

# 06 - Intro to {Scripting,Customizing,Text Editors}

CS 2043: Unix Tools and Scripting, Spring 2016 [1]

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- (poll) The **assignments** repository on GitHub.
- Drop deadline is Wednesday 2/10/2016.

# Scripting

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# What is a Script?

- The high-level story is: nothing special.
- Executable filetype.
- Shebang (later).
- Runs from top to bottom.

## Precursor: the Shebang

- The Shebang[5] is used to tell the thing executing the script how (by what program) it should be executed.
- The only time that you technically do not need it is when these two are the same.
  - E.g. you are using a **bash** shell, and could execute a **bash** script and be safe.
- You should *always* include the shebang.
- If you are executing using a non-standard program, just include the executable name.
  - Other users may have installed this elsewhere.
- With the shebang, I don't have to do **python script.py**, I can just do **./script.py**.

- Scripts execute from top to bottom.
- This is just like Python, for those of you who know it already.
- Bad code inside an **if** statement?
  - You may only realize it when that **if** statement executes.

# Bash Scripting

- Use the shebang:  
**#!/bin/bash**
- Declare variables...  
...no spaces!
- Use variables...  
...dereference with \$
- Store/use commands executed...
  - \$(command ...)
  - `command ...`
- If statements and loops.
- NEVER use aliases in bash scripts. EVER.

```
#!/bin/bash
#
# declare some variables
NAME="Sven Neys"
MSK_ID=`id -u`
#
# A simple if statement
if [[ $MSK_ID -eq 0 ]]; then
    echo "Executing as root."
else
    echo "Executing as normal user."
fi
#
# A simple string concat
# Note the $ works regardless
echo "You are: $NAME"
#
# A simple for loop using a {} range
for n in {1..11}; do
    echo $n
done
#
# recall that $ needs to be escaped
# with \ to get the actual symbol: \$
```



# Caution

- The shebang must be the first line. It must be a valid command.
  - If you expect a custom executable for some reason, then you should only provide the executable name.
    - e.g. **superAwesome** is the executable name, then don't specify the path to your own **superAwesome** executable as the user of the script likely did not install it there.
    - Instead, use **#!/usr/bin/env superAwesome**, making the assumption that your user has properly set their **\$PATH** variable to include **superAwesome**.
    - This is different than what I said in lecture, but a much better approach. This is also suggested for how to do it for **python**.
- Not a **#** commentable language?
  - Official answer: just don't use a shebang.
  - Unofficial answer: technically it doesn't matter, since the shebang is a hack on the first 8 bits, but this would render the file useless except for when it is executed by a shell.

# Text Editors

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- If you have a GUI, I encourage Sublime.
- You do not always get one, so knowing VIM is essential.
  - You are *almost* guaranteed VIM will exist if you don't have a GUI.
- VIM has a LARGE number of shortcuts, you will only learn them with practice.

# What is VIM?

- VIM is a powerful "lightweight" text editor.
- VIM actually stands for "Vi IMporoved", where **vi** is the predecessor.
- VIM can be installed on pretty much every OS these days.
- Allows you to edit things *quickly*, after the initial learning curve.

# The 3 Main Modes of VIM

- Normal Mode:
  - Launching pad to issue commands or go into other modes.
  - Allows you to view the text, but not edit it directly (only through commands).
  - You can jump to normal mode by pressing **ESCAPE**.
- Visual Mode:
  - Used to highlight text and perform block operations.
  - Enter visual mode *from normal mode* by pressing **v** on your keyboard.
    - Visual Line: **shift+v**
    - Visual Block: **ctl+v**
    - Explanation: try them out, move your cursor around...you'll see it.
- Insert Mode:
  - Used to type text into the buffer (file).
  - Like any regular text-editor you've seen before.
  - Enter *from normal mode* with the **i** key.

## Moving Around VIM

- Most of the time (these days at least), you can scroll with your mouse / trackpad.
- You can also use your arrow keys.
- By design, VIM shortcuts exist to avoid moving your hands at all. Use
  - **h** to go left.
  - **j** to go down.
  - **k** to go up.
  - **l** to go right.
- With that in mind, the true VIM folk usually map left caps-lock to be **ESCAPE**.

# Useful Commands

<code>:help</code>	help menu, e.g. specify <code>:help v</code>
<code>:u</code>	undo
<code>:q</code>	exit
<code>:q!</code>	exit without saving
<code>:e [filename]</code>	open a different file
<code>:syntax [on/off]</code>	enable / disable syntax highlighting
<code>:set number</code>	turn line numbering on
<code>:set spell</code>	turn spell checking on
<code>:sp</code>	split screen horizontally
<code>:vsp</code>	split screen vertically
<code>&lt;ctrl&gt;+w &lt;w&gt;</code>	rotate between split regions
<code>:w</code>	save file
<code>:wq</code>	save file and exit
<code>&lt;shift&gt;+&lt;z&gt;&lt;z&gt;</code>	hold shift and hit <b>z</b> twice: alias for <code>:wq</code>

# What?

- VIM is very complicated to start out, but when you memorize the shortcuts it will become crazy fast.
- I suggest you complete the OpenVIM tutorial at [3].
- You can then begin learning the commands, keeping your cheat-sheet[4] handy.
  - The author of [2] made a convenient pdf of that.
  - Start with lesson 1. When you are ready for more, continue forward.



## Customizing

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# Modifying your Prompt: Prompt String 1

- The **\$PS1** variable controls what shows up when you type in your terminal.

- List of all options here:

<http://www.gnu.org/software/bash/manual/bashref.html#Controlling-the-Prompt>

- Common: **export PS1="\u@\h:\w> "**
  - **usr@hostname:current/working/directory>**
- Try changing your **\$PS1** using **export** right now to see how you can modify it.
- Play with colors after, since they are tedious to type in the format needed.

# Modifying your Prompt: Aliases

## Creating Aliases

`alias <new-name> <old-name>`

- Used to create alternative ways of entering things, usually commands.
- e.g. `alias ..="cd .."` means you can just type `..` to go up one directory.
- Think of it as copy-pasting. You type **new-name** and your terminal pastes **old-name**.
- Should not ever be used in scripts.

- Usually stored in the `~/.bashrc` file, though `~/.bash_aliases` is slowly gaining traction.
- Make your own!

# Storing Customizations

- There are many such places that people put things, but generally speaking...
- Your **bashrc** should have things like aliases and functions. Limit the **export** calls to just things related to coloring the terminal.
- Your **bash\_profile** should contain any special environment variables you need to define.
  - Typically when you are exporting things like **\$PATH** or **\$LD\_LIBRARY\_PATH** for something you have installed on your own.
- You should source your **bash\_profile** from your **profile**, and you should source your **bashrc** from your **bash\_profile**.

# Rapid Prototyping

- You may want to quickly change your **\$PS1** or something and see what it looks like immediately.
- Open your text editor and make the changes you want to see. Flip back to your terminal.
- To reload changes immediately, use the **source** command (e.g. **source ~/.bashrc**).
  - The **bashrc** is reloaded when you open a new terminal.
  - The **profile** (and therefore **bash\_profile**) is reloaded when you *log in*.
- You *can* **source** the **bash\_profile**, but that will only affect the current terminal. In order for all new terminals to get it, you need to log out and log back in.

# Customize!!!

Follow the instructions in today's lecture demo:

<https://github.com/cs2043-sp16/lecture-demos/tree/master/lec06>

- [1] B. Abrahao, H. Abu-Libdeh, N. Savva, D. Slater, and others over the years.

**Previous cornell cs 2043 course slides.**

- [2] B. Kidwell.

**vi-vim-cheat-sheet-and-tutorial-pdf.**

`http://www.glump.net/files/2012/08/vi-vim-cheat-sheet-and-tutorial.pdf`.

- [3] Openvim.

**Interactive vim tutorial.**

`http://www.openvim.com/tutorial.html`.

[4] S. Systems.

**Graphical vi-vim cheat sheet and tutorial.**

[http://www.viemu.com/a\\_vi\\_vim\\_graphical\\_cheat\\_sheet\\_tutorial.html](http://www.viemu.com/a_vi_vim_graphical_cheat_sheet_tutorial.html).

[5] Wikipedia.

**Shebang (unix).**

[https:](https://en.wikipedia.org/wiki/Shebang_%28Unix%29)

[//en.wikipedia.org/wiki/Shebang\\_%28Unix%29](https://en.wikipedia.org/wiki/Shebang_%28Unix%29).