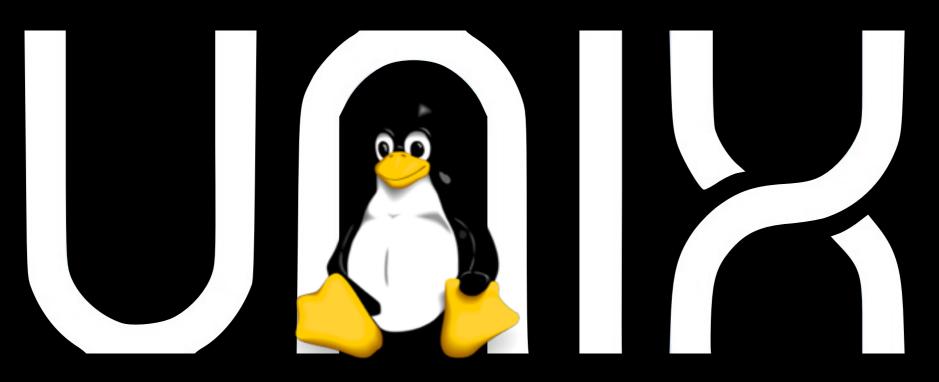
Introduction To



Barry Grant bjgrant@umich.edu http://thegrantlab.org

Introduction to Biocomputing http://bioboot.github.io/web-2015/

Monday	Introduction to UNIX*
Tuesday	Introduction to Programming
Wednesday	Data Formats & Visualization
Thursday	Version Control & Cluster Computing*
Friday	Group Projects









Todays Menu

Time

- 9:00-10:15 AM 10:15-10:30 AM
- II 10:30-12:00 AM 12:00-1:00 PM
- III 1:00-2:15 PM
 - 2:15-2:30 PM
- IV 2:30-4:00 PM

TopicsSetup and MotivationCoffee BreakBeginning UnixLunchWorking with UnixCoffee Break

How to Get Working

http://bioboot.github.io/web-2015/setup/

Lets get started...

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PC MobaXterm

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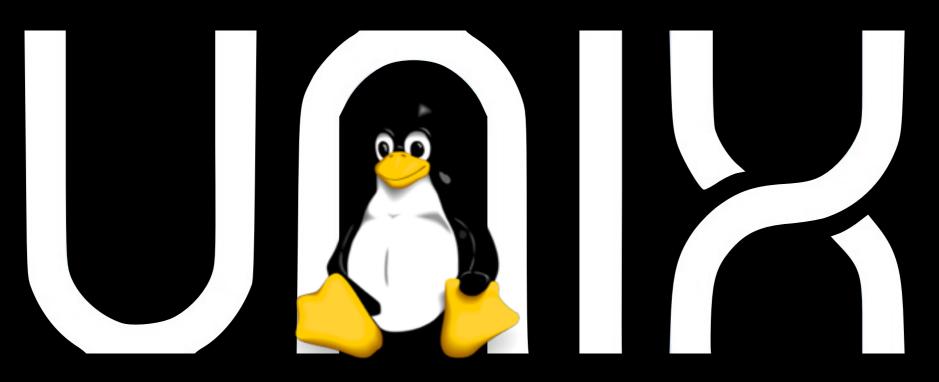
Mac Terminal

Checklist

- Mac: Terminal or PC: MoblXterm
- Mac: Git install or PC: "mobapt" (MoblXterm)
- Python Anaconda install
- Flux access form submitted
- MToken obtained

Example data: <u>http://tinyurl.com/day1-unix</u>

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Motivation

Why do we use Unix?

Modularity	Core programs are modular and work well with others			
Programmability	Best software development environment			
Infrastructure	Access to existing tools and cutting- edge methods			
Reliability	Unparalleled uptime and stability			
Unix Philosophy	Encourages open standards			

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Modularity

The Unix shell was designed to allow users to easily build complex workflows by interfacing smaller **modular programs** together.

An alternative approach is to write a **single complex program** that takes raw data as input, and after hours of data processing, outputs publication figures and a final table of results.

All-in-one custom 'Monster' program

Which would you prefer and why?

Advantages/Disadvantages

The 'monster approach' is customized to a particular project but results in massive, fragile and difficult to modify (therefore inflexible, untransferable, and error prone) code.

With modular workflows, it's easier to:

- Spot errors and figure out where they're occurring by inspecting intermediate results.
- Experiment with alternative methods by swapping out components.
- Tackle novel problems by remixing existing modular tools.

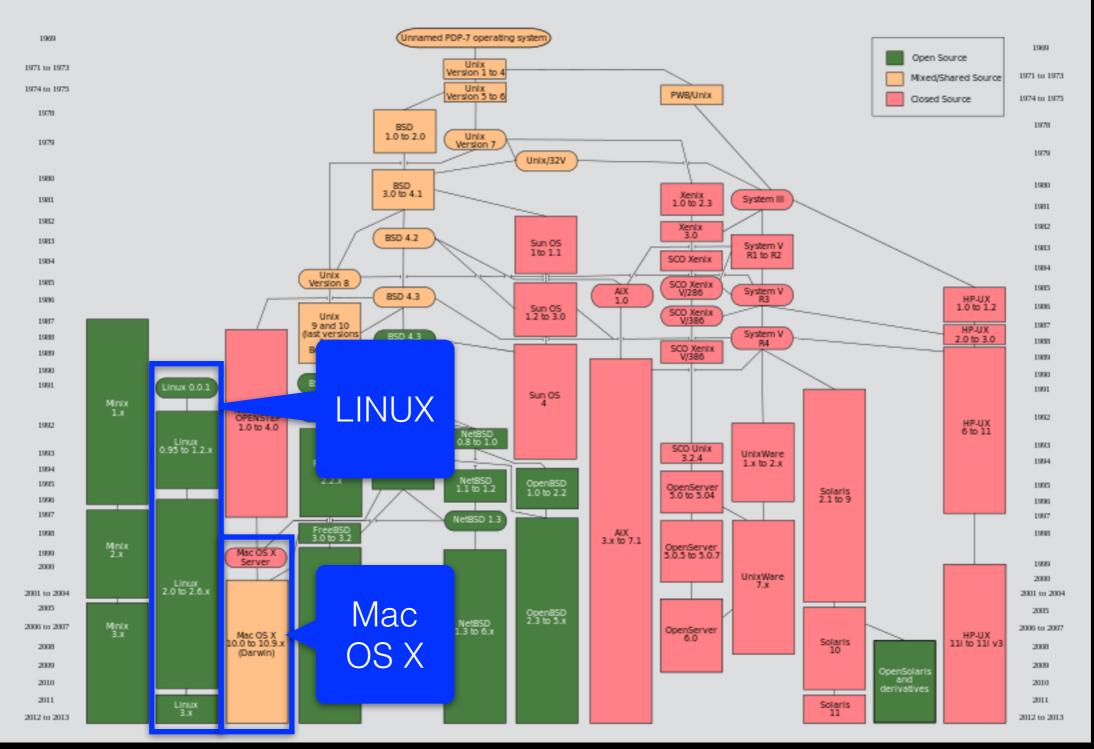
Unix 'Philosophy'

"Write programs that do one thing and do it well. Write programs to work together and that encourage open standards. Write programs to handle text streams, because that is a universal interface."



— Doug Mcllory

Unix family tree [1969-2010]



Source: https://commons.wikimedia.org/wiki/File:Unix_history-simple.svg

Basics	File Control	Viewing & Editing Files	Misc. useful	Power commands	Process related
Is	mv	less	chmod	grep	top
cd	ср	head	echo	find	ps
pwd	mkdir	tail	WC	sed	kill
man	rm	nano	curl	uniq	Crl-c
ssh	(pipe)	touch	source	git	Crl-z
	> (write to file)		cat	R	bg
	< (read from file)			python	fg

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Mac Terminal

Test: Connecting to remote machines (with ssh)

 Most high-performance computing (HPC) resources can only be accessed by **ssh** (Secure SHell)

> ssh [user@host.address]
> ssh barry@scs.gpcc.itd.umich.edu
> ssh -X barry@flux-login.engin.umich.edu