



Caché Installation Guide

Version 2009.1

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About This Book

Caché runs on several different platforms. Please check the [Supported Platforms](#) document to verify if Caché runs on your particular version of the supported operating systems.

The *Caché Installation Guide* contains the following chapters and related appendixes.

If you are upgrading from Caché version 5.1 or later, read the following chapter for a list of pre-installation upgrade tasks:

- [Upgrading Caché](#)

Install Caché following the instructions in the appropriate platform-specific installation chapter:

- [Installing Caché on Microsoft Windows](#)
- [Installing Caché on OpenVMS](#)
- [Installing Caché on UNIX and Linux](#)
- [Installing Caché on Mac](#)

Before installing, review the material in the appropriate platform-specific appendix for setting operating system parameters:

- [Calculating Caché System Parameters for OpenVMS](#)
- [Calculating Caché System Parameters for UNIX and Linux](#)

You may need to read the following appendixes before you install Caché if they apply to your environment:

- “[Using the Caché Installation Parameter File on UNIX and Linux](#)” shows in detail the contents of the parameter file generated during a UNIX-based installation.
- “[Preparing for Caché Advanced Security](#)” explains important details about using the Kerberos authentication method that you should be familiar with before installing Caché.

Note: The InterSystems products Caché and Ensemble share similar underlying technologies. Both products use the instructions in this book for installation. However, there are additional tasks for Ensemble, especially after the initial software installation is complete. Consult the [Ensemble Release Notes](#) for an overview of these tasks before beginning an Ensemble installation.

Default Caché Installation Directory

This release of Caché currently uses the following defaults for the installation directory:

Operating System	Directory
Microsoft Windows	C:\InterSystems\Cache (or Cache <i>N</i> when multiple instances exist)
Caché RPM kit	/usr/cachesys
UNIX-based	No default; you must enter the destination
OpenVMS	No default; you must enter the destination

Throughout the documentation this install directory is referred to as *install-dir*.

For detailed information, see the [Table of Contents](#).

For general information, see [Using InterSystems Documentation](#).

1

Upgrading Caché

This chapter is intended for customers who are upgrading from Caché release 5.1 and later. Topics in this document include:

- [Supported Upgrade Paths](#)
- [Upgrade Tasks](#)

Important: Before upgrading, review the [Caché Upgrade Checklists](#) for issues that may apply to your site and [Supported Platforms](#) for up-to-date information about supported technologies.

1.1 Supported Upgrade Paths

Direct Upgrades

The following *direct upgrade* paths to Caché 2009.1 are supported:

- Caché 2009.1.x
- Caché 2008.2.x
- Caché 2008.1.x
- Caché 2007.1.x
- Caché 5.2.x
- Caché 5.1.x

You may upgrade directly to this release of Caché from release 5.1 or above without converting existing databases.

For upgrading from earlier versions, contact the [InterSystems Worldwide Response Center](#) (WRC).

1.2 Upgrade Tasks

The following upgrade tasks are necessary regardless of the platform on which you are upgrading and running Caché. Perform these tasks before you run the Caché installation procedures:

1. *Obtain an updated license key* — the key structure changed in Caché 5.1; upgrades from Caché 5.0 or earlier require an updated key.
2. *Backup system* — before upgrading, InterSystems recommends that you run a complete backup of your system. Use your customary full operating system backup procedures.
3. *Check system integrity* — run a system integrity check on existing directories to ensure there is no corruption in any of the databases.
4. *Save custom routines and globals* — to prevent your own routines and globals in the %SYS namespace from being affected by the upgrade installation, ensure that they have names that begin with “Z”, “z”, “%Z”, or “%z”. All .int and .obj routines (except for Z*, z*, %Z*, and %z*) are deleted from the %SYS namespace when upgrading.

On an upgrade, the CACHELIB, CACHETEMP, DOCBOOK, and SAMPLES databases are completely replaced.

Any .mac or .inc routines are not affected during the upgrade.

5. *Save user files* — additional files and directories are also deleted or replaced during an upgrade. It is safest to have all your user files in the \Devuser directory or any subdirectories named \User under the Caché installation directory.
6. *Remove PIJ file (OpenVMS clusters only)* — If you are upgrading a member of a Caché OpenVMS cluster system, cleanly shut down all members of the Caché cluster and remove the CACHE.PIJ file. If you do not remove this file, the installation is not upgraded and error messages, such as the following, are written in the cconsole.log for startup:

```
Cache (2100036c) Tue Aug 1 14:28:59 2007
Activating Namespaces
Cache (21000404) Tue Aug 1 14:28:59 2007 Cluster image journal
is incompatible with this version
Cache (21000404) Tue Aug 1 14:28:59 2007 Unable to join the cluster
Cache (21000404) Tue Aug 1 14:29:00 2007
ENQdaemon exited due to VMS error code (decimal) 0
```

1.2.1 Other Upgrade Considerations

There are other tasks that may be necessary depending on your environment and the components you use:

- *Upgrade CSP Gateway* — If your CSP Gateway is on a separate machine from the Caché server you are upgrading, you must also upgrade the CSP Gateway on that separate machine. You accomplish this by performing a custom Caché install (see the [CSP Gateway Installation](#) section of the “Installing Caché on Microsoft Windows” chapter of this guide) on your Web server machine and choosing only to install the CSP Gateway. See the “[Connecting to Remote Servers](#)” chapter of the *Caché System Administration Guide* for details.
- *Upgrade Studio Clients* — The Caché Studio version on a client must be the same or later than the Caché server version to which it connects.

1.2.2 Post-installation Upgrade Tasks

After upgrading Caché, perform the following tasks:

- *Recompile Objects* — you must recompile all Caché Objects applications in all namespaces by running the following command:

```
Do $system.OBJ.CompileAllNamespaces("u")
```

Note: This method both upgrades and compiles the class dictionaries in every namespace.

- *Regenerate Proxy Classes* — you must regenerate any proxy classes you had generated in the upgraded instance by following the instructions in the appropriate guides in the [Caché Language Bindings](#) set.

2

Installing Caché on Microsoft Windows

This chapter describes how to install Caché on a Microsoft Windows system. It assumes you are familiar with Windows directory structures, utilities, and commands. This chapter contains the following major sections:

- [Installation Requirements](#)
- [Caché Upgrade Installation](#)
- [Caché Installation](#)
- [Post-installation Tasks](#)
- [Special Considerations](#)

2.1 Installation Requirements

You must have administrator privileges to install Caché regardless of the type of installation.

The following sections describe the hardware and software requirements for new and upgrade installations of Caché.

2.1.1 Disk Space Requirements

A Caché installation that includes support for Caché Server Pages (CSP) uses approximately 550 MB (megabytes) of disk storage (not including disk space for user data). You must have 10 MB additional disk space free on your Windows system disk for installation.

Your system must have access to a DVD drive for installation, either attached to your computer or available across a network.

Any system that can effectively support Windows should be sufficiently powerful to run Caché. Caché performance greatly improves with increased processor and disk speed.

2.1.2 Supported Platforms and Web Servers

The latest version of Caché is supported on the following versions of the Microsoft Windows operating system:

- Windows 7 — 32-bit and 64-bit versions
- Windows Vista — 32-bit and 64-bit versions
- Windows Server 2008 — 32-bit, 64-bit, and Itanium versions
- Windows Server 2003 — 32-bit, 64-bit, and Itanium versions
- Windows XP Pro
- Windows 2000

Note: For up-to-date information about supported technologies, see [Supported Technologies](#) in *Supported Platforms*.

The CSP technology is supported on the Microsoft IIS Web server and on the Apache Web server, versions 2.0 and 2.2.

If you are using CSP, install the Web server before installing Caché to let Caché configure the Web server automatically. See the “[CSP Configuration](#)” chapter of the *Using Caché Server Pages* guide for more information.

With each instance, Caché installs a private Apache Web server and a private CSP Gateway to serve CSP pages to ensure proper operation of the System Management Portal and the Caché Online Documentation. Its Windows service name is “Web Server for *instname*” where *instname* is the instance name you enter when you install Caché. Caché installs the Web server into the *install-dir*\httpd directory, where *install-dir* is the Caché installation directory. It is uninstalled when you uninstall the corresponding Caché instance.

If you are installing Caché from a network, first copy the entire contents of the DVD to the network drive. Map the network drive to a particular drive letter by clicking **Map Network Drive** from the **Tools** menu in Windows Explorer.

2.1.3 Supported Upgrade Paths and Procedures

If you are performing an upgrade, first read and perform all necessary procedures described in the “[Upgrading Caché](#)” chapter of this guide.

When upgrading, back up your old Caché installation after completing all the pre-installation upgrade tasks and before installing Caché.

2.1.4 Installation Directory Restrictions

You *cannot* install Caché into a destination directory that has any of the following characteristics:

- It has a caret (^) in the pathname.
- It has a character that is not in the US ASCII character set.
- It is at the root level of a drive (such as C:\).
- It is anywhere under the \Program Files directory.

You can find the current default directory in the [Default Caché Installation Directory](#) section of the “Introduction” to this guide.

2.2 Caché Upgrade Installation

The steps for upgrading each type of a Caché installation are the same. The upgrade installation procedure installs the required components for the selected setup type on the computer.

To perform a installation follow these steps:

1. Stop any running Caché server on the computer. Also, close all other Windows applications and shut down the Web server if it is installed on the same computer. For a DVD installation, load the software DVD into your DVD drive. For a network installation, ensure that you have access to the files.
2. The DVD should autoloading; if it does not, click **Start** and click **Run** from the menu. In the **Open** text box of the **Run** dialog box, enter:

```
[drive]:\nt\setup.exe
```

where *[drive]* is the letter of your DVD drive. Click **OK** to start the Caché InstallShield Wizard.

3. If other Caché instances exist on this machine, the **Select Instance** dialog box lists the following:
 - a. **<instance_name and version>** — Displays a list of existing installation directories if there are other instances of Caché installed on the machine so that you can select the instance you want to upgrade.
 - b. **New Instance** — Lets you install a new Caché instance. Continue with [Installing Caché](#).

Note: This dialog box displays only if other instances of Caché are installed on the machine; otherwise, the installation procedure bypasses this dialog box and lets you install a new instance of Caché.

4. The **Welcome to the Caché Installation** dialog box displays the following buttons to let you control the upgrade:
 - Optionally, click **Customize** to add or remove components during the installation upgrade. For more information, see [Caché Custom Installation](#).

Note: When you upgrade a previously-installed instance of Caché, the installer retains all configuration settings unless you customize them.

 - Click **Update** to continue to the next dialog box whether or not you have customized the installation.
5. The **InstallShield Wizard Complete** dialog box indicates the installation has completed successfully. Click **Finish**.

2.3 Caché Installation

The steps for installing each type of a Caché configuration are fundamentally the same, but diverge slightly depending on the type of installation. The differences are detailed in subsections after the standard installation description.

Important: Do not install two instances of Caché at the same time on the same machine.

2.3.1 Installing Caché

The installation procedure installs the required components for the selected setup type on the computer. To perform an installation follow these steps:

1. For a DVD installation, load the software DVD into your DVD drive. For a network installation, ensure that you have access to the files.

2. The DVD should autoloading; if it does not, click **Start** and click **Run** from the menu. In the **Open** text box of the **Run** dialog box, enter:

```
[drive]:\nt\setup.exe
```

where *[drive]* is the letter of your DVD drive. Click **OK** to start the Caché InstallShield Wizard.

3. The Caché setup begins. Within setup, the following buttons are activated to let you control the installation:
 - Click **Next** to continue to the next dialog box.
 - Click **Back** to go back to a previous dialog box and change what you have entered.
 - Click **Cancel** to stop the installation.
4. If other Caché instances exist on this computer, the **Select Instance** dialog box lists the following:
 - a. **<instance_name and version>** — Displays a list of existing installation directories if there are other instances of Caché installed on the computer so that you can select the instance you want to upgrade. To upgrade an existing instance, continue with [Caché Upgrade Installation](#).
 - b. **New Instance** — Lets you install a new Caché instance.

Note: This dialog box displays only if other instances of Caché are installed on the computer; otherwise, the installation procedure bypasses this dialog box and continues with the next step.

5. If you are installing a new instance of Caché on this computer, setup displays the **License Agreement** dialog box. Click **I accept the terms in the license agreement** radio button to confirm that you accept the license agreement.

Note: This dialog box displays only if you are installing a new instances of Caché on the computer. If you do not accept the license agreement, only the **Cancel** button is active.

6. The **Caché Instance Name** dialog box lets you assign a name to the new instance you are installing. The default name is CACHE (or if other instances exist CACHE*n*, where *n* is the number of Caché instances including this new one). Accept the default or enter another name. Subsequent updates to this instance maintain the instance name you enter here.
7. The **Destination Folder** dialog box lets you select a destination directory for the Caché software for the new instance; the default location is C:\InterSystems\Cache (or Cache*n* when multiple instances exist).

You can select or create a directory by clicking **Change**. If the specified directory does not exist, setup lets you create it.

8. The **Setup Type** dialog box lets you specify how you intend to use Caché:

- **Development** — Installs the Caché Database Engine (Samples Database, User Database, SQL Gateway, Server Monitoring Tools), Caché Studio, all supported language bindings, and xDBC (ODBC and JDBC) drivers. Select this option if you plan to use this instance to perform both client and server tasks. See the [Caché Development Installation](#) section for details.

Note: For Ensemble and HealthShare only, the **Development** Setup Type also installs the EnsDemo Database.

- **Server** — Installs Caché Database Engine (Samples database, User database, SQL Gateway, Server monitoring tools) and CSP Gateway. Select this option if you plan to use this instance as a Caché database server which can be accessed by Caché clients. See the [Caché Server Installation](#) section for details.

Note: For Ensemble and HealthShare only, the **Server** Setup Type also installs the EnsDemo Database.

- **Client** — Installs the Caché Studio and xDBC (ODBC and JDBC) drivers. Select this option if you plan to use this instance as a client to a Caché database server on this or another computer. See the [Caché Client Installation](#) section for details.
- **Web Server** — Installs CSP Gateway (IIS, Apache 2.0, Apache 2.2). Select this option if you want to install only those parts of Caché that are required on a CSP gateway machine. See the [Web Server Installation](#) section for information about installing the CSP Gateway.
- **Custom** — Installs/uninstalls specific components. Select this option if you to install or remove specific Caché components. See the [Caché Custom Installation](#) section for details.

The following table identifies which component groups are installed for each setup type. There is also a **Custom** setup type, which lets you specify which component groups/components to install or remove; see the [Caché Custom Installation](#) section of this guide:

Components Installed by Setup Type

Component Group	Components	Devel	Srvr	Client	Web
Caché Database Engine (Caché Server)	Server Monitoring Tools Samples database User database SQL Gateway	X	X		
Caché Launcher (cube)		X	X	X	
Caché Studio		X		X	

Component Group	Components	Devel	Srvr	Client	Web
xDBC	ODBC Driver Java Database Connectivity	X		X	
Caché Application Development	ActiveX Connectivity C++ Binding for Caché Light C++ Binding Java Binding for Caché C++ SDK for Caché Caché Engine Link Libraries Perl Binding for Caché ¹ Python Binding for Caché ¹ .NET Binding for Caché Threaded Server Libraries Other Samples)	X			
Documentation	PDF Documentation Online Documentation	X	X		
Web Server Gateway (CSP)	CSP for IIS CSP for Apache 2.0.x CSP for Apache 2.2.x		X		X

¹ This component is supported only on the x86-32 bit platform.

2.3.2 Caché Development Installation

If you wish, you can install only the components of Caché that are required on a development machine, as described in the [Caché Installation](#) section in this chapter.

To perform a development installation:

1. Follow the [Caché Installation](#) procedure.

Note: This procedure assumes you selected the **Development** button in the **Setup Type** dialog box.

2. The **Ready to Install** dialog box lets you review the installation name, type, and destination directory for the software files.

Note: **Enter License** check box — If you do not have a Caché license key installed on your computer (that is, there is no `cache.key` file in the system manager's directory), the **Enter License** dialog box explains that a key was not detected and asks if you want to enter a license key during the installation:

- To continue without entering a license key, clear the check box. You can update your license information at another time by using the System Management Portal from the **[Home] > [Licensing] > [License Key]** page.
- To open the Caché License Wizard, select the check box. See the [Updating the License Key](#) section of the “Managing Caché Licensing” chapter of the *Caché System Administration Guide* for details about entering InterSystems Caché licensing information.

Click **Install** to continue. Setup installs Caché in the selected directory.

3. The **InstallShield Wizard Complete** dialog box indicates the installation has completed successfully. Choose whether you want to see the *Getting Started* page and click **Finish**.

After Caché is installed, the **Caché Cube** icon appears in the system tray area of the Windows tool bar. Click the cube to bring up the Caché menu. In addition, there is a **Caché** item on the Windows **Programs** menu.

For Windows servers, the installation names the Caché Windows service “*instname*,” using the name from the **Define Caché Instance Name** dialog box. The service is set up to start automatically as a Windows service when you start your server.

You may change the **Start Caché on System Boot** setting from the **[Home] > [Configuration] > [Memory and Startup]** page of the System Management Portal (available from the **Caché Cube**). If this instance is part of a Windows cluster, you must clear the check box to prevent automatic startup, allowing the cluster manager to start Caché.

In addition, you can change the preferred server for this instance of Caché. This procedure is described in the [Define a Remote Server Connection](#) section of the “Connecting to Remote Servers” chapter of the *Caché System Administration Guide*.

2.3.3 Caché Server Installation

If you wish, you can install only the components of Caché that are required on a server machine, as described in the [Caché Installation](#) section in this chapter.

To perform a server installation:

1. Follow the [Caché Installation](#) procedure.

Note: This procedure assumes you selected the **Server** button in the **Setup Type** dialog box.

2. The **Install Unicode Support** dialog box lets you select either 8-bit or Unicode support for your installation (the default depends on your operating system locale):

- **8-bit** — The software handles characters in an 8-bit format.
- **Unicode** — The software handles characters in the Unicode (16-bit) format. Select Unicode if your application uses languages that store data in a Unicode format, such as Japanese.

InterSystems recommends 8-bit character support for locales based upon the Latin-1 character set, ISO 8859–1. Use Unicode if the base character set for your locale is not Latin-1, or if you plan to have data from locales based upon a different character set. If you use an 8-bit version of Caché, your data is not portable to 8-bit locales based on a different character set.

CAUTION: If you choose a Unicode installation, you cannot revert to an 8-bit version without potential data loss. This is because an 8-bit version of Caché cannot retrieve 16-bit character data from a database.

3. The **Initial Security Settings** dialog box lets you decide how restrictive you want the initial Caché security settings to be. If you choose **Minimal**, the installation continues with the next step.

Important: If you select **Minimal** for your initial security setting, but Caché requires network access to shared drives and printers, you must manually change the Windows user account under which to run the Caché service, choosing an existing account or creating a new account that has local administrator privileges on the server machine.

If you select **Normal** or **Locked Down**, it displays **Enter Credentials for Caché Service**, where you can choose to run Caché service under:

- The default system account, which runs Caché as the Windows Local System account.
- Defined Windows user account. The installation creates a Caché account with the %All role for the user who is installing Caché to grant that user access to services necessary to administer Caché. Enter and confirm the password for this account. The password must meet the criteria corresponding to the security setting.

Important: If you are using Kerberos, you must enter a defined account that you have set up to run the Caché service. InterSystems recommends that you use a separate account specifically set up for this purpose.

When you click **Next**, the installation verifies the following if you enter a defined user account:

- The account exists on the domain.
- You have supplied the correct password.
- The account has local administrator privileges on the server machine.

CAUTION: If you are installing on Windows Vista, before entering the account verify that it has local administrator privileges. Currently, the installation procedure cannot check this on the Vista platform.

For a detailed explanation of these settings, see the [Initial Caché Security Settings](#) section of the “Preparing for Caché Advanced Security” appendix of this guide.

4. The **Ready to Install** dialog box lets you review the installation name, type, and destination directory for the software files.

Note: **Enter License** check box — If you do not have a Caché license key installed on your computer (that is, there is no `cache.key` file in the system manager’s directory), the **Enter License** dialog box explains that a key was not detected and asks if you want to enter a license key during the installation:

- To continue without entering a license key, clear the check box. You can update your license information at another time by using the System Management Portal from the **[Home] > [Licensing] > [License Key]** page.
- To open the Caché License Wizard, select the check box. See the [Updating the License Key](#) section of the “Managing Caché Licensing” chapter of the *Caché System Administration Guide* for details about entering InterSystems Caché licensing information.

Click **Install** to continue. Setup installs Caché in the selected directory.

5. The **InstallShield Wizard Complete** dialog box indicates the installation has completed successfully. Choose whether you want to see the *Getting Started* page and click **Finish**.

After Caché is installed, the **Caché Cube** icon appears in the system tray area of the Windows tool bar. Click the cube to bring up the Caché menu. In addition, there is a **Caché** item on the Windows **Programs** menu.

For Windows servers, the installation names the Caché Windows service “*instname*,” using the name from the **Define Caché Instance Name** dialog box. The service is set up to start automatically as a Windows service when you start your server.

You may change the **Start Caché on System Boot** setting from the **[Home] > [Configuration] > [Memory and Startup]** page of the System Management Portal (available from the **Caché Cube**). If this instance

is part of a Windows cluster, you must clear the check box to prevent automatic startup, allowing the cluster manager to start Caché.

In addition, you can change the preferred server for this instance of Caché. This procedure is described in the [Define a Remote Server Connection](#) section of the “Connecting to Remote Servers” chapter of the *Caché System Administration Guide*.

2.3.4 Caché Client Installation

If you wish, you can install only those parts of Caché that are required on a client machine, as described in the [Caché Installation](#) section in this chapter.

To perform a client installation:

1. Follow the [Caché Installation](#) procedure.

Note: This procedure assumes you selected the **Client** button in the **Setup Type** dialog box.

2. The **Ready to Install** dialog box lets you review the installation name, type, and destination directory for the software files.

Click **Install** to continue. Setup installs Caché in the selected directory.

3. The **InstallShield Wizard Complete** dialog box indicates the installation has completed successfully. Click **Finish**.

After Caché is installed on a client, the **Caché Cube** icon appears in the system tray area of the Windows tool bar; it appears dimmed because there is no Caché server running.

Important: Before you can use the client, you must specify the preferred server for this client; this procedure is described in the [Define a Remote Server Connection](#) section of the “Connecting to Remote Servers” chapter of the *Caché System Administration Guide*.

2.3.5 Web Server Installation

If you wish, you can install only those parts of Caché that are required on a CSP gateway machine, as described in the [Caché Installation](#) section in this chapter.

To perform a CSP gateway installation:

1. Follow the [Caché Installation](#) procedure.

Note: This procedure assumes you selected the **Web Server** button in the **Setup Type** dialog box.

2. The **Ready to Install** dialog box lets you review the installation name, type, and destination directory for the software files.

Click **Install** to continue. Setup installs Caché in the selected directory.

3. The **InstallShield Wizard Complete** dialog box indicates the installation has completed successfully. Click **Finish**.

If you are installing the Web Server Gateway (CSP Gateway) and a Web server is running, a dialog box appears asking if you want to stop the Web server. If you click **Yes**, the installation procedure stops the server, installs the CSP Gateway, and restarts the server. If you click **No**, the procedure does not configure the CSP Gateway for the Web server; it only installs the private CSP gateway for the private Apache Web server included with Caché.

The installation detects two types of Web servers and presents options to automatically configure them for the CSP Gateway. If detected, a check box for each of the following is presented:

- CSP IIS
- CSP for Apache 2.x

If you select any of these options, Caché installs the main CSP Gateway and configures the corresponding Web server to work with the CSP Gateway. If you select the CSP Gateway component, but clear all these options, it installs all the files required for the CSP Gateway, but does not change the Web server configurations. You can change the configurations manually after installation from the CSP Gateway application.

If you select all available check boxes, Caché installs the main CSP Gateway and configures each Web server. The CSP Gateway configures the following application paths pointing to the server configured for this instance:

- /
- /csp
- /Cache (instance name)

CAUTION: Installing the CSP Gateway overlays any changes you previously made in the CSP Gateway configuration and selecting the Web server option overlays changes in the Web server configuration. In particular, it overlays any previous configuration for / and /csp.

Caché always installs the private Apache Web server with a private CSP gateway on the selected Web server port for serving the System Management Portal and the online documentation.

2.3.6 Caché Custom Installation

The Caché installation program allows you to select certain Caché components to install on the computer. For example, you may want to install only the Web Server (CSP) Gateway. Keep in mind that some selections require that you also install other components.

To perform a Caché custom installation:

1. Follow the [Caché Installation](#) procedure.

Note: This procedure assumes you selected the **Custom** button in the **Setup Type** dialog box.

2. In the **Custom Setup** dialog box, select the components you want to install as described in the [Components Installed by Setup Type](#) table.

Important: If you are custom-installing the Caché Database Engine (Caché Server) component group or any of its components, ActiveX Connectivity (included in the Caché Application Development component group) is a prerequisite.

If you are custom-installing the Documentation component group or any of its components, the Caché Database Engine (Caché Server) component group is a prerequisite.

Note: You can remove previously-installed components by selecting the **X** menu item for any component group or component.

3. Optionally, you can click the **Space** button to ensure that there is enough space on the disk for the selected components.
4. The **Install Unicode Support** dialog box lets you select either 8-bit or Unicode support for your installation (the default depends on your operating system locale):

- **8-bit** — The software handles characters in an 8-bit format.
- **Unicode** — The software handles characters in the Unicode (16-bit) format. Select Unicode if your application uses languages that store data in a Unicode format, such as Japanese.

InterSystems recommends 8-bit character support for locales based upon the Latin-1 character set, ISO 8859–1. Use Unicode if the base character set for your locale is not Latin-1, or if you plan to have data from locales based upon a different character set. If you use an 8-bit version of Caché, your data is not portable to 8-bit locales based on a different character set.

CAUTION: If you choose a Unicode installation, you cannot revert to an 8-bit version without potential data loss. This is because an 8-bit version of Caché cannot retrieve 16-bit character data from a database.

5. The **Enter Port Numbers** lets you change the port numbers assigned by Caché.

Note: You cannot enter a port number greater than 65535 or less than 1. For information about setting port numbers, see [Set Port Numbers](#) in the “Using Multiple Instances of Caché” chapter of the *Caché System Administration Guide*.

The following port numbers are valid for your Caché instance:

- SuperServer Port Number — 1972 or the first available subsequent number equal to or higher than 56773; you can change the SuperServer port value after installation from the **[Home] > [Configuration] > [Memory and Startup]** page of the System Management Portal.
 - WebServerPort number — 57772 or the first available subsequent number; you can change the WebServerPort values after installation from the **[Home] > [Configuration] > [Startup Settings]** page of the System Management Portal.
6. The **Initial Security Settings** dialog box lets you decide how restrictive you want the initial Caché security settings to be. If you choose **Minimal**, the installation continues with the next step.

Important: If you select **Minimal** for your initial security setting, but Caché requires network access to shared drives and printers, you must manually change the Windows user account under which to run the Caché service, choosing an existing account or creating a new account that has local administrator privileges on the server machine.

If you select **Normal** or **Locked Down**, it displays **Enter Credentials for Caché Service**, where you can choose to run Caché service under:

- The default system account, which runs Caché as the Windows Local System account.
- Defined Windows user account. The installation creates a Caché account with the %All role for the user who is installing Caché to grant that user access to services necessary to administer Caché. Enter and confirm the password for this account. The password must meet the criteria corresponding to the security setting.

Important: If you are using Kerberos, you must enter a defined account that you have set up to run the Caché service. InterSystems recommends that you use a separate account specifically set up for this purpose.

When you click **Next**, the installation verifies the following if you enter a defined user account:

- The account exists on the domain.
- You have supplied the correct password.
- The account has local administrator privileges on the server machine.

CAUTION: If you are installing on Windows Vista, before entering the account verify that it has local administrator privileges. Currently, the installation procedure cannot check this on the Vista platform.

For a detailed explanation of these settings, see the [Initial Caché Security Settings](#) section of the “Preparing for Caché Advanced Security” appendix of this guide.

7. The **Ready to Install** dialog box lets you review the installation name, type, and destination directory for the software files.

Note: **Enter License** check box — If you do not have a Caché license key installed on your computer (that is, there is no `cache.key` file in the system manager's directory), the **Enter License** dialog box explains that a key was not detected and asks if you want to enter a license key during the installation:

- To continue without entering a license key, clear the check box. You can update your license information at another time by using the System Management Portal from the **[Home] > [Licensing] > [License Key]** page.
- To open the Caché License Wizard, select the check box. See the [Updating the License Key](#) section of the “Managing Caché Licensing” chapter of the *Caché System Administration Guide* for details about entering InterSystems Caché licensing information.

Click **Install** to continue. Setup installs Caché in the selected directory.

8. The **InstallShield Wizard Complete** dialog box indicates the installation has completed successfully. Choose whether you want to see the *Getting Started* page and click **Finish**.

2.4 Post-installation Tasks

You can manage your Caché instance using the System Management Portal, which is accessible from the Caché Cube. For more information on this management tool, see the “[Using the System Management Portal](#)” chapter of the *Caché System Administration Guide*.

- If you plan to connect remotely to other instances of Caché, follow the procedure described in the [Define a Remote Server Connection](#) section of the “Connecting to Remote Servers” chapter of the *Caché System Administration Guide*.
- If you are upgrading from a prior version of Caché, perform the following tasks:
 - *Recompile Objects* — you must recompile all Caché Objects applications in all namespaces by running the following command:

```
Do $system.OBJ.CompileAllNamespaces("u")
```

Note: This method both upgrades and compiles the class dictionaries in every namespace.

- *Regenerate Proxy Classes* — you must regenerate any proxy classes you had generated in the upgraded instance by following the instructions in the appropriate guides in the [Caché Language Bindings](#) set.

- If appropriate for your installation, perform any additional tasks described in the [Special Considerations](#) section.

2.5 Special Considerations

The following topics describe particular issues or tasks associated with licensing, specific platforms, or kinds of installations:

- [Multiple Caché Installation Issues](#)
- [Change the Caché Language](#)
- [Uninstall Caché](#)
- [InterSystems Caché Packet Drivers](#)

2.5.1 Multiple Caché Installation Issues

You can install and simultaneously run multiple instances of Caché 4.0 and later on a single Windows machine. Install Caché as for a single installation, giving each instance a unique name, a unique installation directory, and a unique port number.

Please reference the [Multiple Caché Instances](#) section of the *Caché System Administration Guide* for more detailed information.

Installing multiple Caché instances is limited by components where only one exists on a system. For example, typically there is only one Web server on a system; and as such, the Caché installation configures CSP for the last installation. Caché client components stored in the registry encounter the same issue. Caché stores its ODBC driver and ActiveX components in the registry using one name for each. Currently, the last installation updates these components to point to the last instance installed. If you are adding this release of Caché to your machine and keeping older (Caché 4.1 and earlier) versions running, you need to register the latest components. See [Register Files](#) for details.

InterSystems makes an effort to move common components to a common directory that can be shared across Caché instances. Unfortunately, because of backward compatibility issues, not all current Caché components support Caché 5.0 and 4.1 instances and are even less likely to support Caché 4.0 instances on the same machine.

As a work-around, you can take advantage of a feature Microsoft introduced with Windows 2000 and later. You can force your executable to ignore the registry paths to an executable by creating an empty file of the same name with .local appended to the executable name.

For example: CStudio.exe would need an empty file called CStudio.exe.local to force the Studio program to look in the current directory, before using the registry path. By creating these empty .local files, you

enable a previous Caché instance to use the compatible local files, rather than a newly installed current Caché set of registered executables.

To create .local files for all the executables in a directory type the following at a DOS prompt:

```
for %c in (*.exe) do set tempvariable= >%c.local
```

For more information on .local files see the Microsoft article entitled: [The End of DLL Hell](#).

2.5.1.1 Register Files

The Caché installation contains a Regfiles.bat script file in the *install-dir*/Bin directory that reregisters object tool files in a common Caché directory. You require Administrator privileges to run RegFiles.bat.

You only need to run this script if you install or uninstall any instance of Caché 4.1 or earlier; if you are only running instances of Caché 5.0 or later, the object tools function properly with multiple instances.

Here is an example of running the script:

```
C:\MyCache\Bin>regfiles.bat

C:\MyCache\Bin>rem Register Cache Self-Registering executables in
common directory
.
.
```

If after running RegFiles.bat, you still receive errors similar to the following when you start Studio:

```
Cannot create class factory for COM_SLSID_TNodes
```

Run the script with the ALL argument; this reregisters all JCOM DLLs in addition to the other files.

For example:

```
C:\MyCache\Bin>RegFiles.bat ALL

C:\MyCache\Bin>rem Register Cache Self-Registering executables in
common directory
.
.
C:\MyCache\Bin>rem Register JCOM dlls

C:\MyCache\Bin>set CacheDir=C:\MyCache\bin\
.
.
```

Important: Running **RegFiles.bat ALL** when it is not necessary will prevent the uninstall procedure from removing some registry keys under HKLM\Software\InterSystems when you uninstall the last Caché instance.

2.5.2 Change the Caché Language

When you install Caché, all supported language-specific utility DLLs are installed in the *install-dir\Bin* directory. Each DLL contains localized strings and messages.

The format of the name of the DLL is UTILaaa.DLL, where *aaa* is a 3-letter code that signifies the following languages:

Code	Language
CHS	Chinese (Simplified)
DEU	German (Standard)
ENU	English (United States)
ESP	Spanish (Spain)
FRA	French
ITA	Italian (Standard)
JPN	Japanese
KOR	Korean
NLD	Dutch (Standard)
PTB	Portuguese (Brazilian)
RUS	Russian

If you wish to change to the locale of a Caché installation, use the **^NLS** routine. For example:

```
%SYS>Do ^NLS
```

```
1) Locale definitions
2) Table definitions
3) Current system settings
```

```
NLS option? 1
```

```
Select a locale: enuw => English, United States, Unicode
```

```
1) Display locale
2) Edit locale
3) Install locale
4) Export locale
5) Import locale
6) Validate locale
7) Copy locale
8) Delete locale
9) Load locale table
10) Select another locale
```


Locale option? 10

Select a locale: enuw => itaw - Italian, Italy, Unicode

You can only change among 8-bit locales or Unicode locales, not from an 8-bit to Unicode or vice versa.

See the %SYS.NLS entry in the *Caché Class Reference* for more information.

Caché National Language Support requires the Caché Direct Connectivity component and also requires that its service be enabled. Use the **[Home] > [Security Management] > [Services]** page of the System Management Portal to verify if the %Service_CacheDirect service is enabled.

2.5.3 Uninstall Caché

To uninstall Caché, first stop Caché and then click **Exit** on the Caché Cube to remove the cube from the system tray.

Use only the Caché-supplied uninstall program, accessible on Windows systems using the **Add or Remove Programs** utility from the Windows **Control Panel**.

Important: Other uninstall programs are not supported and using them may cause unexpected results.

2.5.4 InterSystems Caché Packet Drivers

Install Caché Packet Driver for Windows 2000, XP, and 2003 Server

To use Raw Ethernet, DDP, or LAT with Caché on Windows systems, you must install the appropriate packet driver as described below. First load the DVD or verify the network location of the appropriate driver file.

For Windows 2000, XP, and 2003 Server systems, install the InterSystems Packet Protocol Driver as follows:

1. Right-click **My Network Places** on the desktop and click **Properties**.
You can also click **Start**, point to **Settings** and click **Network and Dial-up Connections**.
2. Right-click **Local Area Connection** and click **Properties**.
3. Click **Install**.
4. Click **Protocol** in the **Select Network Component Type** dialog box and then click **Add**.
5. Click **Have Disk** in the **Select Network Protocol** dialog box.
6. Enter the path to the packet driver kit and click **OK**.

You can also enter the appropriate drive letter and click **Browse** to search for the correct path, \drivers\win2k, that contains the file ispkt2k.inf. Click **Open** and then click **OK**.

7. Select the appropriate driver for your operating system, **InterSystems Packet Driver for Windows 2000, XP and 2003 Server**, for example, and click **OK**.
8. After the driver is installed, click **Close**.

After you restart Windows, Caché is fully available to you.

3

Installing Caché on OpenVMS

This chapter describes how to install Caché on an OpenVMS system. It assumes that you are familiar with OpenVMS directory structures, utilities, and commands. This chapter contains the following major sections:

- [Installation Requirements](#)
- [Caché Installation](#)
- [Post-installation Tasks](#)
- [Special Considerations](#)

You may wish to consult the appendix on [Calculating System Parameters](#) to verify your parameter settings before you begin the installation, and use the online [OpenVMS Parameter Calculator](#) to obtain parameter values that InterSystems recommends.

3.1 Installation Requirements

This section describes the hardware and software requirements for new and upgrade installations of Caché.

3.1.1 Disk Space Requirements

A standard Caché installation needs approximately 340 MB (megabytes) of disk space depending on the type of installation you choose. This is the equivalent of 696320 blocks of disk space.

3.1.2 Supported Platforms and Web Servers

The latest version of Caché is supported on HP Alpha computers running OpenVMS v7.3-2, v8.2, and v8.3 and HP Itanium processors running OpenVMS v8.2-1 and v8.3. If you are installing Caché on a Non-Uniform Memory Access (NUMA) machine, such as the GS160, contact the [InterSystems Worldwide Response Center](#) (WRC) for current configuration recommendations.

HP Itanium OpenVMS version 8.3 requires patch VMS83I_INSTALL-V0100, available from the HP IT Resource Center site: <http://www2.itrc.hp.com/service/patch/mainPage.do>.

Caché now supports the Secure Web Server v2.1 (based on Apache 2.0.52) on the OpenVMS supported versions.

3.1.3 Supported Upgrade Paths and Procedures

If you are performing an upgrade, please first read and perform all necessary procedures described in the “[Upgrading Caché](#)” chapter.

When upgrading, back up your Caché installation after completing all the pre-installation upgrade tasks and before installing Caché.

3.2 Caché Installation

To install Caché, log into OpenVMS as the system manager or with CMKRNL, WORLD, BYPASS, SYSLCK, ALTPRI, and OPER privileges. If your UIC is not [1,4] when you run the installation script, the command procedure, **CINSTALL**, automatically changes your UIC to [1,4].

Note: If the logical name *CACHE\$MGRUIC* is defined during a new installation, the installation sets the owner UIC of the target directory to the value of that logical. Subdirectories and files inherit that UIC.

Once you are logged into OpenVMS:

1. [Transfer files from the distribution media.](#)
2. [Run the installation script.](#)
3. [Edit the startup file.](#)

3.2.1 Transfer Files from the Distribution Media

Transfer the Caché installation files from the distribution media either to a work directory (recommended) or to the target directory. Use the OpenVMS backup command to copy the distribution files to the work directory. Examples for each medium follow:

- For DVD distribution:

```
$ MOUNT/OVERRIDE=IDENTIFICATION cd_dev:
$ BACKUP cd_dev:[CACHEDIST]C2008_2_0_300_0.BCK/SAVE
      dest_dev:[CACHEKIT...]
$ DISMOUNT cd_dev:
```

Where `cd_dev` is the device name of your DVD drive, `[CACHEDIST]C2008_2_0_300_0.BCK` is an example name of the compressed backup file on the DVD, `dest_dev` is the device name for your local hard disk, and `[CACHEKIT]` is a directory that you create on your local disk to temporarily uncompress and store the installation kit distribution files. Two levels down in the uncompressed kit is `CINSTALL.COM`.

- For magnetic tape distribution:

```
$ MOUNT/FOREIGN magtape_dev:
$ BACKUP magtape_dev:C2008_2_0_300_0.BCK/REWIND/SAVE/SELECT=
      [REL.ALPHAVMS.DIST...] dest_dev:[CACHEKIT...]
$ DISMOUNT magtape_dev:
```

Where `magtape_dev` is the device name of your magnetic tape drive, `C2008_2_0_300_0.BCK` is an example name of the compressed backup file on the tape, `dest_dev` is the device name for your local hard disk, and `[CACHEKIT]` is a directory that you create on your local disk to temporarily uncompress and store the installation kit distribution files. Two levels down in the uncompressed kit is `CINSTALL.COM`.

- For backup save set distribution:

```
$ CREATE/DIR dest_dev:[CACHEKIT...]
$ BACKUP C2008_2_0_300_0.BCK/SAVE dest_dev:[CACHEKIT...]
```

Where `dest_dev` is the device name for your local hard disk, `[CACHEKIT]` is a directory that you create on your local disk, and `C2008_2_0_300_0.BCK` is an example name of the compressed backup file on the ftp server. This is required to correctly recreate the directory structure on your local disk.

Important: Caché does not support lowercase characters in pathnames on OpenVMS.

3.2.2 Run the Installation Script

The installation script, `CINSTALL`, automatically does the following:

- Installs the Caché system manager databases.
- Starts Caché in installation mode.
- Installs Caché system manager globals and routines.
- Shuts down Caché and restarts using the default configuration file. Upgrade installations restart using their original configuration files, updated as necessary.

To perform the installation:

1. Start the installation procedure by running the CINSTALL script, located at the top level of the installation files:

```
@CINSTALL
```

Or, if you are not in the installation directory, use a full path to invoke the script, such as:

```
@DKA0:[CACHEKIT.2008-2-0-250-0]CINSTALL
```

Where, in this case, DKA0:[CACHEKIT.2008-2-0-250-0] specifies the directory path where you uncompressed and stored the installation kit distribution files.

2. The installation script displays a list of any existing Caché instances on this machine. At the prompt, enter an instance name. If an instance with this name already exists, the program asks if you wish to upgrade it. If no such instance exists, it asks if you wish to create it and asks you to specify its location on disk. If the directory you specify does not exist, it asks if you want to create it. The default answers are **Yes**; press **Enter** to continue with the installation.
3. You next are asked if you want to install Caché with 8-bit or Unicode character support.

InterSystems recommends 8-bit character support for locales based upon the Latin-1 character set, ISO 8859-1. Use Unicode if the base character set for your locale is not Latin-1, or if you plan to have data from locales based upon a different character set. If you use an 8-bit version of Caché, your data is not portable to 8-bit locales based on a different character set.

CAUTION: If you choose a Unicode installation, you cannot revert to an 8-bit version without potential data loss. This is because an 8-bit version of Caché cannot retrieve 16-bit character data from a database.

4. The script then asks if you wish to load the source code for the various system management utilities and load the Caché engine link libraries, which are used for building custom callin and callout modules. The default options, **<YES>**, are appropriate for these prompts in most cases.
5. You next decide how restrictive you want the initial Caché security settings to be. Choose from Minimal (1), Normal (2), and Locked Down (3). The default is Minimal; if you choose this, the installation continues with the next step.

If you enter 2 or 3, the script asks for additional information:

- a. Owner of the instance — Enter a user name under which to run Caché. Caché creates an account for this user.
- b. Password for the entered user — Enter the Caché password for the user name twice to confirm it.

For a detailed explanation of these settings, see the [Initial Caché Security Settings](#) section of the “Preparing for Caché Advanced Security” appendix of this guide.

6. If the installation does not detect a `cache.key` file in the MGR subdirectory, it asks if you want to enter the license key information; the default is **No** which lets you enter the license key after installation.

If you choose **Yes**, Caché installs a key as part of the installation process. See the [Updating the License Key](#) section of the “Managing Caché Licensing” chapter of the *Caché System Administration Guide* for details about entering InterSystems Caché licensing information.

Note: On OpenVMS platforms, you cannot create a MGR subdirectory and move the `cache.key` file there before you install; you can, however, activate it from there after you install.

3.2.3 Edit the Startup File

For Caché to function properly, you may need to edit the `CACHE$STARTUP.COM` file to add commands that set up Caché when you restart your machine. The `CACHE$STARTUP.COM` script should only contain commands that affect all Caché instances, such as hardware-dependent definitions. This also includes defining logicals for magnetic tape devices and starting certain Caché instances automatically. To set up the file:

1. Copy `CACHE$STARTUP.COM` from your installation subdirectory [.BIN] to `SYS$LIBRARY`.
2. Make changes in that copy.
3. Edit the OpenVMS system startup command file, `SYS$MANAGER:SYSTARTUP_VMS.COM`, to invoke the `CACHE$STARTUP.COM` file.

For further details, read the comments contained within the `CACHE$STARTUP.COM` file.

3.3 Post-installation Tasks

Once you have completed running the installation procedure, perform the following tasks:

- [Install Caché on a Web Server](#).
- [Start Caché](#).

- [Set OpenVMS Time for Use with Caché.](#)
- If you are upgrading, [Perform Post-installation Upgrade Tasks.](#)
- If appropriate for your installation, perform any additional tasks described in the [Special Considerations](#) section.

3.3.1 Install Caché on a Web Server

Caché does not install a private Web server on a OpenVMS instance; therefore to use the System Management Portal to manage a Caché server on OpenVMS, you must install the CSP Gateway on a supported external Web server and configure it to control the Caché instance on OpenVMS.

The version of Caché on the Web server, in most cases, must be the same or a later version of the Caché system it manages.

See the [Accessing the System Management Portal](#) section of the “Using Caché on OpenVMS” chapter of the *Caché System Administration Guide* for instructions on installing the CSP Gateway component of Caché on a separate Web server to manage the OpenVMS Caché instance you just installed.

3.3.2 Start Caché

When Caché is installed it is left running. However, if you need to start Caché, first log into your operating system, then start Caché using the **ccontrol** command:

```
ccontrol start <instname>
```

Where *instname* is the instance name that you chose during the installation.

Use the **ccontrol** command to start and stop Caché. It is described in greater detail in the [Controlling Caché Instances](#) section of the *Caché System Administration Guide*.

Once Caché is started, initiate a Caché session using the **csession** command:

```
csession <instname>
```

Where *instname* is the instance name that you chose during the installation.

For more information, see the “[Using Caché on OpenVMS](#)” chapter of the *Caché System Administration Guide*.

3.3.3 Set OpenVMS Time for Use with Caché

Beginning with OpenVMS version 7.0, C programs that use UTC time functions (including Caché) require the proper setup for the DEC C Runtime Library interface; they may otherwise obtain incorrect time values. This procedure is fully described in the OpenVMS documentation. In brief:

1. Check if times in Caché and OpenVMS are synchronized, using the following commands at the Caché prompt:

```
> Write $ZTIME($P($H,"",2))
> !SHOW TIME
```

The first displays the Caché time and the second displays the OpenVMS system time. The two values should be approximately the same.

2. Run the UTC\$TIME_SETUP procedure to set the system time.
3. If this procedure exits prematurely, enter the following command at the OpenVMS prompt:

```
$ @SYS$MANAGER:UTC$TIME_SETUP.COM " " BOTH
```

This command forces an update of both the time zone and Time Differential Factor (TDF) data. Make sure these values are consistent. For example, if the selected main time zone is US (33), Eastern zone (6) or EST, the appropriate TDF is -5:00 (or -4:00, if Daylight Saving Time is in effect).

You can configure OpenVMS to automatically adjust for Daylight Saving Time as described in the OpenVMS documentation.

3.3.4 Perform Post-installation Upgrade Tasks

If you are upgrading, there are additional upgrade tasks to perform after the installation is complete:

- *Recompile Objects* — you must recompile all Caché Objects applications in all namespaces by running the following command:

```
Do $system.OBJ.CompileAllNamespaces("u")
```

Note: This method both upgrades and compiles the class dictionaries in every namespace.

- *Regenerate Proxy Classes* — you must regenerate any proxy classes you had generated in the upgraded instance by following the instructions in the appropriate guides in the [Caché Language Bindings](#) set.
- *Update Cluster Configurations (OpenVMS clusters only)* — prior to Caché 5.0 when configuring a Caché cluster it was necessary to define the network type for the cluster (UDP or Ethernet) and define DCP connections between the cluster members. This is no longer necessary. ECP is the default for new installations.

After the upgrade to the latest version of Caché from 4.1, a Caché cluster configuration needs to be changed manually. The changes are in two places of the System Management Portal:

- Enable the ECP service from the **[Home] > [Security Management] > [Services]** page. Click **%Service_ECP**, select the **Service enabled** check box, and click **Save**.

- From the **[Home] > [Configuration] > [Network Settings] > [Legacy Network Connections]** page, delete any DCP connections from the network table that you do not need; they were only there to support clusters.

The upgrade does not automatically make these changes because it cannot detect which DCP connections support clusters and which might be for communicating with machines that are still running a prior release of Caché. With ECP, networking the cluster automatically configures the network tables as needed; it is not necessary to define any ECP connections between the cluster members to support Caché clusters. However, you cannot access the ECP connection created automatically. If the configuration requires ECP, to gain read-only access to privately mounted databases on another cluster member, you must define those connections.

3.4 Special Considerations

The following sections describe particular issues or tasks associated with licensing, specific platforms, or kinds of installations:

- [Multiple Caché Instances](#)
- [Patch for Client Access Using Kerberos on Itanium Platform](#)
- [SYSTEM-F-SECTBLFUL Error](#)
- [INSTALL-E-NOSHRADR Error](#)
- [Uninstall Caché](#)

3.4.1 Multiple Caché Instances

You can install and simultaneously run multiple instances of Caché 4.0 and later on a single OpenVMS machine. Install Caché as for a single installation, giving each instance a unique name, a unique installation directory, and unique port numbers.

Please reference the [Multiple Caché Instances](#) section of the *Caché System Administration Guide* for further details.

3.4.2 Patch for Client Access Using Kerberos on Itanium Platform

Applications attempting to access OpenVMS servers that use Kerberos authentication must install the patch, HP-164VMS-TCP/IP-V0505-11ECO1-1. The Engineering Change Order (ECO) is for TCP/IP, not the actual operating system. Without this patch, the server often transmits erroneous response packets back to clients using the C++ binding, ODBC, JDBC, or Studio.

Note: This ECO applies only to OpenVMS on Itanium hardware. It is not needed for OpenVMS on Alpha.

3.4.3 SYSTEM-F-SECTBLFUL Error

Contact your system administrator or the [WRC](#) if you encounter an error similar to the following when installing Caché:

```
%INSTALL-E-FAIL, failed to CREATE entry for STRIPE1$:<CACHESYS.BIN>CACHE.EXE
-SYSTEM-F-SECTBLFUL, process or global section table is full
```

Also see the [Calculating OpenVMS Parameters](#) section of the “Calculating System Parameters for OpenVMS” appendix of this guide for setting values for the *GBLSECTIONS* parameter.

3.4.4 INSTALL-E-NOSHRADR Error

Beginning with OpenVMS 8.3, cache.exe is installed with */shared=address* rather than */share* because cache.exe is both a shareable image (to support callin applications) and a “main” program that is executed directly. The */shared=address* parameter, which instructs the install program to create the global section for address relocation data, uses up pages controlled by the *IMGREG-PAGES* parameter.

If you encounter an error similar to the following when installing Caché, increase the default value (10,000) of the *IMGREG-PAGES* parameter:

```
%INSTALL-I-NONSHRDADDR, image installed ignoring '/SHARE=ADDRESS'
-INSTALL-E-NOSHRADR, insufficient memory for shareable address data.
```

You can change the value via **AUTOGEN** feedback or by editing *MODPARAMS.DAT* and running **AUTOGEN**.

3.4.5 Uninstall Caché

The uninstall procedure removes all files installed and created during normal Caché processing, including journal and temporary database files.

Important: Be aware that this removes files you may wish to keep. For example: the license key (cache.key), the configuration file (cache.cpf), and the user database file (cache.dat).

To safely uninstall Caché, perform the following tasks:

1. Find the name of the Caché instance you wish to delete using the **ccontrol** command to list all the instances on your machine:

```
ccontrol list
```

2. Verify the instance is stopped. If it is not, stop it with the following command:

```
ccontrol stop <instname>
```

Where *instname* is the instance name that you chose during the installation.

3. Remove the instance using the following command:

```
ccontrol delete <instname>
```

4. Go to the instance directory:

```
set def <device>:[<instancedir>]
```

Where *instancedir* is the directory where the instance is installed.

5. Clean out the instance directory (make sure you are in the instance directory):

```
sh def  
<device>:[<instancedir>]  
del [...]*.*;*
```

Note: Repeat this command until there are no errors, which should be in the form:

```
%DELETE-W-FILENOTDEL, error deleting <device>:[<instancedir>]XXXX.XXX;1  
-RMS-E-MKD, ACP could not mark file for deletion  
-SYSTEM-F-DIRNOTEMPTY, directory file is not empty
```

6. Make sure everything was deleted:

```
dir
```

which should display the following message:

```
%DIRECT-W-NOFILES, no files found
```

4

Installing Caché on UNIX and Linux

This chapter describes how to install Caché on a UNIX or Linux system. It assumes that you are familiar with UNIX and Linux directory structures, utilities, and commands. This chapter contains the following major sections:

- [Installation Requirements](#)
- [Caché Installation](#)
- [Post-installation Tasks](#)
- [Special Considerations](#)

You can consult the appendix on [Calculating System Parameters for UNIX and Linux](#) to verify and adjust your parameter settings before you begin the installation.

4.1 Installation Requirements

The following sections describe the hardware and software requirements for new and upgrade installations of Caché:

- [Disk Space Requirements](#)
- [Supported Platforms and Features](#)
- [Supported Upgrade Paths and Procedures](#)

4.1.1 Disk Space Requirements

A standard Caché installation that includes support for Caché Server Pages (CSP), needs 370 – 450 MB (megabytes) of disk space depending on the type of installation you choose. The installation procedure checks the disk space available before installing.

4.1.2 Supported Platforms and Features

The latest version of Caché is supported on the following operating systems.

- *HP Tru64 UNIX* — See the [Tru64 UNIX](#) portion of the *Special Considerations* section for environment considerations.
- *HP (Itanium and PA-RISC)* — See the [HP-UX](#) portion of the *Special Considerations* section for required patches.
- *IBM pSeries AIX* — See the [IBM AIX](#) portion of the *Special Considerations* section for system requirements and environment considerations.
- *Red Hat Enterprise Linux AS* — See the [Red Hat](#) portion of the *Special Considerations* section for information regarding shared memory size and the MQ Series interface.
- *Sun Solaris (SPARC and AMD)* — See the [Sun Solaris](#) portion of the *Special Considerations* section for environment considerations.
- *SUSE Linux Enterprise Server* — See the [SUSE Linux](#) portion of the *Special Considerations* section for information regarding the SSL development package and shared memory size.

For the particular platforms, versions, and features supported for each operating system, see the [Supported Server Platforms](#), [CSP Supported Web Servers](#), [Supported Client Platforms](#), and [Other Supported Features](#) tables in the *Supported Platforms* document.

Caché installs a private Apache Web server with each instance to ensure proper operation of the System Management Portal and the Caché Online Documentation. If you are using a Web server for CSP other than the private one installed with Caché, you must install it before installing Caché if you want to configure it automatically. Its support on each operating system is dependent on the operating system vendor and is subject to change. See the [Web Server Configuration](#) section of the “CSP Architecture” chapter of the *Using Caché Server Pages* guide for more information.

4.1.3 Supported Upgrade Paths and Procedures

If you are performing an upgrade, first read and perform all necessary procedures described in the “[Upgrading Caché](#)” chapter of this guide.

When upgrading, back up your Caché instance after completing all the pre-installation upgrade tasks and before installing Caché.

4.2 Caché Installation

This release of Caché introduces a significant change to the UNIX-based installation architecture. The installation consists of a set of modular package scripts. The scripts conditionally prompt for information based on input to previous steps, your system environment, and whether or not you are upgrading an existing instance. The first stage of the installation stores all gathered information about the install in a parameter file. You then confirm the specifics of the installation before the actual install takes place. The final phase performs the operations that are contingent upon a successful install, such as instance startup.

There are three main starting points to run a Caché installation on a UNIX-based platform. The following sections explain each in detail:

- *Caché Standard Installation* — Performs the basic Caché installation where you can choose what to install in addition to the Caché server.
- *Caché Client Installation* — Allows you to choose the appropriate client components to install without installing the Caché server.
- *Caché Installation from a Parameter File* — Provides the ability to run a Caché installation from a parameter file created by a previous successful install, bypassing prompts.

4.3 Caché Standard Installation

To install a Caché server, log in as user ID `root`. It is acceptable to `su` (super user) to `root` while logged in from another account.

Once you are logged into your operating system, perform the following steps:

1. *Transfer files from the distribution media.*
2. *Determine owners and groups.*
3. *Run the installation script.*

Important: You must choose a fully resolved physical path, containing no symbolic links, for the Caché installation directory.

4.3.1 Transfer Files from the Distribution Media

Caché for UNIX-based platforms is distributed either on DVD or acquired from InterSystems in a compressed file with a tar.gz extension. There is also a single-user RPM (Red Hat Package Manager) Linux kit available for download from the [InterSystems](#) Web site. The # represents the UNIX prompt in the examples in this chapter.

Transfer the Caché installation files by choosing the *one* appropriate method from the following:

- *Uncompress the downloaded file*, or
- *Mount the distribution DVD*, or
- *Download the RPM package file*, cache-server-xxxx.x.x.xxx.x-x.platform.rpm, where *xxxx.x.x.xxx.x-x* is the Caché build identifier and *platform* is the specific platform kit identifier. For example, cache-server-2008.2.0.500.0-1.rh5.i386.rpm.

Important: You must clear the *GZIP* environment variable before you install, especially on the SUSE Linux 9 platform which sets this variable by default.

4.3.1.1 Uncompress the Downloaded File

Uncompress and untar the appropriate downloaded xxx.x.x.xxx.x_platform.tar.gz file into a temporary directory to avoid permissions issues. Where *xxxx.x.x.xxx.x* is the Caché build identifier and *platform* is the identifier of the specific platform kit. For example:

```
# mkdir /tmp/cachekit
# chmod og+rx /tmp/cachekit
# gunzip -c /media/dvdrom/2008.2.0.500.0_hpit.tar.gz | ( cd
/tmp/cachekit ; tar xf - )
```

Important: Do not install Caché from the /home directory, or any of its subdirectories.

4.3.1.2 Mount the Distribution DVD

For the DVD distribution, install directly from the DVD using the **mount** command. The device name and options for a DVD **mount** command vary between systems. Typically, the **mount** command is:

```
# mount <device> <mountpoint>
```

Where *<device>* specifies the name of the DVD device and *<mountpoint>* specifies the pathname of the directory to which the DVD is mounted.

DVD Mount Commands

Operating System	Sample Mount Command
Tru64UNIX	mount /dev/disk/cdrom0a /dvdrom
HP-UX	mount /dev/dsk/c1t2d0 /dvdrom
IBM AIX*	mount /dev/cd0
Red Hat Linux	mount /dev/dvd /media/dvdrom
Sun Solaris	Mounted automatically (no command needed)
SUSE Linux	mount /dev/dvd /media/dvdrom

* The IBM-AIX mount command accepts only the device or the mount point, not both.

For some operating systems, you must set up devices and mount points in the file system table (preferably through the system management utility). Note that devices and mount points vary by machine; those listed above are merely samples. Consult your operating system documentation for more information.

After running the installation script, unmount the DVD with the **umount** command.

4.3.2 Determine Owners and Groups

The installation process prompts you for user and group ID information of the following types:

- *Owner of the instance* — Effective user ID under which Caché processes run.
- *Group allowed to start and stop the instance* — Name or group ID number of an existing group allowed to start and stop Caché.
- *Effective group for Caché* — Caché internal effective group ID, which also has all privileges to all files and executables in the installation. For maximum security, no actual users should belong to this group. (The default is `cacheusr`; you can only change it using a custom install with Normal or Locked Down initial security settings.)
- *Effective user for the Caché superserver* — Effective user ID for processes started by the superserver and Job servers. Again, for maximum security, no actual users should have this user ID. (The default is `cacheusr`; you can only change it using a custom install with Normal or Locked Down initial security settings.)

If your operating system contains **groupadd** and **useradd** utilities, Caché creates accounts for the user and group IDs you enter if they do not exist. If you are not sure if your system has these utilities, verify the user ID and group ID exist before you begin the installation.

Important: During installation the user ID you choose as the owner of the instance must have read and execute access to the installation media.

Tools used on UNIX-based operating systems to display process ownership may or may not show effective versus real ownership. See the “[Using Caché on UNIX, Linux, and Mac OS X](#)” chapter of the *Caché System Administration Guide* for details on how Caché assigns permissions.

4.3.3 Run the Installation Script

The installation script, **cinstall**, automatically does the following:

- Installs the Caché system manager databases.
- Starts Caché in installation mode.
- Installs Caché system manager globals and routines.
- Shuts down Caché and restarts using the default configuration file (cache.cpf). Upgrade installations restart using their updated configuration files.

Important: The RPM installation does not start Caché. When you start Caché the first time after the installation, it performs the required initialization actions including initializing the databases and creating the configuration file. See the [Start Caché](#) section for details on how to start Caché after the installation.

Install Procedures

To perform the Caché server installation:

1. Start the installation procedure by running the cinstall script, located at the top level of the installation files:

```
# /pathname/cinstall
```

where pathname is the DVD mount point or the directory where the downloaded tar file is unpacked.

or

Install from the RPM package file using the following command:

```
# rpm -ivh cache-server-xxxx.x.x.xxx.x-x.platform.rpm
```

Where *xxxx.x.x.xxx.x-x* is the Caché build identifier and *platform* is the specific platform kit identifier.

For an upgrade from an RPM package file, use the following command:

```
# rpm -u cache-server-xxxx.x.x.xxx.x-x.platform.rpm
```

The upgrade install stops Caché before it replaces the files and starts it afterwards, if it was running before the upgrade.

Important: Caché does *not* support the `--relocate` option of the **rpm** command due to the complexity of the package file; the RPM kit installs into `/usr/cachesys`. The RPM kit always installs the Minimal initial security settings and the Unicode version of Caché. See steps 5 and 6 for details.

2. The installation script identifies your system type and validates it against the installation type on the distribution media.

If your system supports more than one type, for example, 32-bit and 64-bit, or if the install script cannot identify your system type, it prompts you with additional questions. If your system type does not match that on the distribution media, the installation stops. Contact the [InterSystems Worldwide Response Center](#) (WRC) for help in obtaining the correct distribution.

3. The script displays a list of any existing Caché instances on this machine. At the instance prompt, enter an instance name. If an instance with this name already exists, the program asks if you wish to upgrade it. If no such instance exists, it asks if you wish to create it and asks you to specify its location on disk. If the directory you specify does not exist, it asks if you want to create it. The default answers are **Yes**; press **Enter** to continue with the installation.
4. Next, you select the setup type:

```
Select installation type.
  1) Development - Install Cache server and all language bindings
  2) Server only - Install Cache server
  3) Custom - Choose components to install
Setup type <1>?
```

- The default is **Development**, which installs the Caché server, all client components, and the developer tools.
 - The **Server only** option installs just the Caché server.
 - If you would like to choose which client components to install in addition to the Caché server, enter 3 for **Custom**. See the [Caché Custom Installation](#) section for details on selecting the custom components.
5. Decide whether to install Caché with Unicode character support. The default is **No**, which installs the 8-bit version of Caché.

InterSystems recommends 8-bit character support for locales based upon the Latin-1 character set, ISO 8859-1. Use Unicode if the base character set for your locale is not Latin-1, or if you plan to have data from locales based upon a different character set. If you use an 8-bit version of Caché, your data is not portable to 8-bit locales based on a different character set.

CAUTION: If you choose a Unicode installation, you cannot revert to an 8-bit version without potential data loss. This is because an 8-bit version of Caché cannot retrieve 16-bit character data from a database.

6. You next decide how restrictive you want the initial Caché security settings to be. Choose from Minimal (1), Normal (2), and Locked Down (3). The default is Minimal; if you choose this, the owner of the instance becomes `root` and the installation continues with the next step.

If you enter 2 or 3, the script asks for additional information:

- a. Owner of the instance — Enter a user name to use as the effective user ID under which to run Caché processes. Once Caché is installed, you cannot change the owner of the instance.

The installation process lists other accounts it creates for you. Caché assigns the password you enter at the next prompt to each of these accounts.
- b. Password for the entered user — Enter one Caché password for the user name twice to confirm it.

Note: Passwords entered during this procedure should not include whitespace or backslash characters.

For a detailed explanation of these settings, see the [Initial Caché Security Settings](#) section of the “Preparing for Caché Advanced Security” appendix of this guide.

Important: There are additional security settings that you can only choose through a custom install. See the [Caché Custom Installation](#) section for details.

7. At this point in the installation, you are asked which group should be allowed to start and stop Caché. Only one group can have these privileges, and it must be a valid group on the machine. Enter the name or group ID number of an existing group; Caché verifies that the group exists before proceeding.
8. If the installation does not detect a `cache.key` file in the `mgr` subdirectory, it asks if you want to enter the license key information; the default is **No**. You can enter the key information after the installation.

If you choose **Yes**, Caché installs a key as part of the installation process. See the [Updating the License Key](#) section of the “Managing Caché Licensing” chapter of the *Caché System Administration Guide* for details about entering InterSystems Caché licensing information.

9. Next, you are asked if you want to configure the CSP Gateway to use a supported external Web server. Answer **Yes** and then answer additional Web server configuration questions to configure the CSP Gateway after the Caché installation completes.

CAUTION: Configuring the CSP Gateway overlays any changes you previously made in the CSP Gateway configuration and selecting the Web server option overlays changes in the Web server configuration. In particular, it overlays any previous configuration for / and /csp.

See the “[Web Servers for UNIX, LINUX, and Mac OS X](#)” chapter of *Installing and Configuring the CSP Gateway* for more information.

10. Finally, review your installation options and press enter to proceed with the installation. File copying does not begin until you answer **Yes**.

A standard installation sets the following port numbers for a Caché instance:

- *Superserver port number* — 1972 or the first available subsequent number equal to or higher than 56773
- *Web server port number* — 57772 or the first available subsequent number
- *Telnet port number* — 23

If you want to assign different port numbers during a new installation you must choose the custom option. See the [Caché Custom Installation](#) section for details.

You may change the superserver port value after installation from the **[Home] > [Configuration] > [Memory and Startup]** page of the System Management Portal.

You may change the WebServerPort and Telnet port values after installation from the **[Home] > [Configuration] > [Startup Settings]** and **[Home] > [Configuration] > [Device Settings] > [Telnet Settings]** pages, respectively, of the System Management Portal.

When the installation completes, you are directed to the appropriate URL for the System Management Portal to manage your Caché system. See the “[Using the System Management Portal](#)” chapter of the *Caché System Administration Guide* for more information.

4.3.3.1 Caché Custom Installation

If you choose a custom installation, you must answer additional questions throughout the procedure about installing several individual components. The defaults appear in brackets before the question mark (?); press **Enter** to accept the default.

1. *Manager Utility Source Code* — Installs the utility source code into the %SYS namespace.
2. *Superserver and Web Server Ports* — You can choose to let Caché assign the port numbers as described in the standard installation procedure or you can enter custom port numbers. Upgrade installs do not offer this choice; they keep the port numbers of the original instance.
3. *Additional Security Options* — If you chose Normal or Locked Down initial security you have the choice to configure additional security options (minimal installations use the default IDs):

- *Personal Database* — There exist situations where the user ID and group ID for every file must match the user ID and group ID of the file volume. You can accomplish this using the Personal Database option.

If you choose to create a personal database, the effective user ID for the Caché superserver becomes the owner of the instance user ID and the effective group ID for Caché processes becomes the ID you enter to start and stop Caché. Therefore, at the indicated prompts in the install dialog, answer as directed:

- a. At the owner of the instance prompt, enter your user ID.
- b. At the group to start and stop Caché prompt, enter your group ID.
- c. You must start Caché manually after the installation, because `root` should not run the database after installation. Only the owner of the database may manage the database, or login as a user.

Otherwise, if you answer `No` to the Personal Database option, you may change the default effective group and user IDs:

- *Effective group for Caché* — Caché internal effective group ID, which also has all privileges to all files and executables in the installation. For maximum security, no actual users should belong to this group. (Defaults to `cacheusr`.)
- *Effective user for the Caché superserver* — Effective user ID for processes started by the superserver and Job servers. Again, for maximum security, no actual users should have this user ID. (Defaults to `cacheusr`.)

4. *Client Components* — You have a choice to install the following client components:

Client component selection

```
[*] 1) ODBC client
[*] 2) C++ binding
[*] 3) C++ SDK
[*] 4) Perl binding
[*] 5) Python binding
[*] 6) Cache engine link libraries (callin)
[*] 7) Light C++ binding
+ ) Select all
```

Enter the number of each component you wish to install.
Enter the number of an already selected component to deselect it.
Multiple selections can be separated by spaces.
Enter a blank line to continue.

You can use the plus sign (+) to select all components. If this is an upgrade and you clear a previously installed component, that component is neither upgraded nor uninstalled.

See the following guides in the *Caché Language Bindings* set for more information on the specific client components in the selection list:

- *Using Caché ODBC*
- *Using C++ with Caché*
- *Using Perl with Caché*
- *Using Python with Caché*
- *Using the Caché Callin and Callout Functions*

4.4 Caché Client Installation

The Caché distribution also contains a separate script to install a client-only version of Caché. The installation process is fairly simple. You do not need to install as `root`. The files from this install have the user and group permissions of the installing user. To perform the Caché client installation:

1. [Transfer files from the distribution media](#) as described in the *Caché Standard Installation* procedure.
2. Start the installation procedure by running the `cinstall_client` script, located at the top level of the installation files:

```
# /pathname/cinstall_client
```

3. Choose from the available client component options. Components that require the Caché server on the same machine do not appear in the list. For example:

```
Client component selection

[*]    1) ODBC client
[*]    2) C++ binding
[*]    3) C++ SDK
[*]    4) Perl binding
[*]    5) Python binding
[*]    +) Select all
```

```
Enter the number of each component you wish to install.
Enter the number of an already selected component to deselect it.
Multiple selections can be separated by spaces.
Enter a blank line to continue.
```

You can use the plus sign (+) to select all components. If this is an upgrade and you clear a previously installed component, that component is neither upgraded nor uninstalled.

The list of client-only components does not include the engine link libraries or the light C++ binding because these components require a server installation.

You cannot use this script to update client components in server installations. Use the `cinstall` script instead.

See the following guides in the *Caché Language Bindings* set for more information on the specific client components in the selection list:

- [Using Caché ODBC](#)
- [Using C++ with Caché](#)
- [Using Perl with Caché](#)
- [Using Python with Caché](#)

4.5 Caché Installation from a Parameter File

The install procedure places a parameter file (`parameters.isc`) in the root of each install. You can run a Caché install using this parameter file created from a previously successful installation using the `installFromParametersFile` script, which uses the values of the parameter file as input to the install rather than prompting a user. To run the installation using a parameter file use the following syntax:

```
# /pathname/installFromParametersFile <parameter file location>
```

Parameter File Considerations

Keep the following in mind when running an install using a parameter file:

- There are parameters that are specific to the distribution source; if you change from where you are installing, you must update these variables.
- The install essentially does no checking during the actual install phase; it blindly does whatever the parameters in the file tell it to (this is by design).
- The `security_settings.password` variable is removed for security reasons; therefore, if you are using it to install you need to insert one back in the file.

The `parameters.isc` file has the form:

```
parameter: value
parameter: value
...
```

For details on the contents of the `parameters.isc` file see the [“Using the Caché Installation Parameter File on UNIX and Linux”](#) appendix of this guide.

4.6 Post-installation Tasks

Once you have completed running the installation procedure, perform the following tasks:

- [Start Caché](#)
- If you are upgrading from a prior version of Caché, perform the following tasks:
 - *Recompile Objects* — you must recompile all Caché Objects applications in all namespaces by running the following command:

```
Do $system.OBJ.CompileAllNamespaces("u")
```

Note: This method both upgrades and compiles all of the class dictionaries in every namespace.
 - *Regenerate Proxy Classes* — you must regenerate any proxy classes you had generated in the upgraded instance by following the instructions in the appropriate guides in the [Caché Language Bindings](#) set.
- If you plan to develop using the Caché Studio, see the [Install Caché Client on Windows for Development](#) section.
- If appropriate for your installation, perform any additional tasks described in the [Special Considerations](#) section.

4.6.1 Start Caché

The single-user RPM Linux install does not start Caché when it completes. Start and stop Caché using the standard Linux methods. For example:

```
/etc/init.d/<instname> start
```

On Red Hat Linux, you can also use the following:

```
service <instname> start
```

Where *instname* is the instance name that you chose during the installation.

All other installs leave Caché running. If you need to start Caché, first log into your operating system, then start Caché using the **ccontrol** command:

```
ccontrol start <instname>
```

Where *instname* is the instance name that you chose during the installation.

Use the **ccontrol** command to start and stop Caché. It is described in greater detail in the [Controlling Caché Instances](#) section of the *Caché System Administration Guide*.

Note: If the permissions on all elements of the path to the mgr subdirectory do not provide read access to the cacheusr group (at a minimum), the instance fails to fully start and the following message is recorded in cconsole.log: `Element of path manager_subdirectory could not be read (errno 2)`.

Once Caché is started, initiate a Caché session using the **csession** command:

```
csession <instname> [parameters]
```

Where *instname* is the instance name that you chose during the installation.

For more information, see the “[Using Caché on UNIX, Linux, and Mac OS X](#)” chapter of the *Caché System Administration Guide*.

4.6.2 Install Caché Client on Windows for Development

Caché installs a private Apache Web server so that you can access the System Management Portal; therefore, a UNIX-based system does not require a Caché client on a Windows machine to perform system configuration and management tasks.

You do, however, require a Windows client to use the Studio development tool. The procedure is described in the “[Installing Caché on Windows](#)” chapter of this guide. You can install the client-only option. Once installed, from the Caché Cube of the Windows client, perform the following tasks:

- Point to **Preferred Server** and click **Add/Edit** to add a remote server connection to the Caché instance just installed. Make sure you specify the appropriate port numbers for this connection.
- Point to **Remote System Access**, point to **Terminal**, and then click the appropriate connection server name you entered in the previous step.

4.7 Special Considerations

The following sections describe particular issues or tasks associated with specific platforms or kinds of installations:

- [Using DDP with Caché on UNIX](#)
- [Journal File System Recommendations](#)
- [Multiple Caché Instances](#)
- [Uninstall Caché](#)

- [Tru64 UNIX](#)
- [HP-UX](#)
- [IBM AIX](#)
- [Red Hat Linux](#)
- [Sun Solaris](#)
- [SUSE Linux](#)

4.7.1 Using DDP with Caché on UNIX

The legacy Caché distributed data protocol (DDP) opens a raw socket connection, which requires root privileges. Therefore, when using DDP on UNIX-based systems, you must set the Caché process to run as root.

4.7.2 Journal File System Recommendations

To achieve optimal journal performance and ensure journal data integrity when there is a system crash, InterSystems recommends various file systems and mount options for journal files. For specific platform details see the [UNIX File System Recommendations](#) section of the “Journaling” chapter of the *Caché Data Integrity Guide*.

4.7.3 Multiple Caché Instances

You can install and simultaneously run multiple instances of Caché 4.0 and later on a single machine. Install Caché as for a single installation, giving each instance a unique name, a unique installation directory, and a unique port number.

Please reference the [Configuring Multiple Caché Instances](#) section of the *Caché System Administration Guide*.

4.7.4 Uninstall Caché

To safely uninstall Caché, perform the following tasks:

1. Find the name of the Caché instance you wish to delete using the **ccontrol** command to list all the instances on your machine:

```
ccontrol list
```

2. Verify the instance is stopped. If it is not, stop it with the following command:

```
ccontrol stop <instname>
```

Where *instname* is the instance name that you chose during the installation. If it hangs, use the following command to force it down:

```
ccontrol force <instname>
```

3. Remove the instance using the following command:

```
ccontrol delete <instname>
```

4. Remove the installation directory using the following operating system command:

```
rm -r <directory>
```

Important: Be aware that this removes files you may wish to keep. For example: the license key (cache.key), the configuration file (cache.cpf), and the user database file (cache.dat).

RPM Uninstall

If you installed Caché using the RPM package, uninstall using the following option:

```
# rpm -e cache-server
```

The uninstall procedure removes all files installed and created during normal Caché processing, including journal and temporary database files.

Important: The SUSE Linux Enterprise Server 9 platform uses asynchronous scriptlets, so the uninstall process cannot guarantee that Caché stops before it removes files. InterSystems recommends you stop Caché on this platform before you run the RPM uninstall command.

4.7.5 Tru64 UNIX

See the [Tru64 UNIX Platform Notes](#) section of the *Calculating System Parameters for UNIX and Linux* appendix for detailed kernel configuration information.

4.7.5.1 Tru64 UNIX File and Directory Ownership

For the Tru64 UNIX supported releases, unlike other UNIX file systems, group ownership does not come from the group ID of the creating process. Instead, by default, the operating system sets the group ID of the file to the group ID of its parent directory.

However, if you set the vfs subsystem attribute, *sys_v_mode*, to 1, the OS sets the group ID of the file either to the group ID of the process or to the group ID of the parent directory if the *S_ISGID* bit of the parent directory is set. If the group ID of the new file does not match the effective group of the process or one of its supplementary group IDs, the *S_ISGID* bit of the new file is cleared.

Important: InterSystems recommends that you set the `sys_v_mode` to 1 on all file systems and directories that Caché uses to ensure smooth functioning of the system. See [open\(2\)](#) for more information.

4.7.5.2 Tru64 UNIX Mount Point Restriction

Do not use `/usr/local/etc/cachesys` as a mount point for a Caché instance on Tru64. The Caché installation and upgrade process uses the `mkcdsl` command on this directory; the command fails if the directory is anything but the registry directory.

Volumes must be mounted using the System V File System (`sysv`) option. See [mount\(8\)](#) for more information.

Note: If you want to use a different file system — for example, Advanced File System, (AdvFS) — set the group ownership from the root down the directory tree to `cacheusr`.

4.7.6 HP-UX

See the [HP-UX Platform Notes](#) section of the *Calculating System Parameters for UNIX and Linux* appendix for detailed configuration information.

4.7.6.1 HP-UX pwgrd Daemon

HP-UX distributions run a daemon (`pwgrd`) that caches password and group information from network queries. InterSystems does not explicitly enable or disable it, but prior to the 9/2008 Release of HP-UX 11iV3, it was enabled by default; beginning with that version, however, it is disabled by default. As a result of `pwgrd` being disabled, when installing Caché with a network user as the instance owner, users may see the following error: `chown: unknown user id integ`. To prevent the error from occurring, you should enable `pwgrd`.

4.7.6.2 HP-UX Kerberos Client Requirements

For Kerberos to work properly on the HP-UX 11i platform you must have the Kerberos Client (KRB5CLIENT) version 1.3.5. Verify you have the latest upgrade for HP-UX 11i v2 that includes this version. HP-UX 11i v3 includes the proper version of the client.

4.7.6.3 HP-UX Random Number Generator

Caché requires the HP-UX Strong Random Number Generator component for true entropy for its cryptographic random number generator. HP-UX 11i v2 now includes this component by default.

4.7.7 IBM AIX

The default settings of several AIX parameters can adversely affect performance. For detailed information on the settings and recommendations, see the [AIX Platform Notes](#) section of the *Calculating System Parameters for UNIX and Linux* appendix.

4.7.7.1 PowerPC System Requirements

Current versions of Caché are only supported on PowerPC. PowerPC AIX 5.2 and later support a 64-bit kernel on POWER4, POWER5, or equivalent hardware.

The following table lists the allowable combinations of runtime, kernel, and hardware configurations:

AIX PowerPC Configuration Combinations

Combination	Runtime	Kernel	Hardware
1	32-bit	32-bit	32-bit
2	32-bit	32-bit	64-bit
3	64-bit	32-bit	64-bit
4	32-bit	64-bit	64-bit
5	64-bit	64-bit	64-bit

Note: 64-bit Caché requires combination 5.

To determine whether the CPU is 64-bit, issue the following command:

```
# bootinfo -y
```

This returns 64 for POWER3, POWER4, or POWER5 and returns 32 on older PowerPC systems.

To determine whether the 64-bit runtime environment is installed, issue the following command:

```
# lspp -l bos.64bit
```

To determine whether the 64-bit runtime environment is loaded at boot, issue the following command:

```
# grep load64bit /etc/inittab
```

To determine whether the system is running the 64-bit kernel, issue the following command:

```
# bootinfo -K
```

Alternatively, confirm that /unix points to unix_64, rather than unix_up or unix_mp:

```
# ls -l /unix
... /unix -> /usr/lib/boot/unix_64
# file unix
unix:          symbolic link to /usr/lib/boot/unix_64
```

To summarize, 64-bit Caché for PowerPC AIX requires that the 64-bit runtime environment be loaded on the 64-bit kernel; this requires AIX 5.2, or later, on POWER4, POWER5, or equivalent hardware.

4.7.7.2 Shared Library Environment Variable for Caché Engine Link Libraries

The Caché Engine link libraries contain a batch file that references any installed C linker.

If you have either the standard UNIX C libraries or any proprietary C libraries defined in the *LIBPATH* environment variable, then your environment is ready.

If not, append the paths for the standard UNIX C libraries to *LIBPATH*; these paths are */usr/lib* and */lib*.

4.7.7.3 Use of DDP and Raw Ethernet

On IBM AIX machines, in order to use DDP and raw Ethernet, the machine must have the DLPI (Data Link Provider Interface) packages installed. If the machine does not have the DLPI packages, then obtain them from your IBM provider and create DLPI devices through the following procedure:

1. Log in as `root`.
2. In the PSE drivers section of the */etc/pse.conf* file, uncomment the four lines that refer to the DLPI drivers.
3. Save the file.
4. Restart the computer.

If the DLPI devices are not installed, the Caché ObjectScript `$ZU(114)` function returns a null string rather than information about the Ethernet device.

4.7.8 Red Hat Linux

The following considerations may apply to your environment:

- The default shared memory limit (*shmmax*) on Linux platforms is 32 MB. This value is too small for Caché, but it can be changed in the proc file system without a restart. See the [Red Hat Linux Platform Notes](#) section of *Calculating System Parameters for UNIX and Linux* for more information.
- If you configure your instance to lock the shared memory segment in memory to prevent paging, you must raise the *memlock* limit. See the [Red Hat Linux Platform Notes](#) section of *Calculating System Parameters for UNIX and Linux* for more information.
- To use Kerberos on the Red Hat Linux platform, you must install the *krb5-devel* package in addition to the *krb5-libs* package. Installing *krb5-devel* establishes the required symbolic links for using

Kerberos. The package is required for production environments, not only development environments. See the [Red Hat Network](#) Web site for more information about these components.

- Red Hat Enterprise Linux V4 requires Websphere MQ version 6.0 to use the MQ interface.

4.7.9 Sun Solaris

Using Kerberos on Solaris SPARC Release 10 requires two Patch IDs 120469-03 and 121239-01. You can download these patches from the [Sun Update Connection - Patches and Updates](#) page by entering each patch number in the **PatchFinder** section.

If the Ethernet adapters are protected against access by non-root users, the Caché ObjectScript `$ZU(114)` function invoked by a non-root user returns a null string rather than information about the Ethernet device.

If you install Caché in a non-global zone, you must perform the following additional configuration steps:

Note: This procedure must be performed while in the global zone.

1. Assure that `/usr/bin` and `/usr/local` subdirectories in the non-global zone have write permission, as shown in the following steps:
 - a. Create the subdirectories (with write permission) in the global zone, as shown in the following example:
- b. Configure the `/usr/bin` and `/usr/local` subdirectories (with read-write permission) for the non-global zone to use the subdirectories created above in the global zone, as shown in the following example:

```
bash-3.00# mkdir -p /export/zones/test-zone/local
bash-3.00# mkdir -p /export/zones/test-zone/bin

bash-3.00# chmod 700 /export/zones/test-zone/local
bash-3.00# chmod 700 /export/zones/test-zone/bin
```

```
bash-3.00# zonecfg -z test-zone
zonecfg:test-zone> add fs
zonecfg:test-zone:fs> set dir=/usr/local
zonecfg:test-zone:fs> set special=/export/zones/test-zone/local
zonecfg:test-zone:fs> set type=lofs
zonecfg:test-zone:fs> set options=[rw,nodevices]
zonecfg:test-zone:fs> end
zonecfg:test-zone> verify
zonecfg:test-zone> commit
zonecfg:test-zone> exit

bash-3.00# zonecfg -z test-zone
zonecfg:test-zone> add fs
zonecfg:test-zone:fs> set dir=/usr/bin
zonecfg:test-zone:fs> set special=/export/zones/test-zone/bin
zonecfg:test-zone:fs> set type=lofs
zonecfg:test-zone:fs> set options=[rw,nodevices]
zonecfg:test-zone:fs> end
```



```
zonecfg:test-zone> verify
zonecfg:test-zone> commit
zonecfg:test-zone> exit
```

- c. Copy all binaries to the newly created `/usr/bin` subdirectory for the non-global zone to ensure that the non-global zone boots properly, as shown in the following example:

```
bash-3.00# cp -rp /usr/bin/* /export/zones/test-zone/bin
```

2. For ECP connections to work properly in non-global zones, `proc_priocntl` privileges must be specified within the zone, as shown in the following example:

```
bash-3.00# zonecfg -z test-zone
zonecfg:test-zone> set limitpriv="default,proc_priocntl"
zonecfg:test-zone> verify
zonecfg:test-zone> commit
zonecfg:test-zone> exit
```

See the [Sun Solaris Platform Notes](#) section of the *Calculating System Parameters for UNIX and Linux* appendix for more information.

4.7.10 SUSE Linux

The following considerations may apply to your environment:

- The default shared memory limits (`shhmax` and `shmall`) on SUSE Linux 32-bit platforms are too small for Caché, and can be changed in the `proc` file system without a restart.
- If you configure your instance to lock the shared memory segment in memory to prevent paging, you must raise the `memlock` limit.
- To use Kerberos on the SUSE Linux platform, you must install the `krb5-devel` package in addition to the `krb5-libs` package. Installing `krb5-devel` establishes the required symbolic links for using Kerberos. The package is required for production environments, not only development environments. See the [Novell SUSE Linux](#) Web site for more information about these components.

See the [SUSE Linux Platform Notes](#) section of the *Calculating System Parameters for UNIX and Linux* appendix for detailed configuration information.

5

Installing Caché on Mac

This chapter describes how to install Caché on a Apple Mac OS X system. It assumes that you are familiar with Mac directory structures, utilities, and commands. This chapter contains the following major sections:

- [Installation Requirements](#)
- [Caché Installation](#)
- [Caché UNIX-based Installation](#)

5.1 Installation Requirements

This section describes the hardware and software requirements for installations of Caché.

Important: To install Caché in a directory with the FileVault feature enabled, you must use the UNIX-based installation and follow the procedure described in the [Using FileVault](#) section.

5.1.1 Disk Space Requirements

A standard Caché installation that includes support for Caché Server Pages (CSP), needs approximately 395 MB (megabytes) of disk space depending on the type of installation you choose.

5.1.2 Supported Platforms and Web Servers

The latest version of Caché is supported on the Apple Mac OS X operating system on Intel. For Mac OS X, the Caché Server Pages (CSP) technology is supported on the Apache Web server. See the [Supported Platforms](#) document for specific supported versions.

If using CSP, you must install the Web server before installing Caché for the installation to configure the Web server. Its support on each operating system is dependent on the operating system vendor and is subject to change. See the [Web Server Configuration](#) section of the “CSP Configuration” chapter of the *Using Caché Server Pages* guide for more information.

5.2 Caché Installation

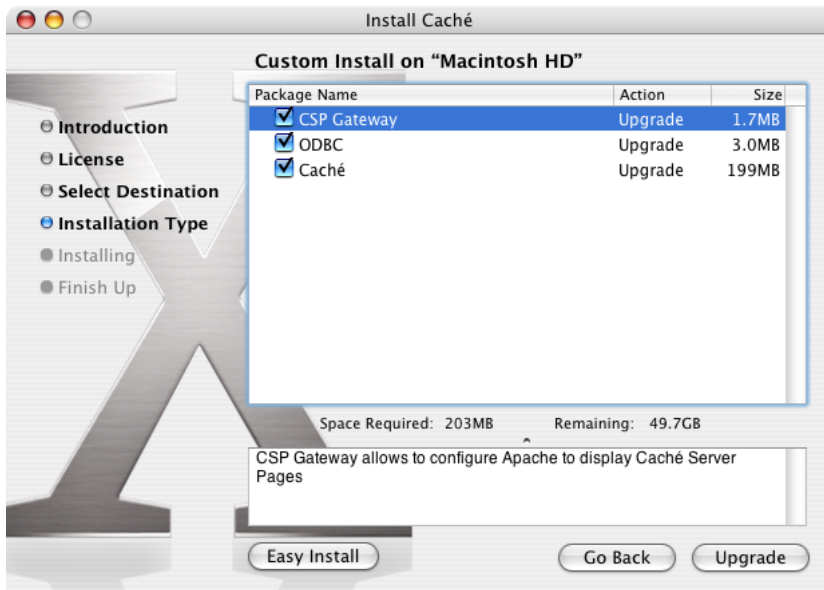
In most cases, the Caché installation is much like installing other software products on the Mac operating system and does not require an archive file. For cases where you are installing multiple instances of Caché on one machine or you require custom install options, see the [Caché UNIX-based Installation](#) section for detailed instructions. Otherwise, the procedure is straightforward:

1. Obtain the Caché disk image file (with a .dmg extension) from InterSystems.
2. If the source is on a DVD, it automatically mounts and displays a window containing the image file, `Cache_macosx_2008.2.0.500.0.dmg`, for example. Double-click the file to open a Finder window.
3. The new window displays two files: `Cache.mpkg` and a `Packages` directory. Double-click `Cache.mpkg` to start the installation.
4. The **Welcome to Caché Installer** window displays. The six steps involved in a Caché installation appear on the left-hand side of the window:



Click **Continue** to begin the Caché installation.

5. The Caché Software License Agreement displays. You must click **Agree** to accept the license agreement before you can **Continue**.
6. Select the Macintosh HD volume as the destination and click **Continue**.
7. Next, choose the installation type. If there are no instances of Caché on this machine, this is a new install, otherwise it is an upgrade. You may choose an **Easy Install** or a **Custom Install**.



8. For a custom install, choose any or all of the following components:
 - CSP Gateway (required to use the System Management Portal and view Caché online documentation)
 - ODBC
 - Caché Database Engine

Clicking **Easy Install** installs all the components. If you plan to use this node only as a client, you may not need to install the Caché database engine.

9. After choosing the installation type, click **New** or **Upgrade** (only the applicable button appears). The install begins after asking you to authenticate that you have the correct privileges to install Caché. Enter your name and password and click **OK**.
10. As the installation completes, you see various messages with a progress bar and finally the “Software installed successfully” message. The installer places Caché in the /Applications/Cache folder and runs from port 1972 or the first available subsequent number equal to or higher than 56773. It names the instance CACHE. Caché starts when the installation completes.

Caché also installs scripts into /Library/StartupItems/Cache to start Caché on OS startup and to allow you to start, stop, and restart Caché using the Mac OS X built-in service utilities.

5.2.1 System Management Portal

You can manage your Caché instance using the System Management Portal, which is accessible from your Web browser; go directly to the System Management Portal URL:

`http://machine:port/csp/sys/UtilHome.csp`, where *machine* is the IP address of your system (such as `localhost`) and *port* is the port number of the private Web server installed by Caché, (defaults to port 57772 or the first available subsequent number).

For example, the default location on the local server of a single installation of Caché is <http://localhost:57772/csp/sys/UtilHome.csp>.

For more information on this management tool, see the “Using the System Management Portal” chapter of the *Caché System Administration Guide*.

5.2.2 Uninstall Caché

To uninstall a Caché instance that was installed with the Mac OS X installer, perform the following from the terminal as `root`:

```
cd /Applications/Cache          ; ./cstop
rm -rf /Applications/Cache
rm -rf /Library/Receipts/CacheEngine.pkg
rm -rf /Library/Receipts/CacheODBC.pkg
rm -rf /Library/Receipts/CacheCSPGateway.pkg
rm -rf /Library/Receipts/CacheDevelopment.pkg

ccontrol delete Cache
```

5.3 Caché UNIX-based Installation

The alternative installation of Caché on the Mac OS X is much like the installation on any UNIX-based platform. To install Caché, log in as user ID `root`. It is acceptable to `su` (super user) to `root` while logged in from another account.

Once you are logged into your operating system, obtain the installation kit either on a DVD which mounts automatically or from InterSystems in a compressed archive file. The Mac OS X tool, StuffIt Expander, automatically uncompresses the archive file and leaves the install files on the desktop. Continue with the following instructions:

1. Before installing Caché, see the [Adjustments for Large Number of Concurrent Processes](#) section if it applies to your system.
2. To install Caché in a directory with the FileVault feature enabled, you must use the UNIX-based installation answering the prompts as described in the [Using FileVault](#) section.

3. Follow the instructions in the [Run the Installation Script](#) section and subsequent sections of the “Installing Caché on UNIX and Linux” chapter of this guide.

5.3.1 Adjustments for Large Number of Concurrent Processes

Make the following adjustments if you are running a system that requires a large number of processes or telnet logins:

1. *Remote connections* — The number of pty (pseudo terminal) connections is limited to 128 system-wide. This is a hard, non-expandable limit. If your applications count on telnet or other pty-using connections for users to access, keep this in mind.
2. *Number of processes* — If the pty limit is not a problem, but you need to run a larger number of processes, there are limits to that as well.
 - *System-wide process limits* — The *kern.maxproc*, *kern.maxprocperuid* parameters are set to 532 and 100 by default. You can change them using the following commands:

```
administrator$ sudo sysctl -w kern.maxproc=2500
kern.maxproc: 2065 -> 2500
administrator$ sudo sysctl -w kern.maxprocperuid=2500
kern.maxprocperuid: 2000 -> 2500

administrator$ sysctl -a | grep maxproc
kern.maxproc = 2500
kern.maxprocperuid = 2500
```

Note, however, that 2500 is the absolute unchangeable upper limit.

- *Process family limit* — On Mac OS X 10.4, an additional *maxproc* limit on the number of descendants of a shell is set to 100. You can change it with the **ulimit** command. For example:

```
prod1:~ root# ulimit -u unlimited
prod1:~ root# ulimit -a
...
max user processes          (-u) 2068
```

This parameter has a hard limit of 2068. Use the **ulimit** command with **bash** and the **limit** command with **csh**.

Note: The process family limit does not apply to Mac OS X 10.5.

5.3.2 Using FileVault

FileVault is a Mac OS X optional feature that encrypts the entire contents of your home directory.

Due to the nature of Mac OS X FileVault, the **setuid** and **setgid** executables do not actually change the effective user ID and group ID of the executable. The result is that in a FileVault Caché installation, many files are left with **root** as owner.

The user ID and group ID for every file must match the user ID and group ID of the owner of the FileVault volume. You can do this using the Personal Database install option. At the indicated prompts in the install dialog, answer as directed:

1. At the setup type prompt, select a Custom install.
2. At the initial security settings prompt, select Normal or Locked Down security.
3. At the owner of the instance prompt, enter your user ID.
4. At the group prompt, enter your group ID.
5. Answer Yes to the following install prompt:

Do you want to configure additional security options?

6. Answer Yes to the following install prompt:

Do you want to configure a Personal Database?

7. You must start Caché manually after the installation, because root should not run the database after installation. Only the owner of the database may manage the database, or login as a user.

Important: If you attempt to install Caché into a subdirectory of a home directory with this option enabled and do not follow these instructions, everything may appear to work; but, in fact, the **setuid** functions that Caché requires to allow a user in the appropriate group to start and stop Caché and to permit a user to connect to Caché will fail without reporting errors.

A

Calculating System Parameters for OpenVMS

This document is part of “[Installing Caché on OpenVMS](#).” It explains how you can calculate the best parameter values for your system.

For optimal Caché performance, you need to calculate proper values for certain Caché system parameters. These values allow you to determine whether you need to adjust certain OpenVMS system parameters. The values you choose should minimize swapping and paging that require disk access, and thus improve system performance.

Review this section carefully and calculate the proper values for both your operating system and Caché before proceeding. Use the [OpenVMS Parameter Calculator](#) and the tables provided here to record the current and calculated values for your system parameters. You can then refer to these tables when you install Caché. After your system is running, you may need to adjust these values to gain optimal performance.

If you are not already familiar with the memory organization at your operating system level, consult the appropriate system documentation and read the overviews of process and physical memory allocation provided in the next few sections:

- [OpenVMS Process Memory Organization](#)
- [OpenVMS Page Organization](#)
- [OpenVMS Physical Memory Allocation](#)
- [How Caché Uses OpenVMS Memory](#)

Once you are familiar with OpenVMS memory organization, use the following sections to tune the parameters for Caché:

- [Calculating OpenVMS Parameters](#)

- [Analyzing the Calculation Results](#)

A.1 OpenVMS Process Memory Organization

An OpenVMS process is any entity that can be scheduled. It may be interactive or run as a batch process. If the OpenVMS process creates subprocesses, that process and all its subprocesses together are called a job.

Many operating system tasks are OpenVMS processes. All processes, whether they are interactive, batch, or operating system-specific, share the structures that this section discusses. OpenVMS can run several processes concurrently. Depending on the size of your computer, OpenVMS could be running between 4 and 1,000 or more simultaneous processes.

Each process uses a share of physical memory, where it stores certain process-specific operating system information, any code the process is using, and any data that it uses or generates. For example, if a programmer edits a routine with an OpenVMS editor, OpenVMS loads the editor into memory, allocates space for the editor's buffers and variables and loads all or a portion of what is being edited into memory.

A.1.1 Shared Memory and Caché

Sometimes code or data is available to more than one process. The editor is one example of this type of code. Another example is the code for Caché and some of the data created with Caché.

Any piece of code or data that several processes can share is stored in a shared section of memory. Shared sections are created by the first user of a system, or during system initialization. They are then made available to subsequent users of that system rather than being duplicated and stored with each individual process.

Caché system code, global buffers, and routine buffers are stored in shared sections of memory.

A.1.2 How OpenVMS Measures Process Memory

OpenVMS measures the code and data area that a process requires in *pages*. Shared sections are also measured in pages, sometimes called shared or global pages.

On OpenVMS systems, page size is not fixed. Normally, it is 8192 bytes. Each page is divided into *pagelets* that are 512 bytes long.

A.2 OpenVMS Page Organization

Sometimes a process needs to access many more pages than can fit within the physical memory allocated to the process. When this situation arises, OpenVMS stores the extra pages on disk. The operating system keeps only the most active, or most recently used, pages in memory. The total of all the pages of a process, whether they are stored in memory or on disk, is called the *virtual memory set* of the process. The pages currently stored in memory are called the *physical working set* of the process, often called *working set*. The status of each page is kept in the process's working set list.

OpenVMS keeps track of free pages available to processes in a free page list. It also keeps a modified page list, which tracks pages that have been changed by a process and must be written to disk before being made available on the free page list.

Sometimes a process needs access to a page not currently in its physical working set. When this happens, OpenVMS searches two places for that page. First, OpenVMS looks in the modified and free page lists, because the page might still be available in physical memory. If the page does not appear on either of these lists, OpenVMS then retrieves the page from disk.

When OpenVMS must retrieve a page, the process has incurred a *page fault*. When the new page is in the modified or free page list, the page fault is called a *soft page fault*. When the page is only available on disk, the page fault is called a *hard page fault*. While OpenVMS retrieves the page from disk, the process becomes inactive. It remains in a page fault wait state until OpenVMS has successfully retrieved the necessary page. The length of time that this procedure requires varies according to the size of the disk, its rotation speed, and the load on the system.

When OpenVMS retrieves the new page, it places one of the current working set pages in the modified or free page list. OpenVMS chooses a page that the process has not used recently.

You can minimize soft page faults by setting the OpenVMS process parameters *WSDEFAULT*, *WSQUOTA*, and *WSEXTENT* appropriately for each process.

Note: The Caché **SETQUOTA** utility lets you modify the default values of quota parameters for jobbed processes, including the network daemons and job servers. **SETQUOTA** can be set to run automatically during multiuser startup, or interactively after startup.

A.3 OpenVMS Physical Memory Allocation

In OpenVMS, you use the **SYSGEN** utility to set system limits on process memory use. You can then set process-by-process (user-by-user) limits with the **AUTHORIZE** utility.

The following table describes the OpenVMS system parameters that affect the memory available to the working set of a process.

OpenVMS Working Set Parameters

Parameter	Definition
WSDEFAULT	Initial size of the working set in 512-byte pagelets.
WSQUOTA	Maximum guaranteed amount of physical memory, in pagelets, that OpenVMS allocates to a given process. WSQUOTA is limited by the value of the SYSGEN parameter WSMAX. If WSQUOTA is larger than WSMAX, the user only has access to the amount of memory in WSMAX.
WSEXTENT	Indicates the maximum amount of physical memory which the process can own. The amount WSEXTENT less WSQUOTA is called “borrowed” memory, which is only allocated to the process if the system's current free list size exceeds the amount specified in the parameter BORROWLIM.
WSINC	The number of pagelets by which the working set size of a process is increased when it needs to grow.
WSDEC	The number of pagelets by which the working set size of a process is decreased when it needs to be reduced in size.
BORROWLIM	Minimum number of pagelets that must be in the free page list before a process can borrow pages in WSINC amounts up to WSEXTENT pages.
PFRATH (Page Fault Rate High)	Indicates the number of page faults that must occur within the period specified by AWSTIME, before OpenVMS makes an “automatic working set adjustment” to increase the working set by WSINC.
PFRATL (Page Fault Rate Low)	If the number of page faults is less than this value, OpenVMS makes an “automatic working set adjustment” to decrease the working set by WSDEC, but not below the point set by AWSMIN.

Note: While parameters have units of pagelets, OpenVMS allocates memory in pages. For this reason, the parameter values you choose should be even multiples of the number of pagelets per page. OpenVMS automatically rounds these parameters if you do not follow this guideline.

A.3.1 Default Memory Allocation

The following steps summarize the algorithm OpenVMS uses to determine the amount of physical memory available to each process. Each capitalized term represents a system parameter that OpenVMS uses in allocating physical memory.

1. The process begins executing an image. OpenVMS allocates to it the number of pagelets specified by the quota parameter *WSDEFAULT*.

```
Page Allocation:
0--->WSDEFAULT
```

2. If the process has a higher page fault rate than *PFRATH*, OpenVMS allocates more pagelets to it. OpenVMS allocates these pagelets in increments of *WSINC* until the process has *WSQUOTA* total pagelets.

```
Page Allocation:
0--->WSDEFAULT-->WSINC-->WSINC-->WSQUOTA
```

3. If the process continues to have a high page fault rate and the free list size exceeds *BORROWLIM*, OpenVMS will continue to allocate pagelets in *WSINC* blocks until the free list size is inadequate or *WSEXTENT* is reached.

```
Page Allocation:
0-->WSDEFAULT-->WSINC-->WSQUOTA-->WSINC-->WSEXTENT
```

4. If the process's page fault rate drops below *PFRATL*, OpenVMS removes pages from the working set in increments of *WSDEC* until the page fault rate exceeds *PFRATL*.
5. When the process exits the image, it loses these additional pages. For example, consider a monthly batch payroll job. When you run it in July, it begins execution at *WSDEFAULT*, and gains pages until it reaches *WSEXTENT*. When you run it in August, it again begins execution at the default value of *WSDEFAULT*.

See your OpenVMS documentation for more on the OpenVMS page allocation scheme.

A.3.2 Process Control of Memory Allocation

OpenVMS provides several facilities to alter working set parameters on a process-by-process or user-by-user basis. The following table summarizes these methods:

Working Set Control

Type of Process	Method of Working Set Control
Users	The AUTHORIZE utility lets you change the default working set on a user-by-user basis.
Interactive Processes	The DCL command SET WORKING_SET allows interactive processes to change working set parameters.
Batch Processes	The SUBMIT command qualifiers for working sets allow batch processes to alter physical memory allocations.
Batch Queues	You can use the DCL command INITIALIZE/QUEUE to alter working set parameters for batch queues.

A.3.3 Keeping Memory Free for New Processes

Memory is finite. Every time a new process begins under OpenVMS, it takes *WSDEFAULT* pages away from the total number of available pages. The remaining memory is available for the free page list and for *WSINC* additions to each process's allocation.

Heavily loaded systems can run so many concurrent processes that the number of pages remaining for use in the free page list becomes very small. OpenVMS includes a parameter called *FREELIM* that sets a lower limit for the number of pages in the free page list.

The size of the free and modified page lists directly affects the ratio of hard page faults to soft page faults. Hard page faults cause a process to experience a resource wait state, resulting in slow execution. For better performance, it is important to tune the system to minimize hard page faults. While soft faults are less expensive, an excessive soft page fault rate can also lead to poor performance.

Whenever OpenVMS detects that the size of the free page list falls below *FREELIM*, OpenVMS starts a mechanism to bring the free list size up to *FREEGOAL*. To achieve this, if all other mechanisms are inadequate, OpenVMS may move the entire working set of an inactive process out to disk. This procedure is called *swapping*. The process placed on disk is swapped out. When the process is brought back into memory, it is swapped in. Swapping has a detrimental effect on overall system performance.

A.3.4 Allocation for Shared Sections

OpenVMS uses a slightly different approach for allocating memory for shared code and data. The *GBLSECTIONS* parameter sets the number of shared sections to be allocated when the system is started. The *GBLPAGES* parameter sets the number of global page table entries. Every group of 128 page entries requires 4 bytes of resident memory. In addition, OpenVMS uses the *GBLPAGFIL* parameter to set the maximum number of page file blocks available for global pages.

A.4 How Caché Uses OpenVMS Memory

Caché uses both shared memory and memory private to each process when running on OpenVMS. It uses the following techniques to increase performance:

- [Balancing Memory Locking and Paging](#)
- [Using Process-Private Space to Reduce Paging](#)
- [Using Resident Memory](#)

A.4.1 Balancing Memory Locking and Paging

All Caché code is shared, and can be physically locked in memory. The same is true for the global and routine buffer pools.

If a routine is larger than the locked portion of a routine buffer, only a portion of the routine in the routine buffer is locked in memory. The remainder of the routine is loaded into unlocked physical memory.

Locking shared data and routines in memory allows better response time since memory access is quicker than disk access. As a result, the more globals and routines that are kept in memory, the better. Memory, however, is a finite resource. The more global and routine buffers that are allocated, the less memory is available for OpenVMS processes. When less memory is available, more OpenVMS paging occurs.

The goal, therefore, is to choose a number of global and routine buffers that lets you keep enough globals and routines in memory without negatively affecting OpenVMS paging. This document provides guidelines for selecting these values.

A.4.2 Using Process-Private Space to Reduce Paging

Every Caché process maps to the shared memory sections, but it also has access to a private area of memory called process-private space. This private area includes variables, arrays, stacks, and other data structures that belong to a particular process.

A portion of this private area of memory may be locked into the process working set to reduce paging. None of the private area, however, is physically locked in memory.

A.4.3 Using Resident Memory

The OpenVMS platform makes use of the Reserved Memory Registry, a mechanism for reserving memory within memory-resident sections. The two features that Caché supports, memory-resident global sections and shared page tables, are always used as a pair.

The advantages of using a memory-resident global section mapped via a shared page table for the shared memory requirement are:

- Access to the pages in a memory-resident global section is not charged against the process's pagefile quota nor the working set quota. Also, when a process maps to a memory-resident global section and references the pages, it does not use the process's working set list, so process quotas may often be reduced.
- Shared page tables enable two or more processes to map to the same physical pages without each process incurring the overhead of page table construction, page file accounting, and working set quota accounting. Internally, shared page tables are treated as a special type of global section and are specifically used to map pages that are part of a memory-resident global section.
- There is only one copy of the global buffer pool page table on the system, which conserves physical memory and speeds up mapping the global section into a new process. Shared page tables dramatically reduce the database server startup time because server processes can map memory-resident global sections hundreds of times faster than traditional global sections. This increases overall system capacity and decreases response time to client requests.

Caché uses one shared memory section; it is either a traditional global section, a memory-resident section, or a reserved (also resident) named memory section. Caché uses a memory-resident section, with shared page tables, any time the total shared memory requirement is greater than 5MB.

A.5 Calculating OpenVMS Parameters

The accompanying OpenVMS Parameter Calculator offers good starting values for both Caché and OpenVMS parameters. Later, if your system is not functioning as well as you would like, you can adjust these parameters to achieve optimal performance. The following sections describe the process of determining OpenVMS parameters:

- [Determine Parameter Calculator Input Values](#)
- [Record Current OpenVMS Parameter Values](#)
- [Use the Caché OpenVMS Parameter Calculator](#)
- [Analyzing the Calculation Results](#)

You may want to print out the tables that follow so that you can record the relevant values.

A.5.1 Determine Parameter Calculator Input Values

This section helps you find appropriate values for the fields that control the number of processes and the number of global and routine buffers used by Caché. You need to determine these values, so that you can use the Parameter Calculator to compute both Caché and OpenVMS parameters accurately.

During installation you can set these and other Caché parameters, or you can retain default values. If you find later that your system needs tuning, you can adjust the values at any time using the System Management Portal. You need to restart Caché for most parameter changes to take effect.

As you determine the values for these fields, also record them in the *Input to OpenVMS Parameter Calculator Table*:

- [Determine Number of Processes](#)
- [Determine Size of Routine Cache](#)
- [Determine Number of Global Buffers Per Process](#)

Important: A bug exists in the OpenVMS operating system when attempting to allocate resident global buffers if insufficient space is available. To prevent Caché from hanging at startup, it is best to calculate the specific memory needs of your system and manually enter these values on the **[Home] > [Configuration] > [Memory and Startup]** page of the System Management Portal or in the configuration (cache.cpf) file itself.

A.5.1.1 Determine Number of Processes

Before you can determine how many global and routine buffers Caché should allocate at startup, you must first determine the maximum number of Caché processes that run on your system at one time.

Every user in Caché constitutes one Caché process. Every Caché **Job** command creates a process. You should consider any process that appears on the %SS system status display, except the system processes **Garbage Collector** and **Write daemon**. As a rule of thumb, use the number of processes called for in your Caché license for this value; it cannot exceed your license limit.

Enter the value in the **Number of Processes** field in the parameter calculator.

A.5.1.2 Determine Size of Routine Cache

Each routine buffer holds one and only one routine at a time. Many processes can share a routine buffer. Thus, when a process switches from one Caché routine to another, it merely accesses the other routine in another buffer. When no process is currently accessing a buffer, the buffer is returned to the pool of free buffers, and a new routine can be loaded into the empty buffer as it is required by another Caché process. If all buffers are occupied when Caché needs to load a routine, it chooses the least recently used (LRU) buffer, not the least frequently used (LFU) buffer. Allowing more buffers enhances performance.

The nature of the application influences the appropriate number of buffers. If many users access a small number of routines, a relatively small number of buffers will suffice for optimum response time. Conversely, an application with a large number of routines will benefit from a large number of buffers.

The parameter calculator starts with a default value for the number of routine buffers. This default is based upon a medium-sized site. You can enter a different value for this parameter in the **Routine Buffer Pool** field in the parameter calculator based on the specifics of your site.

Note: If you prefer to enter a value in this field with an MB unit of measure, this value is used for the **Memory for Routine Cache (MB)** field in the **Calculation Result** section and also in calculations involving routine buffers; it is not recalculated.

A.5.1.3 Determine Number of Global Buffers Per Process

The parameter calculator assumes the global buffers are 8 KB in size. The calculator starts with recommended “rule of thumb” values for clustered and nonclustered systems.

If your system is memory-poor, you can reduce this value. Do not, however, decrease it below a multiple of 32 KB per process.

Using more global buffers helps the performance of most sites. You can use the statistics produced by the **^GLOSTAT** utility to determine if adding more global buffers will reduce disk access and thereby improve performance.

A.5.2 Record Current OpenVMS Parameter Values

Every system has memory needs other than those for Caché. For example, there are memory requirements for computer language layered products as well as for OpenVMS itself. To analyze these requirements for your system, use the following procedures to display the values of the indicated parameters prior to installing Caché.

Note: If you are performing an upgrade, shut down Caché to get accurate numbers.

1. Run the OpenVMS **SYSGEN** utility to display the current value of each parameter listed in the *OpenVMS System Parameter Values Table*.

```
$ SET DEF SYS$SYSTEM
$ RUN SYSGEN
SYSGEN> USE CURRENT
SYSGEN> SHOW parameter-name
```

2. Run the OpenVMS **SYSGEN** utility to display the current value of the process parameters listed in the *OpenVMS Process Parameter Values Table*.

```
$ SET DEF SYS$SYSTEM
$ RUN SYSGEN
SYSGEN> USE CURRENT
SYSGEN> SHOW/PQL
```

Alternatively, you may run the OpenVMS **AUTHORIZE** utility to display the current value of the user authorization file (UAF) parameters for each user account that uses Caché:

```
$ SET DEF SYS$SYSTEM
$ RUN AUTHORIZE
UAF> show user-name
```

You must then set the UAF records for all of the user accounts individually once the calculator returns the minimum recommendations for these values.

A.5.3 Use the Caché OpenVMS Parameter Calculator

This section describes how to use the Caché OpenVMS Parameter Calculator. This tool is an interactive HTML document that provides up-to-date calculations for the OpenVMS parameters required by Caché. The default values provide reasonable numbers for a medium sized installation. InterSystems experts are available to provide additional help configuring and tuning Caché for your site.

Perform the following steps to retrieve parameter values:

1. Choose whether you are calculating parameters for a clustered system. If you select **Yes**, you receive both the cluster master values and values for any additional nodes; otherwise, the tool calculates values for a single node.
2. As input to the OpenVMS Parameter Calculator use the values you determined in the previous section for the following fields:

Input to OpenVMS Parameter Calculator

Parameter	User-supplied value
Number of Processes	
Routine Buffer Pool	
Global Buffers per Process	

3. Access the Caché [OpenVMS Parameter Calculator](http://localhost:57772/csp/docbook/GCI_vmsparmcalc.html) to calculate the necessary parameter values at:

http://localhost:57772/csp/docbook/GCI_vmsparmcalc.html

4. Fill in the values returned by the calculator in the appropriate tables in the following section, [Analyzing the Calculation Results](#).

A.6 Analyzing the Calculation Results

The results from the calculator are suggested values; treat them as a guideline. You may need to adjust settings to balance and maximize system performance, depending on your site's hardware and software configuration. The following sections describe the categories of calculator output values:

- [Update Caché Parameters](#)
- [Update OpenVMS System Parameters](#)
- [Update Resident Memory](#)
- [Update OpenVMS Process Parameters](#)

A.6.1 Update Caché Parameters

The following values are for Caché parameters that you can update during the installation or by using the System Management Portal from a Web server after you install Caché.

Output Caché Parameters

Parameter	Calculated value
Number of Global Buffers	
Memory for Database Cache (MB)	
Memory for Routine Cache (MB)	

Update the memory cache settings using the **[Home] > [Configuration] > [Memory and Startup]** page of the portal. Click **Manually** for the **Configure Memory Settings** option, so that you can enter the values recommended for your system.

A.6.2 Update OpenVMS System Parameters

The system parameter values computed by the OpenVMS Parameter Calculator are the amounts you need to add to your current OpenVMS system to make it ready to run Caché. Caché will consume this much memory, so evaluate your system to make sure that there is the proper amount of memory available.

Use this table to help you combine the required amounts returned by the calculator with your current system values. Update these parameters by using the **SET** command of the OpenVMS **SYSGEN** utility.

OpenVMS System Parameter Values

Parameter	Current value	Required Caché amount	Resulting value
BALSETCNT			
MAXPROCESSCNT			
GBLPAGES			
GBLPAGFIL			
GBLSECTIONS			
SYSMWCNT			
LOCKIDTBL			
RESHASHTBL			

The parameter calculator also provides the following values:

- *Cache Fixed SHMEM req* — a fixed value used in the calculator computations; it is for informational purposes only.
- *Resident Memory requirement* — total shared memory required by this Caché instance, including an amount for the generic memory heap ([gmheap](#)) for a standard installation. If you increase *gmheap*, you may need to increase the resident memory requirement.

Caché does not require you to reserve a named memory-resident section; see the [Update Resident Memory](#) section for details.

A.6.3 Update Resident Memory

If the total required shared memory is more than 5 MB (true of most installations), Caché automatically allocates all memory from resident memory. Caché does not require you to reserve a named memory-resident section, but be sure to update the *GBLPAGES* and *GBLPAGFIL* parameters as the calculator indicates. Although this memory is not pageable, OpenVMS requires sufficient *GBLPAGFIL* and still deducts *GBLSECTION* pages.

In OpenVMS, reserved sections can be either named sections that you create with **SYSMAN** and have a fixed size or resident sections, which include reserved sections, but can also be “anonymous.”

The following are the advantages of reserving a named section:

- On a system with multiple instances, the named sections reserve memory for the various instances; therefore you are certain the memory is available.

- The memory in a named section is physically contiguous and therefore can be mapped by a single *granularity hint region*; this may result in better performance.

The drawback to creating a named reserved section is that if you want to increase the size, you may have to restart your OpenVMS system to reconfigure the amount of space reserved for the memory-resident global section. You can reserve this space when the system starts (via **SYSMAN** and **AUTOGEN**) or you can allocate it dynamically. If you do not reserve it, when Caché requests it, there may be insufficient space available and the request fails. If Caché attempts to use a memory-resident global section and it cannot, it allocates the global buffer pool out of a non-memory-resident global section.

Use the *Resident Memory* value if you want to [Reserve a Named Memory-Resident Section](#) for Caché.

A.6.3.1 Reserve a Named Memory-Resident Section

1. Use the value returned by the OpenVMS Parameter Calculator for *Resident Memory* as the reserved memory size.
2. Use **SYSMAN** to reserve a section of memory and supply a name for the named section. You can use any name that consists of alphanumeric characters (and the underscore) and is not longer than 43 characters. The syntax for **SYSMAN** is:

```
MCR SYSMAN ! run sysman
SYSMAN> RESERVED_MEMORY ADD "Resident_Memory_Name" -
        /ALLOCATE/PAGE_TABLES/ZERO/SIZE=<size in MB>
SYSMAN> EXIT
```

3. Run **AUTOGEN** to process the Reserved Memory Registry data file which contains the information to establish your memory-resident global section. After the system is restarted, the **SYSMAN** command displays the shared memory section you reserved:

```
MCR SYSMAN ! run sysman
SYSMAN> RESERVED_MEMORY SHOW
```

4. Update the configuration file by using the System Management Portal that connects to your OpenVMS Caché instance from a Web server:
 - a. Navigate to the **[Home] > [Configuration] > [Advanced Memory Settings]** page.
 - b. In the **userresidentmem** (ResidentMemorySectionName) setting row, click **Edit**.
 - c. Enter the name you reserved in the **SYSMAN** utility (Resident_Memory_Name in the example in step 2) in the **Value** box and click **Save**.

Alternately, you can modify the Caché configuration file (cache.cpf) to use the reserved section; set the reserved memory parameter in the `[config]` section so that it reads:

```
userresidentmem=<resident memory section name>
```


The *<resident memory section name>* is the name of the section you specified in **SYSMAN** when you reserved it. For the example in step 2, the setting is as follows:

```
userresidentmem=Resident_Memory_Name
```

If you name this section, you must include the name in the configuration file.

5. Restart Caché. If it cannot use the reserved memory section, Caché displays a message and stores an error code in the SYSLOG.

If you use resident memory to map your global buffer pool, you may be able to reduce some of the system parameters, in particular, *WSMAX*. Typically OpenVMS comes with a *WSMAX* default value much larger than is required for running Caché.

A.6.4 Update OpenVMS Process Parameters

InterSystems recommends minimum values for some PQL process quota parameters. This is because Caché maintains a table, *GJOBQ*, which holds default values for many of these parameters. You must have authorized these values for Caché processes to be able to use the values in the *GJOBQ* table.

You do not need to calculate values for these parameters. The minimum suggested values appear in the OpenVMS Parameter Calculator. Enter these values in the *Recommended minimum value* column in the following table.

OpenVMS Process Parameter Values

Parameter	Current value	Recommended minimum value
ASTLM		
BIOLM		
BYTLM		
DIOLM		
FILLM		
PGFLQUOTA		
TQELM		
WSQUOTA		
WSEXTENT		
ENQLM		

If your current value for any of these parameters is less than the recommended minimum value, you should adjust the values during installation using the **SET** command of the OpenVMS **SYSGEN** utility or the OpenVMS **AUTHORIZE** utility for each user account.

B

Calculating System Parameters for UNIX and Linux

This document is part of the *Caché Installation Guide for UNIX and Linux*. This document explains how you can calculate the best parameters for your system. It is divided into two sections:

- *Determine Memory and Disk Requirements*—calculate memory requirements, swap space, disk requirements, maximum buffers, maximum users, and maximum database size.
- *Configure UNIX Kernel Parameters*—set values for tunable UNIX parameters and other platform-specific memory management issues.

For optimal Caché performance, you need to calculate proper values for certain Caché system parameters. These values allow you to determine whether you need to adjust certain system level parameters. The values you choose should minimize swapping and paging that require disk accesses, and thus improve system performance.

Review this section carefully and calculate the proper values for both your operating system and Caché before proceeding. Use the tables provided here to record the current and calculated values for your system level parameters. You can then refer to these tables when you install Caché. After your system is running, you may need to adjust these values to gain optimal performance.

If you are not already familiar with the memory organization at your operating system level, consult the appropriate system documentation.

B.1 Determine Memory and Disk Requirements

This section outlines the basic system requirements for most systems. Because these requirements vary by platform, consult your platform documentation for additional information. The specific requirements include the following:

- [Calculate Memory Requirements](#)
- [Calculate Swap Space](#)
- [Calculate Disk Requirements](#)
- [Determine Number of Global Buffers](#)
- [Determine Number of Routine Buffers](#)
- [Determine Maximum Number of Users](#)
- [Determine Maximum Database Size](#)

B.1.1 Calculate Memory Requirements

Use the breakdown of memory usage shown in the following table to calculate the memory your system needs for Caché.

UNIX Memory Requirements

Components	Memory Requirements
Operating system	1800 KB (operating system dependent)
Caché	842 KB
Global database cache	8 KB per buffer
Routine cache	32 KB per routine buffer
User overhead	1024 KB per process
Network (if present)	300 KB per port for each network system process (DMNNET, DCP, and RECEIVE). Caché ports have two DMNNET system processes per port. In addition, there is a network shared memory requirement, which depends on the number of ports and the number of remote hosts configured. For a basic system, this requirement is about 304 KB.

By default, Caché automatically allocates shared memory, including routine buffers and global buffers, to a total of one-eighth of the system available shared memory space. If you plan to run large applications or support large numbers of users, tune the system according to the following formula:

$$\begin{array}{rcl}
 & (\text{number of routine buffers}) * 32 \text{ KB} & \\
 + & (\text{number of global buffers}) * 8 \text{ KB} & \\
 + & 4 \text{ MB} & \\
 \hline
 = & \text{Shared memory needed} &
 \end{array}$$

For applications where load growth is reflected in the number of simultaneous direct Caché sessions, the memory demand to accommodate the processes increases as the computing power increases. For example, a system that is upgraded from 4 to 8 cores would be capable of supporting a much larger number of sessions (that is, processes). Since each process consumes memory, it might be necessary to increase physical memory.

Note: The amount of memory per process may vary depending on the application and can be larger than the default value recommended in the [UNIX Memory Requirements](#) table.

For configurations dedicated to servers with a limited number of processes (for example, ECP Data Server or Ensemble), an increase in the load does not necessarily involve a greater number of processes. Therefore, a larger load on a more powerful system may not require more memory for processes.

B.1.1.1 Support for Huge Memory Pages for Linux

Using pages of much larger size than default saves memory by saving space for PTE tables on the systems where these tables are not shared by processes and get allocated for each process.

To allocate Huge Pages on Linux, do the following:

1. Check the status

/proc/meminfo contains huge pages information. By default, no huge pages are allocated. Default huge page size is 2MB. For example:

```
[root@woodcrest grub]# tail -4 /proc/meminfo
HugePages_Total:      0
HugePages_Free:       0
HugePages_Rsvd:       0
Hugepagesize:        2048 KB
```

2. Change the number of huge pages.

You can change the system parameter directly: For example, to allocate 2056 Huge Pages, execute:

```
# echo 2056 > /proc/sys/vm/nr_hugepages
```

Note: Alternatively, you can use **sysctl(8)** to change it:

```
# sysctl -w vm.nr_hugepages=2056
```

Huge pages must be allocated contiguously, which may require a reboot. Therefore, to guarantee the allocation, as well as to make the change permanent, do the following:

- a. Enter a line in /etc/sysctl.conf file:

```
echo "vm.nr_hugepages=2056" >> /etc/sysctl.conf
```

- b. Reboot the system.
- c. Verify **meminfo** after reboot; for example:

```
[root woodcrest grub]# tail -4 /proc/meminfo
HugePages_Total: 2056
HugePages_Free: 2056
HugePages_Rsvd: 0
Hugepagesize: 2048 KB
```

3. Verify the use of Huge Pages by Caché.

```
Allocated 3580MB shared memory: 3000MB global buffers, 226MB routine buffers
```

The amount of memory available in Huge Pages should be greater than the total amount of shared memory to be allocated; if it is not greater, Huge Pages are not used.

After Caché is started, **meminfo** should be checked again to verify that the **HugePages_Rsvd** value is close to the total amount of shared memory.

Note: It is not advisable to specify **HugePages_Total** much higher than the shared memory amount because the unused memory will not be available to other components.

B.1.2 Calculate Swap Space

The amount of swap space available on your system should never be less than the amount of real memory plus 256 KB.

With this minimum in mind, InterSystems recommends the following value as the minimum amount of swap space needed for Caché:

$$\begin{array}{rcl}
 & ((\# \text{ of processes} + 4)^\dagger * (1024 \text{ KB})^\dagger & \\
 + & \text{total global buffer space} & \\
 + & \text{total routine buffer space} & \\
 \hline
 = & \text{Minimum swap space} &
 \end{array}$$

[†] Add 4 to the # of processes for the Caché Control Process, the Write daemon, the Garbage Collector, and the Journal daemon. Also add 1 for each slave Write daemon. The # of processes must include all user and jobbed processes which might run concurrently. If you are running networking, add 1 for the RECEIVE system process plus the number of DMNNET daemons you have running (2 per port). If your system is a server, add the number of DCP processes that will be created when all potential clients access the server.

‡ The 1024 KB number is approximate. It is based on the current size of the Caché executable and grows with the partition size you allocate to each Caché process. On most systems, provide only as much swap space as necessary. However, some systems require you to provide swap space for the worst case. Under these conditions, you need to increase this number to as high as 1.5MB, depending on the partition size you specify.

Be sure to confirm that your UNIX system permits the amount of swap space you require. For specific information about swap space on your system, consult your UNIX operating system manual.

B.1.2.1 Solaris Swap Space

To calculate swap space for the Solaris platform:

```
swap -l
```

Example:

```
>swap -l
swapfile      dev      swaplo blocks   free
/dev/dsk/c0t2d0s0  136,0      16     526304   526304
/dev/dsk/c0t2d0s1  136,1      16    2101184  2101184
```

B.1.2.2 Tru64 UNIX Swap Space

To display swap space for Tru64 UNIX:

```
/usr/sbin/swapon -s
```

Information for each swap partition is displayed similar to the following example:

```
Swap partition /dev/disk/dsk1b (default swap):
  Allocated space:      16384 pages (128 MB)
  In-use space:         10452 pages ( 63%)
  Free space:           5932 pages ( 36%)

Swap partition /dev/disk/dsk4c:
  Allocated space:      128178 pages (1001 MB)
  In-use space:         10242 pages (  7%)
  Free space:          117936 pages ( 92%)

Total swap allocation:
  Allocated space:      144562 pages (1.10GB)
  Reserved space:       34253 pages ( 23%)
  In-use space:         20694 pages ( 14%)
  Available space:     110309 pages ( 76%)
```

B.1.2.3 AIX Swap Space

To display swap space for AIX:

```
lsps -a
Page Space  Physical Volume  Volume Group  Size %Used
Active Auto Type
hd6         hdisk2              rootvg        512 MB   72
yes yes      lv
```

B.1.2.4 HP-UX Swap Space

To display swap space for HP-UX:

```
swapinfo (3M)
# /usr/sbin/swapinfo
      KB      KB      KB      PCT      START/      KB
TYPE    AVAIL    USED    FREE    USED    LIMIT RESERVE  PRI  NAME
dev      524288   138260   386028   26%      0      -      1  /dev/vg00/lvol2
reserve    -      78472   -78472
memory  195132   191668    3464    98%
```

B.1.3 Calculate Disk Requirements

In addition to the swap space you just calculated, you need disk space for the following items:

- 67 MB for Caché.
- 3 MB for the Caché Server Pages (CSP).
- 3.5 MB for Caché ODBC support.
- 2.5 MB for the Caché manager sources.
- 6.6 MB for the Caché engine link libraries.
- 3 MB for WebLink.
- Space for your Caché application database.
- Approximately 12.5% of the buffer pool size for the initial size of the write image journal file. If your disk does not have enough space for the write image journal file, when you start Caché it displays a message indicating that the system did not start.
- Desired space for journal files.

Although you do not need to remove any installation files after completing the installation procedure, you can do so if you are short on disk space. The installation program tells you how much space can be saved, and asks if you want to delete the installation files.

B.1.4 Determine Number of Global Buffers

Caché supports the following maximum values for the number of global buffers:

- For 32-bit platforms, any combination of 2- KB and 8- KB buffers that are:
 - Less than 1 GB for HP-UX
 - Less than 2 GB for other 32-bit platforms

The 2-GB value is the total address space the operation system allocates for the process data, which includes not only shared memory, but other Caché and operating system data as well. Therefore, it represents an upper limit that is not achievable in practice.

- For 64-bit platforms:

The number of global buffers is limited only by the operating system and the available memory.

Note: Even if your configuration is using only 2- KB databases, some of the Caché databases, namely CACHESYS and CACHETEMP, are 8- KB. The system always sets aside a minimum of 200 8- KB buffers for these, regardless of what you specify. In general, increase this value, especially if you are making heavy use of Caché SQL.

Set your values to less than the maximum number of buffers.

B.1.5 Determine Number of Routine Buffers

Caché supports the following maximum value for the number of routine buffers:

65,535

Set your values to less than this maximum number of buffers.

B.1.6 Determine Maximum Number of Users

The maximum users allowed by Caché is the *lowest* of the following values:

- License limit
- # of semaphores - 4

B.1.7 Determine Maximum Database Size

The *ulimit* parameter in UNIX determines the maximum file size available to a process. For the Caché Manager group, the value of *ulimit* should either be unlimited or as large as the largest database you may have.

B.2 Configure UNIX Kernel Parameters

The following sections describe issues related to tuning and performance on various UNIX platforms:

- [Set Values for Tunable UNIX Parameters](#)

- [Adjust Maximum File Size](#)
- [Platform Configuration Issues](#)

B.2.1 Set Values for Tunable UNIX Parameters

Caché uses a configurable number of semaphores, in sets whose size you define. The parameters *SEMMNI*, *SEMMNS*, and *SEMMSL* reflect the number of semaphores per set and the total number of semaphores Caché uses. The UNIX/Linux parameters that govern shared memory allocation are *SHMMAX*, *SHMMNI*, *SHMSEG*, and *SHMALL*. Caché uses shared memory and allocates one segment of shared memory; the size of this segment depends on the area set aside for global buffers and routine buffers. It uses the following formula to determine the segment's minimum size:

$$\begin{array}{rcl} & \text{space required for routine buffers} & \\ + & \text{space required for global buffers} & \\ + & & 4 \text{ MB} \\ \hline = & \text{Shared memory segment size} & \end{array}$$

If you are distributing your data across multiple computers, Caché allocates a second segment; by default, there is no memory allocated for the second segment. (If you plan to use distributed data, contact your vendor or InterSystems support for configuration guidelines.) You can alter *NBUF* and *NHBUF* according to other system requirements. Because Caché does all its own disk buffering, you should keep *NBUF* and *NHBUF* small. The following table lists the most common names of the UNIX parameters that you may need to change, the minimum value InterSystems recommends for each parameter, and a brief description of each. Verify that your parameter values are set to at least the minimum value. Certain parameters may not be implemented on all platforms or may be referred to differently. Refer to platform-specific tuning notes for more information.

Tunable UNIX Parameters

Kernel Parameter	Recommended Minimum Value	Definition
CDLIMIT	Number of bytes in largest virtual volume	Maximum size of a file.
MSGMAX	2 KB	Maximum message size, in bytes.
MSGMNI	Number of Caché instances x 2; each Caché instance uses two message queues	Maximum number of uniquely identifiable message queues that may exist simultaneously.
NOFILES	35	Number of open files per process.

Kernel Parameter	Recommended Minimum Value	Definition
SEMMNI	Product of SEMMNI and SEMMSL must be greater than the # of user processes + 4	Number of semaphore identifiers in the kernel; this is the number of unique semaphore sets that can be active at any one time.
SEMMNS	128 or ...	Total number of semaphores in the system. User processes include jobbed processes and all other semaphores required by other software.
	Number of processes expected to run. If the process table might expand, use a larger number to provide for expansion.	
SEMMSL	See SEMMNI	Maximum number of semaphores per identifier list.
SHMALL	60 KB or ...	Maximum total shared memory system-wide. Units should be in KB. 1000 represents the MCOMMON shared region.
	1000 + total global buffer space+ total routine buffer space *	
SHMMNI	3	Maximum number of shared memory identifiers system-wide.
SHMSEG	3	Number of attached shared memory segments per process.
SHMMAX	60 KB or ...	Maximum shared memory segment size in KB.
	1000 + total global buffer space+ total routine buffer space	

* This is the minimum value for *SHMALL* required for Caché UNIX. You must also take into account any other applications that use shared memory. If you are unsure of other shared memory use, calculate *SHMALL* as *SHMSEG* multiplied by *SHMMAX*, in pages; this larger value suffices in all cases.

Important: Enough swap space must be created to support the memory allocated, unless the operating system documentation explicitly states otherwise. On certain operating systems (Solaris, for example) Caché creates *locked shared memory segments*, which are not pageable but still may need swap space.

B.2.2 Adjust Maximum File Size

The hard limit for the maximum file size (*RLIMIT_FSIZE*) on any system running Caché must be *unlimited*. When Caché runs as a user other than root, its daemons do not have the proper privileges

to set *RLIMIT_FSIZE* while running; therefore, you must set the value to unlimited on your operating system before installation. Caché also sets the process soft limit to *RLIMIT_FSIZE* in its daemons to prevent I/O errors.

Important: Caché will not install or start up if *RLIMIT_FSIZE* is not set to unlimited.

See the operating system documentation for your platform for instructions on how to set the system hard limit for the maximum file size, *RLIMIT_FSIZE*.

B.2.3 Platform Configuration Issues

The following sections contain configuration issues for some individual platforms. For more information, consult the system documentation for your platform.

- [Tru64 UNIX Platform Notes](#)
- [HP-UX Platform Notes](#)
- [AIX Platform Notes](#)
- [Red Hat Linux Platform Notes](#)
- [Sun Solaris Platform Notes](#)
- [SUSE Linux Platform Notes](#)

B.2.3.1 Tru64 UNIX Platform Notes

For the Tru64 UNIX supported releases, set the following kernel parameters to the size of all the shared memory to allocate (including space allocated for the buffer pool, routine buffers, and other data structures):

- *shm_max*
- *per_proc_address_space*
- *max_per_proc_address_space*

The following parameters are not implemented:

- *MSGMAX*
- *MSGMNI*
- *SEMMNI*
- *SEMMNS*
- *SEMMSL*
- *SHMALL*

- *SHMMNI*

SMMAX and *SMSEG* are referred to as *SHMMAX* and *SHMSEG*, respectively.

The **sysconfig -q subsystem [attribute]** command displays the current values for the attributes of the specified subsystem, or the particular attribute specified. See the Tru64 UNIX documentation entry for [sysconfig\(8\)](#) for more information.

For example:

```
>sysconfig -q ipc
msg_max = 8192
msg_mnb = 16384
msg_mni = 64
msg_tql = 40
shm_max = 268435456
shm_min = 1
shm_mni = 128
shm_seg = 32
sem_mni = 16
sem_msl = 1000
sem_opm = 10
sem_ume = 10
sem_vmx = 32767
sem_aem = 16384
max_kernel_ports = 56864
ssm_threshold = 8388608
ssm_enable_core_dump = 1
shm_allocate_striped = 1
shm_enable_core_dump = 1
```

To permanently modify the value of an attribute, use the **sysconfigdb -a -f stanza_file subsystem** command to specify the stanza-formatted file that contains the subsystem, the attribute, and the new permanent attribute value. The subsystem argument specifies the subsystem whose attribute you want to modify.

The following is an example of a stanza-formatted file that changes the permanent values of the ipc subsystem attributes *shm_max* and *sem_msl*:

```
ipc:
    shm_max = 268435456
    sem_msl = 1000
```

See [stanza\(4\)](#) and [sysconfigdb\(8\)](#) for information about stanza-formatted files.

To use the new permanent value, restart the system or, if the attribute can be tuned at run time, use the **sysconfig -r** command to change the current value (see the “Displaying and Modifying Kernel Subsystem Attributes” chapter of the *Tru64 UNIX System Configuration and Tuning* guide).

B.2.3.2 HP-UX Platform Notes

HP-UX release 11i does not implement the *CDLIMIT* and *NOFILES* parameters. However, you can tune the values of the *ulimit* and *maxfiles* parameters instead.

Important: If you tune *maxfiles* and *maxfiles_lim*, ensure that the values you set reflect the actual needs of your Caché system. Caché closes all possible open file descriptors when starting a new process via the **Job** command; setting a high value for these parameters may cause unnecessary close operations which can impact job start performance.

Use the HP *System V IPC Shared-Memory Subsystem* to update parameters. See the HP [System V Inter-Process Communication Mechanisms](#) online documentation page for additional information. To change a value, perform the following steps:

1. Enter the **/usr/sbin/sam** command to start the System Administration Manager (SAM) program.
2. Double-click the **Kernel Configuration** icon.
3. Double-click the **Configurable Parameters** icon.
4. Double-click the parameter you want to change and enter the new value in the **Formula/Value** field.
5. Click **OK**.
6. Repeat these steps for all of the kernel configuration parameters that you want to change.
7. When you are finished setting all of the kernel configuration parameters, select **Process New Kernel** from the **Action** menu.

The HP-UX operating system automatically reboots after you change the values for the kernel configuration parameters.

B.2.3.3 AIX Platform Notes

The default settings of several AIX parameters can adversely affect performance. The settings and recommendations are detailed for the following:

- [I/O Pacing Parameters](#)
- [File System Mount Option](#)
- [Memory Management Parameters](#)
- [AIX Tunable Parameters](#)

I/O Pacing Parameters

AIX implements an I/O pacing algorithm that may hinder Caché write daemons. In AIX 5.2 and AIX 5.3, I/O pacing is automatically enabled when using HACMP clustering; beginning in AIX 6.1, however, I/O pacing is enabled on all systems and the default high-water mark is set higher than in earlier releases.

If write daemons are slowing or stalling, you may have to adjust the high-water mark; for information, see the “Using Disk-I/O Pacing” section of the *AIX Performance Management Guide* at the following

IBM Web page: http://publib.boulder.ibm.com/infocenter/systems/scope/aix/topic/com.ibm.aix.prftungd/doc/prftungd/disk_io_pacing.htm.

Important: Beginning in AIX 6.1, you should not have to make any high-water mark adjustments.

If you have questions about the impact to your system, however, contact the [InterSystems WRC Performance Team](#) or your AIX supplier before making any changes.

These recommendations are independent of Caché versions and apply to both JFS and Enhanced JFS (JFS2) file systems.

File System Mount Option

Although different mount options may improve performance for some workloads, InterSystems recommends the concurrent I/O (`cio`) mount option for file systems that contain only CACHE.DAT files.

Note: Non-Caché workloads that benefit from file system caching (for example, operating system-level backups and/or file copies) are slowed by the `cio` mount option.

For JFS2 file systems that contain only journal files, `cio` is strongly recommended. For information, see [UNIX File System Recommendations](#) in the “Journaling” chapter in this guide.

To improve recovery speed using the CACHE.WIJ file after a hard shutdown or system crash, InterSystems recommends a mount option that includes file system buffering (for example, `rw`) for the file system that contains the CACHE.WIJ file.

For information about **mount** options, see the *AIX Commands Reference* at the following IBM Web page: <http://publib.boulder.ibm.com/infocenter/systems/scope/aix/topic/com.ibm.aix.cmds/doc/aix-cmds3/mount.htm>.

Memory Management Parameters

The number of file systems and the amount of activity on them can limit the number of memory structures available to JFS or JFS2, and delay I/O operations waiting for those memory structures.

To monitor these metrics, issue a **vmstat -vs** command, wait two minutes, and issue another **vmstat -vs** command. The output looks similar to the following:

```
# vmstat -vs
1310720 memory pages
1217707 lruable pages
144217 free pages
    1 memory pools
106158 pinned pages
    80.0 maxpin percentage
    20.0 minperm percentage
    80.0 maxperm percentage
    62.8 numperm percentage
764830 file pages
    0.0 compressed percentage
    0 compressed pages
    32.1 numclient percentage
    80.0 maxclient percentage
392036 client pages
    0 remote pageouts scheduled
```

```
0 pending disk I/Os blocked with no pbuf
5060 paging space I/Os blocked with no psbuf
5512714 filesystem I/Os blocked with no fsbuf
194775 client filesystem I/Os blocked with no fsbuf
0 external pager filesystem I/Os blocked with no fsbuf
```

If you see an increase in the following parameters, increase the values for better Caché performance:

- *pending disk I/Os blocked with no pbuf*
- *paging space I/Os blocked with no psbuf*
- *filesystem I/Os blocked with no fsbuf*
- *client filesystem I/Os blocked with no fsbuf*
- *external pager filesystem I/Os blocked with no fsbuf*

When increasing these parameters from the default values:

1. Increase the current value by 50%.
2. Check the **vmstat** output.
3. Run **vmstat** twice, two minutes apart.
4. If the field is still increasing, increase again by the same amount; continue this step until the field stops increasing between **vmstat** reports.

Important: Change both the current and the reboot values, and check the **vmstat** output regularly because I/O patterns may change over time (hours, days, or weeks).

See the following IBM Web pages for more detailed information:

- For a complete description of each of the fields reported by **vmstat**, see the *vmstat Command* page of *AIX Commands Reference, Volume 6, v - z* at:
http://publib16.boulder.ibm.com/doc_link/en_US/a_doc_lib/cmds/aixcmds6/vmstat.htm
- For instructions on how to increase these parameters, see the *VMM page replacement tuning* section of the *AIX Performance Management Guide* at:
http://publib16.boulder.ibm.com/pseries/en_US/aixbman/prftungd/memperf5.htm
- For a complete description of managing I/O tunable parameters, see the *ioo Command* page of *AIX Commands Reference, Volume 3, i - m* at:
http://publib16.boulder.ibm.com/doc_link/en_US/a_doc_lib/cmds/aixcmds3/ioo.htm

AIX Tunable Parameters

None of the following listed parameters requires tuning because each is dynamically adjusted as needed by the kernel. See the appropriate [AIX operating system documentation](#) for more information.

The following table lists the tunable parameters for the IBM pSeries AIX 5.2 operating system.

AIX Interprocess Communication Tunable Parameters

Parameter	Purpose	Dynamic Values
msgmax	Specifies maximum message size.	Maximum value of 4 MB
msgmnb	Specifies maximum number of bytes on queue.	Maximum value of 4 MB
msgmni	Specifies maximum number of message queue IDs.	Maximum value of 4096
msgmnmx	Specifies maximum number of messages per queue.	Maximum value of 524288
semaem	Specifies maximum value for adjustment on exit.	Maximum value of 16384
semmni	Specifies maximum number of semaphore IDs.	Maximum value of 4096
semmsl	Specifies maximum number of semaphores per ID.	Maximum value of 65535
semopm	Specifies maximum number of operations per semop() call.	Maximum value of 1024
semume	Specifies maximum number of undo entries per process.	Maximum value of 1024
semvmx	Specifies maximum value of a semaphore.	Maximum value of 32767
shmmax	Specifies maximum shared memory segment size.	Maximum value of 256 MB for 32-bit processes and 0x80000000u for 64-bit
shmmni	Specifies minimum shared-memory-segment size.	Minimum value of 1
shmnmni	Specifies maximum number of shared memory IDs.	Maximum value of 4096

B.2.3.4 Red Hat Linux Platform Notes

This topic includes the information on the following adjustments:

- [Shared Memory Limit](#)

- [Locked-in Memory](#)
- [Adjustments for Large Number of Concurrent Processes](#)

Shared Memory Limit

The default shared memory limit (*shmmax*) on Linux platforms is 32 MB. This value is too small for Caché, but it can be changed in the *proc* file system without a restart.

If the machine is being used only for Caché, InterSystems recommends setting the shared memory to approximately half the total memory.

For example, to allow 128 MB, type the following command:

```
$ echo 134217728 >/proc/sys/kernel/shmmax
```

You can put this command into a script run at startup.

Alternatively, you can use **sysctl(8)**, if available, to control this parameter. Look for a file called */etc/sysctl.conf* and add a line similar to the following:

```
kernel.shmmax = 134217728
```

This file is usually processed at startup, but **sysctl** can also be called explicitly later.

Important: The *msgmni* parameter may also be set too low if you are running more than one instance of Caché on a machine. As stated in the [Tunable UNIX Parameters](#) table, set this value to two times the number of instances of Caché that run simultaneously on your system.

Other parameters are sufficiently sized for a Caché application. To view the values of other parameters, look in the files */usr/src/linux/include/asm-xxx/shmparam.h* and */usr/src/linux/include/linux/sem.h*.

For more information, reference “[The *proc* File System](#)” chapter of the *Red Hat Enterprise Linux 4: Reference Guide*.

Locked-in Memory

On Linux platforms if you configure Caché to lock the shared memory segment in memory to prevent paging, you must increase the maximum size that may be locked into memory (the *memlock* parameter). The default value is 32 KB. View the current value using the **ulimit** command.

For example, to display all current limits:

```

bash$ ulimit -a
core file size (blocks, -c) unlimited
data seg size ( KBytes, -d) unlimited
file size (blocks, -f) unlimited
pending signals (-i) 1024
max locked memory ( KBytes, -l) 32 <----- THIS ONE
max memory size ( KBytes, -m) unlimited
open files (-n) 1024
pipe size (512 bytes, -p) 8
POSIX message queues (bytes, -q) 819200
stack size ( KBytes, -s) 10240
cpu time (seconds, -t) unlimited
max user processes (-u) 49000
virtual memory ( KBytes, -v) unlimited
file locks (-x) unlimited

```

To display only *memlock*, use the *-l* option:

```

bash$ ulimit -l
32

```

If you have privileges, you can alter the value directly using the **ulimit** command; however, it is better to update the *memlock* parameter in the */etc/security/limits.conf* file. If the *memlock* limit is too low, Linux reports a *ENOMEM* - "Not enough memory" error, which does not make the cause obvious. The actual memory is allocated; it is the lock that fails.

Adjustments for Large Number of Concurrent Processes

Make the following adjustments if you are running a system that requires a large number of processes or telnet logins.

1. In the */etc/xinetd.d/telnet* file, add the following line:

```
instances = unlimited
```

2. In the */etc/xinetd.conf* file, add or change the instances setting to:

```
instances = unlimited
```

3. After you make these modifications, restart the **xinetd** services with:

```
# service xinetd restart
```

4. The default *pty* (pseudo terminal connection) limit is 4096. If this is not sufficient, add or change the maximum *pty* line in the */etc/sysctl.conf* file. For example:

```
kernel.pty.max=10000
```

B.2.3.5 Sun Solaris Platform Notes

Depending on the size of the database cache your deployment requires, it may be necessary to increase shared memory kernel parameters. See the *Solaris Tunable Parameters Reference Manual* for specific information on Solaris tunable parameters.

The Solaris 10 release no longer uses the `/etc/system` mechanism to tune the IPC shared memory parameters. These allocations are now automatic or configured through the resource controls mechanism.

If you try to use `/etc/system` on Solaris 10, you may receive the following message:

```
* IPC Shared Memory
*
* The IPC Shared Memory module no longer has system-wide limits.
* Please see the "Solaris Tunable Parameters Reference Manual" for
* information on how the old limits map to resource controls and
* the prctl(1) and getrctl(2) manual pages for information on
* observing the new limits.
```

See “Chapter 6 Resource Controls (Overview)” of the *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* on the Sun Web site for detailed information on using the **rctladm**, **prctl**, and **projects** commands to set Solaris 10 parameters.

The following subsections summarize several important configuration and tuning guidelines for a reliable, performing deployment of Caché on the Solaris ZFS filesystem:

Note: The recommended minimum Solaris version is Solaris 10 10/08, which contains several key patches related to ZFS.

- [General ZFS Settings](#)
- [ZFS Pool Configuration and Settings](#)
- [Miscellaneous Solaris Settings](#)

General ZFS Settings

You can adjust general ZFS parameters in the `/etc/system` file as follows:

- **zfs_arc_max**

The ZFS adaptive replacement cache (ARC) tries to use most of a system's available memory to cache file system data. The default is to use all of physical memory except 1 GB. As memory pressure increases, the ARC relinquishes memory. This amount needs to be adjusted downwards for optimal Caché performance.

Typically, this amount should be restricted to roughly 10% - 20% of the available RAM. So, if a system had 32 GB RAM configured, you would set this to be either 3.2 GB (10%) or 6.4 GB (20%) by adding the following line to the `/etc/system` file:

```
- 3.2 GB:
    set zfs:zfs_arc_max=3435973837
```

```
- 6.4 GB:
    set zfs:zfs_arc_max=6871947674
```

- **zfs_immediate_write_sz**

The ZFS Intent Log (ZIL) is used during write operations, and is an integral part of the ZFS infrastructure from a data integrity perspective. The ZIL behaves differently for different write sizes — for small writes, the data itself is stored as part of the log record; for large writes, the ZIL does not store a copy of the write, but rather syncs the write to disk and only stores (in the log record) a pointer to the synced data. The value of the large write is defined by the **zfs_immediate_write_sz** configuration item, and by default is 32 KB.

Sun has indicated that there are cases where large writes can result in data integrity issues when trying to recover from a crash. Specifically, the pointer(s) to the synchronized data stored in the log record may become corrupt, thereby rendering recovery impossible.

In order to limit exposure to recovery issues, Sun has released a temporary work-around, which can be configured by adding the following line to the `/etc/system` file:

```
set zfs:zfs_immediate_write_sz=0x20000
```

This line characterizes a large write as 128 KB (as opposed to the default of 32 KB), thereby forcing all writes up to 128 KB to be written to the log record.

Note: Updates to the `/etc/system` file take effect after the next reboot.

ZFS Pool Configuration and Settings

For detailed information about the relevant commands for creating and administering pools and filesystems, see the *Solaris ZFS Administration Guide*. In addition, you should do the following:

- General Options

Turn access time updates (**atime**) off for all configured ZFS pools and file systems (**atime=off**)

Configure record size as follows:

- Database pool/file system(s): 8K (**recordsize=8K**)
- Journal pool/file system: 64K (**recordsize=64K**)
- Write Image Journal pool/file system: 256K (**recordsize=256K**)

- Separate the ZIL

The ZIL can be placed on a separate device (LUN) from the rest of the pool. The default configuration of ZFS is to place the ZIL across the same device(s) (LUNs) as the rest of the pool. Separating the ZIL to its own respective device can result in a significant performance boost, especially for the Caché Journaling.

Although the ZIL can be placed on a separate device at any time, it is best done at pool creation time with the following line:

```
# zpool create <pool> <pool_devices> log <log_devices>
```

The following Web site details other ZIL specific commands: http://blogs.sun.com/per-rin/entry/slog_blog_or_blogging_on

Miscellaneous Solaris Settings

If a driver encounters a request larger than the maximum size of physical I/O requests (**maxphys**), it breaks the request into maxphys-size chunks. This value does not need to be specified on Solaris SPARC implementations, but it should be explicitly configured on Solaris x64 systems.

To configure the maximum size of physical I/O requests, add the following line to the `/etc/system` file:

set maxphys=1048576

B.2.3.6 SUSE Linux Platform Notes

This topic includes the information on the following adjustments:

- [Shared Memory Limits](#)
- [Locked-in Memory](#)

Shared Memory Limits

The default shared memory limits (*shmax* and *shmall*) on SUSE Linux 32-bit platforms are too small for Caché, and can be changed in the `proc` file system without a restart.

Note: The recommendations to change the shared memory limits do not apply to SUSE Linux 64-bit systems.

If the machine is being used only for Caché, InterSystems recommends setting the shared memory to approximately half the total memory.

For example, to allow 512 MB, type the following commands:

```
#sets shmall and shmax shared memory
echo 536870912 >/proc/sys/kernel/shmall      #Sets shmall to 512 MB
echo 536870912 >/proc/sys/kernel/shmax      #Sets shmax to 512 MB
```

You can put these commands into a script that is run at startup. The SUSE Linux product documentation recommends you put the commands in the `/etc/init.d/boot.local` script file.

You can change the settings for the system memory user limits by modifying a file called `/etc/profile.local`. Add lines similar to the following:

```
#sets user limits (ulimit) for system memory resources
ulimit -v 512000      #set virtual (swap) memory to 512 MB
ulimit -m 512000      #set physical memory to 512 MB
```

In this same file, you can permanently change the values for the *PATH* and *CLASSPATH* parameters by adding lines similar to the following:

```
#sets env values PATH and CLASSPATH
export PATH=$PATH:/usr/cache/bin:/path/to/j2sdk/bin:/
export CLASSPATH=
    $CLASSPATH:/cache/dev/java/lib/CacheDB.jar:/path/to/otherjar/file:/
```

Important: To avoid the risk of losing your changes during system upgrades, do not change the `/etc/profile` file.

Locked-in Memory

On Linux platforms if you configure Caché to lock the shared memory segment in memory to prevent paging, you must increase the maximum size that may be locked into memory (*memlock*). Update the *memlock* parameter in the `/etc/security/limits.conf` file.

See the [Locked-in Memory](#) section of the *Red Hat Linux Platform Notes* for details.



Using the Caché Installation Parameter File on UNIX and Linux

This document is part of the [Caché Installation Guide for UNIX and Linux](#). This document explains how you can bypass user prompts in a UNIX-based installation by running an installation script that takes a parameter file as input.

The following table lists the variables in the parameters.isc file with a description and an example value or a list of valid values.

Variable name	Description (Valid values) or Example
<i>legacy_dist.source_dir</i>	Source directory of the installation media. /cachekit/package/../../
<i>product_info.version</i>	InterSystems product version number. 2008.2.0.500.0
<i>product_info.name</i>	Name of InterSystems product. (Cache/Ensemble/HealthShare)
<i>platform_selection.platform</i>	InterSystems abbreviation for install platform. lnxrh5x86 Only time this is different than platform_family is for tru64 UNIX where you indicate cluster or noncluster (clu/noclu)

Variable name	Description (Valid values) or Example
<i>platform_selection.platform_family</i>	InterSystems abbreviation for install platform family. lnxrh5x86
<i>platform_selection.endianness</i>	Platform endian byte order. (big/little)
<i>platform_selection.os</i>	Platform operating system; value of uname command. Linux
<i>posix_tools.user_add</i>	Portable Operating System Interface (POSIX)-compliant user add tool. /usr/sbin/useradd
<i>posix_tools.group_add</i>	POSIX-compliant group add tool. /usr/sbin/groupadd
<i>posix_tools.grep</i>	POSIX-compliant grep utility grep
<i>posix_tools.id</i>	POSIX-compliant id utility id
<i>posix_tools.ps_opt</i>	Extend full options for process listing -ef
<i>posix_tools.gzip</i>	Gnu-compatible zip utility gzip
<i>posix_tools.shared_ext</i>	Extension for shared library files so
<i>server_location.target_dir</i>	Target directory of server installation. /test/CACHE
<i>server_location.is_server_install</i>	Indicates whether or not this is a server installation. (N/Y)

Variable name	Description (Valid values) or Example
<i>server_location.configuration_name</i>	Instance name. CACHE
<i>server_location.is_new_install</i>	Indicates whether or not this is a new install. (N=upgrade/Y=new)
<i>server_location.registry_dir</i>	Location of the Caché registry directory. /usr/local/etc/cachesys
<i>server_location.ensemble_registry_dir</i>	n/a
<i>server_location.convert_ensemble_registry</i>	If you are upgrading a pre-4.0 Ensemble instance this indicates to consolidate the old Ensemble registry with the Caché registry. (N/Y)
<i>server_location.ccontrol</i>	Directory where ccontrol resides during installation. /cachekit/package/../../dist /Cache/bin/lnxrhx86/ shared/ccontrol
<i>server_location.enscontrol</i> (n/a))	n/a
<i>server_location.bin_dir</i>	Location of the OS bin directory. /usr/bin
<i>postinstall*</i>	Specifies packages to run after parameter file phase. upgrade
<i>install_mode.setup_type</i>	Type of installation. (Development/Server/Custom)
<i>unicode_selection.binary_type</i>	Binary type of install. (unicode/eightbit)
<i>unicode_selection.install_unicode</i>	Indicates whether or not to install the Unicode version of the product. (N/Y)

Variable name	Description (Valid values) or Example
<i>security_settings.cache_user</i>	Effective user for the Caché superserver cacheusr
<i>security_settings.cache_group</i>	Effective group for Caché. cacheusr
<i>security_settings.manager_user</i>	Owner of the instance. root
<i>security_settings.manager_group</i>	Group allowed to start and stop the instance. develop
<i>security_settings.personal_database</i>	Indicates whether or not to use the Personal Database feature. (N/Y)
<i>security_settings.initial_level</i>	Initial security settings. (Minimal/Normal/Locked Down)
<i>security_settings.already_secured</i>	If this is an upgrade from a pre-5.1 instance, indicates the need for security settings. (N/Y)
<i>security_settings.password</i>	Password field cleared before the parameter file is stored if running from cinstall .
<i>manager_source_code.available</i>	Indicates whether or not to install the manager utility source code. (N/Y)
<i>port_selection.superserver_port</i>	Superserver port number. 1972
<i>port_selection.webserver_port</i>	Web server port number. 57772
<i>csp_gateway.configure</i>	Indicates whether or not to configure the CSP Gateway for an external Web server. (N/Y)

Variable name	Description (Valid values) or Example
<i>csp_gateway.web_server_type</i>	Type of existing Web server for the CSP Gateway to use. (Apache/SunOne/None)
<i>csp_gateway.apache_conf_file</i>	Location of the Apache Web server configuration file. /etc/httpd/conf/httpd.conf
<i>csp_gateway.apache_pid_file</i>	File that records the process id of the Apache Web server daemon. /usr/local/apache/logs/httpd.pid
<i>csp_gateway.sunone_server</i>	Location of the Sun ONE server for the CSP Gateway to use. /usr/netscape/server4/httpd-production
<i>csp_gateway.directory</i>	Directory to contain the CSP Gateway files.
<i>license_key.enter_key</i>	Indicates whether or not to install the key during installation. (N/Y)
<i>license_key.license_file</i>	Location of the key file information if the value of <i>enter_key</i> is Y.
<i>install*</i>	database_server
<i>postinstall*</i>	database_server
<i>install*</i>	Used to initiate the installation of the SAMPLES database. samples
<i>samples.install</i>	Indicates whether or not to install the SAMPLES database. (N/Y)
<i>japanese_docs.install</i>	Indicates whether or not to install the Japanese documentation sources. (N/Y)

Variable name	Description (Valid values) or Example
<i>install*</i>	Used to initiate the installation of the online documentation. docbook
<i>docbook.install</i>	Indicates whether or not to install the DOCBOOK database for the online documentation. (N/Y)
<i>client_location.target_dir</i>	Target directory of a client-only installation. test/CACHE
<i>client_location.is_client_install</i>	Indicates whether or not it is a client install. (N/Y)
<i>install*</i>	Component name to install.

* The install variable appears several times in the parameter file, once for every component to install. A custom or client-only install conditionally generates any or all of the following:

- dev_kit
- odbc
- cpp_binding
- cpp_sdk
- perl_binding
- python_binding
- engine_link_libraries
- light_cpp_binding
- addenda
- install_confirmation
- copyright

D

Preparing for Caché Advanced Security

The material in this appendix is intended for those choosing to use the advanced security features of Caché. Your authentication and authorization method choices determine what tasks you need to perform to prepare the security environment before installing Caché. To help determine the level of security for your site before installing Caché, review the “[Introduction](#)” to the *Caché Security Administration Guide* for an overview of the authentication and authorization options available.

Important: If you are not using the Kerberos authentication method in your environment, you can bypass the “Preparing the Security Environment” sections. Review the information in the [Initial Caché Security Settings](#) section, particularly if you are choosing to use Normal or Locked Down Caché security.

All Caché supported platforms have versions of Kerberos supplied and supported by the vendor; see the appropriate operating system documentation for details. If you choose to use Kerberos, you must have a Kerberos KDC or a Windows domain controller available on your network. Microsoft Windows implements the Kerberos authentication protocol by integrating the KDC with other security services running on the domain controller.

If you *are* using Kerberos, see the instructions for the appropriate environment of the three outlined in the [Preparing the Security Environment](#) section: Windows-only Environment, Mixed Environment Using Windows Domain Controller, Non-Windows Environment.

Once you have defined the necessary service accounts on your Windows domain controller or tested the KDC functionality on your non-Windows Kerberos server, see the [Initial Caché Security Settings](#) section before you install Caché.

Important: If your security environment is more complex than those this document describes, contact the [InterSystems Worldwide Response Center](#) (WRC) for guidance in setting up such an environment.

D.1 Preparing the Security Environment

These sections describe the installation preparation for three types of environments:

1. [Windows-only Environment](#)
2. [Mixed Environment Using Windows Domain Controller](#)
3. [Non-Windows Environment](#)

D.1.1 Windows-only Environment

This configuration uses a Windows domain controller for KDC functionality with Caché servers and clients on Windows machines. A domain administrator creates domain accounts for running the Caché services on Caché servers.

See the [Create Service Accounts for Windows Caché Servers](#) section for the requirements of using Windows Caché servers.

D.1.2 Mixed Environment Using Windows Domain Controller

This configuration uses a Windows domain controller with Caché servers and clients on a mix of Windows and non-Windows machines. See the following two sections for the requirements for using both Windows and non-Windows Cache servers:

- [Create Service Accounts for Windows Caché Servers](#)
- [Create Service Accounts for Non-Windows Caché Servers](#)

D.1.3 Non-Windows Environment

This configuration uses a UNIX-based or OpenVMS Kerberos KDC with Caché servers and clients all on non-Windows machines. See the following two sections for the requirements for using a UNIX, Mac, or OpenVMS KDC and Caché servers:

- [Create Service Accounts for Non-Windows Caché Servers with a KDC](#)
- [Testing Kerberos KDC Functions](#)

D.1.4 Create Service Accounts for Windows Caché Servers

Before installing Caché in a Windows domain, the Windows domain administrator must create a service account for each Caché server instance on a Windows machine using the Windows domain controller. If you are running multiple instances of Caché on a single Windows server (Windows 2000 only), each must have a separate service account.

D.1.4.1 Account Characteristics

When you create this account on the Windows domain controller, configure it as follows:

- Set the account's **Password never expires** property.
- Set the account's **Use DES encryption types for this account** property
- Make the account a member of the **Administrators** group on the Caché server machine.
- Add the account to the **Log on as a service** policy.

Important: If a domain-wide policy is in effect, you must add this service account to the policy for Caché to function properly.

D.1.4.2 Names and Naming Conventions

In an environment where clients and servers are exclusively on Windows, there are two choices for creating account names:

- Follow the standard Kerberos naming conventions. This ensures compatibility with any non-Windows systems in the future.
- Use any unique string.

Each of these choices involves a slightly different process of configuring a connection to a server as described in the following sections.

Names Following Kerberos Conventions

Kerberos conventions are to give service account names of the form <service_principal>/<fully_qualified_domain_name>.

For a name that follows Kerberos conventions, the procedure is:

1. Run the Windows **setspn** command, specifying “Caché” as the name of service principal and provide the fully qualified host name. For detailed information on the **setspn** tool, see the Microsoft [Setspn.exe](#) page for Windows 2000 or the [Setspn Overview](#) page for Windows 2003.

2. In the **Caché Server Manager** dialog for adding a new preferred server, choose Kerberos. The name populated in the **Caché Service Name** field should match the name in use. If there are multiple Caché instances on the server machine, you may need to edit the contents of this field.

For detailed information on configuring remote server connections, see the “[Connecting to Remote Servers](#)” chapter of the *Caché System Administration Guide*.

Names that are Any Unique String

For a name that uses any unique string, the procedure is:

1. Choose a name for the service principal.
2. In the **Caché Server Manager** dialog for adding a new preferred server, choose Kerberos. Specify the selected name for the service principal in the **Caché Service Name** field.

If you decide not to follow Kerberos conventions, a suggested naming convention for each account representing a Caché server instance is “`cacheHOST`”, which is the literal, `cache`, followed by the host computer name in uppercase. For example, if you are running a Caché server on a Windows machine called WINSRV, name the domain account `cacheWINSRV`.

If you have multiple Caché server instances on one machine, since the service account name must be unique, you may want to follow the default Caché practice of naming instances and use this instance name in place of the `cache` literal. For example, if you install two Caché server instances on the WINSRV machine and use the default instance names (`cache` and `cache2`), name the two service accounts `cacheWINSRV` and `cache2WINSRV`.

For more information on configuring remote server connections, see the “[Connecting to Remote Servers](#)” chapter of the *Caché System Administration Guide* for the detailed procedure.

D.1.5 Create Service Accounts for Non-Windows Caché Servers

Before you install Caché in a Windows domain, the Windows domain administrator must create a service account for each Caché server on a non-Windows machine that uses the Windows domain controller. Create one service account for each machine, regardless of the number of Caché server instances on that machine.

A suggested naming convention for these accounts is “`cacheHOST`,” which is the literal, `cache`, followed by the host computer name in uppercase. For example, if you run a Caché server on a non-Windows machine called UNIXSRV, name the domain account `cacheUNIXSRV`. For Caché servers on non-Windows platforms, this is the account that maps to the Kerberos service principal.

When you create this account on the Windows domain controller, Caché requires that the account have the following characteristics:

- Set the **Password never expires** property.
- Set the **Use DES encryption types for this account** property

To set up a non-Windows Caché server in the Windows domain, it must have a keytab file from the Windows domain. A keytab file is a file containing the service name for the Caché server and its key.

To accomplish this, map the Windows service account (`cacheUNIXSRVR`, in this example) to a service principal on the Caché server and extract the key from the account using the **ktpass** command-line tool on the domain controller; this is available as part of the Windows support tools from Microsoft.

The command maps the account just set up to an account on the UNIX-based or OpenVMS machine; it also generates a key for the account. The command must specify the following parameters:

Parameter	Description
<code>-princ</code>	The principal name (in the form <i>cache/<fully qualified hostname>@<kerberos realm></i>).
<code>-mapuser</code>	The name of the account created (in the form <i>cache<HOST></i>).
<code>-pass</code>	The password specified during account creation.
<code>-crypto</code>	The encryption type to use (use the default, <i>DES-CBC-CRC</i> , unless specified otherwise).
<code>-out</code>	The keytab file you generate to transfer to the Caché server machine and replace or merge with your existing keytab file.

Important: The principal name on UNIX-based and OpenVMS platforms must take the form shown in the table with the literal `cache` as the first part.

Once you have generated a key file, move it to a file on the Caché server with the [key file characteristics](#) described in the following section.

D.1.6 Create Service Accounts for Non-Windows Caché Servers with a KDC

In a non-Windows environment, you must create service principal accounts for all UNIX, Mac, or OpenVMS Caché servers using a UNIX, Mac, or OpenVMS KDC. Once you have an operational KDC, you need to add a service principal account for each Caché server. The service principal name is of the form *cache/<fully qualified hostname>@<kerberos realm>*.

D.1.6.1 Key File Characteristics

Once you have created this principal, extract its key to a key file on the Caché server with the following characteristics:

- On Mac and most versions of UNIX, the pathname is *install-dir/mgr/cache.keytab*. On Tru64, the pathname is */krb5/v5srvtab*; on SUSE Linux, it is */etc/krb5.keytab*.

On OpenVMS, the file is `cache.keytab` and is located in the manager's directory.

- It is owned by the user that owns the Caché installation and the group `cacheusr`.
- On UNIX and Mac, its permissions are `640`; on OpenVMS, its permissions are `[S:RWD,O:RWD,G:R,W:]`.

D.1.7 Testing Kerberos KDC Functions

When using Kerberos in a system of only non-Windows servers and clients, it is simplest to use a native UNIX-based or OpenVMS KDC rather than a Windows domain controller. (Tru64 UNIX, however, can only use the Windows domain controller for KDC functionality.) Consult the vendor documentation on how to install and configure the KDC; these are usually tasks for your system administrator or system manager.

When installing Kerberos, there are two sets of software to install:

- The KDC, which goes on the Kerberos server machine.
- There also may be client software, which goes on all machines hosting Kerberos clients. This set of software can vary widely by operating system. Consult your operating system vendor documentation for what client software exists and how to install it.

After installing the required Kerberos software, you can perform a simple test using the **kadmin**, **kinit**, and **klist** commands to add a user *principal* to the Kerberos database, obtain a TGT (ticket-granting ticket) for this user, and list the TGT.

Once you successfully complete a test to validate that Kerberos is able to provide tickets for registered principals, you are ready to install Caché.

D.2 Initial Caché Security Settings

During installation, there is a prompt for one of three sets of initial security settings: Minimal, Normal, and Locked Down. This selection determines the initial authorization configuration settings for Caché services and security, as shown in the following sections:

- [Initial User Security Settings](#)
- [Initial Service Properties](#)

If you select Normal or Locked Down for your initial security setting, you must provide additional account information to the installation procedure. If you are using Kerberos authentication, you must select Normal or Locked Down mode. See the [User Account Configuration](#) section for details.

Important: If you are concerned about the visibility of data in memory images (often known as core dumps), see the section “[Protecting Sensitive Data in Memory Images](#)” in the “System Management and Security” chapter of the *Caché Security Administration Guide*.

D.2.1 Initial User Security Settings

The following tables show the user password requirements and settings for predefined users based on which security level you choose.

Initial User Security Settings

Security Setting	Minimal	Normal	Locked Down
Password Pattern	3.32ANP	3.32ANP	8.32ANP
Inactive Limit	0	90 days	90 days
Enable _SYSTEM User	Yes	Yes	No
Roles assigned to UnknownUser	%All	None	None

You can maintain both the password pattern and inactive limit values from the **[Home] > [Security Management] > [System Security Settings] > [System-wide Security Parameters]** page of the System Management Portal. See the [System-wide Security Parameters](#) section of the “System Management and Security” chapter of the *Caché Security Administration Guide* for more information.

After installation, you can view and maintain the user settings at the **[Home] > [Security Management] > [Users]** page of the System Management Portal.

D.2.1.1 Password Pattern

When Caché is installed, it has a default set of password requirements. For locked-down installations, the initial requirement is that a password be from 8 to 32 characters, and can consist of alphanumeric characters or punctuation; the abbreviation for this is 8.32ANP. Otherwise, the initial requirement is that the password be from 3 to 32 characters, and can consist of alphanumeric characters or punctuation (3.32ANP).

D.2.1.2 Inactive Limit

This value is the number of days an account can be inactive before it is disabled. For minimal installations, the limit is set to 0 indicating that accounts are not disabled, no matter how long they are inactive. Normal and locked-down installations have the default limit of 90 days.

D.2.1.3 Enable _SYSTEM User

In versions of Caché prior to 5.1, all installed systems included an SQL System Manager user named `_SYSTEM` with a password of `SYS`. This Caché version creates the `_SYSTEM` and additional predefined users using the password you provide during the installation as shown in the following table.

Initial Password Settings for Predefined Users

Password Setting	Minimal	Normal	Locked Down
<code>_SYSTEM</code>	<code>SYS</code>	Same as installing user	Same as installing user
Admin	<code>SYS</code>	Same as installing user	Same as installing user
SuperUser	<code>SYS</code>	Same as installing user	Same as installing user
CSPSystem	<code>SYS</code>	Same as installing user	Same as installing user

For more details on these predefined users, see the [Predefined User Accounts](#) section of the “Users” chapter of the *Caché Security Administration Guide*.

D.2.1.4 Roles Assigned to UnknownUser

When an unauthenticated user connects, Caché assigns a special name, `UnknownUser`, to `$USER-NAME` and assigns the roles defined for that user to `$ROLES`. The `UnknownUser` is assigned the `%All` role with a Minimal-security installation; `UnknownUser` has no roles when choosing a security level other than Minimal.

For more details on the use of `$USERNAME` and `$ROLES`, see the “Users” and “Roles” chapters of the *Caché Security Administration Guide*.

D.2.2 Initial Service Properties

Services are the primary means by which users and computers connect to Caché. For detailed information about the Caché services see the “Services” chapter of the *Caché Security Administration Guide*.

Initial Service Properties

Service Property	Minimal	Normal	Locked Down
Use Permission is Public	Yes	Yes	No
Requires Authentication	No	Yes	Yes
Enabled Services	Most	Some	Fewest

Use Permission is Public

If the Use permission on a service resource is Public, any user can employ the service; otherwise, only privileged users can employ the service.

Requires Authentication

For installations with initial settings of locked down or normal, all services require authentication of some kind (Caché login, operating-system-based, or Kerberos). Otherwise, unauthenticated connections are permitted.

Enabled Services

The initial security settings of an installation determine which of certain services are enabled or disabled when Caché first starts. The following table shows these initial settings:

Initial Enabled Settings for Services

Service	Minimal	Normal	Locked Down
%Service_Bindings	Enabled	Enabled	Disabled
%Service_CSP	Enabled	Enabled	Enabled
%Service_CacheDirect	Enabled	Disabled	Disabled
%Service_CallIn	Enabled	Disabled	Disabled
%Service_ComPort	Disabled	Disabled	Disabled
%Service_Console*	Enabled	Enabled	Enabled
%Service_DCP	Disabled	Disabled	Disabled
%Service_DDP	Disabled	Disabled	Disabled
%Service_ECP	Disabled	Disabled	Disabled
%Service_LAT*	Disabled	Disabled	Disabled
%Service_MSMAActivate	Disabled	Disabled	Disabled
%Service_Monitor	Disabled	Disabled	Disabled
%Service_Shadow	Disabled	Disabled	Disabled
%Service_Telnet*	Disabled	Disabled	Disabled
%Service_Terminal†	Enabled	Enabled	Enabled
%Service_WebLink	Disabled	Disabled	Disabled

* Service exists on Windows servers only

† Service exists on non-Windows servers only

After installation, you can view and maintain these services at the **[Home] > [Security Management] > [Services]** page of the System Management Portal.

D.2.3 User Account Configuration

If you select Normal or Locked Down for your initial security setting, you must provide additional information to the installation procedure:

1. **User Credentials** for *Windows* server installations only — Choose an existing Windows user account under which to run the Caché service. You can choose the default system account, which runs Caché as the Windows Local System account, or enter a defined Windows user account.

Important: If you are using Kerberos, you must enter a defined account that you have set up to run the Caché service. InterSystems recommends you use a separate account specifically set up for this purpose as described in the [Create Service Accounts for Windows Caché Servers](#) section.

The installation verifies the following if you enter a defined user account:

- The account exists on the domain.
 - You have supplied the correct password.
 - The account has local administrative privileges on the server machine.
2. **Caché Users Configuration** for *Windows* installations — The installation creates a Caché account with the %All role for the user that is installing Caché to grant that user access to services necessary to administer Caché.

Owner of the instance for *non-Windows* installations — Enter a user name under which to run Caché. Caché creates an account for this user with the %All role.

Enter and confirm the password for this account. The password must meet the criteria described in the [Initial User Security Settings](#) table.

Setup creates the following Caché accounts for you: _SYSTEM, Admin, SuperUser, CSPSystem, and the user account you enter in this step. See the [Initial Password Settings for Predefined Users](#) table for more information about these accounts.

Important: If you select Minimal for your initial security setting on a *Windows* installation, but Caché requires network access to shared drives and printers, you must manually change the Windows user account under which to run the Caché service. Choose an existing or create a new account that has local administrative privileges on the server machine.

The instructions in the platform-specific chapters of this guide provide details about installing Caché. After reading the *Caché Security Administration Guide* introduction and following the procedures in this appendix, you are prepared to provide the pertinent security information to these installation procedures.

