Apache Web Server Considerations (UNIX®/Linux/macOS)

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Apache Web Server Considerations (UNIX®/Linux/macOS)

This page contains information about the recommended option for UNIX®, Linux, and macOS and atypical option 1 (Alternative Option 1: Apache API Module with NSD (mod_csp24.so)).

1 Security

When an Apache web server starts, it initializes a parent process that usually runs with superuser privileges. This is necessary in order to bind to TCP port 80.

After that, Apache launches the child processes (*worker processes*) which do the work of serving web requests. These child processes run as a less-privileged user and group, which you specify using the `User` and `Group` Apache configuration directives.

The child processes must be able to read all the content that they are responsible for serving (and have read/write access to the Web Gateway's configuration and Event Log files). Beyond this, however, these child processes should be granted as few privileges as possible. Refer to the Apache documentation for further information.

2 Apache Process Management and the Web Gateway

InterSystems Web Gateway modules are directly bound to Apache *worker processes*. Therefore, the way Apache is configured to manage its process pool has a direct effect on the Web Gateway.

Apache provides three Multi-Processing Modules (MPMs) for process management: Prefork MPM (http://httpd.apache.org/docs/current/mod/prefork.html), Worker MPM (http://httpd.apache.org/docs/current/mod/worker.html), or Event MPM (http://httpd.apache.org/docs/current/mod/event.html). Because the Web Gateway dynamic shared object modules (DSOs) are thread-safe, they can be deployed alongside any MPM.

In order to determine which of the server models is in use for an existing installation, issue the following command from a command prompt:

RHEL

```
httpd -V
```

Ubuntu/SUSE

```
apache2 -V
```

All MPMs involve spreading the load over multiple child (worker) processes. For all MPMs, the `StartServers` directive specifies the number of worker processes to start. Because Web Gateway modules are directly bound to worker processes, this directive also determines the number of Web Gateway instances in operation.

However, the running configuration, connection table and form cache is held in a shared memory sector. This allows the contents of the Web Gateway System Status form to consistently reflect the Web Gateway activity across the all worker

processes. For Apache servers, the connection table (and connection numbers) includes an additional column indicating the web server process ID to which each InterSystems IRIS connection is associated is included.

2.1 Maximum Server Connections

While the Web Gateway load is spread over multiple web server processes, the Maximum Server Connections configuration parameter sets a single overall limit on the number of connections the Web Gateway can make to a particular InterSystems IRIS server. This means that the number of worker processes started by Apache does not affect the maximum number of connections the Web Gateway can create.

For installations where most of the Apache workload is devoted to serving InterSystems web application requests, it is better to not assign a value to the Web Gateway's Maximum Server Connections directive and control the amount of concurrent work that can be done with the corresponding Apache configuration parameters instead. Setting an independent value for the Web Gateway's Maximum Server Connections directive would, however, make sense in installations where InterSystems file types represent only part of the workload for the Apache installation as a whole.

3 State-Aware Sessions (Preserve mode 1)

To provide support for state-aware sessions across multiple Apache worker processes, the Web Gateway routes requests between worker processes using UNIX® domain sockets.

As an example, consider a web server installation that distributes its load over 3 worker processes: P1, P2 and P3. Each worker process can potentially start any number of threads (T1, T2 … Tn) according to the web server MPM and configuration in use.

Suppose an application makes a request to mark its session as state-aware (preserve mode 1) and the Web Gateway acknowledges this instruction in process P2. The connection and (security context) to the now private InterSystems IRIS process is hosted by web server worker process P2. All further requests for that user/session must now be processed by worker process P2. However, the Web Gateway has no control over which worker process the web server routes subsequent requests to, so the Web Gateway must establish an IPC channel between P2 and (potentially) any other worker process in the set.

When the Web Gateway marks the connection as state-aware in P2, it starts a listening service in a separate, detached, thread. For log level v2, the Event Log would include a message similar to the following:

```
IPC Server
Process ID: 28457 Listening on Domain Socket: /tmp/csp28457.str
```

If another request for the same session is processed by worker process P3, the Web Gateway forwards that request to process P2 via the IPC channel previously established and then waits for the response. For log level v2, the Event Log would include a message similar to the following:

```
Route request over IPC to another web server process
PrivateSession=2; pid_self=28456; ipc_to_pid=28457;
```

Of course, if the web server routes a request for this session to P2, then no further routing is necessary in the Web Gateway environment.

If the Web Gateway is unable to connect and forward a request to a previously created IPC channel, one of the following messages is recorded to the Event Log (depending on the context):

```
IPC CLIENT: Error
Cannot connect
```

Or:

```
IPC CLIENT: Error
Cannot send request
```

This error may occur if Apache has closed or recycled a worker process. A worker process may also have crashed; in this case, the Apache error log would also record an error.

3.1 Prevent Apache Process Recycling

By default, Apache periodically recycles worker processes. Therefore, if you use state-aware sessions, configure Apache such that it doesn't recycle worker processes by configuring the installation as follows:

- Set the value of `MaxConnectionsPerChild` to zero
- Set the value of `MaxSpareThreads` to the same value as `MaxRequestWorkers`

If it is not possible to prevent Apache periodically recycling processes (perhaps as a result of a malfunctioning module) and state-aware sessions must be used, then an NSD based Gateway configuration can be used. An NSD-based architecture avoids the problems discussed above because it effectively separates the process management of the Web Gateway from the web server. Options for using the Web Gateway's network service daemon (NSD) are covered in Using the NSD on Microsoft Windows and Using the NSD on UNIX®, Linux, and macOS.