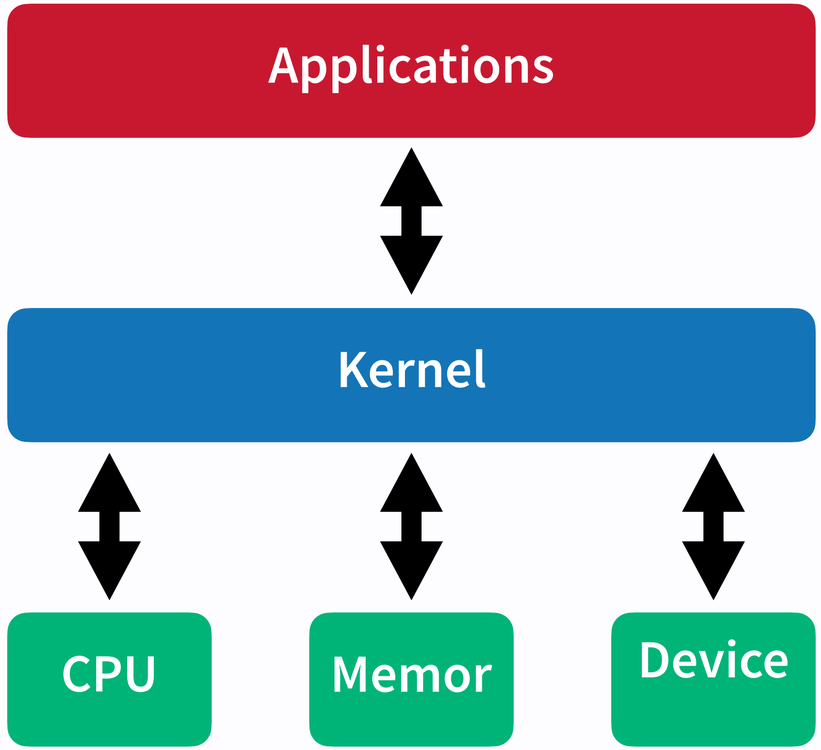
Practices in Visual Computing 1
Fall 2022
Lab Session #6: Linux interfacing

Slides Prepared by Mehdi Safaee

Use this link for connecting to SFU servers

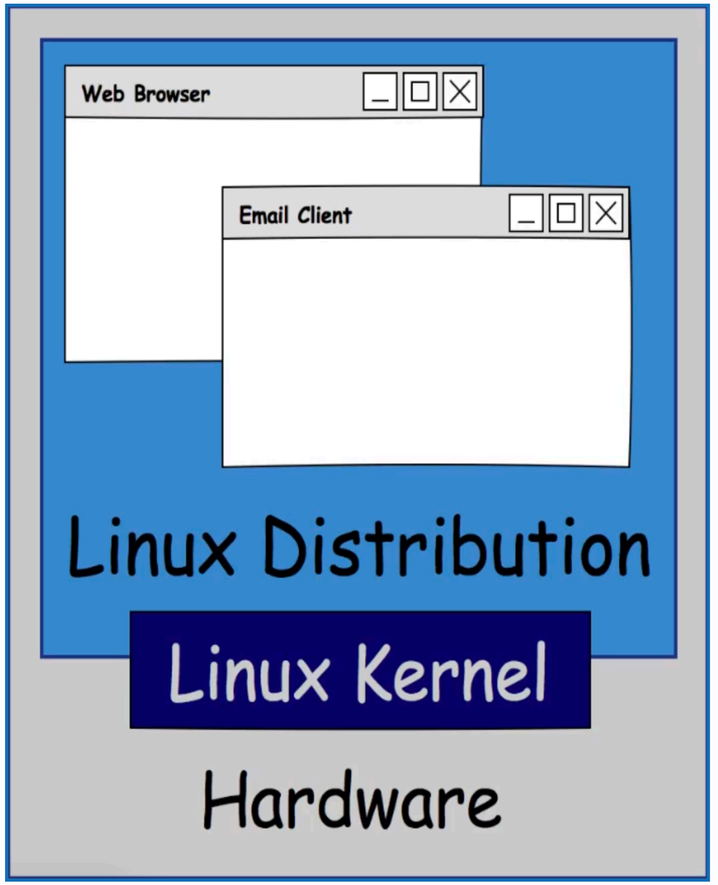
What linux is

- An operating system
- A Kernel
- Created by Linus Torvalds (1991)
- First version released in 1994
- Free/Open Source Software
- Unix-Like



Linux Distributions

- Linux Kernel + Additional Software
- Each Distribution has their own goals
- DistroWatch.com
  - **Redhat**
  - Fedora
  - **Ubuntu**
  - Debian



Why Linux

- Runs on many hardware platforms
- Developed on PC hardware with intel processors
- Small footprint
- Stable, Reliable, Secure
- Great for servers

What is Shell?

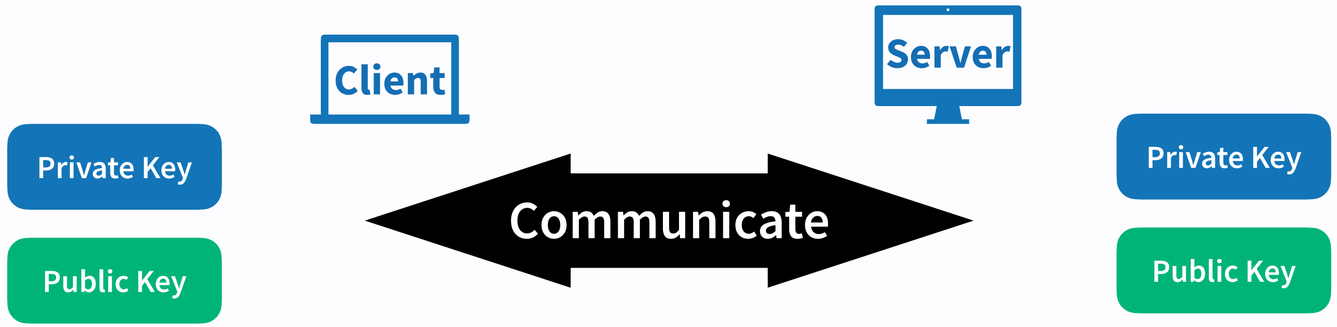
- The default user interface to Linux
- A program that accept your commands and executes them

What is Bash?

- Bash is the command language interpreter for interfacing with Shell

SSH

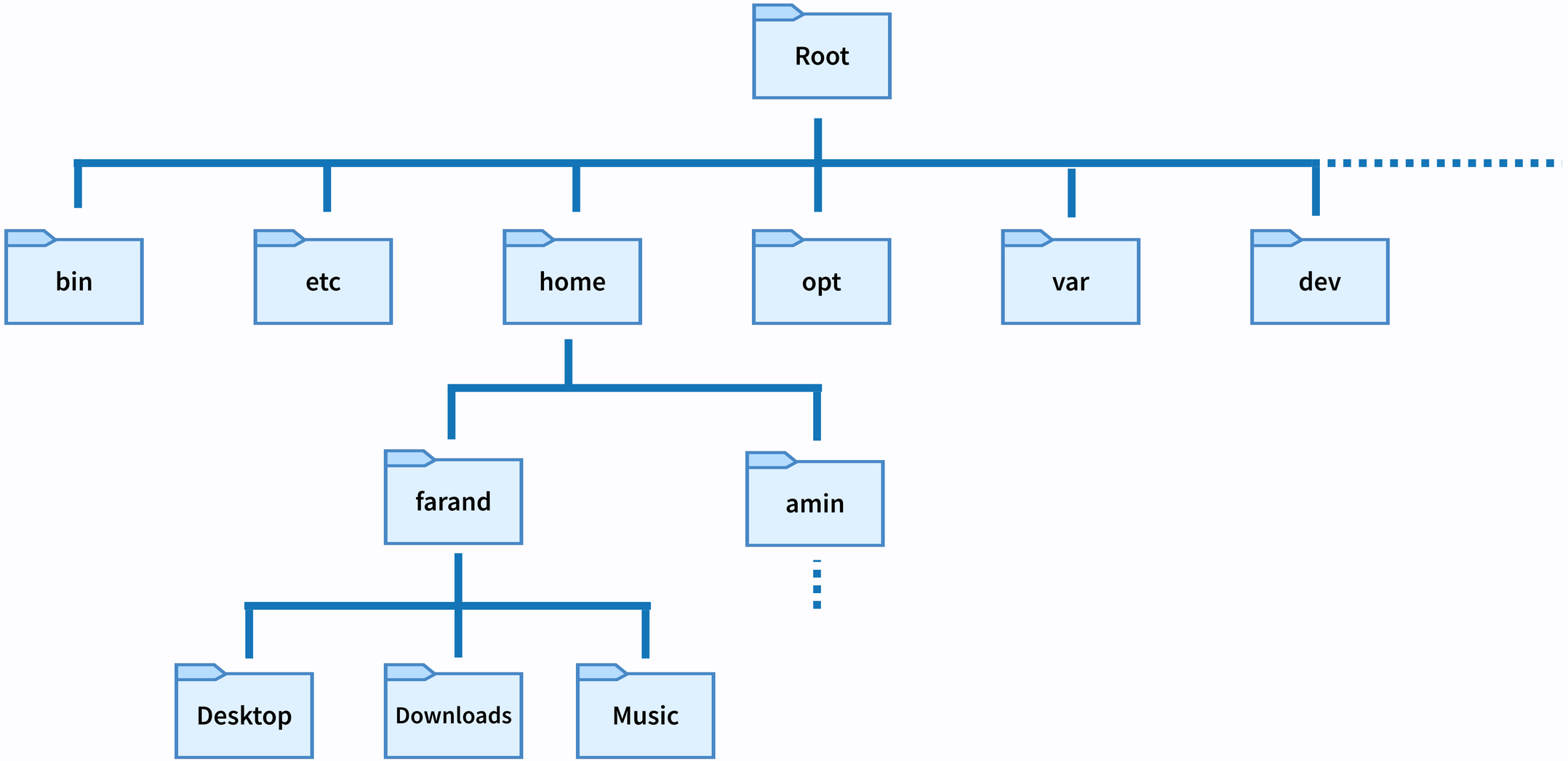
- Stands for Secure SHell
  - A network protocol
  - Encrypted communication



Linux Directories

- /
  - Root Direcory
- /bin
  - Binaries and other executable programs
- /etc
  - System configuration files
- /home
  - Home directories
- /opt
  - Optional or third party software
- /dev
  - Physical devices
- /var
  - Variable data (most notably log files)

Linux Directory Structure



Useful Commands

```
# This is a Comment
```

Useful Commands

```
Command -ARG1 -ARG2 ...
```

Useful Commands

```
pwd
# Displays the present working directory
```

Useful Commands

```
ls
# List directory contents
```

Useful Commands

```
cd
# Change the current directory
```

The ~ expansion

- ~ = /home/deliware
- ~/Desktop = /home/deliware/Desktop

Useful Commands

```
cat
# Concatenates and displays files
```

Useful Commands

```
echo
# Displays arguments to the screen

echo ${VAR_NAME}
# Displays variables to the screen
```

Useful Commands

```
which COMMAND
# Displays arguments to the screen
```

Useful Commands

```
COMMAND --help
# Displays the help for arguments
```

Useful Commands

```
exit
# Exits the shell/your current session
```

Useful Commands

```
clear
# Clear the screen
```

```
# Working with Directories

.
# This directory


..
# Parent directory

cd ..
# Go to parent directory
```

Working with Directories

```
cd -
# Go to previous directory

./command
# Execute a command in current directory
```

Working with Directories

```
mkdir [-p] test
# Creates the test directory

rm -rf directory
# Recursively remove the directory
```

Caution!

No Trash!

Creating Files

```
touch
# Creates a file
```

More on ls

```
ls -l
# List directory contents
# Long listing format

ls -a
# List directory contents
# Include hidden files
```

More on ls

```
ls -la
ls -al
# List directory contents
# Long listing format
# Includes hidden files
```

Working with Spaces in Names

Just Say No to Spaces!

Alternatives:

- Hyphens (-)
- Underscores (_)
- CamelCase

Dealing with spaces in names?

- Encapsulate in quotes
- Use backslash

Directory Shortcuts

```
ls -l
-rw-rw-r-- 1 deliware deliware 4096 dec 10...
```

Symbol	Type
-	Regular File
d	Directory
l	Symbolic Link

Directory Shortcuts

```
ls -l
-rw-rw-r-- 1 deliware deliware 4096 dec 10...
```

Symbol	Type
r	Read
w	Write
x	Execute

Permissions

Type User Group Other

Directory Shortcuts

```
chmod o+x test
# Change permissions for test file
# Add EXECUTE permission to OTHERS group
```

Working with Files

```
cat file
# Displays content of the file

less file
# Browse through a text file (more features)
```

Reading Files

```
head file
# Displays top lines of the file

tail file
# Displays last lines of the file
```

Reading Files - Text Editors

- nano
  - A simple text editor
  - Easy to work with
- Vi
- emacs

Remove Commands

```
rm test
# Removes the test file

rm -r dir
# Removes directory and contents

rm -f test
# Force remove/No confirmation
```

Wild cards

```
rm *.jpg
# Removes all files with .jpg ending

cp -r test myDir
```

Wild Cards

- * Matches zero or more characters
  - *.txt
  - a*
  - a*.txt

Copying and Removing

```
cp SOURCE DESTINATION
# Copies source file(s) to the destination

cp -r myDir destDir
# Copies a directory into another

cp -i test1 test2
# Copies (interactive mode)
```

Copying and Removing

```
mv SOURCE DESTINATION
# Moves/renames source(s) to the destination

mv test1 destDir
# Moves the test1 into destDir

mv -i test1 test2
# Renames (interactive mode)
```

Disk Utils

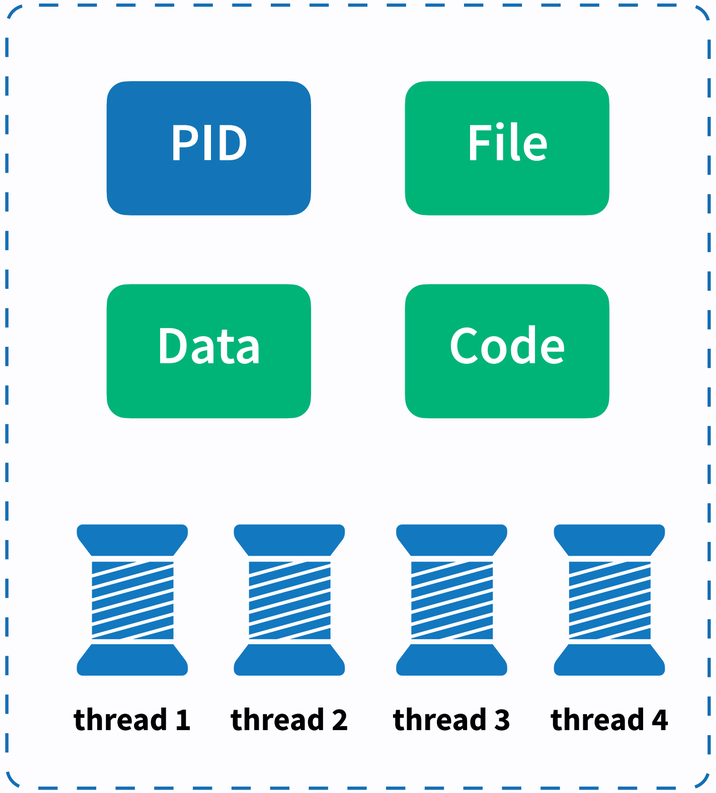
```
du -h file
# Recursively displays the size

du -sh file
# Displays the size in human readable format

df -h
# Shows device storage usage
```

.sh Files

- Chain a few shell commands together
- Turing Complete
- Scripting language
- Source vs Execute
- Exporting variables
- .bashrc (or .zshrc) file

PCB

- Process Control Block
- Have Process ID
- May have single or multiple threads



Process Control

```
ps -e
# Displays all processes

top
# Interactive process viewer
```

Process Control

```
kill 1234
kill -SIGTERM 1234
# Kill the process (gracefully!)

kill -SIGKILL 1234
# Kill the process (immediately!)
```

Process Control

```
killall -u USERNAME
# Kill all the processes deployed by USERNAME
```

GPU Interfacing

- Nvidia GPUs
- CUDA
- Limited with # of cores and VRAM

Process Control

```
nvidia-smi
```

Keeping Processes

```
# Open a tmux session
tmux new -s mehdi

# List all tmux sessions
tmux ls

# List all tmux sessions
tmux attach -t mehdi
```