

# Jarvis Web Gateway

## Installation Instructions

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**Abstract:** The Jarvis Web Gateway is a lightweight web-service designed to give Rich Internet Applications a rapid, powerful and secure mechanism to access and update server-side databases. Jarvis can be configured to use Apache's "mod\_perl" for better performance than simple CGI.

Jarvis supports fetch, create, update and delete with additional support for custom plug-in features. Jarvis is based on the RESTful approach to http web services. It provides JSON, XML interfaces, with additional support for CSV and MS Excel downloads.

Jarvis works excellently with JavaScript web apps using ExtJS, Dojo and many other JS toolkits, and is also ideal for richer client applications such as those written in Adobe Flex.

Jarvis supports any database for which a Perl DBI driver exists. This include Oracle, PostgreSQL, MySQL, SQL Server, SQLite and more.

# Table of Contents

- 1 Licence.....3
  - 1.1 GNU Lesser General Public License.....3
  - 1.2 Clarification of Intentions.....3
- 2 Installation – Debian.....4
  - 2.1 Package.....4
  - 2.2 Install Additional Perl Modules.....4
  - 2.3 Apache Configuration – Without mod\_perl.....5
  - 2.4 Apache Configuration – With mod\_perl.....6
  - 2.5 Apache Configuration – With mod\_perl & Drupal.....6
- 3 Installation – Solaris.....7
  - 3.1 Package.....7
  - 3.2 Install Additional Perl Modules.....7
  - 3.3 Apache Configuration – Without mod\_perl.....8
  - 3.4 Apache Configuration – With mod\_perl.....8
  - 3.5 Apache Configuration – With mod\_perl & Drupal.....8
- 4 Apache Configuration & Testing.....10
  - 4.1 Web-Server.....10
  - 4.2 Apache Configuration – Without mod\_perl.....10
  - 4.3 Apache Configuration – With mod\_perl.....10
  - 4.4 Test.....11
- 5 Relocating Jarvis.....12
  - 5.1 Relocation.....12
- 6 Demo Application.....13
  - 6.1 Introduction.....13
  - 6.2 Complete Basic Jarvis Configuration.....13
  - 6.3 The Demo Database File.....13
  - 6.4 Configure Demo Web-Service.....13

## Version Tracking (Since v5.2.0):

Version	Date	By	Comment
5.2.0	21-Feb-2012	JXC	Add Solaris support. Separate Install/Demo/Tracker docs.
5.3.0	03-Apr-2012	HK	Tracker uses postgres database.
5.7.0	10-Apr-2014	JXC	Remove Tracker.
6.0.0	15-Apr-2014	JXC	Re-released with updated version number.
6.3.2	23-Sep-2016	JXC	Update installation details, especially dependencies.
6.3.3	23-Sep-2016	JXC	Make some dependencies optional.
6.3.4	27-Sep-2016	JXC	Add Time::HiRes, XML::Smart as CentOS dependency.
6.4	2-May-2018	JL	Noted changes to configuration files regarding demo.
6.4	10-Aug-2018	JXC	Added FastCGI configuration notes.
6.7	13-Jun-2019	JXC	Added MongoDB.
7.0.7	17-Jun-2021	JL	Version alignment.

# 1 Licence

## 1.1 GNU Lesser General Public License

This documentation is part of the Jarvis WebApp/Database gateway utility.

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Jarvis is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU Lesser General Public License along with Jarvis. If not, see <<http://www.gnu.org/licenses/>>.

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## 1.2 Clarification of Intentions

The intention of the releasing under the LGPL (rather than the GPL) is to provide additional freedom to allow you to develop Exec and Plugin modules.

Such Exec and Plugin modules are considered to be part of your “Application” and not part of Jarvis, and are thus excluded from the “Minimal Corresponding Source” under the terms of the agreement.

## 2 Installation – Debian

### 2.1 Package

Jarvis has support for Debian packages, suitable for Ubuntu and other popular Debian distributions.

The Jarvis Debian package can be installed with the dpkg command, e.g:

```
# dpkg --install jarvis_5.0.1-1_all.deb
```

**Note:** If pre-requisite Perl modules are not installed, this may fail to complete successfully. If this is the case, install the dependencies (which would be listed in the output of the “dpkg -install” command) via apt-get:

```
# apt-get -f install
```

This will install the necessary packaging automatically, along with completing the install of Jarvis.

The following directory locations will be populated:

Path	Notes
<b>/usr/share/jarvis/cgi-bin</b>	This contains <i>agent.pl</i> , which is the CGI script which accepts requests over http/https when not using mod_perl. This is a simple bootstrap program. Most of the functionality is in the lib/Jarvis/*.pm files in the lib directory.
<b>/usr/share/jarvis/demo</b>	Contains demo files which comprise a simple application showing how to use Jarvis with ExtJS and SQLite.
<b>/usr/share/doc/jarvis</b>	Documentation including this file.
<b>/usr/share/jarvis/htdocs</b>	This contains a helper JavaScript include file for use with ExtJS.
<b>/usr/share/jarvis/lib</b>	Contains the majority of the Jarvis functionality as Perl modules.
<b>/var/lib/jarvis</b>	Working directory for SQLite database files for Demo applications, also recommended location for CGI session files.
<b>/etc/jarvis</b>	Your application top-level configuration XML files will go here.
<b>/etc/jarvis/apache</b>	Apache configuration files.

## 2.2 Optional Dependencies

The following additional dependencies are required in specific cases.

REQUIRED (to run the demo application)

```
# apt-get install libdbd-sqlite3-perl
```

REQUIRED (if using mod\_perl)

```
# apt-get install libapache2-mod-perl2 \  
libapache2-dbi-perl libapache2-request-perl
```

REQUIRED (to use Login = Database, Authentication = 'eksblowfish')

```
# apt-get install libcrypt-eksblowfish-perl
```

REQUIRED (to use Login = LDAP or ActiveDirectory)

```
# apt-get install libnet-ldap-perl
```

REQUIRED (to use Login = OAuth2)

```
# apt-get install libjson-webtoken-perl libio-socket-ssl-perl libcrypt-ssleay-perl
```

REQUIRED (to use Jarvis database with type = "sdp", i.e. Microsoft SSAS)

```
# apt-get install libsoap-lite-perl
```

REQUIRED (to use Jarvis database with type = "mongo", i.e. MongoDB)

```
# apt-get install libmongodb-perl
```

REQUIRED (to use format=csv on requests)

```
# cpan install Text::CSV  
http://search.cpan.org/~makamaka/Text-CSV-1.33/
```

REQUIRED (to use format=xlsx on requests)

```
# cpan install Excel::Writer::XLSX  
http://search.cpan.org/~jmcnamara/Excel-Writer-XLSX-0.95/
```

Additional DB Drivers

```
# apt-get install libdbd-sybase-perl    (DB = SQL Server)  
# apt-get install libdbd-pg-perl      (DB = PostgreSQL)
```

## 2.3 Apache Configuration – FastCGI

FastCGI is the standard modern technology for efficient re-use of CGI applications.

To use FastCGI under apache, first install the “fcgid” module for Apache.

```
# apt-get install libapache2-mod-fcgid
# a2enmod cgi
# a2enmod fcgid (if not done automatically)
```

Enable the Apache configuration contained in “jarvis.conf”:

```
# cp /etc/jarvis/apache/jarvis.conf /etc/apache2/conf-available/jarvis.conf
# cd /etc/apache2/conf-enabled/
# ln -s ../conf-available/jarvis.conf .
```

Check the apache configuration file and if ensure that the “fast-agent.pl” script is being used.

```
ScriptAlias /jarvis-agent "/usr/share/jarvis/cgi-bin/fast-agent.pl"
Alias /jarvis/ "/usr/share/jarvis/htdocs/"
Alias /jarvis-demo/ "/usr/share/jarvis/demo/htdocs/"
```

If using Apache 2.4, you are likely to need to remove some restrictions. Firstly, grant access to the appropriate directory for Jarvis. In /etc/apache2/conf-available/jarvis.conf, add:

```
<Directory /usr/share/jarvis/>
Options FollowSymLinks
AllowOverride None
Require all granted
</Directory>
```

Restart the apache webserver:

```
# apache2ctl restart
```

## 2.4 Apache Configuration – Classic (Slow) CGI

If performance is not a significant factor, you can simply run Jarvis as a CGI script.

The Debian package performs this configuration automatically, with a soft link:

```
# cp /etc/jarvis/apache/jarvis.conf /etc/apache2/conf-available/jarvis.conf
# cd /etc/apache2/conf-enabled/
# ln -s ../conf-available/jarvis.conf .
```

The Apache instructions are as follows:

```
ScriptAlias /jarvis-agent "/usr/share/jarvis/cgi-bin/agent.pl"
Alias /jarvis/ "/usr/share/jarvis/htdocs/"
Alias /jarvis-demo/ "/usr/share/jarvis/demo/htdocs/"
```

If using Apache 2.4, you are likely to need to remove some restrictions. Firstly, grant access to the appropriate directory for Jarvis. In `/etc/apache2/conf-available/jarvis.conf`, add:

```
<Directory /usr/share/jarvis/>
Options FollowSymLinks
AllowOverride None
Require all granted
</Directory>
```

Secondly, CGI must be explicitly enabled:

```
# a2enmod cgi
```

You may need to restart the apache webserver:

```
# apache2ctl restart
```

## **2.5 Apache Configuration – With mod\_perl (Deprecated)**

Jarvis supports the Apache `mod_perl` mechanism. Without `mod_perl`, the webserver must compile and execute the Perl code for each request. Using Apache `mod_perl`, the script is compiled once.

Database connections can also be re-used, and performance is generally superior. See the `mod_perl` page at <http://perl.apache.org/> for further details.

Configuration is as follows:

```
# cd /etc/apache2/conf.d
# rm jarvis.conf
# ln -s /etc/jarvis/apache/jarvis-mod-perl.conf ./jarvis.conf
# apache2ctl restart
```

Note that `mod_perl` is deprecated, and not supported in new versions of Apache. You should use FastCGI instead.

## **2.6 Apache Configuration – With mod\_perl & Drupal**

Note that if you are co-hosting Jarvis on a server running drupal from the root path, you will probably need to exclude `jarvis-agent` from the drupal rewrite rule. E.g. something like the following needs to be added to `/usr/share/drupal6/.htaccess`.

```
RewriteCond %{REQUEST_URI} !^/jarvis-agent/
```

Otherwise you will find that Drupal attempts to handle your `jarvis-agent` requests. Note that this is only required when running with `mod_perl`. When running via a simple `ScriptAlias` (see below), Apache will give priority to the `Alias` match over the Drupal match, and the problem does not arise.

## 3 Installation – Red Hat and CentOS

### 3.1 Package

Jarvis is available in RPM package format compatible with most modern Red Hat-based distributions. The following instructions should be accurate for:

- Red Hat Enterprise 6.8, 7, and 8
- CentOS 6.8 & 7

For other distributions including earlier versions of Red Hat Enterprise or CentOS, you may need to install additional packages to resolve dependencies.

The Jarvis RPM package can be installed with the rpm command, e.g:

```
# sudo rpm -Uvh jarvis-6.0.10-1.noarch.rpm
```

This will likely fail due to dependencies, which can be resolved by following the instructions in the next section. Once installed, the following directory locations will be populated:

Path	Notes
<b>/usr/share/jarvis/cgi-bin</b>	This contains <i>agent.pl</i> , which is the CGI script which accepts requests over http/https when not using mod_perl. This is a simple bootstrap program. Most of the functionality is in the lib/Jarvis/*.pm files in the lib directory.
<b>/usr/share/jarvis/demo</b>	Contains demo files which comprise a simple application showing how to use Jarvis with ExtJS and SQLite.
<b>/usr/share/doc/jarvis</b>	Documentation including this file.
<b>/usr/share/jarvis/htdocs</b>	This contains a helper JavaScript include file for use with ExtJS.
<b>/usr/share/jarvis/lib</b>	Contains the majority of the Jarvis functionality as Perl modules.
<b>/etc/jarvis</b>	Your application top-level configuration XML files will go here.
<b>/etc/jarvis/apache</b>	Apache configuration files.

### 3.2 Mandatory Dependencies

You will need use the “yum” or “dnf” package managers to resolve the following mandatory dependencies (if they are not already installed).

```
# yum install httpd 'perl(CGI)' 'perl(CGI::Session)' 'perl(CGI::Cookie)' \  
  'perl(HTTP::Cookies)' 'perl(MIME::Types)' 'perl(DBI)' 'perl(JSON)' \  
  'perl(Digest::MD5)' 'perl(Time::HiRes)' 'perl(XML::LibXML)'
```

You will also need a package to provide 'perl(CGI::Session)', which can be retrieved from CPAN:

```
# cpan install CGI::Session  
https://metacpan.org/pod/CGI::Session
```



### 3.3 Optional Dependencies

The following additional dependencies are required in specific cases.

REQUIRED (to run the demo application)

```
# yum install 'perl(DBD::SQLite)'
```

REQUIRED (if using mod\_perl under CentOS 6.8)

```
# yum install mod_perl  
# cpan install Apache2::DBI
```

REQUIRED (if using mod\_perl under CentOS 7)

```
# yum install epel-release  
# yum install mod_perl  
# cpan install Apache2::DBI
```

REQUIRED (to use Login = Database, Authentication = 'eksblowfish')

```
# cpan install Crypt::Eksblowfish  
http://search.cpan.org/~zefram/Crypt-Eksblowfish/lib/Crypt/Eksblowfish.pm
```

REQUIRED (to use Login = LDAP or ActiveDirectory)

```
# yum install 'perl(Net::LDAP)'
```

REQUIRED (to use Login = OAuth2)

```
# yum install 'perl(JSON::XS)' 'perl(JSON::WebToken)'
```

REQUIRED (to use Jarvis database with type = "SDP", e.g. Microsoft SSAS)

```
# yum install 'perl(SOAP::Lite)'
```

REQUIRED (to use format=csv on requests)

```
# yum install 'perl(IO::String)'  
# cpan install Text::CSV  
http://search.cpan.org/~makamaka/Text-CSV-1.33/
```

REQUIRED (to use format=xlsx on requests)

```
# cpan install Excel::Writer::XLSX  
http://search.cpan.org/~jmcnamara/Excel-Writer-XLSX-0.95/
```

Additional DB Drivers (PostgreSQL)

```
# yum install 'perl(DBD::Pg)'
```

### 3.4 Apache Configuration – Without mod\_perl

If performance is not a significant factor, you can simply run Jarvis as a CGI script.

The RPM package performs this configuration automatically:

```
# cp /usr/share/jarvis/etc/jarvis/apache/jarvis.conf /etc/httpd/conf.d/jarvis.conf
```

If using Apache 2.4, you are likely to need to remove some restrictions. Firstly, grant access to the appropriate directory for Jarvis. In `/etc/apache2/conf-available/jarvis.conf`, add:

```
<Directory /usr/share/jarvis/>  
Options FollowSymLinks  
AllowOverride None  
Require all granted  
</Directory>
```

You may need to restart the apache webserver, and provide access to it remotely:

```
# sudo systemctl enable httpd.service  
# systemctl start httpd.service  
# firewall-cmd --permanent --zone=public --add-service=http  
# firewall-cmd --permanent --zone=public --add-service=https  
# firewall-cmd --reload
```

## 4 Apache Configuration & Testing

### 4.1 Web-Server

The final task is to configure your web-server to give access to the Jarvis application.

Jarvis is a Perl service, and can operate under any web-server which supports Perl scripts. These include Microsoft IIS, Apache HTTPD and others.

Documentation is provided here for Apache 2.0 or greater. It should be able to be adapted easily to any other web-server's configuration mechanism.

### 4.2 Apache Configuration – Without mod\_perl

If performance is not a significant factor, you can simply run Jarvis as a CGI script without using mod\_perl.

#### For Debian:

Under Debian, the package setup should be performed automatically. The package installation makes a soft link:

```
/etc/apache2/conf.d/jarvis.conf -> /etc/jarvis/apache/jarvis.conf
```

The Apache instructions are as follows:

```
ScriptAlias /jarvis-agent "/usr/share/jarvis/cgi-bin/agent.pl"  
#Alias /jarvis/ "/usr/share/jarvis/htdocs/"  
#Alias /jarvis-demo/ "/usr/share/jarvis/demo/htdocs/"
```

You may need to restart the apache webserver:

```
# apache2ctl restart
```

#### For Other Systems:

```
ScriptAlias /jarvis-agent "/opt/jarvis/cgi-bin/agent.pl"  
#Alias /jarvis/ "/opt/jarvis/htdocs/"
```

These lines are contained in the supplied "apache/jarvis.conf" file. Under Linux you can generally copy or soft-link this file into the /etc/apache2/conf.d directory.

### 4.3 Apache Configuration – With mod\_perl

Jarvis supports the Apache mod\_perl mechanism. Without mod\_perl, the webserver must compile and execute the Perl code for each request. Equally, without mod\_perl, a new database connection must be made for each request.

Using Apache's mod\_perl, the script is compiled once, and re-executed for each request. Database connections can also be re-used. The overhead for each request is greatly reduced. Refer to the mod\_perl home page (<http://perl.apache.org/>) for further details.

Once mod\_perl is configured and available, add the following lines to your server configuration.

Note: When installing the Debian package, this setup is done automatically.

### For Debian:

```
PerlRequire /etc/jarvis/apache/startup.pl
<Location ~ "/jarvis-agent/*">
  SetHandler perl-script
  PerlResponseHandler Jarvis::Agent
</Location>

#Alias /jarvis/ "/usr/share/jarvis/htdocs/"
```

### For Other Systems:

```
PerlRequire /opt/jarvis/etc/apache/startup.pl
<Location ~ "/jarvis-agent/*">
  SetHandler perl-script
  PerlResponseHandler Jarvis::Agent
</Location>

#Alias /jarvis/ "/opt/jarvis/htdocs/"
```

These lines are contained in the supplied "apache/jarvis-mod-perl.conf" file. Under Linux you can generally copy or soft-link this file into the /etc/apache2/conf.d directory.

Note that if you are co-hosting Jarvis on a server running drupal from the root path, you will probably need to exclude jarvis-agent from the drupal rewrite rule. E.g. something like the following needs to be added to /usr/share/drupal6/.htaccess.

```
RewriteCond %{REQUEST_URI} !^/jarvis-agent/
```

Otherwise you will find that Drupal attempts to handle your jarvis-agent requests. Note that this is only required when running with mod\_perl. When running via a simple ScriptAlias (see below), Apache will give priority to the Alias match over the Drupal match, and the problem does not arise.

## 4.4 Test

To test that Jarvis is correctly installed, point your browser at the installed machine (e.g. localhost) with the following URL.

```
http://localhost/jarvis-agent/
```

You should see the error response.

```
Missing path info. Send http://.../jarvis-agent/<app-name>/<dataset-name> in URI!
```

This indicates that Jarvis is installed, and is ready to be configured for an application.

## 5 Relocating Jarvis

### 5.1 Relocation

The standard packages install Jarvis into the default locations for your system. Typically, these packages should work “out of the box”. However, there are some cases where you may wish to install Jarvis into non-default locations. Specifically:

- When installing on a platform for which there is no standard Jarvis package.
- When installing a test system, or where multiple versions of Jarvis must co-exist.

If you install Jarvis into another location, then you must change the Jarvis installation paths in the following locations:

- **Modify the Apache configuration (as described in the Apache Configuration chapter).**
- **Modify the Jarvis module path in `etc/apache/startup.pl` (only if using `mod_perl`).**

The `startup.pl` script is a Perl fragment which tells `mod_perl` where to find the module containing the `mod_perl` handler for the Jarvis web service agent. When relocating Jarvis, modify the path to specify the new location of the Jarvis lib directory.

By default it contains the following.

```
use Apache::DBI;

use lib qw(/usr/share/jarvis/lib);    # For Debian.
use lib qw(/opt/jarvis/lib);         # For other systems.

1;
```

## 6 Demo Application

### 6.1 Introduction

A simple demonstration application is provided with Jarvis. This application uses an SQLite database. When installing the Debian packages, this demonstration is automatically configured and enabled and available under the address:

```
http://localhost/jarvis-demo/
```

The following instructions are required only when not using the Debian package of Jarvis.

### 6.2 Complete Basic Jarvis Configuration

First, ensure that Jarvis itself is available via the `/jarvis-agent/` URL. Access the following URL:

```
http://localhost/jarvis-agent/
```

Verify that you receive the response...

```
Missing app name. Send /jarvis-agent/<app>[/<dataset>[/<arg1>...]] in URI!
```

### 6.3 The Demo Database File

Take a copy of the database to a directory writable by the Apache user. For example:

```
# mkdir -p /var/lib/jarvis/demo/  
# cp /opt/jarvis/demo/db/demo-empty.db /var/lib/jarvis/demo/demo.db  
# chown www-data:www-data /var/lib/jarvis/demo/demo.db
```

If this is not done correctly, you will see the error “Attempt to write to a read-only database” when saving changes via the demo screen.

### 6.4 Configure Demo Web-Service

Install the `demo.xml` Jarvis application configuration file:

```
# cp /opt/jarvis/demo/etc/demo.xml /opt/jarvis/etc/demo.xml
```

In Apache configuration uncomment the alias to the Jarvis demo htdocs:

```
Alias /jarvis-demo/ "/opt/jarvis/demo/htdocs/"
```

and the `/jarvis/` support files:

```
Alias /jarvis/ "/opt/jarvis/htdocs/"
```

Change the default values configured in `demo.xml` to match your installation:

- Location of the demo database file. Default is `/var/lib/jarvis/demo/demo.db`.
- Location of the datasets configuration. Default is `/usr/share/jarvis/demo/dataset`.
- Location of the session files. Default is `/var/lib/jarvis/demo/sessions`.
- Location of the plugin file. Default is `/usr/share/jarvis/demo`.