CSC270—Circuits & Systems

Week 11—Spring 2019

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Feedback on Homework 7

- **Update** the comments. The header of the skeleton program needed to be updated.

- Show how to **compile** and **run** your program in the header.

- Always **reread** the homework before submitting. This homework required the program to display its syntax in case the user didn't specify an input…

- Include an **example of the output** in the header.

- BTW, this was a simplified version of Linux command **figlet**.
Classwiki Accounts

Welcome to the Public Wiki Pages of the Computer Science Department at Smith College!

Anonymous connection and edits to these pages are not enabled. If you are interested in creating a page in this wiki system, please contact one of the computer-science faculty, and ask to be given an account on this system.

Become a fan of the CS Department on Facebook!

(This wiki contains 707 pages.)
Wiki Editing: A Quick Tutorial

• Wikipedia: tool  <—> mediawiki: software

• www.mediawiki.org

• classwiki: http://www.science.smith.edu/classwiki

• If creating new pages, include "CSC270" and "2019" in the page title. Possibly your first name

• See CSC270 page in classwiki for project pages
Back to The Raspberry Pi!

- GPIO
- Linux Administration
GPIO
(Continued)
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PWM

D. Thiebaut, Computer Science, Smith College
• **Physical Pins** 12, 32, 33, & 35

• **10 bit** accuracy (0-1023)

• 19.2 MHz base frequency
Experimental PWM

- **PWM** with WiringPi: http://www.bristolwatch.com/rpi/pwmRpi.htm

- **PWM** with GPIOzero: https://gpiozero.readthedocs.io/en/stable/recipes.html (Section 2.4)
Experimental PWM

```python
from gpiozero import PWMLED
from time import sleep

led = PWMLED(17)

while True:
    led.value = 0  # off
    sleep(1)
    led.value = 0.5  # half brightness
    sleep(1)
    led.value = 1  # full brightness
    sleep(1)

Similarly to blinking on and off continuously, a PWMLED can pulse (fade in and out continuously):

```python
from gpiozero import PWMLED
from signal import pause

led = PWMLED(17)

led.pulse()
pause()
```
STOP

We stopped here last time...
Linux Administration

• Create **new user**
• Customize **environment**
• Install **packages**
• Install a **LAMP** stack
• Install **WordPress**
• **Logs**
Linux

- Open Source
- Many "Distros"

GNU Packages

- Debian
- Fedora
- Ubuntu
- Red Hat
- Suse

Linux Kernel

Libraries

GUI
"All the details [of Linux] have changed—the hardware is very different, the problems we have are very different, and my role is very different. But the whole 'make it better and have interesting challenges' is all the same."

Linus Torvalds
Linux Administration

- Linux kernel
- Android
- Chrome OS
- OSX (almost)

https://www.linuxjournal.com/content/25-years-later-interview-linus-torvalds
Linux Users

pi → root

https://larry.ancile.com/2016/12/15/larrys-favorite-things-day-8-super-users/
• **pi**: default user name when installing Raspbian

• **raspberry**: default user password for **pi**

• **Can** run programs, create/edit files in `/home/pi` directory

  • **Cannot install apps**, **cannot edit files in other users's home**, **cannot edit/view system files**

  • **But, is allowed to use "sudo" command!**
• **root** is the account of the **super-user**

• **root** can
  
  • install apps (**apt-get**)  
  
  • look at all files from all users  
  
  • create/edit/delete **system** files  
  
  • mess up the system  

• "Some" users can temporarily become root with **sudo**

• **pi** and **root** have different **home directories**
Useful Administration Bash-Commands

ls -a
whoami
groups
sudo su
hostname
last
w
ping

Create Yourself!

Create Yourself!

- What is a Linux User?
- Home directory
- Privileges
- whoami

Go to Lab 10
Customizing Your Environment

```sh
cd
ls -a
less .cshrc

emacs -nw .cshrc

# DT's customizations
PS1=\"\[\e[35m\]u@\[\e[m\]\[\e[31m\]h\[\e[m\]\[\e[36m\]w\[\e[m\]\ \$ \"
alias emacs='emacs -nw'
alias ll='ls -l'
alias h='history'

source .cshrc
```

Go to Lab 10
Installing Packages

Go to Lab 10
Installing a LAMP Stack
You said "Patchy?"

- In an April 2000 interview, Brian Behlendorf, one of the creators of Apache said:

The name literally came out of the blue. I wish I could say that it was something fantastic, but it was out of the blue. I put it on a page and then a few months later when this project started, I pointed people to this page and said: "Hey, what do you think of that idea?" ... Someone said they liked the name and that it was a really good pun. And I was like, "A pun? What do you mean?" He said, "Well, we're building a server out of a bunch of software patches, right? So it's a patchy Web server." I went, "Oh, all right." ... When I thought of the name, no. It just sort of connotated: "Take no prisoners. Be kind of aggressive and kick some ass."

https://en.wikipedia.org/wiki/Apache_HTTP_Server
Install a LAMP Stack on your RPi

• **Warning**: this will take a long time (~30 minutes)

Go to Lab 10
Install Wordpress

- Wordpress is a blogging platform
- Most widely used blogging environment
- You will
  - install it on your RPi
  - create a blog (if you wish...)
Follow Lab 10 to Install WordPress
Logs…

Log files are a set of records that Linux maintains for the administrators to keep track of important events. They contain messages about the server, including the kernel, services and applications running on it. Linux provides a centralized repository of log files that can be located under the /var/log directory.

https://www.eurovps.com/blog/important-linux-log-files-you-must-be-monitoring/
Logs

- **/var/log/syslog**
  Shows general messages and info regarding the system. Basically a data log of all activity throughout the global system. Know that everything that happens on Debian systems go in **Syslog**.

- **/var/log/auth.log**
  Keeps authentication logs for both successful or **failed logins**, and authentication processes.

- **/var/log/boot.log**
  start-up messages and **boot** info.

- **/var/log/kern**
  keeps in **Kernel** logs and warning info. Also useful to fix problems with custom kernels.

- **/var/log/dmesg**
  a repository for device driver messages. Use **dmesg** command to see messages in this file.

https://www.eurovps.com/blog/important-linux-log-files-you-must-be-monitoring/
• `/var/log/faillog` records info on **failed logins**. Hence, handy for examining potential security breaches like login credential hacks and brute-force attacks.

• `/var/log/daemon.log` keeps track of running **background** services.

• `/var/log/btmp` keeps a note of all **failed login** attempts.

https://www.eurovps.com/blog/important-linux-log-files-you-must-be-monitoring/
• **apache2/error.log**
  keeps track of *errors* experienced by http server

• **apache2/access.log**
  keeps track of *accesses* to Web pages on http server

• **mysql/error.log**
  keeps track of all *errors* experienced by the mysql server

https://www.eurovps.com/blog/important-linux-log-files-you-must-be-monitoring/
Logs: Experiment

- On your RPi, in the Terminal window, run command:
  
  ```bash
tail -f /var/log/auth.log
  ```

- Ask neighbors to attempt to ssh to your RPi with fake credentials

https://www.eurovps.com/blog/important-linux-log-files-you-must-be-monitoring/