**Architecture**

How does the httpd architecture support processing multiple requests simultaneously?

A single control process (the parent) is created.

The control process in turn creates child process(es).

Child processes in turn

How do you start httpd?

TODO

What is .htaccess?

TODO

What are access logs?

TODO

How do you identify what modules are loaded?

httpd -t -D DUMP\_MODULES

What is the difference between a static and shared module?

Are all modules in the modules directory automatically loaded?

How do you determine which MPM a server is using?

httpd -l

This lists all compiled in modules

How can you determine how many child processes are running?

ps -ef|grep httpd

How can I determine currently effective Directive settings?

TODO

How can I determine all loaded modules?

httpd.exe -M

How can I verify a config-file for syntax?

httpd.exe -t

How do I determine httpd startup options?

httpd.exe -V

How do I show currently configured vhosts?

httpd.exe -S

## Common issues

httpd: Could not reliably determine the server's fully qualified domain name

ServerName directive

(OS 3)The system cannot find the path specified. : httpd.exe: could not open er

ror log file C:/dev/httpd/httpd-2.2\_A/@rel\_logfiledir@/error\_log.

Unable to open logs

ErrorLog directive

**MPM’s**

What kinds of MPM’s are there?

Worker and prefork

What are the main differences between worker and preform MPM’s?

Prefork eagerly spawns a separate process at startup for the maximum number of allowed client connections. It does not use threads for processing requests.

Is the mpm\_winnt.c module worker or prefork?

worker. It only creates a single child process.

Server thread?

A thread spawned by a worker for the purpose of servicing a client request

Do worker (child) processes spawn threads other than server threads?

Yes, listener threads to monitor connections and pass control to a server thread

### Prefork

How does prefork handle requests if not with threads?

The control process preforks a number of server processes to handle requests.

# Forbidden

You don't have permission to access / on this server.

Allow from 127.0.0.1

<Directory "htdocs">

Allow from 127.0.0.1

pages are being served as plain text

DefaultType directive

Attempt to serve directory:

Make sure modules are loaded w LoadModule directive so that default index works

manager.node failed: Access is denied

make sure you’re starting httpd w admin access

## Virtual Hosts

What is a virtual host?

A host that is not in fact a separate host, but instead, shares physical existence with other sides. In other words, multiple virtual hosts reside on a single physical host. Virtual hosts may be either name-based or ip-based

Why virtual hosts?

NameVirtualHost

# Directives

Do changes to httpd settings always require server restart?

<http://www.cyberciti.biz/faq/apache-2-reload-httpd-config-file-unix-linux-command/>

***Keep-Alive***

Relates to persistent connections. Using keep-alive allows multiple requests from a single client to reuse the same http connection. For example, given an html page with multiple embedded resources, setting keep-alive true would allow the browser to use the same connection for requesting the html page and then the embedded resources.

High-traffic sites typically keep this setting off to avoid pinning server threads to a single client, thereby requiring it to spawn new threads for each client.

Max keep-alive requests

The maximum number of requests that a connection kept-alive may service before it must be closed.

Do connections survive across browser refreshes or non-ajax requests?

##### Timeouts

Keep-alive timeout

Timeout

The maximum amount of time the server will attempt to service a request before sending a 504 HTTP response.

***MPM***

There are a number of relevant directives

##### Threads per child

The maximum number of server threads created at startup by a worker.

##### StartServers

The number of child processes (workers) created at startup

##### Max-Clients

The maximum number of client requests that a server can service at a time

Given a serverlimit of 1 and threadsPerChild of 20, the max-clients directive may never be greater than 20.

##### ServerLimit

The maximum number of child processes (workers) which may be started at a time.

##### MaxRequestsPerChild

The maximum number of requests a worker may process before being killed

## Terms

Multi-Processing Modules (MPMs)

A compiled in module which is responsible for binding to a port(s) and then processing requests into that port.

Control process

TODO

Child process

TODO

## Reference

<https://httpd.apache.org/docs/2.2/mod/core.html#serverroot>

## Misc

max-age and expires

max-age takes priority over expires

max-age

directive included in the Cache-Control directive

expressed in seconds

freshness

if max-age present -> max-age value

otherwise, if expires present -> expires - date

freshness lifetime

period of time that a cached value is considered usable, and not stale (required to be refreshed from the source)

caches

Successful response

TODO

Storing a response

Registering a response as a cache entry in a caching system

Expiration model

Allows specification of how long a response should be considered fresh

caches that understand the model will continue to use cached versions of the response until it expires

Freshness lifetime is specified via Expires and Cache-Control headers

No server request is created until the cache entry expires

Validation model

Applicable where content is truly dynamic

content is cached, however the server is asked whether or not the response is still fresh

The server uses an ETag and / or Last modified header to check whether or not the response is fresh (changed since last cached)

Appropriate when a response may be invalidated at any time in response to changing data on the server

Return a response

TODO

Caching

Storage of data such that requests for it may be returned more quickly than otherwise possible

A localized version of a remote datasource

HTTP Cache validation

TODO

HTTP cache

What is a caching system?

Mechanism for caching o

When can a caching system return a response without validation?

TODO

caching system

TODO

cache entry

TODO