#### Apache HTTPD

The Apache HTTP Server is a popular open-source HTTP server. It is an HTTP/1.1-compliant web server that implements the latest protocols, and it is highly configurable and extensible with third-party modules.

##### Resources to better understand the system

* Config Sections: <https://httpd.apache.org/docs/current/sections.html>
* Performance Tuning: <https://httpd.apache.org/docs/current/misc/perf-tuning.html>
* Security Tips: <https://httpd.apache.org/docs/current/misc/security_tips.html>
* Caching Guide: <https://httpd.apache.org/docs/2.4/caching.html>

#### Variation Points

KeepAlive || HostnameLookups || AccessLog || InMemory || ExtendedStatus || FollowSymLinks || EnableSendfile

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| No. | Variation Point | Range | Description |
| 1 | KeepAlive | On|Off | Setting KeepAlive to On provides long-lived HTTP sessions which allow multiple requests to be sent over the same TCP connection. Enabling KeepAlive results in reduced latency times for HTML documents. Disabling KeepAlive is recommended when available memory is low. |
| 2 | HostnameLookups | On|Off | The default is Off in order to save the network traffic for those sites that don't truly need the reverse lookups done. It is also better for the end users because they don't have to suffer the extra latency that a lookup entails. Heavily loaded sites should leave this directive Off, since DNS lookups can take considerable amounts of time.  Setting it to On enables DNS lookups so that host names can be logged. The value Double refers to doing double-reverse DNS lookup. That is, after a reverse lookup is performed, a forward lookup is then performed on that result. At least one of the IP addresses in the forward lookup must match the original address. These can be set for security purposes. |
| 3 | AccessLog | On|Off | The server access log records all requests processed by the server.  LogFormat directive describes a format for use in a log file; The CustomLog directive is used to log requests to the server. It can also be specified with a log format, and the logging can optionally be made conditional on request characteristics using environment variables. Pipe can be used to send logs to another program, If a program is used, then it will be run as the user who started httpd. This will be root if the server was started by root; be sure that the program is secure.  Controlling detail/format of access log enables rich log analysis for troubleshooting, security, profiling etc. Writing entries to the Apache log files obviously takes some effort, but the information gathered from the logs is so valuable that under normal circumstances logging should not be turned off. |
| 4 | InMemory | On|Off | The act of opening a file can itself be a source of delay, particularly on network filesystems. By maintaining a cache of open file descriptors for commonly served files, httpd can avoid this delay. The CacheFile directive opens handles to one or more files (given as whitespace separated arguments) and places these handles into the cache at server startup time.  Serving directly from system memory is universally the fastest method of serving content. Reading files from a disk controller or, even worse, from a remote network is orders of magnitude slower. The MMapFile directive maps one or more files (given as whitespace separated arguments) into memory at server startup time.The directive does not keep track of how much memory it allocates, so you must ensure not to over-use the directive. |
| 5 | ExtendedStatus | On|Off | This option tracks additional data per worker about the currently executing request and creates a utilization summary. This is useful for profiling and debugging performance issues.  However, the collection of extended status information can slow down the server. |
| 6 | FollowSymLinks | On|Off | Set as part of Options directive for a particular directory. If set, then HTTPD will follow symbolic links in this directory. This is the default setting.  Can be disabled for security reasons. |
| 7 | EnableSendfile | On|Off | This directive controls whether httpd may use the sendfile support from the kernel to transmit file contents to the client.  This sendfile mechanism avoids separate read and send operations, and buffer allocations. But on some platforms or within some filesystems, it is better to disable this feature to avoid operational problem such as: On Linux the use of sendfile triggers TCP-checksum offloading bugs on certain networking cards when using IPv6, On Linux on Itanium, sendfile may be unable to handle files over 2GB in size etc |