Internet of Things

Assessment No.2

Packet Tracer and IoT Development Tasks

Due date: 11-Sep-2022

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Contents

Figures

1. Task One (Parts A, B and C)

1.1 Part A - Site Office (5 marks)

The internet provider was implemented with a router connected to the IP 10.10.10.1/24, the registration server is connected to this router which is shown in the yellow area, this server has static IP 192.168.1.10 and the gateway is 192.168.1.1, this server is set 3 services DHCP, DNS and IoT.
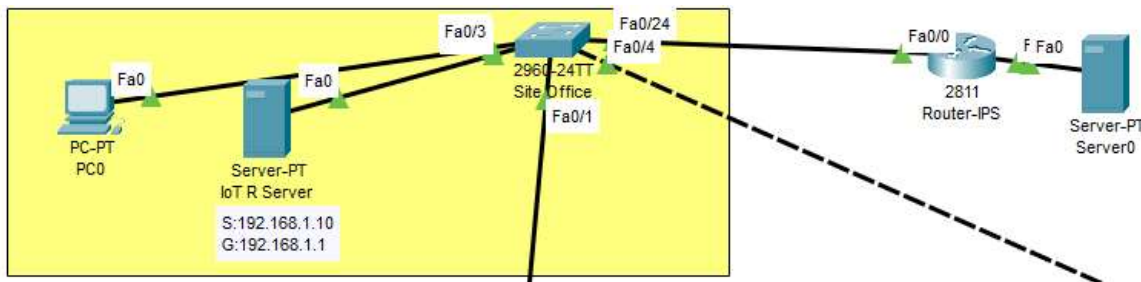

Figure 1. Server on Site office

A client/server protocol called Dynamic Host Configuration Protocol (DHCP) automatically assigns an Internet Protocol (IP) host with its IP address and other necessary configuration data like the subnet mask and default gateway. With DHCP, hosts can get the necessary TCP/IP setup data from a DHCP server(Microsoft, 2022b). Therefore, the server was set up to host a max of 100 users starting with the IP 192.168.1.100/24.

Figure 2. Setting DHCP server

TCP/industry-standard IP's protocol set includes the Domain Name System (DNS), and the DNS Client and DNS Server work together to offer computers and users name-to-IP address name resolution services (Microsoft, 2022a). This service was configured to point the IP 192.168.1.10 which is the Static IP of IoT Server. Then, when a host request this IP is translated to www.johan.com name.

Figure 3. Setting DNS Server

The IoT service is turned on to serve the IoT divices connected in the network in this case the IoT divices connected throught the switch to the recidential facility. All this divices must automatically obtain and IP in the rage of 192.168.1.100 to 192.168.1.200.

Figure 4. Setting IoT Server

Devices were connected to home wireless AP with WAP2-PSK. It utilizes the most recent AES encryption technique and is the most secure personal version of WPA2. Long passwords are used by WPA2-PSK (AES) to safeguard data, providing residential users with a more secure network.

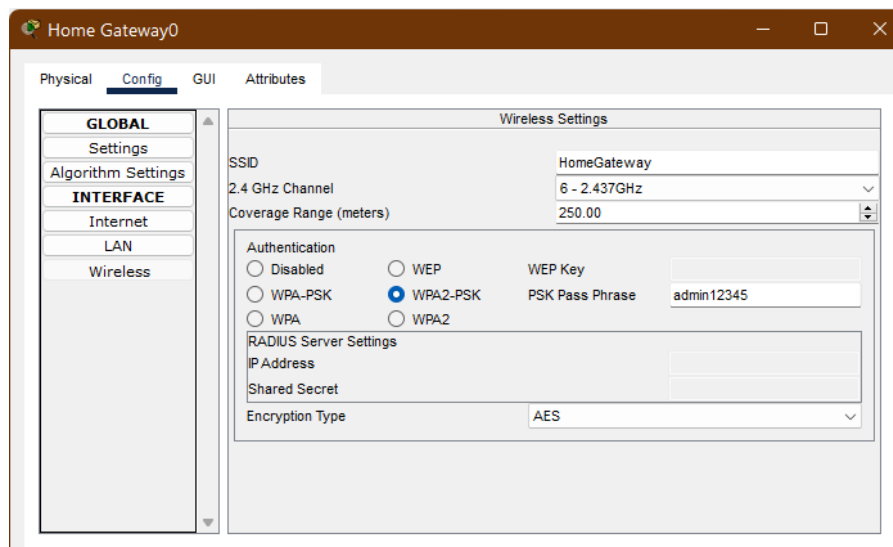*Figure 5. Setting Home Router security WPA2-PSK*

The red area represents the residental facility, the tablet as long the other devices obtain the IP from DHCP server, The tablet can connect to the IoT Server using the traslated name www.johan.com.
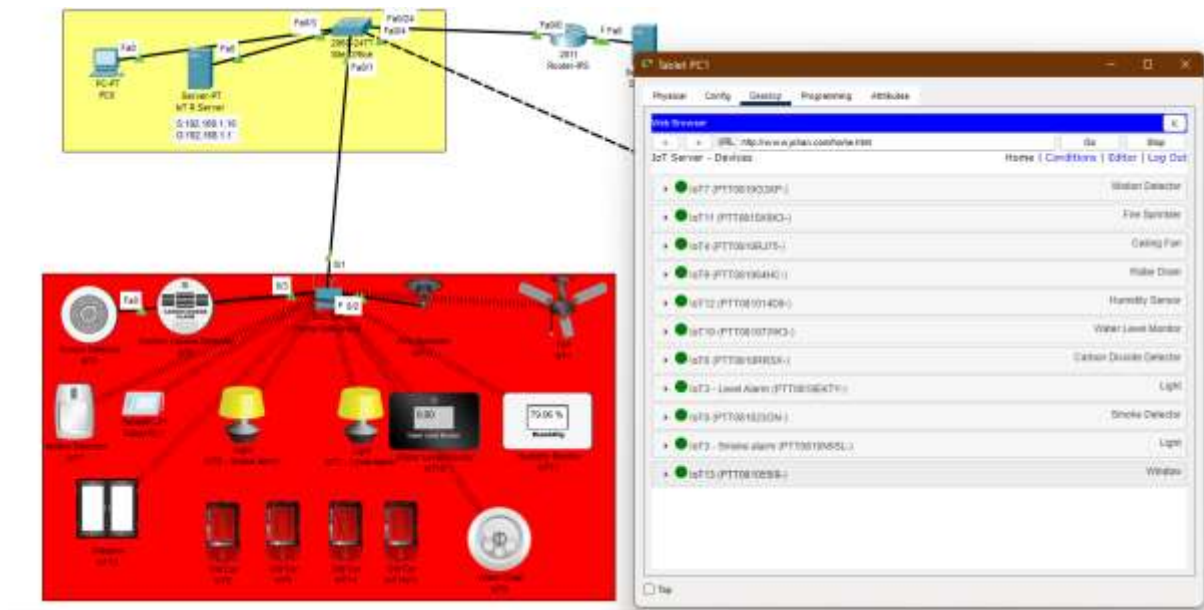
Figure 6. Tablet connected to IoT Server able to control IoT devices

Every device was connected to the IoT server using the device settings, this options also allow to set up the gateway DNS IPv4 in DHCP to automatically obtain the IP.
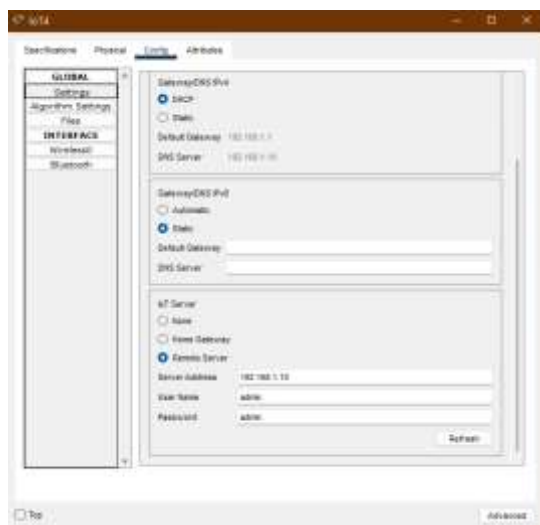
Figure 7. Setting IoT Device to connect to IoT server

Figure 8. Setting IoT device Wi-Fi connection

1.2 Part B - Main Office (4 marks)

The main office was implemented in the green area which is connected through switches to the IoT server that serves all the network. The smartphone is connected to a wireless router AP that also is connected to the arrange of switches. The smartphone is able to connect to the Residential devices to turn on the fan and water drain

Figure 9. Smartphone Connected to the IoT Server able to control IoT devices

1.3   Part C - Main Office Extra (4 marks)

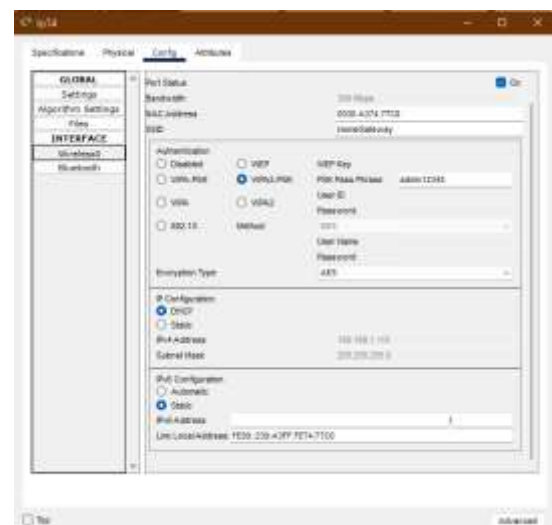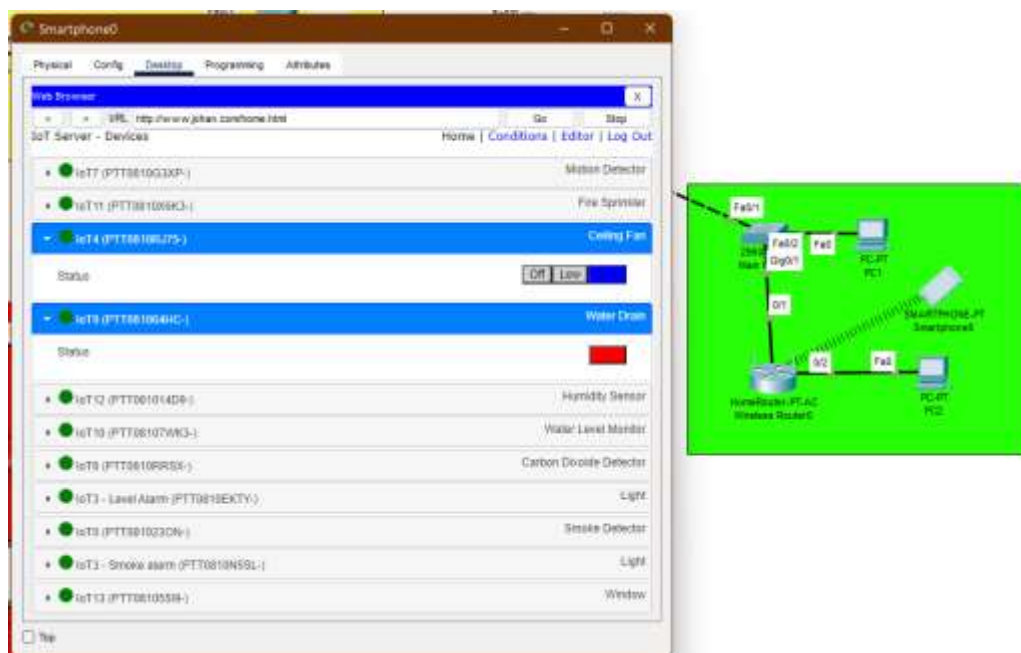The devices are conected to each other and in the IoT server I made the conditions to interact each other if ocurring any event. for example, it is set up that if the smoke detector is gretter or equal than 0.1 trigger a Lamp (represents the alarm) and the window is activated to help to reduce the fire or smoke. At the same time the splinkler water is activated (represents exists a fire alarm) , this increases water level and humidity, the water level trigger and a lamp (represents and alarm) and water drain when the water level monitor reach 20 cm, the fan is also trigger to reduce the humidity
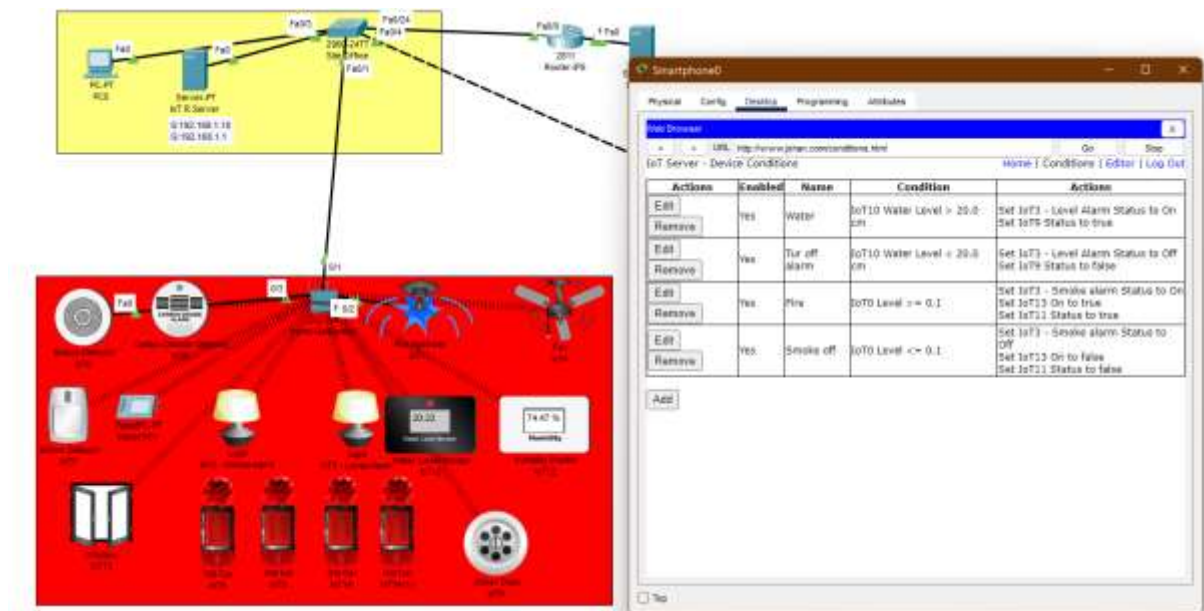

Figure 10. IoT devices Condition environment

2. Task Two (Parts A, B and C)

2.1 Part A (2 marks)

I had already installed the python, but I had a problem using the library requests. I had to update to the latest library request, python 3.10 and pip 22.2.2, I used XAAMP to simulate a website in a local environment.

```
C:\Users\sebas\AppData\Local\Programs\Python\Python310>py -m ensurepip --upgrade
Looking in links: c:\Users\sebas\AppData\Local\Temp\tmp82j2_0d8
Requirement already satisfied: setuptools in c:\users\sebas\appdata\local\programs\python\python310\lib\site-packages (6
3.2.0)
Requirement already satisfied: pip in c:\users\sebas\appdata\local\programs\python\python310\lib\site-packages (22.2.2)

C:\Users\sebas\AppData\Local\Programs\Python\Python310>py -V
Python 3.10.6

C:\Users\sebas\AppData\Local\Programs\Python\Python310>
```

Figure 11. Python installed Proof

2.2 Part B (6 marks)

It was selected pressure, temperature, wind speed, and rain trace, according to my code 11736865. So, the corresponding state is New South Wales and I choose the specific region Port Macquarie the following URL is the corresponding file.

http://www.bom.gov.au/fwo/IDN60701/IDN60701.94799.json

The following code get the data and store the parameters in lists to be manipulated, the complete file is attached to this file

```python
import json
import requests

def main():
    press = []
    temp = []
    windSpeed = []
    raintrance = []

    url = 'http://www.bom.gov.au/fwo/IDN60701/IDN60701.94799.json'
    headers = {
        'User-Agent': 'Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/50.0.
    x = requests.get(url, headers=headers)
    y = json.loads(x.text)
    for val in y['observations']['data']:
        press.append(val['press'])
        temp.append(val['air_temp'])
        windSpeed.append(val['wind_spd_kt'])
        raintrance.append(float(val['rain_trace']))
```

Figure 12. Program in Python

2.3 Part C (4 marks)

The website was implemented in python and It was use XAAMP to simulate a local website environment, It works with Apache and MySQL if is required. Apache server in this environment has some problems with the library requests, but I made it work, the results are presented in tables for better comprehension.

Port Macquarie Weather

	PRESSURE MSLHPA	TEMPERATURE °C	WIND SPEED KTS	RAIN TRANCE MM
MAX	1024.80	18.40	20.00	46.60
MIN	1016.80	9.10	0.00	0.00
AVG	1020.70	14.05	10.63	14.60

Current date: 2022-09-06

DATE	PRESSURE MSLHPA	TEMPERATURE °C	WIND SPEED KTS	RAIN TRANCE MM
06/03:30pm	1022.60	17.20	9.00	0.00
06/03:00pm	1022.50	18.20	8.00	0.00
06/02:30pm	1022.50	17.80	10.00	0.00
06/02:00pm	1022.70	17.80	9.00	0.00
06/01:30pm	1022.60	18.00	10.00	0.00
06/01:00pm	1022.70	17.60	7.00	0.00
06/12:30pm	1023.10	16.80	6.00	0.00
06/12:00pm	1023.40	17.80	9.00	0.00
06/11:30am	1023.70	18.40	8.00	0.00
06/11:00am	1024.00	16.80	6.00	0.00
06/10:30am	1024.10	18.20	7.00	0.00
06/10:00am	1024.30	16.80	7.00	0.00

Figure 13. Web site

3. Files used Packet Tracer and Python

weatherWebSiteBo   assesment2-Final.p
m.py   kt

4. References

Microsoft. (2022a). *Domain Name System (DNS)*. https://docs.microsoft.com/en-us/windows-server/networking/dns/dns-top

Microsoft. (2022b). *Dynamic Host Configuration Protocol (DHCP)*. https://docs.microsoft.com/en-us/windows-server/networking/technologies/dhcp/dhcp-top