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## NAME

sem - semaphore for executing shell command lines in parallel

## SYNOPSIS

**sem** [--fg] [--id <id>] [--semaphore-timeout <secs>] [-j <num>] [--wait] *command*

## DESCRIPTION

GNU **sem** is an alias for GNU **parallel --semaphore**.

GNU **sem** acts as a counting semaphore. When GNU **sem** is called with *command* it starts the *command* in the background. When *num* number of commands are running in the background, GNU **sem** waits for one of these to complete before starting the *command*.

GNU **sem** does not read any arguments to build the *command* (no -a, :::, and ::::). It simply waits for a semaphore to become available and then runs the *command* given.

Before looking at the options you may want to check out the examples after the list of options. That will give you an idea of what GNU **sem** is capable of.

## OPTIONS

*command*

Command to execute. The *command* may be followed by arguments for the *command*.

**--bg**

Run *command* in background thus GNU **sem** will not wait for completion of the *command* before exiting. This is the default.

In toilet analogy: GNU **sem** waits for a toilet to be available, gives the toilet to a person, and exits immediately.

See also: **--fg**

**--jobs N**

**-j N**

**--max-procs N**

**-P N**

Run up to N *commands* in parallel. Default is 1 thus acting like a mutex.

In toilet analogy: **-j** is the number of toilets.

**--jobs +N**

**-j +N**

**--max-procs +N**

**-P +N**

Add N to the number of CPU cores. Run up to this many jobs in parallel. For compute intensive jobs **-j +0** is useful as it will run number-of-cpu-cores jobs simultaneously.

**--jobs -N**

**-j -N**

**--max-procs -N**

**-P -N**

Subtract N from the number of CPU cores. Run up to this many jobs in parallel. If the evaluated number is less than 1 then 1 will be used. See also

**--use-cpus-instead-of-cores**.

**--jobs** *N%*

**-j** *N%*

**--max-procs** *N%*

**-P** *N%*

Multiply *N%* with the number of CPU cores. Run up to this many jobs in parallel. If the evaluated number is less than 1 then 1 will be used. See also **--use-cpus-instead-of-cores**.

**--jobs** *procfile*

**-j** *procfile*

**--max-procs** *procfile*

**-P** *procfile*

Read parameter from file. Use the content of *procfile* as parameter for *-j*. E.g. *procfile* could contain the string 100% or +2 or 10.

**--pipe**

Pass stdin (standard input) to *command*.

If *command* read from stdin (standard input), use **--pipe**.

**--semaphore-name** *name*

**--id** *name*

Use **name** as the name of the semaphore. Default is the name of the controlling tty (output from **tty**).

The default normally works as expected when used interactively, but when used in a script *name* should be set. *\$\$* or *my\_task\_name* are often a good value.

The semaphore is stored in *~/.parallel/semaphores/*

In toilet analogy the name corresponds to different types of toilets: e.g. male, female, customer, staff.

**--fg**

Do not put command in background.

In toilet analogy: GNU **sem** waits for a toilet to be available, takes a person to the toilet, waits for the person to finish, and exits.

**--semaphore-timeout** *secs*

**--st** *secs*

If *secs* > 0: If the semaphore is not released within *secs* seconds, take it anyway.

If *secs* < 0: If the semaphore is not released within *secs* seconds, exit.

In toilet analogy: *secs* > 0: If no toilet becomes available within *secs* seconds, pee on the floor. *secs* < 0: If no toilet becomes available within *secs* seconds, exit without doing anything.

**--wait**

Wait for all commands to complete.

In toilet analogy: Wait until all toilets are empty, then exit.

## UNDERSTANDING A SEMAPHORE

Try the following example:

```
sem -j 2 'sleep 1;echo 1 finished';   echo sem 1 exited
sem -j 2 'sleep 2;echo 2 finished';   echo sem 2 exited
sem -j 2 'sleep 3;echo 3 finished';   echo sem 3 exited
```

```
sem -j 2 'sleep 4;echo 4 finished';   echo sem 4 exited
sem --wait; echo sem --wait done
```

In toilet analogy this uses 2 toilets (**-j 2**). GNU **sem** takes '1' to a toilet, and exits immediately. While '1' is sleeping, another GNU **sem** takes '2' to a toilet, and exits immediately.

While '1' and '2' are sleeping, another GNU **sem** waits for a free toilet. When '1' finishes, a toilet becomes available, and this GNU **sem** stops waiting, and takes '3' to a toilet, and exits immediately.

While '2' and '3' are sleeping, another GNU **sem** waits for a free toilet. When '2' finishes, a toilet becomes available, and this GNU **sem** stops waiting, and takes '4' to a toilet, and exits immediately.

Finally another GNU **sem** waits for all toilets to become free.

### EXAMPLE: Gzipping \*.log

Run one gzip process per CPU core. Block until a CPU core becomes available.

```
for i in *.log ; do
    echo $i
    sem -j+0 gzip $i ";" echo done
done
sem --wait
```

### EXAMPLE: Protecting pod2html from itself

pod2html creates two files: pod2htmd.tmp and pod2htmli.tmp which it does not clean up. It uses these two files for a short time. But if you run multiple pod2html in parallel (e.g. in a Makefile with make -j) there is a risk that two different instances of pod2html will write to the files at the same time:

```
# This may fail due to shared pod2htmd.tmp/pod2htmli.tmp files
foo.html:
    pod2html foo.pod --outfile foo.html

bar.html:
    pod2html bar.pod --outfile bar.html

$ make -j foo.html bar.html
```

You need to protect pod2html from running twice at the same time. **sem** running as a mutex will make sure only one runs:

```
foo.html:
    sem --id pod2html pod2html foo.pod --outfile foo.html

bar.html:
    sem --id pod2html pod2html bar.pod --outfile bar.html

clean: foo.html bar.html
    sem --id pod2html --wait
    rm -f pod2htmd.tmp pod2htmli.tmp

$ make -j foo.html bar.html clean
```

### BUGS

None known.

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## REPORTING BUGS

Report bugs to <bug-parallel@gnu.org>.

## AUTHOR

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**DEPENDENCIES**

GNU **sem** uses Perl, and the Perl modules Getopt::Long, Symbol, Fcntl.

**SEE ALSO**

**parallel**(1)