

#### NAME

IPC::Cmd - finding and running system commands made easy

#### **SYNOPSIS**

```
use IPC::Cmd qw[can_run run run_forked];
   my $full_path = can_run('wget') or warn 'wget is not installed!';
   ### commands can be arrayrefs or strings ###
   my $cmd = "$full_path -b theregister.co.uk";
   my $cmd = [$full path, '-b', 'theregister.co.uk'];
   ### in scalar context ###
   my $buffer;
   if( scalar run( command => $cmd,
                   verbose => 0,
                   buffer => \$buffer,
                   timeout => 20 )
   ) {
       print "fetched webpage successfully: $buffer\n";
   ### in list context ###
   my( $success, $error_message, $full_buf, $stdout_buf, $stderr_buf ) =
           run( command => $cmd, verbose => 0 );
   if( $success ) {
       print "this is what the command printed:\n";
       print join "", @$full_buf;
   }
   ### run_forked example ###
   my $result = run_forked("$full_path -q -0 - theregister.co.uk",
{'timeout' => 20});
   if ($result->{'exit_code'} eq 0 && !$result->{'timeout'}) {
       print "this is what wget returned:\n";
       print $result->{'stdout'};
   }
   ### check for features
   print "IPC::Open3 available: " . IPC::Cmd->can_use_ipc_open3;
   print "IPC::Run available: " . IPC::Cmd->can_use_ipc_run;
   print "Can capture buffer: "
                                  . IPC::Cmd->can_capture_buffer;
   ### don't have IPC::Cmd be verbose, ie don't print to stdout or
   ### stderr when running commands -- default is '0'
   $IPC::Cmd::VERBOSE = 0;
```

## **DESCRIPTION**

IPC::Cmd allows you to run commands platform independently, interactively if desired, but have them still work.

The can\_run function can tell you if a certain binary is installed and if so where, whereas the run



function can actually execute any of the commands you give it and give you a clear return value, as well as adhere to your verbosity settings.

## **CLASS METHODS**

## \$ipc\_run\_version = IPC::Cmd->can\_use\_ipc\_run([VERBOSE])

Utility function that tells you if IPC::Run is available. If the verbose flag is passed, it will print diagnostic messages if *IPC::Run* can not be found or loaded.

## \$ipc\_open3\_version = IPC::Cmd->can\_use\_ipc\_open3([VERBOSE])

Utility function that tells you if IPC::Open3 is available. If the verbose flag is passed, it will print diagnostic messages if IPC::Open3 can not be found or loaded.

## \$bool = IPC::Cmd->can\_capture\_buffer

Utility function that tells you if IPC:: Cmd is capable of capturing buffers in it's current configuration.

## \$bool = IPC::Cmd->can\_use\_run\_forked

Utility function that tells you if IPC::Cmd is capable of providing run\_forked on the current platform.

#### **FUNCTIONS**

## \$path = can run( PROGRAM );

can\_run takes only one argument: the name of a binary you wish to locate. can\_run works much like the unix binary which or the bash command type, which scans through your path, looking for the requested binary.

Unlike which and type, this function is platform independent and will also work on, for example, Win32.

If called in a scalar context it will return the full path to the binary you asked for if it was found, or undef if it was not.

If called in a list context and the global variable \$INSTANCES is a true value, it will return a list of the full paths to instances of the binary where found in PATH, or an empty list if it was not found.

## \$ok | (\$ok, \$err, \$full\_buf, \$stdout\_buff, \$stderr\_buff) = run( command => COMMAND, [verbose => BOOL, buffer => \\$SCALAR, timeout => DIGIT] );

run takes 4 arguments:

#### command

This is the command to execute. It may be either a string or an array reference. This is a required argument.

See Caveats for remarks on how commands are parsed and their limitations.

## verbose

This controls whether all output of a command should also be printed to STDOUT/STDERR or should only be trapped in buffers (NOTE: buffers require *IPC::Run* to be installed, or your system able to work with *IPC::Open3*).

It will default to the global setting of \$IPC::Cmd::VERBOSE, which by default is 0.

#### buffer

This will hold all the output of a command. It needs to be a reference to a scalar. Note that this will hold both the STDOUT and STDERR messages, and you have no way of telling which is which. If you require this distinction, run the run command in list context and inspect the individual buffers.

Of course, this requires that the underlying call supports buffers. See the note on buffers above.



#### timeout

Sets the maximum time the command is allowed to run before aborting, using the built-in alarm() call. If the timeout is triggered, the errorcode in the return value will be set to an object of the IPC::Cmd::TimeOut class. See the error message section below for details.

Defaults to 0, meaning no timeout is set.

run will return a simple true or false when called in scalar context. In list context, you will be returned a list of the following items:

#### success

A simple boolean indicating if the command executed without errors or not.

## error message

If the first element of the return value (success) was 0, then some error occurred. This second element is the error message the command you requested exited with, if available. This is generally a pretty printed value of \$? or \$@. See perldoc perlvar for details on what they can contain. If the error was a timeout, the error message will be prefixed with the string IPC::Cmd::TimeOut, the timeout class.

#### full buffer

This is an array reference containing all the output the command generated. Note that buffers are only available if you have *IPC::Run* installed, or if your system is able to work with *IPC::Open3* -- see below). Otherwise, this element will be undef.

#### out buffer

This is an array reference containing all the output sent to STDOUT the command generated. The notes from *full\_buffer* apply.

## error\_buffer

This is an arrayreference containing all the output sent to STDERR the command generated. The notes from *full buffer* apply.

See the *HOW IT WORKS* section below to see how IPC:: Cmd decides what modules or function calls to use when issuing a command.

# \$hashref = run\_forked( COMMAND, { child\_stdin => SCALAR, timeout => DIGIT, stdout\_handler => CODEREF, stderr\_handler => CODEREF} );

run\_forked is used to execute some program or a coderef, optionally feed it with some input, get its return code and output (both stdout and stderr into separate buffers). In addition, it allows to terminate the program if it takes too long to finish.

The important and distinguishing feature of run\_forked is execution timeout which at first seems to be quite a simple task but if you think that the program which you're spawning might spawn some children itself (which in their turn could do the same and so on) it turns out to be not a simple issue.

 $run\_forked$  is designed to survive and successfully terminate almost any long running task, even a fork bomb in case your system has the resources to survive during given timeout.

This is achieved by creating separate watchdog process which spawns the specified program in a separate process session and supervises it: optionally feeds it with input, stores its exit code, stdout and stderr, terminates it in case it runs longer than specified.

Invocation requires the command to be executed or a coderef and optionally a hashref of options:

#### timeout

Specify in seconds how long to run the command before it is killed with SIG\_KILL (9), which effectively terminates it and all of its children (direct or indirect).



child stdin

Specify some text that will be passed into the STDIN of the executed program.

stdout\_handler

Coderef of a subroutine to call when a portion of data is received on STDOUT from the executing program.

stderr\_handler

Coderef of a subroutine to call when a portion of data is received on STDERR from the executing program.

discard\_output

Discards the buffering of the standard output and standard errors for return by run\_forked(). With this option you have to use the std\*\_handlers to read what the command outputs. Useful for commands that send a lot of output.

```
terminate_on_parent_sudden_death
```

Enable this option if you wish all spawned processes to be killed if the initially spawned process (the parent) is killed or dies without waiting for child processes.

run\_forked will return a HASHREF with the following keys:

exit\_code

The exit code of the executed program.

timeout

The number of seconds the program ran for before being terminated, or 0 if no timeout occurred.

stdout

Holds the standard output of the executed command (or empty string if there was no STDOUT output or if discard\_output was used; it's always defined!)

stderr

Holds the standard error of the executed command (or empty string if there was no STDERR output or if discard\_output was used; it's always defined!)

merged

Holds the standard output and error of the executed command merged into one stream (or empty string if there was no output at all or if discard\_output was used; it's always defined!)

err\_msg

Holds some explanation in the case of an error.

## q = QUOTE

Returns the character used for quoting strings on this platform. This is usually a ' (single quote) on most systems, but some systems use different quotes. For example, Win32 uses " (double quote).

You can use it as follows:

```
use IPC::Cmd qw[run QUOTE];
my $cmd = q[echo] . QUOTE . q[foo bar] . QUOTE;
```

This makes sure that foo bar is treated as a string, rather than two separate arguments to the echo function.



## **HOW IT WORKS**

run will try to execute your command using the following logic:

- If you have IPC::Run installed, and the variable \$IPC::Cmd::USE\_IPC\_RUN is set to true (See the *Global Variables* section) use that to execute the command. You will have the full output available in buffers, interactive commands are sure to work and you are guaranteed to have your verbosity settings honored cleanly.
- Otherwise, if the variable \$IPC::Cmd::USE\_IPC\_OPEN3 is set to true (See the *Global Variables* section), try to execute the command using *IPC::Open3*. Buffers will be available on all platforms, interactive commands will still execute cleanly, and also your verbosity settings will be adhered to nicely;
- Otherwise, if you have the verbose argument set to true, we fall back to a simple system() call. We cannot capture any buffers, but interactive commands will still work.
- Otherwise we will try and temporarily redirect STDERR and STDOUT, do a system() call
  with your command and then re-open STDERR and STDOUT. This is the method of last
  resort and will still allow you to execute your commands cleanly. However, no buffers will be
  available.

## **Global Variables**

The behaviour of IPC::Cmd can be altered by changing the following global variables:

## \$IPC::Cmd::VERBOSE

This controls whether IPC::Cmd will print any output from the commands to the screen or not. The default is 0.

## \$IPC::Cmd::USE IPC RUN

This variable controls whether IPC::Cmd will try to use IPC::Run when available and suitable.

## \$IPC::Cmd::USE\_IPC\_OPEN3

This variable controls whether IPC::Cmd will try to use *IPC::Open3* when available and suitable. Defaults to true.

## \$IPC::Cmd::WARN

This variable controls whether run-time warnings should be issued, like the failure to load an IPC::\* module you explicitly requested.

Defaults to true. Turn this off at your own risk.

## **\$IPC::Cmd::INSTANCES**

This variable controls whether can\_run will return all instances of the binary it finds in the PATH when called in a list context.

Defaults to false, set to true to enable the described behaviour.

## \$IPC::Cmd::ALLOW\_NULL\_ARGS

This variable controls whether  ${\tt run}$  will remove any empty/null arguments it finds in command arguments.

Defaults to false, so it will remove null arguments. Set to true to allow them.

#### Caveats

Whitespace and IPC::Open3 / system()

When using IPC::Open3 or system, if you provide a string as the command argument, it is assumed to be appropriately escaped. You can use the QUOTE constant to use as a portable quote character (see above). However, if you provide an array reference, special rules apply:



If your command contains **special characters** (< > | &), it will be internally stringified before executing the command, to avoid that these special characters are escaped and passed as arguments instead of retaining their special meaning.

However, if the command contained arguments that contained whitespace, stringifying the command would lose the significance of the whitespace. Therefore, IPC:: Cmd will quote any arguments containing whitespace in your command if the command is passed as an arrayref and contains special characters.

#### Whitespace and IPC::Run

When using IPC::Run, if you provide a string as the command argument, the string will be split on whitespace to determine the individual elements of your command. Although this will usually just Do What You Mean, it may break if you have files or commands with whitespace in them.

If you do not wish this to happen, you should provide an array reference, where all parts of your command are already separated out. Note however, if there are extra or spurious whitespaces in these parts, the parser or underlying code may not interpret it correctly, and cause an error.

Example: The following code

```
gzip -cdf foo.tar.gz | tar -xf -
```

should either be passed as

```
"gzip -cdf foo.tar.gz | tar -xf -"
oras
['gzip', '-cdf', 'foo.tar.gz', '|', 'tar', '-xf', '-']
```

But take care not to pass it as, for example

```
['gzip -cdf foo.tar.gz', '|', 'tar -xf -']
```

Since this will lead to issues as described above.

#### **IO** Redirect

Currently it is too complicated to parse your command for IO redirections. For capturing STDOUT or STDERR there is a work around however, since you can just inspect your buffers for the contents.

## Interleaving STDOUT/STDERR

Neither IPC::Run nor IPC::Open3 can interleave STDOUT and STDERR. For short bursts of output from a program, e.g. this sample,

```
for ( 1..4 ) {
    $_ % 2 ? print STDOUT $_ : print STDERR $_;
}
```

IPC::[Run|Open3] will first read all of STDOUT, then all of STDERR, meaning the output looks like '13' on STDOUT and '24' on STDERR, instead of

1 2 3

This has been recorded in *rt.cpan.org* as bug #37532: Unable to interleave STDOUT and STDERR.



## See Also

IPC::Run, IPC::Open3

## **ACKNOWLEDGEMENTS**

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## **BUG REPORTS**

Please report bugs or other issues to <bug-ipc-cmd@rt.cpan.org>.

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