CPE 4040: Data Collection and Analysis, Spring 2024

**Laboratory Report #1**

**Getting Started with Raspberry Pi**

Team Members: Anindita Deb and Damisi Kayode

Electrical and Computer Engineering

Kennesaw State University

Faculty: Dr. Jeffrey L Yiin

Date of Lab Session: January 22, 2024

# Objective

The objective of this lab is to get familiar with our Raspberry Pi and understand how to make a remote connection via SSH and Remote Desktop Connection. After successfully achieving remote desktop connection to the Raspberry Pi, we write and execute a python code.

# Material List

Hardware needed:

* A Raspberry Pi 3 or 4
* Power supply adapter
* Micro SD card (16+ GB)
* (optional) ethernet cable
* USB keyboard, mouse and HDMI monitor/tv

Software needed:

* Putty (Windows OS)
* Advanced IP Scanner (Windows OS)
* Angry IP Scanner (Mac OS)
* WinSCP (Windows OS)
* Raspberry Pi Imager
* Remote Desktop Connection
* Microsoft Remote Desktop
* VNC Viewer App

# Lab Procedures and Results

**Pre-Lab Procedure and Results:**

These steps are completed at home before arriving at the lab session.

1) When setting up a Raspberry Pi for the first time we will first need to flash the SD Card into your laptop and open Raspberry Pi Imager. We will need to format the SD card correctly for the Pi to read it. We ran into problems with the SD card that existed on our Raspberry Pi, so we flashed an entirely new SD card for this class.

13) After setting up and booting up the Raspberry Pi, we connected to the Wi-Fi and enabled SSH. We open Advanced IP Scanner and scan for the connected devices on the Wi-Fi network.

A screenshot of a computer

Description automatically generated

The highlighted line is the Raspberry Pi. The screenshot we took of the raspberry pi’s IP address does not label itself as a Raspberry Pi. However, we knew that this was the same IP address after typing into the terminal (ifconfig) to check.

**Lab Procedure and Results:**

1. Once booted up in class we show that the raspberry pi is connected to a mobile hotspot. Which you can see in the screenshot below. A screenshot of a computer

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2. Once we have the mobile hotspot connection secure, we need to find the IP address of the Raspberry Pi. We take note of it for later use in the next steps. A screenshot of a computer

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3. For SSH Connection, we open Putty and enter the IP address we found from step 2 andestablish SSH connection to the raspberry Pi. We are prompted with our login and password to login. A screenshot of a computer program

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4. Once logged in, we start Software configuration. We open the tool by entering sudo raspi-config. It opens the Infercae Options for us to enable the following settings. A screenshot of a computer

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5. We rebooted to save the changes made in step 4, so we need to start a new login. A screenshot of a computer program

   Description automatically generated

We are prompted to update out packages information by typing in first ‘sudo apt-get update’ then ‘sudo apt-get upgrade’.

1. Once this is successful we set up remote desktop connection. By typing in ‘sudp apt-get install xrdp’. We did not experience any problems installing this.
2. Back on our Windows OS, we open Remote Desktop Connection app on our laptop and enter the IP address of our raspberry pi. (We have this screenshot of the connection established on VNC viewer.) A screenshot of a computer

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3. The image above contains the ‘ifconfig’ results.
4. We write up a simple code to display integres from 0 to 10 inside of Nano editor by first typing in ‘nano test.py’. We save our work and then execute the code by entering ‘python test.py’A screenshot of a computer

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**Knowing our Pi:**

* What is the model of our Raspberry Pi? We have a Raspberry Pi 4 model B.
* Capture a clear photo of your Raspberry Pi PCB board.A green circuit board with many ports

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* On the PCB photo, please highlight at least 7 key components and I/O ports on the board. Key components include SoC, WiFi, Bluetooth, memory, etc. A green circuit board with many ports

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PoE HAT Header

Gigabit Ethernet Port

Quad-Core Processor

2 x USB 3.0

2 x USB 2.0

2-lane MIPI DSI Display Port

USB-C power (5V/3A)

Stereo-audio port

2-lane camera port

2 micro-HDMI ports

2.4/5GHz Wireless Bluetooth

GPIO Pins

SD Card Slot

* A screen shot of a computer

  Description automatically generatedWhich version of Python is on your Raspberry Pi? We ran ‘python -version’ in the command and it resulted in Python 3.11.2.

# Conclusion

* The overall lab was clear cut and simple. Documentation was easy to follow along the lab procedures as well.
* We had run into a problem with the Raspberry Pi 3B+ not recognizing and connecting to the hot stop correctly. I tried troubleshooting it and it was a problem with not having enough space on the Pi for the current updates and Wi-Fi connection on the device was spotty from time to time. Regardless, we continued the lab using an alternate pi (the Raspberry pi 4 B) as a backup.
* Probably the easiest suggestion I could make regarding this lab would be to have students use new SD card entirely and set up their Pi like they had received it in the mail. That way there wouldn’t be issues with storage or any other strange issue with update version or connectivity.