

# Future of Computing and Linux

8-26-2011

# Opening Discussion

- Have you come up with any other questions about the course?
- Any thoughts on computing in your life and society?
- Minute essay comments:
  - Could 3-D printing buildings reduce need for labor?
  - How much time out of class?
  - Should you put Linux on your machines?

# More Comments

- Can you discuss specific issues with classmates?
- Games!
- Connections:
  - Medical science
  - Geoscience

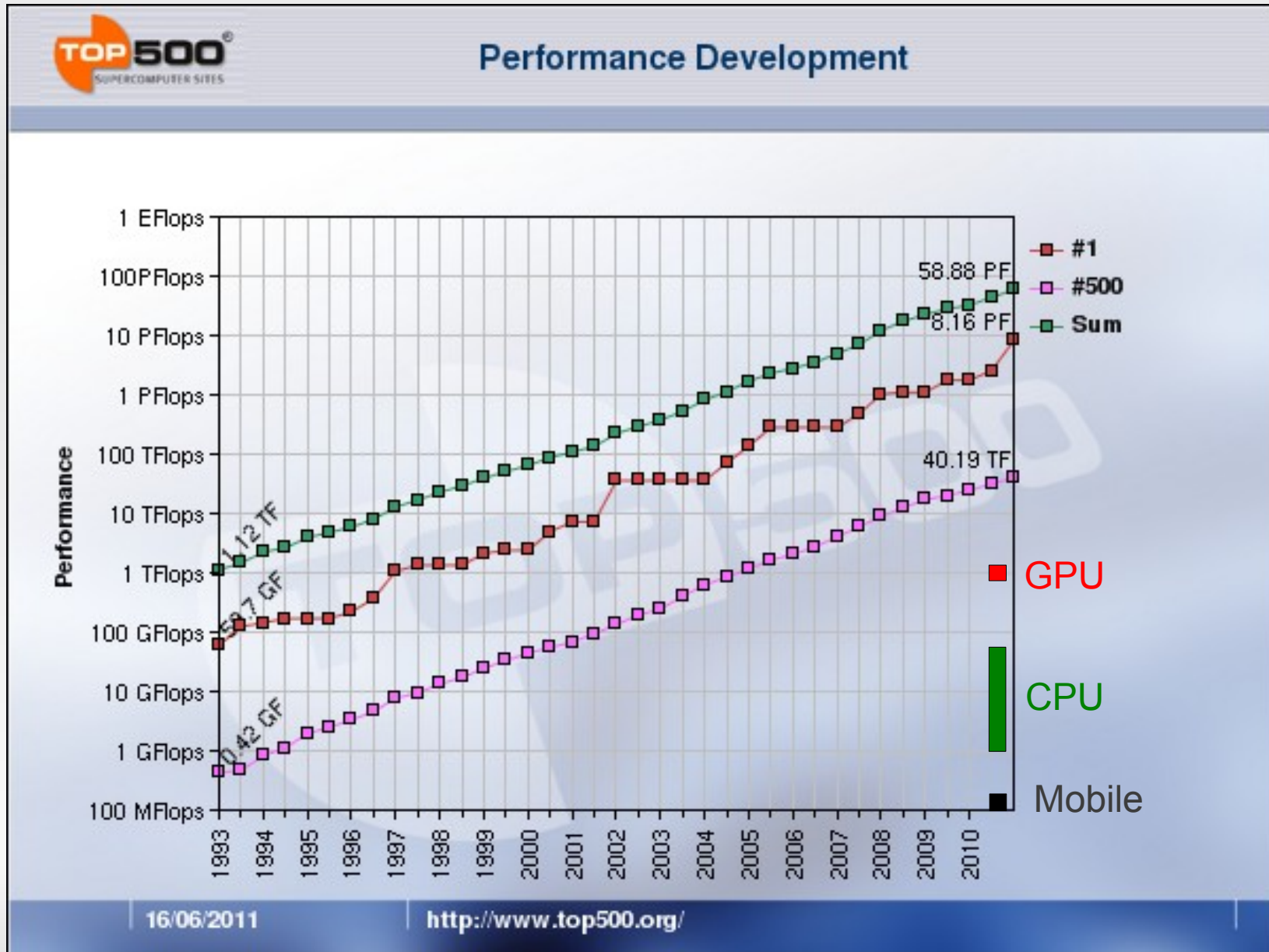
# Cutting Edge



<http://www.youtube.com/watch?v=6zXOW6v0c8s>

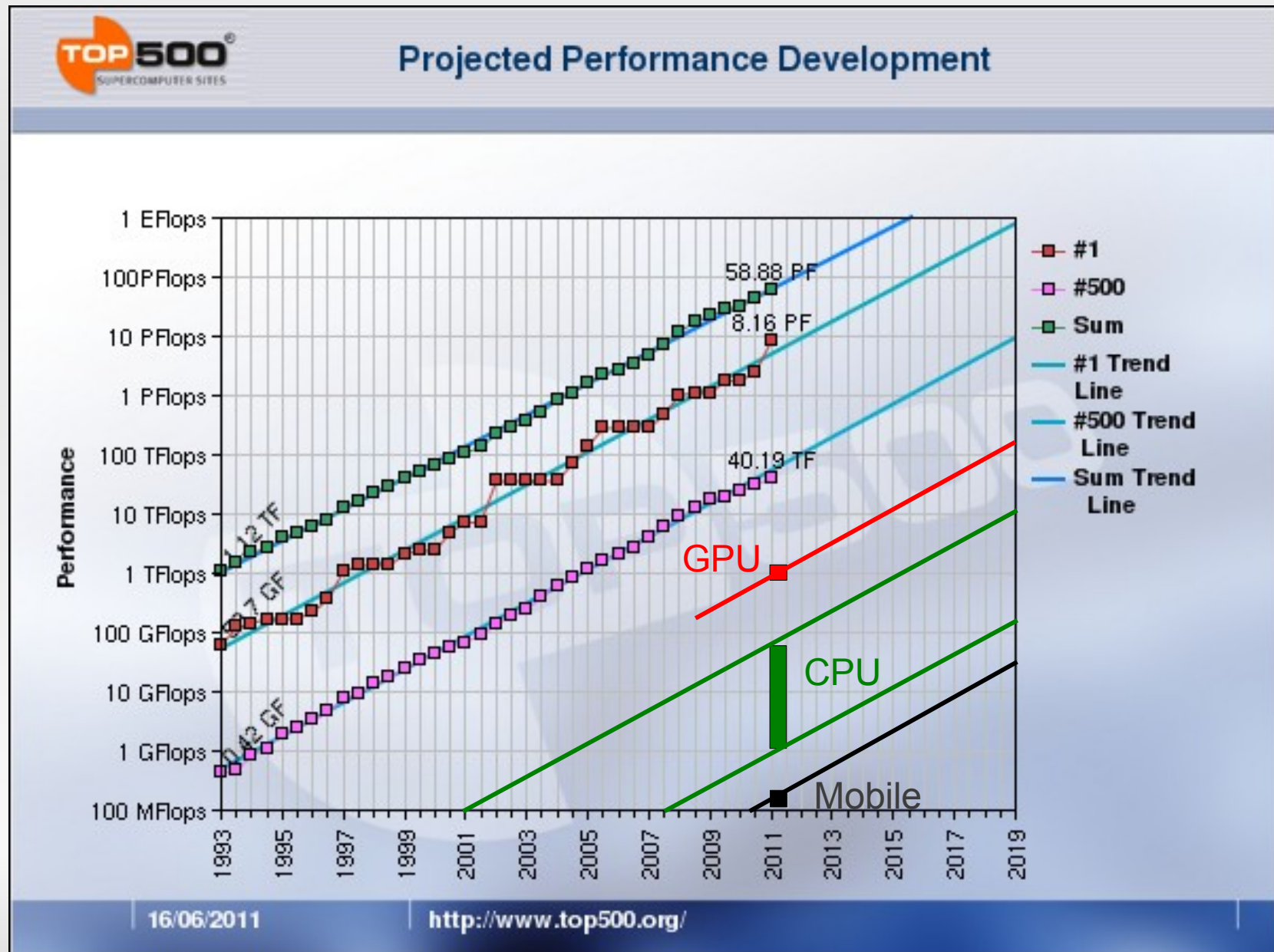


# Computing Power









# The Power of Exponential Growth



# Cost/GFLOP

Date	Approximate cost per GFLOPS	Technology	Comments
1961	US \$1,100,000,000,000 (\$1.1 trillion)	About 17 million <a href="#">IBM 1620</a> units costing \$64,000 each	The 1620's multiplication operation takes 17.7 ms. <sup>[40]</sup>
1984	\$15,000,000	<a href="#">Cray X-MP</a>	
1997	\$30,000	Two 16-processor <a href="#">Beowulf</a> clusters with <a href="#">Pentium Pro</a> microprocessors <sup>[41]</sup>	
April 2000	\$1,000	<a href="#">Bunyip Beowulf cluster</a> 	Bunyip was the first sub-US\$1/MFLOPS computing technology. It won the Gordon Bell Prize in 2000.
May 2000	\$640	<a href="#">KLAT2</a> 	KLAT2 was the first computing technology which scaled to large applications while staying under US\$1/MFLOPS. <sup>[42]</sup>
August 2003	\$82	<a href="#">KASY0</a> 	KASY0 was the first sub-US\$100/GFLOPS computing technology. <sup>[43]</sup>
August 2007	\$48	<a href="#">Microwulf</a> 	As of August 2007, this 26.25 GFLOPS "personal" Beowulf cluster can be built for \$1256. <sup>[44]</sup>
March 2011	\$1.80	<a href="#">HPU4Science</a> 	This \$30,000 cluster was built using only commercially available "gamer" grade hardware. <sup>[45]</sup>

[http://en.wikipedia.org/wiki/FLOPS#Hardware\\_costs](http://en.wikipedia.org/wiki/FLOPS#Hardware_costs)

# Linux

- Go ahead and log in.
- Linux is just another OS, like Windows or Mac OS.
- Linux is primarily used in servers. Efforts are being put into making it a desktop OS.
- It has a GUI, but we will focus on doing things through the command line.
- Bring up a terminal.
- Change password with `passwd`.



# Command Line

- You are likely used to the point and click interface of a GUI.
- To run a program you double click on it or a file associated with it. Any other information has to be given after the program opens.
- With the command line you type in the name of the program you want to run. You can also specify any other information you want through command line arguments.

# Files and Directories

- What you call folders were originally directories.
- Commands:
  - `pwd` – See current directory.
  - `ls` – List the contents of a directory.
  - `mkdir/rmdir` – Make and remove directories.
  - `cp/mv/rm` – Copy, move, remove files.
  - `less/more/cat` – See contents of files.

# Tips

- Tab completion for file/directory names.
- ! - for last matching command.
- Ctrl-r to search your history.
- The man command for manual entries. Use the -k option to search.

# Permissions

- Do ls with -l option to see permissions.
- Sets of rwx for user, group, and others.
- Use whoami and groups to find identity.
- Use chmod and chown to change permissions or ownership.

# Remote

- Use ssh to login into one machine from another.
- Use scp to copy files from one machine to another.
- The website has a link to Putty which will give you these abilities from Windows.



# Other

- du – Lists disk usage
- grep – Searches for something inside of files.
- find – Find files.
- head – List the first several lines of a file.
- tail – List the last several lines of a file.
- top – Look at what is running on a machine.
- w – Look at who is logged into a machine.

# I/O Redirection

- You can send a programs output to a file using `>` or `>>`.
- You can make a program use a file as input using `<`.
- You can do more interesting things by sending the output of one program to another with `|`.

# Minute Essay

- Have you ever used a command-line interface before? What do you think of them based on what you have seen today?
- Pre-survey: Are you considering taking PoP II (CSCI 1321) next semester?
- Try connecting to one of the Xena machines from your room. For example:
  - `xena08.cs.trinity.edu`