# WM7 - Computational and Systems Biology

## A Mini UNIX Tutorial

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# What's UNIX?

- An operating system run on many servers/workstations
- Invented by AT&T Bell Labs in late 60's
- Currently there are different versions and variants of UNIX such as SunOS, Linux, Solaris, BSD, ...

# Basic UNIX

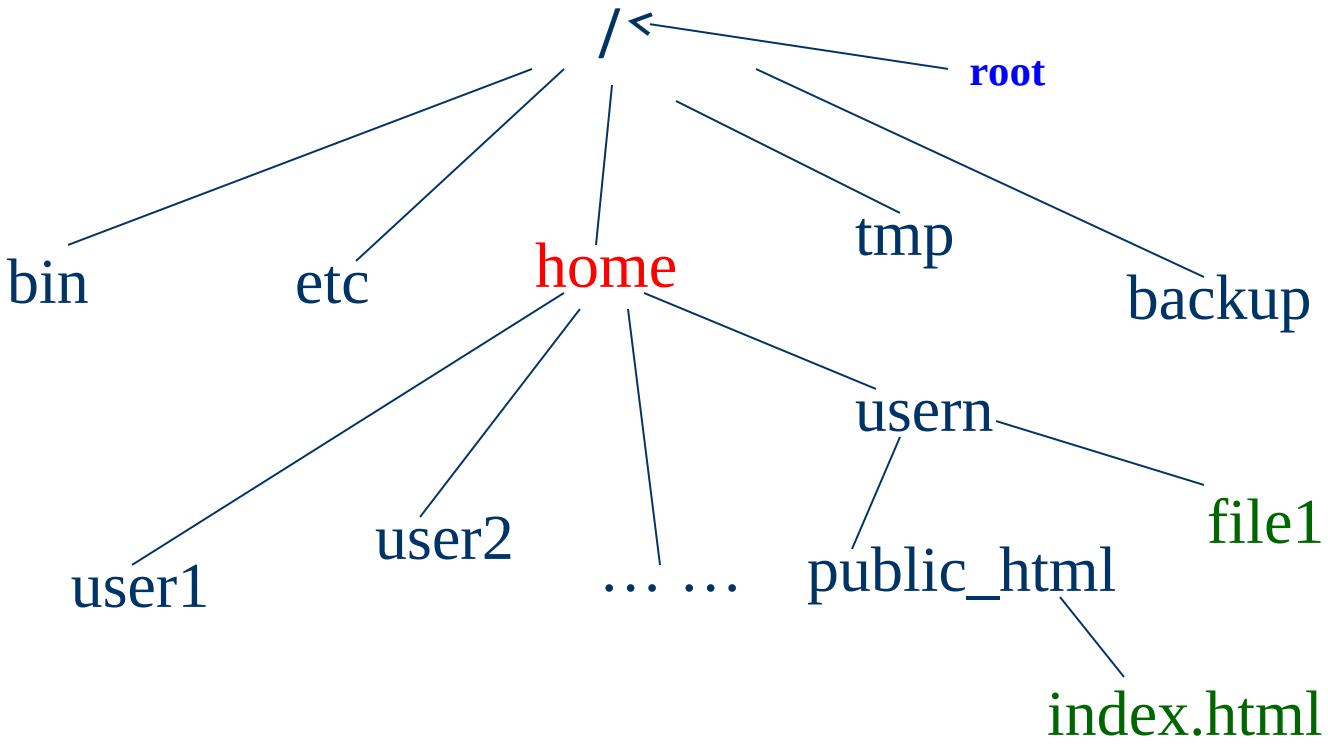
- Most UNIX functionality is accessed through the UNIX prompt.
  - Text based, like MS-DOS
- Mastery of UNIX comes from being familiar with different commands
  - We will cover some of the basic commands in this class
  - Goal: to be able to navigate through the directories

# UNIX Directory Structure

- Files are grouped in the directory structure. The file-system is arranged like hierarchical tree structure.
- The top of the tree is called “root” which usually contains several sub-directories.
  - “/”(forward slash) is used to present the “root”.

# What is Directory?

Directories can hold files and other directories



# Pathnames

- Absolute Pathnames
  - In the previous tree

    /home/usern/file1

    is an absolute pathname
- Relative pathnames
  - If you are already in the home directory, the relative pathname for file1 is

    usern/file1

# More on UNIX paths

- “~” (tilda) points to the user’s home directory. Useful if you are logging into a workstation with many users.
  - Many of the other paths are inaccessible and unimportant to you
  - ~ is the default working directory when you log in.
  - If you are user “usern”, then /home/usern/file1 is the same as ~/file1.
- “.” refers to the current directory
- “..” refers to the parent directory.
  - If you are in /home/usern/, then ../ refers to /home/.

# UNIX – Basic commands

- **pwd** print process working dir
- **cat, head, tail**… view files
- **ls** list contents of directory
- **rm** remove file
- **mv** rename file
- **cp** copy a file
- **touch** create an empty file or update
- **mkdir** and **rmdir** create and remove dir
- **wc** counts the words in a file
- **du** directory usage

# UNIX – More commands

Creation

- mkdir – make directory. Use "mkdir *name*" to create a new directory in the current directory named *name*. Can also create multiple directories.
- cp – copy. Use "cp *file1 file2*" to create a new file, *file2* which is a copy of *file1*. Can also use "cp *file(s) directory*" to copy all *file(s)* to *directory*.
- mv – move. Same as copy, but deletes the original file.

# UNIX – More commands

Deletion – Be careful with these!

- rm – remove. Use "rm *file(s)*" to delete files
- rmdir – remove directory. Use it to delete an empty directory

- You can not recover your files after you removed them!

# Some tips

- “tab” is used for auto-complete.
  - If a file/directory name was partly typed in, tab will auto-complete it.
  - If there are multiple options, tab will auto-complete up to the point where the options branch and show you a list of possible options
- “*” is used as a wild card.
  - “rm *blah**” removes all files which start with *blah*, so blah1, blah2, and blahblah would all be removed
  - Using “cp public/* private/” copies all files in your public directory into your private directory, and keeps all file names intact.
- Use arrow keys to navigate through the command history (up/down)

# More tips

- “-r” is a common option that usually makes a command *recursive*, that is, it will execute the same command on all subdirectories.
  - Commonly used to perform file commands on directories
  - Using “cp private/* public/ -r” copies everything from the private folder to the public folder, and also copies all subdirectories.
  - Using “rm –r *” deletes *everything* in the current directory and all sub-directories. Never use this in the root directory!

# Redirection of input/ouput

- Redirection of output: >
  - example:`$ ls > my_files`
- Redirection of input: <
  - example: `$ program <input.data`
- Append output: >>
  - example: `$ date >> logfile`
- Bourne Shell derivatives: *fd*>
  - example: `$ ls 2> error_log`

# Connect to remote system

- We use SecureShell (ssh) to connect to a remote Linux server

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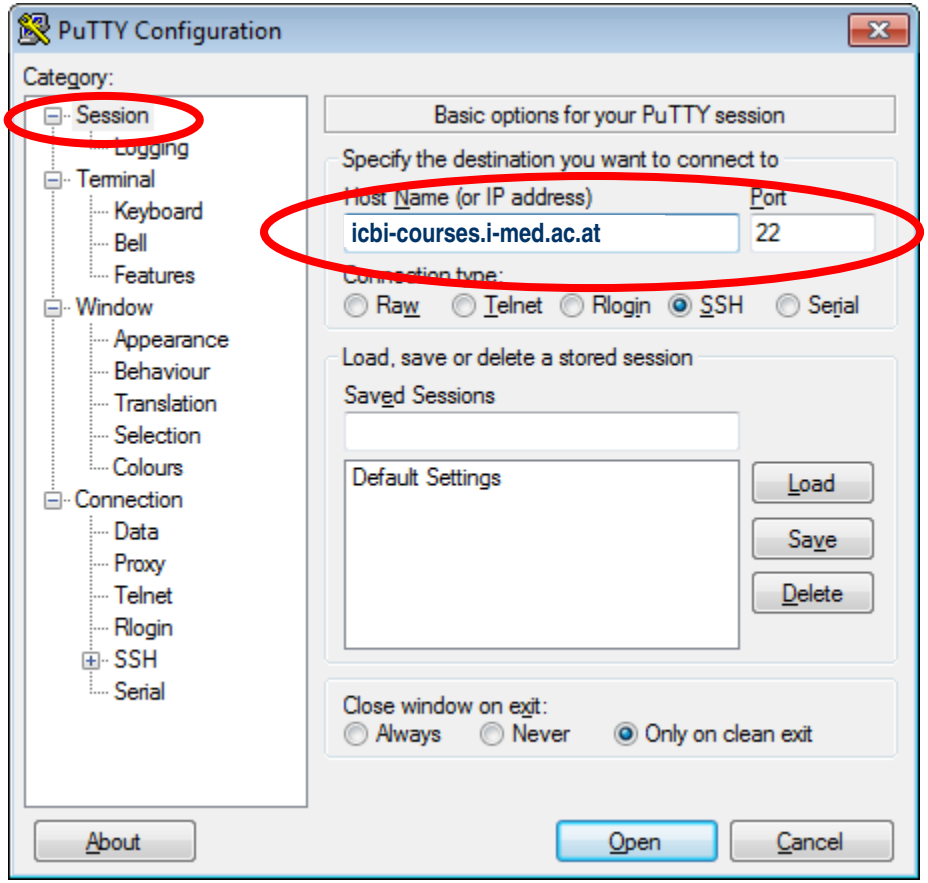
- ssh for Windows is provided by

putty

(http://www.putty.org/)

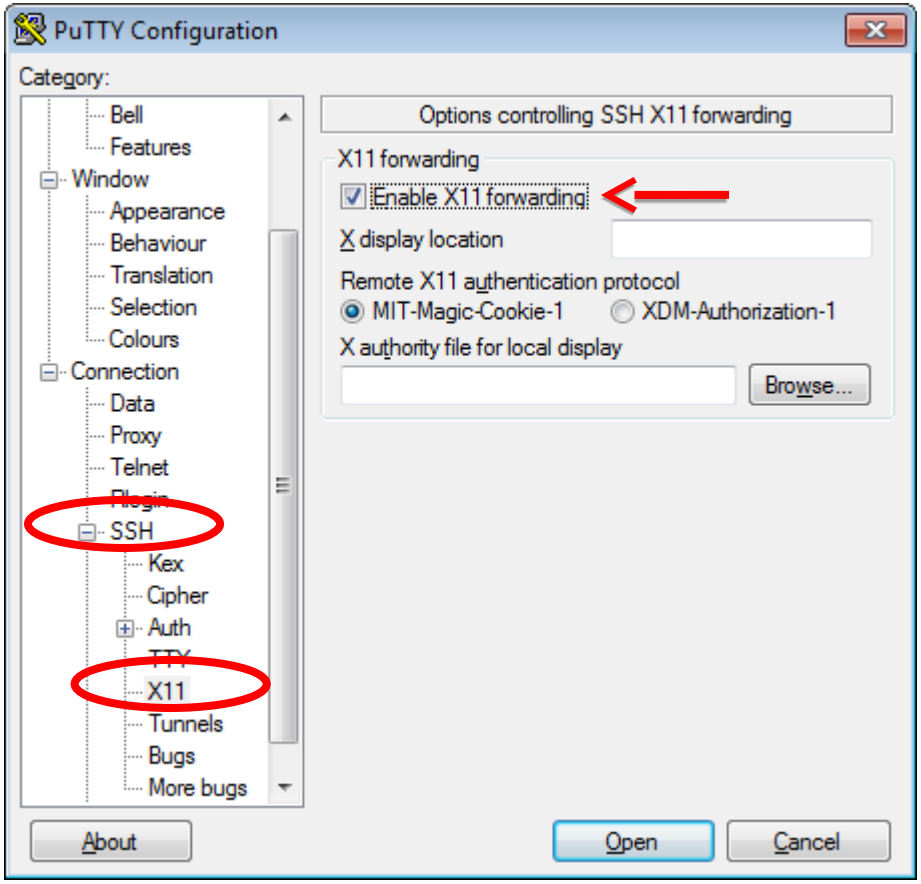
# Connect to remote system

Define connection by specifying a remote host name



# Connect to remote system

Enable X11 fowarding (redirection of graphical output) and start “Xming”



# Connect to remote system

Welcome on cluster: enjoy working