

~ — mininet@mininet-vm: ~ — ssh -X mininet@localhost -p2223

~ — -bash

+

```
*** Shutting down stale tunnels
pkill -9 -f Tunnel=Ethernet
pkill -9 -f .ssh/mn
rm -f ~/.ssh/mn/*
*** Cleanup complete.
mininet@mininet-vm:~$ sudo -E python3 legacy_network.py
[Enter the CN of the webserver(www.webpa4.test): www.webpa4.test
[Enter the CN of the chat server(www.chatpa4.test): www.chatpa4.test
[Enter the passphrase of your root CA: harut
Generating RSA private key, 2048 bit long modulus (2 primes)
.....+++++
.....+++++
e is 65537 (0x010001)
Signature ok
subject=C = US, ST = California, L = Seaside, O = CST311, OU = PA4, CN = www.webpa4.test
Getting CA Private Key
Generating RSA private key, 2048 bit long modulus (2 primes)
.....+++++
.....+++++
e is 65537 (0x010001)
Signature ok
subject=C = US, ST = California, L = Seaside, O = CST311, OU = PA4, CN = www.chatpa4.test
Getting CA Private Key
*** Adding controller
*** Add switches
*** Add hosts
*** Add links
*** Starting network
*** Configuring hosts
r5 r4 r3 h1 h2 h3 h4
*** Starting controllers
*** Starting switches
*** Post configure switches and hosts
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
r5 -> r4 r3 h1 h2 h3 h4
r4 -> r5 r3 h1 h2 h3 h4
r3 -> r5 r4 h1 h2 h3 h4
h1 -> r5 r4 r3 h2 h3 h4
h2 -> r5 r4 r3 h1 h3 h4
h3 -> r5 r4 r3 h1 h2 h4
h4 -> r5 r4 r3 h1 h2 h3
*** Results: 0% dropped (42/42 received)
mininet>
```

```
root@mininet-vm: ~
INFO:__main__:The server is ready to receive on port 12000
Waiting for connections...
Client X connected.
Client Y connected.
X: 'testing x'
Y: 'testing y'
root@mininet-vm:~#
```

Enter the CN of the chat server (www.chatpa4.test): www.chatpa4.test
Enter the passphrase of your root CA: harut

```
"Node: h2"
Listening on port 4443

```

* Post configure switches and hosts
* Starting CLI:


```
root@mininet-vm: ~
Enter a message from the client: testing y
Server response: X: testing x, Y: testing y
root@mininet-vm:~#
```

```
root@mininet-vm: ~
Enter a message from the client: testing x
Server response: X: testing x, Y: testing y
root@mininet-vm:~#
```

No.	Time	Source	Destination	Protocol	Length	Info
-----	------	--------	-------------	----------	--------	------

1	0.000000000	10.0.1.10	10.0.2.11	TLSv1.2	97	Application Data
3	0.019230831	10.0.2.11	10.0.1.10	TLSv1.2	114	Application Data

- ▶ Frame 1: 97 bytes on wire (776 bits), 97 bytes captured (776 bits) on interface s1-eth3, id 0
- ▶ Ethernet II, Src: 56:66:60:9c:14:99 (56:66:60:9c:14:99), Dst: 92:90:56:a9:95:75 (92:90:56:a9:95:75)
- ▶ Internet Protocol Version 4, Src: 10.0.1.10, Dst: 10.0.2.11
- ▶ Transmission Control Protocol, Src Port: 43182, Dst Port: 12000, Seq: 1, Ack: 1, Len: 31
- ▼ Transport Layer Security
 - ▼ TLSv1.2 Record Layer: Application Data Protocol: Application Data
 - Content Type: Application Data (23)
 - Version: TLS 1.2 (0x0303)
 - Length: 26
 - Encrypted Application Data: 626e2c182e43c4287fc8e58b380fdb5e5df24e9710429efc...



"ssl.handshake.type" is deprecated or may have unexpected results. See the User's Guide.
Packets: 17 · Displayed: 2 (11.8%) · Dropped: 0 (0.0%)
Profile: Default

```
root@mininet-vm:~# sudo -E wget https://www.webpa4.test:4443/
--2023-06-16 04:16:11-- https://www.webpa4.test:4443/
Resolving www.webpa4.test (www.webpa4.test)... 10.0.1.11
Connecting to www.webpa4.test (www.webpa4.test)|10.0.1.11|:4443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1031 (1.0K) [text/html]
Saving to: 'index.html.9'
```

```
index.html.9      100%[=====>]    1.01K  --.-KB/s    in 0.001s
```

```
2023-06-16 04:16:11 (1.68 MB/s) - 'index.html.9' saved [1031/1031]
```

```
root@mininet-vm:~# sudo -E python3 PA3_Client_Team9.py
Enter a message from the client: this is y
Server response: X: this is x, Y: this is y
root@mininet-vm:~#
```


...: ~ — ssh -X mininet@localhost -p2223

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```
mininet@mininet-vm:~$ sudo openssl x509 -text -noout -in /etc/ssl/demoCA/cacert.pem
```

Certificate:

Data:

Version: 3 (0x2)

Serial Number:

64:15:2f:cb:00:93:98:58:97:6b:23:d4:3b:d0:03:49:10:3a:a0:62

Signature Algorithm: sha256WithRSAEncryption

Issuer: C = US, ST = California, L = Seaside, O = CSUMB, OU = CST311, CN = ca.csUMB.tes

Validity

Not Before: Jun 16 08:42:18 2023 GMT

Not After : Jun 14 08:42:18 2028 GMT

Subject: C = US, ST = California, L = Seaside, O = CSUMB, OU = CST311, CN = ca.csUMB.te

Subject Public Key Info:

Public Key Algorithm: rsaEncryption

RSA Public-Key: (2048 bit)

Modulus:

00:fd:46:00:25:0f:f0:e9:2e:93:ed:cc:30:dc:0b:
15:49:ec:3b:df:a1:26:b0:4c:0a:22:32:48:d7:5a:
76:56:87:a9:72:b3:cd:c3:59:9e:ec:c7:68:5a:ef:
b9:0c:8b:13:ef:5a:55:81:54:cd:29:71:47:72:80:
84:35:e5:07:43:76:ac:c3:6b:03:fd:d8:11:36:e8:
a6:74:d7:6f:a4:f5:f8:3f:c5:06:26:c8:95:58:2c:
9b:b9:b2:3a:b8:45:bd:2f:25:8e:81:70:a9:45:46:
14:84:bc:3b:af:22:fe:c9:e9:a0:5c:9e:99:57:31:
bc:2f:8e:dc:d6:6e:0f:70:f3:24:e6:6f:3a:5f:e1:
71:7e:63:27:9e:46:3f:be:96:67:2b:85:04:4d:a6:
4c:06:a9:15:a7:01:df:7b:e9:13:38:32:39:4c:78:
c1:96:36:af:d2:4e:ce:e1:c8:41:b8:58:d6:a4:8b:
1b:43:b1:1a:f2:07:88:8f:12:b0:6e:8d:91:47:39:
65:1f:82:d9:31:fd:da:b3:43:f6:54:6b:b2:53:4e:
4e:4e:2a:43:95:60:b1:1d:cf:da:d8:cd:3c:db:da:
ef:76:1f:d6:1a:92:4e:62:29:1f:77:e0:40:6a:22:
a4:e1:4c:c2:56:26:4f:ba:30:74:71:8f:f6:f9:83:
11:87

Exponent: 65537 (0x10001)

X509v3 extensions:

X509v3 Subject Key Identifier:

DB:71:53:47:FC:6D:EA:1B:22:D3:F1:0F:DD:CF:F8:10:09:E0:38:1C

X509v3 Authority Key Identifier:

keyid:DB:71:53:47:FC:6D:EA:1B:22:D3:F1:0F:DD:CF:F8:10:09:E0:38:1C

X509v3 Basic Constraints: critical

CA:TRUE

Signature Algorithm: sha256WithRSAEncryption

15:03:15:1c:c9:a9:a9:85:00:51:f2:b6:68:9a:81:a9:a7:53:
40:13:af:97:07:98:da:ee:e1:33:02:ee:a5:47:cc:dd:89:72:
85:2e:9d:b6:89:31:c1:40:98:54:e5:9b:ee:6b:5f:d9:42:bf:
e6:06:a5:29:9a:9a:5c:ea:8b:b7:ce:61:db:f2:28:2b:ef:6b:
8d:71:76:21:52:e9:ff:21:48:23:fc:e1:48:c2:f6:ff:8e:a1:
c8:44:e6:50:bf:e8:a0:ef:9b:96:05:7f:e1:d3:56:2d:eb:02:
19:e3:04:4e:06:1a:ca:7a:7a:a9:d1:df:0e:0a:67:a8:4c:b2:
bd:f5:a5:ea:88:52:6d:56:1e:b8:45:1f:70:3b:a4:4c:af:7e:
1a:5a:f7:27:b6:ed:f8:8e:b4:91:c7:c6:64:14:9a:a3:cd:51:
9e:67:00:f6:7f:f8:3d:9b:dc:31:15:99:dd:d0:ea:7a:37:b5:
26:3c:ff:f6:2b:2a:58:13:a3:74:cc:c3:81:d9:bf:2b:33:13:
93:36:80:0c:0d:65:7e:f9:e1:64:45:5e:a7:66:52:7b:bf:82:
2c:84:b1:2e:8f:a5:77:6e:e3:02:06:d2:bf:07:03:88:03:f2:
c9:97:6a:5f:5d:71:2e:0a:7c:19:5a:58:4c:45:81:a6:a2:c0:
ec:6f:1c:58

```
mininet@mininet-vm:~$
```