Computer Network Laboratory

Programming with Email and Remote Works

Jiawei Chang

Dept. of Computer Science and Information Engineering
National Taichung University of Science and Technology

Outline

1. 30_verify_mail
2. 31_secure_mail_client (寫信)
3. 32_pop3_mail_client (收信)
4. 33_execute_remote_telnet_cmd
5. 34_install_python_package_remotely
6. 35_create_restful_webservice

VERIFY EMAIL

verify email

```
#!/usr/bin/env python
# This program is optimized for Python 2.7.12 and Python 3.5.2.
# It may run on any other version with/without modifications.

import re
import smtplib
import dns.resolver
import argparse

def mail_checker(fromAddress, toAddress):

    regex = '^[a-z0-9][a-z0-9._%+-]{0,63}@[a-z0-9-]+(\.[a-z0-9-]+)*(\.[a-z]{2,})$'

    addressToVerify = str(toAddress)

    match = re.match(regex, addressToVerify)
    if match == None:
            print('Bad Syntax in the address to verify. Re-enter the correct value')
            raise ValueError('Bad Syntax')

    splitAddress = addressToVerify.split('@')
    domain = str(splitAddress[1])

    records = dns.resolver.query(domain, 'MX')
    mxRecord = records[0].exchange
    mxRecord = str(mxRecord)


    server = smtplib.SMTP()
    server.set_debuglevel(1)

    try:
        server.connect(mxRecord)
    except Exception as e:
        print ("Mail Check Failed Due to Error: %s" %str(e))
        return

    server.helo(server.local_hostname)
    server.mail(fromAddress)
    code, message = server.rcpt(str(addressToVerify))
    server.quit()

    if code == 250:
            print('Successfully verified the email: %s', fromAddress)
    else:
            print('Failed to verify the email: %s', fromAddress)
```

verify email

```
if __name__ == '__main__':
    parser = argparse.ArgumentParser(description='Mail Server Example')
    parser.add_argument('--fromAddress', action="store", dest="fromAddress", type=str, required=True)
    parser.add_argument('--toAddress', action="store", dest="toAddress", type=str, required=True)
    given_args = parser.parse_args()
    mail_checker(given_args.fromAddress, given_args.toAddress)
```

verify email

```
connect: ('mailgw.nutc.edu.tw.', 25)
connect: to ('mailgw.nutc.edu.tw.', 25) None
reply: b'220 Cellopoint E-mail Firewall v4.1.7 Build 0918 ready\r\n'
reply: retcode (220); Msg: b'Cellopoint E-mail Firewall v4.1.7 Build 0918 ready'
connect: b'Cellopoint E-mail Firewall v4.1.7 Build 0918 ready'
send: 'helo [127.0.1.1]\r\n'
reply: b'250 Cellopoint E-mail Firewall v4.1.7 Build 0918\r\n'
reply: retcode (250); Msg: b'Cellopoint E-mail Firewall v4.1.7 Build 0918'
send: 'mail FROM:<0@qqq11w888.com>\r\n'
reply: b'250 Sender <0@qqq11w888.com> Ok\r\n'
reply: retcode (250); Msg: b'Sender <0@qqq11w888.com> Ok'
send: 'rcpt TO:<jwchang@nutc.edu.tw>\r\n'
reply: b'250 Recipient <jwchang@nutc.edu.tw> Ok\r\n'
reply: retcode (250); Msg: b'Recipient <jwchang@nutc.edu.tw> Ok'
send: 'quit\r\n'
reply: b'221 Cellopoint E-mail Firewall v4.1.7 Build 0918 closing connection\r\n'
reply: retcode (221); Msg: b'Cellopoint E-mail Firewall v4.1.7 Build 0918 closing connection'
Successfully verified the email: %s_0@qqq11w888.com
```

SECURE_MAIL_CLIENT

secure mail client

```
#!/usr/bin/env python
# This program is optimized for Python 2.7.12 and Python 3.5.2.
# It may run on any other version with/without modifications.

import smtplib
from email.mime.multipart import MIMEMultipart
from email.mime.text import MIMEText
import argparse
import getpass

def mail_client(host, port, fromAddress, password, toAddress, subject, body):
    msg = MIMEMultipart()

    msg['From'] = fromAddress
    msg['To'] = toAddress
    msg['Subject'] = subject
    message = body
    msg.attach(MIMEText(message))

    mailserver = smtplib.SMTP(host,port)

    # Identify to the SMTP Gmail Client
    mailserver.ehlo()

    # Secure with TLS Encryption
    mailserver.starttls()

    # Reidentifying as an encrypted connection
    mailserver.ehlo()
    mailserver.login(fromAddress, password)

    mailserver.sendmail(fromAddress,toAddress,msg.as_string())
    print ("Email sent from:", fromAddress)

    mailserver.quit()
```

secure mail client

```python
if __name__ == '__main__':
    parser = argparse.ArgumentParser(description='Mail Server Example')
    parser.add_argument('--host', action="store", dest="host", type=str, required=True)
    parser.add_argument('--port', action="store", dest="port", type=int, required=True)
    parser.add_argument('--fromAddress', action="store", dest="fromAddress", type=str, required=True)
    parser.add_argument('--toAddress', action="store", dest="toAddress", type=str, required=True)
    parser.add_argument('--subject', action="store", dest="subject", type=str, required=True)
    parser.add_argument('--body', action="store", dest="body", type=str, required=True)
    password = getpass.getpass("Enter your Password:")
    given_args = parser.parse_args()
    mail_client(given_args.host, given_args.port, given_args.fromAddress, password, given_args.toAddress, given_args.subject, given_args.body)
```

降低安全性，使該程式取得權限發信

https://www.google.com/settings/security/lesssecureapps

>python3 31_secure_mail_client.py
--host='smtp.gmail.com'
--port=587
--fromAddress=test.nutc.chang@gmail.com
--toAddress=XXXXXX@gmail.com
--subject="Hi, Hello.."
--body="Good to see you all. Keep in touch. Take Care"

POP3 MAIL CLIENT

pop3 mail client

```
#!/usr/bin/env python
# This program is optimized for Python 2.7.12 and Python 3.5.2.
# It may run on any other version with/without modifications.

import getpass
import poplib
import argparse

def mail_client(host, port, user, password):
    Mailbox = poplib.POP3_SSL(host, port)
    Mailbox.user(user)
    Mailbox.pass_(password)
    numMessages = len(Mailbox.list()[1])
    print (Mailbox.retr(1)[1])
    Mailbox.quit()


if __name__ == '__main__':
    parser = argparse.ArgumentParser(description='Mail Server Example')
    parser.add_argument('--host', action="store", dest="host", type=str, required=True)
    parser.add_argument('--port', action="store", dest="port", type=int, required=True)
    parser.add_argument('--user', action="store", dest="user", type=str, required=True)
    password = getpass.getpass("Enter your Password:")
    given_args = parser.parse_args()
    mail_client(given_args.host, given_args.port, given_args.user, password)
```

pop3 mail client


```
Enter your Password:
[b'Delivered-To: test.nutc.chang@gmail.com', b'Received: by 2002:a02:cccd:0:0:0:0:0:0 with SMTP id k13csp2963548jaq;', b'        Sun, 28 Apr 2019 10:06:42 -0700 (PDT)', b'X-Received: by 2002:aca:a949:: with
 SMTP id s70mr628692oie.151.1556471201889;', b'        Sun, 28 Apr 2019 10:06:41 -0700 (PDT)', b'ARC-Seal: i=1; a=rsa-sha256; t=1556471201; cv=none;', b'        d=google.com; s=arc-20160816;', b'        b
=tceoKSv8ByBNJhaQaPn+0NFtfjmqT1StH/uahRhyT5brLVysRLWEeu5qDneyc6ePhN', b'        /jt93A9TaBPX025/8iNZjHlvymQmDHpT1WTiZ3AWUsQLyvD8TtY8vK3SCVwJORcYvN0w', b'        3Wq6XU6ZU10PGssjeF+7duARJree0lhTRKJq8IV94
5Kh3IJZiJi0bF6Sc1OVynaCs5Sq', b'        UfNQ6BL3BJDWxW8ykzAAaYuUSyTbfmrGACG3BimNk/y9kdGhEo/hiard4xqnT6E8btIn', b'        GzIJXFvWc7f0vebD4pduEL1/Uzv5f5PSIdLTXhtryZ7iVVrAeM6vFrw9Ld8otK9G1Ak6', b'
 rLBw==', b'ARC-Message-Signature: i=1; a=rsa-sha256; c=relaxed/relaxed; d=google.com; s=arc-20160816;', b'        h=to:subject:message-id:date:from:mime-version:dkim-signature;', b'        bh=FUL0cuxOGX8
hEtPDgRmqbA8EEBDRtc55f5if+Tkcfg0=;', b'        b=Hzlacrvnuf1uA4OXZhx/o5JLkU4PkcTi3qpVKDcg/fv77hx3tbxT62odGvL6qEAeRK', b'        UtxBYOBNd4LEqpvx174MqyIK7BHSkqKZUpYEftQHCglHGUyLilaDUy26PPMCdPdyyUbT', b'
        9wvwi/htePnJs9xuiETnVmV8qbd4anPkY3hFsJKvm3a0N/WIecigg7rp81OHbVpJOhZ7', b'        RwpDAk57hGZyu1NeJi/5eMG5+YzdewWbjkghczuDxFvUcCyi0+/1kJYGyDH2icwKKDNW', b'        XvKN2PbTCLYYOWhFqpYBXWvT6GZILZlTN
jbiDFUcx+sogx0U6iwGp7UW2sdVWEbnnaal', b'        piaQ==', b'ARC-Authentication-Results: i=1; mx.google.com;', b'        dkim=pass header.i=@gmail.com header.s=20161025 header.b=LpkxhEnf;', b'        spf=pas
s (google.com: domain of jiaweichang.gary@gmail.com designates 209.85.220.41 as permitted sender) smtp.mailfrom=jiaweichang.gary@gmail.com;', b'        dmarc=pass (p=NONE sp=QUARANTINE dis=NONE) header.fro
m=gmail.com', b'Return-Path: <jiaweichang.gary@gmail.com>', b'Received: from mail-sor-f41.google.com (mail-sor-f41.google.com. [209.85.220.41])', b'        by mx.google.com with SMTPS id i205sor1730463oif
.60.2019.04.28.10.06.41', b'        for <test.nutc.chang@gmail.com>', b'        (Google Transport Security);', b'        Sun, 28 Apr 2019 10:06:41 -0700 (PDT)', b'Received-SPF: pass (google.com: domain of
 jiaweichang.gary@gmail.com designates 209.85.220.41 as permitted sender) client-ip=209.85.220.41;', b'Authentication-Results: mx.google.com;', b'        dkim=pass header.i=@gmail.com header.s=20161025 hea
der.b=LpkxhEnf;', b'       spf=pass (google.com: domain of jiaweichang.gary@gmail.com designates 209.85.220.41 as permitted sender) smtp.mailfrom=jiaweichang.gary@gmail.com;', b'       dmarc=pass (p=NONE
sp=QUARANTINE dis=NONE) header.from=gmail.com', b'DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/relaxed;', b'        d=gmail.com; s=20161025;', b'        h=mime-version:from:date:message-id:subject:to;', b
'        bh=FUL0cuxOGX8hEtPDgRmqbA8EEBDRtc55f5if+Tkcfg0=;', b'        b=LpkxhEnfzrRPFK/qnPxf1DxrnAJQmoDs3iL0eIz+0EpybmANVdukfuvu+juEv9nKY7', b'        jSE9hwv1hgyNrn38m9hzaLhICLHnAWhVjvakRtjIplIJK39+jhTQ
fgAdRvTh1IbBr2B5', b'         hp/+bnckDSReIm7w5kPNh+W2sSaYNapz7jabvW4TEEqKHcfabC38bSYSxuy1BkaF98wI', b'         DUtqZa3fEqHJUAtOQKy9OfDr7kRxSbxj9MAb3OjHXeM9NJmngzDLOYDHeCvGCL2t/Ubm', b'         zIfKRychss
ClzclXzEI0+BnHLke0mAMqURlYv8QhsaOmdJGmr4+bhSdSNr2sK+DJ2YjE', b'        ppjg==', b'X-Google-DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/relaxed;', b'        d=1e100.net; s=20161025;', b'        h=x-gm-me
ssage-state:mime-version:from:date:message-id:subject:to;', b'        bh=FUL0cuxOGX8hEtPDgRmqbA8EEBDRtc55f5if+Tkcfg0=;', b'        b=tevFXP1KxotR3QM9pEEsSjW1A7y/y4uK5/D64blEqhnMpZWNkYLkcvszp97eMkX6NV', b'
         CH39X+BEOXtGH6U1HvZgfLCEPaDM7wUwiDychMPvvB6LQE0gIqSLIDUMXzqYQgi3Nfzm', b'         HmdG2MSw2sDPf9uiONZJANhemnZWYOn+7U0GwlcfQxE8sDqY108G1KD4WvTUoaLxG0mK', b'         Jx6E84icElLC7Dz86A6jFIu6IyE7bxF
Jm1w5i1s8ie/jx9aL4PRdBqofXuZ9F2WygzVA', b'         G/18pB5mtwAy0ib8s9VQYm/KUHcXl5tBnVDbYK4QxAildbXadNfikZ8dlnQzayCl2YH/', b'         IcEw==', b'X-Gm-Message-State: APjAAAV6SmjW/ayX42FC7idUKmo6gvmZA2NGVywz
FbELMBYofwjlmh9g', b'\t0O47hW2Zg91mIkXgKfafdFDeJc5mjHMUyUmZTwl5OPFL', b'X-Google-Smtp-Source: APXvYqzJCqTRFG/dSONaPFTuDgbb4CCQ0soXyDxKgSFS1ogim8vICZphJy3FBm+LLtMwM3vH+BAI4bxOzHR0byEzixk=', b'X-Received: b
y 2002:a54:4402:: with SMTP id k2mr14272575oiw.117.1556471201457;', b' Sun, 28 Apr 2019 10:06:41 -0700 (PDT)', b'MIME-Version: 1.0', b'From: =?UTF-8?B?5by15a6255GL?= <jiaweichang.gary@gmail.com>', b'Date:
 Mon, 29 Apr 2019 01:06:11 +0800', b'Message-ID: <CAN11BTg_nu8NOps=4HzqoL9kgufuYP=R6FFYPo6k1-M0zt8rMQ@mail.gmail.com>', b'Subject: test', b'To: test.nutc.chang@gmail.com', b'Content-Type: multipart/altern
ative; boundary="00000000000010ebfc05879a31b2"', b'', b'--00000000000010ebfc05879a31b2', b'Content-Type: text/plain; charset="UTF-8"', b'Content-Transfer-Encoding: quoted-printable', b'', b'12333', b'', b
'Sincerely,', b'Jia-Wei Chang', b'', b'------------------------------------------------------------------------=', b'---------', b'Dr. Jia-Wei Chang (Assistant Professor)', b'(=E5=BC=B5=E5=AE=B6=E7=91=
8B =E5=8D=9A=E5=A3=AB/=E5=8A=A9=E7=90=86=E6=95=99=', b'=E6=8E=88)', b'Department of Computer Science and Information Engineering', b'(=E8=B3=87=E8=A8=8A=E5=B7=A5=E7=A8=8B=E7=B3=BB)', b'National Taichung U
niversity of Science and Technology', b'(=E5=9C=8B=E7=AB=8B=E8=87=BA=E4=B8=AD=E7=A7=91=E6=8A=80=E5=A4=A7=E5=AD=B8)', b'Website: jiaweichang.github.io/biography', b'<https://mailtrack.io/trace/link/ea5e69f
dd48aee67b2adeb844b39264755c19db6?u=', b'rl=3Dhttp%3A%2F%2Fjiaweichang.github.io%2Fbiography&userId=3D508960&signatu=', b're=3Dc41a2aa804e0b255>', b'', b'--00000000000010ebfc05879a31b2', b'Content-Type: t
ext/html; charset="UTF-8"', b'Content-Transfer-Encoding: quoted-printable', b'', b'<div dir=3D"ltr"><img width=3D"0" height=3D"0" class=3D"mailtrack-img" alt=', b'=3D"" style=3D"display:flex" src=3D"https
://mailtrack.io/trace/mail/43de4b4=', b'730e28a2cdd1c0390f815a9d57ccf9221.png?u=3D508960">12333<div><br clear=3D"al=', b'l"><div><div dir=3D"ltr" class=3D"gmail_signature" data-smartmail=3D"gmail_=', b'si
gnature"><div dir=3D"ltr"><div><div dir=3D"ltr"><div><div dir=3D"ltr"><di=', b'v><div dir=3D"ltr"><div dir=3D"ltr"><div dir=3D"ltr"><div dir=3D"ltr"><div =', b'dir=3D"ltr"><div dir=3D"ltr"><div dir=3D"ltr
"><div dir=3D"ltr"><div dir=3D"=', b'ltr"><div dir=3D"ltr"><div dir=3D"ltr"><d=', b'iv dir=3D"ltr"><div dir=3D"ltr"><div dir=3D"ltr"><div><font face=3D"microso=', b'ft jh
enghei, sans-serif" size=3D"2"><span style=3D"color:rgb(0,0,0)">Sincer=', b'ely,</span><br></font></div><div><span style=3D"color:rgb(0,0,0)"><font siz=', b'e=3D"2" face=3D"microsoft jhenghei, sans-serif"
>Jia-Wei Chang</font></span>=', b'</div><font color=3D"#333333" face=3D"microsoft jhenghei, sans-serif"><div>=', b'<br></div><div><font color=3D"#333333" size=3D"1">------------------------=', b'--------
------------------------------------------------</font></div></f=', b'ont><font face=3D"microsoft jhenghei, sans-serif" size=3D"1">Dr. Jia-Wei Ch=', b'ang (Assistant Professor)<br>(=E5=BC=B5=E5=AE=B6=E
7=91=8B =E5=8D=9A=E5=A3=', b'=AB/=E5=8A=A9=E7=90=86=E6=95=99=E6=8E=88)<br>Department of Computer Science=', b' and Information Engineering<br>(=E8=B3=87=E8=A8=8A=E5=B7=A5=E7=A8=8B=E7=B3=', b'=BB)<br>Natio
nal Taichung University of Science and Technology<br>(=E5=9C=', b'=8B=E7=AB=8B=E8=87=BA=E4=B8=AD=E7=A7=91=E6=8A=80=E5=A4=A7=E5=AD=B8)<br>Webs=', b'ite:<a href=3D"https://mailtrack.io/trace/link/ea5e69fdd4
8aee67b2adeb844b39=', b'264755c19db6?url=3Dhttp%3A%2F%2Fjiaweichang.github.io%2Fbiography&amp;userI=', b'd=3D508960&amp;signature=3Dc41a2aa804e0b255" target=3D"_blank"> jiaweichang=', b'.github.io/biograp
hy</a></font></div></div></div></div></div></div></div></=', b'div></div></div></div></div></div></div></div></div></div></div></div=', b'></div></div></div></div></div>', b'', b'--00000000000
010ebfc05879a31b2--']
```


降低安全性，使該程式取得權限發信

https://www.google.com/settings/security/lesssecureapps

```
>python3 32_pop3_mail_client.py
  --host=  'pop.googlemail.com'
  --port=995
  --user=test.nutc.chang@gmail.com
```

EXECUTE REMOTE TELNET CMD

execute remote telnet cmd

1. sudo apt-get install telnetd
2. telnet localhost

```
jwchang@ubuntu:~$ telnet localhost
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
Ubuntu 18.04.2 LTS
ubuntu login: jwchang
Password:
Last login: Sun May  5 09:22:08 PDT 2019 from localhost on pts/1
Welcome to Ubuntu 18.04.2 LTS (GNU/Linux 4.18.0-17-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage


 * Canonical Livepatch is available for installation.
   - Reduce system reboots and improve kernel security. Activate at:
     https://ubuntu.com/livepatch

170 packages can be updated.
0 updates are security updates.

Your Hardware Enablement Stack (HWE) is supported until April 2023.
```

execute remote telnet cmd

```
#!/usr/bin/env python
# This program is optimized for Python 3.5.2.
# It may run on any other version with/without modifications.
# To make it run on Python 2.7.x, needs some changes due to API differences.
# Follow the comments inline to make the program work with Python 2.


import getpass
import sys
import telnetlib

HOST = "localhost"

def run_telnet_session():

    user = input("Enter your remote account: ")
    # Comment out the above line and uncomment the below line for Python 2.7.
    # user = raw_input("Enter your remote account: ")

    password = getpass.getpass()

    session = telnetlib.Telnet(HOST)

    session.read_until(b"login: ")
    session.write(user.encode('ascii') + b"\n")
    if password:
        session.read_until(b"Password: ")
        session.write(password.encode('ascii') + b"\n")

    session.write(b"ls\n")
    session.write(b"exit\n")

    print (session.read_all())

if __name__ == '__main__':
    run_telnet_session()
```

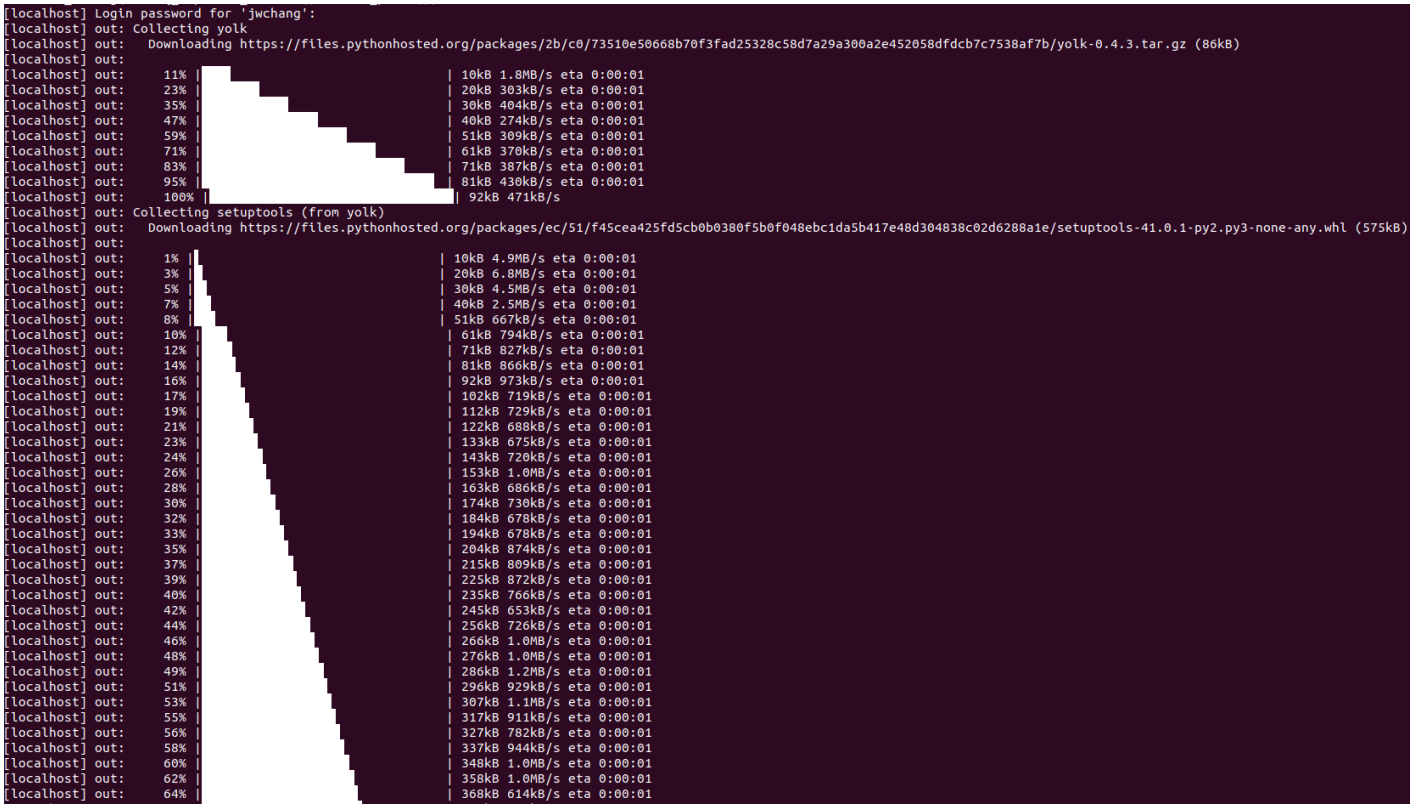
execute remote telnet cmd

```
jwchang@ubuntu:~/Desktop/20190506$ python3 33_execute_remote_telnet_cmd.py
Enter your remote account: jwchang
Password:
b'\r\nLast login: Sun May  5 09:28:14 PDT 2019 from localhost on pts/2\r\nls\r\n
exit\r\nWelcome to Ubuntu 18.04.2 LTS (GNU/Linux 4.18.0-17-generic x86_64)\r\n\r
\n * Documentation:  https://help.ubuntu.com\r\n * Management:     https://lands
cape.canonical.com\r\n * Support:        https://ubuntu.com/advantage\r\n\r\n\r\
n * Canonical Livepatch is available for installation.\r\n   - Reduce system reb
oots and improve kernel security. Activate at:\r\n     https://ubuntu.com/livepa
tch\r\n\r\n170 packages can be updated.\r\n0 updates are security updates.\r\n\r
\nYour Hardware Enablement Stack (HWE) is supported until April 2023.\r\njwchang
@ubuntu:~$ ls\r\nDesktop    examples.desktop  Public      Untitled1.ipynb\r\nDoc
uments  Music             readme.txt  Untitled.ipynb\r\nDownloads  Pictures
     Templates   Videos\r\njwchang@ubuntu:~$ exit\r\nlogout\r\n'
```

INSTALL PYTHON PACKAGE REMOTELY

install python package remotely

1. sudo pip3 install fabric3
2. sudo apt-get install openssh-server



install python package remotely

```
#!/usr/bin/env python
# This program is optimized for Python 2.7.12 and Python 3.5.2.
# It may run on any other version with/without modifications.

from getpass import getpass
from fabric.api import settings, run, env, prompt


def remote_server():
    env.hosts = ['localhost']
    env.user = prompt('Enter user name: ')
    env.password = getpass('Enter password: ')

def install_package():
    run("pip install yolk")

if __name__ == '__main__':
    install_package()
```

CREATE RESTFUL WEBSERVICE

create restful webservice

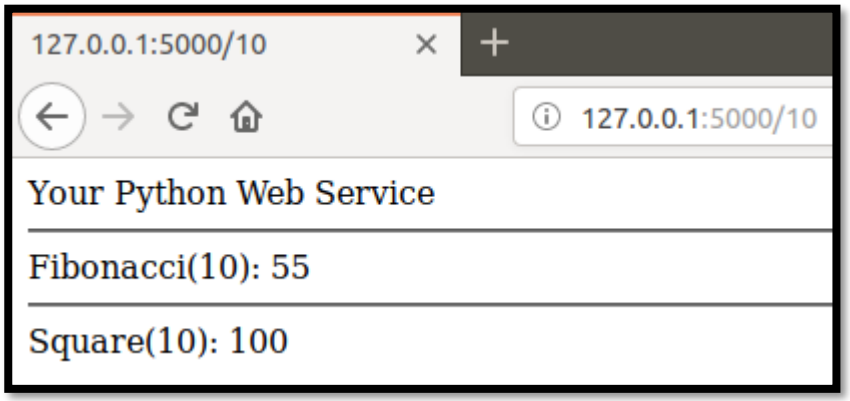
- pip3 install flask

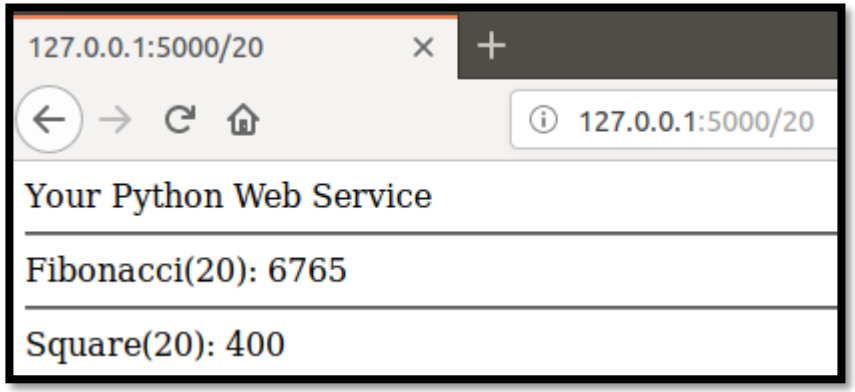
```
jwchang@ubuntu:~$ pip3 install flask
Collecting flask
  Using cached https://files.pythonhosted.org/packages/7f/e7/08578774ed4536d3242b14dacb469
6386634607af824ea997202cd0edb4b/Flask-1.0.2-py2.py3-none-any.whl
Collecting Werkzeug>=0.14 (from flask)
  Downloading https://files.pythonhosted.org/packages/18/79/84f02539cc181cdbf5ff5a41b9f52c
ae870b6f632767e43ba6ac70132e92/Werkzeug-0.15.2-py2.py3-none-any.whl (328kB)
    100% |                                | 337kB 928kB/s
Collecting Jinja2>=2.10 (from flask)
  Downloading https://files.pythonhosted.org/packages/1d/e7/fd8b501e7a6dfe492a433deb7b9d83
3d39ca74916fa8bc63dd1a4947a671/Jinja2-2.10.1-py2.py3-none-any.whl (124kB)
    100% |                                | 133kB 1.2MB/s
Collecting itsdangerous>=0.24 (from flask)
  Using cached https://files.pythonhosted.org/packages/76/ae/44b03b253d6fade317f32c24d100b
3b35c2239807046a4c953c7b89fa49e/itsdangerous-1.1.0-py2.py3-none-any.whl
Collecting click>=5.1 (from flask)
  Using cached https://files.pythonhosted.org/packages/fa/37/45185cb5abbc30d7257104c434fe0
b07e5a195a6847506c074527aa599ec/Click-7.0-py2.py3-none-any.whl
Collecting MarkupSafe>=0.23 (from Jinja2>=2.10->flask)
  Using cached https://files.pythonhosted.org/packages/b2/5f/23e0023be6bb885d00ffbefad2942
bc51a620328ee910f64abe5a8d18dd1/MarkupSafe-1.1.1-cp36-cp36m-manylinux1_x86_64.whl
Installing collected packages: Werkzeug, MarkupSafe, Jinja2, itsdangerous, click, flask
Successfully installed Jinja2-2.10.1 MarkupSafe-1.1.1 Werkzeug-0.15.2 click-7.0 flask-1.0.
2 itsdangerous-1.1.0
```

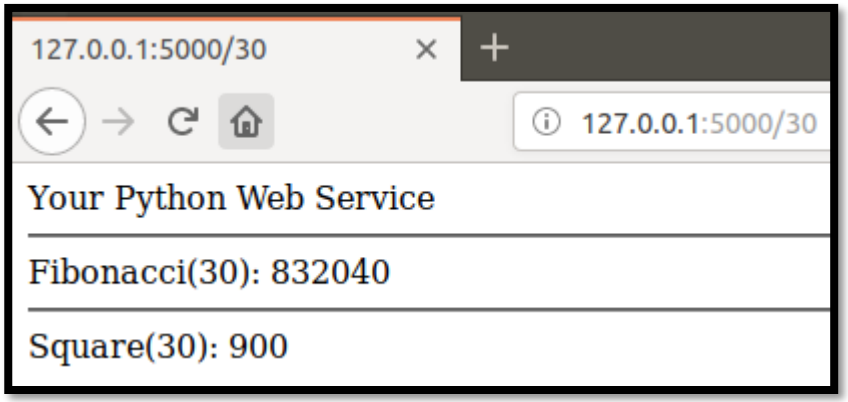
create restful webservice

```
#!/usr/bin/env python
# This program is optimized for Python 2.7.12 and Python 3.5.2.
# It may run on any other version with/without modifications.

from flask import Flask
app = Flask(__name__)

@app.route('/<int:num>')
def index(num=1):
    return "Your Python Web Service <hr>Fibonacci("+ str(num) + "): "+ str(fibonacci(num))+ "<hr>Square("+ str(num) + "): "+ str(square(num))

def fibonacci(n):
    if n == 0:
        return 0
    elif n == 1:
        return 1
    else:
        return fibonacci(n-1) + fibonacci(n-2)


def square(n):
    print ("Calculating for the number %s" %n)
    return n*n

if __name__ == '__main__':
    app.run(debug=True)
```

create restful webservice







延伸閱讀

- Socket Programming in Python (Guide)
  - https://realpython.com/python-sockets/#socket-api-overview
- Python 网络编程
  - http://www.runoob.com/python/python-socket.html

Resource is available by
https://jiaweichang.github.io/biography/

THANKS