

Web Design & Programming

Web Servers - Apache HTTPD

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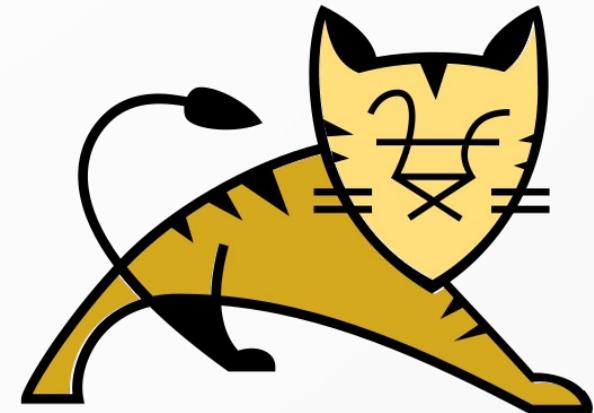
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Web Servers

- Apache HTTPD
- Microsoft Internet Information Server (IIS)
- Nginx
- Caddy
- lighttpd
- Apache Tomcat
- ...



Installing Apache HTTPD

- The original source code can be found at:
 - <https://httpd.apache.org/>
- On Debian / Ubuntu
 - `apt install apache2`
- On Red Hat
 - `yum install httpd`
- Note: some modules/features may require additional packages.

Standard File Locations

- Configuration Files
 - Debian / Ubuntu: `/etc/apache2`
 - Red Hat: `/etc/httpd`
- Web Content
 - `/var/www`
- Log Files
 - Debian / Ubuntu: `/var/log/apache2`
 - Red Hat: `/var/log/httpd`

Managing the HTTPD Service

- Debian / Ubuntu

- `systemctl start | stop | reload | status apache2`

- Red Hat

- `systemctl start | stop | reload | status httpd`

Configuration Files

- Apache HTTPD configuration file is modular; most of the time one file is used for the main server, and additional files are used for websites, modules and specific configurations.
- Debian / Ubuntu has a very fragmented configuration by default. Additional commands are used to perform some changes.

```
# This is the main Apache HTTP server configuration file.
# It contains the configuration directives that give the server
# its instructions.
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed
# information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>
# for a discussion of each configuration directive.
#
# Do NOT simply read the instructions in here without
# understanding what they do. They're here only as hints
# or reminders. If you are unsure consult the online docs.
# You have been warned.
```

Some Configuration Directives

- *Listen*: TCP port number
- *User* and *Group*
- *ServerAdmin*: administrator's email address
- *ServerRoot*: base directory
- *DocumentRoot*: web content location
- *ErrorLog* and *CustomLog*: log files location

Basic Troubleshooting

- Is the configuration file syntax correct?
- Are all the files and directories permissions correct?
- Is the service running properly?
- What has been recorded in the log files?
- Is there any type of network filtering in place?

Virtual Hosts

- Virtual Hosts is a way for Apache HTTPD to host multiple websites, with different names, on the same server.
- The usual approach is to create a distinct configuration files for each web site, and to include those files in the main configuration.

Apache HTTPD Modules

- Specific features can be enabled by using a rule to load modules in a configuration file.
- Modules can have their own configuration block (or file).
- Use `apache2ctl -M` to list all active modules.
 - *auth_**, *authn_**, *authz_**: authentication
 - *rewrite*: rewriting HTTP requests
 - *ssl*: encryption (HTTPS)
 - *php*

.htaccess

- `.htaccess` are configuration files that can be located in the web directory (hence, modifiable by a webmaster).
- Directives that can be used in a `.htaccess` can be limited by the main configuration.
- Files are processed immediately, without restarting the service.
- `.htaccess` files can cause a performance hit, since the server will lookup for any of those files for each request.

mod_ssl

- The `mod_ssl` module allows to use encryption with the Apache HTTPD server and enables HTTPS support.
- **SSL**: Secure Sockets Layer (deprecated, old name still in use)
- **TLS**: Transport Layer Security (current standard)
 - TLS 1.0 and 1.1 are deprecated
 - TLS 1.2 and 1.3 are recommended

Certificate File Formats

- Security certificates are based on the X.509 standard
- Multiple files format are used for a certificate:
 - .csr: certificate request
 - .key: secret key
 - .pem: encoded certificate
 - .pfx: binary format; used by MS IIS
- Various tool sets are available (OpenSSL, KeyStore Explorer, certutil, PowerShell, ...).

Enabling HTTPS

- Obtain a security certificate:
 - Generate a key
 - Generate a Certificate Request
 - Get the request approved and receive the certificate from your Certificate Authority
- Configure Apache HTTPD:
 - `SSLEngine on`
 - `SSLCertificateFile`
 - `SSLCertificateKeyFile`
 - And more

Obtaining Security Certificates

- **Self-Signed Certificate:** for tests only
- **Internal Certification Authority:** to use inside an organization, requires reliable processes (certificate issuance, distribution, revocation, ...)
- **Public Certification Authority:** cost money ¹, required for public Internet access

1: Let's Encrypt is a notable exception

Implementation

- It is strongly recommended to follow current encryption practices and recommendations.
- You should test your web server to check its configuration.
- Security certificates do expire; make sure to have a good renewal process.

- **Apache HTTPD Logo: Wikimedia Commons**

[https://en.wikipedia.org/wiki/File:Apache_HTTP_server_logo_\(2019-present\).svg](https://en.wikipedia.org/wiki/File:Apache_HTTP_server_logo_(2019-present).svg)

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