

```
p20130063@vc231:~/shlab-handout$ cat tshref.out
```

```
make[1]: Entering directory `/afs/cs.cmu.edu/project/ics/im/labs/shlab/src'
```

```
./sdriver.pl -t trace01.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace01.txt - Properly terminate on EOF.
```

```
#
```

```
./sdriver.pl -t trace02.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace02.txt - Process builtin quit command.
```

```
#
```

```
./sdriver.pl -t trace03.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace03.txt - Run a foreground job.
```

```
#
```

```
tsh> quit
```

```
./sdriver.pl -t trace04.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace04.txt - Run a background job.
```

```
#
```

```
tsh> ./myspin 1 &
```

```
[1] (26252) ./myspin 1 &
```

```
./sdriver.pl -t trace05.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace05.txt - Process jobs builtin command.
```

```
#
```

```
tsh> ./myspin 2 &
```

```
[1] (26256) ./myspin 2 &
```

```
tsh> ./myspin 3 &
```

```
[2] (26258) ./myspin 3 &
```

```
tsh> jobs
```

```
[1] (26256) Running ./myspin 2 &
```

```
[2] (26258) Running ./myspin 3 &
```

```
./sdriver.pl -t trace06.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace06.txt - Forward SIGINT to foreground job.
```

```
#
```

```
tsh> ./myspin 4
```

Job [1] (26263) terminated by signal 2

```
./sdriver.pl -t trace07.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace07.txt - Forward SIGINT only to foreground job.
```

```
#
```

```
tsh> ./myspin 4 &
```

```
[1] (26267) ./myspin 4 &
```

```
tsh> ./myspin 5
```

Job [2] (26269) terminated by signal 2

```
tsh> jobs
```

```
[1] (26267) Running ./myspin 4 &
```

```
./sdriver.pl -t trace08.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace08.txt - Forward SIGTSTP only to foreground job.
```

```
#
```

```
tsh> ./myspin 4 &
```

```
[1] (26274) ./myspin 4 &
```

```
tsh> ./myspin 5
```

Job [2] (26276) stopped by signal 20

```
tsh> jobs
```

```
[1] (26274) Running ./myspin 4 &
```

```
[2] (26276) Stopped ./myspin 5
```

```
./sdriver.pl -t trace09.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace09.txt - Process bg builtin command
```

```
#
```

```
tsh> ./myspin 4 &
```

```
[1] (26281) ./myspin 4 &
```

```
tsh> ./myspin 5
```

Job [2] (26283) stopped by signal 20

```
tsh> jobs
```

```
[1] (26281) Running ./myspin 4 &
```

```
[2] (26283) Stopped ./myspin 5
```

```
tsh> bg %2
```

```
[2] (26283) ./myspin 5
```

```
tsh> jobs
```

```
[1] (26281) Running ./myspin 4 &
```

```
[2] (26283) Running ./myspin 5
```

```
./sdriver.pl -t trace10.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace10.txt - Process fg builtin command.
```

```
#
```

```
tsh> ./myspin 4 &
```

```
[1] (26290) ./myspin 4 &
```

```
tsh> fg %1
```

```
Job [1] (26290) stopped by signal 20
```

```
tsh> jobs
```

```
[1] (26290) Stopped ./myspin 4 &
```

```
tsh> fg %1
```

```
tsh> jobs
```

```
./sdriver.pl -t trace11.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace11.txt - Forward SIGINT to every process in foreground process group
```

```
#
```

```
tsh> ./mysplit 4
```

```
Job [1] (26298) terminated by signal 2
```

```
tsh> /bin/ps a
```

PID	TTY	STAT	TIME	COMMAND
25181	pts/3	S	0:00	-usr/local/bin/tcsh -i
26239	pts/3	S	0:00	make tshrefout
26240	pts/3	S	0:00	/bin/sh -c make tests > tshref.out 2>&1
26241	pts/3	S	0:00	make tests
26295	pts/3	S	0:00	perl ./sdriver.pl -t trace11.txt -s ./tsh -a -p
26296	pts/3	S	0:00	./tsh -p
26301	pts/3	R	0:00	/bin/ps a

```
./sdriver.pl -t trace12.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace12.txt - Forward SIGTSTP to every process in foreground process group
```

```
#
```

```
tsh> ./mysplit 4
```

```
Job [1] (26305) stopped by signal 20
```

```
tsh> jobs
```

```
[1] (26305) Stopped ./mysplit 4
```

```
tsh> /bin/ps a
```

PID	TTY	STAT	TIME	COMMAND
25181	pts/3	S	0:00	-usr/local/bin/tcsh -i
26239	pts/3	S	0:00	make tshrefout
26240	pts/3	S	0:00	/bin/sh -c make tests > tshref.out 2>&1
26241	pts/3	S	0:00	make tests
26302	pts/3	S	0:00	perl ./sdriver.pl -t trace12.txt -s ./tsh -a -p
26303	pts/3	S	0:00	./tsh -p
26305	pts/3	T	0:00	./mysplit 4

```
26306 pts/3    T      0:00 ./mysplit 4
26309 pts/3    R      0:00 /bin/ps a
```

```
./sdriver.pl -t trace13.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace13.txt - Restart every stopped process in process group
```

```
#
```

```
tsh> ./mysplit 4
```

```
Job [1] (26313) stopped by signal 20
```

```
tsh> jobs
```

```
[1] (26313) Stopped ./mysplit 4
```

```
tsh> /bin/ps a
```

PID	TTY	STAT	TIME	COMMAND
25181	pts/3	S	0:00	-usr/local/bin/tcsh -i
26239	pts/3	S	0:00	make tshrefout
26240	pts/3	S	0:00	/bin/sh -c make tests > tshref.out 2>&1
26241	pts/3	S	0:00	make tests
26310	pts/3	S	0:00	perl ./sdriver.pl -t trace13.txt -s ./tsh -a -p
26311	pts/3	S	0:00	./tsh -p
26313	pts/3	T	0:00	./mysplit 4
26314	pts/3	T	0:00	./mysplit 4
26317	pts/3	R	0:00	/bin/ps a

```
tsh> fg %1
```

```
tsh> /bin/ps a
```

PID	TTY	STAT	TIME	COMMAND
25181	pts/3	S	0:00	-usr/local/bin/tcsh -i
26239	pts/3	S	0:00	make tshrefout
26240	pts/3	S	0:00	/bin/sh -c make tests > tshref.out 2>&1
26241	pts/3	S	0:00	make tests
26310	pts/3	S	0:00	perl ./sdriver.pl -t trace13.txt -s ./tsh -a -p
26311	pts/3	S	0:00	./tsh -p
26320	pts/3	R	0:00	/bin/ps a

```
./sdriver.pl -t trace14.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace14.txt - Simple error handling
```

```
#
```

```
tsh> ./bogus
```

```
./bogus: Command not found
```

```
tsh> ./myspin 4 &
```

```
[1] (26326) ./myspin 4 &
```

```
tsh> fg
```

```
fg command requires PID or %jobid argument
```

```
tsh> bg
```

bg command requires PID or %jobid argument

```
tsh> fg a
```

fg: argument must be a PID or %jobid

```
tsh> bg a
```

bg: argument must be a PID or %jobid

```
tsh> fg 9999999
```

(9999999): No such process

```
tsh> bg 9999999
```

(9999999): No such process

```
tsh> fg %2
```

%2: No such job

```
tsh> fg %1
```

Job [1] (26326) stopped by signal 20

```
tsh> bg %2
```

%2: No such job

```
tsh> bg %1
```

[1] (26326) ./myspin 4 &

```
tsh> jobs
```

[1] (26326) Running ./myspin 4 &

```
./sdriver.pl -t trace15.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace15.txt - Putting it all together
```

```
#
```

```
tsh> ./bogus
```

./bogus: Command not found

```
tsh> ./myspin 10
```

Job [1] (26343) terminated by signal 2

```
tsh> ./myspin 3 &
```

[1] (26345) ./myspin 3 &

```
tsh> ./myspin 4 &
```

[2] (26347) ./myspin 4 &

```
tsh> jobs
```

[1] (26345) Running ./myspin 3 &

[2] (26347) Running ./myspin 4 &

```
tsh> fg %1
```

Job [1] (26345) stopped by signal 20

```
tsh> jobs
```

[1] (26345) Stopped ./myspin 3 &

[2] (26347) Running ./myspin 4 &

```
tsh> bg %3
```

%3: No such job

```
tsh> bg %1
```

[1] (26345) ./myspin 3 &

```
tsh> jobs
[1] (26345) Running ./myspin 3 &
[2] (26347) Running ./myspin 4 &
tsh> fg %1
tsh> quit
```

```
./sdriver.pl -t trace16.txt -s ./tsh -a "-p"
```

```
#
```

```
# trace16.txt - Tests whether the shell can handle SIGTSTP and SIGINT
```

```
# signals that come from other processes instead of the terminal.
```

```
#
```

```
tsh> ./mystop 2
```

```
Job [1] (26359) stopped by signal 20
```

```
tsh> jobs
```

```
[1] (26359) Stopped ./mystop 2
```

```
tsh> ./myint 2
```

```
Job [2] (26362) terminated by signal 2
```

```
make[1]: Leaving directory `/afs/cs.cmu.edu/project/ics/im/labs/shlab/src'
```

```
p20130063@vc231:~/shlab-handout$
```