

# :mod:`dis` --- Disassembler for Python bytecode

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

Unknown directive type "module".

```
.. module:: dis
   :synopsis: Disassembler for Python bytecode.
```

**Source code:** :source:`Lib/dis.py`

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 7); [backlink](#)

Unknown interpreted text role "source".

The :mod:`dis` module supports the analysis of CPython :term:`bytecode` by disassembling it. The CPython bytecode which this module takes as an input is defined in the file :file:`Include/opcode.h` and used by the compiler and the interpreter.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 11); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 11); [backlink](#)

Unknown interpreted text role "term".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 11); [backlink](#)

Unknown interpreted text role "file".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 16)

Unknown directive type "impl-detail".

```
.. impl-detail::

    Bytecode is an implementation detail of the CPython interpreter. No
    guarantees are made that bytecode will not be added, removed, or changed
    between versions of Python. Use of this module should not be considered to
    work across Python VMs or Python releases.

.. versionchanged:: 3.6
    Use 2 bytes for each instruction. Previously the number of bytes varied
    by instruction.

.. versionchanged:: 3.11
    Some instructions are accompanied by one or more inline cache entries,
    which take the form of :opcode:`CACHE` instructions. These instructions
    are hidden by default, but can be shown by passing ``show_caches=True`` to
    any :mod:`dis` utility.
```

**Example:** Given the function :func:`myfunc`:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 34); [backlink](#)**

Unknown interpreted text role "func".

```
def myfunc(alist):  
    return len(alist)
```

the following command can be used to display the disassembly of `func`myfunc``:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 39); [backlink](#)**

Unknown interpreted text role "func".

```
>>> dis.dis(myfunc)  
1           0 RESUME                               0  
  
2           2 PUSH_NULL                               1  
           4 LOAD_GLOBAL                             1 (NULL + len)  
           6 LOAD_FAST                               0 (alist)  
           8 PRECALL                                1  
          10 CALL                                  1  
          12 RETURN_VALUE
```

(The "2" is a line number).

## Bytecode analysis

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 57)**

Unknown directive type "versionadded".

```
.. versionadded:: 3.4
```

The bytecode analysis API allows pieces of Python code to be wrapped in a `class`Bytecode`` object that provides easy access to details of the compiled code.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 59); [backlink](#)**

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 63)**

Invalid class attribute value for "class" directive: "Bytecode(x, \*, first\_line=None, current\_offset=None, show\_caches=False)".

```
.. class:: Bytecode(x, *, first_line=None, current_offset=None, show_caches=False)
```

Analyse the bytecode corresponding to a function, generator, asynchronous generator, coroutine, method, string of source code, or a code object (as returned by `func`compile``).

This is a convenience wrapper around many of the functions listed below, most notably `func`get_instructions``, as iterating over a `class`Bytecode`` instance yields the bytecode operations as `class`Instruction`` instances.

If `*first_line*` is not ```None```, it indicates the line number that should be reported for the first source line in the disassembled code. Otherwise, the source line information (if any) is taken directly from the disassembled code object.

If `*current_offset*` is not ```None```, it refers to an instruction offset in the disassembled code. Setting this means `meth`.dis`` will display a "current instruction" marker against the specified opcode.

```
.. classmethod:: from_traceback(tb, *, show_caches=False)
```

Construct a `class`Bytecode`` instance from the given traceback, setting

```

        *current_offset* to the instruction responsible for the exception.

.. data:: codeobj

    The compiled code object.

.. data:: first_line

    The first source line of the code object (if available)

.. method:: dis()

    Return a formatted view of the bytecode operations (the same as printed by
    :func:`dis.dis`, but returned as a multi-line string).

.. method:: info()

    Return a formatted multi-line string with detailed information about the
    code object, like :func:`code_info`.

.. versionchanged:: 3.7
    This can now handle coroutine and asynchronous generator objects.

.. versionchanged:: 3.11
    Added the ``show_caches`` parameter.

```

#### Example:

```

>>> bytecode = dis.Bytecode(myfunc)
>>> for instr in bytecode:
...     print(instr.opname)
...
RESUME
PUSH_NULL
LOAD_GLOBAL
LOAD_FAST
PRECALL
CALL
RETURN_VALUE

```

## Analysis functions

The `mod:dis` module also defines the following analysis functions that convert the input directly to the desired output. They can be useful if only a single operation is being performed, so the intermediate analysis object isn't useful:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 130); [backlink](#)**

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 134)**

Unknown directive type "function".

```

.. function:: code_info(x)

    Return a formatted multi-line string with detailed code object information
    for the supplied function, generator, asynchronous generator, coroutine,
    method, source code string or code object.

    Note that the exact contents of code info strings are highly implementation
    dependent and they may change arbitrarily across Python VMs or Python
    releases.

.. versionadded:: 3.2

.. versionchanged:: 3.7
    This can now handle coroutine and asynchronous generator objects.

```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 150)**

Unknown directive type "function".

```
.. function:: show_code(x, *, file=None)
```

Print detailed code object information for the supplied function, method, source code string or code object to *\*file\** (or `sys.stdout` if *\*file\** is not specified).

This is a convenient shorthand for `print(code_info(x), file=file)`, intended for interactive exploration at the interpreter prompt.

```
.. versionadded:: 3.2
```

```
.. versionchanged:: 3.4
   Added *file* parameter.
```

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

Unknown directive type "function".

```
.. function:: dis(x=None, *, file=None, depth=None, show_caches=False)
```

Disassemble the *\*x\** object. *\*x\** can denote either a module, a class, a method, a function, a generator, an asynchronous generator, a coroutine, a code object, a string of source code or a byte sequence of raw bytecode. For a module, it disassembles all functions. For a class, it disassembles all methods (including class and static methods). For a code object or sequence of raw bytecode, it prints one line per bytecode instruction. It also recursively disassembles nested code objects (the code of comprehensions, generator expressions and nested functions, and the code used for building nested classes). Strings are first compiled to code objects with the `:func:`compile`` built-in function before being disassembled. If no object is provided, this function disassembles the last traceback.

The disassembly is written as text to the supplied *\*file\** argument if provided and to `sys.stdout` otherwise.

The maximal depth of recursion is limited by *\*depth\** unless it is `None`. `depth=0` means no recursion.

```
.. versionchanged:: 3.4
   Added *file* parameter.
```

```
.. versionchanged:: 3.7
   Implemented recursive disassembling and added *depth* parameter.
```

```
.. versionchanged:: 3.7
   This can now handle coroutine and asynchronous generator objects.
```

```
.. versionchanged:: 3.11
   Added the show_caches parameter.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 199)**

Unknown directive type "function".

```
.. function:: distb(tb=None, *, file=None, show_caches=False)
```

Disassemble the top-of-stack function of a traceback, using the last traceback if none was passed. The instruction causing the exception is indicated.

The disassembly is written as text to the supplied *\*file\** argument if provided and to `sys.stdout` otherwise.

```
.. versionchanged:: 3.4
   Added *file* parameter.
```

```
.. versionchanged:: 3.11
   Added the show_caches parameter.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 215)**

Unknown directive type "function".

```
.. function:: disassemble(code, lasti=-1, *, file=None, show_caches=False)
               disco(code, lasti=-1, *, file=None, show_caches=False)
```

Disassemble a code object, indicating the last instruction if *\*lasti\** was provided. The output is divided in the following columns:

- #. the line number, for the first instruction of each line
- #. the current instruction, indicated as ``-->``,
- #. a labelled instruction, indicated with ``>>``,
- #. the address of the instruction,
- #. the operation code name,
- #. operation parameters, and
- #. interpretation of the parameters in parentheses.

The parameter interpretation recognizes local and global variable names, constant values, branch targets, and compare operators.

The disassembly is written as text to the supplied *\*file\** argument if provided and to ``sys.stdout`` otherwise.

```
.. versionchanged:: 3.4
   Added *file* parameter.

.. versionchanged:: 3.11
   Added the ``show_caches`` parameter.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 242)**

Unknown directive type "function".

```
.. function:: get_instructions(x, *, first_line=None, show_caches=False)
```

Return an iterator over the instructions in the supplied function, method, source code string or code object.

The iterator generates a series of `:class:`Instruction`` named tuples giving the details of each operation in the supplied code.

If *\*first\_line\** is not ``None``, it indicates the line number that should be reported for the first source line in the disassembled code. Otherwise, the source line information (if any) is taken directly from the disassembled code object.

```
.. versionadded:: 3.4

.. versionchanged:: 3.11
   Added the ``show_caches`` parameter.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 261)**

Unknown directive type "function".

```
.. function:: findlinestarts(code)
```

This generator function uses the `co_firstlineno` and `co_lnotab` attributes of the code object *\*code\** to find the offsets which are starts of lines in the source code. They are generated as `((offset, lineno))` pairs. See `:source:`Objects/lnotab_notes.txt`` for the `co_lnotab` format and how to decode it.

```
.. versionchanged:: 3.6
   Line numbers can be decreasing. Before, they were always increasing.
```

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

main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 273)

Unknown directive type "function".

```
.. function:: findlabels(code)
```

Detect all offsets in the raw compiled bytecode string *\*code\** which are jump targets, and return a list of these offsets.

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

Unknown directive type "function".

```
.. function:: stack_effect(opcode, oparg=None, *, jump=None)
```

Compute the stack effect of *\*opcode\** with argument *\*oparg\**.

If the code has a jump target and *\*jump\** is ``True``, :func:`~stack\_effect` will return the stack effect of jumping. If *\*jump\** is ``False``, it will return the stack effect of not jumping. And if *\*jump\** is ``None`` (default), it will return the maximal stack effect of both cases.

```
.. versionadded:: 3.4
```

```
.. versionchanged:: 3.8
   Added *jump* parameter.
```

## Python Bytecode Instructions

The :func:`get\_instructions` function and :class:`Bytecode` class provide details of bytecode instructions as :class:`Instruction` instances:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 299); [backlink](#)**

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 299); [backlink](#)**

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 299); [backlink](#)**

Unknown interpreted text role "class".

Details for a bytecode operation

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 306)**

Unknown directive type "data".

```
.. data:: opcode
```

numeric code for operation, corresponding to the opcode values listed below and the bytecode values in the :ref:`opcode\_collections`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 312)**

Unknown directive type "data".

```
.. data:: opcode
```

human readable name for operation

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 317)**

Unknown directive type "data".

```
.. data:: arg
```

numeric argument to operation (if any), otherwise ``None``

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 322)**

Unknown directive type "data".

```
.. data:: argval
```

resolved arg value (if any), otherwise ``None``

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 327)**

Unknown directive type "data".

```
.. data:: argrepr
```

human readable description of operation argument (if any),  
otherwise an empty string.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 333)**

Unknown directive type "data".

```
.. data:: offset
```

start index of operation within bytecode sequence

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 338)**

Unknown directive type "data".

```
.. data:: starts_line
```

line started by this opcode (if any), otherwise ``None``

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 343)**

Unknown directive type "data".

```
.. data:: is_jump_target
```

``True`` if other code jumps to here, otherwise ``False``

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 348)**

Unknown directive type "data".

```
.. data:: positions

: class: `dis.Positions` object holding the
start and end locations that are covered by this instruction.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 353)**

Unknown directive type "versionadded".

```
.. versionadded:: 3.4
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 355)**

Unknown directive type "versionchanged".

```
.. versionchanged:: 3.11

Field ``positions`` is added.
```

In case the information is not available, some fields might be *None*.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 364)**

Unknown directive type "data".

```
.. data:: lineno
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 365)**

Unknown directive type "data".

```
.. data:: end_lineno
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 366)**

Unknown directive type "data".

```
.. data:: col_offset
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 367)**

Unknown directive type "data".

```
.. data:: end_col_offset
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 369)**

Unknown directive type "versionadded".

```
.. versionadded:: 3.11
```

The Python compiler currently generates the following bytecode instructions.

#### General instructions

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



**main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 377)**

Unknown directive type "opcode".

```
.. opcode:: NOP
```

Do nothing code. Used as a placeholder by the bytecode optimizer, and to generate line tracing events.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 383)**

Unknown directive type "opcode".

```
.. opcode:: POP_TOP
```

Removes the top-of-stack (TOS) item.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 388)**

Unknown directive type "opcode".

```
.. opcode:: COPY (i)
```

Push the \*i\*-th item to the top of the stack. The item is not removed from its original location.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 396)**

Unknown directive type "opcode".

```
.. opcode:: SWAP (i)
```

Swap TOS with the item at position \*i\*.

```
.. versionadded:: 3.11
```

## Unary operations

Unary operations take the top of the stack, apply the operation, and push the result back on the stack.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 408)**

Unknown directive type "opcode".

```
.. opcode:: UNARY_POSITIVE
```

Implements ``TOS = +TOS``.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 413)**

Unknown directive type "opcode".

```
.. opcode:: UNARY_NEGATIVE
```

Implements ``TOS = -TOS``.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 418)**

Unknown directive type "opcode".

```
.. opcode:: UNARY_NOT

    Implements ``TOS = not TOS``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 423)**

Unknown directive type "opcode".

```
.. opcode:: UNARY_INVERT

    Implements ``TOS = ~TOS``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 428)**

Unknown directive type "opcode".

```
.. opcode:: GET_ITER

    Implements ``TOS = iter(TOS)``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 433)**

Unknown directive type "opcode".

```
.. opcode:: GET_YIELD_FROM_ITER

    If ``TOS`` is a :term:`generator iterator` or :term:`coroutine` object
    it is left as is. Otherwise, implements ``TOS = iter(TOS)``.

    .. versionadded:: 3.5
```

## Binary and in-place operations

Binary operations remove the top of the stack (TOS) and the second top-most stack item (TOS1) from the stack. They perform the operation, and put the result back on the stack.

In-place operations are like binary operations, in that they remove TOS and TOS1, and push the result back on the stack, but the operation is done in-place when TOS1 supports it, and the resulting TOS may be (but does not have to be) the original TOS1.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 453)**

Unknown directive type "opcode".

```
.. opcode:: BINARY_OP (op)

    Implements the binary and in-place operators (depending on the value of
    *op*).

    .. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 461)**

Unknown directive type "opcode".

```
.. opcode:: BINARY_SUBSCR
```

```
Implements ``TOS = TOS1[TOS]``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 466)**

Unknown directive type "opcode".

```
.. opcode:: STORE_SUBSCR
```

```
Implements ``TOS1[TOS] = TOS2``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 471)**

Unknown directive type "opcode".

```
.. opcode:: DELETE_SUBSCR
```

```
Implements ``del TOS1[TOS]``.
```

## Coroutine opcodes

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 478)**

Unknown directive type "opcode".

```
.. opcode:: GET_AWAITABLE (where)
```

```
Implements ``TOS = get_awaitable(TOS)`` , where ``get_awaitable(o)``  
returns ``o`` if ``o`` is a coroutine object or a generator object with  
the CO_ITERABLE_COROUTINE flag, or resolves  
``o.__await__``.
```

If the ``where`` operand is nonzero, it indicates where the instruction  
occurs:

```
* ``1`` After a call to ``__aenter__``  
* ``2`` After a call to ``__aexit__``
```

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

```
.. versionchanged:: 3.11  
Previously, this instruction did not have an oparg.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 497)**

Unknown directive type "opcode".

```
.. opcode:: GET_AITER
```

```
Implements ``TOS = TOS.__aiter__()``.
```

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

```
.. versionchanged:: 3.7
```

Returning awaitable objects from ``\_\_aiter\_\_`` is no longer  
supported.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 507)**

Unknown directive type "opcode".

```
.. opcode:: GET_ANEXT
```

Implements ``PUSH(get\_awaitable(TOS.\_\_anext\_\_()))``. See ``GET\_AWAITABLE`` for details about ``get\_awaitable``

.. versionadded:: 3.5

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 515)**

Unknown directive type "opcode".

.. opcode:: END\_ASYNC\_FOR

Terminates an :keyword:`async for` loop. Handles an exception raised when awaiting a next item. If TOS is :exc:`StopAsyncIteration` pop 3 values from the stack and restore the exception state using the second of them. Otherwise re-raise the exception using the value from the stack. An exception handler block is removed from the block stack.

.. versionadded:: 3.8

.. versionchanged:: 3.11

Exception representation on the stack now consist of one, not three, items.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 528)**

Unknown directive type "opcode".

.. opcode:: BEFORE\_ASYNC\_WITH

Resolves ``\_\_aenter\_\_`` and ``\_\_aexit\_\_`` from the object on top of the stack. Pushes ``\_\_aexit\_\_`` and result of ``\_\_aenter\_\_()`` to the stack.

.. versionadded:: 3.5

## Miscellaneous opcodes

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 539)**

Unknown directive type "opcode".

.. opcode:: PRINT\_EXPR

Implements the expression statement for the interactive mode. TOS is removed from the stack and printed. In non-interactive mode, an expression statement is terminated with :opcode:`POP\_TOP`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 546)**

Unknown directive type "opcode".

.. opcode:: SET\_ADD (i)

Calls ``set.add(TOS1[-i], TOS)``. Used to implement set comprehensions.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 551)**

Unknown directive type "opcode".

.. opcode:: LIST\_APPEND (i)

Calls ``list.append(TOS1[-i], TOS)``. Used to implement list comprehensions.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 556)**

Unknown directive type "opcode".

```
.. opcode:: MAP_ADD (i)

    Calls ``dict.__setitem__(TOS1[-i], TOS1, TOS)``. Used to implement dict
    comprehensions.

.. versionadded:: 3.1
.. versionchanged:: 3.8
    Map value is TOS and map key is TOS1. Before, those were reversed.
```

For all of the `:opcode:'SET_ADD'`, `:opcode:'LIST_APPEND'` and `:opcode:'MAP_ADD'` instructions, while the added value or key/value pair is popped off, the container object remains on the stack so that it is available for further iterations of the loop.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 565); [backlink](#)**

Unknown interpreted text role "opcode".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 565); [backlink](#)**

Unknown interpreted text role "opcode".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 565); [backlink](#)**

Unknown interpreted text role "opcode".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 571)**

Unknown directive type "opcode".

```
.. opcode:: RETURN_VALUE

    Returns with TOS to the caller of the function.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 576)**

Unknown directive type "opcode".

```
.. opcode:: YIELD_VALUE

    Pops TOS and yields it from a :term:`generator`.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 581)**

Unknown directive type "opcode".

```
.. opcode:: YIELD_FROM

    Pops TOS and delegates to it as a subiterator from a :term:`generator`.

.. versionadded:: 3.3
```

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

**main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 588)**

Unknown directive type "opcode".

```
.. opcode:: SETUP_ANNOTATIONS
```

Checks whether ``\_\_annotations\_\_`` is defined in ``locals()``, if not it is set up to an empty ``dict``. This opcode is only emitted if a class or module body contains :term:`variable annotations` <variable annotation>` statically.

```
.. versionadded:: 3.6
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 598)**

Unknown directive type "opcode".

```
.. opcode:: IMPORT_STAR
```

Loads all symbols not starting with ``'\_`` directly from the module TOS to the local namespace. The module is popped after loading all names. This opcode implements ``from module import \*``.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 605)**

Unknown directive type "opcode".

```
.. opcode:: POP_EXCEPT
```

Pops a value from the stack, which is used to restore the exception state.

```
.. versionchanged:: 3.11
    Exception representation on the stack now consist of one, not three, items.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 612)**

Unknown directive type "opcode".

```
.. opcode:: RERAISE
```

Re-raises the exception currently on top of the stack. If oparg is non-zero, pops an additional value from the stack which is used to set ``f\_lasti`` of the current frame.

```
.. versionadded:: 3.9

.. versionchanged:: 3.11
    Exception representation on the stack now consist of one, not three, items.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 623)**

Unknown directive type "opcode".

```
.. opcode:: PUSH_EXC_INFO
```

Pops a value from the stack. Pushes the current exception to the top of the stack. Pushes the value originally popped back to the stack. Used in exception handlers.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 631)**

Unknown directive type "opcode".

```
.. opcode:: CHECK_EXC_MATCH
```

Performs exception matching for ``except``. Tests whether the TOS1 is an exception matching TOS. Pops TOS and pushes the boolean result of the test.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\cpython-main [Doc] [library]dis.rst, line 638)**

Unknown directive type "opcode".

```
.. opcode:: CHECK_EG_MATCH
```

Performs exception matching for ``except\*``. Applies ``split(TOS)`` on the exception group representing TOS1.

In case of a match, pops two items from the stack and pushes the non-matching subgroup (``None`` in case of full match) followed by the matching subgroup. When there is no match, pops one item (the match type) and pushes ``None``.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\cpython-main [Doc] [library]dis.rst, line 650)**

Unknown directive type "opcode".

```
.. opcode:: PREP_RERAISE_STAR
```

Combines the raised and reraised exceptions list from TOS, into an exception group to propagate from a try-except\* block. Uses the original exception group from TOS1 to reconstruct the structure of reraised exceptions. Pops two items from the stack and pushes the exception to reraise or ``None`` if there isn't one.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\cpython-main [Doc] [library]dis.rst, line 660)**

Unknown directive type "opcode".

```
.. opcode:: WITH_EXCEPT_START
```

Calls the function in position 4 on the stack with arguments (type, val, tb) representing the exception at the top of the stack.

Used to implement the call ``context\_manager.\_\_exit\_\_(\*exc\_info())`` when an exception has occurred in a :keyword:`with` statement.

```
.. versionadded:: 3.9
```

```
.. versionchanged:: 3.11
```

The ``\_\_exit\_\_`` function is in position 4 of the stack rather than 7. Exception representation on the stack now consist of one, not three, items.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\cpython-main [Doc] [library]dis.rst, line 674)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_ASSERTION_ERROR
```

Pushes :exc:`AssertionError` onto the stack. Used by the :keyword:`assert` statement.

```
.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 682)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_BUILD_CLASS
```

Pushes `:func:~builtins.__build_class__` onto the stack. It is later called to construct a class.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 688)**

Unknown directive type "opcode".

```
.. opcode:: BEFORE_WITH (delta)
```

This opcode performs several operations before a with block starts. First, it loads `:meth:~object.__exit__` from the context manager and pushes it onto the stack for later use by `:opcode:~WITH_EXCEPT_START`. Then, `:meth:~object.__enter__` is called. Finally, the result of calling the `__enter__()` method is pushed onto the stack.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 699)**

Unknown directive type "opcode".

```
.. opcode:: GET_LEN
```

Push `len(TOS)` onto the stack.

```
.. versionadded:: 3.10
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 706)**

Unknown directive type "opcode".

```
.. opcode:: MATCH_MAPPING
```

If TOS is an instance of `:class:~collections.abc.Mapping` (or, more technically: if it has the `:const:~Py_TPFLAGS_MAPPING` flag set in its `:c:member:~PyObject.tp_flags`), push `True` onto the stack. Otherwise, push `False`.

```
.. versionadded:: 3.10
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 716)**

Unknown directive type "opcode".

```
.. opcode:: MATCH_SEQUENCE
```

If TOS is an instance of `:class:~collections.abc.Sequence` and is *not* an instance of `:class:~str`/`:class:~bytes`/`:class:~bytearray` (or, more technically: if it has the `:const:~Py_TPFLAGS_SEQUENCE` flag set in its `:c:member:~PyObject.tp_flags`), push `True` onto the stack. Otherwise, push `False`.

```
.. versionadded:: 3.10
```

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



**main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 726)**

Unknown directive type "opcode".

```
.. opcode:: MATCH_KEYS
```

TOS is a tuple of mapping keys, and TOS1 is the match subject. If TOS1 contains all of the keys in TOS, push a :class:`tuple` containing the corresponding values. Otherwise, push ``None``.

```
.. versionadded:: 3.10
```

```
.. versionchanged:: 3.11
```

Previously, this instruction also pushed a boolean value indicating success (``True``) or failure (``False``).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 739)**

Unknown directive type "opcode".

```
.. opcode:: STORE_NAME (namei)
```

Implements ``name = TOS``. \*namei\* is the index of \*name\* in the attribute :attr:`co\_names` of the code object. The compiler tries to use :opcode:`STORE\_FAST` or :opcode:`STORE\_GLOBAL` if possible.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 746)**

Unknown directive type "opcode".

```
.. opcode:: DELETE_NAME (namei)
```

Implements ``del name``, where \*namei\* is the index into :attr:`co\_names` attribute of the code object.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 752)**

Unknown directive type "opcode".

```
.. opcode:: UNPACK_SEQUENCE (count)
```

Unpacks TOS into \*count\* individual values, which are put onto the stack right-to-left.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 758)**

Unknown directive type "opcode".

```
.. opcode:: UNPACK_EX (counts)
```

Implements assignment with a starred target: Unpacks an iterable in TOS into individual values, where the total number of values can be smaller than the number of items in the iterable: one of the new values will be a list of all leftover items.

The low byte of \*counts\* is the number of values before the list value, the high byte of \*counts\* the number of values after it. The resulting values are put onto the stack right-to-left.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 770)**

Unknown directive type "opcode".

```
.. opcode:: STORE_ATTR (namei)
```

Implements ``TOS.name = TOS1``, where \*namei\* is the index of name in :attr:`co\_names`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 776)**

Unknown directive type "opcode".

```
.. opcode:: DELETE_ATTR (namei)
```

Implements ``del TOS.name``, using \*namei\* as index into :attr:`co\_names`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 781)**

Unknown directive type "opcode".

```
.. opcode:: STORE_GLOBAL (namei)
```

Works as :opcode:`STORE\_NAME`, but stores the name as a global.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 786)**

Unknown directive type "opcode".

```
.. opcode:: DELETE_GLOBAL (namei)
```

Works as :opcode:`DELETE\_NAME`, but deletes a global name.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 791)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_CONST (consti)
```

Pushes ``co\_consts[consti]`` onto the stack.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 796)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_NAME (namei)
```

Pushes the value associated with ``co\_names[namei]`` onto the stack.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 801)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_TUPLE (count)
```

Creates a tuple consuming \*count\* items from the stack, and pushes the resulting tuple onto the stack.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 807)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_LIST (count)
```

Works as :opcode:`BUILD\_TUPLE`, but creates a list.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 812)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_SET (count)
```

Works as :opcode:`BUILD\_TUPLE`, but creates a set.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 817)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_MAP (count)
```

Pushes a new dictionary object onto the stack. Pops ``2 \* count`` items so that the dictionary holds \*count\* entries:  
``{..., TOS3: TOS2, TOS1: TOS}``.

```
.. versionchanged:: 3.5
```

The dictionary is created from stack items instead of creating an empty dictionary pre-sized to hold \*count\* items.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 828)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_CONST_KEY_MAP (count)
```

The version of :opcode:`BUILD\_MAP` specialized for constant keys. Pops the top element on the stack which contains a tuple of keys, then starting from ``TOS1``, pops \*count\* values to form values in the built dictionary.

```
.. versionadded:: 3.6
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 837)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_STRING (count)
```

Concatenates \*count\* strings from the stack and pushes the resulting string onto the stack.

```
.. versionadded:: 3.6
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 845)**

Unknown directive type "opcode".

```
.. opcode:: LIST_TO_TUPLE
```

Pops a list from the stack and pushes a tuple containing the same values.

```
.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 852)**

Unknown directive type "opcode".

```
.. opcode:: LIST_EXTEND (i)

    Calls ``list.extend(TOS1[-i], TOS)``. Used to build lists.

.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 859)**

Unknown directive type "opcode".

```
.. opcode:: SET_UPDATE (i)

    Calls ``set.update(TOS1[-i], TOS)``. Used to build sets.

.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 866)**

Unknown directive type "opcode".

```
.. opcode:: DICT_UPDATE (i)

    Calls ``dict.update(TOS1[-i], TOS)``. Used to build dicts.

.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 873)**

Unknown directive type "opcode".

```
.. opcode:: DICT_MERGE (i)

    Like :opcode:`DICT_UPDATE` but raises an exception for duplicate keys.

.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 880)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_ATTR (namei)

    Replaces TOS with ``getattr(TOS, co_names[namei])``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 885)**

Unknown directive type "opcode".

```
.. opcode:: COMPARE_OP (opname)
```

Performs a Boolean operation. The operation name can be found in ``cmp_op[opname]``.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 891)**

Unknown directive type "opcode".

```
.. opcode:: IS_OP (invert)
```

Performs ``is`` comparison, or ``is not`` if ``invert`` is 1.

```
.. versionadded:: 3.9
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 898)**

Unknown directive type "opcode".

```
.. opcode:: CONTAINS_OP (invert)
```

Performs ``in`` comparison, or ``not in`` if ``invert`` is 1.

```
.. versionadded:: 3.9
```

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

Unknown directive type "opcode".

```
.. opcode:: IMPORT_NAME (namei)
```

Imports the module ``co_names[namei]``. TOS and TOS1 are popped and provide the `*fromlist*` and `*level*` arguments of `:func:``__import__``. The module object is pushed onto the stack. The current namespace is not affected: for a proper import statement, a subsequent `:opcode:``STORE_FAST`` instruction modifies the namespace.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 914)**

Unknown directive type "opcode".

```
.. opcode:: IMPORT_FROM (namei)
```

Loads the attribute ``co_names[namei]`` from the module found in TOS. The resulting object is pushed onto the stack, to be subsequently stored by a `:opcode:``STORE_FAST`` instruction.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 921)**

Unknown directive type "opcode".

```
.. opcode:: JUMP_FORWARD (delta)
```

Increments bytecode counter by `*delta*`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 926)**

Unknown directive type "opcode".

```
.. opcode:: JUMP_BACKWARD (delta)

    Decrements bytecode counter by *delta*. Checks for interrupts.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 933)**

Unknown directive type "opcode".

```
.. opcode:: JUMP_BACKWARD_NO_INTERRUPT (delta)

    Decrements bytecode counter by *delta*. Does not check for interrupts.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 940)**

Unknown directive type "opcode".

```
.. opcode:: POP_JUMP_IF_TRUE (target)

    If TOS is true, sets the bytecode counter to *target*. TOS is popped.

.. versionadded:: 3.1
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 947)**

Unknown directive type "opcode".

```
.. opcode:: POP_JUMP_IF_FALSE (target)

    If TOS is false, sets the bytecode counter to *target*. TOS is popped.

.. versionadded:: 3.1
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 954)**

Unknown directive type "opcode".

```
.. opcode:: POP_JUMP_IF_NOT_NONE (target)

    If TOS is not none, sets the bytecode counter to *target*. TOS is popped.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 961)**

Unknown directive type "opcode".

```
.. opcode:: POP_JUMP_IF_NONE (target)

    If TOS is none, sets the bytecode counter to *target*. TOS is popped.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 968)**

Unknown directive type "opcode".

```
.. opcode:: JUMP_IF_TRUE_OR_POP (target)
```

If TOS is true, sets the bytecode counter to \*target\* and leaves TOS on the stack. Otherwise (TOS is false), TOS is popped.

```
.. versionadded:: 3.1
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 976)**

Unknown directive type "opcode".

```
.. opcode:: JUMP_IF_FALSE_OR_POP (target)
```

If TOS is false, sets the bytecode counter to \*target\* and leaves TOS on the stack. Otherwise (TOS is true), TOS is popped.

```
.. versionadded:: 3.1
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 984)**

Unknown directive type "opcode".

```
.. opcode:: FOR_ITER (delta)
```

TOS is an :term:`iterator`. Call its :meth:`~iterator.\_\_next\_\_` method. If this yields a new value, push it on the stack (leaving the iterator below it). If the iterator indicates it is exhausted, TOS is popped, and the byte code counter is incremented by \*delta\*.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 992)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_GLOBAL (namei)
```

Loads the global named ``co\_names[namei>>1]`` onto the stack.

```
.. versionchanged:: 3.11
```

If the low bit of ``namei`` is set, then a ``NULL`` is pushed to the stack before the global variable.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 1000)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_FAST (var_num)
```

Pushes a reference to the local ``co\_varnames[var\_num]`` onto the stack.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 1005)**

Unknown directive type "opcode".

```
.. opcode:: STORE_FAST (var_num)
```

Stores TOS into the local ``co\_varnames[var\_num]``.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1010)**

Unknown directive type "opcode".

```
.. opcode:: DELETE_FAST (var_num)

    Deletes local ``co_varnames[var_num]``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1015)**

Unknown directive type "opcode".

```
.. opcode:: MAKE_CELL (i)

    Creates a new cell in slot ``i``. If that slot is empty then
    that value is stored into the new cell.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1023)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_CLOSURE (i)

    Pushes a reference to the cell contained in slot ``i`` of the "fast locals"
    storage. The name of the variable is ``co_fastlocalnames[i]``.

    Note that ``LOAD_CLOSURE`` is effectively an alias for ``LOAD_FAST``.
    It exists to keep bytecode a little more readable.

.. versionchanged:: 3.11
    ``i`` is no longer offset by the length of ``co_varnames``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1035)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_DEREF (i)

    Loads the cell contained in slot ``i`` of the "fast locals" storage.
    Pushes a reference to the object the cell contains on the stack.

.. versionchanged:: 3.11
    ``i`` is no longer offset by the length of ``co_varnames``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1044)**

Unknown directive type "opcode".

```
.. opcode:: LOAD_CLASSDEREF (i)

    Much like :opcode:`LOAD_DEREF` but first checks the locals dictionary before
    consulting the cell. This is used for loading free variables in class
    bodies.

.. versionadded:: 3.4

.. versionchanged:: 3.11
    ``i`` is no longer offset by the length of ``co_varnames``.
```



**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1056)**

Unknown directive type "opcode".

```
.. opcode:: STORE_DEREF (i)

Stores TOS into the cell contained in slot ``i`` of the "fast locals"
storage.

.. versionchanged:: 3.11
   ``i`` is no longer offset by the length of ``co_varnames``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1065)**

Unknown directive type "opcode".

```
.. opcode:: DELETE_DEREF (i)

Empties the cell contained in slot ``i`` of the "fast locals" storage.
Used by the :keyword:`del` statement.

.. versionadded:: 3.2

.. versionchanged:: 3.11
   ``i`` is no longer offset by the length of ``co_varnames``.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1076)**

Unknown directive type "opcode".

```
.. opcode:: COPY_FREE_VARS (n)

Copies the ``n`` free variables from the closure into the frame.
Removes the need for special code on the caller's side when calling
closures.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1085)**

Unknown directive type "opcode".

```
.. opcode:: RAISE_VARARGS (argc)

Raises an exception using one of the 3 forms of the ``raise`` statement,
depending on the value of *argc*:

* 0: ``raise`` (re-raise previous exception)
* 1: ``raise TOS`` (raise exception instance or type at ``TOS``)
* 2: ``raise TOS1 from TOS`` (raise exception instance or type at ``TOS1``
   with ``__cause__`` set to ``TOS``)
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1096)**

Unknown directive type "opcode".

```
.. opcode:: CALL (argc)

Calls a callable object with the number of arguments specified by ``argc``,
including the named arguments specified by the preceding
:opcode:`KW_NAMES`, if any.
On the stack are (in ascending order), either:

* NULL
```

```

* The callable
* The positional arguments
* The named arguments

or:

* The callable
* ``self``
* The remaining positional arguments
* The named arguments

``argc`` is the total of the positional and named arguments, excluding
``self`` when a ``NULL`` is not present.

``CALL`` pops all arguments and the callable object off the stack,
calls the callable object with those arguments, and pushes the return value
returned by the callable object.

.. versionadded:: 3.11

```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 1125)**

Unknown directive type "opcode".

```

.. opcode:: CALL_FUNCTION_EX (flags)

Calls a callable object with variable set of positional and keyword
arguments. If the lowest bit of *flags* is set, the top of the stack
contains a mapping object containing additional keyword arguments.
Before the callable is called, the mapping object and iterable object
are each "unpacked" and their contents passed in as keyword and
positional arguments respectively.
``CALL_FUNCTION_EX`` pops all arguments and the callable object off the stack,
calls the callable object with those arguments, and pushes the return value
returned by the callable object.

.. versionadded:: 3.6

```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 1140)**

Unknown directive type "opcode".

```

.. opcode:: LOAD_METHOD (namei)

Loads a method named ``co_names[namei]`` from the TOS object. TOS is popped.
This bytecode distinguishes two cases: if TOS has a method with the correct
name, the bytecode pushes the unbound method and TOS. TOS will be used as
the first argument (``self``) by :opcode:`CALL` when calling the
unbound method. Otherwise, ``NULL`` and the object return by the attribute
lookup are pushed.

.. versionadded:: 3.7

```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main][Doc][library]dis.rst, line 1152)**

Unknown directive type "opcode".

```

.. opcode:: PRECALL (argc)

Prefixes :opcode:`CALL`. Logically this is a no op.
It exists to enable effective specialization of calls.
``argc`` is the number of arguments as described in :opcode:`CALL`.

.. versionadded:: 3.11

```

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

**main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1161)**

Unknown directive type "opcode".

```
.. opcode:: PUSH_NULL

    Pushes a ``NULL`` to the stack.
    Used in the call sequence to match the ``NULL`` pushed by
    :opcode:`LOAD_METHOD` for non-method calls.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1170)**

Unknown directive type "opcode".

```
.. opcode:: KW_NAMES (i)

    Prefixes :opcode:`PRECALL`.
    Stores a reference to ``co_consts[consti]`` into an internal variable
    for use by :opcode:`CALL`. ``co_consts[consti]`` must be a tuple of strings.

.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1179)**

Unknown directive type "opcode".

```
.. opcode:: MAKE_FUNCTION (flags)

    Pushes a new function object on the stack. From bottom to top, the consumed
    stack must consist of values if the argument carries a specified flag value

    * ``0x01`` a tuple of default values for positional-only and
      positional-or-keyword parameters in positional order
    * ``0x02`` a dictionary of keyword-only parameters' default values
    * ``0x04`` a tuple of strings containing parameters' annotations
    * ``0x08`` a tuple containing cells for free variables, making a closure
    * the code associated with the function (at TOS1)
    * the :term:`qualified name` of the function (at TOS)

.. versionchanged:: 3.10
    Flag value ``0x04`` is a tuple of strings instead of dictionary
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1195)**

Unknown directive type "opcode".

```
.. opcode:: BUILD_SLICE (argc)

.. index:: builtin: slice

    Pushes a slice object on the stack. *argc* must be 2 or 3. If it is 2,
    ``slice(TOS1, TOS)`` is pushed; if it is 3, ``slice(TOS2, TOS1, TOS)`` is
    pushed. See the :func:`slice` built-in function for more information.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1204)**

Unknown directive type "opcode".

```
.. opcode:: EXTENDED_ARG (ext)

    Prefixes any opcode which has an argument too big to fit into the default one
    byte. *ext* holds an additional byte which act as higher bits in the argument.
    For each opcode, at most three prefixal ``EXTENDED_ARG`` are allowed, forming
    an argument from two-byte to four-byte.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1212)**

Unknown directive type "opcode".

```
.. opcode:: FORMAT_VALUE (flags)
```

Used for implementing formatted literal strings (f-strings). Pops an optional *\*fmt\_spec\** from the stack, then a required *\*value\**. *\*flags\** is interpreted as follows:

```
* `` (flags & 0x03) == 0x00``: *value* is formatted as-is.
* `` (flags & 0x03) == 0x01``: call :func:`str` on *value* before
  formatting it.
* `` (flags & 0x03) == 0x02``: call :func:`repr` on *value* before
  formatting it.
* `` (flags & 0x03) == 0x03``: call :func:`ascii` on *value* before
  formatting it.
* `` (flags & 0x04) == 0x04``: pop *fmt_spec* from the stack and use
  it, else use an empty *fmt_spec*.
```

Formatting is performed using :c:func:`PyObject\_Format`. The result is pushed on the stack.

```
.. versionadded:: 3.6
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1234)**

Unknown directive type "opcode".

```
.. opcode:: MATCH_CLASS (count)
```

TOS is a tuple of keyword attribute names, TOS1 is the class being matched against, and TOS2 is the match subject. *\*count\** is the number of positional sub-patterns.

Pop TOS, TOS1, and TOS2. If TOS2 is an instance of TOS1 and has the positional and keyword attributes required by *\*count\** and TOS, push a tuple of extracted attributes. Otherwise, push ``None``.

```
.. versionadded:: 3.10
```

```
.. versionchanged:: 3.11
```

Previously, this instruction also pushed a boolean value indicating success (``True``) or failure (``False``).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1251)**

Unknown directive type "opcode".

```
.. opcode:: RESUME (where)
```

A no-op. Performs internal tracing, debugging and optimization checks.

The ``where`` operand marks where the ``RESUME`` occurs:

```
* ``0`` The start of a function
* ``1`` After a ``yield`` expression
* ``2`` After a ``yield from`` expression
* ``3`` After an ``await`` expression
```

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1265)**

Unknown directive type "opcode".

```
.. opcode:: RETURN_GENERATOR
```

Create a generator, coroutine, or async generator from the current frame.  
Clear the current frame and return the newly created generator.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 1273)**

Unknown directive type "opcode".

```
.. opcode:: SEND
```

Sends ``None`` to the sub-generator of this generator.  
Used in ``yield from`` and ``await`` statements.

```
.. versionadded:: 3.11
```

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

Unknown directive type "opcode".

```
.. opcode:: ASYNC_GEN_WRAP
```

Wraps the value on top of the stack in an ``async\_generator\_wrapped\_value``.  
Used to yield in async generators.

```
.. versionadded:: 3.11
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 1289)**

Unknown directive type "opcode".

```
.. opcode:: HAVE_ARGUMENT
```

This is not really an opcode. It identifies the dividing line between  
opcodes which don't use their argument and those that do  
(``< HAVE\_ARGUMENT`` and ``>= HAVE\_ARGUMENT``, respectively).

```
.. versionchanged:: 3.6
```

Now every instruction has an argument, but opcodes ``< HAVE\_ARGUMENT``  
ignore it. Before, only opcodes ``>= HAVE\_ARGUMENT`` had an argument.

## Opcode collections

These collections are provided for automatic introspection of bytecode instructions:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 1308)**

Unknown directive type "data".

```
.. data:: opcode
```

Sequence of operation names, indexable using the bytecode.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\ [cpython-main] [Doc] [library]dis.rst, line 1313)**

Unknown directive type "data".

```
.. data:: opmap
```

Dictionary mapping operation names to bytecodes.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1318)**

Unknown directive type "data".

```
.. data:: cmp_op
```

Sequence of all compare operation names.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1323)**

Unknown directive type "data".

```
.. data:: hasconst
```

Sequence of bytecodes that access a constant.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1328)**

Unknown directive type "data".

```
.. data:: hasfree
```

Sequence of bytecodes that access a free variable (note that 'free' in this context refers to names in the current scope that are referenced by inner scopes or names in outer scopes that are referenced from this scope. It does \*not\* include references to global or builtin scopes).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1336)**

Unknown directive type "data".

```
.. data:: hasname
```

Sequence of bytecodes that access an attribute by name.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1341)**

Unknown directive type "data".

```
.. data:: hasjrel
```

Sequence of bytecodes that have a relative jump target.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1346)**

Unknown directive type "data".

```
.. data:: hasjabs
```

Sequence of bytecodes that have an absolute jump target.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1351)**

Unknown directive type "data".

```
.. data:: haslocal
```

Sequence of bytecodes that access a local variable.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\library\[cpython-main] [Doc] [library]dis.rst, line 1356)**

Unknown directive type "data".

```
.. data:: hascompare
```

Sequence of bytecodes of Boolean operations.