:mod:`mmap` --- Memory-mapped file support

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 1); *backlink*

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 4)

Unknown directive type "module".

```
.. module:: mmap
   :synopsis: Interface to memory-mapped files for Unix and Windows.
```

Memory-mapped file objects behave like both :class:`bytearray` and like :term:`file objects <file object>`. You can use mmap objects in most places where :class:`bytearray` are expected; for example, you can use the :mod:`re` module to search through a memory-mapped file. You can also change a single byte by doing `obj[index] = 97`, or change a subsequence by assigning to a slice: `obj[i1:i2] = b'...'`. You can also read and write data starting at the current file position, and :meth:`seek` through the file to different positions.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 9); *backlink*

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 9); *backlink*

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 9); *backlink*

Unknown interpreted text role "class".

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Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 9); *backlink*

Unknown interpreted text role "meth".

A memory-mapped file is created by the :class:`~mmap.mmap` constructor, which is different on Unix and on Windows. In either case you must provide a file descriptor for a file opened for update. If you wish to map an existing Python file object, use its :meth:`fileno` method to obtain the correct value for the *fileno* parameter. Otherwise, you can open the file using the :func:`os.open` function, which returns a file descriptor directly (the file still needs to be closed when done).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 17); *backlink*

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 17); *backlink*

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 17); *backlink*

Unknown interpreted text role "func".

Note

If you want to create a memory-mapping for a writable, buffered file, you should :func:`~io.IOBase.flush` the file first. This is necessary to ensure that local modifications to the buffers are actually available to the mapping.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 26); *backlink*

Unknown interpreted text role "func".

For both the Unix and Windows versions of the constructor, *access* may be specified as an optional keyword parameter. *access* accepts one of four values: :const:`ACCESS_READ`, :const:`ACCESS_WRITE`, or :const:`ACCESS_COPY` to specify read-only, write-through or copy-on-write memory respectively, or :const:`ACCESS_DEFAULT` to defer to *prot*. *access* can be used on both Unix and Windows. If *access* is not specified, Windows mmap returns a write-through mapping. The initial memory values for all three access types are taken from the specified file. Assignment to an :const:`ACCESS_READ` memory map raises a

:exc:`TypeError` exception. Assignment to an :const:`ACCESS_WRITE` memory map affects both memory and the underlying file. Assignment to an :const:`ACCESS_COPY` memory map affects memory but does not update the underlying file.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "exc".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 31); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 44)

Unknown directive type "versionchanged".

```
.. versionchanged:: 3.7
   Added :const:`ACCESS_DEFAULT` constant.
```

To map anonymous memory, -1 should be passed as the fileno along with the length.

(Windows version) Maps *length* bytes from the file specified by the file handle *fileno*, and creates a mmap object. If *length* is larger than the current size of the file, the file is extended to contain *length* bytes. If *length* is `0`, the maximum length of the map is the current size of the file, except that if the file is empty Windows raises an exception (you cannot create an empty mapping on Windows).

tagname, if specified and not `None`, is a string giving a tag name for the mapping. Windows allows you to have many different mappings against the same file. If you specify the name of an existing tag, that tag is opened, otherwise a new tag of this name is created. If this parameter is omitted or `None`, the mapping is created without a name. Avoiding the use of the tag parameter will assist in keeping your code portable between Unix and Windows.

offset may be specified as a non-negative integer offset. mmap references will be relative to the offset from the beginning of the file. *offset* defaults to 0. *offset* must be a multiple of the :const:`ALLOCATIONGRANULARITY`.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 66); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 70)

Unknown directive type "audit-event".

```
.. audit-event:: mmap.__new__ fileno,length,access,offset mmap.mmap
```

(Unix version) Maps *length* bytes from the file specified by the file descriptor *fileno*, and returns a mmap object. If *length* is `0`, the maximum length of the map will be the current size of the file when :class:`~mmap.mmap` is called.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst`, line 75); *backlink*

Unknown interpreted text role "class".

flags specifies the nature of the mapping. :const:`MAP_PRIVATE` creates a private copy-on-write mapping, so changes to the

contents of the mmap object will be private to this process, and :const:`MAP_SHARED` creates a mapping that's shared with all other processes mapping the same areas of the file. The default value is :const:`MAP_SHARED`. Some systems have additional possible flags with the full list specified in :ref:`MAP_* constants <map-constants>`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 80); backlink

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 80); backlink

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 80); backlink

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 80); backlink

Unknown interpreted text role "ref".

prot, if specified, gives the desired memory protection; the two most useful values are :const:`PROT_READ` and :const:`PROT_WRITE`, to specify that the pages may be read or written. *prot* defaults to :const:`PROT_READ \| PROT_WRITE`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 88); backlink

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 88); backlink

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 88); backlink

Unknown interpreted text role "const".

access may be specified in lieu of *flags* and *prot* as an optional keyword parameter. It is an error to specify both *flags*, *prot* and *access*. See the description of *access* above for information on how to use this parameter.

offset may be specified as a non-negative integer offset. mmap references will be relative to the offset from the beginning of the file. *offset* defaults to 0. *offset* must be a multiple of :const:`ALLOCATIONGRANULARITY` which is equal to :const:`PAGESIZE` on Unix systems.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 98); backlink

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 98); backlink

Unknown interpreted text role "const".

To ensure validity of the created memory mapping the file specified by the descriptor *fileno* is internally automatically synchronized with physical backing store on macOS and OpenVMS.

This example shows a simple way of using :class:`~mmap.mmap`:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 107); backlink

Unknown interpreted text role "class".

```
import mmap

# write a simple example file
with open("hello.txt", "wb") as f:
    f.write(b"Hello Python!\n")

with open("hello.txt", "r+b") as f:
    # memory-map the file, size 0 means whole file
    mm = mmap.mmap(f.fileno(), 0)
    # read content via standard file methods
    print(mm.readline())  # prints b"Hello Python!\n"
    # read content via slice notation
    print(mm[:5])  # prints b"Hello"
    # update content using slice notation;
    # note that new content must have same size
    mm[6:] = b" world!\n"
    # ... and read again using standard file methods
    mm.seek(0)
    print(mm.readline())  # prints b"Hello  world!\n"
    # close the map
    mm.close()
```

:class:`~mmap.mmap` can also be used as a context manager in a :keyword:`with` statement:

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Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 132); *backlink*

Unknown interpreted text role "keyword".

```
import mmap

with mmap.mmap(-1, 13) as mm:
    mm.write(b"Hello world!")
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 140)

Unknown directive type "versionadded".

```
.. versionadded:: 3.2
   Context manager support.
```

The next example demonstrates how to create an anonymous map and exchange data between the parent and child processes:

```
import mmap
import os

mm = mmap.mmap(-1, 13)
mm.write(b"Hello world!")

pid = os.fork()

if pid == 0:  # In a child process
    mm.seek(0)
    print(mm.readline())

    mm.close()
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 161)

Unknown directive type "audit-event".

```
.. audit-event:: mmap.__new__ fileno,length,access,offset mmap.mmap
```

Memory-mapped file objects support the following methods:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 165)

Unknown directive type "method".

```
.. method:: close()

   Closes the mmap. Subsequent calls to other methods of the object will
   result in a ValueError exception being raised. This will not close
   the open file.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 172)

Unknown directive type "attribute".

```
.. attribute:: closed

   ``True`` if the file is closed.

   .. versionadded:: 3.2
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 179)

Unknown directive type "method".

```
.. method:: find(sub[, start[, end]])

   Returns the lowest index in the object where the subsequence *sub* is
   found, such that *sub* is contained in the range [*start*, *end*].
   Optional arguments *start* and *end* are interpreted as in slice notation.
   Returns ``-1`` on failure.

   .. versionchanged:: 3.5
      Writable :term:`bytes-like object` is now accepted.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 190)

Unknown directive type "method".

```
.. method:: flush([offset[, size]])

   Flushes changes made to the in-memory copy of a file back to disk. Without
   use of this call there is no guarantee that changes are written back before
   the object is destroyed.  If *offset* and *size* are specified, only
   changes to the given range of bytes will be flushed to disk; otherwise, the
   whole extent of the mapping is flushed.  *offset* must be a multiple of the
   :const:`PAGESIZE` or :const:`ALLOCATIONGRANULARITY`.

   ``None`` is returned to indicate success.  An exception is raised when the
   call failed.

   .. versionchanged:: 3.8
      Previously, a nonzero value was returned on success; zero was returned
      on error under Windows.  A zero value was returned on success; an
      exception was raised on error under Unix.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 208)

Unknown directive type "method".

```
.. method:: madvise(option[, start[, length]])

   Send advice *option* to the kernel about the memory region beginning at
   *start* and extending *length* bytes.  *option* must be one of the
   :ref:`MADV_* constants <madvise-constants>` available on the system.  If
   *start* and *length* are omitted, the entire mapping is spanned.  On
   some systems (including Linux), *start* must be a multiple of the
   :const:`PAGESIZE`.

   Availability: Systems with the ``madvise()`` system call.

   .. versionadded:: 3.8
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 222)

Unknown directive type "method".

```
.. method:: move(dest, src, count)

   Copy the *count* bytes starting at offset *src* to the destination index
   *dest*.  If the mmap was created with :const:`ACCESS_READ`, then calls to
   move will raise a :exc:`TypeError` exception.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 229)

Unknown directive type "method".

```
.. method:: read([n])

   Return a :class:`bytes` containing up to *n* bytes starting from the
   current file position. If the argument is omitted, ``None`` or negative,
   return all bytes from the current file position to the end of the
   mapping. The file position is updated to point after the bytes that were
   returned.

   .. versionchanged:: 3.3
      Argument can be omitted or ``None``.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 240)

Unknown directive type "method".

```
.. method:: read_byte()

   Returns a byte at the current file position as an integer, and advances
   the file position by 1.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 246)

Unknown directive type "method".

```
.. method:: readline()

   Returns a single line, starting at the current file position and up to the
   next newline. The file position is updated to point after the bytes that were
   returned.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 253)

Unknown directive type "method".

```
.. method:: resize(newsize)

   Resizes the map and the underlying file, if any. If the mmap was created
```

```
   with :const:`ACCESS_READ` or :const:`ACCESS_COPY`, resizing the map will
   raise a :exc:`TypeError` exception.

   **On Windows**: Resizing the map will raise an :exc:`OSError` if there are other
   maps against the same named file. Resizing an anonymous map (ie against the
   pagefile) will silently create a new map with the original data copied over
   up to the length of the new size.

   .. versionchanged:: 3.11
      Correctly fails if attempting to resize when another map is held
      Allows resize against an anonymous map on Windows
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 268)

Unknown directive type "method".

```
.. method:: rfind(sub[, start[, end]])

   Returns the highest index in the object where the subsequence *sub* is
   found, such that *sub* is contained in the range [*start*, *end*].
   Optional arguments *start* and *end* are interpreted as in slice notation.
   Returns ``-1`` on failure.

   .. versionchanged:: 3.5
      Writable :term:`bytes-like object` is now accepted.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 279)

Unknown directive type "method".

```
.. method:: seek(pos[, whence])

   Set the file's current position.  *whence* argument is optional and
   defaults to ``os.SEEK_SET`` or ``0`` (absolute file positioning); other
   values are ``os.SEEK_CUR`` or ``1`` (seek relative to the current
   position) and ``os.SEEK_END`` or ``2`` (seek relative to the file's end).
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 287)

Unknown directive type "method".

```
.. method:: size()

   Return the length of the file, which can be larger than the size of the
   memory-mapped area.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 293)

Unknown directive type "method".

```
.. method:: tell()

   Returns the current position of the file pointer.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 298)

Unknown directive type "method".

```
.. method:: write(bytes)

   Write the bytes in *bytes* into memory at the current position of the
   file pointer and return the number of bytes written (never less than
   ``len(bytes)``, since if the write fails, a :exc:`ValueError` will be
   raised).  The file position is updated to point after the bytes that
   were written.  If the mmap was created with :const:`ACCESS_READ`, then
   writing to it will raise a :exc:`TypeError` exception.

   .. versionchanged:: 3.5
      Writable :term:`bytes-like object` is now accepted.

   .. versionchanged:: 3.6
      The number of bytes written is now returned.
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 314)

Unknown directive type "method".

```
.. method:: write_byte(byte)

   Write the integer *byte* into memory at the current
   position of the file pointer; the file position is advanced by ``1``. If
   the mmap was created with :const:`ACCESS_READ`, then writing to it will
   raise a :exc:`TypeError` exception.
```

MADV_* Constants

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 326)

Unknown directive type "data".

```
.. data:: MADV_NORMAL
          MADV_RANDOM
          MADV_SEQUENTIAL
          MADV_WILLNEED
          MADV_DONTNEED
          MADV_REMOVE
          MADV_DONTFORK
          MADV_DOFORK
          MADV_HWPOISON
          MADV_MERGEABLE
          MADV_UNMERGEABLE
          MADV_SOFT_OFFLINE
          MADV_HUGEPAGE
          MADV_NOHUGEPAGE
          MADV_DONTDUMP
          MADV_DODUMP
          MADV_FREE
          MADV_NOSYNC
          MADV_AUTOSYNC
          MADV_NOCORE
          MADV_CORE
          MADV_PROTECT
          MADV_FREE_REUSABLE
          MADV_FREE_REUSE

   These options can be passed to :meth:`mmap.madvise`.  Not every option will
   be present on every system.

   Availability: Systems with the madvise() system call.

   .. versionadded:: 3.8
```

MAP_* Constants

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]mmap.rst, line 363)

Unknown directive type "data".

```
.. data:: MAP_SHARED
          MAP_PRIVATE
          MAP_DENYWRITE
          MAP_EXECUTABLE
          MAP_ANON
          MAP_ANONYMOUS
          MAP_POPULATE
          MAP_STACK

   These are the various flags that can be passed to :meth:`mmap.mmap`. Note that some options might not be presen

   .. versionchanged:: 3.10
      Added MAP_POPULATE constant.

   .. versionadded:: 3.11
      Added MAP_STACK constant.
```