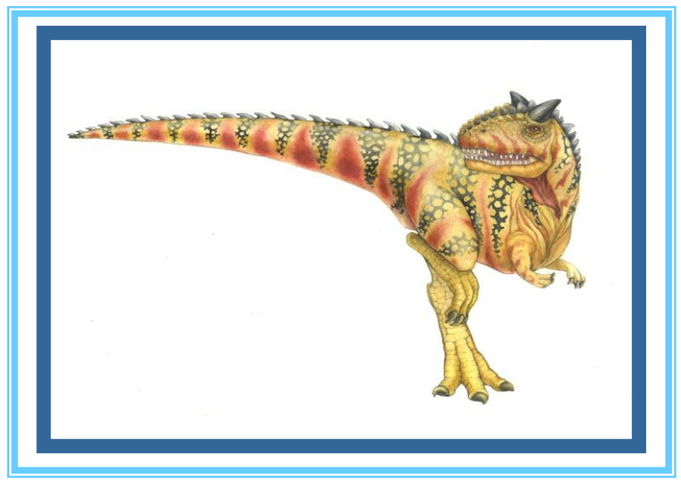
Project 4
The Linux Operating System



Your Linux Account

- Go to the Operating Systems Course page and learn how to connect to your Linux account:
  http://www.samyzaf.com/braude/OS/index.html#linux
- This page also explains how to transfer files from Windows to Linux and from Linux to Windows
- Your first task is to move all your solutions to project 3 from your Windows pc to your Linux account
- Log on to your Linux account (using putty.exe):
  Make sure to enter the correct server name:
  brdlinux.braude.ac.il
  login: u12345
  password: u12345 (last 5 digits of your ID)

Reading Assignment

- Go to the Operating Systems Course page and read chapters 5 and 6 of the Hebrew OS book http://www.samyzaf.com/braude/OS/os.pdf
- Only 22 short pages! So don't be lazy … ☺

Linux Warm Up Exercises

- **Problem 1:**
  you need to create a new directory “proj4” under your Linux home directory: `mkdir ~/proj4`
- **Problem 2:**
  Move all solutions of project 3 from my account (samyz) to this directory:

```
cp  ~samyz/os/proj4/*  ~/proj4
```

- **Problem 3:**
  Make sure all files were copied all right by moving to this directory, list files, and view one of the files

```
> cd ~/proj4
> ls
> cat find_files.py
```

First Linux Python Program

- All user programs are usually created inside the ~/bin directory.
  So you need to create a ‘bin’ directory:

  ```
  mkdir ~/bin
  ```

- **Problem 4:**
  Copy your **find_files.py** program from ~/proj4 to a new file:
  ~/bin/find_files
  What is the Linux command to do that?
  Note that the new file does not have the “.py” extension !

First Linux Python Program

- To be able to run the **find_files** program as a system program from the Linux command line, you must first add execute permission on it:

```
> chmod +x find_files
```

chmod is the standard Linux command for controlling file permission bits (access control)

Using the find_files.py program in Linux

- Run the following command:

```
> find_files /usr/src cpu.h
```

  What are the 20 files that you get?

- Find how many directories named **kernel** are in /usr/src ?
- Find where are **stdlib.h** and **stdio.h** libraries are located?
  Hint: /usr/include, /usr/src, use the **find_files** program

Next Linux Python Program

- By now you should know that the symbol ~ represents your home directory in Linux (like: /home/u12345 or /home/samyz)
- Copy the file **~/proj4/proj3_ex2.py** to **~/bin/dir_info**
- Use the Linux editor '**nano**' to edit dir_info.py so that it looks like:

```
#!/usr/bin/env python

import os, sys

def dir_info(directory):
    nfiles = 0
    ndirs  = 0
    for path, dirs, files in os.walk(directory):
        nfiles += len(files)
        ndirs += len(dirs)

    return nfiles, ndirs

if __name__ == "__main__":
    dir = sys.argv[1]
    nfiles, ndirs = dir_info(dir)
    print "Number of files =", nfiles
    print "Number of directories =", ndirs
```

Using dir_info.py and beyond

- **Problem 5:**
  Count how many files and directories are in **/usr/src** ?
- To find the total file size of **/usr/src** we need to do the same thing for creating a new system program: **~/bin/dir_size**
- **Problem 6:**
  Create a system program: **~/bin/dir_size**
  which calculates the total file size of a directory
  Hint: Copy the function from proj3_ex1.py

Next Linux Challenge: dir_lines.py

- **Problem 7:**
  Write a function **dir_lines(directory)**
  which accepts a directory argument and computes the total number of lines in all the files in directory (including sub directories)
- **Problem 8:**
  Create a system program: **~/bin/dir_lines**
  which reports the total number of lines of all files in directory
- Use the **dir_lines** program to count how many lines of code the Linux operating system has?
  Hint:

```
> dir_lines /usr/src
```