



OMIS 30: Intro to Programming

“Python Programming”

Instructor: Denis Vrdoljak





LAST week's goals:

- Have Python (via Anaconda) installed and your IDE set up
- Be able to write a Hello World program in Python, and run it from the command line
- Run a Hello World program in Jupyter
- Be able to navigate your system from the command line



By the end of week you should:

- Be able to write a simple calculator program
- Have identified at least 2 classmates for questions/problems
- Understand variables in Python



Student Introductions

- Introduce yourself
- Tell us about your background and interests
- Share with us what you hope to get out of this class/why you are here?
 - It's ok if the answer to this last one is "because it's a requirement," or "it looked easier than Physics for Engineers!"
- Share something interesting about yourself-- like what you did this summer, or what you want to do after graduating



I'll go first: About Me

Denis Vrdoljak

- Master Of Information and Data Science - UC Berkeley
- Master of International Affairs - Texas A&M
- BS, Engineering Physics - SCU, Class of 2005!
- Currently Working as a Data Scientist @ Cisco
- Other places I've worked at: UC Berkeley, SanDisk/Western Digital, IBM, Specter Defense, Berkeley Data Science Group





Your Turn: Student Introductions



- Tell us about your background and interests
- Share with us what you hope to get out of this class/why you are here?
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Command Line

- Why learn command line?
- Used as the basic interface on servers & virtual machines (cloud)
 - Uses less resources (memory/storage) than a graphical interface
 - Less network traffic transmitted back and forth from the server to your computer
- Important to know to navigate on the servers
- Can do a: **man <command>** or **help <command>** to see the help page on that command
- Dos/Windows vs Linux/Unix:
[https://access.redhat.com/documentation/en-US/Red Hat Enterprise Linux/4/html/Step by Step Guide/ap-doslinux.html](https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/4/html/Step_by_Step_Guide/ap-doslinux.html)



Command Line Commands

- Navigation
 - **ls** - shows the contents of the present folder (**dir** for windows)
 - **ls -alh** - anything after a hyphen is called an option, flag, or switch & modifies the original command
 - a = all files including hidden ones (ones that start with a .)
 - l = long list
 - h = human readable (so a size of 4096 bytes = 4.0K instead)
 - **cd <dir>** = change directory
 - **cd ..** = back one directory
 - **cd .** = this directory
 - **pwd** = print working directory - the full directory name of your current directory (**cd** for windows)



Command Line Commands

- Making files & directories
 - **touch <file_name>** = make a blank file of that name (N/A on windows)
 - **mkdir <directory_name>** = make a new directory of that name
- Deleting
 - **rm <file or directory name>** = removes / deletes that file or directory
 - CAUTION: if you remove it it is gone (no 'recycling bin' etc to recover it from!)
 - **rm -r <directory_name>**= removes all the directories under that directory name



Command Line Commands

- Writing to the command line
 - **echo <message>** = print that message back to the screen
 - **clear** = clears the screen (**cls** in windows)
- Writing to a file
 - **> <file_name>** = push the output of that command to that file_name (and overwrites the file)
 - echo Hi > hi.txt
 - **>> <file_name>** = appends the output of that command to that file_name
 - echo How are you? >> hi.txt
- See contents of a file:
 - **cat <file_name>** = view the contents of that file_name



Command Line Commands

- Moving, renaming & copying
 - **mv <source_file> <destination_file>** = moves that file from one spot to the other
 - The file will no longer be in the source directory
 - Rename a file: use the 'mv' command to 'move' a file to the same spot with a different name
 - **cp <source_file> <destination_file>** = copies the file to another spot
 - The file will be in both locations



Advanced Command Line Commands

- **grep** = search a file for the matching string
 - grep Hi hi.txt
- | (pipe) = string two commands together in a sequence
 - cat hi.txt | grep Hi
- **python --version**
 - -- = 'long' option sent to the python command
 - Some commands use the - and some use the --
 - Usually the -- is more spelled out (hence long)



Advanced Command Line Commands

- **vi (vim)** - file text editors
 - Best to hit the INS key to start typing (hit INS twice to go to replace mode)
 - To exit hit ESC - :wq <enter>
 - w = write
 - q = quit
 - If you don't want to write the changes type :q! (quit and disregard changes)
- **chmod 755 <file_name>** - modify permission to a file
 - First Number 7 - Read, write, and execute for user
 - Second Number 5 - Read and execute for group
 - Third Number 5 - Read and execute for other
 - Can do 777 for Read, write, and execute for everyone (but less secure)



Command Line Review

- Navigation

- **ls** - shows the contents of the present folder (**dir** for windows)
- **ls -alh** - anything after a hyphen is called an option, flag, or switch & modifies the original command
 - a = all files including hidden ones (ones that start with a .)
 - l = long list
 - h = human readable (so a size of 4096 bytes = 4.0K instead)
- **dir** (Windows/DOS)
- **cd**= change directory
 - **chdir** (Windows/DOS)
 - **cd ..** = back one directory
- **pwd** = print working directory - shows full path (location) of current directory
- **cd** for Windows/DOS



Command Line Review

- Writing to a file
 - **> <file_name>** = push the output of that command to that file_name (and overwrites the file!!)
 - echo Hi > hi.txt
 - **>> <file_name>** = appends the output of that command to that file_name
 - echo How are you? >> hi.txt
- See contents of a file:
 - **cat <file_name>** = view the contents of that file_name



Command Line Review

- See contents of a file:
 - **less <file_name>** = view the full contents of that file_name, with scrolling for large files, press 'q' to exit (Linux/Mac tool, some versions of Windows CMD)
 - **more <file_name>** = view the contents of that file_name with scrolling for large files (Windows CMD/Dos tool, also ported to all Linux/Mac)
 - up/down arrows to scroll
 - **f** to page down, **b** to page up
 - **/<string>** to search for next occurrence of “string”
 - **q** to exit
 - Example to show running processes: **ps -ef | more**
 - * (“|” is the vertical pipe above \)



Command Line: PC vs Mac/Linux

- echo
 - Linux/Mac: echo “text goes here (parentheses need to be in quotes!)”
 - PC: echo text goes here (and parentheses are ok)
- | (pipe): pipe output of one command (eg, cat logfile.txt) to another command or script (eg, grep “error”)
 - E.g.: cat logfile.txt | grep “error”



Command Line: Making an Executable

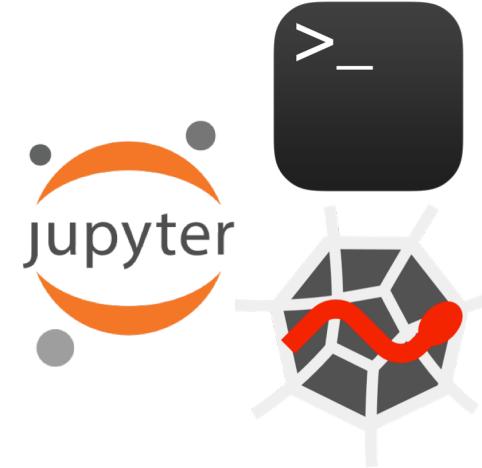
- At top of file:
 - `#!/bin/sh`
 - (This is called a “shebang”)
 - **Make executable (`chmod +x script.sh`)**
 - **Can now run as `./script.sh`**
- For more details/answers:
 - <https://stackoverflow.com/questions/8779951/how-do-i-run-a-shell-script-without-using-sh-or-bash-commands>



Running Python

3 ways to start Python and input code:

- Command-line interface
- Jupyter Notebook
- Spyder





Python from the command line

- Find and open your terminal, this will be powershell on PC and shell/terminal on mac
- Launch python from the shell, by typing ‘python’
- Should look like this:

```
(py3) D:\omis30>python
Python 3.6.6 |Anaconda custom (64-bit)| (default, Jun 28 2018, 11:27:44) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

- Make sure the version is Python 3.7+



Python from the command line - simple commands

- Type in $100 + 100$ and hit enter - should get a response of 200

```
(py3) D:\omis30>python
Python 3.6.6 |Anaconda custom (64-bit)| (default, Jun 28 2018, 11:27:44) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> 100 + 100
200
>>>
```

- Next type in a simple print command in Python:
- `print("Hello World")`

```
Python 3.6.6 |Anaconda custom (64-bit)| (default, Jun 28 2018, 11:27:44) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> 100 + 100
200
>>> print("Hello World")
Hello World
>>>
```



Python from the command line

- This interpreter is useful for short commands or testing of some code but probably isn't practical for a large program
- To exit: type `exit()` or CTRL-D

```
(py3) D:\omis30>python
Python 3.6.6 |Anaconda custom (64-bit)| (default, Jun 28 2018, 11:27:44) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> 100 + 100
200
>>> print("Hello World")
Hello World
>>> exit()

(py3) D:\omis30>
```



Reading Assignments for Week 2

Learning Python: Chapter 1

Learning Python: Chapter 2

Learning Python: Chapter 3

Note: if you are a new programmer, read this book carefully!

If you know most of this, skim for new info/knowledge!