Coding DIY - Build Network Monitoring Web Apps

These labs show you how to use Python, Bottle, HTML, CSS and SQL to build simple solutions.

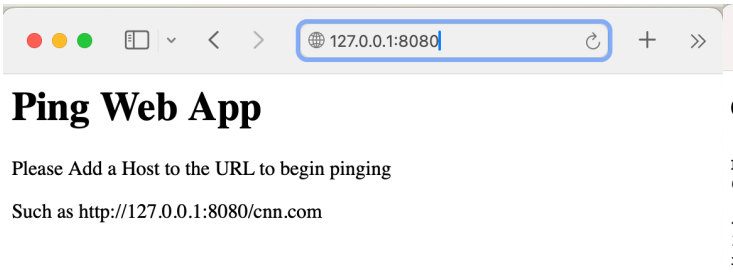
Things to think are about are:
- How should users enter commands into your app?
- How should results be displayed and what information is valuable to users?
- How should data be stored for your app?

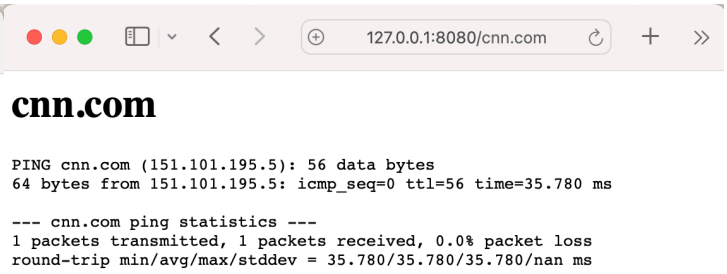
Setup

```
python3 -m pip install bottle

python3 -m pip install requests
```

Ping Single Host

This lab has your app ping a host from a value added in the URL. We use Dynamic Filters in Bottle to take the value and then send the ping command to the OS.



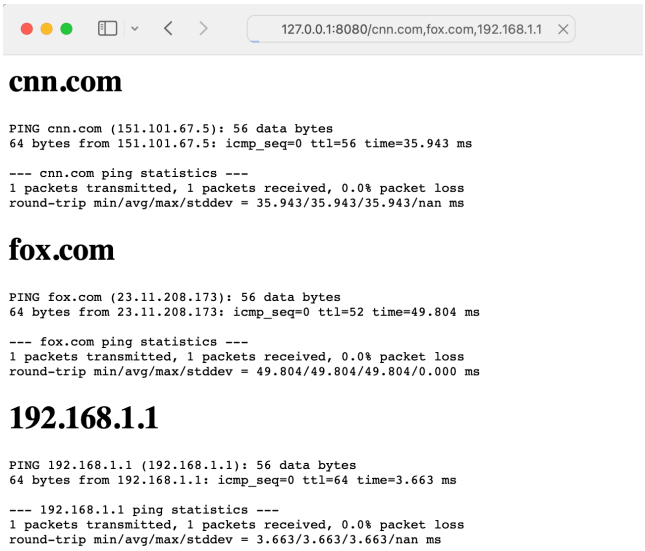


ping.py

```
from bottle import run, route
import os

@route('/')
def index():
    page =   f'''
                    <h1>Ping Web App</h1>
                    <p>Please Add a Host to the URL to begin pinging</p>
                    <p>Such as http://127.0.0.1:8080/cnn.com</p>
                '''
    return page

@route('/<host>')
def index(host):
    try:
        response = os.popen(f'ping -c 1 {host}').read()
    except:
        response = 'Problem Connecting'
    finally:
        if response == '':
            response = 'Host Could Not Resolve'
    header = '<meta http-equiv="refresh" content="5">'
    page = f''' {header}
                <h1>{host}</h1>
                <pre>{response}</pre>
            '''
    return page

run(host='127.0.0.1', port=8080)
```

Ping Multiple Hosts

This lab allows you to ping multiple hosts by adding them to the URL separated by commas.

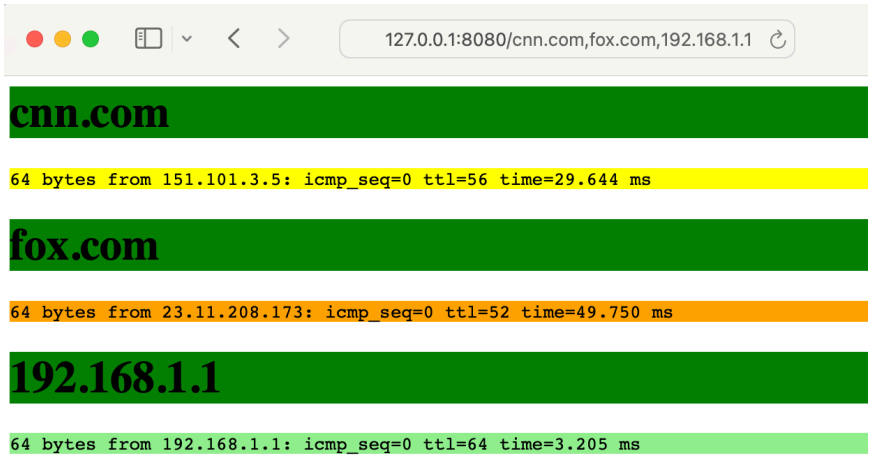


ping-multi.py

```
from bottle import run, route
import os

@route('/')
def index():
    page =   f'''
                <h1>Ping Web App</h1>
                <p>Please Add a Hosts to the URL to begin pinging</p>
                <p>Such as http://127.0.0.1:8080/
cnn.com,fox.com,192.168.1.1</p>
            '''
    return page

@route('/<host>')
def index(host):
    host_list = host.split(',')
    body = ''
    for value in host_list:
        value = value.strip()
        try:
            response = os.popen(f'ping -c 1 {value}').read()
        except:
            response = 'Problem Connecting'
        finally:
            if response == '':
                response = 'Host Could Not Resolve'
```

```
        body = f'''
                {body}
                <h1>{value}</h1>
                <pre>{response}</pre>
                '''
    header = '<meta http-equiv="refresh" content="5">'
    page = f'''
            {header}
            {body}
            '''
    return page

run(host='127.0.0.1', port=8080)
```

Ping Multiple Hosts with Color Indicators



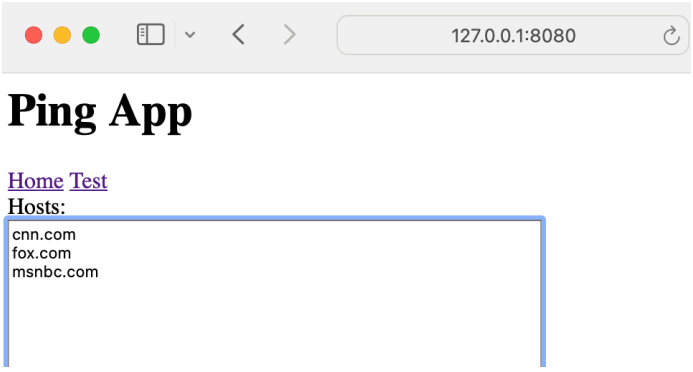
This lab allows you to ping multiple hosts and then color code both on whether the host is up, and based off of its latency.

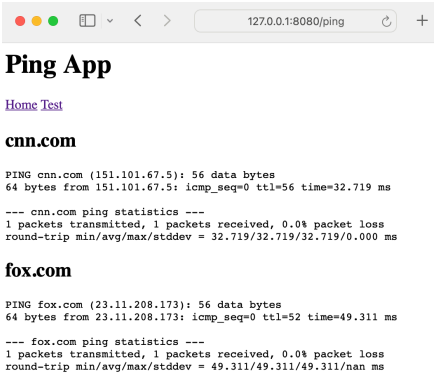
ping-color.py

```
from bottle import run, route
import os

latency_quality = {'good': 20, 'usable': 40, 'bad': 50}

@route('/')
def index():
    page =   f'''
                <h1>Ping Web App</h1>
                <p>Please Add a Hosts to the URL to begin pinging</p>
                <p>Such as http://127.0.0.1:8080/
cnn.com,fox.com,192.168.1.1</p>
                '''
    return page

@route('/<host>')
def index(host):
    command = 'ping -c 1 '
    arg = ' | grep time'
    host_list = host.split(',')
    body = ''
    for host in host_list:
        color = ''
        latency_color = ''
        host = host.strip()
        try:
            response = os.popen(f'{command} {host} {arg}').read()
        except:
```

```
            response = 'Problem Connecting'
        else:
            if 'time' in response:
                color = 'green'
            else:
                color = 'red'
            response_list = response.split(' ')
            for value in response_list:
                if 'time' in value:
                    time_list = value.split('=')
                    latency = float(time_list[1])
                    if latency < latency_quality['good']:
                        latency_color = 'lightgreen'
                    elif latency > latency_quality['good'] and latency <=
latency_quality['usable']:
                        latency_color = 'yellow'
                    elif latency > latency_quality['usable'] and latency
<= latency_quality['bad']:
                        latency_color = 'orange'
                    elif latency > latency_quality['bad']:
                        latency_color = 'red'
                    else:
                        latency_color = 'purple'
        finally:
            if response == '':
                response = 'Host Could Not Resolve'

        body = f'''
                {body}
                <h1 style="background-color:{color};">{host}</h1>
                <pre style="background-color:{latency_color}">{response}</
pre>
                '''

    header = '<meta http-equiv="refresh" content="5">'
    page = f'''
            {header}
            {body}
            '''
    return page

run(host='127.0.0.1', port=8080)
```

Ping App with SQL Configuration





This lab allows you to store the hosts that you want to ping in a SQLite table.

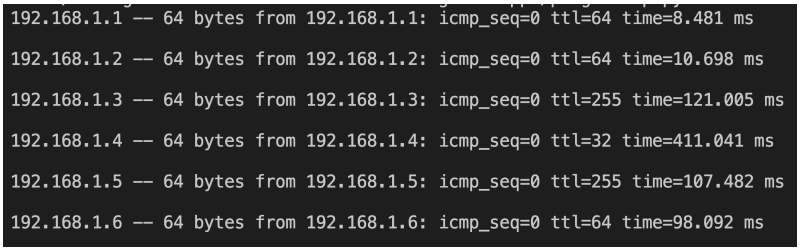
ping-sql.py

```
from bottle import run, route, request, post, redirect
import os
import sqlite3

database = ('ping.db')
header = ('''
            <h1>Ping App</h1>
            <a href="/">Home<a>
            <a href="/ping">Test</a>
          ''')

def db_create():
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    cursor.execute('CREATE TABLE IF NOT EXISTS host(host_list)')
    conn.commit()
    conn.close()

def db_find_host():
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    try:
        query = cursor.execute('SELECT * FROM host where rowid = 1')
        query = query.fetchone()
        query = query[0]
    except:
        query = ''
    finally:
        conn.close()

    return query
```

```
@post('/db_insert')
def db_insert():
    hosts = request.forms.get('hosts')
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    try:
        cursor.execute('UPDATE host set host_list = ? where rowid = 1',
(hosts,))
        if cursor.rowcount == 0:
            cursor.execute('INSERT INTO host(host_list) values(?)',
(hosts,))
    except:
        print('database problem')

    finally:
        conn.commit()
        conn.close()

    redirect('/')

@route('/')
def index():
    host = db_find_host()
    host = host.split('\n')
    host_output = ''
    for item in host:
        item = item.strip()
        host_output = f'{host_output}{item}\n'
    page = f'''
                {header}
                <form action="/db_insert" method="post">
                    Hosts:
                    <br>
                    <textarea name=hosts rows="50" cols="50">{host_output}
</textarea>
                    <br>
                    <input type="submit">
                </form>
            '''
    return page

@route('/ping')
def ping():
    page = f'''
            <meta http-equiv="refresh" content="5">
            {header}
            '''
```

```
    hosts = db_find_host()
    print(hosts)
    hosts = hosts.split('\n')

    for item in hosts:
        item = item.strip()
        command = f'ping -c 1 {item}'
        try:
            response = os.popen(command).read()
        except:
            response = 'Problem'
        page = f'''
                {page}
                <h2>{item}</h2>
                <pre>{response}</pre>
                '''
    return page

db_create()

run(host='127.0.0.1', port=8080)
```

Ping Sweep Cli Tool

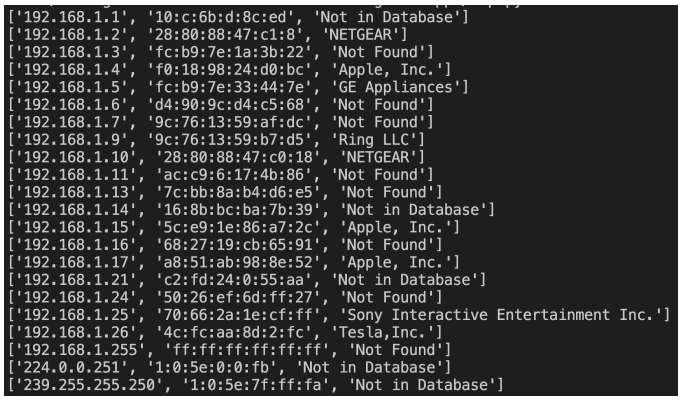


This lab allows you to do a ping sweep of your local LAN. This is only configured for a Type c Subnet (255.255.255.0)

ping-sweep.py

```
import os

subnet = '192.168.1.'
command = 'ping -c 1 '
arg = '| grep time'

ip = 1
while ip <= 254:
    response = os.popen(f'{command} {subnet}{ip} {arg}').read()
    print(f'{subnet}{ip} -- {response}')
    ip += 1
```

ARP Dump and MAC Address Vendor Lookup

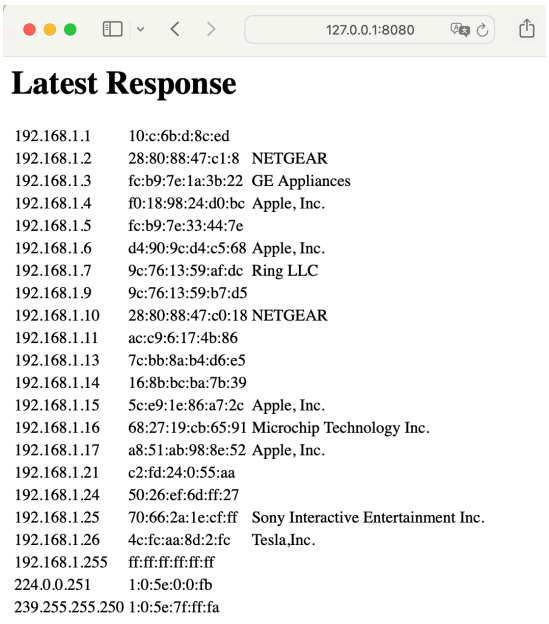


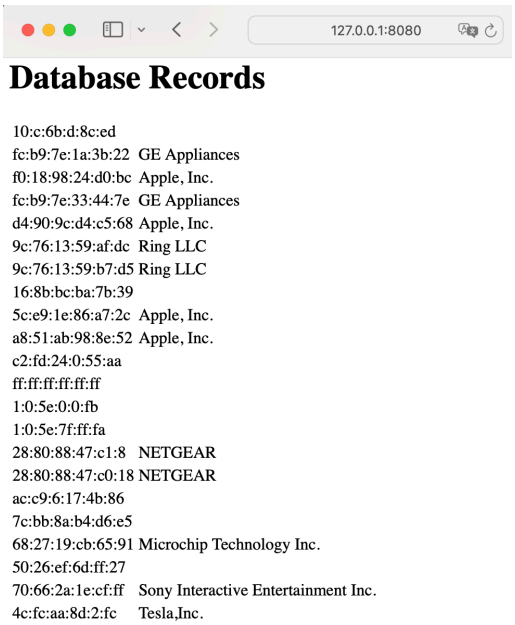
This lab dumps your ARP table and then matches the MAC Addresses to vendors using a REST API

arp.py

```
import os
import requests

command = 'arp -a'

response = os.popen(command).readlines()
#print(response)

for x in response:
    #print(x)
    if ':' in x:
        #print(x)
        record =[0,0,0]
        x = x.split(' ')
        for y in x:
            if '.' in y:
                y = y.replace('(', '').replace(')','')
                #print(y)
                record[0] = y
            elif ':' in y:
                #print(y)
                record[1] = y
        try:
            response_mac = requests.get(f'https://api.maclookup.app/v2/
macs/{record[1]}').json()
            record[2] = response_mac['company']
            if response_mac['company'] == '':
                record[2] = 'Not in Database'
        except:
            record[2] = 'Not Found'

        print(record)
```

ARP Device Discovery with SQL Bckend





This lab allows you to dump your ARP table, find vendors for MAC Addresses, adn then save those values to a SQLite table. The MAC Address API provides sporadic results so this allows you to update records as new information is available from the API. This is an extremely simple version of machine learning.

arp-web.py

```
from bottle import run, route
import os
import requests
import sqlite3

command = 'arp -a'
database = 'arp.db'

def db_create():
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    cursor.execute('CREATE TABLE IF NOT EXISTS arp(mac,vendor)')
    conn.commit()
    conn.close()

def db_find(mac):
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    try:
        query = cursor.execute('SELECT * FROM arp where mac = ?',(mac,))
        query = query.fetchone()
        print(query)
```

```
    except:
        query = ''
    finally:
        conn.close()

    return query

def db_find_all():
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    try:
        query = cursor.execute('SELECT * FROM arp')
        query = query.fetchall()
    except:
        query = ''
    finally:
        conn.close()

    return query

def db_insert(mac, vendor):
    conn = sqlite3.connect(database)
    cursor = conn.cursor()
    try:
        cursor.execute('UPDATE arp SET vendor = ? where mac = ?',(vendor,
mac,))
        if cursor.rowcount == 0:
            cursor.execute('INSERT INTO arp(mac,vendor) values(?,?)',(mac,
vendor,))
    except:
        print('database problem')
    finally:
        conn.commit()
        conn.close()

@route('/')
def index():
    page='<table>'
    response = os.popen(command).readlines()

    for line in response:
        if ':' in line:
            record ={'ip':'','mac':'','vendor':''} #Create a Dictionary
for Host Values
            line = line.split(' ')
            for value in line:
                if '.' in value:
                    value = value.replace('(', '').replace(')','')
```

```
                    record['ip'] = value
                elif ':' in value:
                    record['mac'] = value
            try:
                response_mac = requests.get(f'https://api.maclookup.app/
v2/macs/{record['mac']}').json()
                record['vendor'] = response_mac['company']
                if response_mac['company'] == '':
                    record['vendor'] = ''
            except:
                record['vendor'] = ''

            page = f'''
                    {page}
                    <tr>
                        <td>{record['ip']}</td>
                        <td>{record['mac']}</td>
                        <td>{record['vendor']}</td>
                    </tr>
                    '''
            response_query = db_find(record['mac'])
            if response_query == None or response_query[1] == '':
                db_insert(record['mac'],record['vendor'])

    page = f'{page}</table>'

    response_all = db_find_all()
    table_db = '<table>'
    for record in response_all:
        table_db = f'''
                    {table_db}
                    <tr>
                        <td>{record[0]}</td>
                        <td>{record[1]}</td>
                    </tr>
                    '''
    table_db = f'{table_db} </table>'

    page = f'''
            <h1>Latest Response</h1>
            {page}
            <h1>Database Records</h1>
            {table_db}
            '''
    return(page)

db_create()
```

```
run(host='127.0.0.1', port=8080)
```