Lecture 2: Useful Tools and Cluster Warm-up (An Interactive Tutorial)

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Disclaimer

- Quick overview
  - nothing new for some...
  - overwhelming for others
- Similar information available on class wiki
- Be able to do HW0 with ease after today
- Please ask questions

Logistics

- Everybody in the class should be on CMS by now `http://cms.csuglab.cornell.edu/web/guest`
- The enrollment cap has been increased to the room limit (several seats are available)
- If you cannot see the course under CMS or log in to the cluster please email us with your netID
- HW0 is out (due Tuesday Feb 4th)

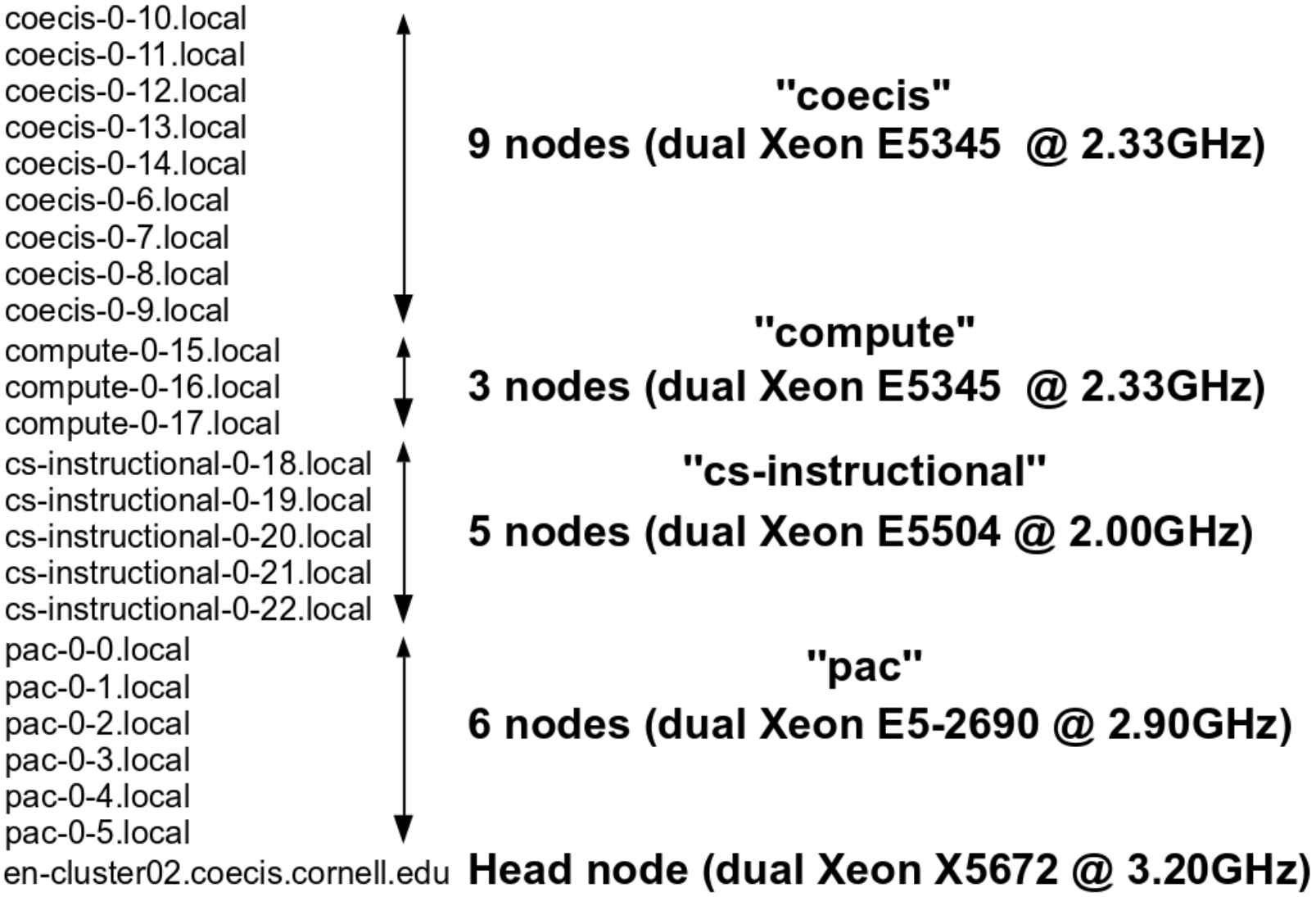
Today

- Connecting to the cluster
- Basic usage of the shell
- Version control
- Running and monitoring cluster jobs
- HW0 walkthrough
- More demos (if time permits)

C4 cluster

- Rocks linux cluster (V6.1)
  `http://www.rocksclusters.org/wordpress/`
  Heterogeneous nodes
- HTCondor scheduler (v7.8.5)
  `http://research.cs.wisc.edu/htcondor/`
  use to submit and monitor jobs on cluster
- Ganglia activity monitor
  `http://c4.coecis.cornell.edu/ganglia/`

C4 cluster machines



ssh access to cluster

- Use a Terminal under OS X or Linux
- PuTTY or Cygwin for windows
- Authenticate with Cornell NetID and password
  ssh netID@c4.coecis.cornell.edu

Terminal prompt

- Type the following for a one-off initialization:

  /share/cs-instructional/cs5220/script/setup.sh

  This appends commands to .bashrc and .bash_profile to automatically set a class-related environment every time you log in.

Customize the prompt

Google customize $PS1
add your version to the .bashrc file

export $PS1 = ...

\u username
\h hostname
pwd working directory path
\n new line

Some bash commands

ls	w	chmod	ssh	
cd	ps	export	scp	
pwd	jobs	set	tar	
mkdir	fg	alias	vi	
rmdir	bg	exit	nano	. .. > » < « &
mv	kill	history	which	
cp	Ctrl + C	|	man	
grep	Ctrl + Z	find	echo	

If you are not particularly familiar with the above please check out the following tutorial :

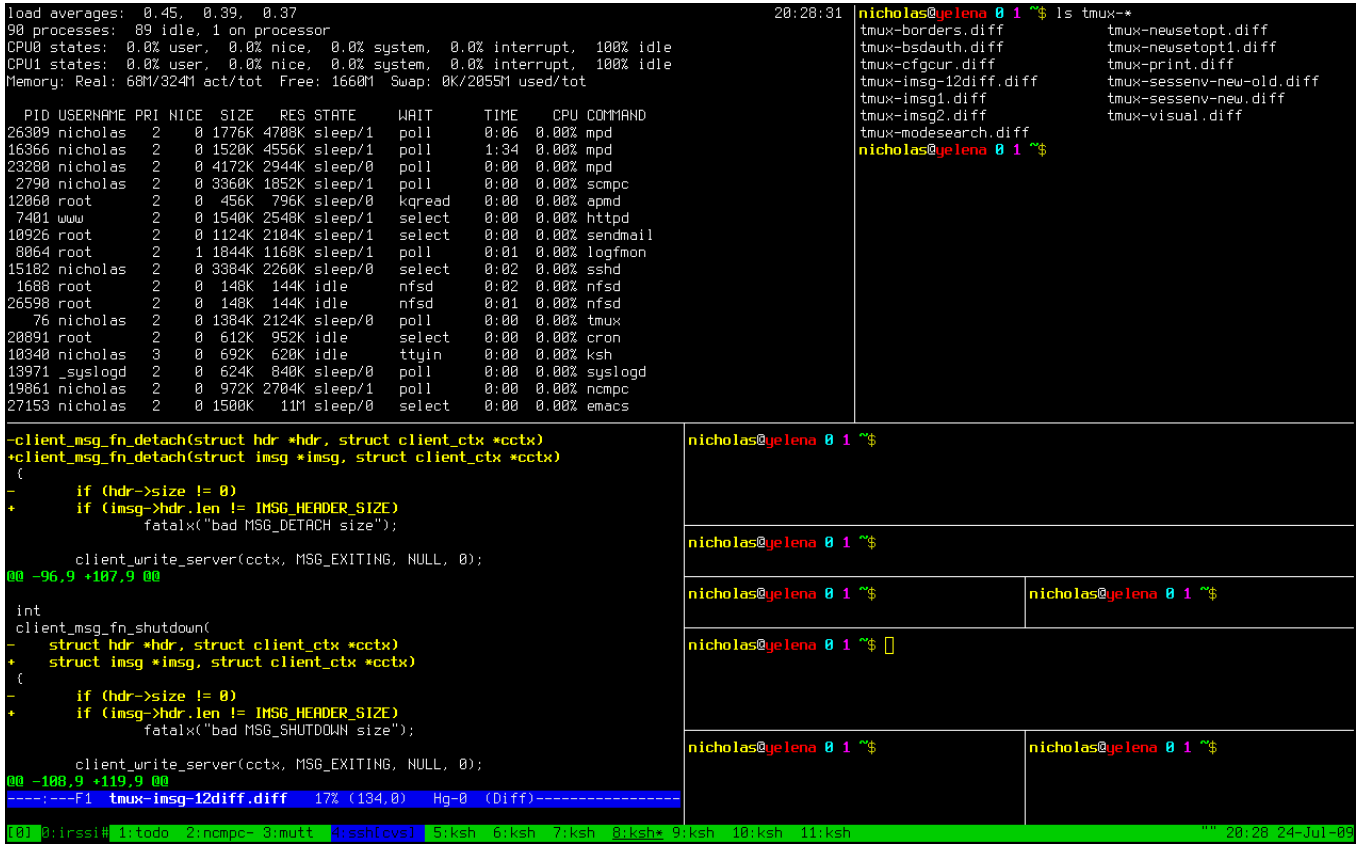
`http://software-carpentry.org/v4/shell/`

For more details

- *The UNIX programming environment*
  by Kernighan & Pike
  http://cornell.worldcat.org/title/unix-programming-environment/
- *Learning the bash shell*
  by Newham & Rosenblatt
  http://cornell.worldcat.org/title/learning-the-bash-shell/

Both are available through the Cornell library

Terminal multiplexer (tmux)



http://tmux.sourceforge.net/

- Concurrently view/manage multiple programs in one terminal
- Read documentation (key-binding / configuration)
- Edit .tmux.conf

Version Control Systems (VCS)

- Why version control?
  - Keep revision history
  - Easy way to share files between machines
  - More effective collaboration
  - (Remote) backup

VCS - many flavors

- Distributed
  - Git
  - Mercurial (Hg)
  - Bazaar

    ...
- Client-server
  - Subversion (SVN)
  - CVS

    ...

Repositories - Host projects online

- Bitbucket (Mercurial or Git)
- Github (Git)
- Launchpad (Bazaar)
- Google Code (SVN, Mercurial or Git)
- Microsoft CodePlex (SVN, Mercurial or Git)
- Sourceforge (CVS, SVN, Bazaar, Git or Mercurial)
- Cornell Forge (SVN) - `http://forge.cornell.edu`

Bitbucket

- Class repository and wiki are hosted on Bitbucket:
  `https://bitbucket.org/dbindel/cs5220-s14/`
  Sign up for a free account
- Git tutorial
  `https://www.atlassian.com/git/tutorial`
- Pro Git book
  `http://git-scm.com/documentation`
- Git (Interactive) Cheat Sheet
  `http://ndpsoftware.com/git-cheatsheet.html`
- Git commands overview
  `https://www.atlassian.com/dms/wac/images/landing/git/atlassian_git_cheatsheet.pdf`

Making a local copy

- Clone the class repository

  git clone https://bitbucket.org/dbindel/cs5220-s14.git

  The folder cs5220-s14 now contains local copy

Git basics demo

- git clone
- git add
- git diff
- git commit
- git log
- git remote
- git pull
- git push

Please look at the cheat sheet and tutorials for more functionality

Graphical Interfaces available

- EGit (Git with Eclipse IDE)
  `http://www.eclipse.org/egit/`
- Subclipse (SVN with Eclipse)
  `http://subclipse.tigris.org/`
- SourceTree (Git and Mercurial GUI under Windows or Mac)
  `http://www.sourcetreeapp.com/`
- TortoiseSVN, TortoiseHg, TortoiseGit... series (mostly Windows)

Eclipse PTP (Parallel Tools Platform)

- IDE for developing parallel applications
- Support MPI, OpenMP, UPC
- Parallel debugger
- Various profiling tools
- Some issues running on c4 cluster
- Experiment with it on your own machine
- Please don't use PTP remotely on c4 right now

`http://www.eclipse.org/ptp/`

Using HTCondor

- condor_status [-claimed -avail -master -verbose]
- condor_q [-analyze -run -hold]
- condor_submit
- condor_hold
- condo_release
- condor_rm
- condor_history [-backwards -forwards -match]

[-constraint -format]

HTCondor CS5220 wrapper scripts

- csub (serial submissions)
- mpisub (Message Passing Interface)
- upcsub (Unified Parallel C)
- ompsub (OpenMP: Open Multi-Processing)

`https://bitbucket.org/dbindel/c4-pkg`

Environment modules

Make it easy to install:

- different versions of software packages
- software packages that might conflict

- module list

- module avail

- module load
  module add

- module unload
  module rm

`https://bitbucket.org/dbindel/cs5220-s14/wiki/modules`

Homework 0 walkthrough

Steps:

- Clone class repo
- membench
- membench with ClassAd requirements
- HTCondor job management
- pinfo
- Retrieve the results (using sftp or scp)

`http://bitbucket.org/dbindel/cs5220-s14/wiki/HW0`

Additional Demos...