

Administrivia

- Reminder: Homework 1 due today at 5pm.
- Homework 2 on the Web; due a week from Monday. Some problems you can do now; others involve material from next class.

Slide 1

Minute Essay From Last Lecture

- Most people (but not all!) found the pace okay or even a little slow. As with programming classes, you'll probably learn by practicing/experimenting outside class. Homeworks are meant to help with that.

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Shell Customizations

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- At startup, shell reads in various configuration files (see `man` page for details, under `INVOCATION`). At least one will be in your home directory. For `bash`, `.bashrc` is read for all shells and `.bash_profile` when it's a "login shell" (e.g., `ssh` session, but not terminal window).
- Default `.bashrc` file on our systems reads ("sources" — more about that soon) `/etc/bashrc`. Somewhat complicated, but eventually reads files in `/etc/profile.d`. Allows sites to do site-wide customizations. Appears to be somewhat standard practice for Linux, at least the distributions I know.

Shell Customizations — User-Defined Files

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- In these files, you can do many things:
- Define/redefine environment variables.
- Set various shell options and variables.
- Define aliases/functions.
- Invoke other commands (e.g., `umask` to set default file permissions, or `module load` (later)).

Environment Variables

- Some we've mentioned already (e.g, PATH). Others we haven't (e.g., PS1).
- For `bash`, be sure to `export` them so they're available to called programs.
- Can also define new ones (I find this useful).

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Shell Options and Variables

- `set` and `shopt` let you set various shell variables and options.
- Details in `man page` or manual, but some I find useful:
`set -o noclobber`
`set -o ignoreeof`
`shopt -s histappend`

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Shell Aliases and Functions (bash)

- Aliases are simple substitution, no parameters. Examples:

```
alias lt='ls -ltF'
```

```
alias google='lynx http://www.google.com'
```

- Functions can have positional parameters. Examples:

```
function cd-and-show() { cd $1 ; pwd ; ls; }
```

CORRECTION: The keyword `function` is optional and indeed non-standard.

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Another bash Feature — Directory Stack

- `bash` maintains a stack of directories. Use commands `pushd`, `popd`, `dirs` to manipulate it.
- Very useful (I think!) if you want to navigate from one deeply-nested subdirectory to another without losing your place.

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I/O Redirection

- In programming classes I talk about “reading from standard input” (`stdin`) rather than “reading from the keyboard”, and “writing to standard output” rather than “writing to the screen”. Why?

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I/O Redirection, Continued

- `stdin` (standard input) can come from keyboard, file, or inline in shell script.
- `stdout` and `stderr` (standard output, error) can go to terminal or file (overwrite or append), separately or together. (Syntax depends in part on which shell you’re using.)
- How is this useful? (e.g., in program development? testing?)
- *OR* — remember quotation from first class?
“Write programs that do one thing and do it well. Write programs to work together. Write programs to handle text streams, because that is a universal interface.”

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Pipes

- “Pipes” provide one-way communication between programs — output of program A becomes input of program B.
- Key component of “the UNIX philosophy” — emphasis on providing a toolkit of small programs, mechanisms for combining them.
- “Filters” are programs designed to work this way, and there are lots of them (next time). `less` and `more` also useful.

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Minute Essay

- Have you made changes to your `.bashrc`, perhaps for another class? If so, what?

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