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# Data Types



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## 1 Acceso a ficheros

### 1.1 Ficheros

- File es un tipo de objeto predefinido en Python (built-in).
- Permite acceder a ficheros desde programas Python.
- Los ficheros son de un tipo especial:
  - Son built-in, pero no son ni números, ni secuencias, ni mappings. Tampoco responden a operadores en expresiones.
  - La función open permite crear objetos de tipo fichero.

Formato general para abrir un fichero:

afile = open(filename, mode)

- mode es opcional. Por defecto, los ficheros se abren en modo lectura.
- Los datos leídos de un fichero siempre se obtienen en formato string. Lo mismo ocurre con escritura.
- Los ficheros se deben cerrar invocando close (liberación de recursos).

```
In [1]: # Lectura desde fichero usando método 'read'. Devuelve todo el contenido del
mi_fichero = open('res/multiple_lines.txt')
print(mi_fichero.read())
mi_fichero.close()
```

Este fichero  
contiene tres  
líneas de texto.

```
In [2]: # Lectura linea a linea a través del bucle 'for'.
mi_fichero = open('res/multiple_lines.txt')
for linea in mi_fichero:
    print(f"{linea}")
mi_fichero.close()
```

Este fichero  
contiene tres  
lineas de texto.

```
In [3]: # leer de un archivo a una lista.  
mi_fichero = open('res/multiple_lines.txt')  
lineas = mi_fichero.readlines()  
mi_fichero.close()  
  
print(lineas)
```

```
[ 'Este fichero\n', 'contiene tres\n', 'lineas de texto.\n' ]
```

- Resolución de paths independiente de plataforma

```
In [4]: import os  
ruta = os.path.join("res", "multiple_lines.txt")  
print(ruta)
```

```
res/multiple_lines.txt  
res\multiple_lines.txt
```

```
In [5]: dataset_file_path = ["res","multiple_lines.txt"]  
ruta = os.path.join(*dataset_file_path)  
print(ruta)
```

```
res/multiple_lines.txt
```

- close automático con sentencia with. Esta es la forma habitual de leer de fichero en Python, context manager

```
In [6]: with open(ruta) as mi_fichero:  
    for linea in mi_fichero:  
        print(linea, end= '')
```

Este fichero  
contiene tres  
lineas de texto.

- Se puede abrir varios ficheros en un mismo with.

```
In [7]: #abrir varios ficheros en el mismo with  
ruta1 = os.path.join("res", "one_line.txt")  
ruta2 = os.path.join("res", "multiple_lines.txt")  
with open(ruta1) as fichero1, open(ruta2) as fichero2:  
    print(fichero1.readlines())  
    print(fichero2.readlines())
```

```
[ 'Hola mundo desde un fichero.' ]  
[ 'Este fichero\n', 'contiene tres\n', 'lineas de texto.\n' ]
```

## 1.2 Modos de acceso

- Al crear un objeto de tipo File se puede especificar el modo de acceso (lectura/escritura).

Modo de Acceso	Descripción
r	Solo lectura
w	Solo escritura (borra el archivo si ya existe)
x	Solo escritura (falla si el archivo ya existe)
a	Crea fichero (si existe lo abre y añade al final)
r+	Lectura y escritura
b	Se puede añadir a otros modos para acceso binario
t	Acceso para archivos de texto (por defecto)

### 1.3 Acceso para escritura

```
In [8]: def crear_lista(tamanyo):
    lista = []
    for i in range(tamanyo):
        lista.append(str(i) + '\n')
    return lista

ruta = os.path.join("res", "a_dummy.txt")
with open(ruta, 'wt') as fichero:
    fichero.write('Cabecera del ciclo del for en el ejemplo\n')
    lista = crear_lista(10)
    fichero.writelines(lista)
    print("archivo creado")
```

archivo creado

### Buffering

- Por defecto, el texto que transfieres desde tu programa a un fichero no se guarda en disco inmediatamente. Se almacena en un buffer.
- Acciones como cerrar un fichero o invocar el método flush fuerzan que se transfiera el contenido del buffer a disco

```
In [9]: ruta = os.path.join("res", "FicheroParaEscritura.txt")
fichero_write = open(ruta, 'w')
fichero_write.write('foter')

fichero_read = open(ruta, "r")
print(fichero_read.readlines())

fichero_write.flush()
print(fichero_read.readlines())
```

```
fichero_write.close()  
fichero_read.close()  
[]  
['foter']
```

## 1.4 Archivos CSV

- Python permite leer datos de ficheros CSV y también escribir ficheros en este formato.
- Popular formato en ciencia de datos.

```
In [11]: # tabla_operaciones.csv contiene valores separados por comas  
import csv  
ruta = os.path.join("res", "tabla_operaciones.csv")  
  
with open(ruta) as fichero:  
    data_reader = csv.reader(fichero, delimiter=',')  
    for linea in data_reader:  
        print(linea[0] + ' ---- ' + linea[1])  
  
Operacion ---- Descripcion  
a + b ---- suma a y b  
a - b ---- resta a menos b  
a / b ---- a dividido  
a // b ---- a dividido entre b (quitando decimales)  
a % b ---- devuelve el resto de la división a/b (modulus)  
a * b ---- a multiplicado por b  
a ** b ---- a elevado a b  
  
Operacion ---- Descripcion  
a + b ---- suma a y b  
a - b ---- resta a menos b  
a / b ---- a dividido  
a // b ---- a dividido entre b (quitando decimales)  
a % b ---- devuelve el resto de la división a/b (modulus)  
a * b ---- a multiplicado por b  
a ** b ---- a elevado a b
```

```
In [13]: ruta = os.path.join("res", "tabla_operaciones.csv")  
f = open(ruta)  
data_reader = csv.reader(f, delimiter = ',')  
  
ruta_o = os.path.join("res", "4_tabla_operaciones.csv")  
with open(ruta_o, 'w') as f2:  
    csv_writer = csv.writer(f2, delimiter = '|')  
    for line in data_reader:  
        print(line)  
        csv_writer.writerow(line)  
  
f.close()
```

```
['Operacion', 'Descripcion']
['a + b', 'suma a y b']
['a - b', 'resta a menos b']
['a / b', 'a dividido']
['a // b', 'a dividido entre b (quitando decimales)']
['a % b', 'devuelve el resto de la división a/b (modulus)']
['a * b', 'a multiplicado por b']
['a ** b', 'a elevado a b']

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['a * b', 'a multiplicado por b']
['a ** b', 'a elevado a b']
```

## 2 Docstrings

- Python permite adjuntar documentación a los objetos e inspeccionarla a través de la línea de comandos o durante la ejecución del programa.
- Los docstrings se almacenan en el atributo **doc** de cada objeto.
- El valor de dicho atributo se puede mostrar por medio de la función help.

```
In [14]: help(open)
```

Help on function open in module io:

```
open(file, mode='r', buffering=-1, encoding=None, errors=None, newline=None,
closefd=True, opener=None)
```

Open file and return a stream. Raise OSError upon failure.

file is either a text or byte string giving the name (and the path if the file isn't in the current working directory) of the file to be opened or an integer file descriptor of the file to be wrapped. (If a file descriptor is given, it is closed when the returned I/O object is closed, unless closefd is set to False.)

mode is an optional string that specifies the mode in which the file is opened. It defaults to 'r' which means open for reading in text mode. Other common values are 'w' for writing (truncating the file if it already exists), 'x' for creating and writing to a new file, and 'a' for appending (which on some Unix systems, means that all writes append to the end of the file regardless of the current seek position). In text mode, if encoding is not specified the encoding used is platform dependent: locale.getencoding() is called to get the current locale encoding.

(For reading and writing raw bytes use binary mode and leave encoding unspecified.) The available modes are:

===== ======	
=	Character Meaning
-----	
-	'r' open for reading (default)
	'w' open for writing, truncating the file first
	'x' create a new file and open it for writing
s	'a' open for writing, appending to the end of the file if it exist
	'b' binary mode
	't' text mode (default)
	'+' open a disk file for updating (reading and writing)
===== ======	
=	

The default mode is 'rt' (open for reading text). For binary random access, the mode 'w+b' opens and truncates the file to 0 bytes, while 'r+b' opens the file without truncation. The 'x' mode implies 'w' and raises an `FileExistsError` if the file already exists.

Python distinguishes between files opened in binary and text modes, even when the underlying operating system doesn't. Files opened in binary mode (appending 'b' to the mode argument) return contents as bytes objects without any decoding. In text mode (the default, or when 't' is appended to the mode argument), the contents of the file are returned as strings, the bytes having been first decoded using a platform-dependent encoding or using the specified encoding if given.

buffering is an optional integer used to set the buffering policy.  
Pass 0 to switch buffering off (only allowed in binary mode), 1 to select

line buffering (only usable in text mode), and an integer > 1 to indicate the size of a fixed-size chunk buffer. When no buffering argument is given, the default buffering policy works as follows:

- \* Binary files are buffered in fixed-size chunks; the size of the buffer is chosen using a heuristic trying to determine the underlying device's "block size" and falling back on `io.DEFAULT\_BUFFER\_SIZE`. On many systems, the buffer will typically be 4096 or 8192 bytes long.
- \* "Interactive" text files (files for which `isatty()` returns True) use line buffering. Other text files use the policy described above for binary files.

`encoding` is the name of the encoding used to decode or encode the file. This should only be used in text mode. The default encoding is platform dependent, but any encoding supported by Python can be passed. See the `codecs` module for the list of supported encodings.

`errors` is an optional string that specifies how encoding errors are to be handled---this argument should not be used in binary mode. Pass '`'strict'`' to raise a `ValueError` exception if there is an encoding error (the default of `None` has the same effect), or pass '`'ignore'`' to ignore errors. (Note that ignoring encoding errors can lead to data loss.) See the documentation for `codecs.register` or run '`help(codecs.Codec)`' for a list of the permitted encoding error strings.

`newline` controls how universal newlines works (it only applies to text mode). It can be `None`, `''`, `'\n'`, `'\r'`, and `'\r\n'`. It works as follows:

- \* On input, if `newline` is `None`, universal newlines mode is enabled. Lines in the input can end in `'\n'`, `'\r'`, or `'\r\n'`, and these are translated into `'\n'` before being returned to the caller. If it is `''`, universal newline mode is enabled, but line endings are returned to the caller untranslated. If it has any of the other legal values, input lines are only terminated by the given string, and the line ending is returned to the caller untranslated.
- \* On output, if `newline` is `None`, any `'\n'` characters written are translated to the system default line separator, `os.linesep`. If `newline` is `''` or `'\n'`, no translation takes place. If `newline` is any of the other legal values, any `'\n'` characters written are translated to the given string.

If `closefd` is `False`, the underlying file descriptor will be kept open when the file is closed. This does not work when a file name is given and must be `True` in that case.

A custom opener can be used by passing a callable as `*opener*`. The underlying file descriptor for the file object is then obtained by calling `*opener*` with `(*file*, *flags*)`. `*opener*` must return an open file descriptor (passing `os.open` as `*opener*` results in functionality similar to passing `None`).

`open()` returns a file object whose type depends on the mode, and through which the standard file operations such as reading and writing are performed. When `open()` is used to open a file in a text mode ('`w`', '`r`', '`wt`', '`rt`', etc.), it returns a `TextIOWrapper`. When used to open a file in a binary mode, the returned class varies: in read binary mode, it returns a `BufferedReader`; in write binary and append binary modes, it returns a `BufferedWriter`, and in read/write mode, it returns a `BufferedRandom`.

It is also possible to use a string or bytearray as a file for both reading and writing. For strings `StringIO` can be used like a file opened in a text mode, and for bytes a `BytesIO` can be used like a file opened in a binary mode.

- No es necesario editar este atributo directamente.
- Para asociar un docstring a un objeto basta con escribir el texto (entre triples comillas) al principio de los modulos, funciones o clases, antes del código ejecutable

```
In [15]: def funcion_de_prueba():
    """Esta es la documentación de la función de prueba"""
    pass

help(funcion_de_prueba)
```

Help on function `funcion_de_prueba` in module `__main__`:

```
funcion_de_prueba()
    Esta es la documentación de la función de prueba
```

- Accediendo al atributo `doc` sólo se obtiene el docstring.

```
In [16]: print(funcion_de_prueba.__doc__)

Esta es la documentación de la función de prueba
```

Como se puede observar, `help` añade información adicional. Por ejemplo, para entidades más grandes, `help` muestra el docstring dividido en secciones.

```
In [17]: import sys
help(sys)
```

Help on built-in module sys:

NAME  
  sys

MODULE REFERENCE  
  <https://docs.python.org/3.11/library/sys.html>

The following documentation is automatically generated from the Python source files. It may be incomplete, incorrect or include features that are considered implementation detail and may vary between Python implementations. When in doubt, consult the module reference at the location listed above.

#### DESCRIPTION

This module provides access to some objects used or maintained by the interpreter and to functions that interact strongly with the interpreter.

Dynamic objects:

argv -- command line arguments; argv[0] is the script pathname if known  
path -- module search path; path[0] is the script directory, else ''  
modules -- dictionary of loaded modules

displayhook -- called to show results in an interactive session  
 excepthook -- called to handle any uncaught exception other than SystemExit

To customize printing in an interactive session or to install a custom top-level exception handler, assign other functions to replace these.

stdin -- standard input file object; used by input()  
stdout -- standard output file object; used by print()  
stderr -- standard error object; used for error messages

By assigning other file objects (or objects that behave like files) to these, it is possible to redirect all of the interpreter's I/O.

last\_type -- type of last uncaught exception  
last\_value -- value of last uncaught exception  
last\_traceback -- traceback of last uncaught exception  
These three are only available in an interactive session after a traceback has been printed.

Static objects:

builtin\_module\_names -- tuple of module names built into this interpreter  
copyright -- copyright notice pertaining to this interpreter  
exec\_prefix -- prefix used to find the machine-specific Python library  
executable -- absolute path of the executable binary of the Python interpreter  
float\_info -- a named tuple with information about the float implementation.  
float\_repr\_style -- string indicating the style of repr() output for floats  
hash\_info -- a named tuple with information about the hash algorithm.

```
hexversion -- version information encoded as a single integer
implementation -- Python implementation information.
int_info -- a named tuple with information about the int implementation.
maxsize -- the largest supported length of containers.
maxunicode -- the value of the largest Unicode code point
platform -- platform identifier
prefix -- prefix used to find the Python library
thread_info -- a named tuple with information about the thread implementation.

version -- the version of this interpreter as a string
version_info -- version information as a named tuple
__stdin__ -- the original stdin; don't touch!
__stdout__ -- the original stdout; don't touch!
__stderr__ -- the original stderr; don't touch!
__displayhook__ -- the original displayhook; don't touch!
__excepthook__ -- the original excepthook; don't touch!
```

#### Functions:

```
displayhook() -- print an object to the screen, and save it in builtins.

-
    excepthook() -- print an exception and its traceback to sys.stderr
    exception() -- return the current thread's active exception
    exc_info() -- return information about the current thread's active exception
    exit() -- exit the interpreter by raising SystemExit
    getdlopenflags() -- returns flags to be used for dlopen() calls
    getprofile() -- get the global profiling function
    getrefcount() -- return the reference count for an object (plus one :-)
    getrecursionlimit() -- return the max recursion depth for the interpreter
r
    getssizeof() -- return the size of an object in bytes
    gettrace() -- get the global debug tracing function
    setdlopenflags() -- set the flags to be used for dlopen() calls
    setprofile() -- set the global profiling function
    setrecursionlimit() -- set the max recursion depth for the interpreter
    settrace() -- set the global debug tracing function
```

#### FUNCTIONS

```
__breakpointhook__ = breakpointhook(*args, **kws)
```

This hook function is called by built-in breakpoint().

```
__displayhook__ = displayhook(object, /)
    Print an object to sys.stdout and also save it in builtins._
```

```
__excepthook__ = excepthook(exctype, value, traceback, /)
    Handle an exception by displaying it with a traceback on sys.stderr.
```

```
__unraisablehook__ = unraisablehook(unraisable, /)
    Handle an unraisable exception.
```

The unraisable argument has the following attributes:

\* exc\_type: Exception type.

```
* exc_value: Exception value, can be None.
* exc_traceback: Exception traceback, can be None.
* err_msg: Error message, can be None.
* object: Object causing the exception, can be None.

addaudithook(hook)
    Adds a new audit hook callback.

audit(...)
    audit(event, *args)

    Passes the event to any audit hooks that are attached.

call_tracing(func, args, /)
    Call func(*args), while tracing is enabled.

    The tracing state is saved, and restored afterwards. This is intended
    to be called from a debugger from a checkpoint, to recursively debug
    some other code.

exc_info()
    Return current exception information: (type, value, traceback).

    Return information about the most recent exception caught by an except
    pt
    clause in the current stack frame or in an older stack frame.

exception()
    Return the current exception.

    Return the most recent exception caught by an except clause
    in the current stack frame or in an older stack frame, or None
    if no such exception exists.

exit(status=None, /)
    Exit the interpreter by raising SystemExit(status).

    If the status is omitted or None, it defaults to zero (i.e., success).
    If the status is an integer, it will be used as the system exit status.
    If it is another kind of object, it will be printed and the system
    exit status will be one (i.e., failure).

get_asasyncgen_hooks()
    Return the installed asynchronous generators hooks.

    This returns a namedtuple of the form (firstiter, finalizer).

get_coroutine_origin_tracking_depth()
    Check status of origin tracking for coroutine objects in this thread.

get_int_max_str_digits()
    Return the maximum string digits limit for non-binary int<->str conversion.
```

ersions.

`getallocatedblocks()`

Return the number of memory blocks currently allocated.

`getdefaultencoding()`

Return the current default encoding used by the Unicode implementation.

`getdlopenflags()`

Return the current value of the flags that are used for `dlopen` calls.

The flag constants are defined in the `os` module.

`getfilesystemencodeerrors()`

Return the error mode used Unicode to OS filename conversion.

`getfilesystemencoding()`

Return the encoding used to convert Unicode filenames to OS filenames.

`getprofile()`

Return the profiling function set with `sys.setprofile`.

See the profiler chapter in the library manual.

`getrecursionlimit()`

Return the current value of the recursion limit.

The recursion limit is the maximum depth of the Python interpreter stack. This limit prevents infinite recursion from causing an overflow of the C stack and crashing Python.

`getrefcount(object, /)`

Return the reference count of object.

The count returned is generally one higher than you might expect, because it includes the (temporary) reference as an argument to `getrefcount()`.

`getsizeof(...)`

`getsizeof(object [, default]) -> int`

Return the size of object in bytes.

`getswitchinterval()`

Return the current thread switch interval; see `sys.setswitchinterval()`.

`gettrace()`

Return the global debug tracing function set with `sys.settrace`.

See the debugger chapter in the library manual.

```
intern(string, /)
    ``Intern'' the given string.

        This enters the string in the (global) table of interned strings who
se
        purpose is to speed up dictionary lookups. Return the string itself
or
        the previously interned string object with the same value.

is_finalizing()
    Return True if Python is exiting.

set_asasyncgen_hooks(...)
    set_asasyncgen_hooks([firstiter] [, finalizer])

        Set a finalizer for async generators objects.

setCoroutine_origin_tracking_depth(depth)
    Enable or disable origin tracking for coroutine objects in this thre
ad.

        Coroutine objects will track 'depth' frames of traceback information
about where they came from, available in their cr_origin attribute.

        Set a depth of 0 to disable.

set_int_max_str_digits(maxdigits)
    Set the maximum string digits limit for non-binary int<->str convers
ions.

setdlopenflags(flags, /)
    Set the flags used by the interpreter for dlopen calls.

        This is used, for example, when the interpreter loads extension
modules. Among other things, this will enable a lazy resolving of
symbols when importing a module, if called as sys.setdlopenflags(0).
To share symbols across extension modules, call as
sys.setdlopenflags(os.RTLD_GLOBAL). Symbolic names for the flag
modules can be found in the os module (RTLD_xxx constants, e.g.
os.RTLD_LAZY).

setprofile(...)
    setprofile(function)

        Set the profiling function. It will be called on each function call
and return. See the profiler chapter in the library manual.

setrecursionlimit(limit, /)
    Set the maximum depth of the Python interpreter stack to n.

        This limit prevents infinite recursion from causing an overflow of t
he C
        stack and crashing Python. The highest possible limit is platform-
dependent.

setswitchinterval(interval, /)
```

Set the ideal thread switching delay inside the Python interpreter.

The actual frequency of switching threads can be lower if the interpreter executes long sequences of uninterruptible code (this is implementation-specific and workload-dependent).

The parameter must represent the desired switching delay in seconds A typical value is 0.005 (5 milliseconds).

```
settrace(...)  
    settrace(function)
```

Set the global debug tracing function. It will be called on each function call. See the debugger chapter in the library manual.

```
unraisablehook(unraisable, /)  
    Handle an unraisable exception.
```

The unraisable argument has the following attributes:

- \* exc\_type: Exception type.
- \* exc\_value: Exception value, can be None.
- \* exc\_traceback: Exception traceback, can be None.
- \* err\_msg: Error message, can be None.
- \* object: Object causing the exception, can be None.

#### DATA

```
    __stderr__ = <_io.TextIOWrapper name='<stderr>' mode='w' encoding='utf-8'  
f...  
    __stdin__ = <_io.TextIOWrapper name='<stdin>' mode='r' encoding='utf-8'  
8...  
    __stdout__ = <_io.TextIOWrapper name='<stdout>' mode='w' encoding='utf-8'  
f...  
    abiflags = ''  
    api_version = 1013  
    argv = ['/opt/anaconda3/envs/machinelearning1/lib/python3.11/site-pac  
k...  
    base_exec_prefix = '/opt/anaconda3/envs/machinelearning1'  
    base_prefix = '/opt/anaconda3/envs/machinelearning1'  
    builtin_module_names = ('_abc', '_ast', '_codecs', '_collections', '_f...  
    byteorder = 'little'  
    copyright = 'Copyright (c) 2001-2023 Python Software Foundation...emati  
s...  
    displayhook = <ipykernel.displayhook.ZMQShellDisplayHook object>  
    dont_write_bytocode = False  
    exec_prefix = '/opt/anaconda3/envs/machinelearning1'  
    executable = '/opt/anaconda3/envs/machinelearning1/bin/python'  
    flags = sys.flags(debug=0, inspect=0, interactive=0, opt...coding=0,  
s...  
    float_info = sys.float_info(max=1.7976931348623157e+308, max_...epsilon  
0...  
    float_repr_style = 'short'  
    hash_info = sys.hash_info(width=64, modulus=2305843009213693...iphash  
1...  
    hexversion = 51056368
```

```
implementation = namespace(name='cpython', cache_tag='cpython-311...i
a...
    int_info = sys.int_info(bits_per_digit=30, sizeof_digit=4, ..._str_di
g...
        last_value = IndentationError('unexpected indent', ('/var/fol... 8,
'...
            maxsize = 9223372036854775807
            maxunicode = 1114111
            meta_path = [<_distutils_hack.DistutilsMetaFinder object>, <class '_f
r...
                modules = {'IPython': <module 'IPython' from '/opt/anaconda3/envs/mac
h...
                    orig_argv = ['/opt/anaconda3/envs/machinelearning1/bin/python', '-Xfr
0...
                        path = ['/opt/anaconda3/envs/machinelearning1/lib/python311.zip', '/o
p...
                            path_hooks = [<class 'zipimport.zipimporter'>, <function FileFinder.p
a...
                                path_importer_cache = {'/Users/edgargarces/Desktop/MachineLearning202
6...
                                    platform = 'darwin'
                                    platlibdir = 'lib'
                                    prefix = '/opt/anaconda3/envs/machinelearning1'
                                    ps1 = 'In : '
                                    ps2 = '....: '
                                    ps3 = 'Out: '
                                    pycache_prefix = None
                                    stderr = <ipykernel.iostream.OutStream object>
                                    stdin = <_io.TextIOWrapper name='<stdin>' mode='r' encoding='utf-8'>
                                    stdlib_module_names = frozenset({'__future__', '__abc__', '__aix_support
t',...
                                        stdout = <ipykernel.iostream.OutStream object>
                                        thread_info = sys.thread_info(name='pthread', lock='mutex+cond', versi
...
                                            version = '3.11.14 (main, Oct 21 2025, 18:27:30) [Clang 20.1.8 ]'
                                            version_info = sys.version_info(major=3, minor=11, micro=14, releaselev
el...
                                                warnoptions = []
```

FILE  
(built-in)

Los docstrings que ocupan más de una línea suelen tener estas partes:

- Resumen en la primera línea.
- Línea en blanco.
- Descripción detallada.
- Otra línea en blanco antes del código.

```
In [18]: def funcion_de_prueba2():
    """Esta es la línea para el resumen.
    Este es el párrafo donde se puede escribir una descripción más
    detallada de la función. Observa que el resumen y la descripción
```

```
detallada van separados por una línea en blanco. También hay
otra línea en blanco antes de empezar el código.
"""
pass

help(funcion_de_prueba2)
```

```
Help on function funcion_de_prueba2 in module __main__:

funcion_de_prueba2()
    Esta es la línea para el resumen.
    Este es el párrafo donde se puede escribir una descripción más
    detallada de la función. Observa que el resumen y la descripción
    detallada van separados por una línea en blanco. También hay
    otra línea en blanco antes de empezar el código.
```

Algunos comentarios adicionales:

- Comentarios con '#' suelen asociarse a expresiones sencillas, instrucciones individuales o pequeños bloques de código.
- Los docstrings son más apropiados para construcciones de más alto nivel: funciones, clases y módulos.

## 2.1 Sphinx

- Herramienta de documentación.
- Especialmente útil para sistemas grandes.
- Da soporte a una gran variedad de formatos de salida: HTML, LaTeX, ePub, ...

Web de Sphinx.

Proyectos que usan Sphinx.

## 2.2 Estilo

- Es importante que los docstrings sean consistentes.
- El equipo de desarrollo debe acordar un formato y seguirlo rigurosamente.

Google Python Style Guide Google define la siguiente guía de estilo.

Contiene reglas para los docstrings de:

- Módulos.
- Métodos y funciones.
- Clases.

## 2.3 Ejercicios

1. Escribe una función que reciba una ruta de un fichero de texto y una cadena de caracteres a buscar y determine si la cadena aparece en el fichero.
2. Escribe una función que reciba una lista, una ruta destino y un número n. La función debe crear un fichero en la ruta especificada. El contenido del fichero serán los primeros n elementos de la lista. La función debe controlar de manera apropiada los posibles valores de n que estén fuera de rango.

3. Escribe una función que reciba una ruta de un fichero de texto devuelva un diccionario con la frecuencia de aparición de cada palabra. Ejemplo: un fichero que contenga la frase 'es mejor que venga que que no venga' devolverá el siguiente diccionario: {'es' : 1, 'mejor' : 1, 'que' : 3, 'venga' : 2, 'no' : 1}. Para dividir un string en palabras puedes hacer uso del método split.

In [29]: #1

```
ruta = os.path.join("res", "multiple_lines.txt")

fichero_read = open(ruta, "r")
print(fichero_read.readlines())

string_buscar = "lineas de texto."

with open(ruta, 'r', encoding='utf-8') as fichero:
    contenido = fichero.read()

if string_buscar in contenido:
    print("Sí existe")
else:
    print("No existe")
```

['Este fichero\n', 'contiene tres\n', 'lineas de texto.\n']  
Sí existe

In [38]: #2

```
letras = ["a", "b", "c", "d", "e", "f", "g", "h", "i"]
num = 3

ruta = os.path.join("res", "archivo.txt")

def crear_fichero(num):
    resultado = letras[:num]

    with open(ruta, "w", encoding="utf-8") as fichero:
        for letra in resultado:
            fichero.write(letra + "\n")

crear_fichero(num)
print("Se creó fichero en res")
```

Se creó fichero en res

In [41]: #3

```
ruta_fichero = os.path.join("res", "archivo.txt")

def frecuencia_palabras(ruta_fichero):
    frecuencias = {}

    with open(ruta_fichero, "r", encoding="utf-8") as fichero:
        texto = fichero.read()
```

```
palabras = texto.split()

for palabra in palabras:
    if palabra in frecuencias:
        frecuencias[palabra] += 1
    else:
        frecuencias[palabra] = 1

return frecuencias

resultado = frecuencia_palabras(ruta_fichero)
print(resultado)

{'a': 1, 'b': 1, 'c': 1}
```

In [ ]: