

BUZZWORDS

1

MESSAGE

NETMASK

CONNECTIVITY

NETWORK

INTERNET

PORT

writing network aware programs

SERVER

GATEWAY

DYNAMIC

on your Raspberry Pi

ADDRESS

STATIC

CLIENT

using Python 3

ETHERNET

ROUTER

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STATIC IP SETUP

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```
sudo nano /etc/network/interfaces
```

```
iface eth0 inet static
address 192.168.0.YourNumberHere
netmask 255.255.255.0
network 192.168.0.0
broadcast 192.168.0.255
gateway 192.168.0.1
```

press CTRL X

press Y

press ENTER

sudo reboot

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CONNECTING 2 RASPBERRY PI'S

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Plug an ethernet cable in both Raspberry Pi's

Make sure the LEDs on both boards light up

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CHECK YOUR IP ADDRESS

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Confirm your IP address configuration by typing

```
ifconfig
```

PING TO TEST THE NETWORK

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PING means "packet internet groper"

It is a diagnostic tool

To "ping" another computer, use it's IP address like this:

```
ping 192.168.0.2
```

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WRITE A SERVER

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```
import network
import time

def heard(phrase):
    print(phrase)

network.wait(whenHearCall=heard)
print("connected")
while network.isConnected():
    print("waiting")
    time.sleep(4)
print("disconnected")
```

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INSTALL TELNET [OPTIONAL]

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telnet means "make a telephone call over the network"

It should be pre-installed.

If it is not installed, connect to the internet and type:

```
sudo apt-get install telnet
```

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TEST YOUR SERVER WITH TELNET

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Open Ixterminal and type:
`python3 server.py`

Open another Ixterminal and type:
`telnet localhost 8888`

Now type something in the second terminal
and press ENTER

WRITE YOUR OWN CLIENT

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```
import network
import time

network.call("localhost")

while network.isConnected():
    print("sending")
    network.say("hello")
    time.sleep(1)
```

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TEST CLIENT/SERVER LOCAL

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Open Ixterminal and type:
`python3 server.py`

Open another Ixterminal and type:
`python3 client.py`

Now type something in the second terminal
and press ENTER

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TEST CLIENT/SERVER BETWEEN PI'S 11

Open Ixterminal on the first Pi and type:
`ifconfig`
Note down the IP address
Then type:
`python3 server.py`

On the second Pi, edit `client.py`
Change "localhost" to the IP address above
Then type:
`python3 client.py`

Now type something in the client Ixterminal
and press ENTER

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INTERNET CHAT PROGRAM

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```
import network
import sys

def heard(phrase):
    print("them:" + phrase)

if (len(sys.argv) >= 2):
    network.call(sys.argv[1], whenHearCall=heard)
else:
    network.wait(whenHearCall=heard)

while network.isConnected():
    #phrase = raw_input() #python2
    phrase = input() # python3
    print("me:" + phrase)
    network.say(phrase)
```

TESTING INTERNET CHAT

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Open Ixterminal on the first Pi and type:
`python3 chat.py`

Open Ixterminal on the second Pi and type:
`python3 chat.py 192.168.0.2`

Make sure you replace the IP address with the address of the server Pi you want to contact

Now type messages on both Pi's and press ENTER

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THE INTERNET OF THINGS

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The next "wave" of innovation on the internet is being called "The Internet of Things".

Billions of small intelligent sensors and devices are being connected to the internet.

All you need to make an "Internet of Things" device is:

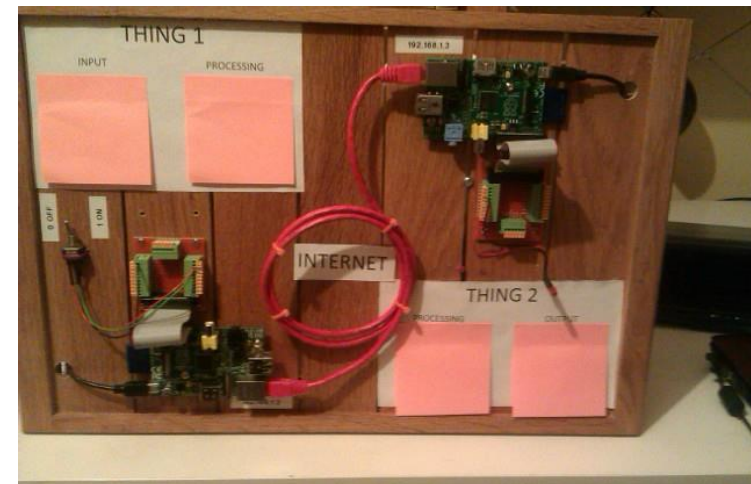
- a small computer
- a network connection
- a client program
- a server program
- some bits of hardware like sensors/lights

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IOT DEMONSTRATOR

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WHAT WOULD YOUR SWITCH BE? 16

Write down here what the switch in the IOT demonstrator could represent:

e.g. monitoring the heartbeat of a patient

WHAT PROCESSING ON CLIENT? 17

Write down here what processing would take place on your client computer:

e.g. checking heartbeat is normal (not too slow or too fast)

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WHAT PROCESSING ON SERVER? 18

Write down here what processing would take place on your server computer:

e.g. look up patient records from hospital database

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WHAT WOULD YOUR LED BE? 19

Write down here what the LED in the IOT demonstrator could represent:

e.g. a message popping up on a doctors mobile phone, showing the patient contact details and their health records

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WHAT HAVE YOU JUST INVENTED? 20

Write down here what you have just invented with your switch, your LED, your two computers and the internet:

e.g. a patient monitoring and alerting system.

NETWORK.PY REFERENCE 21

```
import network # use the network module  
  
network.call() # client calls server  
  
network.wait() # server waits for client  
  
network.say() # sends message  
  
network.isConnected() # still connected?  
  
network.hangUp() # disconnect
```

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RESOURCES 22

Latest Raspberry Pi bake-off resources:

<https://github.com/whaleygeek/pibakeoff>

python:

<http://python.org/download/>

python documentation:

<http://docs.python.org/3/>

networking:

<http://www.bbc.co.uk/schools/gcsebitesize/ict/datacomm/>

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MORE FLASHCARDS

<http://blog.whaleygeek.co.uk>

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