



BEL Framework V1.2 Production Deployment Guide

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Introduction

This document describes the deployment of the BEL Framework V1 in production environment. The BEL Framework V1 includes the following components:

- BEL Workbench
- BEL Framework Compiler/Assembler
- BEL Framework Tools
- BEL Framework API, and
- BEL Framework Web API.

Refer to the BEL Framework V1.2 Getting Started Guide for system requirements and installation instructions. When deploying the BEL Framework in production environment, additional considerations must be taken into account.

Version Changes

Version 1.2 of the BEL Framework includes changes to the KAMs and how KAMs are stored and Version 1.2 KAMs are no longer backwardly compatible to earlier versions. Existing KAMs will need to be rebuilt and any existing KAM schemas removed and re-created.

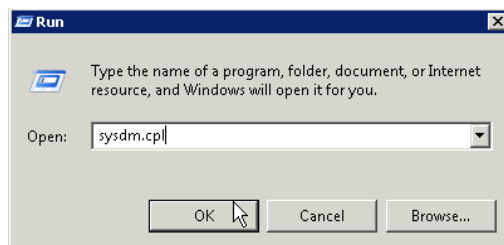
Environment Variable

The BELFRAMEWORK_HOME environment variable is required for proper functions of all command-line tools and web applications in the BEL Framework. This environment variable should be set to the location that contains the BEL Framework configuration folder. In most cases, this location is the BEL Framework installation directory. For example, if you have installed the BEL Framework in /opt/belframework, BELFRAMEWORK_HOME should be set to /opt/belframework.

Environment Variables in Windows

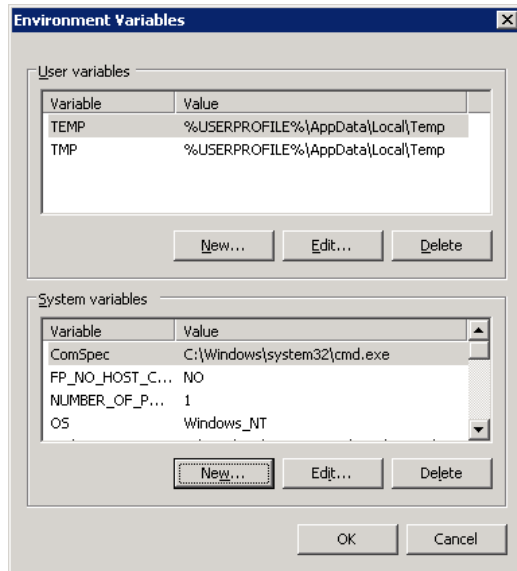
On Microsoft Windows operating systems, BELFRAMEWORK_HOME can be set as a system environment variable. To set up a system environment variable, administrative rights on the server is required. The following procedures assume the BEL Framework is installed in C:\BELFramework and set a system environment variable to that location:

- Click on the **Start** button on the task bar.
- Select **Run...**

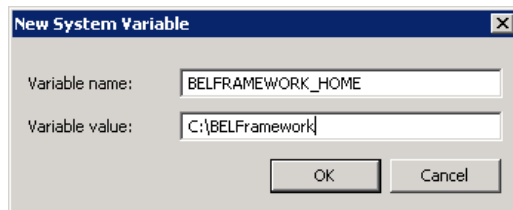


- Type `sysdm.cpl` and click **OK**
- Click on the **Advanced** tab
- Click the **Environment Variables...** button

- A new dialog comes up, click the **New...** button under System variables.



- Type BELFRAMEWORK_HOME as the variable name.
- Type C:\BELFramework as the variable value.



- Click **OK** to close the New System Variable dialog.
- Click **OK** again to close the Environment Variables dialog.
- You may need to restart your computer for this new system variable to be visible to all processes.

Environment Variables in Linux

On Linux operating systems, the BELFRAMEWORK_HOME environment variable can be set in the user's profile. If the script needs to be run unattended by a scheduler, create a wrapper script to set the environment variable before calling any of the BEL Framework tools.

The following example script sets the BELFRAMEWORK_HOME environment variable to /opt/belframework and the calls the KamSummarizer command-line tool:

```
#!/bin/bash
export BELFRAMEWORK_HOME=/opt/belframework
$BELFRAMEWORK_HOME/tools/KamSummarizer.sh "$@"
```

Database Support

The BEL Framework is preconfigured to use an embedded database to store BEL Documents and Knowledge Assembly Models (KAMs). For performance and scalability reasons, the embedded database option is not recommended for any production deployment. To deploy the BEL Framework in a production environment, choose from one of the following databases:

- MySQL Database Server 5.x
- Oracle Database Server 11g

Refer to the BEL Framework V1.0 System Configuration Guide for additional information on configuring the above databases.

Application Server Support

The BEL Framework comes bundled with Apache Tomcat Server 6.0.32. The web applications are packaged as standard J2EE application web archives (WARs). They are designed to work with any J2EE application servers, but they are only tested under Apache Tomcat.

If you decide to run Apache Tomcat as your production application server, download the appropriate binary distribution for your operating system from the Apache Tomcat website (<http://tomcat.apache.org>). Refer to the Apache Tomcat documentation for installation instructions.

Shared Libraries

A supported database driver is required for running the web applications in the BEL Framework. Copy the following file to your application server's shared libraries folder. For Apache Tomcat, this folder is <Tomcat Installation Directory>/lib

MySQL Database Server Driver	<BEL Framework Installation Directory>/server/tomcat/lib/mysql-connector-java-5.1.15.jar
Oracle Database Server Driver	<BEL Framework Installation Directory>/server/tomcat/lib/ojdbc6-11.2.0.2.0.jar

Deploying Web Applications

The BEL Framework includes the following web applications:

BELWorkbench	<BEL Framework Installation Directory>/server/war/BELWorkbench.war
BELFrameworkWebAPI	<BEL Framework Installation Directory>/server/war/BELFrameworkWebAPI.war

These applications are packaged as a standard J2EE WAR files. Refer to your application server's documentation for instructions to deploy WAR files. For Apache Tomcat, simply copy the WAR files to the web applications directory. By default this is <Tomcat Installation Directory>/webapps.

Memory Allocation

The application server must be configured with the proper Java heap memory allocation. The actual amount of memory required depends on the size of the BEL Document and KAM objects. Refer to the BELFramework V1.0 System Configuration Guide for more information.

Security

The BEL Framework configuration directory (<BELFRAMEWORK_HOME>/config) contains sensitive database login and encryption key information. Access to the configuration file should be limited by file system permissions.

The following table lists the recommended file system access permission for the BEL Framework Configuration folder:

User	Description	Recommended Permission
Administrator	Administrator of the server	READ, WRITE
Application Server User	User account used to run the web application server	READ
Scheduler User	User account used to run the scheduled command-line tools	READ
Other Users	All other users	NONE

Additional Information

This section provides additional information that might be helpful to you.

Obtaining Technical Support

Technical support is available by phone or email during normal business hours (8am to 5pm EST).

Email Support

Send an email to support@belframework.org. Please make sure to include your name, a phone number where you can be reached, and details about the issue.

Phone Support

Please call Selventa's technical support line at (617) 851-5273 during normal support hours.

Learning More About Selventa's Software and Services

For all sales and other inquiries, please contact:

Louis Latino
EVP Sales and Marketing
One Alewife Center,
Cambridge MA 02140

Phone: (617) 547-5421 x237

Email: llatino@selventa.com