Implementing HTTPS with the Apache Web Server

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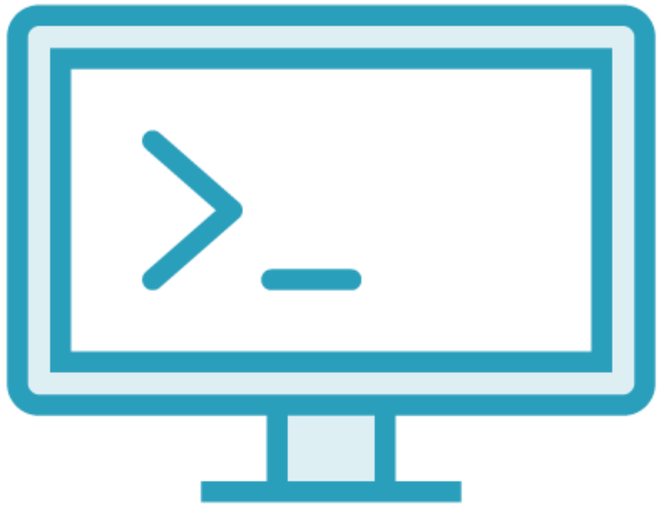
Overview

Securing Apache with HTTPS

- Install Apache2 (Ubuntu)
- Observe Hostname Resolution
- Create Self Signed Certificate
- Enable SSL and SSL Site in Apache
- Redirect HTTP to HTTPS in Default Site

Lab Systems



Ubuntu 20.04:

- VirtualBox / Vagrant

```
$ sudo -i

# apt update #Update metadata

# apt install -y apache2 w3m #Install apache2 (httpd in centos) and CLI browser

# ss -ntl #Show listening TCP ports, port 80 (HTTP) will be open
```

Install Apache

Installing Apache is simple on Ubuntu and the service starts automatically but on

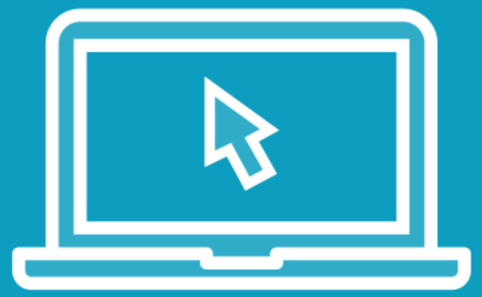
To use HTTPS we will need a hostname that we can access

```
# ping ubuntu #The hostname can be resolved by systemd-resolve
# cat /etc/hosts #There is probably not an entry for ubuntu
# dig ubuntu #The hostname ubuntu is resolved through DNS running on 127.0.0.53
# apachectl configtest #Often will not have the ServerName directive configured
```

Hostname Resolution in Ubuntu

Ubuntu 20.04, by default, resolves the hostname by the systemd-resolve daemon.

Demo



Installing Apache

- Install Apache
- Install CLI Browser W3m
- Resolve Hostname

```
# a2enmod ssl
# openssl req -x509 -nodes -days 365 -newkey rsa:2048
  -keyout /etc/ssl/private/ubuntu.key
  -out /etc/ssl/certs/ubuntu.crt #Open dialogue, enter correct CN (Common Name)
# vim /etc/apache/sites-available/default-ssl.conf
  ServerName ubuntu
  SSLCertifcateKeyFile /etc/ssl/private/ubuntu.key
  SSLCertificateFile /etc/ssl/certs/ubuntu.crt
# a2ensite default-ssl
# systemctl restart apache2
```

Configuring SSL

Using openssl we can create a self-signed key pair. The default uses a self-signed "snakeoil" key pair. The default configuration can be edited to use our key pair and the correct hostname

Demo

We now configure SSL:

- Create Self-Signed Certificate
- Modify Defaults
- Restart Web Server

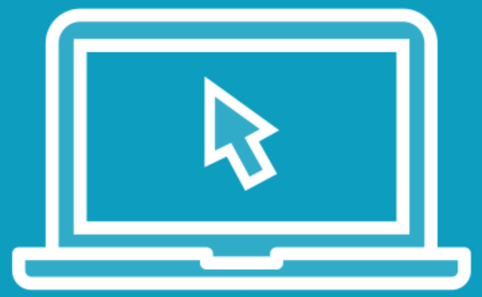
```
# vim /etc/apache2/sites-available/000-default.conf

<VirtualHost *:80>
     ServerName ubuntu
     Redirect / https://ubuntu/
</VirtualHost>
# systemctl restart apache2
```

Redirect HTTP Request

To secure the web server, we should ensure HTTPS is used by redirecting HTTP to HTTPS

Demo



We now modify the configuration to redirect HTTP to HTTPS:

- Edit the default http site
- Add ServerName and Redirect

```
$ openssl s_client -connect example.com:443

$ openssl s_client -connect example.com:443 -showcerts
```

View Certificate Information

We can test the HTTPS connection using openssl and the s_client module

Demo

Testing HTTPS and HTTP Redirect:

- openssl
- w3m

Summary

Apache HTTPS

- Install Apache
  - Test HTTP
  - Set Hostname
- Create Self-Signed Certs
  - SSL Conf
  - Enable Site
- Test Access

Implementing openSSL Certificate Server