

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1)

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Type Objects

Perhaps one of the most important structures of the Python object system is the structure that defines a new type: the `c:type:PyTypeObject` structure. Type objects can be handled using any of the `c:func:PyObject_*` or `c:func:PyType_*` functions, but do not offer much that's interesting to most Python applications. These objects are fundamental to how objects behave, so they are very important to the interpreter itself and to any extension module that implements new types.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 8); backlink

Unknown interpreted text role "c:type".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 8); backlink

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 8); backlink

Unknown interpreted text role "c:func".

Type objects are fairly large compared to most of the standard types. The reason for the size is that each type object stores a large number of values, mostly C function pointers, each of which implements a small part of the type's functionality. The fields of the type object are examined in detail in this section. The fields will be described in the order in which they occur in the structure.

In addition to the following quick reference, the `ref:typedef-examples` section provides at-a-glance insight into the meaning and use of `c:type:PyTypeObject`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 23); backlink

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 23); backlink

Unknown interpreted text role "c:type".

Quick Reference

"tp slots"

	<code>:ref:`Type <slot-typedefs-table>`</code>		Info [2]
PyTypeObject Slot [1]	<div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 41); backlink</div><div>Unknown interpreted text role "ref".</div></div>	special methods/attrs	O T D I
<code><R> :c:member:`~PyTypeObject.tp_name`</code>	const char *	<code>__name__</code>	X X

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	<div>Info [2]</div> <div>O T D I</div>
:cmember:`~PyTypeObject.tp_basicsize` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 47); backlink Unknown interpreted text role "cmember". </div>	Py_size_t		<div>X X X</div>
:cmember:`~PyTypeObject.tp_itemsize` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 49); backlink Unknown interpreted text role "cmember". </div>	Py_size_t		<div>X X</div>
:cmember:`~PyTypeObject.tp_dealloc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 51); backlink Unknown interpreted text role "cmember". </div>	:ctype:`destructor` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 51); backlink Unknown interpreted text role "ctype". </div>		<div>X X X</div>
:cmember:`~PyTypeObject.tp_vectorcall_offset` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 53); backlink Unknown interpreted text role "cmember". </div>	Py_size_t		<div>X X</div>

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] O T D I
(x:member:`~PyTypeObject.tp_getattr`) <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 55); backlink Unknown interpreted text role "c:member". </div>	x:type:`getattrfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 55); backlink Unknown interpreted text role "c:type". </div>	__getattr__ , __getatrr__	G
(x:member:`~PyTypeObject.tp_setattr`) <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 58); backlink Unknown interpreted text role "c:member". </div>	x:type:`setattrfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 58); backlink Unknown interpreted text role "c:type". </div>	__setattr__ , __delattr__	G
(x:member:`~PyTypeObject.tp_as_async`) <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 61); backlink Unknown interpreted text role "c:member". </div>	x:type:`PyAsyncMethods` * <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 61); backlink Unknown interpreted text role "c:type". </div>	:ref:`sub-slots` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 61); backlink Unknown interpreted text role "ref". </div>	%
(x:member:`~PyTypeObject.tp_repr`) <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 63); backlink Unknown interpreted text role "c:member". </div>	x:type:`reprfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 63); backlink Unknown interpreted text role "c:type". </div>	__repr__	X X X

PyTypeObject Slot [1]	:ref:'Type <slot-typedefs-table>' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] <div>O T D I</div>
:cmember:'~PyTypeObject.tp_as_number' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 65); backlink Unknown interpreted text role "cmember". </div>	:ctype:'PyNumberMethods' * <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 65); backlink Unknown interpreted text role "ctype". </div>	:ref:'sub-slots' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 65); backlink Unknown interpreted text role "ref". </div>	%
:cmember:'~PyTypeObject.tp_as_sequence' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 67); backlink Unknown interpreted text role "cmember". </div>	:ctype:'PySequenceMethods' * <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 67); backlink Unknown interpreted text role "ctype". </div>	:ref:'sub-slots' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 67); backlink Unknown interpreted text role "ref". </div>	%
:cmember:'~PyTypeObject.tp_as_mapping' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 69); backlink Unknown interpreted text role "cmember". </div>	:ctype:'PyMappingMethods' * <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 69); backlink Unknown interpreted text role "ctype". </div>	:ref:'sub-slots' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 69); backlink Unknown interpreted text role "ref". </div>	%
:cmember:'~PyTypeObject.tp_hash' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 71); backlink Unknown interpreted text role "cmember". </div>	:ctype:'hashfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 71); backlink Unknown interpreted text role "ctype". </div>	__hash__	X G

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] O T D I
:cmember:`~PyTypeObject.tp_call` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 73); backlink Unknown interpreted text role "cmember". </div>	:ctype:`ternaryfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 73); backlink Unknown interpreted text role "ctype". </div>	__call__	X X
:cmember:`~PyTypeObject.tp_str` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 75); backlink Unknown interpreted text role "cmember". </div>	:ctype:`reprfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 75); backlink Unknown interpreted text role "ctype". </div>	__str__	X X
:cmember:`~PyTypeObject.tp_getattro` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 77); backlink Unknown interpreted text role "cmember". </div>	:ctype:`getattrofunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 77); backlink Unknown interpreted text role "ctype". </div>	__getattribute__, __getattr__	X X G
:cmember:`~PyTypeObject.tp_setattro` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 80); backlink Unknown interpreted text role "cmember". </div>	:ctype:`setattrofunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 80); backlink Unknown interpreted text role "ctype". </div>	__setattr__, __delattr__	X X G

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] O T D I
:cmember:`~PyTypeObject.tp_as_buffer` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 83); backlink Unknown interpreted text role "cmember". </div>	:ctype:`PyBufferProc` * <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 83); backlink Unknown interpreted text role "ctype". </div>		%
:cmember:`~PyTypeObject.tp_flags` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 85); backlink Unknown interpreted text role "cmember". </div>	unsigned long		X X ?
:cmember:`~PyTypeObject.tp_doc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 87); backlink Unknown interpreted text role "cmember". </div>	const char *	__doc__	X X
:cmember:`~PyTypeObject.tp_traverse` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 89); backlink Unknown interpreted text role "cmember". </div>	:ctype:`traverseproc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 89); backlink Unknown interpreted text role "ctype". </div>		X G

PyTypeObject Slot [1]	<div> <div> :ref:Type <slot-typedefs-table>` </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div> </div>	special methods/attrs	Info [2]	O	T	D	I
:cmember:~PyTypeObject.tp_clear` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 91); backlink Unknown interpreted text role "cmember". </div>	:ctype:inquiry` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 91); backlink Unknown interpreted text role "ctype". </div>			X			G
:cmember:~PyTypeObject.tp_richcompare` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 93); backlink Unknown interpreted text role "cmember". </div>	:ctype:richcmpfunc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 93); backlink Unknown interpreted text role "ctype". </div>	__lt__, __le__, __eq__, __ne__, __gt__, __ge__		X			G
:cmember:~PyTypeObject.tp_weaklistoffset` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 100); backlink Unknown interpreted text role "cmember". </div>	Py_size_t			X			?
:cmember:~PyTypeObject.tp_iter` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 102); backlink Unknown interpreted text role "cmember". </div>	:ctype:getiterfunc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 102); backlink Unknown interpreted text role "ctype". </div>	__iter__					X

PyTypeObject Slot [1]	<div> <div> :ref:'Type <slot-typedefs-table>' </div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div> </div>	special methods/attrs	Info [2]	O	T	D	I
:cmember:'~PyTypeObject.tp_itemext' <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 104); backlink Unknown interpreted text role "cmember". </div> </div>	:ctype:'itemextfunc' <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 104); backlink Unknown interpreted text role "ctype". </div> </div>	__next__					X
:cmember:'~PyTypeObject.tp_methods' <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 106); backlink Unknown interpreted text role "cmember". </div> </div>	:ctype:'PyMethodDef' [] <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 106); backlink Unknown interpreted text role "ctype". </div> </div>			X	X		
:cmember:'~PyTypeObject.tp_members' <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 108); backlink Unknown interpreted text role "cmember". </div> </div>	:ctype:'PyMemberDef' [] <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 108); backlink Unknown interpreted text role "ctype". </div> </div>					X	
:cmember:'~PyTypeObject.tp_getset' <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 110); backlink Unknown interpreted text role "cmember". </div> </div>	:ctype:'PyGetSetDef' [] <div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 110); backlink Unknown interpreted text role "ctype". </div> </div>			X	X		

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] O T D I
:cmember:`~PyTypeObject.tp_base` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 112); backlink Unknown interpreted text role "cmember". </div>	:ctype:`PyTypeObject` * <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 112); backlink Unknown interpreted text role "ctype". </div>	__base__	X
:cmember:`~PyTypeObject.tp_dict` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 114); backlink Unknown interpreted text role "cmember". </div>	:ctype:`PyObject` * <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 114); backlink Unknown interpreted text role "ctype". </div>	__dict__	?
:cmember:`~PyTypeObject.tp_descr_get` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 116); backlink Unknown interpreted text role "cmember". </div>	:ctype:`descrgetfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 116); backlink Unknown interpreted text role "ctype". </div>	__get__	X
:cmember:`~PyTypeObject.tp_descr_set` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 118); backlink Unknown interpreted text role "cmember". </div>	:ctype:`descrsetfunc` <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 118); backlink Unknown interpreted text role "ctype". </div>	__set__, __delete__	X

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	<div>Info [2]</div> <div>O T D I</div>
:cmember:`~PyTypeObject.tp_dictoffset` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 121); backlink Unknown interpreted text role "cmember". </div>	Py_ssize_t		<div>X ?</div>
:cmember:`~PyTypeObject.tp_init` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 123); backlink Unknown interpreted text role "cmember". </div>	:ctype:`initproc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 123); backlink Unknown interpreted text role "ctype". </div>	__init__	<div>X X X</div>
:cmember:`~PyTypeObject.tp_alloc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 125); backlink Unknown interpreted text role "cmember". </div>	:ctype:`allocfunc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 125); backlink Unknown interpreted text role "ctype". </div>		<div>X ? ?</div>
:cmember:`~PyTypeObject.tp_new` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 127); backlink Unknown interpreted text role "cmember". </div>	:ctype:`newfunc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 127); backlink Unknown interpreted text role "ctype". </div>	__new__	<div>X X ? ?</div>

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] O T D I
:c:member:`~PyTypeObject.tp_free` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 129); backlink Unknown interpreted text role "c:member". </div>	:c:type:`freefunc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 129); backlink Unknown interpreted text role "c:type". </div>		X X ? ?
:c:member:`~PyTypeObject.tp_is_gc` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 131); backlink Unknown interpreted text role "c:member". </div>	:c:type:`inquiry` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 131); backlink Unknown interpreted text role "c:type". </div>		X X
<c:member:`~PyTypeObject.tp_bases`>	:c:type:`PyObject` * <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 133); backlink Unknown interpreted text role "c:member". </div>	__bases__	~
<c:member:`~PyTypeObject.tp_mro`>	:c:type:`PyObject` * <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 135); backlink Unknown interpreted text role "c:member". </div>	__mro__	~

PyTypeObject Slot [1]	:ref:`Type <slot-typedefs-table>` <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref". </div>	special methods/attrs	Info [2] O T D I
[:cmember:`~PyTypeObject.tp_cache`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 137); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_cache`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 137); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_cache`]	
[:cmember:`~PyTypeObject.tp_subclasses`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 139); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_subclasses`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 139); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_subclasses`]	
[:cmember:`~PyTypeObject.tp_weaklist`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 141); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_weaklist`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 141); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_weaklist`]	
[:cmember:`~PyTypeObject.tp_del`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 143); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_del`] <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 143); backlink Unknown interpreted text role "cmember". </div>	[:cmember:`~PyTypeObject.tp_del`]	

PyTypeObject Slot [1]	:ref:'Type <slot-typedefs-table>'		Info [2]			
	<div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 41); backlink Unknown interpreted text role "ref".</div>	special methods/attrs	O	T	D	I
[cmember:'~PyTypeObject.tp_version_tag']	<div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 145); backlink Unknown interpreted text role "cmember".</div>	unsigned int				
:cmember:'~PyTypeObject.tp_finalize'	<div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 147); backlink Unknown interpreted text role "cmember".</div>	:ctype:'destructor'				
	<div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 147); backlink Unknown interpreted text role "ctype".</div>	<code>__del__</code>				X
:cmember:'~PyTypeObject.tp_vectorcall'	<div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 149); backlink Unknown interpreted text role "cmember".</div>	:ctype:'vectorcallfunc'				
	<div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 149); backlink Unknown interpreted text role "ctype".</div>					

[1] A slot name in parentheses indicates it is (effectively) deprecated. Names in angle brackets should be treated as read-only. Names in square brackets are for internal use only. "<R>" (as a prefix) means the field is required (must be non-NULL).

[2] Columns:

"O": set on :ctype:'PyBaseObject_Type'

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 158); [backlink](#)

Unknown interpreted text role "ctype".

"T": set on :ctype:'PyType_Type'

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 160); [backlink](#)

Unknown interpreted text role "ctype".

"D": default (if slot is set to NULL)

System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 164)

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none

X - PyType_Ready sets this value if it is NULL
~ - PyType_Ready always sets this value (it should be NULL)
? - PyType_Ready may set this value depending on other slots

Also see the inheritance column ("I").
```

"I": inheritance

System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 174)

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none

X - type slot is inherited via *PyType_Ready* if defined with a *NULL* value
% - the slots of the sub-struct are inherited individually
G - inherited, but only in combination with other slots; see the slot's description
? - it's complicated; see the slot's description
```

Note that some slots are effectively inherited through the normal attribute lookup chain.

sub-slots

Slot	<div>.ref:'Type <slot-typedefs-table>'</div> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink</div> <div>Unknown interpreted text role "ref".</div>	special methods
<div>x:member:'~PyAsyncMethods.am_await'</div> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 197); backlink</div> <div>Unknown interpreted text role "c:member".</div>	<div>x:type:'unaryfunc'</div> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 197); backlink</div> <div>Unknown interpreted text role "c:type".</div>	<div>__await__</div>
<div>x:member:'~PyAsyncMethods.am_aiter'</div> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 199); backlink</div> <div>Unknown interpreted text role "c:member".</div>	<div>x:type:'unaryfunc'</div> <div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 199); backlink</div> <div>Unknown interpreted text role "c:type".</div>	<div>__aiter__</div>

Slot	<p>ref: 'Type <slot-tyedefs-table>'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink</p> <p>Unknown interpreted text role "ref".</p> </div>	special methods
<p>x:member: '~PyAsyncMethods.am_anext'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 201); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'unaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 201); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>anext</u>
<p>x:member: '~PyAsyncMethods.am_send'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 203); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'sendfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 203); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	
<p>x:member: '~PyNumberMethods.nb_add'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 207); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 207); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>add</u> <u>radd</u>
<p>x:member: '~PyNumberMethods.nb_inplace_add'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 210); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 210); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>iadd</u>

Slot	:ref:'Type <slot-typedefs-table>' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
:c.member:'~PyNumberMethods.nb_subtract' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 212); backlink Unknown interpreted text role "c.member". </div>	:c.type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 212); backlink Unknown interpreted text role "c.type". </div>	__sub__ __rsub__
:c.member:'~PyNumberMethods.nb_inplace_subtract' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 215); backlink Unknown interpreted text role "c.member". </div>	:c.type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 215); backlink Unknown interpreted text role "c.type". </div>	__isub__
:c.member:'~PyNumberMethods.nb_multiply' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 217); backlink Unknown interpreted text role "c.member". </div>	:c.type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 217); backlink Unknown interpreted text role "c.type". </div>	__mul__ __rmul__
:c.member:'~PyNumberMethods.nb_inplace_multiply' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 220); backlink Unknown interpreted text role "c.member". </div>	:c.type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 220); backlink Unknown interpreted text role "c.type". </div>	__imul__

Slot	<p>:ref:'Type <slot-typedefs-table>'</p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
x:member:'~PyNumberMethods.nb_remainder' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 222); backlink Unknown interpreted text role "c:member". </div>	x:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 222); backlink Unknown interpreted text role "c:type". </div>	__mod__ __rmod__
x:member:'~PyNumberMethods.nb_inplace_remainder' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 225); backlink Unknown interpreted text role "c:member". </div>	x:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 225); backlink Unknown interpreted text role "c:type". </div>	__imod__
x:member:'~PyNumberMethods.nb_divmod' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 227); backlink Unknown interpreted text role "c:member". </div>	x:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 227); backlink Unknown interpreted text role "c:type". </div>	__divmod__ __rdivmod__
x:member:'~PyNumberMethods.nb_power' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 230); backlink Unknown interpreted text role "c:member". </div>	x:type:'ternaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 230); backlink Unknown interpreted text role "c:type". </div>	__pow__ __rpow__

Slot	:ref:'Type <slot-typedefs-table>' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
:x.member:'~PyNumberMethods.nb_inplace_power'	: x.type:'ternaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 233); backlink Unknown interpreted text role "c.member". </div>	<u>__ipow__</u>
:x.member:'~PyNumberMethods.nb_negative'	: x.type:'unaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 235); backlink Unknown interpreted text role "c.member". </div>	<u>__neg__</u>
:x.member:'~PyNumberMethods.nb_positive'	: x.type:'unaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 237); backlink Unknown interpreted text role "c.member". </div>	<u>__pos__</u>
:x.member:'~PyNumberMethods.nb_absolute'	: x.type:'unaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 239); backlink Unknown interpreted text role "c.member". </div>	<u>__abs__</u>

Slot	:ref:'Type <slot-typedefs-table>' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
:x.member:'~PyNumberMethods.nb_bool'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 241); backlink Unknown interpreted text role "c.member". </div>	:x.type:'inquiry' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 241); backlink Unknown interpreted text role "c.type". </div> __bool__
:x.member:'~PyNumberMethods.nb_invert'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 243); backlink Unknown interpreted text role "c.member". </div>	:x.type:'unaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 243); backlink Unknown interpreted text role "c.type". </div> __invert__
:x.member:'~PyNumberMethods.nb_lshift'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 245); backlink Unknown interpreted text role "c.member". </div>	:x.type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 245); backlink Unknown interpreted text role "c.type". </div> __lshift__ __rshift__
:x.member:'~PyNumberMethods.nb_inplace_lshift'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 248); backlink Unknown interpreted text role "c.member". </div>	:x.type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 248); backlink Unknown interpreted text role "c.type". </div> __ilshift__

Slot	<p>ref: 'Type <slot-tyedefs-table>'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink</p> <p>Unknown interpreted text role "ref".</p> </div>	special methods
<p>x: member: '~PyNumberMethods.nb_rshift'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 250); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 250); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<code>__rshift__</code> <code>__rrshift__</code>
<p>x: member: '~PyNumberMethods.nb_inplace_rshift'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 253); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 253); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<code>__irshift__</code>
<p>x: member: '~PyNumberMethods.nb_and'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 255); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 255); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<code>__and__</code> <code>__rand__</code>
<p>x: member: '~PyNumberMethods.nb_inplace_and'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 258); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 258); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<code>__iand__</code>

Slot	<p>:ref:'Type <slot-typedefs-table>'</p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
:c:member:'~PyNumberMethods.nb_xor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 260); backlink Unknown interpreted text role "c:member". </div>	:c:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 260); backlink Unknown interpreted text role "c:type". </div>	__xor__ __rxor__
:c:member:'~PyNumberMethods.nb_inplace_xor' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 263); backlink Unknown interpreted text role "c:member". </div>	:c:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 263); backlink Unknown interpreted text role "c:type". </div>	__ixor__
:c:member:'~PyNumberMethods.nb_or' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 265); backlink Unknown interpreted text role "c:member". </div>	:c:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 265); backlink Unknown interpreted text role "c:type". </div>	__or__ __ror__
:c:member:'~PyNumberMethods.nb_inplace_or' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 268); backlink Unknown interpreted text role "c:member". </div>	:c:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 268); backlink Unknown interpreted text role "c:type". </div>	__ior__

Slot	:ref:'Type <slot-typedefs-table>' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
:c:member:'~PyNumberMethods.nb_int'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 270); backlink Unknown interpreted text role "c:member". </div> :ctype:'unaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 270); backlink Unknown interpreted text role "c:type". </div>	<u>int</u>
:c:member:'~PyNumberMethods.nb_reserved'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 272); backlink Unknown interpreted text role "c:member". </div> void *	
:c:member:'~PyNumberMethods.nb_float'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 274); backlink Unknown interpreted text role "c:member". </div> :ctype:'unaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 274); backlink Unknown interpreted text role "c:type". </div>	<u>float</u>
:c:member:'~PyNumberMethods.nb_floor_divide'	<div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 276); backlink Unknown interpreted text role "c:member". </div> :ctype:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 276); backlink Unknown interpreted text role "c:type". </div>	<u>floordiv</u>

Slot	<p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink</p> <p>Unknown interpreted text role "ref".</p>	special methods
<code>x.member: '~PyNumberMethods.nb_inplace_floor_divide'</code>	<p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 278); backlink</p> <p>Unknown interpreted text role "c.member".</p>	<code>__ifloordiv__</code>
<code>x.member: '~PyNumberMethods.nb_true_divide'</code>	<p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 280); backlink</p> <p>Unknown interpreted text role "c.member".</p>	<code>__truediv__</code>
<code>x.member: '~PyNumberMethods.nb_inplace_true_divide'</code>	<p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 282); backlink</p> <p>Unknown interpreted text role "c.member".</p>	<code>__itruediv__</code>
<code>x.member: '~PyNumberMethods.nb_index'</code>	<p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 284); backlink</p> <p>Unknown interpreted text role "c.member".</p>	<code>__index__</code>

Slot	<p>ref: 'Type <slot-tyedefs-table>'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink</p> <p>Unknown interpreted text role "ref".</p> </div>	special methods
<p>x:member: '~PyNumberMethods.nb_matrix_multiply'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 286); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 286); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>matmul</u>
<p>x:member: '~PyNumberMethods.nb_inplace_matrix_multiply'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 289); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 289); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>imatmul</u>
<p>x:member: '~PyMappingMethods.mp_length'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 293); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'lenfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 293); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>len</u>
<p>x:member: '~PyMappingMethods.mp_subscript'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 295); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x:type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 295); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>getitem</u>

Slot	:ref:'Type <slot-typedefs-table>' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink Unknown interpreted text role "ref". </div>	special methods
x:member:'~PyMappingMethods.mp_ass_subscript' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 297); backlink Unknown interpreted text role "c:member". </div>	x:type:'objobjargproc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 297); backlink Unknown interpreted text role "c:type". </div>	__setitem__, __delitem__
x:member:'~PySequenceMethods.sq_length' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 302); backlink Unknown interpreted text role "c:member". </div>	x:type:'lenfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 302); backlink Unknown interpreted text role "c:type". </div>	__len__
x:member:'~PySequenceMethods.sq_concat' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 304); backlink Unknown interpreted text role "c:member". </div>	x:type:'binaryfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 304); backlink Unknown interpreted text role "c:type". </div>	__add__
x:member:'~PySequenceMethods.sq_repeat' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 306); backlink Unknown interpreted text role "c:member". </div>	x:type:'ssizeargfunc' <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 306); backlink Unknown interpreted text role "c:type". </div>	__mul__

Slot	<p>ref: 'Type <slot-typedefs-table>'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 194); backlink</p> <p>Unknown interpreted text role "ref".</p> </div>	special methods
<p>x: member: '~PySequenceMethods.sq_item'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 308); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'ssizeargfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 308); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>__getitem__</u>
<p>x: member: '~PySequenceMethods.sq_ass_item'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 310); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'ssizeobjargproc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 310); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>__setitem__</u> <u>__delitem__</u>
<p>x: member: '~PySequenceMethods.sq_contains'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 313); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'objobjproc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 313); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>__contains__</u>
<p>x: member: '~PySequenceMethods.sq_inplace_concat'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 315); backlink</p> <p>Unknown interpreted text role "c:member".</p> </div>	<p>x: type: 'binaryfunc'</p> <div> <p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 315); backlink</p> <p>Unknown interpreted text role "c:type".</p> </div>	<u>__iadd__</u>

typedef	Parameter Types	Return Type
<p><code>:ctype:'allocfunc'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 334); backlink Unknown interpreted text role "ctype". </div>	<p><code>:ctype:'PyTypeObject' *</code> <code>Py_ssize_t</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 669); backlink Unknown interpreted text role "ctype". </div>	<p><code>:ctype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 334); backlink Unknown interpreted text role "ctype". </div>
<p><code>:ctype:'destructor'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 339); backlink Unknown interpreted text role "ctype". </div>	<p><code>void *</code></p>	<p><code>void</code></p>
<p><code>:ctype:'freefunc'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 341); backlink Unknown interpreted text role "ctype". </div>	<p><code>void *</code></p>	<p><code>void</code></p>
<p><code>:ctype:'traverseproc'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 343); backlink Unknown interpreted text role "ctype". </div>	<p><code>void *</code> <code>:ctype:'visitproc'</code> <code>void *</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 688); backlink Unknown interpreted text role "ctype". </div>	<p><code>int</code></p>

typedef	Parameter Types	Return Type
<p><code>xtype:'newfunc'</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 349); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 699); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 700); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 701); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 349); backlink</p><p>Unknown interpreted text role "ctype".</p></div>

typedef	Parameter Types	Return Type
<p><code>xtype:'initproc'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 355); backlink Unknown interpreted text role "ctype". </div>	<p> <code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> </p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 711); backlink Unknown interpreted text role "ctype". </div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 712); backlink Unknown interpreted text role "ctype". </div> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 713); backlink Unknown interpreted text role "ctype". </div>	<p><code>int</code></p>
<p><code>xtype:'reprfunc'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 361); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 361); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 361); backlink Unknown interpreted text role "ctype". </div>
<p><code>xtype:'getattrfunc'</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 363); backlink Unknown interpreted text role "ctype". </div>	<p> <code>xtype:'PyObject' *</code> <code>const char *</code> </p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 727); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 363); backlink Unknown interpreted text role "ctype". </div>

typedef	Parameter Types	Return Type
<p><code>xtype:'setattrfunc'</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 368); backlink</p><p>Unknown interpreted text role "c.type".</p></div>	<p><code>xtype:'PyObject' *</code> <code>const char *</code> <code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 737); backlink</p><p>Unknown interpreted text role "c.type".</p></div> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 739); backlink</p><p>Unknown interpreted text role "c.type".</p></div>	<p><code>int</code></p>
<p><code>xtype:'getattrofunc'</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 374); backlink</p><p>Unknown interpreted text role "c.type".</p></div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 749); backlink</p><p>Unknown interpreted text role "c.type".</p></div> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 750); backlink</p><p>Unknown interpreted text role "c.type".</p></div>	<p><code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 374); backlink</p><p>Unknown interpreted text role "c.type".</p></div>

typedef	Parameter Types	Return Type
<div>x.type:'PyObject' *</div> <div>x.type:'PyObject' *</div> <div>x.type:'PyObject' *</div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 759); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 379); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 760); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 761); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div>	<div>x.type:'PyObject' *</div> <div>x.type:'PyObject' *</div> <div>x.type:'PyObject' *</div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 759); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 760); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div> <div><div><div><div>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 761); backlink</div><div>Unknown interpreted text role "ctype".</div></div></div></div>	<div>int</div>

typedef	Parameter Types	Return Type
<p><code>xtype:'descrgetfunc'</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 385); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 771); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 772); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 773); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 385); backlink</p><p>Unknown interpreted text role "ctype".</p></div>

typedef	Parameter Types	Return Type
<p><code>:ctype:'descrsetfunc'</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 391); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>:ctype:'PyObject' *</code> <code>:ctype:'PyObject' *</code> <code>:ctype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 783); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 784); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 785); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>.int</code></p>
<p><code>:ctype:'hashfunc'</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 397); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>:ctype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 397); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>Py_hash_t</code></p>

typedef	Parameter Types	Return Type
<p><code>xtype:'richempfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 399); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> <code>int</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 799); backlink Unknown interpreted text role "c:type". </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 800); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 399); backlink Unknown interpreted text role "c:type". </div>
<p><code>xtype:'getiterfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 405); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 405); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 405); backlink Unknown interpreted text role "c:type". </div>
<p><code>xtype:'itemextfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 407); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 407); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 407); backlink Unknown interpreted text role "c:type". </div>
<p><code>xtype:'lenfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 409); backlink Unknown interpreted text role "c:type". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 409); backlink Unknown interpreted text role "c:type". </div>	<p><code>Py_ssize_t</code></p>

typedef	Parameter Types	Return Type
<p><code>__ctype: 'getbufferproc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 823); backlink Unknown interpreted text role "c.type". </div>	<p> <code>__ctype: 'PyObject' *</code> <code>__ctype: 'Py_buffer' *</code> int </p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 823); backlink Unknown interpreted text role "c.type". </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 824); backlink Unknown interpreted text role "c.type". </div>	<p>int</p>
<p><code>__ctype: 'releasebufferproc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 417); backlink Unknown interpreted text role "c.type". </div>	<p> <code>__ctype: 'PyObject' *</code> <code>__ctype: 'Py_buffer' *</code> </p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 835); backlink Unknown interpreted text role "c.type". </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 836); backlink Unknown interpreted text role "c.type". </div>	<p>void</p>
<p><code>__ctype: 'inquiry'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 422); backlink Unknown interpreted text role "c.type". </div>	<p>void *</p>	<p>int</p>

typedef	Parameter Types	Return Type
<p><code>x:type:'unaryfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 424); backlink Unknown interpreted text role "c.type". </div>	<p><code>x:type:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 849); backlink Unknown interpreted text role "c.type". </div>	<p><code>x:type:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 424); backlink Unknown interpreted text role "c.type". </div>
<p><code>x:type:'binaryfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 428); backlink Unknown interpreted text role "c.type". </div>	<p><code>x:type:'PyObject' *</code> <code>x:type:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 857); backlink Unknown interpreted text role "c.type". </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 858); backlink Unknown interpreted text role "c.type". </div>	<p><code>x:type:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 428); backlink Unknown interpreted text role "c.type". </div>

typedef	Parameter Types	Return Type
<p><code>xtype:'temaryfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 433); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 867); backlink Unknown interpreted text role "ctype". </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 868); backlink Unknown interpreted text role "ctype". </div> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 869); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 433); backlink Unknown interpreted text role "ctype". </div>
<p><code>xtype:'ssizeargfunc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 439); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code> <code>Py_ssize_t</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 879); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 439); backlink Unknown interpreted text role "ctype". </div>
<p><code>xtype:'ssizeobjargproc'</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 444); backlink Unknown interpreted text role "ctype". </div>	<p><code>xtype:'PyObject' *</code> <code>Py_ssize_t</code></p> <div> System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\ [cpython-main] [Doc] [c-api] typeobj.rst, line 889); backlink Unknown interpreted text role "ctype". </div>	<p><code>int</code></p>

typedef	Parameter Types	Return Type
<p><code>xtype:'objobjproc'</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 449); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 899); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 900); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p>int</p>
<p><code>xtype:'objobjargproc'</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 454); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p><code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code> <code>xtype:'PyObject' *</code></p> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 909); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 910); backlink</p><p>Unknown interpreted text role "ctype".</p></div> <div><p>System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 911); backlink</p><p>Unknown interpreted text role "ctype".</p></div>	<p>int</p>

See `ref: slot-typedefs` below for more detail.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 460); [backlink](#)

Unknown interpreted text role "ref".

PyTypeObject Definition

The structure definition for `:ctype:'PyTypeObject'` can be found in `:file:'Include/object.h'`. For convenience of reference, this repeats the definition found there:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 466); [backlink](#)

Unknown interpreted text role "ctype".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 466); [backlink](#)

Unknown interpreted text role "file".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 472)

Unknown directive type "literalinclude".

```
.. literalinclude:: ../includes/typestruct.h
```

PyObject Slots

The type object structure extends the `:ctype:'PyVarObject'` structure. The `:attr:'ob_size'` field is used for dynamic types (created by `:func:'type_new'`, usually called from a class statement). Note that `:cdata:'PyType_Type'` (the metatype) initializes `:cmember:'~PyTypeObject.tp_itemsize'`, which means that its instances (i.e. type objects) *must* have the `:attr:'ob_size'` field.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 478); [backlink](#)

Unknown interpreted text role "ctype".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 478); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 478); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 478); [backlink](#)

Unknown interpreted text role "cdata".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 478); [backlink](#)

Unknown interpreted text role "cmember".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 478); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 485)

Unknown directive type "cmember".

```
.. c:member:: Py_ssize_t PyObject.ob_refcnt
```

This is the type object's reference count, initialized to `1` by the `PyObject_HEAD_INIT` macro. Note that for `:ref:'statically allocated type objects <static-types>'`, the type's instances (objects whose `:attr:'ob_type'` points back to the type) do *not* count as references. But for `:ref:'dynamically allocated type objects <heap-types>'`, the instances *do* count as references.

Inheritance:

This field is not inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 499)

Unknown directive type "cmember".

```
.. c:member:: PyTypeObject* PyObject.ob_type
```

This is the type's type, in other words its metatype. It is initialized by the argument to the `PyObject_HEAD_INIT` macro, and its value should normally be `&PyType_Type`. However, for dynamically loadable extension modules that must be usable on Windows (at least), the compiler complains that this is not a valid initializer. Therefore, the convention is to pass `NULL` to the `PyObject_HEAD_INIT` macro and to initialize this field explicitly at the

start of the module's initialization function, before doing anything else. This is typically done like this::

```
Foo_Type.ob_type = &PyType_Type;
```

This should be done before any instances of the type are created.
:c:func:`PyType_Ready` checks if :attr:`ob_type` is ``NULL``, and if so, initializes it to the :attr:`ob_type` field of the base class.
:c:func:`PyType_Ready` will not change this field if it is non-zero.

****Inheritance:****

This field is inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 522)

Unknown directive type "c:member".

```
.. c:member:: PyObject* PyObject.ob_next
               PyObject* PyObject._ob_prev
```

These fields are only present when the macro ``Py_TRACE_REFS`` is defined (see the :option:`configure --with-trace-refs` option <--with-trace-refs>).

Their initialization to ``NULL`` is taken care of by the ``PyObject_HEAD_INIT`` macro. For :ref:`statically allocated objects <static-types>`, these fields always remain ``NULL``. For :ref:`dynamically allocated objects <heap-types>`, these two fields are used to link the object into a doubly-linked list of *all* live objects on the heap.

This could be used for various debugging purposes; currently the only uses are the :func:`sys.getobjects` function and to print the objects that are still alive at the end of a run when the environment variable :envvar:`PYTHONDUMPREFS` is set.

****Inheritance:****

These fields are not inherited by subtypes.

PyVarObject Slots

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 547)

Unknown directive type "c:member".

```
.. c:member:: Py_ssize_t PyVarObject.ob_size
```

For :ref:`statically allocated type objects <static-types>`, this should be initialized to zero. For :ref:`dynamically allocated type objects <heap-types>`, this field has a special internal meaning.

****Inheritance:****

This field is not inherited by subtypes.

PyTypeObject Slots

Each slot has a section describing inheritance. If :c:func:`PyType_Ready` may set a value when the field is set to NULL then there will also be a "Default" section. (Note that many fields set on :c:type:`PyBaseObject_Type` and :c:type:`PyType_Type` effectively act as defaults.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 561); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 561); [backlink](#)

Unknown interpreted text role "c:type".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 561); [backlink](#)

Unknown interpreted text role "c:type".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 566)

Unknown directive type "c:member".

```
.. c:member:: const char* PyTypeObject.tp_name
```

Pointer to a NUL-terminated string containing the name of the type. For types that are accessible as module globals, the string should be the full module name, followed by a dot, followed by the type name; for built-in types, it should be just the type name. If the module is a submodule of a package, the full package name is part of the full module name. For example, a type named :class:`T` defined in module :mod:`M` in subpackage :mod:`Q` in package :mod:`P` should have the :c:member:`~PyTypeObject.tp_name` initializer ``"P.Q.M.T"``.

For :ref:`dynamically allocated type objects <heap-types>`,

this should just be the type name, and the module name explicitly stored in the type dict as the value for key ``__module__``.

For :ref:`statically allocated type objects <static-types>`, the *tp_name* field should contain a dot. Everything before the last dot is made accessible as the :attr:`__module__` attribute, and everything after the last dot is made accessible as the :attr:`~definition.__name__` attribute.

If no dot is present, the entire :c:member:`~PyTypeObject.tp_name` field is made accessible as the :attr:`~definition.__name__` attribute, and the :attr:`__module__` attribute is undefined (unless explicitly set in the dictionary, as explained above). This means your type will be impossible to pickle. Additionally, it will not be listed in module documentations created with pydoc.

This field must not be ``NULL``. It is the only required field in :c:func:`~PyTypeObject` (other than potentially :c:member:`~PyTypeObject.tp_itemsize`).

Inheritance:

This field is not inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 602)

Unknown directive type "c:member".

```
.. c:member:: Py_ssize_t PyTypeObject.tp_basicsize
               Py_ssize_t PyTypeObject.tp_itemsize
```

These fields allow calculating the size in bytes of instances of the type.

There are two kinds of types: types with fixed-length instances have a zero :c:member:`~PyTypeObject.tp_itemsize` field, types with variable-length instances have a non-zero :c:member:`~PyTypeObject.tp_itemsize` field. For a type with fixed-length instances, all instances have the same size, given in :c:member:`~PyTypeObject.tp_basicsize`.

For a type with variable-length instances, the instances must have an :attr:`ob_size` field, and the instance size is :c:member:`~PyTypeObject.tp_basicsize` plus N times :c:member:`~PyTypeObject.tp_itemsize`, where N is the "length" of the object. The value of N is typically stored in the instance's :attr:`ob_size` field. There are exceptions: for example, ints use a negative :attr:`ob_size` to indicate a negative number, and N is ``abs(ob_size)`` there. Also, the presence of an :attr:`ob_size` field in the instance layout doesn't mean that the instance structure is variable-length (for example, the structure for the list type has fixed-length instances, yet those instances have a meaningful :attr:`ob_size` field).

The basic size includes the fields in the instance declared by the macro :c:macro:`PyObject_HEAD` or :c:macro:`PyObject_VAR_HEAD` (whichever is used to declare the instance struct) and this in turn includes the :attr:`ob_prev` and :attr:`ob_next` fields if they are present. This means that the only correct way to get an initializer for the :c:member:`~PyTypeObject.tp_basicsize` is to use the ``sizeof`` operator on the struct used to declare the instance layout. The basic size does not include the GC header size.

A note about alignment: if the variable items require a particular alignment, this should be taken care of by the value of :c:member:`~PyTypeObject.tp_basicsize`. Example: suppose a type implements an array of ``double``. :c:member:`~PyTypeObject.tp_itemsize` is ``sizeof(double)``. It is the programmer's responsibility that :c:member:`~PyTypeObject.tp_basicsize` is a multiple of ``sizeof(double)`` (assuming this is the alignment requirement for ``double``).

For any type with variable-length instances, this field must not be ``NULL``.

Inheritance:

These fields are inherited separately by subtypes. If the base type has a non-zero :c:member:`~PyTypeObject.tp_itemsize`, it is generally not safe to set :c:member:`~PyTypeObject.tp_itemsize` to a different non-zero value in a subtype (though this depends on the implementation of the base type).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 648)

Unknown directive type "c:member".

```
.. c:member:: destructor PyTypeObject.tp_dealloc
```

A pointer to the instance destructor function. This function must be defined unless the type guarantees that its instances will never be deallocated (as is the case for the singletons ``None`` and ``Ellipsis``). The function signature is:

```
void tp_dealloc(PyObject *self);
```

The destructor function is called by the :c:func:`Py_DECREF` and :c:func:`Py_XDECREF` macros when the new reference count is zero. At this point, the instance is still in existence, but there are no references to it. The destructor function should free all references which the instance owns, free all memory buffers owned by the instance (using the freeing function corresponding to the allocation function used to allocate the buffer), and call the type's :c:member:`~PyTypeObject.tp_free` function. If the type is not subtypeable (doesn't have the :const:`Py_TPFLAGS_BASETYPE` flag bit set), it is permissible to call the object deallocator directly instead of via :c:member:`~PyTypeObject.tp_free`. The object deallocator should be the one used to allocate the instance; this is normally :c:func:`PyObject_Del` if the instance was allocated using :c:func:`PyObject_New` or :c:func:`PyObject_VarNew`, or :c:func:`PyObject_GC_Del` if the instance was allocated using :c:func:`PyObject_GC_New` or :c:func:`PyObject_GC_NewVar`.

If the type supports garbage collection (has the :const:`Py_TPFLAGS_HAVE_GC`

flag bit set), the destructor should call `:c:func:'PyObject_GC_UnTrack'` before clearing any member fields.

```
.. code-block:: c

static void foo_dealloc(foo_object *self) {
    PyObject_GC_UnTrack(self);
    Py_CLEAR(self->ref);
    Py_TYPE(self)->tp_free((PyObject *)self);
}
```

Finally, if the type is heap allocated (`:const:'Py_TPFLAGS_HEAPTYPE'`), the deallocator should decrement the reference count for its type object after calling the type deallocator. In order to avoid dangling pointers, the recommended way to achieve this is:

```
.. code-block:: c

static void foo_dealloc(foo_object *self) {
    PyTypeObject *tp = Py_TYPE(self);
    // free references and buffers here
    tp->tp_free(self);
    Py_DECREF(tp);
}
```

****Inheritance:****

This field is inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 703)

Unknown directive type "c:member".

```
.. c:member:: Py_ssize_t PyTypeObject.tp_vectorcall_offset
```

An optional offset to a per-instance function that implements calling the object using the `:ref:'vectorcall' protocol <vectorcall>`, a more efficient alternative of the simpler `:c:member:'~PyTypeObject.tp_call'`.

This field is only used if the flag `:const:'Py_TPFLAGS_HAVE_VECTORCALL'` is set. If so, this must be a positive integer containing the offset in the instance of a `:c:type:'vectorcallfunc'` pointer.

The `*vectorcallfunc` pointer may be `'NULL'`, in which case the instance behaves as if `:const:'Py_TPFLAGS_HAVE_VECTORCALL'` was not set: calling the instance falls back to `:c:member:'~PyTypeObject.tp_call'`.

Any class that sets `'Py_TPFLAGS_HAVE_VECTORCALL'` must also set `:c:member:'~PyTypeObject.tp_call'` and make sure its behaviour is consistent with the `*vectorcallfunc` function. This can be done by setting `*tp_call` to `:c:func:'PyVectorcall_Call'`.

.. warning::

It is not recommended for `:ref:'mutable heap types <heap-types>'` to implement the vectorcall protocol. When a user sets `:attr:'__call__'` in Python code, only `*tp_call` is updated, likely making it inconsistent with the vectorcall function.

.. note::

The semantics of the `'tp_vectorcall_offset'` slot are provisional and expected to be finalized in Python 3.9. If you use vectorcall, plan for updating your code for Python 3.9.

.. versionchanged:: 3.8

Before version 3.8, this slot was named `'tp_print'`. In Python 2.x, it was used for printing to a file. In Python 3.0 to 3.7, it was unused.

****Inheritance:****

This field is always inherited. However, the `:const:'Py_TPFLAGS_HAVE_VECTORCALL'` flag is not always inherited. If it's not, then the subclass won't use `:ref:'vectorcall <vectorcall>'`, except when `:c:func:'PyVectorcall_Call'` is explicitly called. This is in particular the case for types without the `:const:'Py_TPFLAGS_IMMUTABLETYPE'` flag set (including subclasses defined in Python).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 754)

Unknown directive type "c:member".

```
.. c:member:: getattrofunc PyTypeObject.tp_getattro
```

An optional pointer to the get-attribute-string function.

This field is deprecated. When it is defined, it should point to a function that acts the same as the `:c:member:'~PyTypeObject.tp_getattro'` function, but taking a C string instead of a Python string object to give the attribute name.

****Inheritance:****

Group: `:attr:'tp_getattro'`, `:attr:'tp_getattro'`

This field is inherited by subtypes together with `:c:member:'~PyTypeObject.tp_getattro'`: a subtype

inherits both `:c:member:~PyTypeObject.tp_getattr`` and `:c:member:~PyTypeObject.tp_getattro`` from its base type `:c:member:~PyTypeObject`, the subtype's `:c:member:~PyTypeObject.tp_getattr`` and `:c:member:~PyTypeObject.tp_getattro`` are both `NULL``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 771)

Unknown directive type "c:member".

```
.. c:member:: setattrfunc PyTypeObject.tp_setattr
```

An optional pointer to the function for setting and deleting attributes.

This field is deprecated. When it is defined, it should point to a function that acts the same as the `:c:member:~PyTypeObject.tp_setattro`` function, but taking a C string instead of a Python string object to give the attribute name.

Inheritance:

Group: `:attr:~tp_setattr``, `:attr:~tp_setattro``

This field is inherited by subtypes together with `:c:member:~PyTypeObject.tp_setattro``: a subtype inherits both `:c:member:~PyTypeObject.tp_setattr`` and `:c:member:~PyTypeObject.tp_setattro`` from its base type `:c:member:~PyTypeObject`, the subtype's `:c:member:~PyTypeObject.tp_setattr`` and `:c:member:~PyTypeObject.tp_setattro`` are both `NULL``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 788)

Unknown directive type "c:member".

```
.. c:member:: PyAsyncMethods* PyTypeObject.tp_as_async
```

Pointer to an additional structure that contains fields relevant only to objects which implement `:term:~awaitable`` and `:term:~asynchronous iterator`` protocols at the C-level. See `:ref:~async-structs`` for details.

versionadded: 3.5
Formerly known as `~tp_compare`` and `~tp_reserved``.

Inheritance:

The `:c:member:~PyTypeObject.tp_as_async`` field is not inherited, but the contained fields are inherited individually.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 803)

Unknown directive type "c:member".

```
.. c:member:: reprfunc PyTypeObject.tp_repr
```

index: builtin: repr

An optional pointer to a function that implements the built-in function `:func:~repr``.

The signature is the same as for `:c:func:~PyObject_Repr::``:

```
PyObject *tp_repr(PyObject *self);
```

The function must return a string or a Unicode object. Ideally, this function should return a string that, when passed to `:func:~eval``, given a suitable environment, returns an object with the same value. If this is not feasible, it should return a string starting with `~<`` and ending with `~>`` from which both the type and the value of the object can be deduced.

Inheritance:

This field is inherited by subtypes.

Default:

When this field is not set, a string of the form `~<~s object at ~p>`` is returned, where `~s`` is replaced by the type name, and `~p`` by the object's memory address.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 832)

Unknown directive type "c:member".

```
.. c:member:: PyNumberMethods* PyTypeObject.tp_as_number
```

Pointer to an additional structure that contains fields relevant only to objects which implement the number protocol. These fields are documented in `:ref:~number-structs``.

Inheritance:

The `:c:member:~PyTypeObject.tp_as_number`` field is not inherited, but the contained fields are inherited individually.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 844)

Unknown directive type "c:member".

```
.. c:member:: PySequenceMethods* PyTypeObject.tp_as_sequence
```

Pointer to an additional structure that contains fields relevant only to objects which implement the sequence protocol. These fields are documented in :ref:`sequence-structs`.

****Inheritance:****

The :c:member:`~PyTypeObject.tp_as_sequence` field is not inherited, but the contained fields are inherited individually.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 856)

Unknown directive type "c:member".

```
.. c:member:: PyMappingMethods* PyTypeObject.tp_as_mapping
```

Pointer to an additional structure that contains fields relevant only to objects which implement the mapping protocol. These fields are documented in :ref:`mapping-structs`.

****Inheritance:****

The :c:member:`~PyTypeObject.tp_as_mapping` field is not inherited, but the contained fields are inherited individually.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 868)

Unknown directive type "c:member".

```
.. c:member:: hashfunc PyTypeObject.tp_hash
```

```
.. index:: builtin: hash
```

An optional pointer to a function that implements the built-in function :func:`hash`.

The signature is the same as for :c:func:`PyObject_Hash`::

```
Py_hash_t tp_hash(PyObject *);
```

The value ``-1`` should not be returned as a normal return value; when an error occurs during the computation of the hash value, the function should set an exception and return ``-1``.

When this field is not set (*and* :attr:`tp_richcompare` is not set), an attempt to take the hash of the object raises :exc:`TypeError`. This is the same as setting it to :c:func:`PyObject_HashNotImplemented`.

This field can be set explicitly to :c:func:`PyObject_HashNotImplemented` to block inheritance of the hash method from a parent type. This is interpreted as the equivalent of ``__hash__ = None`` at the Python level, causing ``isinstance(o, collections.Hashable)`` to correctly return ``False``. Note that the converse is also true - setting ``__hash__ = None`` on a class at the Python level will result in the ``tp_hash`` slot being set to :c:func:`PyObject_HashNotImplemented`.

****Inheritance:****

Group: :attr:`tp_hash`, :attr:`tp_richcompare`

This field is inherited by subtypes together with :c:member:`~PyTypeObject.tp_richcompare`: a subtype inherits both of :c:member:`~PyTypeObject.tp_richcompare` and :c:member:`~PyTypeObject.tp_hash`, when the subtype's :c:member:`~PyTypeObject.tp_richcompare` and :c:member:`~PyTypeObject.tp_hash` are both ``NULL``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 905)

Unknown directive type "c:member".

```
.. c:member:: ternaryfunc PyTypeObject.tp_call
```

An optional pointer to a function that implements calling the object. This should be ``NULL`` if the object is not callable. The signature is the same as for :c:func:`PyObject_Call`::

```
PyObject *tp_call(PyObject *self, PyObject *args, PyObject *kwargs);
```

****Inheritance:****

This field is inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 918)

Unknown directive type "c:member".

```
.. c:member:: reprfunc PyTypeObject.tp_str
```

An optional pointer to a function that implements the built-in operation

```
:func:`str`. (Note that :class:`str` is a type now, and :func:`str` calls the
constructor for that type. This constructor calls :c:func:`PyObject_Str` to do
the actual work, and :c:func:`PyObject_Str` will call this handler.)
```

The signature is the same as for :c:func:`PyObject_Str`:

```
PyObject *tp_str(PyObject *self);
```

The function must return a string or a Unicode object. It should be a "friendly" string representation of the object, as this is the representation that will be used, among other things, by the :func:`print` function.

****Inheritance:****

This field is inherited by subtypes.

****Default:****

When this field is not set, :c:func:`PyObject_Repr` is called to return a string representation.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 943)

Unknown directive type "c:member".

```
.. c:member:: getattrofunc PyTypeObject.tp_getattro
```

An optional pointer to the get-attribute function.

The signature is the same as for :c:func:`PyObject_GetAttr`:

```
PyObject *tp_getattro(PyObject *self, PyObject *attr);
```

It is usually convenient to set this field to :c:func:`PyObject_GenericGetAttr`, which implements the normal way of looking for object attributes.

****Inheritance:****

Group: :attr:`tp_getattr`, :attr:`tp_getattro`

This field is inherited by subtypes together with :c:member:`~PyTypeObject.tp_getattr`: a subtype inherits both :c:member:`~PyTypeObject.tp_getattr` and :c:member:`~PyTypeObject.tp_getattro` from its base type, the subtype's :c:member:`~PyTypeObject.tp_getattr` and :c:member:`~PyTypeObject.tp_getattro` are both ``NULL``.

****Default:****

:c:type:`PyBaseObject_Type` uses :c:func:`PyObject_GenericGetAttr`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 967)

Unknown directive type "c:member".

```
.. c:member:: setattrofunc PyTypeObject.tp_setattro
```

An optional pointer to the function for setting and deleting attributes.

The signature is the same as for :c:func:`PyObject_SetAttr`:

```
int tp_setattro(PyObject *self, PyObject *attr, PyObject *value);
```

In addition, setting *value* to ``NULL`` to delete an attribute must be supported. It is usually convenient to set this field to :c:func:`PyObject_GenericSetAttr`, which implements the normal way of setting object attributes.

****Inheritance:****

Group: :attr:`tp_setattr`, :attr:`tp_setattro`

This field is inherited by subtypes together with :c:member:`~PyTypeObject.tp_setattr`: a subtype inherits both :c:member:`~PyTypeObject.tp_setattr` and :c:member:`~PyTypeObject.tp_setattro` from its base type, the subtype's :c:member:`~PyTypeObject.tp_setattr` and :c:member:`~PyTypeObject.tp_setattro` are both ``NULL``.

****Default:****

:c:type:`PyBaseObject_Type` uses :c:func:`PyObject_GenericSetAttr`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 993)

Unknown directive type "c:member".

```
.. c:member:: PyBufferProcs* PyTypeObject.tp_as_buffer
```

Pointer to an additional structure that contains fields relevant only to objects which implement the buffer interface. These fields are documented in :ref:`buffer-structs`.

****Inheritance:****

The :c:member:`~PyTypeObject.tp_as_buffer` field is not inherited, but the contained fields are inherited individually.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

Unknown directive type "c:member".

```
.. c:member:: unsigned long PyTypeObject.tp_flags
```

This field is a bit mask of various flags. Some flags indicate variant semantics for certain situations; others are used to indicate that certain fields in the type object (or in the extension structures referenced via :c:member:`~PyTypeObject.tp_as_number`, :c:member:`~PyTypeObject.tp_as_sequence`, :c:member:`~PyTypeObject.tp_as_buffer`) that were historically not always present are valid; if such a flag bit is clear, the type fields it guards must not be accessed and must be considered to have a zero or ``NULL`` value instead.

****Inheritance:****

Inheritance of this field is complicated. Most flag bits are inherited individually, i.e. if the base type has a flag bit set, the subtype inherits this flag bit. The flag bits that pertain to extension structures are strictly inherited if the extension structure is inherited, i.e. the base type's value of the flag bit is copied into the subtype together with a pointer to the extension structure. The :const:`Py_TPFLAGS_HAVE_GC` flag bit is inherited together with the :c:member:`~PyTypeObject.tp_traverse` and :c:member:`~PyTypeObject.tp_clear` fields, i.e. if the :const:`Py_TPFLAGS_HAVE_GC` flag bit is clear in the subtype and the :c:member:`~PyTypeObject.tp_traverse` and :c:member:`~PyTypeObject.tp_clear` fields in the subtype exist and have ``NULL`` values.

.. XXX are most flag bits *really* inherited individually?

****Default:****

:c:type:`PyBaseObject_Type` uses
 ``Py_TPFLAGS_DEFAULT | Py_TPFLAGS_BASETYPE``.

****Bit Masks:****

The following bit masks are currently defined; these can be ORed together using the ``|`` operator to form the value of the :c:member:`~PyTypeObject.tp_flags` field. The macro :c:func:`PyType_HasFeature` takes a type and a flags value, *tp* and *f*, and checks whether ``tp->tp_flags & f`` is non-zero.

```
.. data:: Py_TPFLAGS_HEAPTYPE
```

This bit is set when the type object itself is allocated on the heap, for example, types created dynamically using :c:func:`PyType_FromSpec`. In this case, the :attr:`ob_type` field of its instances is considered a reference to the type, and the type object is INCREf'ed when a new instance is created, and DECREf'ed when an instance is destroyed (this does not apply to instances of subtypes; only the type referenced by the instance's ob_type gets INCREf'ed or DECREf'ed).

****Inheritance:****

???

```
.. data:: Py_TPFLAGS_BASETYPE
```

This bit is set when the type can be used as the base type of another type. If this bit is clear, the type cannot be subtyped (similar to a "final" class in Java).

****Inheritance:****

???

```
.. data:: Py_TPFLAGS_READY
```

This bit is set when the type object has been fully initialized by :c:func:`PyType_Ready`.

****Inheritance:****

???

```
.. data:: Py_TPFLAGS_READYING
```

This bit is set while :c:func:`PyType_Ready` is in the process of initializing the type object.

****Inheritance:****

???

```
.. data:: Py_TPFLAGS_HAVE_GC
```

This bit is set when the object supports garbage collection. If this bit is set, instances must be created using :c:func:`PyObject_GC_New` and destroyed using :c:func:`PyObject_GC_Del`. More information in section :ref:`supporting-cycle-detection`. This bit also implies that the GC-related fields :c:member:`~PyTypeObject.tp_traverse` and :c:member:`~PyTypeObject.tp_clear` are present in the type object.

****Inheritance:****

Group: :const:`Py_TPFLAGS_HAVE_GC`, :attr:`tp_traverse`, :attr:`tp_clear`

The :const:`Py_TPFLAGS_HAVE_GC` flag bit is inherited together with the :attr:`tp_traverse` and :attr:`tp_clear` fields, i.e. if the :const:`Py_TPFLAGS_HAVE_GC` flag bit is clear in the subtype and the :attr:`tp_traverse` and :attr:`tp_clear` fields in the subtype exist and have ``NULL`` values.

```
.. data:: Py_TPFLAGS_DEFAULT
```

```

This is a bitmask of all the bits that pertain to the existence of certain
fields in the type object and its extension structures. Currently, it includes
the following bits: :const:`Py_TPFLAGS_HAVE_STACKLESS_EXTENSION`.

**Inheritance:**

???

.. data:: Py_TPFLAGS_METHOD_DESCRIPTOR

This bit indicates that objects behave like unbound methods.

If this flag is set for ``type(meth)``, then:

- ``meth.__get__(obj, cls)(*args, **kwargs)`` (with ``obj`` not None)
  must be equivalent to ``meth(obj, *args, **kwargs)``.

- ``meth.__get__(None, cls)(*args, **kwargs)``
  must be equivalent to ``meth(*args, **kwargs)``.

This flag enables an optimization for typical method calls like
``obj.meth()``: it avoids creating a temporary "bound method" object for
``obj.meth``.

.. versionadded:: 3.8

**Inheritance:**

This flag is never inherited by types without the
:const:`Py_TPFLAGS_IMMUTABLETYPE` flag set. For extension types, it is
inherited whenever :c:member:`~PyTypeObject.tp_descr_get` is inherited.

.. XXX Document more flags here?

.. data:: Py_TPFLAGS_LONG_SUBCLASS
.. data:: Py_TPFLAGS_LIST_SUBCLASS
.. data:: Py_TPFLAGS_TUPLE_SUBCLASS
.. data:: Py_TPFLAGS_BYTES_SUBCLASS
.. data:: Py_TPFLAGS_UNICODE_SUBCLASS
.. data:: Py_TPFLAGS_DICT_SUBCLASS
.. data:: Py_TPFLAGS_BASE_EXC_SUBCLASS
.. data:: Py_TPFLAGS_TYPE_SUBCLASS

These flags are used by functions such as
:c:func:`PyLong_Check` to quickly determine if a type is a subclass
of a built-in type; such specific checks are faster than a generic
check, like :c:func:`PyObject_IsInstance`. Custom types that inherit
from built-ins should have their :c:member:`~PyTypeObject.tp_flags`
set appropriately, or the code that interacts with such types
will behave differently depending on what kind of check is used.

.. data:: Py_TPFLAGS_HAVE_FINALIZE

This bit is set when the :c:member:`~PyTypeObject.tp_finalize` slot is present in the
type structure.

.. versionadded:: 3.4

.. deprecated:: 3.8
    This flag isn't necessary anymore, as the interpreter assumes the
    :c:member:`~PyTypeObject.tp_finalize` slot is always present in the
    type structure.

.. data:: Py_TPFLAGS_HAVE_VECTORCALL

This bit is set when the class implements
the :ref:`vectorcall protocol <vectorcall>`.
See :c:member:`~PyTypeObject.tp_vectorcall_offset` for details.

**Inheritance:**

This bit is inherited for types with the
:const:`Py_TPFLAGS_IMMUTABLETYPE` flag set, if
:c:member:`~PyTypeObject.tp_call` is also inherited.

.. versionadded:: 3.9

.. data:: Py_TPFLAGS_IMMUTABLETYPE

This bit is set for type objects that are immutable: type attributes cannot be set nor deleted.

:c:func:`PyType_Ready` automatically applies this flag to
:ref:`static types <static-types>`.

**Inheritance:**

This flag is not inherited.

.. versionadded:: 3.10

.. data:: Py_TPFLAGS_DISALLOW_INSTANTIATION

Disallow creating instances of the type: set
:c:member:`~PyTypeObject.tp_new` to NULL and don't create the ``__new__``
key in the type dictionary.

The flag must be set before creating the type, not after. For example, it
must be set before :c:func:`PyType_Ready` is called on the type.

The flag is set automatically on :ref:`static types <static-types>` if
:c:member:`~PyTypeObject.tp_base` is NULL or ``&PyBaseObject_Type`` and
:c:member:`~PyTypeObject.tp_new` is NULL.

```



```

**Inheritance:**

This flag is not inherited.

.. versionadded:: 3.10

.. data:: Py_TPFLAGS_MAPPING

This bit indicates that instances of the class may match mapping patterns
when used as the subject of a :keyword:`match` block. It is automatically
set when registering or subclassing :class:`collections.abc.Mapping`, and
unset when registering :class:`collections.abc.Sequence`.

.. note::

    :const:`Py_TPFLAGS_MAPPING` and :const:`Py_TPFLAGS_SEQUENCE` are
    mutually exclusive; it is an error to enable both flags simultaneously.

**Inheritance:**

This flag is inherited by types that do not already set
:const:`Py_TPFLAGS_SEQUENCE`.

.. seealso:: :pep:`634` -- Structural Pattern Matching: Specification

.. versionadded:: 3.10

.. data:: Py_TPFLAGS_SEQUENCE

This bit indicates that instances of the class may match sequence patterns
when used as the subject of a :keyword:`match` block. It is automatically
set when registering or subclassing :class:`collections.abc.Sequence`, and
unset when registering :class:`collections.abc.Mapping`.

.. note::

    :const:`Py_TPFLAGS_MAPPING` and :const:`Py_TPFLAGS_SEQUENCE` are
    mutually exclusive; it is an error to enable both flags simultaneously.

**Inheritance:**

This flag is inherited by types that do not already set
:const:`Py_TPFLAGS_MAPPING`.

.. seealso:: :pep:`634` -- Structural Pattern Matching: Specification

.. versionadded:: 3.10

```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 1270)

Unknown directive type "c:member".

```

.. c:member:: const char* PyTypeObject.tp_doc

An optional pointer to a NUL-terminated C string giving the docstring for this
type object. This is exposed as the :attr:`__doc__` attribute on the type and
instances of the type.

**Inheritance:**

This field is *not* inherited by subtypes.

```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 1281)

Unknown directive type "c:member".

```

.. c:member:: traverseproc PyTypeObject.tp_traverse

An optional pointer to a traversal function for the garbage collector. This is
only used if the :const:`Py_TPFLAGS_HAVE_GC` flag bit is set. The signature is::

    int tp_traverse(PyObject *self, visitproc visit, void *arg);

More information about Python's garbage collection scheme can be found
in section :ref:`supporting-cycle-detection`.

The :c:member:`~PyTypeObject.tp_traverse` pointer is used by the garbage collector to detect
reference cycles. A typical implementation of a :c:member:`~PyTypeObject.tp_traverse` function
simply calls :c:func:`Py_VISIT` on each of the instance's members that are Python
objects that the instance owns. For example, this is function :c:func:`local_traverse` from the
:mod:`_thread` extension module::

    static int
    local_traverse(localobject *self, visitproc visit, void *arg)
    {
        Py_VISIT(self->args);
        Py_VISIT(self->kw);
        Py_VISIT(self->dict);
        return 0;
    }

Note that :c:func:`Py_VISIT` is called only on those members that can participate
in reference cycles. Although there is also a ``self->key`` member, it can only
be ``NULL`` or a Python string and therefore cannot be part of a reference cycle.

On the other hand, even if you know a member can never be part of a cycle, as a
debugging aid you may want to visit it anyway just so the :mod:`gc` module's
:c:func:`~gc.get_referents` function will include it.

```

```

.. warning::
    When implementing :c:member:`~PyObject.tp_traverse`, only the
    members that the instance *owns* (by having :term:`strong references`
    <strong reference> to them) must be
    visited. For instance, if an object supports weak references via the
    :c:member:`~PyObject.tp_weaklist` slot, the pointer supporting
    the linked list (what *tp_weaklist* points to) must not be
    visited as the instance does not directly own the weak references to itself
    (the weakreference list is there to support the weak reference machinery,
    but the instance has no strong reference to the elements inside it, as they
    are allowed to be removed even if the instance is still alive).

Note that :c:func:`Py_VISIT` requires the *visit* and *arg* parameters to
:c:func:`local_traverse` to have these specific names; don't name them just
anything.

Instances of :ref:`heap-allocated types <heap-types>` hold a reference to
their type. Their traversal function must therefore either visit
:c:func:`Py_TYPE(self)` <Py_TYPE>, or delegate this responsibility by
calling ``tp_traverse`` of another heap-allocated type (such as a
heap-allocated superclass).
If they do not, the type object may not be garbage-collected.

.. versionchanged:: 3.9

    Heap-allocated types are expected to visit ``Py_TYPE(self)`` in
    ``tp_traverse``. In earlier versions of Python, due to
    `bug 40217 <https://bugs.python.org/issue40217>`, doing this
    may lead to crashes in subclasses.

**Inheritance:**

Group: :const:`Py_TPFLAGS_HAVE_GC`, :attr:`tp_traverse`, :attr:`tp_clear`

This field is inherited by subtypes together with :c:member:`~PyObject.tp_clear` and the
:const:`Py_TPFLAGS_HAVE_GC` flag bit: the flag bit, :c:member:`~PyObject.tp_traverse`, and
:c:member:`~PyObject.tp_clear` are all inherited from the base type if they are all zero in
the subtype.

```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1354)

Unknown directive type "c:member".

```

.. c:member:: inquiry PyObject.tp_clear

```

An optional pointer to a clear function for the garbage collector. This is only used if the :const:`Py_TPFLAGS_HAVE_GC` flag bit is set. The signature is::

```

int tp_clear(PyObject *);

```

The :c:member:`~PyObject.tp_clear` member function is used to break reference cycles in cyclic garbage detected by the garbage collector. Taken together, all :c:member:`~PyObject.tp_clear` functions in the system must combine to break all reference cycles. This is subtle, and if in any doubt supply a :c:member:`~PyObject.tp_clear` function. For example, the tuple type does not implement a :c:member:`~PyObject.tp_clear` function, because it's possible to prove that no reference cycle can be composed entirely of tuples. Therefore the :c:member:`~PyObject.tp_clear` functions of other types must be sufficient to break any cycle containing a tuple. This isn't immediately obvious, and there's rarely a good reason to avoid implementing :c:member:`~PyObject.tp_clear`.

Implementations of :c:member:`~PyObject.tp_clear` should drop the instance's references to those of its members that may be Python objects, and set its pointers to those members to ``NULL``, as in the following example::

```

static int
local_clear(localobject *self)
{
    Py_CLEAR(self->key);
    Py_CLEAR(self->args);
    Py_CLEAR(self->kw);
    Py_CLEAR(self->dict);
    return 0;
}

```

The :c:func:`Py_CLEAR` macro should be used, because clearing references is delicate: the reference to the contained object must not be decremented until after the pointer to the contained object is set to ``NULL``. This is because decrementing the reference count may cause the contained object to become trash, triggering a chain of reclamation activity that may include invoking arbitrary Python code (due to finalizers, or weakref callbacks, associated with the contained object). If it's possible for such code to reference *self* again, it's important that the pointer to the contained object be ``NULL`` at that time, so that *self* knows the contained object can no longer be used. The :c:func:`Py_CLEAR` macro performs the operations in a safe order.

Note that :c:member:`~PyObject.tp_clear` is not *always* called before an instance is deallocated. For example, when reference counting is enough to determine that an object is no longer used, the cyclic garbage collector is not involved and :c:member:`~PyObject.tp_dealloc` is called directly.

Because the goal of :c:member:`~PyObject.tp_clear` functions is to break reference cycles, it's not necessary to clear contained objects like Python strings or Python integers, which can't participate in reference cycles. On the other hand, it may be convenient to clear all contained Python objects, and write the type's :c:member:`~PyObject.tp_dealloc` function to invoke :c:member:`~PyObject.tp_clear`.

More information about Python's garbage collection scheme can be found in section :ref:`supporting-cycle-detection`.

Inheritance:

Group: :const:`Py_TPFLAGS_HAVE_GC`, :attr:`tp_traverse`, :attr:`tp_clear`

This field is inherited by subtypes together with :c:member:`~PyObject.tp_traverse` and the

```
:const:`Py_TPFLAGS_HAVE_GC` flag bit: the flag bit, :c:member:`~PyTypeObject.tp_traverse`, and  
:c:member:`~PyTypeObject.tp_clear` are all inherited from the base type if they are all zero in  
the subtype.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1421)

Unknown directive type "c:member".

```
.. c:member:: richcmpfunc PyTypeObject.tp_richcompare
```

An optional pointer to the rich comparison function, whose signature is::

```
PyObject *tp_richcompare(PyObject *self, PyObject *other, int op);
```

The first parameter is guaranteed to be an instance of the type that is defined by :c:type:`PyTypeObject`.

The function should return the result of the comparison (usually ``Py_True`` or ``Py_False``). If the comparison is undefined, it must return ``Py_NotImplemented``, if another error occurred it must return ``NULL`` and set an exception condition.

The following constants are defined to be used as the third argument for :c:member:`~PyTypeObject.tp_richcompare` and for :c:func:`PyObject_RichCompare`:

Constant	Comparison
:const:`Py_LT`	<
:const:`Py_LE`	<=
:const:`Py_EQ`	=
:const:`Py_NE`	!=
:const:`Py_GT`	>
:const:`Py_GE`	>=

The following macro is defined to ease writing rich comparison functions:

```
.. c:macro:: Py_RETURN_RICHCOMPARE(VAL_A, VAL_B, op)
```

Return ``Py_True`` or ``Py_False`` from the function, depending on the result of a comparison. VAL A and VAL B must be orderable by C comparison operators (for example, they may be C ints or floats). The third argument specifies the requested operation, as for :c:func:`PyObject_RichCompare`.

The return value's reference count is properly incremented.

On error, sets an exception and returns ``NULL`` from the function.

```
.. versionadded:: 3.7
```

Inheritance:

Group: :attr:`tp_hash`, :attr:`tp_richcompare`

This field is inherited by subtypes together with :c:member:`~PyTypeObject.tp_hash`; a subtype inherits :c:member:`~PyTypeObject.tp_richcompare` and :c:member:`~PyTypeObject.tp_hash` when the subtype's :c:member:`~PyTypeObject.tp_richcompare` and :c:member:`~PyTypeObject.tp_hash` are both ``NULL``.

Default:

:c:type:`PyBaseObject_Type` provides a :attr:`tp_richcompare` implementation, which may be inherited. However, if only :attr:`tp_hash` is defined, not even the inherited function is used and instances of the type will not be able to participate in any comparisons.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1488)

Unknown directive type "c:member".

```
.. c:member:: Py_ssize_t PyTypeObject.tp_weaklistoffset
```

If the instances of this type are weakly referenceable, this field is greater than zero and contains the offset in the instance structure of the weak reference list head (ignoring the GC header, if present); this offset is used by :c:func:`PyObject_ClearWeakRefs` and the :c:func:`PyWeakref_*` functions. The instance structure needs to include a field of type :c:type:`PyObject*` which is initialized to ``NULL``.

Do not confuse this field with :c:member:`~PyTypeObject.tp_weaklist`; that is the list head for weak references to the type object itself.

Inheritance:

This field is inherited by subtypes, but see the rules listed below. A subtype may override this offset; this means that the subtype uses a different weak reference list head than the base type. Since the list head is always found via :c:member:`~PyTypeObject.tp_weaklistoffset`, this should not be a problem.

When a type defined by a class statement has no :attr:`~object.__slots__` declaration, and none of its base types are weakly referenceable, the type is made weakly referenceable by adding a weak reference list head slot to the instance layout and setting the :c:member:`~PyTypeObject.tp_weaklistoffset` of that slot's offset.

When a type's :attr:`__slots__` declaration contains a slot named :attr:`__weakref__`, that slot becomes the weak reference list head for instances of the type, and the slot's offset is stored in the type's :c:member:`~PyObject.tp_weaklistoffset`.

When a type's :attr:`__slots__` declaration does not contain a slot named :attr:`__weakref__`, the type inherits its :c:member:`~PyObject.tp_weaklistoffset` from its base type.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 1522)

Unknown directive type "c:member".

```
.. c:member:: getiterfunc PyObject.tp_iter
```

An optional pointer to a function that returns an :term:`iterator` for the object. Its presence normally signals that the instances of this type are :term:`iterable` (although sequences may be iterable without this function).

This function has the same signature as :c:func:`PyObject_GetIter`::

```
PyObject *tp_iter(PyObject *self);
```

Inheritance:

This field is inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 1537)

Unknown directive type "c:member".

```
.. c:member:: iternextfunc PyObject.tp_iternext
```

An optional pointer to a function that returns the next item in an :term:`iterator`. The signature is::

```
PyObject *tp_iternext(PyObject *self);
```

When the iterator is exhausted, it must return ``NULL``; a :exc:`StopIteration` exception may or may not be set. When another error occurs, it must return ``NULL`` too. Its presence signals that the instances of this type are iterators.

Iterator types should also define the :c:member:`~PyObject.tp_iter` function, and that function should return the iterator instance itself (not a new iterator instance).

This function has the same signature as :c:func:`PyIter_Next`.

Inheritance:

This field is inherited by subtypes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 1560)

Unknown directive type "c:member".

```
.. c:member:: struct PyMethodDef* PyObject.tp_methods
```

An optional pointer to a static ``NULL``-terminated array of :c:type:`PyMethodDef` structures, declaring regular methods of this type.

For each entry in the array, an entry is added to the type's dictionary (see :c:member:`~PyObject.tp_dict` below) containing a method descriptor.

Inheritance:

This field is not inherited by subtypes (methods are inherited through a different mechanism).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 1574)

Unknown directive type "c:member".

```
.. c:member:: struct PyMemberDef* PyObject.tp_members
```

An optional pointer to a static ``NULL``-terminated array of :c:type:`PyMemberDef` structures, declaring regular data members (fields or slots) of instances of this type.

For each entry in the array, an entry is added to the type's dictionary (see :c:member:`~PyObject.tp_dict` below) containing a member descriptor.

Inheritance:

This field is not inherited by subtypes (members are inherited through a different mechanism).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1589)

Unknown directive type "c:member".

```
.. c:member:: struct PyGetSetDef* PyTypeObject.tp_getset
```

An optional pointer to a static ``NULL``-terminated array of :c:type:`PyGetSetDef` structures, declaring computed attributes of instances of this type.

For each entry in the array, an entry is added to the type's dictionary (see :c:member:`~PyTypeObject.tp_dict` below) containing a getset descriptor.

****Inheritance:****

This field is not inherited by subtypes (computed attributes are inherited through a different mechanism).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1603)

Unknown directive type "c:member".

```
.. c:member:: PyTypeObject* PyTypeObject.tp_base
```

An optional pointer to a base type from which type properties are inherited. At this level, only single inheritance is supported; multiple inheritance require dynamically creating a type object by calling the metatype.

.. note::

```
.. from Modules/xxmodule.c
```

Slot initialization is subject to the rules of initializing globals. C99 requires the initializers to be "address constants". Function designators like :c:func:`PyType_GenericNew`, with implicit conversion to a pointer, are valid C99 address constants.

However, the unary '&' operator applied to a non-static variable like :c:func:`PyBaseObject_Type` is not required to produce an address constant. Compilers may support this (gcc does), MSVC does not. Both compilers are strictly standard conforming in this particular behavior.

Consequently, :c:member:`~PyTypeObject.tp_base` should be set in the extension module's init function.

****Inheritance:****

This field is not inherited by subtypes (obviously).

****Default:****

This field defaults to ``&PyBaseObject_Type`` (which to Python programmers is known as the type :class:`object`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1637)

Unknown directive type "c:member".

```
.. c:member:: PyObject* PyTypeObject.tp_dict
```

The type's dictionary is stored here by :c:func:`PyType_Ready`.

This field should normally be initialized to ``NULL`` before `PyType_Ready` is called; it may also be initialized to a dictionary containing initial attributes for the type. Once :c:func:`PyType_Ready` has initialized the type, extra attributes for the type may be added to this dictionary only if they don't correspond to overloaded operations (like :meth:`__add__`).

****Inheritance:****

This field is not inherited by subtypes (though the attributes defined in here are inherited through a different mechanism).

****Default:****

If this field is ``NULL``, :c:func:`PyType_Ready` will assign a new dictionary to it.

.. warning::

It is not safe to use :c:func:`PyDict_SetItem` on or otherwise modify :c:member:`~PyTypeObject.tp_dict` with the dictionary C-API.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1663)

Unknown directive type "c:member".

```
.. c:member:: descrgetfunc PyTypeObject.tp_descr_get
```

An optional pointer to a "descriptor get" function.

The function signature is::

```
PyObject * tp_descr_get(PyObject *self, PyObject *obj, PyObject *type);
```

```
.. XXX explain more?

**Inheritance:**

This field is inherited by subtypes.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1678)

Unknown directive type "c:member".

```
.. c:member:: descrsetfunc PyTypeObject.tp_descr_set

An optional pointer to a function for setting and deleting
a descriptor's value.

The function signature is::

    int tp_descr_set(PyObject *self, PyObject *obj, PyObject *value);

The *value* argument is set to ``NULL`` to delete the value.

.. XXX explain more?

**Inheritance:**

This field is inherited by subtypes.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1696)

Unknown directive type "c:member".

```
.. c:member:: Py_ssize_t PyTypeObject.tp_dictoffset

If the instances of this type have a dictionary containing instance variables,
this field is non-zero and contains the offset in the instances of the type of
the instance variable dictionary; this offset is used by
:c:func:`PyObject_GenericGetAttr`.

Do not confuse this field with :c:member:`~PyTypeObject.tp_dict`; that is the dictionary for
attributes of the type object itself.

If the value of this field is greater than zero, it specifies the offset from
the start of the instance structure. If the value is less than zero, it
specifies the offset from the *end* of the instance structure. A negative
offset is more expensive to use, and should only be used when the instance
structure contains a variable-length part. This is used for example to add an
instance variable dictionary to subtypes of :class:`str` or :class:`tuple`. Note
that the :c:member:`~PyTypeObject.tp_basicsize` field should account for the dictionary added to
the end in that case, even though the dictionary is not included in the basic
object layout. On a system with a pointer size of 4 bytes,
:c:member:`~PyTypeObject.tp_dictoffset` should be set to ``-4`` to indicate that the dictionary is
at the very end of the structure.

The real dictionary offset in an instance can be computed from a negative
:c:member:`~PyTypeObject.tp_dictoffset` as follows::

    dictoffset = tp_basicsize + abs(ob_size)*tp_itemsize + tp_dictoffset
    if dictoffset is not aligned on sizeof(void*):
        round up to sizeof(void*)

where :c:member:`~PyTypeObject.tp_basicsize`, :c:member:`~PyTypeObject.tp_itemsize` and :c:member:`~PyTypeObject.
taken from the type object, and :attr:`ob_size` is taken from the instance. The
absolute value is taken because ints use the sign of :attr:`ob_size` to
store the sign of the number. (There's never a need to do this calculation
yourself; it is done for you by :c:func:`_PyObject_GetDictPtr`.)

**Inheritance:**

This field is inherited by subtypes, but see the rules listed below. A subtype
may override this offset; this means that the subtype instances store the
dictionary at a difference offset than the base type. Since the dictionary is
always found via :c:member:`~PyTypeObject.tp_dictoffset`, this should not be a problem.

When a type defined by a class statement has no :attr:`~object.__slots__` declaration,
and none of its base types has an instance variable dictionary, a dictionary
slot is added to the instance layout and the :c:member:`~PyTypeObject.tp_dictoffset` is set to
that slot's offset.

When a type defined by a class statement has a :attr:`~object.__slots__` declaration,
the type inherits its :c:member:`~PyTypeObject.tp_dictoffset` from its base type.

(Adding a slot named :attr:`~object.__dict__` to the :attr:`~object.__slots__` declaration does
not have the expected effect, it just causes confusion. Maybe this should be
added as a feature just like :attr:`~object.__weakref__` though.)

**Default:**

This slot has no default. For :ref:`static types <static-types>`, if the
field is ``NULL`` then no :attr:`__dict__` gets created for instances.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1756)

Unknown directive type "c:member".

```
.. c:member:: initproc PyTypeObject.tp_init

An optional pointer to an instance initialization function.
```

This function corresponds to the :meth:`__init__` method of classes. Like :meth:`__init__`, it is possible to create an instance without calling :meth:`__init__`, and it is possible to reinitialize an instance by calling its :meth:`__init__` method again.

The function signature is::

```
int tp_init(PyObject *self, PyObject *args, PyObject *kwargs);
```

The self argument is the instance to be initialized; the *args* and *kwargs* arguments represent positional and keyword arguments of the call to :meth:`__init__`.

The :c:member:`~PyTypeObject.tp_init` function, if not ``NULL``, is called when an instance is created normally by calling its type, after the type's :c:member:`~PyTypeObject.tp_new` function has returned an instance of the type. If the :c:member:`~PyTypeObject.tp_new` function returns an instance of some other type that is not a subtype of the original type, no :c:member:`~PyTypeObject.tp_init` function is called; if :c:member:`~PyTypeObject.tp_new` returns an instance of subtype of the original type, the subtype's :c:member:`~PyTypeObject.tp_init` is called.

Returns ``0`` on success, ``-1`` and sets an exception on error.

****Inheritance:****

This field is inherited by subtypes.

****Default:****

For :ref:`static types <static-types>` this field does not have a default.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1791)

Unknown directive type "c:member".

```
.. c:member:: allocfunc PyTypeObject.tp_alloc
```

An optional pointer to an instance allocation function.

The function signature is::

```
PyObject *tp_alloc(PyTypeObject *self, Py_ssize_t nitems);
```

****Inheritance:****

This field is inherited by static subtypes, but not by dynamic subtypes (subtypes created by a class statement).

****Default:****

For dynamic subtypes, this field is always set to :c:func:`PyType_GenericAlloc`, to force a standard heap allocation strategy.

For static subtypes, :c:type:`PyBaseObject_Type` uses :c:func:`PyType_GenericAlloc`. That is the recommended value for all statically defined types.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 1815)

Unknown directive type "c:member".

```
.. c:member:: newfunc PyTypeObject.tp_new
```

An optional pointer to an instance creation function.

The function signature is::

```
PyObject *tp_new(PyTypeObject *subtype, PyObject *args, PyObject *kwargs);
```

The *subtype* argument is the type of the object being created; the *args* and *kwargs* arguments represent positional and keyword arguments of the call to the type. Note that *subtype* doesn't have to equal the type whose :c:member:`~PyTypeObject.tp_new` function is called; it may be a subtype of that type (but not an unrelated type).

The :c:member:`~PyTypeObject.tp_new` function should call ``subtype->tp_alloc(subtype, nitems)`` to allocate space for the object, and then do only as much further initialization as is absolutely necessary. Initialization that can safely be ignored or repeated should be placed in the :c:member:`~PyTypeObject.tp_init` handler. A good rule of thumb is that for immutable types, all initialization should take place in :c:member:`~PyTypeObject.tp_new`, while for mutable types, most initialization should be deferred to :c:member:`~PyTypeObject.tp_init`.

Set the :c:const:`Py_TPFLAGS_DISALLOW_INSTANTIATION` flag to disallow creating instances of the type in Python.

****Inheritance:****

This field is inherited by subtypes, except it is not inherited by :ref:`static types <static-types>` whose :c:member:`~PyTypeObject.tp_base` is ``NULL`` or ``&PyBaseObject_Type``.

****Default:****

For :ref:`static types <static-types>` this field has no default. This means if the slot is defined as ``NULL``, the type cannot be called to create new instances; presumably there is some other way to create instances, like a factory function.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1854)

Unknown directive type "c:member".

```
.. c:member:: freefunc PyTypeObject.tp_free

    An optional pointer to an instance deallocation function. Its signature is::

        void tp_free(void *self);

    An initializer that is compatible with this signature is :c:func:`PyObject_Free`.

**Inheritance:**

This field is inherited by static subtypes, but not by dynamic
subtypes (subtypes created by a class statement)

**Default:**

In dynamic subtypes, this field is set to a deallocator suitable to
match :c:func:`PyType_GenericAlloc` and the value of the
:const:`Py_TPFLAGS_HAVE_GC` flag bit.

For static subtypes, :c:type:`PyBaseObject_Type` uses PyObject_Del.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1876)

Unknown directive type "c:member".

```
.. c:member:: inquiry PyTypeObject.tp_is_gc

    An optional pointer to a function called by the garbage collector.

    The garbage collector needs to know whether a particular object is collectible
    or not. Normally, it is sufficient to look at the object's type's
    :c:member:`~PyTypeObject.tp_flags` field, and check the :const:`Py_TPFLAGS_HAVE_GC`
    flag bit. But some types have a mixture of statically and dynamically allocated instances, and
    the statically allocated instances are not collectible. Such types should
    define this function; it should return ``1`` for a collectible instance, and
    ``0`` for a non-collectible instance. The signature is::

        int tp_is_gc(PyObject *self);

    (The only example of this are types themselves. The metatype,
    :c:data:`PyType_Type`, defines this function to distinguish between statically
    and :ref:`dynamically allocated types <heap-types>`.)

**Inheritance:**

This field is inherited by subtypes.

**Default:**

This slot has no default. If this field is ``NULL``,
:const:`Py_TPFLAGS_HAVE_GC` is used as the functional equivalent.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1904)

Unknown directive type "c:member".

```
.. c:member:: PyObject* PyTypeObject.tp_bases

    Tuple of base types.

    This is set for types created by a class statement. It should be ``NULL`` for
    statically defined types.

**Inheritance:**

This field is not inherited.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1916)

Unknown directive type "c:member".

```
.. c:member:: PyObject* PyTypeObject.tp_mro

    Tuple containing the expanded set of base types, starting with the type itself
    and ending with :class:`object`, in Method Resolution Order.

**Inheritance:**

This field is not inherited; it is calculated fresh by
:c:func:`PyType_Ready`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1928)

Unknown directive type "c:member".


```
.. c:member:: PyObject* PyTypeObject.tp_cache
```

Unused. Internal use only.

****Inheritance:****

This field is not inherited.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1937)

Unknown directive type "c:member".

```
.. c:member:: PyObject* PyTypeObject.tp_subclasses
```

List of weak references to subclasses. Internal use only.

****Inheritance:****

This field is not inherited.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1946)

Unknown directive type "c:member".

```
.. c:member:: PyObject* PyTypeObject.tp_weaklist
```

Weak reference list head, for weak references to this type object. Not inherited. Internal use only.

****Inheritance:****

This field is not inherited.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1956)

Unknown directive type "c:member".

```
.. c:member:: destructor PyTypeObject.tp_del
```

This field is deprecated. Use :c:member:`~PyTypeObject.tp_finalize` instead.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1961)

Unknown directive type "c:member".

```
.. c:member:: unsigned int PyTypeObject.tp_version_tag
```

Used to index into the method cache. Internal use only.

****Inheritance:****

This field is not inherited.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 1970)

Unknown directive type "c:member".

```
.. c:member:: destructor PyTypeObject.tp_finalize
```

An optional pointer to an instance finalization function. Its signature is::

```
void tp_finalize(PyObject *self);
```

If :c:member:`~PyTypeObject.tp_finalize` is set, the interpreter calls it once when finalizing an instance. It is called either from the garbage collector (if the instance is part of an isolated reference cycle) or just before the object is deallocated. Either way, it is guaranteed to be called before attempting to break reference cycles, ensuring that it finds the object in a sane state.

:c:member:`~PyTypeObject.tp_finalize` should not mutate the current exception status; therefore, a recommended way to write a non-trivial finalizer is::

```
static void
local_finalize(PyObject *self)
{
    PyObject *error_type, *error_value, *error_traceback;

    /* Save the current exception, if any. */
    PyErr_Fetch(&error_type, &error_value, &error_traceback);

    /* ... */

    /* Restore the saved exception. */
    PyErr_Restore(error_type, error_value, error_traceback);
}
```

For this field to be taken into account (even through inheritance), you must also set the :const:`Py_TPFLAGS_HAVE_FINALIZE` flags bit.

Also, note that, in a garbage collected Python,
:c:member:`~PyTypeObject.tp_dealloc` may be called from
any Python thread, not just the thread which created the object (if the object
becomes part of a refcount cycle, that cycle might be collected by a garbage
collection on any thread). This is not a problem for Python API calls, since
the thread on which `tp_dealloc` is called will own the Global Interpreter Lock
(GIL). However, if the object being destroyed in turn destroys objects from some
other C or C++ library, care should be taken to ensure that destroying those
objects on the thread which called `tp_dealloc` will not violate any assumptions
of the library.

****Inheritance:****

This field is inherited by subtypes.

.. versionadded:: 3.4

.. seealso:: "Safe object finalization" (:pep:`442`)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2023)

Unknown directive type "c:member".

.. c:member:: vectorcallfunc PyTypeObject.tp_vectorcall

Vectorcall function to use for calls of this type object.
In other words, it is used to implement
:ref:`vectorcall <vectorcall>` for ``type.__call__``.
If ``tp_vectorcall`` is ``NULL``, the default call implementation
using :attr:`~__new__` and :attr:`~__init__` is used.

****Inheritance:****

This field is never inherited.

.. versionadded:: 3.9 (the field exists since 3.8 but it's only used since 3.9)

Static Types

Traditionally, types defined in C code are *static*, that is, a static `c:type:PyTypeObject` structure is defined directly in code and initialized using `c:func:PyType_Ready`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2043); backlink

Unknown interpreted text role "c:type".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2043); backlink

Unknown interpreted text role "c:func".

This results in types that are limited relative to types defined in Python:

- Static types are limited to one base, i.e. they cannot use multiple inheritance.
- Static type objects (but not necessarily their instances) are immutable. It is not possible to add or modify the type object's attributes from Python.
- Static type objects are shared across :ref:`sub-interpreters <sub-interpreter-support>`, so they should not include any subinterpreter-specific state.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2053); backlink

Unknown interpreted text role "ref".

Also, since `c:type:PyTypeObject` is not part of the :ref:`stable ABI <stable>`, any extension modules using static types must be compiled for a specific Python minor version.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2057); backlink

Unknown interpreted text role "c:type".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2057); backlink

Unknown interpreted text role "ref".

Heap Types

An alternative to :ref:`static types <static-types>` is *heap-allocated types*, or *heap types* for short, which correspond closely to classes created by Python's `class` statement. Heap types have the `const:Py_TPFLAGS_HEAPTYPE` flag set.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2067); backlink

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2067); [backlink](#)

Unknown interpreted text role "const".

This is done by filling a `x:type:'PyType_Spec'` structure and calling `x:func:'PyType_FromSpec'`, `x:func:'PyType_FromSpecWithBases'`, or `x:func:'PyType_FromModuleAndSpec'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2072); [backlink](#)

Unknown interpreted text role "ctype".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2072); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2072); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2072); [backlink](#)

Unknown interpreted text role "c:func".

Number Object Structures

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2082)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Amaury Forgeot d'Arc
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2085)

Unknown directive type "ctype".

```
.. c:type:: PyNumberMethods
```

This structure holds pointers to the functions which an object uses to implement the number protocol. Each function is used by the function of similar name documented in the `:ref:`number`` section.

```
.. XXX Drop the definition?
```

Here is the structure definition::

```
typedef struct {
    binaryfunc nb_add;
    binaryfunc nb_subtract;
    binaryfunc nb_multiply;
    binaryfunc nb_remainder;
    binaryfunc nb_divmod;
    ternaryfunc nb_power;
    unaryfunc nb_negative;
    unaryfunc nb_positive;
    unaryfunc nb_absolute;
    inquiry nb_bool;
    unaryfunc nb_invert;
    binaryfunc nb_lshift;
    binaryfunc nb_rshift;
    binaryfunc nb_and;
    binaryfunc nb_xor;
    binaryfunc nb_or;
    unaryfunc nb_int;
    void *nb_reserved;
    unaryfunc nb_float;

    binaryfunc nb_inplace_add;
    binaryfunc nb_inplace_subtract;
    binaryfunc nb_inplace_multiply;
    binaryfunc nb_inplace_remainder;
    ternaryfunc nb_inplace_power;
    binaryfunc nb_inplace_lshift;
    binaryfunc nb_inplace_rshift;
    binaryfunc nb_inplace_and;
    binaryfunc nb_inplace_xor;
    binaryfunc nb_inplace_or;

    binaryfunc nb_floor_divide;
    binaryfunc nb_true_divide;
    binaryfunc nb_inplace_floor_divide;
    binaryfunc nb_inplace_true_divide;

    unaryfunc nb_index;

    binaryfunc nb_matrix_multiply;
    binaryfunc nb_inplace_matrix_multiply;
} PyNumberMethods;

.. note::
```

Binary and ternary functions must check the type of all their operands, and implement the necessary conversions (at least one of the operands is an instance of the defined type). If the operation is not defined for the given operands, binary and ternary functions must return ``Py_NotImplemented``, if another error occurred they must return ``NULL`` and set an exception.

.. note::

The `:c:data:'nb_reserved'` field should always be ``NULL``. It was previously called `:c:data:'nb_long'`, and was renamed in Python 3.0.1.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2153)

Unknown directive type "c:member".

.. c:member:: binaryfunc PyNumberMethods.nb_add

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2154)

Unknown directive type "c:member".

.. c:member:: binaryfunc PyNumberMethods.nb_subtract

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2155)

Unknown directive type "c:member".

.. c:member:: binaryfunc PyNumberMethods.nb_multiply

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2156)

Unknown directive type "c:member".

.. c:member:: binaryfunc PyNumberMethods.nb_remainder

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2157)

Unknown directive type "c:member".

.. c:member:: binaryfunc PyNumberMethods.nb_divmod

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2158)

Unknown directive type "c:member".

.. c:member:: ternaryfunc PyNumberMethods.nb_power

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2159)

Unknown directive type "c:member".

.. c:member:: unaryfunc PyNumberMethods.nb_negative

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2160)

Unknown directive type "c:member".

.. c:member:: unaryfunc PyNumberMethods.nb_positive

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2161)

Unknown directive type "c:member".

.. c:member:: unaryfunc PyNumberMethods.nb_absolute

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2162)

Unknown directive type "c:member".

.. c:member:: inquiry PyNumberMethods.nb_bool

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2163)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyNumberMethods.nb_invert
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2164)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_lshift
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2165)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_rshift
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2166)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_and
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2167)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_xor
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2168)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_or
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2169)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyNumberMethods.nb_int
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2170)

Unknown directive type "c:member".

```
.. c:member:: void *PyNumberMethods.nb_reserved
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2171)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyNumberMethods.nb_float
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2172)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_add
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2173)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_subtract
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2174)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_multiply
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2175)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_remainder
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2176)

Unknown directive type "c:member".

```
.. c:member:: ternaryfunc PyNumberMethods.nb_inplace_power
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2177)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_lshift
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2178)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_rshift
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2179)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_and
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2180)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_xor
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2181)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_or
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2182)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_floor_divide
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2183)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_true_divide
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2184)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_floor_divide
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2185)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_true_divide
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2186)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyNumberMethods.nb_index
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2187)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_matrix_multiply
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2188)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyNumberMethods.nb_inplace_matrix_multiply
```

Mapping Object Structures

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2196)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Amaury Forgeot d'Arc
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2199)

Unknown directive type "c:type".

```
.. c:type:: PyMappingMethods
```

This structure holds pointers to the functions which an object uses to implement the mapping protocol. It has three members:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2204)

Unknown directive type "c:member".

```
.. c:member:: lenfunc PyMappingMethods.mp_length
```

This function is used by :c:func:`PyMapping_Size` and :c:func:`PyObject_Size`, and has the same signature. This slot may be set to ``NULL`` if the object has no defined length.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2210)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PyMappingMethods.mp_subscript
```

This function is used by :c:func:`PyObject_GetItem` and :c:func:`PySequence_GetSlice`, and has the same signature as :c:func:`!PyObject_GetItem`. This slot must be filled for the :c:func:`PyMapping_Check` function to return ``1``, it can be ``NULL`` otherwise.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2218)

Unknown directive type "c:member".

```
.. c:member:: objobjargproc PyMappingMethods.mp_ass_subscript
```

This function is used by :c:func:`PyObject_SetItem`, :c:func:`PyObject_DelItem`, :c:func:`PyObject_SetSlice` and :c:func:`PyObject_DelSlice`. It has the same signature as :c:func:`!PyObject_SetItem`, but *v* can also be set to ``NULL`` to delete an item. If this slot is ``NULL``, the object does not support item assignment and deletion.

Sequence Object Structures

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2233)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Amaury Forgeot d'Arc
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2236)

Unknown directive type "c:type".

```
.. c:type:: PySequenceMethods
```

This structure holds pointers to the functions which an object uses to implement the sequence protocol.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2241)

Unknown directive type "c:member".

```
.. c:member:: lenfunc PySequenceMethods.sq_length
```

This function is used by :c:func:`PySequence_Size` and :c:func:`PyObject_Size`, and has the same signature. It is also used for handling negative indices via the :c:member:`~PySequenceMethods.sq_item` and the :c:member:`~PySequenceMethods.sq_ass_item` slots.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2248)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PySequenceMethods.sq_concat
```

This function is used by :c:func:`PySequence_Concat` and has the same signature. It is also used by the ``+`` operator, after trying the numeric addition via the :c:member:`~PyNumberMethods.nb_add` slot.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2254)

Unknown directive type "c:member".

```
.. c:member:: ssizeargfunc PySequenceMethods.sq_repeat
```

This function is used by :c:func:`PySequence_Repeat` and has the same signature. It is also used by the ``*`` operator, after trying numeric multiplication via the :c:member:`~PyNumberMethods.nb_multiply` slot.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2260)

Unknown directive type "c:member".

```
.. c:member:: ssizeargfunc PySequenceMethods.sq_item
```

This function is used by :c:func:`PySequence_GetItem` and has the same signature. It is also used by :c:func:`PyObject_GetItem`, after trying the subscription via the :c:member:`~PyMappingMethods.mp_subscript` slot. This slot must be filled for the :c:func:`PySequence_Check` function to return ``1``, it can be ``NULL`` otherwise.

Negative indexes are handled as follows: if the :attr:`sq_length` slot is filled, it is called and the sequence length is used to compute a positive index which is passed to :attr:`sq_item`. If :attr:`sq_length` is ``NULL``, the index is passed as is to the function.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2273)

Unknown directive type "c:member".

```
.. c:member:: ssizeobjargproc PySequenceMethods.sq_ass_item
```

This function is used by :c:func:`PySequence_SetItem` and has the same signature. It is also used by :c:func:`PyObject_SetItem` and :c:func:`PyObject_DelItem`, after trying the item assignment and deletion via the :c:member:`~PyMappingMethods.mp_ass_subscript` slot. This slot may be left to ``NULL`` if the object does not support item assignment and deletion.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2282)

Unknown directive type "c:member".

```
.. c:member:: objobjproc PySequenceMethods.sq_contains
```

This function may be used by :c:func:`PySequence_Contains` and has the same signature. This slot may be left to ``NULL``, in this case :c:func:`!PySequence_Contains` simply traverses the sequence until it finds a match.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2289)

Unknown directive type "c:member".

```
.. c:member:: binaryfunc PySequenceMethods.sq_inplace_concat
```

This function is used by :c:func:`PySequence_InPlaceConcat` and has the same signature. It should modify its first operand, and return it. This slot may be left to ``NULL``, in this case :c:func:`!PySequence_InPlaceConcat` will fall back to :c:func:`PySequence_Concat`. It is also used by the augmented assignment ``+=``, after trying numeric in-place addition via the :c:member:`~PyNumberMethods.nb_inplace_add` slot.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2298)

Unknown directive type "c:member".

```
.. c:member:: ssizeargfunc PySequenceMethods.sq_inplace_repeat
```

This function is used by :c:func:`PySequence_InPlaceRepeat` and has the same signature. It should modify its first operand, and return it. This slot may be left to ``NULL``, in this case :c:func:`!PySequence_InPlaceRepeat` will fall back to :c:func:`PySequence_Repeat`. It is also used by the augmented assignment ``*=``, after trying numeric in-place multiplication via the :c:member:`~PyNumberMethods.nb_inplace_multiply` slot.

Buffer Object Structures

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2313)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Greg J. Stein <greg@lyra.org>
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2314)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Benjamin Peterson
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2315)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Stefan Krah
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2317)

Unknown directive type "c:type".

```
.. c:type:: PyBufferProcs
```

This structure holds pointers to the functions required by the :ref:`Buffer protocol <bufferobjects>`. The protocol defines how an exporter object can expose its internal data to consumer objects.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main) [Doc] [c-api] typeobj.rst, line 2323)

Unknown directive type "c:member".

```
.. c:member:: getbufferproc PyBufferProcs.bf_getbuffer
```

The signature of this function is::

```
int (PyObject *exporter, Py_buffer *view, int flags);
```

Handle a request to *exporter* to fill in *view* as specified by *flags*. Except for point (3), an implementation of this function MUST take these steps:

- (1) Check if the request can be met. If not, raise :c:data:`PyExc_BufferError`, set :c:data:`view->obj` to ``NULL`` and return ``-1``.
- (2) Fill in the requested fields.
- (3) Increment an internal counter for the number of exports.
- (4) Set :c:data:`view->obj` to *exporter* and increment :c:data:`view->obj`.
- (5) Return ``0``.

If *exporter* is part of a chain or tree of buffer providers, two main schemes can be used:

- * Re-export: Each member of the tree acts as the exporting object and sets :c:data:`view->obj` to a new reference to itself.
- * Redirect: The buffer request is redirected to the root object of the tree. Here, :c:data:`view->obj` will be a new reference to the root object.

The individual fields of *view* are described in section :ref:`Buffer structure <buffer-structure>`, the rules how an exporter must react to specific requests are in section :ref:`Buffer request types <buffer-request-types>`.

All memory pointed to in the :c:type:`Py_buffer` structure belongs to the exporter and must remain valid until there are no consumers left. :c:member:`~Py_buffer.format`, :c:member:`~Py_buffer.shape`, :c:member:`~Py_buffer.strides`, :c:member:`~Py_buffer.suboffsets` and :c:member:`~Py_buffer.internal` are read-only for the consumer.

```
:c:func:`PyBuffer_FillInfo` provides an easy way of exposing a simple
bytes buffer while dealing correctly with all request types.

:c:func:`PyObject_GetBuffer` is the interface for the consumer that
wraps this function.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 2372)

Unknown directive type "c:member".

```
.. c:member:: releasebufferproc PyBufferProcs.bf_releasebuffer
```

The signature of this function is::

```
void (PyObject *exporter, Py_buffer *view);
```

Handle a request to release the resources of the buffer. If no resources need to be released, :c:member:`PyBufferProcs.bf_releasebuffer` may be ``NULL``. Otherwise, a standard implementation of this function will take these optional steps:

(1) Decrement an internal counter for the number of exports.

(2) If the counter is ``0``, free all memory associated with *view*.

The exporter MUST use the :c:member:`~Py_buffer.internal` field to keep track of buffer-specific resources. This field is guaranteed to remain constant, while a consumer MAY pass a copy of the original buffer as the *view* argument.

This function MUST NOT decrement :c:data:`view->obj`, since that is done automatically in :c:func:`PyBuffer_Release` (this scheme is useful for breaking reference cycles).

:c:func:`PyBuffer_Release` is the interface for the consumer that wraps this function.

Async Object Structures

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 2408)

Unknown directive type "sectionauthor".

```
.. sectionauthor:: Yury Selivanov <ysselivanov@sprymix.com>
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 2410)

Unknown directive type "versionadded".

```
.. versionadded:: 3.5
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 2412)

Unknown directive type "c:type".

```
.. c:type:: PyAsyncMethods
```

This structure holds pointers to the functions required to implement :term:`awaitable` and :term:`asynchronous iterator` objects.

Here is the structure definition::

```
typedef struct {
    unaryfunc am_await;
    unaryfunc am_aiter;
    unaryfunc am_anext;
    sendfunc am_send;
} PyAsyncMethods;
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 2426)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyAsyncMethods.am_await
```

The signature of this function is::

```
PyObject *am_await(PyObject *self);
```

The returned object must be an :term:`iterator`, i.e. :c:func:`PyIter_Check` must return ``1`` for it.

This slot may be set to ``NULL`` if an object is not an :term:`awaitable`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main\Doc[c-api]typeobj.rst, line 2437)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyAsyncMethods.am_aiter

The signature of this function is::

    PyObject *am_aiter(PyObject *self);

Must return an :term:`asynchronous iterator` object.
See :meth:`__anext__` for details.

This slot may be set to ``NULL`` if an object does not implement
asynchronous iteration protocol.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2449)

Unknown directive type "c:member".

```
.. c:member:: unaryfunc PyAsyncMethods.am_anext

The signature of this function is::

    PyObject *am_anext(PyObject *self);

Must return an :term:`awaitable` object. See :meth:`__anext__` for details.
This slot may be set to ``NULL``.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2458)

Unknown directive type "c:member".

```
.. c:member:: sendfunc PyAsyncMethods.am_send

The signature of this function is::

    PySendResult am_send(PyObject *self, PyObject *arg, PyObject **result);

See :c:func:`PyIter_Send` for details.
This slot may be set to ``NULL``.

.. versionadded:: 3.10
```

Slot Type typedefs

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2475)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*allocfunc) (PyTypeObject *cls, Py_ssize_t nitems)

The purpose of this function is to separate memory allocation from memory
initialization. It should return a pointer to a block of memory of adequate
length for the instance, suitably aligned, and initialized to zeros, but with
:attr:`ob_refcnt` set to ``1`` and :attr:`ob_type` set to the type argument. If
the type's :c:member:`~PyTypeObject.tp_itemsize` is non-zero, the object's :attr:`ob_size` field
should be initialized to *nitems* and the length of the allocated memory block
should be ``tp_basicsize + nitems*tp_itemsize``, rounded up to a multiple of
``sizeof(void*)``; otherwise, *nitems* is not used and the length of the block
should be :c:member:`~PyTypeObject.tp_basicsize`.

This function should not do any other instance initialization, not even to
allocate additional memory; that should be done by :c:member:`~PyTypeObject.tp_new`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2490)

Unknown directive type "c:type".

```
.. c:type:: void (*destructor) (PyObject *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2492)

Unknown directive type "c:type".

```
.. c:type:: void (*freefunc) (void *)

See :c:member:`~PyTypeObject.tp_free`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2496)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*newfunc) (PyObject *, PyObject *, PyObject *)

See :c:member:`~PyTypeObject.tp_new`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2500)

Unknown directive type "c:type".

```
.. c:type:: int (*initproc) (PyObject *, PyObject *, PyObject *)

See :c:member:`~PyTypeObject.tp_init`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2504)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*reprfunc) (PyObject *)

See :c:member:`~PyTypeObject.tp_repr`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2508)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*getattrfunc) (PyObject *self, char *attr)

Return the value of the named attribute for the object.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2512)

Unknown directive type "c:type".

```
.. c:type:: int (*setattrfunc) (PyObject *self, char *attr, PyObject *value)

Set the value of the named attribute for the object.
The value argument is set to ``NULL`` to delete the attribute.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2517)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*getattrofunc) (PyObject *self, PyObject *attr)

Return the value of the named attribute for the object.

See :c:member:`~PyTypeObject.tp_getattro`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2523)

Unknown directive type "c:type".

```
.. c:type:: int (*setattrofunc) (PyObject *self, PyObject *attr, PyObject *value)

Set the value of the named attribute for the object.
The value argument is set to ``NULL`` to delete the attribute.

See :c:member:`~PyTypeObject.tp_setattro`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2530)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*descrgetfunc) (PyObject *, PyObject *, PyObject *)

See :c:member:`~PyTypeObject.tp_descrget`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2534)

Unknown directive type "c:type".

```
.. c:type:: int (*descrsetfunc) (PyObject *, PyObject *, PyObject *)

See :c:member:`~PyTypeObject.tp_descrset`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2538)

Unknown directive type "c:type".

```
.. c:type:: Py_hash_t (*hashfunc) (PyObject *)

See :c:member:`~PyTypeObject.tp_hash`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2542)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*richcmpfunc) (PyObject *, PyObject *, int)

See :c:member:`~PyTypeObject.tp_richcompare`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2546)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*getiterfunc) (PyObject *)

See :c:member:`~PyTypeObject.tp_iter`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2550)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*iternextfunc) (PyObject *)

See :c:member:`~PyTypeObject.tp_iternext`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2554)

Unknown directive type "c:type".

```
.. c:type:: Py_ssize_t (*lenfunc) (PyObject *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2556)

Unknown directive type "c:type".

```
.. c:type:: int (*getbufferproc) (PyObject *, Py_buffer *, int)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2558)

Unknown directive type "c:type".

```
.. c:type:: void (*releasebufferproc) (PyObject *, Py_buffer *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2560)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*unaryfunc) (PyObject *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2562)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*binaryfunc) (PyObject *, PyObject *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2564)

Unknown directive type "c:type".

```
.. c:type:: PySendResult (*sendfunc) (PyObject *, PyObject *, PyObject **)

See :c:member:`~PyAsyncMethods.am_send`.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2568)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*ternaryfunc) (PyObject *, PyObject *, PyObject *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2570)

Unknown directive type "c:type".

```
.. c:type:: PyObject *(*ssizeargfunc) (PyObject *, Py_ssize_t)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2572)

Unknown directive type "c:type".

```
.. c:type:: int (*ssizeobjargproc) (PyObject *, Py_ssize_t)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2574)

Unknown directive type "ctype".

```
.. ctype:: int (*objobjproc)(PyObject *, PyObject *)
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2576)

Unknown directive type "ctype".

```
.. ctype:: int (*objobjargproc)(PyObject *, PyObject *, PyObject *)
```

Examples

The following are simple examples of Python type definitions. They include common usage you may encounter. Some demonstrate tricky corner cases. For more examples, practical info, and a tutorial, see [:ref: defining-new-types](#) and [:ref: new-types-topics](#).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2584); backlink

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2584); backlink

Unknown interpreted text role "ref".

A basic [:ref: static type <static-types>](#):

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\cpython-main [Doc] [c-api] typeobj.rst, line 2589); backlink

Unknown interpreted text role "ref".

```
typedef struct {
    PyObject_HEAD
    const char *data;
} PyObject;

static PyTypeObject PyObject_Type = {
    PyVarObject_HEAD_INIT(NULL, 0)
    .tp_name = "mymod.MyObject",
    .tp_basicsize = sizeof(MyObject),
    .tp_doc = "My objects",
    .tp_new = myobj_new,
    .tp_dealloc = (destructor)myobj_dealloc,
    .tp_repr = (reprfunc)myobj_repr,
};
```

You may also find older code (especially in the CPython code base) with a more verbose initializer:

```
static PyTypeObject PyObject_Type = {
    PyVarObject_HEAD_INIT(NULL, 0)
    "mymod.MyObject", /* tp_name */
    sizeof(MyObject), /* tp_basicsize */
    0, /* tp_itemsize */
    (destructor)myobj_dealloc, /* tp_dealloc */
    0, /* tp_vectorcall_offset */
    0, /* tp_getattr */
    0, /* tp_setattr */
    0, /* tp_as_async */
    (reprfunc)myobj_repr, /* tp_repr */
    0, /* tp_as_number */
    0, /* tp_as_sequence */
    0, /* tp_as_mapping */
    0, /* tp_hash */
    0, /* tp_call */
    0, /* tp_str */
    0, /* tp_getattro */
    0, /* tp_setattro */
    0, /* tp_as_buffer */
    0, /* tp_flags */
    "My objects", /* tp_doc */
    0, /* tp_traverse */
    0, /* tp_clear */
    0, /* tp_richcompare */
    0, /* tp_weaklistoffset */
    0, /* tp_iter */
    0, /* tp_iternext */
    0, /* tp_methods */
    0, /* tp_members */
    0, /* tp_getset */
    0, /* tp_base */
    0, /* tp_dict */
    0, /* tp_descr_get */
    0, /* tp_descr_set */
    0, /* tp_dictoffset */
    0, /* tp_init */
    0, /* tp_alloc */
    myobj_new, /* tp_new */
};
```

A type that supports weakrefs, instance dicts, and hashing:

```
typedef struct {
```

```

PyObject_HEAD
const char *data;
PyObject *inst_dict;
PyObject *weakreflist;
} PyObject;

static PyTypeObject PyObject_Type = {
    PyVarObject_HEAD_INIT(NULL, 0)
    .tp_name = "mymod.MyObject",
    .tp_basicsize = sizeof(MyObject),
    .tp_doc = "My objects",
    .tp_weaklistoffset = offsetof(MyObject, weakreflist),
    .tp_dictoffset = offsetof(MyObject, inst_dict),
    .tp_flags = Py_TPFLAGS_DEFAULT | Py_TPFLAGS_BASETYPE | Py_TPFLAGS_HAVE_GC,
    .tp_new = myobj_new,
    .tp_traverse = (traverseproc)myobj_traverse,
    .tp_clear = (inquiry)myobj_clear,
    .tp_alloc = PyType_GenericNew,
    .tp_dealloc = (destructor)myobj_dealloc,
    .tp_repr = (reprfunc)myobj_repr,
    .tp_hash = (hashfunc)myobj_hash,
    .tp_richcompare = PyBaseObject_Type.tp_richcompare,
};

```

A str subclass that cannot be subclassed and cannot be called to create instances (e.g. uses a separate factory func) using `Py_TPFLAGS_DISALLOW_INSTANTIATION` flag:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2677); [backlink](#)

Unknown interpreted text role "cdata".

```

typedef struct {
    PyUnicodeObject raw;
    char *extra;
} MyStr;

static PyTypeObject MyStr_Type = {
    PyVarObject_HEAD_INIT(NULL, 0)
    .tp_name = "mymod.MyStr",
    .tp_basicsize = sizeof(MyStr),
    .tp_base = NULL, // set to &PyUnicode_Type in module init
    .tp_doc = "my custom str",
    .tp_flags = Py_TPFLAGS_DEFAULT | Py_TPFLAGS_DISALLOW_INSTANTIATION,
    .tp_repr = (reprfunc)myobj_repr,
};

```

The simplest `ref` static type `<static-types>` with fixed-length instances:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2696); [backlink](#)

Unknown interpreted text role "ref".

```

typedef struct {
    PyObject_HEAD
} PyObject;

static PyTypeObject PyObject_Type = {
    PyVarObject_HEAD_INIT(NULL, 0)
    .tp_name = "mymod.MyObject",
};

```

The simplest `ref` static type `<static-types>` with variable-length instances:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\c-api\[cpython-main] [Doc] [c-api] typeobj.rst, line 2707); [backlink](#)

Unknown interpreted text role "ref".

```

typedef struct {
    PyObject_VAR_HEAD
    const char *data[1];
} PyObject;

static PyTypeObject PyObject_Type = {
    PyVarObject_HEAD_INIT(NULL, 0)
    .tp_name = "mymod.MyObject",
    .tp_basicsize = sizeof(MyObject) - sizeof(char *),
    .tp_itemsize = sizeof(char *),
};

```