-c/Models/Power.h"
```

Type

```
struct temu_PowerLineIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.191. temu_PowerLineIfaceRefArray

Include

```
#include "temu-c/Models/Power.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_PowerLineIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.192. temu_PowerPCIfaceRef

Include

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_PowerPCIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.193. temu_PowerPCIfaceRefArray

Include

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_PowerPCIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.194. temu_PropAccessor

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_PropAccessor {
  temu_Type Typ;
  temu_Object * Obj;
  int Index;
  void * Data;
  temu_PropWriter Writer;
  temu_PropReader Reader;
  temu_PropWriter Setter;
  temu_PropReader Getter;
}
```

Description

Generic property accessor

This struct serves as a generic accessor for properties. The intention for this is to be able to cache property accessors, without having to disambiguate between properties and pseudo properties.

The accessor is queried by the temu_getPropAccessor function, and is then used by calling the functions:

- `readProp`
- `writeProp`
- `getProp`
- `setProp`

Depending on whether read, write, get or set semantics is needed.

Fields

Field	Type	Description
Typ	temu_Type	Type of property
Obj	temu_Object *	Pointer to object containing property
Index	int	Index used in access, can be modified by user

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Data	void *	Pointer to value if applicable
Writer	temu_PropWriter	Writer function if applicable
Reader	int),temu_PropReader	Reader function if applicable
Setter	temu_PropWriter	Setter function if applicable
Getter	int),temu_PropReader	Getter function if applicable

1.2.195. temu_PropInfo

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_PropInfo {
  const char * Name;
  temu_Type Typ;
  size_t Count;
  uintptr_t Offset;
}
```

Description

Fields

Field	Type	Description
Name	const char *	Name of property
Typ	temu_Type	Type tag
Count	size_t	Number of elements in property
Offset	uintptr_t	Offset from struct start

1.2.196. temu_PropName

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_PropName {
  temu_Object * Obj;
  const char * Name;
}
```

Description

Named property reference

Fields

Field	Type	Description
Obj	temu_Object *	Object pointer
Name	const char *	Property name

1.2.197. temu_Propref

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_Propref {
  temu_Type Typ;
  void * Ptr;
}
```

Description

Typed property reference.

The property reference contains a type tag and a raw pointer to the property.

Fields

Field	Type	Description
Typ	temu_Type	Type of property
Ptr	void *	Pointer to property

1.2.198. temu_Propval

Include

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```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_Propval {
  temu_Type Typ;
}
```

Description

Generic property value.

As properties can be of any normal type, the propval struct provides a sum type/tagged union which contain both the type tag and the property value.

Fields

Field	Type	Description
Typ	temu_Type	Value type

1.2.199. temu_PwmIfaceRef

Include

```
#include "temu-c/Bus/Pwm.h"
```

Type

```
struct temu_PwmIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.200. temu_PwmIfaceRefArray

Include

```
#include "temu-c/Bus/Pwm.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_PwmIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.201. temu_Register16

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_Register16 {
}
```

Description

16 bit memory mapped register

Fields

Field	Type	Description

1.2.202. temu_Register32

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_Register32 {
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

32 bit memory mapped register

Fields

Field	Type	Description

1.2.203. temu_Register64

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_Register64 {
}
```

Description

64 bit memory mapped register

Fields

Field	Type	Description

1.2.204. temu_Register8

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_Register8 {
}
```

Description

8 bit memory mapped register

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.205. temu_RegisterIfaceRef

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_RegisterIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.206. temu_RegisterIfaceRefArray

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_RegisterIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.207. temu_RegisterMetaData

Include

```
#include "temu-c/Support/Register.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_RegisterMetaData {
}
```

Description

Fields

Field	Type	Description

1.2.208. temu_ReplayPlaybackIfaceRef

Include

```
#include "temu-c/Bus/Replay.h"
```

Type

```
struct temu_ReplayPlaybackIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.209. temu_ReplayPlaybackIfaceRefArray

Include

```
#include "temu-c/Bus/Replay.h"
```

Type

```
struct temu_ReplayPlaybackIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.210. temu_ReplayStorageIfaceRef

Include

```
#include "temu-c/Bus/Replay.h"
```

Type

```
struct temu_ReplayStorageIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.211. temu_ReplayStorageIfaceRefArray

Include

```
#include "temu-c/Bus/Replay.h"
```

Type

```
struct temu_ReplayStorageIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.212. temu_ResetIfaceRef

Include

```
#include "temu-c/Models/Reset.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_ResetIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.213. temu_ResetIfaceRefArray

Include

```
#include "temu-c/Models/Reset.h"
```

Type

```
struct temu_ResetIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.214. temu_ResetInfo

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_ResetInfo {
  int ResetType;
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
ResetType	int	0 == cold, 1 == warm reset

1.2.215. temu_RiscvIfaceRef

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_RiscvIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.216. temu_RiscvIfaceRefArray

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_RiscvIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.217. temu_SchedControlRequestInfo

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
struct temu_SchedControlRequestInfo {
}
```

Description

Fields

Field	Type	Description

1.2.218. temu_SchedSyncInfo

Include

```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
struct temu_SchedSyncInfo {
}
```

Description

Fields

Field	Type	Description

1.2.219. temu_SdCardIfaceRef

Include

```
#include "temu-c/Bus/SdCard.h"
```

Type

```
struct temu_SdCardIfaceRef {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.220. temu_SdCardIfaceRefArray

Include

```
#include "temu-c/Bus/SdCard.h"
```

Type

```
struct temu_SdCardIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.221. temu_SdResponse

Include

```
#include "temu-c/Bus/SdCard.h"
```

Type

```
struct temu_SdResponse {
  uint32_t[4] Words;
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Words	uint32_t[4]	The response's 32-bit content in Words[0] for R1, R1b, R3, R6 and R7. For R2, the CID or CSD register bits 127:0, most significant word first: Words[0] holds bits 127:96, Words[3] bits 31:0 (CRC7 in 7:1, bit 0 is 1).

1.2.222. temu_SerialIfaceRef

Include

```
#include "temu-c/Bus/Serial.h"
```

Type

```
struct temu_SerialIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.223. temu_SerialIfaceRefArray

Include

```
#include "temu-c/Bus/Serial.h"
```

Type

```
struct temu_SerialIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.224. temu_SignalIfaceRef

Include

```
#include "temu-c/Bus/Signal.h"
```

Type

```
struct temu_SignalIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.225. temu_SignalIfaceRefArray

Include

```
#include "temu-c/Bus/Signal.h"
```

Type

```
struct temu_SignalIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.226. temu_SparcV8IfaceRef

Include

```
#include "temu-c/Target/Sparc.h"
```

Type

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```
struct temu_SparcV8IfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.227. temu_SparcV8IfaceRefArray

Include

```
#include "temu-c/Target/Sparc.h"
```

Type

```
struct temu_SparcV8IfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.228. temu_SpfiControlWord

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

```
struct temu_SpfiControlWord {
  uint32_t Flags;
  uint8_t Channel;
  uint8_t SeqNum;
  uint8_t Value;
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

A SpaceFibre control word that matters to software models (most don't).

Fields

Field	Type	Description
Flags	uint32_t	See temu_SpfiFlags. This also encodes the type of control word.
Channel	uint8_t	The channel field of this control word (if there is one).
SeqNum	uint8_t	The 7-bit seq. number field of this control word (if there is one). This field exists mostly for error injection and debugging. Seq. nums are usually not exposed to higher layers/software.
Value	uint8_t	For Flow Control Tokens, this is the value M (so zero is not allowed, and valid for Mx64 words/Mx256 bytes).

1.2.229. temu_SpfiPacket

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

```
struct temu_SpfiPacket {
  uint32_t Flags;
  uint8_t Channel;
  uint8_t SeqNum;
  uint8_t Type;
  temu_Buff PktData;
}
```

Description

A SpaceFibre packet. On a packet level, SpaceWire and SpaceFibre are basically the same. Routing and e.g. Rmap works the same. However, SpaceFibre has virtual channels, broadcasts, and way more control characters/words.

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Fields

Field	Type	Description
Flags	uint32_t	See temu_SpfiFlags. Either Broadcast or DataPacket bits must be set for a packet.
Channel	uint8_t	The (virtual or broadcast) channel this packet was received on.
SeqNum	uint8_t	A 7-bit seq. number. Note that technically sequence numbers are per frame, not packet, and that a single frame can contain multiple packets or a single packet be split over multiple frames. This field exists mostly for error injection and debugging.
Type	uint8_t	Only for broadcast frames: The B_TYPE field.
PktData	temu_Buff	The payload. Keep this field at the end because of (de)serialization.

1.2.230. temu_SpfiPortIfaceRef

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

```
struct temu_SpfiPortIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.231. temu_SpfiPortIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

```
struct temu_SpfiPortIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.232. temu_SpiBus

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBus {
}
```

Description

Fields

Field	Type	Description

1.2.233. temu_SpiBus2IfaceRef

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBus2IfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.234. temu_SpiBus2IfaceRefArray

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBus2IfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.235. temu_SpiBusIfaceRef

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.236. temu_SpiBusIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.237. temu_SpiDevConfig

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiDevConfig {
}
```

Description

Fields

Field	Type	Description

1.2.238. temu_SpiMasterDeviceIfaceRef

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiMasterDeviceIfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.239. temu_SpiMasterDeviceIfaceRefArray

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiMasterDeviceIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.240. temu_SpiRomIfaceRef

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiRomIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.241. temu_SpiRomIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiRomIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.242. temu_SpiSlaveDevice

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDevice {
}
```

Description

Fields

Field	Type	Description

1.2.243. temu_SpiSlaveDevice2

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDevice2 {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.244. temu_SpiSlaveDevice2IfaceRef

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDevice2IfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.245. temu_SpiSlaveDevice2IfaceRefArray

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDevice2IfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.246. temu_SpiSlaveDeviceIfaceRef

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDeviceIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.247. temu_SpiSlaveDeviceIfaceRefArray

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDeviceIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.248. temu_SpiTransaction

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiTransaction {
  uint8_t BitsInCharacter;
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
  uint8_t BytePerCharacter;
  uint32_t NumCharactersSent;
  uint32_t NumBitsSent;
  uint8_t * MosiBuf;
  uint32_t NumCharactersToReceive;
  uint32_t NumBitsReceived;
  uint8_t * MisoBuf;
  uint32_t flags;
}
```

Description

Fields

Field	Type	Description
BitsInCharacter	uint8_t	No. of bits in each character
BytePerCharacter	uint8_t	log2(no. of bytes used to encode each character)
NumCharactersSent	uint32_t	No. of characters in the MOSI buffer
NumBitsSent	uint32_t	Total number of bits sent. Typically bitsInCharacter*noCharactersSent. May be used if last transmission did not fill all bits in a character, e.g. when injecting errors.
MosiBuf	uint8_t *	Byte array containing all characters to be transferred
NumCharactersToReceive	uint32_t	No. of characters the slave should reply with.
NumBitsReceived	uint32_t	As NoBitsSent but for MISO errors
MisoBuf	uint8_t *	Byte array for slave to write into
flags	uint32_t	For future use

1.2.249. temu_SpwPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_SpwPacket {
}
```

Description

Fields

Field	Type	Description

1.2.250. temu_SpwPortIfaceRef

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwPortIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.251. temu_SpwPortIfaceRefArray

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwPortIfaceRefArray {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.252. temu_SpwRmapDecodedCmdField

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedCmdField {
}
```

Description

Fields

Field	Type	Description

1.2.253. temu_SpwRmapDecodedCommandHeader

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedCommandHeader {
}
```

Description

Fields

Field	Type	Description

1.2.254. temu_SpwRmapDecodedPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_SpwRmapDecodedPacket {
  uint32_t TotalSize;
  temu_SpwRmapPacketType PacketType;
  temu_SpwRmapDecodedCmdField CmdField;
  temu_SpwRmapRawHeader RawHeader;
}
```

Description

Fields

Field	Type	Description
TotalSize	uint32_t	Total size of the packet received.
PacketType	temu_SpwRmapPacketType	The packet type as identified by bits [7,6] in instruction.
CmdField	temu_SpwRmapDecodedCmdField	The command field, bits [5,4,3,2] in instruction.
RawHeader	temu_SpwRmapRawHeader	Raw header data access.

1.2.255. temu_SpwRmapDecodedReadReply

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedReadReply {
  const uint8_t * Data;
  uint32_t AvailableDataLength;
  uint8_t DataCrc;
}
```

Description

Fields

Field	Type	Description
Data	const uint8_t *	Pointer to the first data char.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
AvailableDataLength	uint32_t	The amount of data available.
DataCrc	uint8_t	Data crc. Valid only if AvailableDataLength > Header.DataLength.

1.2.256. temu_SpwRmapDecodedReadReplyHeader

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedReadReplyHeader {
}
```

Description

Fields

Field	Type	Description

1.2.257. temu_SpwRmapDecodedRmwReply

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedRmwReply {
  const uint8_t * Data;
  uint32_t AvailableDataLength;
  uint8_t DataCrc;
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Data	const uint8_t *	Pointer to the first data char.
AvailableDataLength	uint32_t	The amount of data available.
DataCrc	uint8_t	Data crc. Valid only if AvailableDataLength > Header.DataLength.

1.2.258. temu_SpwRmapDecodedWriteReply

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedWriteReply {
}
```

Description

Fields

Field	Type	Description

1.2.259. temu_SpwRmapDecodedWriteReplyHeader

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapDecodedWriteReplyHeader {
}
```

Description

Fields

Field	Type	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.2.260. temu_SpwRmapRawHeader

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapRawHeader {
}
```

Description

Fields

Field	Type	Description

1.2.261. temu_SpwRmapReadCmdPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapReadCmdPacket {
}
```

Description

Fields

Field	Type	Description

1.2.262. temu_SpwRmapRmwCmdPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_SpwRmapRmwCmdPacket {
  uint8_t AccessSize;
  const uint8_t * Data;
  const uint8_t * Mask;
  uint32_t AvailableDataLength;
  uint8_t DataCrc;
}
```

Description

Fields

Field	Type	Description
AccessSize	uint8_t	Size of the access.
Data	const uint8_t *	Pointer to the first data char.
Mask	const uint8_t *	Pointer to the first mask char.
AvailableDataLength	uint32_t	The amount of data available.
DataCrc	uint8_t	Data crc. Valid only if AvailableDataLength > Header.DataLength.

1.2.263. temu_SpwRmapWriteCmdPacket

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwRmapWriteCmdPacket {
  const uint8_t * Data;
  uint32_t AvailableDataLength;
  uint8_t DataCrc;
}
```

Description

Fields

Field	Type	Description
Data	const uint8_t *	Pointer to the first data char.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
AvailableDataLength	uint32_t	The amount of data available.
DataCrc	uint8_t	Data crc. Valid only if AvailableDataLength > Header.DataLength.

1.2.264. temu_SrecRegion

Include

```
#include "temu-c/Support/Loader.h"
```

Type

```
struct temu_SrecRegion {
}
```

Description

Fields

Field	Type	Description

1.2.265. temu_StopInfo

Include

```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
struct temu_StopInfo {
}
```

Description

Fields

Field	Type	Description

1.2.266. temu_StreamIfaceRef

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_StreamIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.267. temu_StreamIfaceRefArray

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_StreamIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.268. temu_StringBreakpointIfaceRef

Include

```
#include "temu-c/Support/StringBreakpoint.h"
```

Type

```
struct temu_StringBreakpointIfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.269. temu_StringBreakpointIfaceRefArray

Include

```
#include "temu-c/Support/StringBreakpoint.h"
```

Type

```
struct temu_StringBreakpointIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.270. temu_TargetExecutionIfaceRef

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_TargetExecutionIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.271. temu_TargetExecutionIfaceRefArray

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_TargetExecutionIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.272. temu_TimeSource

Include

```
#include "temu-c/Support/Events.h"
```

Type

```
struct temu_TimeSource {
}
```

Description

Fields

Field	Type	Description

1.2.273. temu_TrapEventInfo

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_TrapEventInfo {
  uint32_t TrapId;
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
  uint64_t PC;
  uint64_t nPC;
}
```

Description

Fields

Field	Type	Description
TrapId	uint32_t	Trap number (architecture specific)
PC	uint64_t	Program counter when trap occurred
nPC	uint64_t	Only valid for targets with delay slots

1.2.274. temu_U128

Include

```
#include "temu-c/Support/Int128.h"
```

Type

```
struct temu_U128 {
  uint64_t Lo;
  uint64_t Hi;
}
```

Description

128-bit value, low half first.

Signedness is carried by the property type tag (teTY_U128 or teTY_I128) and by the operation, not by this type, exactly as it is for the machine word this stands in for.

Fields

Field	Type	Description
Lo	uint64_t	Bits 63:0
Hi	uint64_t	Bits 127:64

1.2.275. temu_UsbBusIfaceRef

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbBusIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.276. temu_UsbBusIfaceRefArray

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbBusIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.277. temu_UsbClassIfaceRef

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbClassIfaceRef {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.2.278. temu_UsbClassIfaceRefArray

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbClassIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.279. temu_UsbClassRequest

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbClassRequest {
  uint8_t InterfaceNumber;
  temu_UsbSetupPacket Setup;
  temu_Buff Buffer;
  uint32_t Length;
}
```

Description

Class/backend request derived from a control transfer.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Fields

Field	Type	Description
InterfaceNumber	uint8_t	Interface number selected by wIndex.
Setup	temu_UsbSetupPacket	Original control SETUP packet.
Buffer	temu_Buff	Optional request or response payload.
Length	uint32_t	Payload length in bytes.

1.2.280. temu_UsbCompletion

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbCompletion {
  uint64_t Id;
  temu_UsbStatus Status;
  uint32_t ActualLength;
  uint64_t CompleteAt;
  uint32_t Flags;
  temu_Buff Data;
}
```

Description

Result reported for a previously submitted USB transfer.

Fields

Field	Type	Description
Id	uint64_t	Transfer identifier from temu_UsbTransfer::Id.
Status	temu_UsbStatus	Final transfer status.
ActualLength	uint32_t	Number of payload bytes transferred.
CompleteAt	uint64_t	Simulated time the transfer completes (0 = now).

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Flags	uint32_t	Completion flags, reserved for protocol users.
Data	temu_Buff	IN data returned to the host (empty for OUT).

1.2.281. temu_UsbDeviceIfaceRef

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbDeviceIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.282. temu_UsbDeviceIfaceRefArray

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbDeviceIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.283. temu_UsbDeviceInfo

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbDeviceInfo {
  temu_UsbSpeed MaxSpeed;
  uint8_t CurrentAddress;
  uint8_t CurrentConfiguration;
  _Bool RemoteWakeupEnabled;
}
```

Description

Device state visible to a host or fabric.

Fields

Field	Type	Description
MaxSpeed	temu_UsbSpeed	Fastest speed supported.
CurrentAddress	uint8_t	Current USB address (0 before assignment).
CurrentConfiguration	uint8_t	Active configuration value or 0.
RemoteWakeupEnabled	_Bool	True when the host enabled remote wakeup.

1.2.284. temu_UsbHostControllerIfaceRef

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHostControllerIfaceRef {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.285. temu_UsbHostControllerIfaceRefArray

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHostControllerIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.286. temu_UsbHostNotifyIfaceRef

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHostNotifyIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.287. temu_UsbHostNotifyIfaceRefArray

Include

```
#include "temu-c/Bus/Usb.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_UsbHostNotifyIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.288. temu_UsbHubIfaceRef

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHubIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.289. temu_UsbHubIfaceRefArray

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHubIfaceRefArray {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.290. temu_UsbPortState

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbPortState {
  uint32_t Flags;
  temu_UsbSpeed Speed;
}
```

Description

Snapshot of one downstream port’s status.

Fields

Field	Type	Description
Flags	uint32_t	Bitwise OR of temu_UsbPortStateFlags values.
Speed	temu_UsbSpeed	Speed of the attached device, if connected.

1.2.291. temu_UsbSetupPacket

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbSetupPacket {
}
```

Description

USB control transfer SETUP packet

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.2.292. temu_UsbTransfer

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbTransfer {
  uint64_t Id;
  uint8_t Address;
  uint8_t Endpoint;
  temu_UsbTransferType Type;
  temu_UsbTransferDir Dir;
  uint32_t StreamId;
  uint32_t Flags;
  uint32_t Length;
  temu_Buff Buffer;
  temu_UsbSetupPacket Setup;
}
```

Description

A single USB transfer (URB).

Fields

Field	Type	Description
Id	uint64_t	Controller-assigned transfer identifier.
Address	uint8_t	USB device address.
Endpoint	uint8_t	Endpoint number without the direction bit.
Type	temu_UsbTransferType	Transfer category.
Dir	temu_UsbTransferDir	Transfer direction.
StreamId	uint32_t	SuperSpeed stream id, or 0 when unused.
Flags	uint32_t	Transfer flags, reserved for protocol users.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
Length	uint32_t	Requested transfer length in bytes.
Buffer	temu_Buff	OUT/IN data payload. Unused when Dir == teUTD_Setup.
Setup	temu_UsbSetupPacket	Used when Dir is teUTD_Setup and must be valid in that case, and buffer must not be touched.

1.2.293. temu_Vector

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_Vector {
  temu_Type Typ;
  void * VecData;
  uint32_t Size;
  uint32_t Capacity;
}
```

Description

Dynamically sized array

Fields

Field	Type	Description
Typ	temu_Type	Type of vector data
VecData	void *	Managed pointer, do not use directly
Size	uint32_t	Managed do not use directly
Capacity	uint32_t	Managed do not use directly

1.2.294. temu_eFPGAFabricDesignIfaceRef

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Models/eFPGA.h"
```

Type

```
struct temu_eFPGAFabricDesignIfaceRef {
}
```

Description

Fields

Field	Type	Description

1.2.295. temu_eFPGAFabricDesignIfaceRefArray

Include

```
#include "temu-c/Models/eFPGA.h"
```

Type

```
struct temu_eFPGAFabricDesignIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.296. temu_eFPGAHostIfaceRef

Include

```
#include "temu-c/Models/eFPGA.h"
```

Type

```
struct temu_eFPGAHostIfaceRef {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.297. temu_eFPGAHostIfaceRefArray

Include

```
#include "temu-c/Models/eFPGA.h"
```

Type

```
struct temu_eFPGAHostIfaceRefArray {
}
```

Description

Fields

Field	Type	Description

1.2.298. temu_i16Array

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_i16Array {
}
```

Description

Fields

Field	Type	Description

1.2.299. temu_i32Array

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_i32Array {
}
```

Description

Fields

Field	Type	Description

1.2.300. temu_i64Array

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_i64Array {
}
```

Description

Fields

Field	Type	Description

1.2.301. temu_i8Array

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_i8Array {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.302. temu_jmp_buf_t

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
struct temu_jmp_buf_t {
}
```

Description

Fields

Field	Type	Description

1.2.303. temu_objectArray

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_objectArray {
}
```

Description

Fields

Field	Type	Description

1.2.304. temu_u16Array

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_u16Array {
}
```

Description

Fields

Field	Type	Description

1.2.305. temu_u32Array

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_u32Array {
}
```

Description

Fields

Field	Type	Description

1.2.306. temu_u64Array

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_u64Array {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.2.307. temu_u8Array

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_u8Array {
}
```

Description

Fields

Field	Type	Description

1.3. Enumerations

1.3.1. temu_ARMExecMode

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
enum temu_ARMExecMode {
  teARM_ARM = 0,
  teARM_Thumb = 1,
  teARM_Jazelle = 2,
  teARM_ThumbEE = 3,
}
```

Description

Enumerators

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Name	Value	Description
teARM_ARM	0	Processor is in ARM mode
teARM_Thumb	1	Processor is in Thumb mode
teARM_Jazelle	2	Processor is in Jazelle mode
teARM_ThumbEE	3	Processor is in Thumb EE mode

1.3.2. temu_ARMMode

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
enum temu_ARMMode {
  teARM_Usr = 0,
  teARM_Fiq = 1,
  teARM_Irq = 2,
  teARM_Svc = 3,
  teARM_Mon = 4,
  teARM_Abt = 5,
  teARM_Hyp = 6,
  teARM_Und = 7,
  teARM_Sys = 8,
}
```

Description

Enumerators

Name	Value	Description
teARM_Usr	0	User 0b10000 0x10 16
teARM_Fiq	1	Fast irq 0b10001 0x11 17
teARM_Irq	2	Interrupt 0b10010 0x12 18
teARM_Svc	3	Supervisor 0b10011 0x13 19
teARM_Mon	4	Monitor 0b10110 0x14 20
teARM_Abt	5	Abort 0b10111 0x15 21
teARM_Hyp	6	Hypervisor 0b11010 0x1a 26
teARM_Und	7	Undefined 0b11011 0b1b 27
teARM_Sys	8	System 0b11111 0b1f 31

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.3.3. temu_ARPHandlingResult

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
enum temu_ARPHandlingResult {
}
```

Description

Enumerators

Name	Value	Description

1.3.4. temu_BTStatID

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
enum temu_BTStatID {
  teBTS_TranslatedInstructions = 0,
  teBTS_ExecutedInstructions = 1,
  teBTS_TranslatedBlocks = 2,
  teBTS_ExecutedBlocks = 3,
  teBTS_CodeSize = 4,
}
```

Description

Statistics ID for controlling collection of individual statistics.

Enumerators

Name	Value	Description
teBTS_TranslatedInstructions	0	Number of translated instructions

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Name	Value	Description
teBTS_ExecutedInstructions	1	Number of executed instructions
teBTS_TranslatedBlocks	2	Number of translated blocks
teBTS_ExecutedBlocks	3	Number of executed blocks
teBTS_CodeSize	4	Translated code size in bytes

1.3.5. temu_BreakAction

Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
enum temu_BreakAction {
}
```

Description

Enumerators

Name	Value	Description

1.3.6. temu_BreakState

Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
enum temu_BreakState {
}
```

Description

Enumerators

Name	Value	Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

1.3.7. temu_ClockStopReason

Include

```
#include "temu-c/Models/Clock.h"
```

Type

```
enum temu_ClockStopReason {
  teCSR_Normal = 0,
  teCSR_Halt = 1,
  teCSR_BreakWatch = 2,
  teCSR_Early = 3,
  teCSR_Panic = 4,
  teCSR_Sync = 5,
}
```

Description

Clock stop reason, these are similar to CPU exit reason, but not identical.

Enumerators

Name	Value	Description
teCSR_Normal	0	Normal exit (cannot be passed to early exit)
teCSR_Halt	1	Exited due to clock halting
teCSR_BreakWatch	2	Exited due to breakpoint or watchpoint hit
teCSR_Early	3	Other early stop reason
teCSR_Panic	4	Clock had a serious internal error
teCSR_Sync	5	Clock needs to synchronize

1.3.8. temu_CmdOptionKind

Include

```
#include "temu-c/Support/CommandLine.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
enum temu_CmdOptionKind {
  teCOK_Path = 1,
  teCOK_Object = 2,
  teCOK_Int = 3,
  teCOK_Double = 4,
  teCOK_Prop = 5,
  teCOK_Iface = 6,
  teCOK_Reg = 7,
  teCOK_Field = 8,
  teCOK_Class = 9,
}
```

Description

Enumerators

Name	Value	Description
teCOK_Path	1	Path is a string, but with auto completion of file names
teCOK_Object	2	Object is a named object
teCOK_Int	3	Any integer number
teCOK_Double	4	Any floating point number
teCOK_Prop	5	Property reference
teCOK_Iface	6	Interface reference
teCOK_Reg	7	Register reference
teCOK_Field	8	Register field reference
teCOK_Class	9	Class option

1.3.9. temu_CpuExitReason

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
enum temu_CpuExitReason {
  teCER_Normal = 0,
  teCER_Trap = 2,
  teCER_Halt = 3,
  teCER_Event = 4,
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
  teCER_Break = 5,
  teCER_WatchR = 6,
  teCER_WatchW = 7,
  teCER_Early = 8,
  teCER_Panic = 9,
  teCER_Sync = 10,
}
```

Description

Enumerators

Name	Value	Description
teCER_Normal	0	Normal exit (cannot be passed to early exit)
teCER_Trap	2	Exited due to trap (sync trap)
teCER_Halt	3	Exited due to halting (e.g. sparc error mode)
teCER_Event	4	Exited due to synchronised event (internally, returned for any event)
teCER_Break	5	Exited due to breakpoint hit
teCER_WatchR	6	Exited due to watchpoint read hit
teCER_WatchW	7	Exited due to watchpoint write hit
teCER_Early	8	Other early exit reason
teCER_Panic	9	Emulator panic (e.g. illegal mode transition)
teCER_Sync	10	Instruction cache sync operation

1.3.10. temu_CpuFlags

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
enum temu_CpuFlags {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
  teCF_Profile = 1,
  teCF_Sanitizer = 2,
  teCF_NormalExit = 256,
  teCF_ForceExit = 512,
}
```

Description

Bits of temu_Cpu::Flags.

Code flags select handlers and translations, so changing one needs a flush. The decoder takes teCF_Profile from TEMU_STICKY_PROFILE_MODE instead.

Enumerators

Name	Value	Description
teCF_Profile	1	Decode the profiling handler variants.
teCF_Sanitizer	2	A guest sanitizer observes this processor.
teCF_NormalExit	256	Leave the run loop at the next check.
teCF_ForceExit	512	Leave it early.

1.3.11. temu_CpuSchedStopReason

Include

```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
enum temu_CpuSchedStopReason {
}
```

Description

Enumerators

Name	Value	Description

1.3.12. temu_CpuState

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
enum temu_CpuState {
  teCS_Nominal = 0,
  teCS_Halted = 1,
  teCS_Idling = 2,
  teCS_Off = 3,
  teCS_Reset = 4,
}
```

Description

Enumerators

Name	Value	Description
teCS_Nominal	0	Normal all ok CPU state: Next states: halted, idling, off, reset.
teCS_Halted	1	Halted CPU (e.g. SPARC error mode, or PPC checkstop), the CPU can go to the normal state using a reset. Legal next states: off, reset, nominal
teCS_Idling	2	The CPU is in idle mode. It will not run instructions, only advance the CPUs event queue (until the CPU moves to another mode). Legal next states: off, nominal or reset.
teCS_Off	3	Processor core is powered off (added to TEMU 5). Legal next states: reset or nominal.
teCS_Reset	4	Processor core in reset-state (added to TEMU 5). Legal Next states: nominal or off. Reset is transient for most CPUs, so off-state goes directly to nominal instead of going through reset.

1.3.13. temu_DBTProfileSite

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
enum temu_DBTProfileSite {
}
```

Description

Extra DBT profiling sites, see dbt/profile/* in the configuration.

Enumerators

Name	Value	Description

1.3.14. temu_DMARequestResult

Include

```
#include "temu-c/Bus/DMA.h"
```

Type

```
enum temu_DMARequestResult {
}
```

Description

Enumerators

Name	Value	Description

1.3.15. temu_Endian

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

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```
enum temu_Endian {
  teEN_Little = 0,
  teEN_Big = 1,
  teEN_Dynamic = 2,
}
```

Description

Enumerators

Name	Value	Description
teEN_Little	0	Always little endian
teEN_Big	1	Always big endian
teEN_Dynamic	2	Can switch at runtime

1.3.16. temu_ExecutionState

Include

```
#include "temu-c/Support/Scheduler.h"
```

Type

```
enum temu_ExecutionState {
}
```

Description

Enumerators

Name	Value	Description

1.3.17. temu_FluxEventType

Include

```
#include "temu-c/Flux/Flux.h"
```

Type

```
enum temu_FluxEventType {
```

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```
}
```

Description

Enumerators

Name	Value	Description

1.3.18. temu_I2CBusState

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
enum temu_I2CBusState {
  teI2C_Invalid = 0,
  teI2C_ACK = 1,
  teI2C_NACK = 2,
  teI2C_ArbitrationLost = 3,
  teI2C_Busy = 4,
}
```

Description

Return value for most I2C interface functions.

Enumerators

Name	Value	Description
teI2C_Invalid	0	Reserved, should never be observed.
teI2C_ACK	1	A device or controller acknowleged.
teI2C_NACK	2	No acknowlegement, e.g. if no target device with a specific device address is even connected to the bus, or the device is disabled.
teI2C_ArbitrationLost	3	Currently only happens on timeouts or a reset during a ongoing communication.

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Name	Value	Description
teI2C_Busy	4	The bus is busy.

1.3.19. temu_InitiatorType

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
enum temu_InitiatorType {
  teIT_Cpu = 0,
  teIT_Device = 1,
  teIT_Unknown = 2,
}
```

Description

Enumerators

Name	Value	Description
teIT_Cpu	0	Memory transaction initiated by CPU
teIT_Device	1	Memory transaction initiated by device
teIT_Unknown	2	Memory transaction initiator unknown

1.3.20. temu_InstrClass

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
enum temu_InstrClass {
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Enumerators

Name	Value	Description

1.3.21. temu_InstructionFieldType

Include

```
#include "temu-c/Support/Assembler.h"
```

Type

```
enum temu_InstructionFieldType {
}
```

Description

Enumerators

Name	Value	Description

1.3.22. temu_InstructionFlags

Include

```
#include "temu-c/EmulatorManager/Instrumenter.h"
```

Type

```
enum temu_InstructionFlags {
  teIF_Branch = 1,
  teIF_IndirectBranch = 2,
  teIF_Load = 4,
  teIF_Store = 8,
  teIF_Integer = 16,
  teIF_Float = 32,
  teIF_Arithmetic = 64,
  teIF_Annulled = 128,
  teIF_UnconditionalTaken = 256,
  teIF_UnconditionalNotTaken = 512,
  teIF_OnPage = 1024,
  teIF_ModeSwitch = 2048,
  teIF_Call = 4096,
  teIF_Unimplemented = 8192,
  teIF_Fused = 16384,
```

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```
}
```

Description

Instruction classification flags

Enumerators

Name	Value	Description
teIF_Branch	1	Instruction is a branch
teIF_IndirectBranch	2	Instruction is an indirect branch
teIF_Load	4	Instruction is a load
teIF_Store	8	Instruction is a store
teIF_Integer	16	Integer instruction
teIF_Float	32	Floating point instruction
teIF_Arithmetic	64	Arithmetic instruction
teIF_Annulled	128	Annulled branch
teIF_UnconditionalTaken	256	Unconditional taken branch
teIF_UnconditionalNotTaken	512	Unconditional not-taken branch
teIF_OnPage	1024	On page branch
teIF_ModeSwitch	2048	Privilege mode switching instruction
teIF_Call	4096	Call instruction
teIF_Unimplemented	8192	Permanently unimplemented
teIF_Fused	16384	Fused instruction sequence

1.3.23. temu_LinkDirection

Include

```
#include "temu-c/Bus/LinkNotifications.h"
```

Type

```
enum temu_LinkDirection {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Enumerators

Name	Value	Description

1.3.24. temu_LogLevel

Include

```
#include "temu-c/Support/Logging.h"
```

Type

```
enum temu_LogLevel {
  teLL_Fatal = 0,
  teLL_Error = 1,
  teLL_Warning = 2,
  teLL_Info = 3,
  teLL_Trace = 4,
  teLL_Debug = 5,
}
```

Description

Logging levels corresponds roughly to some of the RFC 5424 severity levels.

Enumerators

Name	Value	Description
teLL_Fatal	0	Fatal, emulator cannot keep on running
teLL_Error	1	Error happened, in principle critical but up to user
teLL_Warning	2	Warnings
teLL_Info	3	Normal messages
teLL_Trace	4	Trace messages, not compiled away
teLL_Debug	5	Debug

1.3.25. temu_MemoryAttr

Include

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```
#include "temu-c/Support/Memory.h"
```

Type

```
enum temu_MemoryAttr {
  teMA_Break = 1,
  teMA_WatchRead = 2,
  teMA_WatchWrite = 4,
  teMA_Upset = 8,
  teMA_Faulty = 16,
  teMA_User1 = 32,
  teMA_User2 = 64,
  teMA_User3 = 128,
}
```

Description

The emulator provides 5 standard attributes, and 3 user defined ones. The attributes are set in the memory space (not the memory models), so it is possible to set a watch point on memory mapped devices. When an attribute is set on a page, that page will get a shadow attribute page (same size as the page), enabling attributes to be set on a per byte level.

Attributes are only checked on the address being accessed, the transaction size is not taken into account.

Enumerators

Name	Value	Description
teMA_Break	1	Breakpoint set
teMA_WatchRead	2	Read watchpoint set
teMA_WatchWrite	4	Write watchpoint set
teMA_Upset	8	Single event upset
teMA_Faulty	16	Multiple event upset / uncorrectable
teMA_User1	32	User definable
teMA_User2	64	User definable
teMA_User3	128	User definable

1.3.26. temu_MemoryEndianness

Include

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```
#include "temu-c/Memory/Memory.h"
```

Type

```
enum temu_MemoryEndianness {
  teME_BigEndian = 0,
  teME_LittleEndian = 1,
  teME_UnspecifiedEndian = 2,
}
```

Description

Enumerators

Name	Value	Description
teME_BigEndian	0	Memory access interface in big endian
teME_LittleEndian	1	Memory access interface in little endian
teME_UnspecifiedEndian	2	Memory access interface in undefined endian

1.3.27. temu_MemoryKind

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
enum temu_MemoryKind {
  teMK_RAM = 0,
  teMK_ROM = 1,
  teMK_MMIO = 2,
  teMK_IO = 2,
  teMK_ProxyMemory = 3,
  teMK_MemSpace = 4,
  teMK_Last = 4,
}
```

Description

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Enumerators

Name	Value	Description
teMK_RAM	0	Model is a RAM
teMK_ROM	1	Model is a ROM
teMK_MMIO	2	Alias for `teMK_IO`
teMK_IO	2	Model is a normal IO device
teMK_ProxyMemory	3	Mapped object is not a RAM/ROM but promises fetch/probe fill Mt→Page/Meta
teMK_MemSpace	4	Model is a memory space
teMK_Last	4	DO NOT USE

1.3.28. temu_MemoryStat

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
enum temu_MemoryStat {
}
```

Description

Enumerators

Name	Value	Description

1.3.29. temu_Mil1553BusResetType

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
enum temu_Mil1553BusResetType {
}
```

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Description

Enumerators

Name	Value	Description

1.3.30. temu_Mil1553Error

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
enum temu_Mil1553Error {
}
```

Description

Enumerators

Name	Value	Description

1.3.31. temu_Mil1553MsgType

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
enum temu_Mil1553MsgType {
}
```

Description

Enumerators

Name	Value	Description

1.3.32. temu_NoDebuggerBreakpointPolicy

Include

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```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

```
enum temu_NoDebuggerBreakpointPolicy {
}
```

Description

Enumerators

Name	Value	Description

1.3.33. temu_PCIeMessageTypes

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
enum temu_PCIeMessageTypes {
}
```

Description

temu_PCIeMessageTypes: PCI Express Messages name = code

Enumerators

Name	Value	Description

1.3.34. temu_PatternAction

Include

```
#include "temu-c/Target/CodePatterns.h"
```

Type

```
enum temu_PatternAction {
  tePA_Idle = 0,
```

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```
  tePA_Skip = 1,
  tePA_Call = 2,
  tePA_Invalid = 3,
}
```

Description

Enumerators

Name	Value	Description
tePA_Idle	0	Enter idle when running pattern
tePA_Skip	1	Skip over code pattern
tePA_Call	2	Call function but run code after function returns
tePA_Invalid	3	Invalid action, do not use! Internal API use only.

1.3.35. temu_PixelFormat

Include

```
#include "temu-c/Graphics/PixelFormat.h"
```

Type

```
enum temu_PixelFormat {
  tePF_ARGB8888 = 0,
  tePF_RGB888 = 1,
  tePF_RGB565 = 2,
  tePF_ARGB1555 = 3,
  tePF_ARGB4444 = 4,
  tePF_L8 = 5,
  tePF_AL44 = 6,
  tePF_AL88 = 7,
}
```

Description

Pixel formats handled by the graphics subsystem.

The numeric values match the STM32F4 LTDC LxPFCR / DMA2D pixel-format encoding so a controller can cast its register field directly. Byte layout is the little-endian in-memory order the guest programs, e.g. ARGB8888 is stored B,G,R,A.

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The canonical format used by conversion is ARGB8888 delivered as a host uint32_t 0xAARRGGBB, which is what the display sinks (PPM, VNC) consume.

Enumerators

Name	Value	Description
tePF_ARGB8888	0	32 bpp, memory order B,G,R,A
tePF_RGB888	1	24 bpp, memory order B,G,R
tePF_RGB565	2	16 bpp
tePF_ARGB1555	3	16 bpp
tePF_ARGB4444	4	16 bpp
tePF_L8	5	8 bpp CLUT-indexed luminance
tePF_AL44	6	8 bpp, 4-bit alpha + 4-bit luminance
tePF_AL88	7	16 bpp, 8-bit alpha + 8-bit luminance

1.3.36. temu_PowerState

Include

```
#include "temu-c/Models/Power.h"
```

Type

```
enum temu_PowerState {
  tePS_Off = 0,
  tePS_On = 1,
}
```

Description

Used to indicate whether a model is powered on

Enumerators

Name	Value	Description
tePS_Off	0	System is powered off
tePS_On	1	System is powered on

1.3.37. temu_PropPathKind

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Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
enum temu_PropPathKind {
  tePPK_None = 0,
  tePPK_Property = 1,
  tePPK_Namespace = 2,
}
```

Description

What lies at a path in a class's property namespace.

Flags, because a name can be both. That is deprecated and will not be supported in TEMU 6.

Enumerators

Name	Value	Description
tePPK_None	0	Nothing registered at or below the path.
tePPK_Property	1	A property is registered at exactly this path.
tePPK_Namespace	2	Properties are registered below this path.

1.3.38. temu_RiscVPrivilegeLevel

Include

```
#include "temu-c/Support/Cpu.h"
```

Type

```
enum temu_RiscVPrivilegeLevel {
}
```

Description

Enumerators

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Name	Value	Description

1.3.39. temu_RiscvCsr

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
enum temu_RiscvCsr {
}
```

Description

RISC-V CSRs

Enumerators

Name	Value	Description

1.3.40. temu_SanitizerAccessKind

Include

```
#include "temu-c/Debugging/SanitizersUnstable.h"
```

Type

```
enum temu_SanitizerAccessKind {
}
```

Description

Enumerators

Name	Value	Description

1.3.41. temu_SchedControlRequestOrigin

Include

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```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
enum temu_SchedControlRequestOrigin {
}
```

Description

Enumerators

Name	Value	Description

1.3.42. temu_SchedControlStopPolicy

Include

```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
enum temu_SchedControlStopPolicy {
}
```

Description

Enumerators

Name	Value	Description

1.3.43. temu_SchedStatus

Include

```
#include "temu-c/Scheduler/MultiLevelScheduler.h"
```

Type

```
enum temu_SchedStatus {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Enumerators

Name	Value	Description

1.3.44. temu_SchedVariant

Include

```
#include "temu-c/Scheduler/Init.h"
```

Type

```
enum temu_SchedVariant {
}
```

Description

Enumerators

Name	Value	Description

1.3.45. temu_SdResponseType

Include

```
#include "temu-c/Bus/SdCard.h"
```

Type

```
enum temu_SdResponseType {
  teSDR_None = 0,
  teSDR_R1 = 1,
  teSDR_R1b = 2,
  teSDR_R2 = 3,
  teSDR_R3 = 4,
  teSDR_R6 = 5,
  teSDR_R7 = 6,
}
```

Description

The response format of a command, as the SD specification defines it.

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Enumerators

Name	Value	Description
teSDR_None	0	no response (CMD0, CMD4, CMD15)
teSDR_R1	1	card status
teSDR_R1b	2	card status, then busy on DAT0
teSDR_R2	3	CID or CSD register (136 bits)
teSDR_R3	4	OCR register; carries no valid CRC
teSDR_R6	5	published RCA and status bits
teSDR_R7	6	card interface condition (CMD8)

1.3.46. temu_SdStatus

Include

```
#include "temu-c/Bus/SdCard.h"
```

Type

```
enum temu_SdStatus {
  teSDS_Ok = 0,
  teSDS_NoResponse = 1,
  teSDS_CrcError = 2,
  teSDS_DataError = 3,
}
```

Description

Outcome of a command or a data transfer.

Enumerators

Name	Value	Description
teSDS_Ok	0	The card responded, or the data was transferred.

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Name	Value	Description
teSDS_NoResponse	1	The card did not respond: there is no card, the command is not legal in the card's current state, or it is not supported. A controller reports a command response timeout.
teSDS_CrcError	2	The response or data was corrupted on the bus (CRC error). Reserved for fault injection; a card model never reports it on its own.
teSDS_DataError	3	No data phase is in progress for this direction, or the card could not access its medium.

1.3.47. temu_SparcPrivilegeLevel

Include

```
#include "temu-c/Support/Cpu.h"
```

Type

```
enum temu_SparcPrivilegeLevel {
}
```

Description

Enumerators

Name	Value	Description

1.3.48. temu_SpfiFlags

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

```
enum temu_SpfiFlags {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Flags describing a SpaceFibre packet and/or control word like flow control tokens.

Enumerators

Name	Value	Description

1.3.49. temu_SpfiLinkState

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

```
enum temu_SpfiLinkState {
}
```

Description

SpaceFibre link states.

Enumerators

Name	Value	Description

1.3.50. temu_SpiDataRate

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
enum temu_SpiDataRate {
}
```

Description

Enumerators

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Name	Value	Description

1.3.51. temu_SpiMode

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
enum temu_SpiMode {
}
```

Description

Enumerators

Name	Value	Description

1.3.52. temu_SpwLinkState

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
enum temu_SpwLinkState {
  teSPWLS_FIFO = 6,
}
```

Description

Enumerators

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Name	Value	Description
teSPWLS_FIFO	6	A special link state to indicate that this is a FIFO port. If this is a FIFO port, as used e.g. to connect the GRPSFI and GRSPWROUTER IPs on the GR765. No link initialization or so does happen on FIFO ports, both sides must know in advance which ports are FIFO ports.

1.3.53. temu_SpwPacketType

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
enum temu_SpwPacketType {
}
```

Description

Enumerators

Name	Value	Description

1.3.54. temu_SpwRmapCommandType

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
enum temu_SpwRmapCommandType {
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Enumerators

Name	Value	Description

1.3.55. temu_SpwRmapDecodedPacketType

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
enum temu_SpwRmapDecodedPacketType {
}
```

Description

Enumerators

Name	Value	Description

1.3.56. temu_SpwRmapDecodingOutcome

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
enum temu_SpwRmapDecodingOutcome {
}
```

Description

Enumerators

Name	Value	Description

1.3.57. temu_SpwRmapPacketType

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
enum temu_SpwRmapPacketType {
}
```

Description

Enumerators

Name	Value	Description

1.3.58. temu_StatClass

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
enum temu_StatClass {
}
```

Description

Enumerators

Name	Value	Description

1.3.59. temu_SyncEvent

Include

```
#include "temu-c/Support/Events.h"
```

Type

```
enum temu_SyncEvent {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Enumerators

Name	Value	Description

1.3.60. temu_TraceType

Include

```
#include "temu-c/Target/CpuUnstable.h"
```

Type

```
enum temu_TraceType {
}
```

Description

Enumerators

Name	Value	Description

1.3.61. temu_Type

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
enum temu_Type {
  teTY_Invalid = 0,
  teTY_Intptr = 1,
  teTY_Uintptr = 2,
  teTY_Float = 3,
  teTY_Double = 4,
  teTY_U8 = 5,
  teTY_U16 = 6,
  teTY_U32 = 7,
  teTY_U64 = 8,
  teTY_I8 = 9,
  teTY_I16 = 10,
  teTY_I32 = 11,
  teTY_I64 = 12,
```

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```
    teTY_Obj = 13,
    teTY_InternalPtr = 14,
    teTY_IfaceRef = 15,
    teTY_IfaceRefArray = 16,
    teTY_String = 17,
    teTY_Buffer = 18,
    teTY_Dict = 19,
    teTY_Vector = 20,
    teTY_List = 21,
    teTY_U128 = 22,
    teTY_I128 = 23,
}
```

Description

Type tag

The TEMU object system uses type tags to track which type is registered and in use at runtime. Type tags are used in for example the property registration functions.

Enumerators

Name	Value	Description
teTY_Invalid	0	Invalid value 0
teTY_Intptr	1	Pointer sized signed integer (intptr_t)
teTY_Uintptr	2	Pointer sized unsigned integer (uintptr_t)
teTY_Float	3	Single precision floating point value
teTY_Double	4	Double precision floating point value
teTY_U8	5	8-bit fixed width unsigned integer
teTY_U16	6	16-bit fixed width unsigned integer
teTY_U32	7	32-bit fixed width unsigned integer
teTY_U64	8	64-bit fixed width unsigned integer
teTY_I8	9	8-bit fixed width signed integer

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Name	Value	Description
teTY_I16	10	16-bit fixed width signed integer
teTY_I32	11	32-bit fixed width signed integer
teTY_I64	12	64-bit fixed width signed integer
teTY_Obj	13	Pointer to temu_Object
teTY_InternalPtr	14	Internal pointer
teTY_IfaceRef	15	Interface reference
teTY_IfaceRefArray	16	Dynamic object/interface array
teTY_String	17	C-string, useful for serialization
teTY_Buffer	18	Buffer (see Buffer.h)
teTY_Dict	19	Dictionary
teTY_Vector	20	Vector (i.e. dynamic array)
teTY_List	21	List
teTY_U128	22	128-bit fixed width unsigned integer (temu_U128)
teTY_I128	23	128-bit fixed width signed integer (temu_U128)

1.3.62. temu_UsbPortStateFlags

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
enum temu_UsbPortStateFlags {
  teUPSF_Connected = 1,
  teUPSF_Enabled = 2,
  teUPSF_Suspended = 4,
  teUPSF_Reset = 8,
  teUPSF_Powered = 16,
  teUPSF_OverCurrent = 32,
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Bit flags describing USB port state.

Enumerators

Name	Value	Description
teUPSF_Connected	1	Downstream device attached.
teUPSF_Enabled	2	Port enabled for traffic.
teUPSF_Suspended	4	Port suspended.
teUPSF_Reset	8	Port reset signalling active.
teUPSF_Powered	16	Port power applied.
teUPSF_OverCurrent	32	Port reports over-current.

1.3.63. temu_UsbSpeed

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
enum temu_UsbSpeed {
  teUSP_LowSpeed = 0,
  teUSP_FullSpeed = 1,
  teUSP_HighSpeed = 2,
  teUSP_SuperSpeed = 3,
  teUSP_SuperSpeedPlus = 4,
}
```

Description

USB signalling speed negotiated for a device or port.

Enumerators

Name	Value	Description
teUSP_LowSpeed	0	Low-speed USB, 1.5 Mbit/s.
teUSP_FullSpeed	1	Full-speed USB, 12 Mbit/s.
teUSP_HighSpeed	2	High-speed USB, 480 Mbit/s.
teUSP_SuperSpeed	3	SuperSpeed USB, 5 Gbit/s.
teUSP_SuperSpeedPlus	4	SuperSpeed+ USB, 10 Gbit/s.

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1.3.64. temu_UsbStatus

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
enum temu_UsbStatus {
  teUST_Ok = 0,
  teUST_Stall = 1,
  teUST_Nak = 2,
  teUST_Timeout = 3,
  teUST_Babble = 4,
  teUST_ShortPacket = 5,
  teUST_Disconnected = 6,
  teUST_IoError = 7,
}
```

Description

Completion status for a submitted USB transfer.

Enumerators

Name	Value	Description
teUST_Ok	0	Transfer completed successfully.
teUST_Stall	1	Endpoint returned STALL.
teUST_Nak	2	Endpoint returned NAK.
teUST_Timeout	3	Transfer timed out.
teUST_Babble	4	Device returned more data than allowed.
teUST_ShortPacket	5	Transfer completed with a short packet.
teUST_Disconnected	6	Device or route disappeared before completion.
teUST_IoError	7	Generic fabric or backend error.

1.3.65. temu_UsbTransferDir

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
enum temu_UsbTransferDir {
  teUTD_Out = 0,
  teUTD_In = 1,
  teUTD_Setup = 2,
}
```

Description

Direction is from the host's point of view.

Enumerators

Name	Value	Description
teUTD_Out	0	Host-to-device data phase.
teUTD_In	1	Device-to-host data phase.
teUTD_Setup	2	Control SETUP packet.

1.3.66. temu_UsbTransferType

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
enum temu_UsbTransferType {
  teUTT_Control = 0,
  teUTT_Bulk = 1,
  teUTT_Interrupt = 2,
  teUTT_Isochronous = 3,
}
```

Description

USB transfer category.

Enumerators

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Name	Value	Description
teUTT_Control	0	Control endpoint transfer.
teUTT_Bulk	1	Bulk transfer.
teUTT_Interrupt	2	Interrupt transfer.
teUTT_Isochronous	3	Isochronous transfer.

1.4. Interfaces

1.4.1. temu_AArch64CpuIface

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_AArch64CpuIface {
  temu_U128 (*)(void *, unsigned int) getVReg;
  void (*)(void *, unsigned int, temu_U128) setVReg;
}
```

Description

AArch64 state outside the generic CPU interface. Only the classes with A64 provide it, also through the ARM CPU VTable (temu_ARMCpuVTable).

Fields

Field	Type	Description
getVReg	temu_U128 (*)(void *, unsigned int)	Read V Reg (0 to 31) whole, low half in Lo.
setVReg	void (*)(void *, unsigned int, temu_U128)	Write V Reg (0 to 31) whole.

1.4.2. temu_ARMCoProcessorIface

Include

```
#include "temu-c/Target/ARM.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_ARMCoProcessorIface {
}
```

Description

Fields

Field	Type	Description

1.4.3. temu_ARMCpuIface

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMCpuIface {
}
```

Description

Fields

Field	Type	Description

1.4.4. temu_ARMMProfileClientIface

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMMProfileClientIface {
  int (*)(void *, uint32_t *) newFpContext;
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
newFpContext	int (*)(void *, uint32_t *)	Optional. Called when a floating-point instruction executes while CONTROL.FPCA is 0. Returns 1 if the instruction creates a new floating-point context (FPCCR.ASPEN), filling *Fpscr with its FPSCR value (FPDSCR); 0 leaves CONTROL.FPCA alone. When null the core sets CONTROL.FPCA and keeps FPSCR.

1.4.5. temu_ARMMProfileIface

Include

```
#include "temu-c/Target/ARM.h"
```

Type

```
struct temu_ARMMProfileIface {
  void (*)(void *) invalidateTranslations;
}
```

Description

Fields

Field	Type	Description
invalidateTranslations	void (*)(void *)	The MPU configuration changed: drop every cached address translation, so the next data access is checked again. Safe to call from inside a memory access. Instruction fetch from the current page is checked again at the next context synchronisation (ISB, exception entry or return) or branch off the page, as the architecture allows.

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1.4.6. temu_AclintCsrIface

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_AclintCsrIface {
  uint64_t (*)(void *, temu_TimeSource *) readMtime;
}
```

Description

Fields

Field	Type	Description
readMtime	uint64_t (*)(void *, temu_TimeSource *)	Read mtime

1.4.7. temu_AhbIface

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_AhbIface {
}
```

Description

AHB bus plug and play interface

A device providing plug and play info for the AHB bridge, should implement this interface. The recommended way is to put a temu_AhbPnpInfo struct inside your model struct and then return a pointer to this one. This way the PNP info can be changed on a per object basis.

Fields

Field	Type	Description

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1.4.8. temu_AiaCsrIface

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_AiaCsrIface {
  uint64_t (*)(void *, uint64_t, unsigned int, _Bool) readIreg;
  void (*)(void *, uint64_t, uint64_t, unsigned int, _Bool) writeIreg;
  uint64_t (*)(void *, unsigned int, _Bool) readTopei;
  void (*)(void *, uint64_t, unsigned int, _Bool) writeTopei;
}
```

Description

Fields

Field	Type	Description
readIreg	uint64_t (*)(void *, uint64_t, unsigned int, _Bool)	Read ireg
writeIreg	void (*)(void *, uint64_t, uint64_t, unsigned int, _Bool)	Write ireg
readTopei	uint64_t (*)(void *, unsigned int, _Bool)	Read topei
writeTopei	void (*)(void *, uint64_t, unsigned int, _Bool)	Write topei

1.4.9. temu_AnalogIface

Include

```
#include "temu-c/Bus/Analog.h"
```

Type

```
struct temu_AnalogIface {
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Analog signal interface NOTE THIS IS EXPERIMENTAL

Fields

Field	Type	Description

1.4.10. temu_ApbIface

Include

```
#include "temu-c/Bus/Amba.h"
```

Type

```
struct temu_ApbIface {
}
```

Description

APB bus plug and play interface

A device providing plug and play info for the APB bridge, should implement this interface. The recommended way is to put a temu_ApbPnpInfo struct inside your model struct and then return a pointer to this one. This way the PNP info can be changed on a per object basis.

Fields

Field	Type	Description

1.4.11. temu_AssemblerIface

Include

```
#include "temu-c/Support/Assembler.h"
```

Type

```
struct temu_AssemblerIface {
}
```

Description

Fields

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Field	Type	Description

1.4.12. temu_AudioIface

Include

```
#include "temu-c/Bus/Audio.h"
```

Type

```
struct temu_AudioIface {
  int (*)(void *, const temu_AudioFrame *, temu_AudioFrame *) transfer;
}
```

Description

Fields

Field	Type	Description
transfer	int (*)(void *, const temu_AudioFrame *, temu_AudioFrame *)	One audio frame from the clock master. Returns 1 if the device drove data back in Rx (which may be null if the caller does not receive).

1.4.13. temu_BinaryTranslationControlIface

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_BinaryTranslationControlIface {
  void (*)(void *) enableBinaryTranslator;
  void (*)(void *) disableBinaryTranslator;
  void (*)(void *, unsigned int) setThreshold;
  int (*)(void *, uint64_t, uint64_t, unsigned int) translateInstructions;
  int (*)(void *, uint64_t, uint64_t) translateBlock;
  int (*)(void *, uint64_t, uint64_t) translateFunc;
  int (*)(void *, uint64_t, uint64_t, int) chainBlocks;
  const char *(*)(void *, uint64_t) disassembleBlock;
  int (*)(void *, uint64_t) clearBlock;
```

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```
    int (*)(void *, uint64_t) clearBlocksOnPage;
    void (*)(void *, temu_BTStatID) enableStatistics;
    void (*)(void *, temu_BTStatID) disableStatistics;
    uint64_t (*)(void *, temu_BTStatID) getStatistics;
    void (*)(void *, temu_BTStatID) clearStatistics;
}
```

Description

Fields

Field	Type	Description
enableBinaryTranslator	void (*)(void *)	Enable translator for processor
disableBinaryTranslator	void (*)(void *)	Disable translator for processor
setThreshold	void (*)(void *, unsigned int)	Set threshold (of call target execution) for triggering translation
translateInstructions	int (*)(void *, uint64_t, uint64_t, unsigned int)	Translate specific instruction range
translateBlock	int (*)(void *, uint64_t, uint64_t)	Translate block (terminating with a branch, or end of page (special rules for delay slots apply)).
translateFunc	int (*)(void *, uint64_t, uint64_t)	Translate a complete function (determined to be statically reachable from the PA on this page).
chainBlocks	int (*)(void *, uint64_t, uint64_t, int)	Manually chain blocks.
disassembleBlock	const char **()**(void *, uint64_t)	Disassemble block (using the host assembler)
clearBlock	int (*)(void *, uint64_t)	Remove a specific block and unlink incoming/outgoing chains
clearBlocksOnPage	int (*)(void *, uint64_t)	Remove all translated blocks on a specific physical page
enableStatistics	void (*)(void *, temu_BTStatID)	Enable collection of statistic in translated code
disableStatistics	void (*)(void *, temu_BTStatID)	Disable collection of statistic in translated code

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
getStatistics	uint64_t (*)(void *, temu_BTStatID)	Get statistic
clearStatistics	void (*)(void *, temu_BTStatID)	Reset statistics

1.4.14. temu_BlockDisassemblerIface

Include

```
#include "temu-c/HostDisassembler/HostDisassembler.h"
```

Type

```
struct temu_BlockDisassemblerIface {
}
```

Description

Block disassembler disassembles data blocks of code.

The main purpose is to disassemble host code, however the interface is genericly named so it could be used for other purposes in the future.

The disassemble method is supposed to return a thread local C-string, that is valid until the next call of the function. Consequently, you do not need to free or in other ways worry of the string.

field disassemble Disassembly function.

Fields

Field	Type	Description

1.4.15. temu_CacheCtrlIface

Include

```
#include "temu-c/Memory/Cache.h"
```

Type

```
struct temu_CacheCtrlIface {
  void (*)(void *) evictionInProgress;
  void (*)(void *) evictionCompleted;
```

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```
}
```

Description

The cache control interface can be implemented by a cache controller. Which may be embedded in a CPU or device model. Typically, the assumption is that the cache controller will turn on and off the cache and that it may need to be notified on global eviction operations, which may or may not be reflected in the cache controllers status registers.

Fields

Field	Type	Description
evictionInProgress	void (*)(void *)	Global evict operation ongoing
evictionCompleted	void (*)(void *)	Global evict operation completed

1.4.16. temu_CacheIface

Include

```
#include "temu-c/Memory/Cache.h"
```

Type

```
struct temu_CacheIface {
  void (*)(void *) enable;
  void (*)(void *) disable;
  void (*)(void *) freeze;
  void (*)(void *, uint64_t) lockLine;
  void (*)(void *, uint64_t) unlockLine;
  void (*)(void *) invalidateAll;
  void (*)(void *, uint64_t) invalidateLine;
  void (*)(void *) evictAll;
  void (*)(void *, uint64_t) evictLine;
  uint32_t (*)(void *) getReplacementPolicy;
  uint32_t (*)(void *) getSets;
  uint32_t (*)(void *) getWays;
  uint32_t (*)(void *) getLineSize;
  int (*)(void *, uint64_t) isValid;
  uint64_t (*)(void *, uint64_t) readFlags;
  void (*)(void *, uint64_t, uint64_t) writeFlags;
  uint64_t (*)(void *, uint64_t) readData;
  int (*)(void *, uint64_t, uint64_t) writeData;
}
```

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Description

Invalidation: cache line will be tagged as invalid (i.e. flushed) Eviction: cache line will be invalidated and in writeBack caches the content will be written back to memory.

Fields

Field	Type	Description
enable	void (*)(void *)	Enable cache
disable	void (*)(void *)	Disable cache
freeze	void (*)(void *)	Freeze cache
lockLine	void (*)(void *, uint64_t)	Lock line for addr
unlockLine	void (*)(void *, uint64_t)	Unlock line
invalidateAll	void (*)(void *)	Invalidate entire cache
invalidateLine	void (*)(void *, uint64_t)	Invalidate single line
evictAll	void (*)(void *)	Evict all (i.e. spill to memory)
evictLine	void (*)(void *, uint64_t)	Evict line
getReplacementPolicy	uint32_t (*)(void *)	Interrogation of cache properties - A directly mapped cache has 1 way, but typically several sets - A fully associative cache has 1 set, but typically several ways - Total cache size in bytes is sets * ways * linesize
getSets	uint32_t (*)(void *)	Get number of sets
getWays	uint32_t (*)(void *)	Get number of ways
getLineSize	uint32_t (*)(void *)	Get line size in bytes
isValid	int (*)(void *, uint64_t)	Check if an address belong to a cached line
readFlags	uint64_t (*)(void *, uint64_t)	Access the flags data, the format is cache model specific and can for specific models include also the tag. Typically, this is used for diagnostic access for more accurate cache models. Note that addr is not a physical address, but rather an address interpreted differently for different caches. I.e. the address is in a cache local address space.

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Field	Type	Description
writeFlags	void (*)(void *, uint64_t, uint64_t)	Write flags data
readData	uint64_t (*)(void *, uint64_t)	Get cached data for the given address. The data returned comes from RAM using a normal memory transaction in case the cache is modelled for timing only, otherwise it comes from the cache model. Addr is a cache local address space, which depends on the cache implementation. The functions are intended for diagnostic cache access which is implemented in some systems. Note that on writes, the data will NOT be written to memory except in the case the cache line would be evicted in an accurate cache model. All reads from valid addresses succeed, other addresses are undefined. writeData returns non-zero on failure (e.g. invalid address).
writeData	int (*)(void *, uint64_t, uint64_t)	Write data in cache

1.4.17. temu_CameraIface

Include

```
#include "temu-c/Bus/Camera.h"
```

Type

```
struct temu_CameraIface {
  int (*)(void *) frameStart;
  void (*)(void *, unsigned int, unsigned int, const uint16_t *) lines;
  void (*)(void *) frameEnd;
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Fields

Field	Type	Description
frameStart	int (*)(void *)	Start of frame (VSYNC goes inactive). Returns 1 if the receiver captures this frame.
lines	void (*)(void *, unsigned int, unsigned int, const uint16_t *)	Count complete lines of Width pixel clocks each; Data may be null.
frameEnd	void (*)(void *)	End of frame (VSYNC goes active).

1.4.18. temu_CanBusIface

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanBusIface {
}
```

Description

Fields

Field	Type	Description

1.4.19. temu_CanDevIface

Include

```
#include "temu-c/Bus/Can.h"
```

Type

```
struct temu_CanDevIface {
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Fields

Field	Type	Description

1.4.20. temu_ClockIface

Include

```
#include "temu-c/Models/Clock.h"
```

Type

```
struct temu_ClockIface {
}
```

Description

Fields

Field	Type	Description

1.4.21. temu_CodePatternIface

Include

```
#include "temu-c/Target/CodePatterns.h"
```

Type

```
struct temu_CodePatternIface {
  void (*)(void *, temu_CodePattern *) installPattern;
  int (*)(void *, const temu_CodePattern *) removePattern;
  void (*)(void *) removeAllPatterns;
}
```

Description

Fields

Field	Type	Description
installPattern	void (*)(void *, temu_CodePattern *)	Installs a pattern.

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Field	Type	Description
removePattern	int (*)(void *, const temu_CodePattern *)	Removes the pattern with the same addresses, masks, context and instructions, returns 0 on success and -1 if it is not installed.
removeAllPatterns	void (*)(void *)	Removes all patterns.

1.4.22. temu_CpuIface

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_CpuIface {
  const char *(*)(void *, int) getTrapName;
  const temu_CpuInfo *(*)(void *) getCPUInfo;
  int (*)(void *) wakeUp;
  void (*)(void *) forceEarlyExit;
  void (*)(void *) enableProfiling;
  void (*)(void *) disableProfiling;
  void (*)(void *) flushProfileCaches;
  int64_t (*)(void *) getIdleSteps;
  int64_t (*)(void *) getIdleCycles;
  void (*)(void *) enterHaltedMode;
  int (*)(void *) purgeDirtyPages;
  void (*)(void *) invalidateFetchAtc;
  int (*)(void *) getCurrentPrivilegeLevel;
  int (*)(void *) isVirtualized;
}
```

Description

Common CPU interface.

The CPU interface provides common functionality that all processors must implement. This includes the reset and run methods. But also different register access functions. The register access functions are functions, because registers may be banked and we want some type of common interface that can access the current registers. Note that the interface currently only support 32 bit processors.

field reset The function executing a reset. It takes as parameter the reset type, which is 0 for a default cold reset.

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field run Run the main emulator loop for a given number of cycles.

field runUntil Run the main emulator loop until its cycle counter reach the end cycles.

field step Run the given number of steps. A step is one instruction, completed or not. E.g. a trapping instruction does not complete but is counted as a step.

field stepUntil Step the emulator, but stop if the step exceeds a certain fixed time.

field raiseTrap Raises a trap on the CPU. THIS FUNCTION DOES NOT RETURN!!!

field enterIdleMode Will call longjmp and enter idle mode immediately, this is useful for devices that activates power down mode.

field exitEmuCore Will call longjmp to exit the emulator core. This can be used in certain cases where the other exit functions do not suite well. One being that a reset is called from an MMIO write or read, or from a watchdog event. The reset can otherwise be called when the emulator is not running, so in a model you can call reset and then exitEmuCore.

field getGpr Read the currently visible general purpose registers. For banked registers (e.g. SPARC reg windows), you should look at the arch specific interface instead.

field getFpr32 Read the currently visible floating point registers.

field setSpr Set special purpose registers. The indexes have been explicitly choosen to be equal to what is assumed by the GDB protocol, but re-based at zero.

field getSpr Read special purpose registers. The indexes have been explicitly choosen to be equal to what is assumed by GDB but rebased at zero.

field disassemble This function will disassemble an instruction. The function returns a heap-allocated string (allocated with malloc()). The caller is responsible for calling free() and managing the lifetime.

field invalidateAtc Invalidates the ATC cache for the given address range. Flags select what is invalidated: TEMU_ATC_FETCH, TEMU_ATC_READ and TEMU_ATC_WRITE pick the kinds of entry, TEMU_ATC_USER, TEMU_ATC_SUPER and TEMU_ATC_HYPER the privilege levels. Flags 0 invalidates everything.

field translateAddress Does a table walk and translates the virtual address to physical page address. For MMU free systems, the function returns the Va masked with ~(page size-1). Otherwise, the return is the translated page address and in the case of failure -1.

field raiseTrapNoJmp Raises a trap without longjmp to emulator core main loop. This can be used in e.g. timed event handlers and when the core isn’t running.

Fields

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Field	Type	Description
getTrapName	const char ()(void *, int)	Get name for trap
getCPUInfo	const temu_CpuInfo ()(void *)	Experimental
wakeUp	int (*)(void *)	Wake up CPU if it is idling, return 1 if woken up 0 if no state change occurred
forceEarlyExit	void (*)(void *)	Force early return of core (after event cleanup), unless the core returns for normal reasons, the emulator will return teCER_Early after the current instruction.
enableProfiling	void (*)(void *)	Enable profiling mode
disableProfiling	void (*)(void *)	Disable profiling mode
flushProfileCaches	void (*)(void *)	Flush profile caches
getIdleSteps	int64_t (*)(void *)	Get the number of idle steps
getIdleCycles	int64_t (*)(void *)	Get the number of idle cycles
enterHaltedMode	void (*)(void *)	Make the processor enter halted mode using a stack posted event.
purgeDirtyPages	int (*)(void *)	Purge all dirty memory pages Returns non-zero if pages were purged
invalidateFetchAtc	void (*)(void *)	Invalidate ATC for fetches
getCurrentPrivilegeLevel	int (*)(void *)	Get current privilege level
isVirtualized	int (*)(void *)	Return true if CPU is currently in guest mode (**not** if KVM/virtualization is used instead of emulation).

1.4.23. temu_CpuReverseSchedIface

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

```
struct temu_CpuReverseSchedIface {
```

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```
}
```

Description

Fields

Field	Type	Description

1.4.24. temu_CpuSchedIface

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

```
struct temu_CpuSchedIface {
}
```

Description

Fields

Field	Type	Description

1.4.25. temu_DMARequestIface

Include

```
#include "temu-c/Bus/DMA.h"
```

Type

```
struct temu_DMARequestIface {
}
```

Description

Fields

Field	Type	Description

1.4.26. temu_DebuggerAttachIface

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Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
struct temu_DebuggerAttachIface {
}
```

Description

Fields

Field	Type	Description

1.4.27. temu_DebuggerIface

Include

```
#include "temu-c/Support/Debugger.h"
```

Type

```
struct temu_DebuggerIface {
}
```

Description

Fields

Field	Type	Description

1.4.28. temu_DeviceIdIface

Include

```
#include "temu-c/Models/IntegrationSupport.h"
```

Type

```
struct temu_DeviceIdIface {
  void (*)(void *, uint32_t, void *, temu_DeviceIdMemAccessIface *) attach;
```

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```
}
```

Description

Device ID Interface

This interface enables an external simulator to attach a device ID handler in the DeviceIdIntegrator.

Fields

Field	Type	Description
attach	void (*)(void *, uint32_t, void *, temu_DeviceIdMemAccessIface *)	Attach external device

1.4.29. temu_DeviceIdMemAccessIface

Include

```
#include "temu-c/Models/IntegrationSupport.h"
```

Type

```
struct temu_DeviceIdMemAccessIface {
  void (*)(void *, uint32_t, temu_MemTransaction *) fetch;
  void (*)(void *, uint32_t, temu_MemTransaction *) read;
  void (*)(void *, uint32_t, temu_MemTransaction *) write;
}
```

Description

Device ID Memory Access Interface

This interface mirrors the memory access interface, but takes an additional device id parameter to be filled in by the DeviceIdIntegrator class.

Fields

Field	Type	Description
fetch	void (*)(void *, uint32_t, temu_MemTransaction *)	Called when fetching an instruction
read	void (*)(void *, uint32_t, temu_MemTransaction *)	Called when reading data

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Field	Type	Description
write	void (*)(void *, uint32_t, temu_MemTransaction *)	Called when writing data

1.4.30. temu_DeviceIface

Include

```
#include "temu-c/Models/Device.h"
```

Type

```
struct temu_DeviceIface {
}
```

Description

Standard device interface

field reset Called when the device is reset.

field mapDevice If defined, called when a device is mapped.

Fields

Field	Type	Description

1.4.31. temu_DisplayIface

Include

```
#include "temu-c/Models/Display.h"
```

Type

```
struct temu_DisplayIface {
  void (*)(void *, uint32_t, uint32_t, temu_PixelFormat) configure;
  void (*)(void *, const void *, uint32_t) present;
}
```

Description

Display interface: decouples display controllers (LTDC, DMA2D-fed framebuffers, future text-mode

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devices) from display servers (PPM snapshot, VNC, …). A controller holds a temu_DisplayIfaceRef to its sink, wired via a component interface reference, exactly as a UART holds a serial console.

Frames are delivered in the controller's native pixel format; the sink is responsible for any conversion (see temu-c/Graphics/PixelFormat.h) and does so off the simulation thread. The pixel buffer passed to present() is owned by the controller and valid only for the duration of the call — the sink must copy what it needs before returning.

Fields

Field	Type	Description
configure	void (*)(void *, uint32_t, uint32_t, temu_PixelFormat)	Geometry and/or pixel format changed (controller enabled or reconfigured). The sink should (re)allocate its buffers accordingly.
present	void (*)(void *, const void *, uint32_t)	Present one complete frame. p points at the top-left pixel in the format from the most recent configure(); p is the row length in bytes. Valid only for the duration of the call.

1.4.32. temu_DynCallIface

Include

```
#include "temu-c/Bus/DynamicInvocation.h"
```

Type

```
struct temu_DynCallIface {
}
```

Description

Fields

Field	Type	Description

1.4.33. temu_DynamicResetAddressIface

Include

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```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_DynamicResetAddressIface {
  void (*)(void *, uint64_t) setResetAddress;
  uint64_t (*)(void *) getResetAddress;
}
```

Description

Interface for controlling the reset address used in a processor.

Processors may in some cases have their reset addresses set dynamically. This interface expose such functionality to peripherals.

Fields

Field	Type	Description
setResetAddress	void (*)(void *, uint64_t)	Update reset address in processor
getResetAddress	uint64_t (*)(void *)	Get reset address in processor, optional method

1.4.34. temu_E500MMUIface

Include

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_E500MMUIface {
}
```

Description

Fields

Field	Type	Description

1.4.35. temu_EthDelayIface

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Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_EthDelayIface {
}
```

Description

Fields

Field	Type	Description

1.4.36. temu_EthernetIface

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_EthernetIface {
}
```

Description

Fields

Field	Type	Description

1.4.37. temu_GpioBusIface

Include

```
#include "temu-c/Bus/Gpio.h"
```

Type

```
struct temu_GpioBusIface {
  void (*)(void *, uint64_t, uint64_t) setGpioBits;
```

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```
  uint64_t (*)(void *, uint64_t) getGpioBits;
}
```

Description

Interface implemented by the GPIO bus class.

Normally this does not have to be implemented yourself. It exist for the bus model only. In-case you need a separate bus model, you can implement this interface.

Note that this interface is deprecated for future models and it is expected that the signal interface is used instead.

Fields

Field	Type	Description
setGpioBits	void (*)(void *, uint64_t, uint64_t)	setGpioBits should set or clear the bits in Bits if they are set in Mask. Upon a set, the GPIO bus model should notify any connected GPIO clients about the changed bits. This is done using the temu_GpioClientIface. In the built in bus model, notifications are only delivered if any of the bits actually changed.
getGpioBits	uint64_t (*)(void *, uint64_t)	Get the gpio-bits currently on the bus. The bits in mask will be extracted from the bus and returned in the result.

1.4.38. temu_GpioClientIface

Include

```
#include "temu-c/Bus/Gpio.h"
```

Type

```
struct temu_GpioClientIface {
  void (*)(void *, uint64_t, uint64_t) gpioBitsChanged;
}
```

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Description

Interface for GPIO clients.

A GPIO client is a device that interface with the GPIO bus. Such a client can poll using the GpioBusIface, but it is likely better to be lazily notified about changes to the bus values. Such notifications will be delivered to the GpioClientIface.

Note that this interface is deprecated for future models and it is expected that the signal interface is used instead.

Fields

Field	Type	Description
gpioBitsChanged	void (*)(void *, uint64_t, uint64_t)	Notification function. A client will always be notified about changed bus values. The Bus value is indicated in the Bits param, and the values that where changed are indicated in the Mask param.

1.4.39. temu_I2CBusIface

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
struct temu_I2CBusIface {
  void (*)(temu_Object *, uint16_t, temu_I2CDevIfaceRef) connect;
  void (*)(temu_Object *, uint16_t, temu_I2CDevIfaceRef) disconnect;
  _Bool (*)(temu_Object *) isBusy;
  temu_I2CBusState (*)(temu_Object *, temu_Object *, uint16_t, _Bool)
sendStartAndDevAddr;
  temu_I2CBusState (*)(temu_Object *, temu_Object *, size_t, const uint8_t *, _Bool)
sendData;
  temu_I2CBusState (*)(temu_Object *, temu_Object *, size_t, uint8_t *, _Bool, _Bool)
receiveResponse;
  _Bool (*)(temu_Object *, uint16_t *, uint64_t *) currentTransfer;
  void (*)(temu_Object *, temu_Object *) reset;
}
```

Description

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Fields

Field	Type	Description
connect	void (*)(temu_Object *, uint16_t, temu_I2CDevIfaceRef)	Connect target devices to the bus. Controllers don't need to connect to the bus but can still use it's interface. A device may connect to the bus multiple times with different device addresses.
disconnect	void (*)(temu_Object *, uint16_t, temu_I2CDevIfaceRef)	Disconnect a device from this bus for this specific device address.
isBusy	_Bool (*)(temu_Object *)	Returns true if the bus is currently busy.
sendStartAndDevAddr	temu_I2CBusState (*)(temu_Object *, temu_Object *, uint16_t, _Bool)	Send a start condition and a device address, initiating a new transfer, if this is the first time this is called after the bus was idle. It is allowed to call this multiple times without the Stop condition inbetween. The typical usecase for this are addressing reads where the controller first writes the target memory/register address it wants to read and then calls this function again but with IsRead = true to receive the requested bytes. This is a convention, I2C allows for arbitrary message formats.

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Field	Type	Description
sendData	temu_I2CBusState (*)(temu_Object *, temu_Object *, size_t, const uint8_t *, _Bool)	For writes: This sends the data over the bus and also ends this statefull transfer if Stop is true. Return true if the device selected by sendDevAddr acknowleged the data. Note that the protocol usually transfers byte after byte only setting Stop for true for the very last call. In order to speed up sequential writes, Len can be more than 1. However, this means the target device can't acknowlege byte by byte.
receiveResponse	temu_I2CBusState (*)(temu_Object *, temu_Object *, size_t, uint8_t *, _Bool, _Bool)	For reads: This will cause the device selected by sendStartAndAddr to write the data to read into Data. Stop should be true for the last byte to read. On hardware, data bytes are transfered and acknowleged individually, but this interface allows for bulk responses from the target back to the controller if the controller sets Len to something more than 1. ReceiverACKs can be used to simulate the situation where a controller initiated a read transfer and wants to receive data from a target device but does not itself achknowlege the byte sent by the target back to the controller.
currentTransfer	_Bool (*)(temu_Object *, uint16_t *, uint64_t *)	Help detect timeouts: If true is returned, the arguments CurrentDevAddr and CurrentCounter are set to values that can be used to identify the current transfer.
reset	void (*)(temu_Object *, temu_Object *)	Reset the bus, e.g. because of timeouts.

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1.4.40. temu_I2CDevIface

Include

```
#include "temu-c/Bus/I2C.h"
```

Type

```
struct temu_I2CDevIface {
  void (*)(temu_Object *, uint16_t, temu_I2CBusIfaceRef) connected;
  void (*)(temu_Object *, uint16_t) disconnected;
  temu_I2CBusState (*)(temu_Object *, uint16_t, _Bool, size_t) receiveAddr;
  temu_I2CBusState (*)(temu_Object *, size_t, const uint8_t *, _Bool) receiveData;
  temu_I2CBusState (*)(temu_Object *, size_t, uint8_t *, _Bool, _Bool) replyWithData;
}
```

Description

Interface for I2C target ("slave" in older versions of the standard) devices. A target device responds to transfers initiated by a target, it cannot start transfers itself. A I2C controller (or "master") does not have to implement this interface if it does not also reacts to transfers started by others.

Fields

Field	Type	Description
connected	void (*)(temu_Object *, uint16_t, temu_I2CBusIfaceRef)	Called when Dev was connected to Bus using device address DevAddr. Note that one device could be connected to a bus using the same interface at different addresses.
disconnected	void (*)(temu_Object *, uint16_t)	Called when Dev was disconnected from its bus and had device address DevAddr.

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Field	Type	Description
receiveAddr	temu_I2CBusState (*)(temu_Object *, uint16_t, _Bool, size_t)	Called when the START condition and a address have been send over the bus. For the first START of a transfer, NumStarts is 0. After that it increases by one for every additional START on the bus and resets when the STOP condition is reached. DevAddr will only ever be the address of this device itself or all-zero for broadcasts because the bus will not pass transfers for other devices.
receiveData	temu_I2CBusState (*)(temu_Object *, size_t, const uint8_t *, _Bool)	For writes: This is called when a controller is writing to this target device. Bulk transfers are possible here by setting Len to > 1, even though the protocol requires bytes to be acknowleged individually on hardware. This function can be called repeatedly, this ends a transfer if Stop is true.
replyWithData	temu_I2CBusState (*)(temu_Object *, size_t, uint8_t *, _Bool, _Bool)	For reads: This is called when a controller wants to read from this target device. Bulk transfers are possible here by setting Len to > 1, even though the protocol requires bytes to be acknowleged individually on hardware. This function can be called repeatedly, this ends a transfer if Stop is true.

1.4.41. temu_IPv4NATIface

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

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```
struct temu_IPv4NATIface {
}
```

Description

Fields

Field	Type	Description

1.4.42. temu_InstrumenterIface

Include

```
#include "temu-c/EmulatorManager/Instrumenter.h"
```

Type

```
struct temu_InstrumenterIface {
  int (*)(void *, uint64_t, uint64_t) beginBlock;
  int (*)(void *, uint64_t, uint64_t) endBlock;
  int (*)(void *, uint64_t, uint64_t, uint32_t, uint32_t) beginInstr;
  int (*)(void *, uint64_t, uint64_t, uint32_t, uint32_t, int) endInstr;
}
```

Description

Binary translation instrumentation interface

Fields

Field	Type	Description
beginBlock	int (*)(void *, uint64_t, uint64_t)	Called on start of a block
endBlock	int (*)(void *, uint64_t, uint64_t)	Called at the end of a block
beginInstr	int (*)(void *, uint64_t, uint64_t, uint32_t, uint32_t)	Called when instruction is started
endInstr	int (*)(void *, uint64_t, uint64_t, uint32_t, uint32_t, int)	Called when instruction is finished. Arm: 0 = normal / not taken branch. 1 = taken conditional instruction.

1.4.43. temu_IrqClientIface

Include

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```
#include "temu-c/Models/IrqController.h"
```

Type

```
struct temu_IrqClientIface {
  void (*)(void *, uint8_t) ackInterrupt;
  void (*)(void *) updateInterrupts;
}
```

Description

Interface to be defined for classes that uses an IRQ controller object. An IRQ controller may acknowledge to the IRQ controller client, or it may notify the IrqClient that the underlying IRQ controller has been modified and any pending IRQs should be re-issued. Typically, an updateInterrupt call happens if the IRQ registers change in such a way that the IRQ controller does not know the next interrupt to be issued. E.g. On the sparc, the updateInterrupts function will be called on its IRQ controller whenever the ET or PIL field has changed. That is updateInterrupts are called by lazy IRQ controllers.

Fields

Field	Type	Description
ackInterrupt	void (*)(void *, uint8_t)	Acknowledge interrupt (IRQ controller should clear interrupt)
updateInterrupts	void (*)(void *)	Called in case IRQ re-issuing is needed eg. when the IRQ controlling registers have been modified. IRQ controller should reevaluate interrupts and reraise them upstream.

1.4.44. temu_IrqControllerIface

Include

```
#include "temu-c/Models/IrqController.h"
```

Type

```
struct temu_IrqControllerIface {
  void (*)(void *, uint8_t) raiseInterrupt;
  void (*)(void *, uint8_t) lowerInterrupt;
```

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```
}
```

Description

Interrupt controller interface. An interrupt controller can raise and lower IRQ signals. For systems which has interrupts which can be configured to be active high, low or rising or falling, the raise and lower irq have different semantics. For rising edge triggering, the raiseInterrupt function should trigger the IRQ.

Fields

Field	Type	Description
raiseInterrupt	void (*)(void *, uint8_t)	Raise interrupt
lowerInterrupt	void (*)(void *, uint8_t)	Lower interrupt

1.4.45. temu_Leon5Iface

Include

```
#include "temu-c/Target/Sparc.h"
```

Type

```
struct temu_Leon5Iface {
}
```

Description

Fields

Field	Type	Description

1.4.46. temu_LineDataLoggerIface

Include

```
#include "temu-c/Models/LineDataLogger.h"
```

Type

```
struct temu_LineDataLoggerIface {
  uint64_t (*)(void *) getLineCount;
  const char *(*)(void *, uint64_t) getLine;
```

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```
}
```

Description

Simple interface to get recorded line data from e.g. the console model.

Fields

Field	Type	Description
getLineCount	uint64_t (*)(void *)	Get number of lines
getLine	const char ()(void *, uint64_t)	Get pointer to line string

1.4.47. temu_MACIface

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_MACIface {
}
```

Description

Fields

Field	Type	Description

1.4.48. temu_MDIOIface

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_MDIOIface {
}
```

Description

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Fields

Field	Type	Description

1.4.49. temu_MemAccessIface

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessIface {
  void (*)(void *, temu_MemTransaction *) fetch;
  void (*)(void *, temu_MemTransaction *) read;
  void (*)(void *, temu_MemTransaction *) write;
  void (*)(void *, temu_MemTransaction *) exchange;
  void (*)(void *, uint64_t, uint64_t) mapped;
  const temu_MemAccessCapabilities *(*)(void *) getCapabilities;
  void (*)(void *, temu_MemTransaction *) probe;
}
```

Description

Memory access interface implemented by all memory mapped devices Exposed to the emulator core by a memory object.

Fields

Field	Type	Description
fetch	void (*)(void *, temu_MemTransaction *)	Function called on fetches. The function can be null in case fetches are not allowed from the model.
read	void (*)(void *, temu_MemTransaction *)	Function called on reads.
write	void (*)(void *, temu_MemTransaction *)	Function called on writes.
exchange	void (*)(void *, temu_MemTransaction *)	Function called on atomic exchanges, by default if this is not defined, the memory space will call read followed by write in order.

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Field	Type	Description
mapped	void (*)(void *, uint64_t, uint64_t)	Optional method, called when interface is mapped
getCapabilities	const temu_MemAccessCapabilities ()(void *)	Query for supported features Function is optional. By default the assumption is that the base capabilities are equal to R_ALL
W_ALL, custom memories must explicitly register itself as fetchable memory. in addition, the default assumption is that the device does not support large transactions.	probe	void (*)(void *, temu_MemTransaction *)

1.4.50. temu_MemAccessPropertyIface

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemAccessPropertyIface {
  uint64_t (*)(void *) getBaseAddress;
  uint64_t (*)(void *) getSize;
  unsigned int (*)(void *) getAddressSize;
}
```

Description

Fields

Field	Type	Description
getBaseAddress	uint64_t (*)(void *)	Optional method to query the default physical base address, This is intended for device specific visualization.
getSize	uint64_t (*)(void *)	Optional method to query the size of the memory region This is intended for visualization purposes.

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Field	Type	Description
getAddressSize	unsigned int (*)(void *)	Optional method to query the address size of a memory region This is intended for device specific visualization.

1.4.51. temu_MemoryIface

Include

```
#include "temu-c/Memory/Memory.h"
```

Type

```
struct temu_MemoryIface {
}
```

Description

For objects which have actualm memory (not just registers) This is for the simulator (not the emu core). The procedures should write the data given in bytes to the given physical offset. The offset is a 64 bit uint to support 64 bit targets. The interface is used for example by DMA transactions.

The size argument is in bytes.

The swap argument is used to swap bytes to the host endianess. Specify the log size of the read data types. - 0: We are reading bytes (bytes will be in target memory order) - 1: We are reading half words (will be swapped to host order) - 2: We are reading words (will be swapped) - 3: We are reading double words (will be swapped) With 0 for swap, we are basically reading a byte array

readBytes and writeBytes should return the number of bytes read / written or negative on error.

Fields

Field	Type	Description

1.4.52. temu_MemorySpaceIface

Include

```
#include "temu-c/Support/Memory.h"
```

Type

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```
struct temu_MemorySpaceIface {
  int (*)(void *, uint64_t, uint64_t, temu_Object *, uint32_t) mapDevice;
  void (*)(void *, uint64_t, uint64_t, temu_MemoryAttr) setAttr;
  void (*)(void *, uint64_t, uint64_t, temu_MemoryAttr) clearAttr;
  temu_MemoryAttrs (*)(void *, uint64_t) getAttrs;
  int (*)(void *, uint64_t, uint64_t, temu_Object *, const char *, uint32_t)
mapDeviceWithNamedIface;
  int (*)(void *, uint64_t, uint64_t) unmapRange;
  int (*)(void *, uint64_t, uint64_t, temu_Object *, temu_MemAccessIface *, uint32_t)
mapDeviceWithIface;
  uint64_t (*)(void *, temu_MemoryStat) getStat;
  void (*)(void *) unmapAll;
  int (*)(void *) collectGarbage;
  int (*)(void *) processDirtyPages;
  uint64_t (*)(void *) getCodeEpoch;
  int (*)(void *, temu_Object *, temu_MemAccessIface *, temu_Object *,
temu_MemAccessIface *) registerSnoop;
  int (*)(void *, temu_Object *, temu_MemAccessIface *, temu_Object *,
temu_MemAccessIface *) unregisterSnoop;
}
```

Description

Fields

Field	Type	Description
mapDevice	int (*)(void *, uint64_t, uint64_t, temu_Object *, uint32_t)	Map device (using the default MemAccessIface interface)
setAttr	void (*)(void *, uint64_t, uint64_t, temu_MemoryAttr)	Set attribute bit
clearAttr	void (*)(void *, uint64_t, uint64_t, temu_MemoryAttr)	Clear attribute bit
getAttrs	temu_MemoryAttrs (*)(void *, uint64_t)	Get attributes for address
mapDeviceWithNamedIface	int (*)(void *, uint64_t, uint64_t, temu_Object *, const char *, uint32_t)	Map device with named interface
unmapRange	int (*)(void *, uint64_t, uint64_t)	Unmap devices in range
mapDeviceWithIface	int (*)(void *, uint64_t, uint64_t, temu_Object *, temu_MemAccessIface *, uint32_t)	Map device with interface pointer

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Field	Type	Description
getStat	uint64_t (*)(void *, temu_MemoryStat)	Get memory space statistic
unmapAll	void (*)(void *)	Unmap everything
collectGarbage	int (*)(void *)	Run memory-space maintenance/garbage collection pass
processDirtyPages	int (*)(void *)	Process dirty code pages and advance code epoch if anything changed
getCodeEpoch	uint64_t (*)(void *)	Get current code epoch for this memory space
registerSnoop	int (*)(void *, temu_Object *, temu_MemAccessIface *, temu_Object *, temu_MemAccessIface *)	Register a interceptor model (e.g. MemorySnooper) that should outlive physical address space remappings.
unregisterSnoop	int (*)(void *, temu_Object *, temu_MemAccessIface *, temu_Object *, temu_MemAccessIface *)	Remove a redirection previously installed with registerSnoop().

1.4.53. temu_Mil1553BusIface

Include

```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553BusIface {
}
```

Description

Fields

Field	Type	Description

1.4.54. temu_Mil1553DevIface

Include

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```
#include "temu-c/Bus/MilStd1553.h"
```

Type

```
struct temu_Mil1553DevIface {
  void (*)(void *, temu_Mil1553BusIfaceRef, int) connected;
  void (*)(void *, temu_Mil1553BusIfaceRef, int) disconnected;
  void (*)(void *, temu_Mil1553Msg *) receive;
  void (*)(void *, temu_Mil1553BusIdleInfo *) busEnteredIdle;
}
```

Description

Fields

Field	Type	Description
connected	void (*)(void *, temu_Mil1553BusIfaceRef, int)	Called after device is connected to bus
disconnected	void (*)(void *, temu_Mil1553BusIfaceRef, int)	Called after device is disconnected
receive	void (*)(void *, temu_Mil1553Msg *)	Receive of 1553 message
busEnteredIdle	void (*)(void *, temu_Mil1553BusIdleInfo *)	Notifies the bus controller the bus enters an idle

1.4.55. temu_NvmArrayIface

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmArrayIface {
  int (*)(void *, uint64_t, void *, uint64_t) read;
  int (*)(void *, uint64_t, const void *, uint64_t, uint32_t) program;
  int (*)(void *, uint64_t, uint64_t, uint32_t) erase;
  int (*)(void *) reset;
}
```

Description

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Fields

Field	Type	Description
read	int (*)(void *, uint64_t, void *, uint64_t)	Read from the NVM memory. Wraps around to the beginning if read position overflows chip size.
program	int (*)(void *, uint64_t, const void *, uint64_t, uint32_t)	Program the NVM memory. Writes will wrap at the page boundary.
erase	int (*)(void *, uint64_t, uint64_t, uint32_t)	Erase a sector of the specified size from the NVM memory. The size in bytes represents the sector size to align to. The offset may be any address within the sector which is to be erased.
reset	int (*)(void *)	Resets the entire memory contents. Does not reset size/layout etc.

1.4.56. temu_NvmImageIface

Include

```
#include "temu-c/Memory/NVM.h"
```

Type

```
struct temu_NvmImageIface {
}
```

Description

Fields

Field	Type	Description

1.4.57. temu_NvmNandIface

Include

```
#include "temu-c/Memory/NVM.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_NvmNandIface {
}
```

Description

Fields

Field	Type	Description

1.4.58. temu_ObjectIface

Include

```
#include "temu-c/Support/Objsys.h"
```

Type

```
struct temu_ObjectIface {
  void (*)(void *, const char *, void *) serialise;
  void (*)(void *, const char *, void *) deserialise;
  int (*)(void *, int) checkSanity;
  void (*)(void *) timeSourceSet;
  void (*)(void *) printObject;
}
```

Description

Generic object interface The object interface provides generic functionality such as serialisation and sanity checking support.

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
serialise	void (*)(void *, const char *, void *)	Optional function Called after an object has been written to the snapshot, this function can write out additional properties to the snapshot and take other actions. Note that with the pseudoproperties supporting snapshotting, this function is very rarely needed.
deserialise	void (*)(void *, const char *, void *)	Optional function Called after an object has been restored from a snapshot, this function can read additional properties to the snapshot and take other actions. Note that with the pseudoproperties supporting snapshotting, this function is very rarely needed.
checkSanity	int (*)(void *, int)	Return zero if the object is connected as expected, return non-zero if the object is not fully connected the default check will ensure that all the Interface references are connected, but does not care about optional interfaces or
timeSourceSet	void (*)(void *)	Optional function Called when the time source has been set on the object The function can for example post initial events.
printObject	void (*)(void *)	Optional function Pretty prints the object to stdout, called by the object-print command.

1.4.59. temu_PCIBridgeIface

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIBridgeIface {
}
```

Description

Fields

Field	Type	Description

1.4.60. temu_PCIBusIface

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIBusIface {
}
```

Description

Fields

Field	Type	Description

1.4.61. temu_PCIDeviceIface

Include

```
#include "temu-c/Bus/PCI.h"
```

Type

```
struct temu_PCIDeviceIface {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.4.62. temu_PCIExpressBridgeIface

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBridgeIface {
}
```

Description

Fields

Field	Type	Description

1.4.63. temu_PCIExpressBusIface

Include

```
#include "temu-c/Bus/PCIExpress.h"
```

Type

```
struct temu_PCIExpressBusIface {
}
```

Description

Fields

Field	Type	Description

1.4.64. temu_PDCIface

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Include

```
#include "temu-c/Support/Memory.h"
```

Type

```
struct temu_PDCIface {
  void (*)(void *) flushAllCode;
}
```

Description

Fields

Field	Type	Description
flushAllCode	void (*)(void *)	Drop every predecoded instruction and every translation in the space.

1.4.65. temu_PHYIface

Include

```
#include "temu-c/Bus/Ethernet.h"
```

Type

```
struct temu_PHYIface {
}
```

Description

Fields

Field	Type	Description

1.4.66. temu_PointerIface

Include

```
#include "temu-c/Models/Display.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_PointerIface {
  void (*)(void *, uint32_t, uint32_t, uint32_t) pointerEvent;
}
```

Description

Pointer input: a display server (e.g. VNC) forwards the user's pointer to a device on the display, such as a touch screen controller. Called on the simulation thread.

Fields

Field	Type	Description
pointerEvent	void (*)(void *, uint32_t, uint32_t, uint32_t)	The pointer is at (p p in pixels of the frame last presented, with the TEMU_POINTER_BUTTON_* bits of the pressed buttons in p

1.4.67. temu_PowerIface

Include

```
#include "temu-c/Models/Power.h"
```

Type

```
struct temu_PowerIface {
  void (*)(void *) powerOn;
  void (*)(void *) powerOff;
  temu_PowerState (*)(void *) getPowerState;
}
```

Description

Power interface

Fields

Field	Type	Description
powerOn	void (*)(void *)	Power on device
powerOff	void (*)(void *)	Power off device

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
getPowerState	temu_PowerState (*)(void *)	Get current power state

1.4.68. temu_PowerLineIface

Include

```
#include "temu-c/Models/Power.h"
```

Type

```
struct temu_PowerLineIface {
}
```

Description

Fields

Field	Type	Description

1.4.69. temu_PowerPCIface

Include

```
#include "temu-c/Target/PowerPC.h"
```

Type

```
struct temu_PowerPCIface {
  uint64_t (*)(const void *) getXER;
  void (*)(void *, uint64_t) setXER;
  uint32_t (*)(const void *) getCR;
  void (*)(void *, uint32_t) setCR;
  uint64_t (*)(const void *) getMSR;
  void (*)(void *, uint64_t) setMSR;
  uint32_t (*)(const void *) getCTR;
  void (*)(void *, uint32_t) setCTR;
  uint64_t (*)(const void *) getLR;
  void (*)(void *, uint64_t) setLR;
  uint32_t (*)(const void *) getFPSCR;
  void (*)(void *, uint32_t) setFPSCR;
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Interface for PowerPC specific functionality

Fields

Field	Type	Description
getXER	uint64_t (*)(const void *)	Get XER register
setXER	void (*)(void *, uint64_t)	Set XER register
getCR	uint32_t (*)(const void *)	Get CR register
setCR	void (*)(void *, uint32_t)	Set XER register
getMSR	uint64_t (*)(const void *)	Get MSR register
setMSR	void (*)(void *, uint64_t)	Set MSR register
getCTR	uint32_t (*)(const void *)	Get CTR register
setCTR	void (*)(void *, uint32_t)	Set CTR register
getLR	uint64_t (*)(const void *)	Get LR register
setLR	void (*)(void *, uint64_t)	Set LR register
getFPSCR	uint32_t (*)(const void *)	Get FPSCR register
setFPSCR	void (*)(void *, uint32_t)	Set FPSCR register

1.4.70. temu_PwmIface

Include

```
#include "temu-c/Bus/Pwm.h"
```

Type

```
struct temu_PwmIface {
  void (*)(void *, uint64_t, uint64_t, int) setWaveform;
  void (*)(void *, int) setEnabled;
}
```

Description

Pulse width modulated output interface

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
setWaveform	void (*)(void *, uint64_t, uint64_t, int)	The waveform changed.
setEnabled	void (*)(void *, int)	The output was enabled or disabled. A disabled output holds its idle level and the waveform parameters are not meaningful.

1.4.71. temu_RegisterIface

Include

```
#include "temu-c/Support/Register.h"
```

Type

```
struct temu_RegisterIface {
}
```

Description

Fields

Field	Type	Description

1.4.72. temu_ReplayPlaybackIface

Include

```
#include "temu-c/Bus/Replay.h"
```

Type

```
struct temu_ReplayPlaybackIface {
  void (*)(void *, const uint8_t *, const size_t) replayTransmission;
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
replayTransmission	void (*)(void *, const uint8_t *, const size_t)	Replay a recorded transmission. This is called both for just-stored transmissions during normal execution and after rewinding to replay old transmissions

1.4.73. temu_ReplayStorageIface

Include

```
#include "temu-c/Bus/Replay.h"
```

Type

```
struct temu_ReplayStorageIface {
  void (*)(void *, const int64_t, _Bool, int64_t) startTransmission;
  void (*)(void *, const int64_t, const uint8_t *, const size_t) saveTransmission;
  void (*)(void *, const int64_t) stopTransmission;
  void (*)(void *, void *, temu_DiscardReplayCheck) registerReplayCondition;
}
```

Description

Fields

Field	Type	Description
startTransmission	void (*)(void *, const int64_t, _Bool, int64_t)	Start storing a transmission.
saveTransmission	void (*)(void *, const int64_t, const uint8_t *, const size_t)	Append data to the current transmission being stored
stopTransmission	void (*)(void *, const int64_t)	Finalize storing a transmissions. Only finalized transmissions are available for replay.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
registerReplayCondition	void (*)(void *, void *, temu_DiscardReplayCheck)	Register an optional condition check to run on replay start. Checked for all stored messages, if true will discard the message Obj Obj implementing this Iface ctx Context to pass to check function check The function to run on all messages

1.4.74. temu_ResetIface

Include

```
#include "temu-c/Models/Reset.h"
```

Type

```
struct temu_ResetIface {
  void (*)(void *, int) reset;
}
```

Description

Reset interface

Alternative to the reset function in the device interface.

Fields

Field	Type	Description
reset	void (*)(void *, int)	Reset device

1.4.75. temu_ReverseReplayIface

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_ReverseReplayIface {
}
```

Description

Fields

Field	Type	Description

1.4.76. temu_RiscvIface

Include

```
#include "temu-c/Target/RISCV.h"
```

Type

```
struct temu_RiscvIface {
}
```

Description

Interface for RISCV specific functionality

Fields

Field	Type	Description

1.4.77. temu_SchedDebugIface

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

```
struct temu_SchedDebugIface {
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description

1.4.78. temu_SdCardIface

Include

```
#include "temu-c/Bus/SdCard.h"
```

Type

```
struct temu_SdCardIface {
  temu_SdStatus (*)(temu_Object *, uint8_t, uint32_t, temu_SdResponse *) sendCommand;
  temu_SdStatus (*)(temu_Object *, uint8_t *, size_t) readData;
  temu_SdStatus (*)(temu_Object *, const uint8_t *, size_t) writeData;
}
```

Description

Implemented by an SD card.

Fields

Field	Type	Description
sendCommand	temu_SdStatus (*)(temu_Object *, uint8_t, uint32_t, temu_SdResponse *)	Send command Cmd (0-63) with argument Arg. On teSDS_Ok, Resp holds the response; a command that starts a data phase makes its data available through readData or writeData.
readData	temu_SdStatus (*)(temu_Object *, uint8_t *, size_t)	Read Len bytes of the current card-to-host data phase: data blocks after CMD17/CMD18, or a register such as the SCR (ACMD51), SD status (ACMD13) or switch function status (CMD6). The card keeps the position, so a controller can move the data in any chunk size. A single block read ends after its block; a multiple block read continues until CMD12.

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
writeData	temu_SdStatus (*)(temu_Object *, const uint8_t *, size_t)	Write Len bytes of the current host-to-card data phase (CMD24, CMD25). The card stores each block once it is complete.

1.4.79. temu_SerialIface

Include

```
#include "temu-c/Bus/Serial.h"
```

Type

```
struct temu_SerialIface {
  void (*)(void *, uint8_t) write;
  void (*)(void *) cts;
  _Bool (*)(void *) isClearToReceive;
}
```

Description

Serial communications interface

Fields

Field	Type	Description
write	void (*)(void *, uint8_t)	This function will be called when data is written on the serial bus
cts	void (*)(void *)	Notify this endpoint that the peer may now be clear to receive data.
isClearToReceive	_Bool (*)(void *)	Return whether this endpoint is currently clear to receive data. Optional. If NULL, we assume it is always clear to receive.

1.4.80. temu_SignalIface

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/Signal.h"
```

Type

```
struct temu_SignalIface {
}
```

Description

Digital signal interface

Fields

Field	Type	Description

1.4.81. temu_SparcV8Iface

Include

```
#include "temu-c/Target/Sparc.h"
```

Type

```
struct temu_SparcV8Iface {
}
```

Description

Interface for SPARC specific functionality

Fields

Field	Type	Description

1.4.82. temu_SpfiPortIface

Include

```
#include "temu-c/Bus/SpaceFibre.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_SpfiPortIface {
  void (*)(temu_Object *, temu_SpfiPortIfaceRef) connect;
  void (*)(temu_Object *) disconnect;
  void (*)(temu_Object *, temu_SpfiLinkState) signalLinkStateChange;
  temu_SpfiLinkState (*)(temu_Object *) getOtherSideLinkState;
  void (*)(temu_Object *, temu_Object *, temu_SpfiControlWord *) sendControlWord;
  void (*)(temu_Object *, temu_Object *, temu_SpfiPacket *) sendPacket;
}
```

Description

SpaceFibre port interface. A model must implement this interface for each SpaceFibre link (not lane). SpaceFibre is always a duplex point-to-point connection. This interface is packet based, underlying frames are hidden away with the exception of sequence numbers only exposed for error injection. Virtual/Broadcast channels are exposed as fields in the control word/packet structures.

Fields

Field	Type	Description
connect	void (*)(temu_Object *, temu_SpfiPortIfaceRef)	Connect this device Dev to OtherSide.
disconnect	void (*)(temu_Object *)	Disconnect this SpaceFibre port.
signalLinkStateChange	void (*)(temu_Object *, temu_SpfiLinkState)	Tell the other side about a link state change.
getOtherSideLinkState	temu_SpfiLinkState (*)(temu_Object *)	Get the link state from the other side.
sendControlWord	void (*)(temu_Object *, temu_Object *, temu_SpfiControlWord *)	Called by other side to send a control word and can be called by device to send one to the other side. For link initialization, the link state change functions are used instead of control words.
sendPacket	void (*)(temu_Object *, temu_Object *, temu_SpfiPacket *)	Called by the other side to send a broadcast or data packet and can be called by device to send a packet itself.

1.4.83. temu_SpiBus2Iface

Include

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBus2Iface {
}
```

Description

Fields

Field	Type	Description

1.4.84. temu_SpiBusIface

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiBusIface {
}
```

Description

Fields

Field	Type	Description

1.4.85. temu_SpiMasterDeviceIface

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiMasterDeviceIface {
}
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Description

Fields

Field	Type	Description

1.4.86. temu_SpiRomIface

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiRomIface {
}
```

Description

Fields

Field	Type	Description

1.4.87. temu_SpiSlaveDevice2Iface

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDevice2Iface {
  void (*)(temu_Object *) chipSelectRaised;
  void (*)(temu_Object *) chipSelectLowered;
  void (*)(temu_Object *, temu_SpiTransaction *) transfer;
}
```

Description

Fields

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Field	Type	Description
chipSelectRaised	void (*)(temu_Object *)	Callback to signal that the device's chipSelect was raised
chipSelectLowered	void (*)(temu_Object *)	Callback to signal that the device's chipSelect was lowered
transfer	void (*)(temu_Object *, temu_SpiTransaction *)	SPI Transfer call. Data exchange is done through a tx and rx buffer. The ST contains information on how much data is to be sent/received by the slave.

1.4.88. temu_SpiSlaveDeviceIface

Include

```
#include "temu-c/Bus/SPI.h"
```

Type

```
struct temu_SpiSlaveDeviceIface {
}
```

Description

Fields

Field	Type	Description

1.4.89. temu_SpwPortIface

Include

```
#include "temu-c/Bus/Spacewire.h"
```

Type

```
struct temu_SpwPortIface {
  void (*)(void *, void *, temu_SpwPacket *) receive;
  void (*)(void *, temu_SpwLinkState) signalLinkStateChange;
  temu_SpwLinkState (*)(void *) getOtherSideLinkState;
  void (*)(void *, temu_SpwPortIfaceRef) connect;
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
  void (*)(void *) disconnect;
  uint64_t (*)(void *, uint64_t) timeToSendPacketNs;
}
```

Description

SpaceWire port interface. A model must implement this interface for each SpaceWire port.

Fields

Field	Type	Description
receive	void (*)(void *, void *, temu_SpwPacket *)	Implement to receive and handle the SpaceWire packet. This will be called by the model on the other end that sends or forwards the packet.
signalLinkStateChange	void (*)(void *, temu_SpwLinkState)	The other end device (A) uses this to inform this device (B) about its (A) change of link state.
getOtherSideLinkState	temu_SpwLinkState (*)(void *)	Should return the link state of the device. Called by the other end device to handle connection.
connect	void (*)(void *, temu_SpwPortIfaceRef)	Connect a device to this port.
disconnect	void (*)(void *)	Disconnects the device currently connected to this port.
timeToSendPacketNs	uint64_t (*)(void *, uint64_t)	Return the amount of time required to send a packet through the port, in nano seconds.

1.4.90. temu_StreamIface

Include

```
#include "temu-c/Bus/ExperimentalEthernetExtensions.h"
```

Type

```
struct temu_StreamIface {
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
}
```

Description

Fields

Field	Type	Description

1.4.91. temu_StringBreakpointIface

Include

```
#include "temu-c/Support/StringBreakpoint.h"
```

Type

```
struct temu_StringBreakpointIface {
  void (*)(temu_Object *) printBreakpointList;
  void (*)(temu_Object *, const char *) addBreakpoint;
  void (*)(temu_Object *, int) deleteBreakpoint;
}
```

Description

Simple interface to get recorded line data from e.g. the console model.

Fields

Field	Type	Description
printBreakpointList	void (*)(temu_Object *)	print all breakpoints with their indexes
addBreakpoint	void (*)(temu_Object *, const char *)	add log line to use for break
deleteBreakpoint	void (*)(temu_Object *, int)	delete breakpoint with index = idx, if idx = -1 deleate all

1.4.92. temu_SyncIface

Include

```
#include "temu-c/Scheduler/MultiLevelSchedulerUnstable.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_SyncIface {
}
```

Description

Fields

Field	Type	Description

1.4.93. temu_TargetExecutionIface

Include

```
#include "temu-c/Target/Cpu.h"
```

Type

```
struct temu_TargetExecutionIface {
  void (*)(void *, uint64_t) profileCounterOverflow;
  void (*)(void *, uint64_t, uint64_t) wrotePage;
  void *(*)(void *) getRawRuntime;
}
```

Description

Internal interface for binary translator

Fields

Field	Type	Description
profileCounterOverflow	void (*)(void *, uint64_t)	Profile counter overflow handler
wrotePage	void (*)(void *, uint64_t, uint64_t)	Page written (for flushing caches)
getRawRuntime	void ()(void *)	Internal usage

1.4.94. temu_UsbBusIface

Include

```
#include "temu-c/Bus/Usb.h"
```

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

Type

```
struct temu_UsbBusIface {
  int (*)(temu_Object *, const temu_UsbTransfer *) submitTransfer;
  int (*)(temu_Object *, uint64_t) cancelTransfer;
  int (*)(temu_Object *, uint8_t, temu_Object *, temu_UsbDeviceIface *)
setAddressRoute;
  int (*)(temu_Object *) resetTopology;
}
```

Description

Transfer fabric: controllers submit transfer-level requests here; the fabric routes them to the addressed device.

This interface is deliberately above USB wire packets. Controller models may split one transfer into packet-sized FIFO/status events when their register model exposes that detail, but the fabric routes the software-visible transfer/URB.

Transfers are asynchronous and completion may be deferred arbitrarily. A device can only satisfy a transfer once its firmware has armed the target endpoint.

Fields

Field	Type	Description
submitTransfer	int (*)(temu_Object *, const temu_UsbTransfer *)	Accept a transfer for asynchronous routing to the addressed device.
cancelTransfer	int (*)(temu_Object *, uint64_t)	Cancel a previously submitted transfer.
setAddressRoute	int (*)(temu_Object *, uint8_t, temu_Object *, temu_UsbDeviceIface *)	Route a USB address to a concrete device endpoint.
resetTopology	int (*)(temu_Object *)	Drop address routes and return the topology to its reset state.

1.4.95. temu_UsbClassIface

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

The use and/or disclosure,etc. of the contents of this document (or any part thereof) is subject to the restrictions referenced on the front page.

```
struct temu_UsbClassIface {
  int (*)(temu_Object *, const temu_UsbClassRequest *, temu_UsbCompletion *) control;
  int (*)(temu_Object *, const temu_UsbTransfer *, temu_UsbCompletion *) transfer;
  int (*)(temu_Object *, uint8_t, uint8_t) setInterface;
  int (*)(temu_Object *) reset;
  int (*)(temu_Object *) disconnect;
}
```

Description

Function backend behind a generic device model (CDC serial, HID, MSC...).

Fields

Field	Type	Description
control	int (*)(temu_Object *, const temu_UsbClassRequest *, temu_UsbCompletion *)	Handle a class/vendor control request.
transfer	int (*)(temu_Object *, const temu_UsbTransfer *, temu_UsbCompletion *)	Handle a non-control endpoint transfer.
setInterface	int (*)(temu_Object *, uint8_t, uint8_t)	Select an alternate setting for an interface.
reset	int (*)(temu_Object *)	Reset backend state after a USB reset.
disconnect	int (*)(temu_Object *)	Notify the backend that the device disconnected.

1.4.96. temu_UsbDeviceIface

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbDeviceIface {
  int (*)(temu_Object *, temu_UsbSpeed, temu_UsbHostNotifyIface *, temu_Object *)
connect;
  int (*)(temu_Object *, uint32_t) disconnect;
  int (*)(temu_Object *) reset;
  int (*)(temu_Object *, uint8_t) setAddress;
  int (*)(temu_Object *, const temu_UsbTransfer *) submitTransfer;
```

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```
    int (*)(temu_Object *, uint64_t) cancelTransfer;
    int (*)(temu_Object *, temu_UsbDeviceInfo *) getInfo;
}
```

Description

A USB device’s transaction endpoint.

Fields

Field	Type	Description
connect	int (*)(temu_Object *, temu_UsbSpeed, temu_UsbHostNotifyIface *, temu_Object *)	Connect the device to a fabric at the negotiated speed.
disconnect	int (*)(temu_Object *, uint32_t)	Disconnect the device from the fabric.
reset	int (*)(temu_Object *)	Reset the device to its default USB state.
setAddress	int (*)(temu_Object *, uint8_t)	Advisory. A controller/OTG device in device mode owns its bus address through its own register model (e.g. DWC2 DCFG.DAD, written by firmware after the SET_ADDRESS control transfer) and self-filters on temu_UsbTransfer::Address; for such devices this is a no-op. The generic device model uses it to track the assigned address directly.
submitTransfer	int (*)(temu_Object *, const temu_UsbTransfer *)	Asynchronous; see temu_UsbBusIface::submitTransfer — completion may be deferred until firmware services the endpoint and is reported through the notify interface passed to connect().
cancelTransfer	int (*)(temu_Object *, uint64_t)	Cancel a transfer previously accepted by submitTransfer.
getInfo	int (*)(temu_Object *, temu_UsbDeviceInfo *)	Return current device address/configuration state.

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1.4.97. temu_UsbHostControllerIface

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHostControllerIface {
  int (*)(temu_Object *, unsigned int, temu_Object *, temu_UsbDeviceIface *,
temu_UsbSpeed) attachDevice;
  int (*)(temu_Object *, unsigned int, uint32_t) detachDevice;
  int (*)(temu_Object *, unsigned int) resetPort;
  int (*)(temu_Object *, unsigned int, _Bool) setPortPower;
  int (*)(temu_Object *, unsigned int, _Bool) suspendPort;
  int (*)(temu_Object *, unsigned int, temu_UsbPortState *) getPortState;
}
```

Description

Root-hub / port control surface exposed by a host controller.

Fields

Field	Type	Description
attachDevice	int (*)(temu_Object *, unsigned int, temu_Object *, temu_UsbDeviceIface *, temu_UsbSpeed)	Attach a device to a root-hub port.
detachDevice	int (*)(temu_Object *, unsigned int, uint32_t)	Detach the device currently connected to a root-hub port.
resetPort	int (*)(temu_Object *, unsigned int)	Drive reset signalling on a root-hub port.
setPortPower	int (*)(temu_Object *, unsigned int, _Bool)	Enable or disable power on a root-hub port.
suspendPort	int (*)(temu_Object *, unsigned int, _Bool)	Enter or leave suspend on a root-hub port.
getPortState	int (*)(temu_Object *, unsigned int, temu_UsbPortState *)	Return the current status bits for a root-hub port.

1.4.98. temu_UsbHostNotifyIface

Include

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```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHostNotifyIface {
  void (*)(temu_Object *, const temu_UsbCompletion *) transferCompleted;
  void (*)(temu_Object *, unsigned int, const temu_UsbPortState *) portChanged;
  void (*)(temu_Object *, unsigned int) wakeupSignalled;
}
```

Description

Asynchronous notifications back to the host controller.

Fields

Field	Type	Description
transferCompleted	void (*)(temu_Object *, const temu_UsbCompletion *)	Reports the outcome of an earlier submitTransfer, matched by temu_UsbCompletion::Id. May fire long after submission (deferred completion). Completion::Data carries returned IN data.
portChanged	void (*)(temu_Object *, unsigned int, const temu_UsbPortState *)	Report that a root-hub port's status changed.
wakeupSignalled	void (*)(temu_Object *, unsigned int)	Report a remote-wakeup signal from a suspended device.

1.4.99. temu_UsbHubIface

Include

```
#include "temu-c/Bus/Usb.h"
```

Type

```
struct temu_UsbHubIface {
  int (*)(temu_Object *, unsigned int, temu_Object *, temu_UsbDeviceIface *,
temu_UsbSpeed) attachDevice;
```

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```
  int (*)(temu_Object *, unsigned int, uint32_t) detachDevice;
  int (*)(temu_Object *, unsigned int) resetPort;
  int (*)(temu_Object *, unsigned int, _Bool) setPortPower;
  int (*)(temu_Object *, unsigned int, temu_UsbPortState *) getPortState;
}
```

Description

Downstream ports provided by a hub (the root hub uses the host-controller surface above; an external hub is just a device that also offers this).

Fields

Field	Type	Description
attachDevice	int (*)(temu_Object *, unsigned int, temu_Object *, temu_UsbDeviceIface *, temu_UsbSpeed)	Attach a device to a downstream hub port.
detachDevice	int (*)(temu_Object *, unsigned int, uint32_t)	Detach the device currently connected to a downstream hub port.
resetPort	int (*)(temu_Object *, unsigned int)	Drive reset signalling on a downstream hub port.
setPortPower	int (*)(temu_Object *, unsigned int, _Bool)	Enable or disable power on a downstream hub port.
getPortState	int (*)(temu_Object *, unsigned int, temu_UsbPortState *)	Return the current status bits for a downstream hub port.

1.4.100. temu_eFPGAFabricDesignIface

Include

```
#include "temu-c/Models/eFPGA.h"
```

Type

```
struct temu_eFPGAFabricDesignIface {
}
```

Description

Fields

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Field	Type	Description

1.4.101. temu_eFPGAHostIface

Include

```
#include "temu-c/Models/eFPGA.h"
```

Type

```
struct temu_eFPGAHostIface {
}
```

Description

Fields

Field	Type	Description

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