
Pexpect Documentation

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Pexpect makes Python a better tool for controlling other applications.

Pexpect is a pure Python module for spawning child applications; controlling them; and responding to expected patterns in their output. Pexpect works like Don Libes' Expect. Pexpect allows your script to spawn a child application and control it as if a human were typing commands.

Pexpect can be used for automating interactive applications such as ssh, ftp, passwd, telnet, etc. It can be used to automate setup scripts for duplicating software package installations on different servers. It can be used for automated software testing. Pexpect is in the spirit of Don Libes' Expect, but Pexpect is pure Python. Unlike other Expect-like modules for Python, Pexpect does not require TCL or Expect nor does it require C extensions to be compiled. It should work on any platform that supports the standard Python pty module. The Pexpect interface was designed to be easy to use.

Contents:

Installation

Pexpect is on PyPI, and can be installed with standard tools:

```
pip install pexpect
```

Or:

```
easy_install pexpect
```

1.1 Requirements

This version of Pexpect requires Python 2.6 or 3.2 or above. For older versions of Python, continue using Pexpect 2.4.

Pexpect only works on POSIX systems, where the `pty` module is present in the standard library. It may be possible to run it on Windows using [Cygwin](#).

API Overview

Pexpect can be used for automating interactive applications such as ssh, ftp, mencoder, passwd, etc. The Pexpect interface was designed to be easy to use.

Here is an example of Pexpect in action:

```
# This connects to the openbsd ftp site and  
# downloads the recursive directory listing.  
import pexpect  
child = pexpect.spawn('ftp ftp.openbsd.org')  
child.expect('Name .*: ')  
child.sendline('anonymous')  
child.expect('Password:')  
child.sendline('noah@example.com')  
child.expect('ftp> ')  
child.sendline('lcd /tmp')  
child.expect('ftp> ')  
child.sendline('cd pub')  
child.expect('ftp> ')  
child.sendline('get README')  
child.expect('ftp> ')  
child.sendline('bye')
```

Obviously you could write an ftp client using Python's own `ftplib` module, but this is just a demonstration. You can use this technique with any application. This is especially handy if you are writing automated test tools.

There are two important methods in Pexpect – `expect()` and `send()` (or `sendline()` which is like `send()` with a newline). The `expect()` method waits for the child application to return a given string. The string you specify is a regular expression, so you can match complicated patterns. The `send()` method writes a string to the child application. From the child's point of view it looks just like someone typed the text from a terminal. After each call to `expect()` the `before` and `after` properties will be set to the text printed by child application. The `before` property will contain all text up to the expected string pattern. The `after` string will contain the text that was matched by the expected pattern. The `match` property is set to the `re match` object.

An example of Pexpect in action may make things more clear. This example uses ftp to login to the OpenBSD site; list files in a directory; and then pass interactive control of the ftp session to the human user:

```
import pexpect  
child = pexpect.spawn ('ftp ftp.openbsd.org')  
child.expect ('Name .*: ')  
child.sendline ('anonymous')  
child.expect ('Password:')  
child.sendline ('noah@example.com')  
child.expect ('ftp> ')
```

```
child.sendline ('ls /pub/OpenBSD/')
child.expect ('ftp> ')
print child.before # Print the result of the ls command.
child.interact() # Give control of the child to the user.
```

2.1 Special EOF and TIMEOUT patterns

There are two special patterns to match the End Of File (EOF) or a Timeout condition (TIMEOUT). You can pass these patterns to `expect()`. These patterns are not regular expressions. Use them like predefined constants.

If the child has died and you have read all the child's output then ordinarily `expect()` will raise an EOF exception. You can read everything up to the EOF without generating an exception by using the EOF pattern `expect`. In this case everything the child has output will be available in the `before` property.

The pattern given to `expect()` may be a regular expression or it may also be a list of regular expressions. This allows you to match multiple optional responses. The `expect()` method returns the index of the pattern that was matched. For example, say you wanted to login to a server. After entering a password you could get various responses from the server – your password could be rejected; or you could be allowed in and asked for your terminal type; or you could be let right in and given a command prompt. The following code fragment gives an example of this:

```
child.expect('password:')
child.sendline(my_secret_password)
# We expect any of these three patterns...
i = child.expect(['Permission denied', 'Terminal type', '[#\$\] '])
if i==0:
    print('Permission denied on host. Can't login')
    child.kill(0)
elif i==2:
    print('Login OK... need to send terminal type.')
    child.sendline('vt100')
    child.expect('[#\$\] ')
elif i==3:
    print('Login OK.')
    print('Shell command prompt', child.after)
```

If nothing matches an expected pattern then `expect()` will eventually raise a TIMEOUT exception. The default time is 30 seconds, but you can change this by passing a timeout argument to `expect()`:

```
# Wait no more than 2 minutes (120 seconds) for password prompt.
child.expect('password:', timeout=120)
```

2.2 Find the end of line – CR/LF conventions

Pexpect matches regular expressions a little differently than what you might be used to.

The `$` pattern for end of line match is useless. The `$` matches the end of string, but Pexpect reads from the child one character at a time, so each character looks like the end of a line. Pexpect can't do a look-ahead into the child's output stream. In general you would have this situation when using regular expressions with any stream.

Note: Pexpect does have an internal buffer, so reads are faster than one character at a time, but from the user's perspective the regex patterns test happens one character at a time.

The best way to match the end of a line is to look for the newline: `"\r\n"` (CR/LF). Yes, that does appear to be DOS-style. It may surprise some UNIX people to learn that terminal TTY device drivers (dumb, vt100, ANSI, xterm,

etc.) all use the CR/LF combination to signify the end of line. Pexpect uses a Pseudo-TTY device to talk to the child application, so when the child app prints "\n" you actually see "\r\n".

UNIX uses just linefeeds to end lines of text, but not when it comes to TTY devices! TTY devices are more like the Windows world. Each line of text ends with a CR/LF combination. When you intercept data from a UNIX command from a TTY device you will find that the TTY device outputs a CR/LF combination. A UNIX command may only write a linefeed (\n), but the TTY device driver converts it to CR/LF. This means that your terminal will see lines end with CR/LF (hex 0D 0A). Since Pexpect emulates a terminal, to match ends of lines you have to expect the CR/LF combination:

```
child.expect ('\r\n')
```

If you just need to skip past a new line then `expect ('\n')` by itself will work, but if you are expecting a specific pattern before the end of line then you need to explicitly look for the `\r`. For example the following expects a word at the end of a line:

```
child.expect ('\w+\r\n')
```

But the following would both fail:

```
child.expect ('\w+\n')
```

And as explained before, trying to use `$` to match the end of line would not work either:

```
child.expect ('\w+$')
```

So if you need to explicitly look for the END OF LINE, you want to look for the CR/LF combination – not just the LF and not the `$` pattern.

This problem is not limited to Pexpect. This problem happens any time you try to perform a regular expression match on a stream. Regular expressions need to look ahead. With a stream it is hard to look ahead because the process generating the stream may not be finished. There is no way to know if the process has paused momentarily or is finished and waiting for you. Pexpect must implicitly always do a NON greedy match (minimal) at the end of a input.

Pexpect compiles all regular expressions with the `re.DOTALL` flag. With the `DOTALL` flag, a "." will match a newline.

2.3 Beware of + and * at the end of patterns

Remember that any time you try to match a pattern that needs look-ahead that you will always get a minimal match (non greedy). For example, the following will always return just one character:

```
child.expect ('.+')
```

This example will match successfully, but will always return no characters:

```
child.expect ('.*')
```

Generally any star `*` expression will match as little as possible.

One thing you can do is to try to force a non-ambiguous character at the end of your `\d+` pattern. Expect that character to delimit the string. For example, you might try making the end of your pattern be `\D+` instead of `\D*`. Number digits alone would not satisfy the `(\d+)\D+` pattern. You would need some numbers and at least one non-number at the end.

2.4 Debugging

If you get the string value of a `pexpect.spawn` object you will get lots of useful debugging information. For debugging it's very useful to use the following pattern:

```
try:
    i = child.expect ([pattern1, pattern2, pattern3, etc])
except:
    print("Exception was thrown")
    print("debug information:")
    print(str(child))
```

It is also useful to log the child's input and out to a file or the screen. The following will turn on logging and send output to stdout (the screen):

```
child = pexpect.spawn(foo)
child.logfile = sys.stdout
```

2.5 Exceptions

EOF

Note that two flavors of EOF Exception may be thrown. They are virtually identical except for the message string. For practical purposes you should have no need to distinguish between them, but they do give a little extra information about what type of platform you are running. The two messages are:

- “End Of File (EOF) in read(). Exception style platform.”
- “End Of File (EOF) in read(). Empty string style platform.”

Some UNIX platforms will throw an exception when you try to read from a file descriptor in the EOF state. Other UNIX platforms instead quietly return an empty string to indicate that the EOF state has been reached.

If you wish to read up to the end of the child's output without generating an EOF exception then use the `expect(pexpect.EOF)` method.

TIMEOUT

The `expect()` and `read()` methods will also timeout if the child does not generate any output for a given amount of time. If this happens they will raise a `TIMEOUT` exception. You can have these method ignore a timeout and block indefinitely by passing `None` for the timeout parameter:

```
child.expect(pexpect.EOF, timeout=None)
```

API documentation

3.1 Core pexpect components

Pexpect is a Python module for spawning child applications and controlling them automatically. Pexpect can be used for automating interactive applications such as ssh, ftp, passwd, telnet, etc. It can be used to automate setup scripts for duplicating software package installations on different servers. It can be used for automated software testing. Pexpect is in the spirit of Don Libes' Expect, but Pexpect is pure Python. Other Expect-like modules for Python require TCL and Expect or require C extensions to be compiled. Pexpect does not use C, Expect, or TCL extensions. It should work on any platform that supports the standard Python pty module. The Pexpect interface focuses on ease of use so that simple tasks are easy.

There are two main interfaces to the Pexpect system; these are the function, `run()` and the class, `spawn`. The `spawn` class is more powerful. The `run()` function is simpler than `spawn`, and is good for quickly calling program. When you call the `run()` function it executes a given program and then returns the output. This is a handy replacement for `os.system()`.

For example:

```
pexpect.run('ls -la')
```

The `spawn` class is the more powerful interface to the Pexpect system. You can use this to spawn a child program then interact with it by sending input and expecting responses (waiting for patterns in the child's output).

For example:

```
child = pexpect.spawn('scp foo user@example.com:.')
child.expect('Password:')
child.sendline(mypassword)
```

This works even for commands that ask for passwords or other input outside of the normal stdio streams. For example, ssh reads input directly from the TTY device which bypasses stdin.

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Pexpect is free, open source, and all that good stuff. <http://pexpect.sourceforge.net/>

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3.1.1 spawn class

class pexpect.**spawn**(*command*, *args*=[], *timeout*=30, *maxread*=2000, *searchwindowsize*=None, *logfile*=None, *cwd*=None, *env*=None, *ignore_sighup*=True, *echo*=True)

This is the main class interface for Pexpect. Use this class to start and control child applications.

__init__(*command*, *args*=[], *timeout*=30, *maxread*=2000, *searchwindowsize*=None, *logfile*=None, *cwd*=None, *env*=None, *ignore_sighup*=True, *echo*=True)

This is the constructor. The command parameter may be a string that includes a command and any arguments to the command. For example:

```
child = pexpect.spawn('/usr/bin/ftp')
child = pexpect.spawn('/usr/bin/ssh user@example.com')
child = pexpect.spawn('ls -latr /tmp')
```

You may also construct it with a list of arguments like so:

```
child = pexpect.spawn('/usr/bin/ftp', [])
child = pexpect.spawn('/usr/bin/ssh', ['user@example.com'])
child = pexpect.spawn('ls', ['-latr', '/tmp'])
```

After this the child application will be created and will be ready to talk to. For normal use, see `expect()` and `send()` and `sendline()`.

Remember that Pexpect does NOT interpret shell meta characters such as redirect, pipe, or wild cards (>, |, or *). This is a common mistake. If you want to run a command and pipe it through another command then you must also start a shell. For example:

```
child = pexpect.spawn('/bin/bash -c "ls -l | grep LOG > logs.txt"')
child.expect(pexpect.EOF)
```

The second form of `spawn` (where you pass a list of arguments) is useful in situations where you wish to spawn a command and pass it its own argument list. This can make syntax more clear. For example, the following is equivalent to the previous example:

```
shell_cmd = 'ls -l | grep LOG > logs.txt'
child = pexpect.spawn('/bin/bash', ['-c', shell_cmd])
child.expect(pexpect.EOF)
```

The `maxread` attribute sets the read buffer size. This is maximum number of bytes that Pexpect will try to read from a TTY at one time. Setting the `maxread` size to 1 will turn off buffering. Setting the `maxread` value higher may help performance in cases where large amounts of output are read back from the child. This feature is useful in conjunction with `searchwindowsize`.

The `searchwindowsize` attribute sets the how far back in the incoming search buffer Pexpect will search for pattern matches. Every time Pexpect reads some data from the child it will append the data to the incoming

buffer. The default is to search from the beginning of the incoming buffer each time new data is read from the child. But this is very inefficient if you are running a command that generates a large amount of data where you want to match. The `searchwindowsize` does not affect the size of the incoming data buffer. You will still have access to the full buffer after `expect()` returns.

The `logfile` member turns on or off logging. All input and output will be copied to the given file object. Set `logfile` to `None` to stop logging. This is the default. Set `logfile` to `sys.stdout` to echo everything to standard output. The logfile is flushed after each write.

Example log input and output to a file:

```
child = pexpect.spawn('some_command')
fout = file('mylog.txt', 'w')
child.logfile = fout
```

Example log to stdout:

```
child = pexpect.spawn('some_command')
child.logfile = sys.stdout
```

The `logfile_read` and `logfile_send` members can be used to separately log the input from the child and output sent to the child. Sometimes you don't want to see everything you write to the child. You only want to log what the child sends back. For example:

```
child = pexpect.spawn('some_command')
child.logfile_read = sys.stdout
```

To separately log output sent to the child use `logfile_send`:

```
self.logfile_send = fout
```

If `ignore_sighup` is `True`, the child process will ignore `SIGHUP` signals. For now, the default is `True`, to preserve the behaviour of earlier versions of Pexpect, but you should pass this explicitly if you want to rely on it.

The `delaybeforesend` helps overcome a weird behavior that many users were experiencing. The typical problem was that a user would `expect()` a "Password:" prompt and then immediately call `sendline()` to send the password. The user would then see that their password was echoed back to them. Passwords don't normally echo. The problem is caused by the fact that most applications print out the "Password" prompt and then turn off `stdin` echo, but if you send your password before the application turned off echo, then you get your password echoed. Normally this wouldn't be a problem when interacting with a human at a real keyboard. If you introduce a slight delay just before writing then this seems to clear up the problem. This was such a common problem for many users that I decided that the default pexpect behavior should be to sleep just before writing to the child application. 1/20th of a second (50 ms) seems to be enough to clear up the problem. You can set `delaybeforesend` to 0 to return to the old behavior. Most Linux machines don't like this to be below 0.03. I don't know why.

Note that `spawn` is clever about finding commands on your path. It uses the same logic that "which" uses to find executables.

If you wish to get the exit status of the child you must call the `close()` method. The exit or signal status of the child will be stored in `self.exitstatus` or `self.signalstatus`. If the child exited normally then `exitstatus` will store the exit return code and `signalstatus` will be `None`. If the child was terminated abnormally with a signal then `signalstatus` will store the signal value and `exitstatus` will be `None`. If you need more detail you can also read the `self.status` member which stores the status returned by `os.waitpid`. You can interpret this using `os.WIFEXITED/os.WEXITSTATUS` or `os.WIFSIGNALED/os.TERMSIG`.

The `echo` attribute may be set to `False` to disable echoing of input. As a pseudo-terminal, all input echoed by the "keyboard" (`send()` or `sendline()`) will be repeated to output. For many cases, it is not desirable to

have echo enabled, and it may be later disabled using `setecho(False)` followed by `waitnoecho()`. However, for some platforms such as Solaris, this is not possible, and should be disabled immediately on spawn.

expect (*pattern, timeout=-1, searchwindowsize=-1*)

This seeks through the stream until a pattern is matched. The pattern is overloaded and may take several types. The pattern can be a `StringType`, EOF, a compiled re, or a list of any of those types. Strings will be compiled to re types. This returns the index into the pattern list. If the pattern was not a list this returns index 0 on a successful match. This may raise exceptions for EOF or TIMEOUT. To avoid the EOF or TIMEOUT exceptions add EOF or TIMEOUT to the pattern list. That will cause expect to match an EOF or TIMEOUT condition instead of raising an exception.

If you pass a list of patterns and more than one matches, the first match in the stream is chosen. If more than one pattern matches at that point, the leftmost in the pattern list is chosen. For example:

```
# the input is 'foobar'
index = p.expect(['bar', 'foo', 'foobar'])
# returns 1('foo') even though 'foobar' is a "better" match
```

Please note, however, that buffering can affect this behavior, since input arrives in unpredictable chunks. For example:

```
# the input is 'foobar'
index = p.expect(['foobar', 'foo'])
# returns 0('foobar') if all input is available at once,
# but returns 1('foo') if parts of the final 'bar' arrive late
```

After a match is found the instance attributes 'before', 'after' and 'match' will be set. You can see all the data read before the match in 'before'. You can see the data that was matched in 'after'. The `re.MatchObject` used in the re match will be in 'match'. If an error occurred then 'before' will be set to all the data read so far and 'after' and 'match' will be None.

If timeout is -1 then timeout will be set to the `self.timeout` value.

A list entry may be EOF or TIMEOUT instead of a string. This will catch these exceptions and return the index of the list entry instead of raising the exception. The attribute 'after' will be set to the exception type. The attribute 'match' will be None. This allows you to write code like this:

```
index = p.expect(['good', 'bad', pexpect.EOF, pexpect.TIMEOUT])
if index == 0:
    do_something()
elif index == 1:
    do_something_else()
elif index == 2:
    do_some_other_thing()
elif index == 3:
    do_something_completely_different()
```

instead of code like this:

```
try:
    index = p.expect(['good', 'bad'])
    if index == 0:
        do_something()
    elif index == 1:
        do_something_else()
except EOF:
    do_some_other_thing()
except TIMEOUT:
    do_something_completely_different()
```

These two forms are equivalent. It all depends on what you want. You can also just expect the EOF if you are waiting for all output of a child to finish. For example:

```
p = pexpect.spawn('/bin/ls')
p.expect(pexpect.EOF)
print p.before
```

If you are trying to optimize for speed then see `expect_list()`.

expect_exact (*pattern_list, timeout=-1, searchwindowsize=-1*)

This is similar to `expect()`, but uses plain string matching instead of compiled regular expressions in ‘`pattern_list`’. The ‘`pattern_list`’ may be a string; a list or other sequence of strings; or `TIMEOUT` and `EOF`.

This call might be faster than `expect()` for two reasons: string searching is faster than RE matching and it is possible to limit the search to just the end of the input buffer.

This method is also useful when you don’t want to have to worry about escaping regular expression characters that you want to match.

expect_list (*pattern_list, timeout=-1, searchwindowsize=-1*)

This takes a list of compiled regular expressions and returns the index into the `pattern_list` that matched the child output. The list may also contain `EOF` or `TIMEOUT`(which are not compiled regular expressions). This method is similar to the `expect()` method except that `expect_list()` does not recompile the pattern list on every call. This may help if you are trying to optimize for speed, otherwise just use the `expect()` method. This is called by `expect()`. If `timeout==-1` then the `self.timeout` value is used. If `searchwindowsize==-1` then the `self.searchwindowsize` value is used.

compile_pattern_list (*patterns*)

This compiles a pattern-string or a list of pattern-strings. Patterns must be a `StringType`, `EOF`, `TIMEOUT`, `SRE_Pattern`, or a list of those. Patterns may also be `None` which results in an empty list (you might do this if waiting for an `EOF` or `TIMEOUT` condition without expecting any pattern).

This is used by `expect()` when calling `expect_list()`. Thus `expect()` is nothing more than:

```
cpl = self.compile_pattern_list(pl)
return self.expect_list(cpl, timeout)
```

If you are using `expect()` within a loop it may be more efficient to compile the patterns first and then call `expect_list()`. This avoid calls in a loop to `compile_pattern_list()`:

```
cpl = self.compile_pattern_list(my_pattern)
while some_condition:
    ...
    i = self.expect_list(cpl, timeout)
    ...
```

send (*s*)

Sends string `s` to the child process, returning the number of bytes written. If a logfile is specified, a copy is written to that log.

sendline (*s=''*)

Wraps `send()`, sending string `s` to child process, with `os.linesep` automatically appended. Returns number of bytes written.

write (*s*)

This is similar to `send()` except that there is no return value.

writelines (*sequence*)

This calls `write()` for each element in the sequence. The sequence can be any iterable object producing strings, typically a list of strings. This does not add line separators. There is no return value.

sendcontrol (*char*)

Helper method that wraps send() with mnemonic access for sending control character to the child (such as Ctrl-C or Ctrl-D). For example, to send Ctrl-G (ASCII 7, bell, ‘\a’):

```
child.sendcontrol('g')
```

See also, sendintr() and sendeof().

sendeof ()

This sends an EOF to the child. This sends a character which causes the pending parent output buffer to be sent to the waiting child program without waiting for end-of-line. If it is the first character of the line, the read() in the user program returns 0, which signifies end-of-file. This means to work as expected a sendeof() has to be called at the beginning of a line. This method does not send a newline. It is the responsibility of the caller to ensure the eof is sent at the beginning of a line.

sendintr ()

This sends a SIGINT to the child. It does not require the SIGINT to be the first character on a line.

read (*size=-1*)

This reads at most “size” bytes from the file (less if the read hits EOF before obtaining size bytes). If the size argument is negative or omitted, read all data until EOF is reached. The bytes are returned as a string object. An empty string is returned when EOF is encountered immediately.

readline (*size=-1*)

This reads and returns one entire line. The newline at the end of line is returned as part of the string, unless the file ends without a newline. An empty string is returned if EOF is encountered immediately. This looks for a newline as a CR/LF pair (rn) even on UNIX because this is what the pseudotty device returns. So contrary to what you may expect you will receive newlines as rn.

If the size argument is 0 then an empty string is returned. In all other cases the size argument is ignored, which is not standard behavior for a file-like object.

read_nonblocking (*size=1, timeout=-1*)

This reads at most size characters from the child application. It includes a timeout. If the read does not complete within the timeout period then a TIMEOUT exception is raised. If the end of file is read then an EOF exception will be raised. If a log file was set using setlog() then all data will also be written to the log file.

If timeout is None then the read may block indefinitely. If timeout is -1 then the self.timeout value is used. If timeout is 0 then the child is polled and if there is no data immediately ready then this will raise a TIMEOUT exception.

The timeout refers only to the amount of time to read at least one character. This is not effected by the ‘size’ parameter, so if you call read_nonblocking(size=100, timeout=30) and only one character is available right away then one character will be returned immediately. It will not wait for 30 seconds for another 99 characters to come in.

This is a wrapper around os.read(). It uses select.select() to implement the timeout.

eof ()

This returns True if the EOF exception was ever raised.

interact (*escape_character='x1d', input_filter=None, output_filter=None*)

This gives control of the child process to the interactive user (the human at the keyboard). Keystrokes are sent to the child process, and the stdout and stderr output of the child process is printed. This simply echos the child stdout and child stderr to the real stdout and it echos the real stdin to the child stdin. When the user types the escape_character this method will stop. The default for escape_character is ^]. This should not be confused with ASCII 27 – the ESC character. ASCII 29 was chosen for historical merit because this is the character used by ‘telnet’ as the escape character. The escape_character will not be sent to the child process.

You may pass in optional input and output filter functions. These functions should take a string and return a string. The `output_filter` will be passed all the output from the child process. The `input_filter` will be passed all the keyboard input from the user. The `input_filter` is run BEFORE the check for the `escape_character`.

Note that if you change the window size of the parent the SIGWINCH signal will not be passed through to the child. If you want the child window size to change when the parent's window size changes then do something like the following example:

```
import pexpect, struct, fcntl, termios, signal, sys
def sigwinch_passthrough (sig, data):
    s = struct.pack("HHHH", 0, 0, 0, 0)
    a = struct.unpack('hhhh', fcntl.ioctl(sys.stdout.fileno(),
        termios.TIOCGWINSZ , s))
    global p
    p.setwinsize(a[0],a[1])
# Note this 'p' global and used in sigwinch_passthrough.
p = pexpect.spawn('/bin/bash')
signal.signal(signal.SIGWINCH, sigwinch_passthrough)
p.interact()
```

logfile

logfile_read

logfile_send

Set these to a Python file object (or `sys.stdout`) to log all communication, data read from the child process, or data sent to the child process.

Note: With a `spawn` instance, the log files should be open for writing binary data. With a `spawnu` instance, they should be open for writing unicode text.

Controlling the child process

class `pexpect.spawn`

kill (*sig*)

This sends the given signal to the child application. In keeping with UNIX tradition it has a misleading name. It does not necessarily kill the child unless you send the right signal.

terminate (*force=False*)

This forces a child process to terminate. It starts nicely with SIGHUP and SIGINT. If “force” is True then moves onto SIGKILL. This returns True if the child was terminated. This returns False if the child could not be terminated.

isalive ()

This tests if the child process is running or not. This is non-blocking. If the child was terminated then this will read the `exitstatus` or `signalstatus` of the child. This returns True if the child process appears to be running or False if not. It can take literally SECONDS for Solaris to return the right status.

wait ()

This waits until the child exits. This is a blocking call. This will not read any data from the child, so this will block forever if the child has unread output and has terminated. In other words, the child may have printed output then called `exit()`, but, the child is technically still alive until its output is read by the parent.

close (*force=True*)

This closes the connection with the child application. Note that calling `close()` more than once is valid. This emulates standard Python behavior with files. Set `force` to True if you want to make sure that the child is terminated (SIGKILL is sent if the child ignores SIGHUP and SIGINT).

getwinsize()

This returns the terminal window size of the child tty. The return value is a tuple of (rows, cols).

setwinsize(rows, cols)

This sets the terminal window size of the child tty. This will cause a SIGWINCH signal to be sent to the child. This does not change the physical window size. It changes the size reported to TTY-aware applications like vi or curses – applications that respond to the SIGWINCH signal.

getecho()

This returns the terminal echo mode. This returns True if echo is on or False if echo is off. Child applications that are expecting you to enter a password often set ECHO False. See waitnoecho().

Not supported on platforms where isatty() returns False.

setecho(state)

This sets the terminal echo mode on or off. Note that anything the child sent before the echo will be lost, so you should be sure that your input buffer is empty before you call setecho(). For example, the following will work as expected:

```
p = pexpect.spawn('cat') # Echo is on by default.
p.sendline('1234') # We expect see this twice from the child...
p.expect(['1234']) # ... once from the tty echo...
p.expect(['1234']) # ... and again from cat itself.
p.setecho(False) # Turn off tty echo
p.sendline('abcd') # We will set this only once (echoed by cat).
p.sendline('wxyz') # We will set this only once (echoed by cat)
p.expect(['abcd'])
p.expect(['wxyz'])
```

The following WILL NOT WORK because the lines sent before the setecho will be lost:

```
p = pexpect.spawn('cat')
p.sendline('1234')
p.setecho(False) # Turn off tty echo
p.sendline('abcd') # We will set this only once (echoed by cat).
p.sendline('wxyz') # We will set this only once (echoed by cat)
p.expect(['1234'])
p.expect(['1234'])
p.expect(['abcd'])
p.expect(['wxyz'])
```

Not supported on platforms where isatty() returns False.

waitnoecho(timeout=-1)

This waits until the terminal ECHO flag is set False. This returns True if the echo mode is off. This returns False if the ECHO flag was not set False before the timeout. This can be used to detect when the child is waiting for a password. Usually a child application will turn off echo mode when it is waiting for the user to enter a password. For example, instead of expecting the “password:” prompt you can wait for the child to set ECHO off:

```
p = pexpect.spawn('ssh user@example.com')
p.waitnoecho()
p.sendline(mypassword)
```

If timeout==-1 then this method will use the value in self.timeout. If timeout==None then this method to block until ECHO flag is False.

pid

The process ID of the child process.

child_fd

The file descriptor used to communicate with the child process.

Handling unicode

For backwards compatibility, `spawn` can handle some Unicode: its send methods will encode arbitrary unicode as UTF-8 before sending it to the child process, and its expect methods can accept ascii-only unicode strings. However, for a proper unicode API to a subprocess, use this subclass:

```
class pexpect.spawnu (*args, **kwargs)
```

```
    Bases: pexpect.spawn
```

Works like `spawn`, but accepts and returns unicode strings.

Extra parameters:

Parameters

- **encoding** – The encoding to use for communications (default: ‘utf-8’)
- **errors** – How to handle encoding/decoding errors; one of ‘strict’ (the default), ‘ignore’, or ‘replace’, as described for `decode()` and `encode()`.

There is also a `runu()` function, the unicode counterpart to `run()`.

Note: Unicode handling with pexpect works the same way on Python 2 and 3, despite the difference in names. I.e.:

- `spawn` works with `str` on Python 2, and `bytes` on Python 3,
 - `spawnu` works with `unicode` on Python 2, and `str` on Python 3.
-

3.1.2 run function

```
pexpect.run (command, timeout=-1, withexitstatus=False, events=None, extra_args=None, logfile=None,
            cwd=None, env=None)
```

This function runs the given command; waits for it to finish; then returns all output as a string. `STDERR` is included in output. If the full path to the command is not given then the path is searched.

Note that lines are terminated by CR/LF (rn) combination even on UNIX-like systems because this is the standard for pseudotys. If you set ‘withexitstatus’ to true, then `run` will return a tuple of (command_output, exitstatus). If ‘withexitstatus’ is false then this returns just command_output.

The `run()` function can often be used instead of creating a `spawn` instance. For example, the following code uses `spawn`:

```
from pexpect import *
child = spawn('scp foo user@example.com:.')
child.expect('(?)password')
child.sendline(mypassword)
```

The previous code can be replace with the following:

```
from pexpect import *
run('scp foo user@example.com:.', events={'(?)password': mypassword})
```

Examples

Start the apache daemon on the local machine:

```
from pexpect import *
run("/usr/local/apache/bin/apachectl start")
```

Check in a file using SVN:

```
from pexpect import *
run("svn ci -m 'automatic commit' my_file.py")
```

Run a command and capture exit status:

```
from pexpect import *
(command_output, exitstatus) = run('ls -l /bin', withexitstatus=1)
```

The following will run SSH and execute 'ls -l' on the remote machine. The password 'secret' will be sent if the '(?i)password' pattern is ever seen:

```
run("ssh username@machine.example.com 'ls -l'",
    events={'(?i)password': 'secret\n'})
```

This will start mencoder to rip a video from DVD. This will also display progress ticks every 5 seconds as it runs. For example:

```
from pexpect import *
def print_ticks(d):
    print d['event_count'],
run("mencoder dvd://1 -o video.avi -oac copy -ovc copy",
    events={TIMEOUT:print_ticks}, timeout=5)
```

The 'events' argument should be a dictionary of patterns and responses. Whenever one of the patterns is seen in the command out run() will send the associated response string. Note that you should put newlines in your string if Enter is necessary. The responses may also contain callback functions. Any callback is function that takes a dictionary as an argument. The dictionary contains all the locals from the run() function, so you can access the child spawn object or any other variable defined in run() (event_count, child, and extra_args are the most useful). A callback may return True to stop the current run process otherwise run() continues until the next event. A callback may also return a string which will be sent to the child. 'extra_args' is not used by directly run(). It provides a way to pass data to a callback function through run() through the locals dictionary passed to a callback.

`pexpect.runu(command, timeout=-1, withexitstatus=False, events=None, extra_args=None, logfile=None, cwd=None, env=None, **kwargs)`

This offers the same interface as `run()`, but using unicode.

Like `spawnu`, you can pass `encoding` and `errors` parameters, which will be used for both input and output.

3.1.3 Exceptions

class `pexpect.EOF` (*value*)

Raised when EOF is read from a child. This usually means the child has exited.

class `pexpect.TIMEOUT` (*value*)

Raised when a read time exceeds the timeout.

class `pexpect.ExceptionPexpect` (*value*)

Base class for all exceptions raised by this module.

3.1.4 Utility functions

`pexpect.which(filename)`

This takes a given filename; tries to find it in the environment path; then checks if it is executable. This returns the full path to the filename if found and executable. Otherwise this returns None.

`pexpect.split_command_line(command_line)`

This splits a command line into a list of arguments. It splits arguments on spaces, but handles embedded quotes, doublequotes, and escaped characters. It's impossible to do this with a regular expression, so I wrote a little state machine to parse the command line.

3.2 fdpexpect - use pexpect with a file descriptor

This is like pexpect, but it will work with any file descriptor that you pass it. You are responsible for opening and close the file descriptor. This allows you to use Pexpect with sockets and named pipes (FIFOs).

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3.2.1 fdspawn class

`class pexpect.fdpexpect.fdspawn(fd, args=[], timeout=30, maxread=2000, searchwindow-size=None, logfile=None)`

Bases: `pexpect.spawn`

This is like `pexpect.spawn` but allows you to supply your own open file descriptor. For example, you could use it to read through a file looking for patterns, or to control a modem or serial device.

`__init__(fd, args=[], timeout=30, maxread=2000, searchwindow-size=None, logfile=None)`

This takes a file descriptor (an int) or an object that support the `fileno()` method (returning an int). All Python file-like objects support `fileno()`.

`isalive()`

This checks if the file descriptor is still valid. If `os.fstat()` does not raise an exception then we assume it is alive.

`close()`

Close the file descriptor.

Calling this method a second time does nothing, but if the file descriptor was closed elsewhere, `OSError` will be raised.

Note: `fdspawn` inherits all of the methods of `spawn`, but not all of them can be used, especially if the file descriptor is not a terminal. Some methods may do nothing (e.g. `kill()`), while others will raise an exception (e.g. `terminate()`). This behaviour might be made more consistent in the future, so try to avoid relying on it.

3.3 replwrap - Control read-eval-print-loops

Generic wrapper for read-eval-print-loops, a.k.a. interactive shells

New in version 3.3.

```
class pexpect.replwrap.REPLWrapper(cmd_or_spawn, orig_prompt, prompt_change,
                                   new_prompt=u'[PEXPECT_PROMPT>', continuation_prompt=u'[PEXPECT_PROMPT+')
    Wrapper for a REPL.
```

Parameters

- **cmd_or_spawn** – This can either be an instance of `pexpect.spawn` in which a REPL has already been started, or a str command to start a new REPL process.
- **orig_prompt** (*str*) – The prompt to expect at first.
- **prompt_change** (*str*) – A command to change the prompt to something more unique. If this is `None`, the prompt will not be changed. This will be formatted with the new and continuation prompts as positional parameters, so you can use `{ }` style formatting to insert them into the command.
- **new_prompt** (*str*) – The more unique prompt to expect after the change.

```
run_command(command, timeout=-1)
```

Send a command to the REPL, wait for and return output.

Parameters

- **command** (*str*) – The command to send. Trailing newlines are not needed. This should be a complete block of input that will trigger execution; if a continuation prompt is found after sending input, `ValueError` will be raised.
- **timeout** (*int*) – How long to wait for the next prompt. `-1` means the default from the `pexpect.spawn` object (default 30 seconds). `None` means to wait indefinitely.

```
pexpect.replwrap.PEXPECT_PROMPT
```

A string that can be used as a prompt, and is unlikely to be found in output.

Using the objects above, it is easy to wrap a REPL. For instance, to use a Python shell:

```
py = REPLWrapper("python", ">>> ", "import sys; sys.ps1={!r}; sys.ps2={!r}")
py.run_command("4+7")
```

Convenience functions are provided for Python and bash shells:

```
pexpect.replwrap.python(command='python')
```

Start a Python shell and return a `REPLWrapper` object.

```
pexpect.replwrap.bash(command='bash', orig_prompt=<_sre.SRE_Pattern object at
                    0x7f3d4ff310c8>)
```

Start a bash shell and return a `REPLWrapper` object.

3.4 pxssh - control an SSH session

This class extends `pexpect.spawn` to specialize setting up SSH connections. This adds methods for login, logout, and expecting the shell prompt.

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```
class pexpect.pxssh.ExceptionPxssh(value)
    Raised for pxssh exceptions.
```

3.4.1 pxssh class

```
class pexpect.pxssh.pxssh(timeout=30, maxread=2000, searchwindowsize=None, logfile=None,
                          cwd=None, env=None)
```

This class extends `pexpect.spawn` to specialize setting up SSH connections. This adds methods for login, logout, and expecting the shell prompt. It does various tricky things to handle many situations in the SSH login process. For example, if the session is your first login, then `pxssh` automatically accepts the remote certificate; or if you have public key authentication setup then `pxssh` won't wait for the password prompt.

`pxssh` uses the shell prompt to synchronize output from the remote host. In order to make this more robust it sets the shell prompt to something more unique than just `$` or `#`. This should work on most Bourne/Bash or Csh style shells.

Example that runs a few commands on a remote server and prints the result:

```
import pxssh
import getpass
try:
    s = pxssh.pxssh()
    hostname = raw_input('hostname: ')
    username = raw_input('username: ')
    password = getpass.getpass('password: ')
    s.login(hostname, username, password)
    s.sendline('uptime')    # run a command
    s.prompt()              # match the prompt
    print(s.before)        # print everything before the prompt.
    s.sendline('ls -l')
    s.prompt()
    print(s.before)
    s.sendline('df')
    s.prompt()
    print(s.before)
```

```
s.logout()
except pxssh.ExceptionPxssh as e:
    print("pxssh failed on login.")
    print(e)
```

Note that if you have ssh-agent running while doing development with pxssh then this can lead to a lot of confusion. Many X display managers (xdm, gdm, kdm, etc.) will automatically start a GUI agent. You may see a GUI dialog box popup asking for a password during development. You should turn off any key agents during testing. The `force_password` attribute will turn off public key authentication. This will only work if the remote SSH server is configured to allow password logins. Example of using `force_password` attribute:

```
s = pxssh.pxssh()
s.force_password = True
hostname = raw_input('hostname: ')
username = raw_input('username: ')
password = getpass.getpass('password: ')
s.login(hostname, username, password)
```

```
__init__(timeout=30, maxread=2000, searchwindowsize=None, logfile=None, cwd=None,
         env=None)
```

PROMPT

The regex pattern to search for to find the prompt. If you call `login()` with `auto_prompt_reset=False`, you must set this attribute manually.

force_password

If this is set to True, public key authentication is disabled, forcing the server to ask for a password. Note that the sysadmin can disable password logins, in which case this won't work.

```
login(server, username, password='', terminal_type='ansi', original_prompt='[#$]', login_timeout=10, port=None, auto_prompt_reset=True, ssh_key=None, quiet=True, sync_multiplier=1, check_local_ip=True)
```

This logs the user into the given server.

It uses `original_prompt` to try to find the prompt right after login. When it finds the prompt it immediately tries to reset the prompt to something more easily matched. The default `original_prompt` is very optimistic and is easily fooled. It's more reliable to try to match the original prompt as exactly as possible to prevent false matches by server strings such as the "Message Of The Day". On many systems you can disable the MOTD on the remote server by creating a zero-length file called `~/.hushlogin` on the remote server. If a prompt cannot be found then this will not necessarily cause the login to fail. In the case of a timeout when looking for the prompt we assume that the original prompt was so weird that we could not match it, so we use a few tricks to guess when we have reached the prompt. Then we hope for the best and blindly try to reset the prompt to something more unique. If that fails then `login()` raises an `ExceptionPxssh` exception.

In some situations it is not possible or desirable to reset the original prompt. In this case, pass `auto_prompt_reset=False` to inhibit setting the prompt to the `UNIQUE_PROMPT`. Remember that pxssh uses a unique prompt in the `prompt()` method. If the original prompt is not reset then this will disable the `prompt()` method unless you manually set the `PROMPT` attribute.

logout()

Sends exit to the remote shell.

If there are stopped jobs then this automatically sends exit twice.

prompt(timeout=-1)

Match the next shell prompt.

This is little more than a short-cut to the `expect()` method. Note that if you called `login()` with `auto_prompt_reset=False`, then before calling `prompt()` you must set the `PROMPT` attribute to

a regex that it will use for matching the prompt.

Calling `prompt()` will erase the contents of the `before` attribute even if no prompt is ever matched. If timeout is not given or it is set to -1 then `self.timeout` is used.

Returns True if the shell prompt was matched, False if the timeout was reached.

`sync_original_prompt` (*sync_multiplier=1.0*)

This attempts to find the prompt. Basically, press enter and record the response; press enter again and record the response; if the two responses are similar then assume we are at the original prompt. This can be a slow function. Worst case with the default `sync_multiplier` can take 12 seconds. Low latency connections are more likely to fail with a low `sync_multiplier`. Best case sync time gets worse with a high `sync_multiplier` (500 ms with default).

`set_unique_prompt` ()

This sets the remote prompt to something more unique than `#` or `$`. This makes it easier for the `prompt()` method to match the shell prompt unambiguously. This method is called automatically by the `login()` method, but you may want to call it manually if you somehow reset the shell prompt. For example, if you `'su'` to a different user then you will need to manually reset the prompt. This sends shell commands to the remote host to set the prompt, so this assumes the remote host is ready to receive commands.

Alternatively, you may use your own prompt pattern. In this case you should call `login()` with `auto_prompt_reset=False`; then set the `PROMPT` attribute to a regular expression. After that, the `prompt()` method will try to match your prompt pattern.

3.5 screen - manage a virtual 'screen'

This implements a virtual screen. This is used to support ANSI terminal emulation. The screen representation and state is implemented in this class. Most of the methods are inspired by ANSI screen control codes. The `ANSI` class extends this class to add parsing of ANSI escape codes.

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class `pexpect.screen.screen` (*r=24, c=80*)

This object maintains the state of a virtual text screen as a rectangular array. This maintains a virtual cursor position and handles scrolling as characters are added. This supports most of the methods needed by an ANSI text screen. Row and column indexes are 1-based (not zero-based, like arrays).

`__init__` (*r=24, c=80*)

This initializes a blank screen of the given dimensions.

`__str__` ()

This returns a printable representation of the screen. The end of each screen line is terminated by a newline.

clear_all_tabs ()

Clears all tabs.

clear_tab ()

Clears tab at the current position.

cr ()

This moves the cursor to the beginning (col 1) of the current row.

crlf ()

This advances the cursor with CRLF properties. The cursor will line wrap and the screen may scroll.

cursor_constrain ()

This keeps the cursor within the screen area.

cursor_force_position (r, c)

Identical to Cursor Home.

cursor_restore_attrs ()

Restores cursor position after a Save Cursor.

cursor_save ()

Save current cursor position.

cursor_save_attrs ()

Save current cursor position.

cursor_unsave ()

Restores cursor position after a Save Cursor.

dump ()

This returns a copy of the screen as a string. This is similar to `__str__` except that lines are not terminated with line feeds.

erase_down ()

Erases the screen from the current line down to the bottom of the screen.

erase_end_of_line ()

Erases from the current cursor position to the end of the current line.

erase_line ()

Erases the entire current line.

erase_screen ()

Erases the screen with the background color.

erase_start_of_line ()

Erases from the current cursor position to the start of the current line.

erase_up ()

Erases the screen from the current line up to the top of the screen.

get_region (rs, cs, re, ce)

This returns a list of lines representing the region.

insert_abs (r, c, ch)

This inserts a character at (r,c). Everything under and to the right is shifted right one character. The last character of the line is lost.

lf ()

This moves the cursor down with scrolling.

newline ()

This is an alias for `crlf()`.

pretty ()

This returns a copy of the screen as a string with an ASCII text box around the screen border. This is similar to `__str__` except that it adds a box.

put (ch)

This puts a characters at the current cursor position.

put_abs (r, c, ch)

Screen array starts at 1 index.

scroll_constrain ()

This keeps the scroll region within the screen region.

scroll_down ()

Scroll display down one line.

scroll_screen ()

Enable scrolling for entire display.

scroll_screen_rows (rs, re)

Enable scrolling from row {start} to row {end}.

scroll_up ()

Scroll display up one line.

set_tab ()

Sets a tab at the current position.

3.6 ANSI - ANSI (VT100) terminal emulator

This implements an ANSI (VT100) terminal emulator as a subclass of screen.

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```
class pexpect.ANSI.term (r=24, c=80)
```

Bases: `pexpect.screen.screen`

This class is an abstract, generic terminal. This does nothing. This is a placeholder that provides a common base class for other terminals such as an ANSI terminal.

```
class pexpect.ANSI.ANSI (r=24, c=80)
```

Bases: `pexpect.ANSI.term`

This class implements an ANSI (VT100) terminal. It is a stream filter that recognizes ANSI terminal escape sequences and maintains the state of a screen object.

write_ch (*ch*)

This puts a character at the current cursor position. The cursor position is moved forward with wrap-around, but no scrolling is done if the cursor hits the lower-right corner of the screen.

write (*s*)

Process text, writing it to the virtual screen while handling ANSI escape codes.

process (*c*)

Process a single byte. Called by `write()`.

Examples

Under the distribution tarball directory you should find an “examples” directory. This is the best way to learn to use Pexpect. See the descriptions of Pexpect Examples.

topip.py This runs *netstat* on a local or remote server. It calculates some simple statistical information on the number of external inet connections. This can be used to detect if one IP address is taking up an excessive number of connections. It can also send an email alert if a given IP address exceeds a threshold between runs of the script. This script can be used as a drop-in Munin plugin or it can be used stand-alone from cron. I used this on a busy web server that would sometimes get hit with denial of service attacks. This made it easy to see if a script was opening many multiple connections. A typical browser would open fewer than 10 connections at once. A script might open over 100 simultaneous connections.

hive.py This script creates SSH connections to a list of hosts that you provide. Then you are given a command line prompt. Each shell command that you enter is sent to all the hosts. The response from each host is collected and printed. For example, you could connect to a dozen different machines and reboot them all at once.

script.py This implements a command similar to the classic BSD “script” command. This will start a subshell and log all input and output to a file. This demonstrates the `interact()` method of Pexpect.

ftp.py This demonstrates an FTP “bookmark”. This connects to an ftp site; does a few ftp tasks; and then gives the user interactive control over the session. In this case the “bookmark” is to a directory on the OpenBSD ftp server. It puts you in the `i386` packages directory. You can easily modify this for other sites. This demonstrates the `interact()` method of Pexpect.

monitor.py This runs a sequence of commands on a remote host using SSH. It runs a simple system checks such as uptime and free to monitor the state of the remote host.

passmass.py This will login to each given server and change the password of the given user. This demonstrates scripting logins and passwords.

python.py This starts the python interpreter and prints the greeting message backwards. It then gives the user interactive control of Python. It’s pretty useless!

ssh_tunnel.py This starts an SSH tunnel to a remote machine. It monitors the connection and restarts the tunnel if it goes down.

uptime.py This will run the uptime command and parse the output into variables. This demonstrates using a single regular expression to match the output of a command and capturing different variable in match groups. The grouping regular expression handles a wide variety of different uptime formats.

Q: Why don't shell pipe and redirect (| and >) work when I spawn a command?

A: Remember that Pexpect does NOT interpret shell meta characters such as redirect, pipe, or wild cards (>, |, or *). That's done by a shell not the command you are spawning. This is a common mistake. If you want to run a command and pipe it through another command then you must also start a shell. For example:

```
child = pexpect.spawn('/bin/bash -c "ls -l | grep LOG > log_list.txt"')
child.expect(pexpect.EOF)
```

The second form of spawn (where you pass a list of arguments) is useful in situations where you wish to spawn a command and pass it its own argument list. This can make syntax more clear. For example, the following is equivalent to the previous example:

```
shell_cmd = 'ls -l | grep LOG > log_list.txt'
child = pexpect.spawn('/bin/bash', ['-c', shell_cmd])
child.expect(pexpect.EOF)
```

Q: Isn't there already a Python Expect?

A: Yes, there are several of them. They usually require you to compile C. I wanted something that was pure Python and preferably a single module that was simple to install. I also wanted something that was easy to use. This pure Python expect only became possible with the introduction of the pty module in the standard Python library. Previously, C extensions were required.

Q: The 'before' and 'after' properties sound weird.

A: This is how the -B and -A options in grep works, so that made it easier for me to remember. Whatever makes my life easier is what's best. Originally I was going to model Pexpect after Expect, but then I found that I didn't actually like the way Expect did some things. It was more confusing. The *after* property can be a little confusing at first, because it will actually include the matched string. The *after* means after the point of match, not after the matched string.

Q: Why not just use Expect?

A: I love it. It's great. It has bailed me out of some real jams, but I wanted something that would do 90% of what I need from Expect; be 10% of the size; and allow me to write my code in Python instead of TCL. Pexpect is not nearly as big as Expect, but Pexpect does everything I have ever used Expect for. **Q: Why not just use a pipe (popen())?**

A: A pipe works fine for getting the output to non-interactive programs. If you just want to get the output from ls, uname, or ping then this works. Pipes do not work very well for interactive programs and pipes will almost certainly fail for most applications that ask for passwords such as telnet, ftp, or ssh.

There are two reasons for this.

- First an application may bypass stdout and print directly to its controlling TTY. Something like SSH will do this when it asks you for a password. This is why you cannot redirect the password prompt because it does not go through stdout or stderr.
- The second reason is because most applications are built using the C Standard IO Library (anything that uses `#include <stdio.h>`). One of the features of the stdio library is that it buffers all input and output. Normally output is line buffered when a program is printing to a TTY (your terminal screen). Everytime the program prints a line-feed the currently buffered data will get printed to your screen. The problem comes when you connect a pipe. The stdio library is smart and can tell that it is printing to a pipe instead of a TTY. In that case it switches from line buffer mode to block buffered. In this mode the currently buffered data is flushed when the buffer is full. This causes most interactive programs to deadlock. Block buffering is more efficient when writing to disks and pipes. Take the situation where a program prints a message "Enter your user name:\n" and then waits for you type type something. In block buffered mode, the stdio library will not put the message into the pipe even though a linefeed is printed. The result is that you never receive the message, yet the child application will sit and wait for you to type a response. Don't confuse the stdio lib's buffer with the pipe's buffer. The pipe buffer is another area that can cause problems. You could flush the input side of a pipe, whereas you have no control over the stdio library buffer.

More information: the Standard IO library has three states for a FILE *. These are: `_IOFBF` for block buffered; `_IOLBF` for line buffered; and `_IONBF` for unbuffered. The STDIO lib will use block buffering when talking to a block file descriptor such as a pipe. This is usually not helpful for interactive programs. Short of recompiling your program to include `fflush()` everywhere or recompiling a custom stdio library there is not much a controlling application can do about this if talking over a pipe.

The program may have put data in its output that remains unflushed because the output buffer is not full; then the program will go and deadlock while waiting for input – because you never send it any because you are still waiting for its output (still stuck in the STDIO's output buffer).

The answer is to use a pseudo-tty. A TTY device will force line buffering (as opposed to block buffering). Line buffering means that you will get each line when the child program sends a line feed. This corresponds to the way most interactive programs operate – send a line of output then wait for a line of input.

I put "answer" in quotes because it's ugly solution and because there is no POSIX standard for pseudo-TTY devices (even though they have a TTY standard...). What would make more sense to me would be to have some way to set a mode on a file descriptor so that it will tell the STDIO to be line-buffered. I have investigated, and I don't think there is a way to set the buffered state of a child process. The STDIO Library does not maintain any external state in the kernel or whatnot, so I don't think there is any way for you to alter it. I'm not quite sure how this line-buffered/block-buffered state change happens internally in the STDIO library. I think the STDIO lib looks at the file descriptor and decides to change behavior based on whether it's a TTY or a block file (see `isatty()`).

I hope that this qualifies as helpful. Don't use a pipe to control another application.

Q: Can I do screen scraping with this thing?

A: That depends. If your application just does line-oriented output then this is easy. If it does screen-oriented output then it may work, but it could be hard. For example, trying to scrape data from the 'top' command would be hard. The top command repaints the text window.

I am working on an ANSI / VT100 terminal emulator that will have methods to get characters from an arbitrary X,Y coordinate of the virtual screen. It works and you can play with it (see `pexpect.ANSI`), but I have no working examples at this time.

Common problems

6.1 Threads

On Linux (RH 8) you cannot spawn a child from a different thread and pass the handle back to a worker thread. The child is successfully spawned but you can't interact with it. The only way to make it work is to spawn and interact with the child all in the same thread. [Adam Kerrison]

6.2 Timing issue with `send()` and `sendline()`

This problem has been addressed and should not affect most users.

It is sometimes possible to read an echo of the string sent with `send()` and `sendline()`. If you call `send()` and then immediately call `readline()`, you may get part of your output echoed back. You may read back what you just wrote even if the child application does not explicitly echo it. Timing is critical. This could be a security issue when talking to an application that asks for a password; otherwise, this does not seem like a big deal. But why do TTYs do this?

People usually report this when they are trying to control SSH or some other login. For example, if your code looks something like this:

```
child.expect ('[pP]assword:')
child.sendline (my_password)
```

1. SSH prints "password:" prompt to the user.
2. SSH turns off echo on the TTY device.
3. SSH waits for user to enter a password.

When scripting with Pexpect what can happen is that Pexpect will respond to the "password:" prompt before SSH has had time to turn off TTY echo. In other words, Pexpect sends the password between steps 1. and 2., so the password gets echoed back to the TTY. I would call this an SSH bug.

Pexpect now automatically adds a short delay before sending data to a child process. This more closely mimics what happens in the usual human-to-app interaction. The delay can be tuned with the `delaybeforesend` attribute of the spawn class. In general, this fixes the problem for everyone and so this should not be an issue for most users. For some applications you might wish to turn it off:

```
child = pexpect.spawn ("ssh user@example.com")
child.delaybeforesend = 0
```

6.3 Timing issue with `isalive()`

Reading the state of `isalive()` immediately after a child exits may sometimes return 1. This is a race condition. The child has closed its file descriptor, but has not yet fully exited before Pexpect's `isalive()` executes. Adding a slight delay before the `isalive()` call will help. For example:

```
child = pexpect.spawn('ls')
child.expect(pexpect.EOF)
time.sleep(0.1)
print child.isalive()
```

6.4 Truncated output just before child exits

So far I have seen this only on older versions of Apple's MacOS X. If the child application quits it may not flush its output buffer. This means that your Pexpect application will receive an EOF even though it should have received a little more data before the child died. This is not generally a problem when talking to interactive child applications. One example where it is a problem is when trying to read output from a program like `ls`. You may receive most of the directory listing, but the last few lines will get lost before you receive an EOF. The reason for this is that `ls` runs; completes its task; and then exits. The buffer is not flushed before exit so the last few lines are lost. The following example demonstrates the problem:

```
child = pexpect.spawn('ls -l')
child.expect(pexpect.EOF)
print child.before
```

6.5 Controlling SSH on Solaris

Pexpect does not yet work perfectly on Solaris. One common problem is that SSH sometimes will not allow TTY password authentication. For example, you may expect SSH to ask you for a password using code like this:

```
child = pexpect.spawn('ssh user@example.com')
child.expect('assword')
child.sendline('mypassword')
```

You may see the following error come back from a spawned child SSH:

```
Permission denied (publickey,keyboard-interactive).
```

This means that SSH thinks it can't access the TTY to ask you for your password. The only solution I have found is to use public key authentication with SSH. This bypasses the need for a password. I'm not happy with this solution. The problem is due to poor support for Solaris Pseudo TTYs in the Python Standard Library.

7.1 Releases

7.1.1 Version 3.3

- Added a mechanism to wrap REPLs, or shells, in an object which can conveniently be used to send commands and wait for the output (`pexpect.replwrap`).
- Fixed issue where pexpect would attempt to execute a directory because it has the ‘execute’ bit set (#37).
- Removed the `pexpect.psh` module. This was never documented, and we found no evidence that people use it. The new `pexpect.replwrap` module provides a more flexible alternative.
- Fixed `TypeError: got <type 'str'> ('\r\n')` as pattern in `spawnu.readline()` method (#67).
- Fixed issue where EOF was not correctly detected in `interact()`, causing a repeating loop of output on Linux, and blocking before EOF on BSD and Solaris (#49).
- Several Solaris (SmartOS) bugfixes, preventing `IOError` exceptions, especially when used with `cron(1)` (#44).
- Added new keyword argument `echo=True` for `spawn`. On SVR4-like systems, the method `isatty()` will always return `False`: the child pty does not appear as a terminal. Therefore, `setecho()`, `getwinsize()`, `setwinsize()`, and `waitnoecho()` are not supported on those platforms.

After this, we intend to start working on a bigger refactoring of the code, to be released as Pexpect 4. There may be more bugfix 3.x releases, however.

7.1.2 Version 3.2

- Fix exception handling from `select.select()` on Python 2 (PR #38). This was accidentally broken in the previous release when it was fixed for Python 3.
- Removed a workaround for `TIOCSWINSZ` on very old systems, which was causing issues on some BSD systems (PR #40).
- Fixed an issue with exception handling in `pxssh` (PR #43)

The documentation for `pxssh` was improved.

7.1.3 Version 3.1

- Fix an issue that prevented importing pexpect on Python 3 when `sys.stdout` was reassigned (PR #30).
- Improve prompt synchronisation in `pxssh` (PR #28).
- Fix pickling exception instances (PR #34).
- Fix handling exceptions from `select.select()` on Python 3 (PR #33).

The examples have also been cleaned up somewhat - this will continue in future releases.

7.1.4 Version 3.0

The new major version number doesn't indicate any deliberate API incompatibility. We have endeavoured to avoid breaking existing APIs. However, pexpect is under new maintenance after a long dormancy, so some caution is warranted.

- A new *unicode API* was introduced.
- Python 3 is now supported, using a single codebase.
- Pexpect now requires at least Python 2.6 or 3.2.
- The modules other than pexpect, such as `pexpect.fdpexpect` and `pexpect.pxssh`, were moved into the pexpect package. For now, wrapper modules are installed to the old locations for backwards compatibility (e.g. `import pxssh` will still work), but these will be removed at some point in the future.
- Ignoring `SIGHUP` is now optional - thanks to Kimmo Parviainen-Jalanko for the patch.

We also now have [docs on ReadTheDocs](#), and [continuous integration on Travis CI](#).

7.1.5 Version 2.4

- Fix a bug regarding making the pty the controlling terminal when the process spawning it is not, actually, a terminal (such as from cron)

7.1.6 Version 2.3

- Fixed `OSError` exception when a pexpect object is cleaned up. Previously, you might have seen this exception:

```
Exception exceptions.OSError: (10, 'No child processes')
in <bound method spawn.__del__ of <pexpect.spawn instance at 0xd248c>> ignored
```

You should not see that anymore. Thanks to Michael Surette.

- Added support for buffering reads. This greatly improves speed when trying to match long output from a child process. When you create an instance of the spawn object you can then set a buffer size. For now you **MUST** do the following to turn on buffering – it may be on by default in future version:

```
child = pexpect.spawn ('my_command')
child.maxread=1000 # Sets buffer to 1000 characters.
```

- I made a subtle change to the way `TIMEOUT` and `EOF` exceptions behave. Previously you could either expect these states in which case pexpect will not raise an exception, or you could just let pexpect raise an exception when these states were encountered. If you expected the states then the `before` property was set to everything before the state was encountered, but if you let pexpect raise the exception then `before` was not set. Now, the `before` property will get set either way you choose to handle these states.

- The spawn object now provides iterators for a *file-like interface*. This makes Pexpect a more complete file-like object. You can now write code like this:

```
child = pexpect.spawn ('ls -l')
for line in child:
    print line
```

- write and writelines() no longer return a value. Use send() if you need that functionality. I did this to make the Spawn object more closely match a file-like object.
- Added the attribute exitstatus. This will give the exit code returned by the child process. This will be set to None while the child is still alive. When isalive() returns 0 then exitstatus will be set.
- Made a few more tweaks to isalive() so that it will operate more consistently on different platforms. Solaris is the most difficult to support.
- You can now put TIMEOUT in a list of expected patterns. This is just like putting EOF in the pattern list. Expecting for a TIMEOUT may not be used as often as EOF, but this makes Pexpect more consistent.
- Thanks to a suggestion and sample code from Chad J. Schroeder I added the ability for Pexpect to operate on a file descriptor that is already open. This means that Pexpect can be used to control streams such as those from serial port devices. Now, you just pass the integer file descriptor as the “command” when constructing a spawn open. For example on a Linux box with a modem on ttyS1:

```
fd = os.open("/dev/ttyS1", os.O_RDWR|os.O_NONBLOCK|os.O_NOCTTY)
m = pexpect.spawn(fd) # Note integer fd is used instead of usual string.
m.send("+++") # Escape sequence
m.send("ATZ0\r") # Reset modem to profile 0
rval = m.expect(["OK", "ERROR"])
```

- read() was renamed to read_nonblocking(). Added new read() method that matches file-like object interface. In general, you should not notice the difference except that read() no longer allows you to directly set the timeout value. I hope this will not effect any existing code. Switching to read_nonblocking() should fix existing code.
- Changed the name of set_echo() to setecho().
- Changed the name of send_eof() to sendeof().
- Modified kill() so that it checks to make sure the pid isalive().
- modified spawn() (really called from __spawn()) so that it does not raise an exception if setwinsize() fails. Some platforms such as Cygwin do not like setwinsize. This was a constant problem and since it is not a critical feature I decided to just silence the error. Normally I don't like to do that, but in this case I'm making an exception.
- Added a method close() that does what you think. It closes the file descriptor of the child application. It makes no attempt to actually kill the child or wait for its status.
- Add variables __version__ and __revision__ (from cvs) to the pexpect modules. This is mainly helpful to me so that I can make sure that I'm testing with the right version instead of one already installed.
- log_open() and log_close() have been removed. Now use setlog(). The setlog() method takes a file object. This is far more flexible than the previous log method. Each time data is written to the file object it will be flushed. To turn logging off simply call setlog() with None.
- renamed the isAlive() method to isalive() to match the more typical naming style in Python. Also the technique used to detect child process status has been drastically modified. Previously I did some funky stuff with signals which caused indigestion in other Python modules on some platforms. It was a big headache. It still is, but I think it works better now.
- attribute matched renamed to after

- new attribute `match`
- The `expect_eof()` method is gone. You can now simply use the `expect()` method to look for EOF.
- **Pexpect works on OS X**, but the nature of the quirks cause many of the tests to fail. See bugs. (Incomplete Child Output). The problem is more than minor, but Pexpect is still more than useful for most tasks.
- **Solaris**: For some reason, the *second* time a pty file descriptor is created and deleted it never gets returned for use. It does not effect the first time or the third time or any time after that. It's only the second time. This is weird... This could be a file descriptor leak, or it could be some peculiarity of how Solaris recycles them. I thought it was a UNIX requirement for the OS to give you the lowest available filedescriptor number. In any case, this should not be a problem unless you create hundreds of pexpect instances... It may also be a pty module bug.

7.2 Moves and forks

- Pexpect development used to be hosted on Sourceforge.
- In 2011, Thomas Kluyver forked pexpect as 'pexpect-u', to support Python 3. He later decided he had taken the wrong approach with this.
- In 2012, Noah Spurrier, the original author of Pexpect, moved the project to Github, but was still too busy to develop it much.
- In 2013, Thomas Kluyver and Jeff Quast forked Pexpect again, intending to call the new fork Pexpected. Noah Spurrier agreed to let them use the name Pexpect, so Pexpect versions 3 and above are based on this fork, which now lives [here on Github](#).

Pexpect is developed [on Github](#). Please report [issues](#) there as well.

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