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## Starting with Lines- 90-226 additional helpers

Here we have wrapper/helper functions for our system calls we are going to implement, these are additional variables and functions to help out with the mandatory functions that are going to be implemented. Mainly consisting of string errors, calls, reverse strings, print errors, etc.

## Line- 314 –356 eval function

For the eval function, we first determine whether the job runs in the foreground or background, and creates a process id. Create an empty signal set in mask, and 3 signals set to be bloacked. The cmd line is then checked to see if it is built in. if it is, the execute, if not, then block. If process is foreground, parent waits for job to terminate. If the process is background, adds process to job, gets jobpid , and prints the details of background.

## Line- 431-451 builtin_cmd

If argument quit, exit shell. If argument is jobs, list all jobs, if argument is bg, move to bg. If argument is fg, move to fg.

## Line- 457-523 do bgfg

Store job, if no second argument, print an error. If % then job id, if not, print error. Get jid, if not, print error. Then get pid, if not, print error. Send SIGCONT signal, and if background, jobs changes to BG, print status. If foreground, job changes to fg, finish job.

## Wait fg-Line 528-539

Process pid will be blocked until its no longer in the fg process. If not on fg, it will return without doing anything.

## sigchld handler- 552-584

stores child pid, then gets child pid in loop. Gets jobs details of the child, and if no job prints an error. If stoppes, then changes status of the job to pause, prints. If received a signal, deletes a job from the list, prints. If exited, delete job. If nothing happens os is signaled, prints an error.

## sigint handler-Lines 591-606

stores fg pid, retrieve pid of fg. If running fg, send sigint to process in foreground.

## Sigtstp_handler Lines 608-623

We use a similar process to sigint here. stores fg pid, retrieve pid of fg. If running fg, send sigint to process in foreground.