



How to Migrate to InterSystems IRIS

Version 2023.1
2023-04-14

How to Migrate to InterSystems IRIS

InterSystems IRIS Data Platform Version 2023.1 2023-04-14

Copyright © 2023 InterSystems Corporation

All rights reserved.

InterSystems®, InterSystems IRIS®, IntegratedML®, InterSystems HealthShare®, InterSystems HealthShare Care Community®, HealthShare Unified Care Record®, InterSystems Caché®, and InterSystems Ensemble® are registered trademarks of InterSystems Corporation. InterSystems IRIS for Health™ and HealthShare® CMS Solution Pack™ are trademarks of InterSystems Corporation.

All other brand or product names used herein are trademarks or registered trademarks of their respective companies or organizations.

This document contains trade secret and confidential information which is the property of InterSystems Corporation, One Memorial Drive, Cambridge, MA 02142, or its affiliates, and is furnished for the sole purpose of the operation and maintenance of the products of InterSystems Corporation. No part of this publication is to be used for any other purpose, and this publication is not to be reproduced, copied, disclosed, transmitted, stored in a retrieval system or translated into any human or computer language, in any form, by any means, in whole or in part, without the express prior written consent of InterSystems Corporation.

The copying, use and disposition of this document and the software programs described herein is prohibited except to the limited extent set forth in the standard software license agreement(s) of InterSystems Corporation covering such programs and related documentation. InterSystems Corporation makes no representations and warranties concerning such software programs other than those set forth in such standard software license agreement(s). In addition, the liability of InterSystems Corporation for any losses or damages relating to or arising out of the use of such software programs is limited in the manner set forth in such standard software license agreement(s).

THE FOREGOING IS A GENERAL SUMMARY OF THE RESTRICTIONS AND LIMITATIONS IMPOSED BY INTERSYSTEMS CORPORATION ON THE USE OF, AND LIABILITY ARISING FROM, ITS COMPUTER SOFTWARE. FOR COMPLETE INFORMATION REFERENCE SHOULD BE MADE TO THE STANDARD SOFTWARE LICENSE AGREEMENT(S) OF INTERSYSTEMS CORPORATION, COPIES OF WHICH WILL BE MADE AVAILABLE UPON REQUEST.

InterSystems Corporation disclaims responsibility for errors which may appear in this document, and it reserves the right, in its sole discretion and without notice, to make substitutions and modifications in the products and practices described in this document.

For Support questions about any InterSystems products, contact:

InterSystems Worldwide Response Center (WRC)

Tel: +1-617-621-0700

Tel: +44 (0) 844 854 2917

Email: support@InterSystems.com

Table of Contents

Introduction	1
Requirements	1
Supported Versions	1
Supported Migration Paths	2
Supported Platforms	4
Limitations	4
Mirroring	4
Enterprise Cache Protocol (ECP)	4
KMIP Server	5
Windows Cluster	5
Known Issues	5
Special Cases	5
About This Book	5
1 Performing Pre-Migration Tasks	7
2 Performing a Migration in a Non-Mirrored Environment	11
2.1 Perform Pre-Migration Tasks	12
2.2 Uncompress the Installation Kit (UNIX® or Linux Only)	12
2.3 Turn Off System-Wide Production Auto-Start (Ensemble or Health Connect Only)	12
2.4 Stop All Ensemble Productions (Ensemble or Health Connect Only)	13
2.5 Shut Down the Caché or Ensemble Instance	14
2.6 Run the Installation Script or Installer	14
2.7 Upgrade FHIR Repositories (If Migrating to InterSystems IRIS for Health Only)	16
2.8 Update User Code, Compile Namespaces, and Start Productions	16
2.8.1 Update User Code	17
2.8.2 Compile Namespaces	17
2.8.3 Start Productions (If Migrating an Ensemble or Health Connect Instance)	18
2.9 Turn On System-Wide Production Auto-Start	19
3 Performing a Migration in a Mirrored Environment	21
3.1 Perform Pre-Migration Tasks	23
3.2 Uncompress the Installation Kit (UNIX® or Linux Only) — Server B	23
3.3 Set Mirror No Failover — Server B	24
3.4 Turn Off System-Wide Production Auto-Start (Ensemble or Health Connect Only) — Server B	24
3.5 Delete %ALL Namespace (If Using) — Server B	25
3.6 Shut Down the Caché or Ensemble Instance — Server B	25
3.7 Stop and Disable ISCAgent (Linux Only) — Server B	25
3.8 Run the Installation Script or Installer — Server B	26
3.9 Start and Enable ISCAgent (Linux Only) — Server B	28
3.10 Make Sure Server is the Backup Failover Member — Server B	29
3.11 Clear Mirror No Failover — Server B	29
3.12 Turn Off System-Wide Production Auto-Start (Ensemble or Health Connect Only) — Server A	30
3.13 Stop All Ensemble Productions (Ensemble or Health Connect Only) — Server A	30
3.14 Delete %ALL Namespace (If Using) — Server A	31
3.15 Shut Down the Caché or Ensemble Instance — Server A	31
3.16 Make Sure Mirror Failed Over — Server B	31

3.17 Create %ALL Namespace (If Using) — Server B	31
3.18 Upgrade FHIR Repositories (If Migrating to InterSystems IRIS for Health Only) — Server B	32
3.19 Update User Code, Compile Namespaces, and Start Productions — Server B	32
3.19.1 Update User Code	33
3.19.2 Compile Namespaces	33
3.19.3 Start Productions (If Migrating an Ensemble or Health Connect Instance)	34
3.20 Set Mirror No Failover — Server B	34
3.21 Validate Non-Mirrored InterSystems IRIS — Server B	35
3.22 Uncompress the Installation Kit (UNIX® or Linux Only) — Server A	35
3.23 Stop and Disable ISCAgent (Linux Only) — Server A	35
3.24 Run the Installation Script or Installer — Server A	35
3.25 Create %ALL Namespace (If Using) — Server A	36
3.26 Start and Enable ISCAgent (Linux Only) — Server A	36
3.27 Make Sure Server is the Backup Failover Member — Server A	36
3.28 Turn On System-Wide Production Auto-Start — Server A	36
3.29 Clear Mirror No Failover — Server B	36
3.30 Turn On System-Wide Production Auto-Start — Server B	37
3.31 Stop All Interoperability Productions (Ensemble or Health Connect Only) — Server B	37
3.32 Shut Down the InterSystems IRIS Instance — Server B	38
3.33 Make Sure Mirror Failed Over — Server A	38
3.34 Start the InterSystems IRIS Instance — Server B	39
3.35 Make Sure Server is the Backup Failover Member — Server B	39
3.36 Compile Code in Non-Mirrored Databases — Server A	39
3.36.1 Update User Code	40
3.36.2 Compile Namespaces	40
4 Using an Installation Manifest	43
4.1 Creating a Class That Defines a Manifest	43
4.2 Running the Manifest	44
4.2.1 Running the Manifest Manually	44
4.2.2 Running the Manifest with the Installation	44
4.3 Manifest Examples	45
4.3.1 Copying an IRIS Code-Only Database	45
4.3.2 Importing Code from an XML Export	46
4.3.3 Upgrading a FHIR Repository	47
4.3.4 Loading Library Code into a Read-Only Database	48
Appendix A: Conversion Details	51
A.1 InterSystems IRIS Conversion Details	51
A.2 Security Database Conversion Details	52
Appendix B: Updated, Re-Implemented, and Removed Health Connect Classes	53
B.1 Updated and Re-Implemented Classes	53
B.2 Removed Classes	54
Appendix C: InterSystems IRIS for Health Memory Considerations	57
C.1 Use Terminal	57
C.2 Use the Management Portal	58
Appendix D: Migrating Additional Mirror Components	59
D.1 Disaster Recovery Async (D/R Async) Member	59
D.2 Arbiter	60

Appendix E: Issues with Caché or Ensemble and InterSystems IRIS on the Same Machine	61
E.1 ISCAgent Version Conflict (Linux Only)	61
E.2 Port Number Conflict	62
E.3 Instance Name Conflict	62
Appendix F: Migrating a Health Connect/HSAP Instance That Was Previously Upgraded from a Full HealthShare Instance	63
Appendix G: Migrating Instances Having Custom HL7 Schema Global Mappings	65
Appendix H: Fixing Compiler Errors	67
H.1 Protect Errors	67
H.2 Class Dictionary Out of Date Errors	67
H.3 Illegal Regular SQL Identifier Errors	68
H.3.1 Preventing the Error	68
H.3.2 Fixing the Error	68
H.4 Other Errors	69
Appendix I: Migrating from Older Versions of Caché or Ensemble	71
I.1 Same Server Method	71
I.2 New Server Method	71
I.2.1 Provision the Target Server	72
I.2.2 Perform the Initial Installation	72
I.2.3 Migrate Security Settings	73
I.2.4 Upgrade to the Latest Version of Your Caché or Ensemble-Based Product	73
I.2.5 Perform an In-Place conversion to InterSystems IRIS	73
I.2.6 Configuration Parameter File (CPF)	73
I.2.7 Migrate User-Created Databases	73
I.2.8 Migrate Custom Items in %SYS Namespace	74
I.2.9 Copy CSP, JS, and CSS Files	74
I.2.10 Update User Code and Compile	74
I.2.11 Migrate Task Manager Tasks	74
I.2.12 Migrate External Linked Libraries and Custom Shared Libraries	74
I.2.13 Set Up Mirroring	75
Appendix J: Migrating iFind and iKnow Data	77
J.1 Rebuilding iFind Indexes	77
J.2 Rebuilding iKnow Domains	77
Appendix K: Migrating Object Gateways for .NET	79
K.1 Migrating to InterSystems IRIS 2020 (Version 2020.1.4 or Later)	79
K.2 Migrating to InterSystems IRIS 2021 (Version 2021.1.3 or Later)	79
K.3 Migrating to InterSystems IRIS 2022 (Version 2022.1.2 or Later) or Beyond	80
Appendix L: Known Issues	81
L.1 System Mode Setting Is Lost During Conversion	81
L.2 Lingering Reference to Removed Database MPRLLIB	81
L.3 SQL %ID and COUNT() Data Types Have Changed from INTEGER to BIGINT	82
L.4 Custom Diffie-Hellman Bits Setting Is Lost During Conversion	82
Appendix M: Version History	85

List of Tables

Table 1: Migration Matrix 3

Table 2–1: Non-Mirrored Environment Migration Checklist 11

Table 3–1: Mirrored Environment Migration Checklist 21

Table II–1: Updated and Re-Implemented Health Connect Classes 53

Table II–2: Other Updated and Re-Implemented Health Connect Files 54

Table II–3: Removed Health Connect Classes 55

Table II–4: Other Removed Health Connect Artifacts 55

Table XIII–1: History of Document Versions and Changes Made 85

Introduction

This document describes how to migrate to InterSystems IRIS from earlier InterSystems products. To be specific, in the context of this document, “migration” means converting an existing instance of InterSystems Caché®, InterSystems Ensemble®, or InterSystems HealthShare® Health Connect/HSAP (based on the Caché/Ensemble platform) to the appropriate product based on InterSystems IRIS® data platform, as well as making any other changes needed to run your application using the new product.

You can use this document to migrate an existing instance to:

- InterSystems IRIS
- InterSystems IRIS for Health™
- Health Connect 2020.1 or later (based on the InterSystems IRIS platform)

Not every possible migration scenario is supported. See [Supported Migration Paths](#) for details.

The migration process may require some changes to application code, configuration scripts, and other procedures, but will be relatively easy for the majority of cases.

Before attempting a migration, review the *InterSystems IRIS Migration Guide* for background information on the differences between Caché or Ensemble and InterSystems IRIS. You can download the guide from the InterSystems Worldwide Response Center [documents distribution page](#).

Depending on which features your instance uses, some sections of this document may not apply to your environment.

CAUTION: As with any major upgrade, you should thoroughly test your custom code, including any business services, processes, and operations, in a test environment before deploying to a live production environment.

In addition, before performing a migration in a production environment, you should test the entire migration process in a test environment that matches the production environment. In particular, the operating system user permissions, code, and security configurations must be the same in the test and production environments for the test to be considered valid.

The migration process cannot be undone. It is essential that you make a complete backup of your system before attempting the migration.

If you are uncertain about any aspect of the migration process, InterSystems recommends that you contact the [InterSystems Worldwide Response Center](#) for assistance.

Requirements

This section summarizes the valid migration paths from Caché/Ensemble-based products to InterSystems IRIS-based products and the supported starting and destination versions for each product. In all cases, you must have the proper installation kit and a valid license key for the destination product to which you are migrating.

Supported Versions

This section lists the versions for each starting and destination product for which migration is supported using an installation kit.

Not every possible migration scenario is supported. See [Supported Migration Paths](#) for details.

The supported versions apply to both mirrored and non-mirrored configurations. Container-only releases are not included in the supported versions.

If migration is not supported for your product version, see the appendix [Migrating from Older Versions of Caché or Ensemble](#).

Starting Products

- Caché 2016.2 or later
- Ensemble 2016.2 or later
- Health Connect (HSAP) 15.03, 15.031, or 15.032 based on Ensemble 2017.1 or later

Destination Products

- InterSystems IRIS 2020.1 or later
- InterSystems IRIS for Health 2020.1 or later
- Health Connect 2020.1 or later (based on InterSystems IRIS)

Supported Migration Paths

The left column of the following table lists the products that can be migrated to an InterSystems IRIS-based product. The remaining columns show, for each starting product, if a migration can be performed to get to a given destination product.

Table 1: Migration Matrix

Starting Product	InterSystems IRIS	InterSystems IRIS for Health	Health Connect (on InterSystems IRIS)
Caché 2016.2.x	2020.1.x	2020.1.x	—
Caché 2017.1.x	2020.1.x	2020.1.x	—
Caché 2017.2.x	2021.1.x	2021.1.x	
Caché 2018.1.x	2021.2.x	2021.2.x	
	2022.1.x	2022.1.x	
	2022.2.x	2022.2.x	
	2022.3.x	2022.3.x	
	2023.1.x	2023.1.x	
Ensemble 2016.2.x	2020.1.x	2020.1.x	2020.1.x
Ensemble 2017.1.x	2020.1.x	2020.1.x	2020.1.x
Ensemble 2017.2.x	2021.1.x	2021.1.x	2021.1.x
Ensemble 2018.1.x	2021.2.x	2021.2.x	2021.2.x
	2022.1.x	2022.1.x	2022.1.x
	2022.2.x	2022.2.x	2022.2.x
	2022.3.x	2022.3.x	2022.3.x
	2023.1.x	2023.1.x	2023.1.x
Health Connect/HSAP (15.03x on Ensemble 2017.1 or later)	—	2020.1.x	2020.1.x
		2021.1.x	2021.1.x
		2021.2.x	2021.2.x
		2022.1.x	2022.1.x
		2022.2.x	2022.2.x
		2022.3.x	2022.3.x
		2023.1.x	2023.1.x

If migration is not supported for your product version, see the appendix [Migrating from Older Versions of Caché or Ensemble](#).

- Important:** If you are using Ensemble as a platform for healthcare, make note of the following:
- InterSystems IRIS does not support the HL7 and the DICOM features that are available in Ensemble. This support is included in the Health Connect and InterSystems IRIS for Health products.
 - If you are using Ensemble as an integration engine and have no plans to use it as a general-purpose data platform for healthcare, perform a migration to Health Connect 2020.1 or later (based on the InterSystems IRIS platform).
 - If you are using Ensemble as a general-purpose data platform for healthcare, or plan to in the future, perform a migration to InterSystems IRIS for Health 2020.1 or later.
- Important:** If you are using Health Connect (HSAP), make note of the following:
- If you are using Health Connect as an integration engine and have no plans to use it as a general-purpose data platform for healthcare, perform a migration to Health Connect 2020.1 or later (based on the InterSystems IRIS platform).
 - If you are using Health Connect as a general-purpose data platform for healthcare, or plan to in the future, perform a migration to InterSystems IRIS for Health 2020.1 or later.

Supported Platforms

Some older platforms that are supported for Caché or Ensemble are no longer supported for InterSystems IRIS. Read [Supported Platforms](#) for the version of InterSystems IRIS to which you are migrating. You may need to upgrade your operating system to one that InterSystems IRIS supports.

Migration is supported for server platforms only, not for platforms that are supported solely for development purposes.

Limitations

Mirroring

To support mixed mirror configurations between Caché/Ensemble-based instances and InterSystems IRIS-based instances, Caché/Ensemble must have a specific enhancement (SML2736). SML2736 enables a Caché/Ensemble instance to discover an InterSystems IRIS failover mirror and is available with Caché/Ensemble 2018.1.3 or later. If you are running an earlier version, please contact the [InterSystems Worldwide Response Center](#) for assistance.

These mixed mirror configurations are useful for a limited number of scenarios, such connecting a Caché/Ensemble-based reporting async to an InterSystems IRIS-based failover mirror. Both the primary and backup members of the failover mirror should be migrated to InterSystems IRIS using the procedure described in [Performing a Migration in a Mirrored Environment](#), which does not require the presence of SML2736.

Enterprise Cache Protocol (ECP)

Connecting an InterSystems IRIS instance to a Caché or Ensemble instance using ECP is fully supported for data (global) access only.

Running object-based applications in mixed ECP configurations (containing both Caché/Ensemble-based instances and InterSystems IRIS-based instances) is not supported.

Running routine code in mixed ECP configurations may be possible, but is subject to limitations.

For more information, see [Supported Version Interoperability](#).

KMIP Server

InterSystems IRIS does not currently support migration of instances that use the Key Management Interoperability Protocol (KMIP) for managed key encryption.

Windows Cluster

InterSystems IRIS does not currently support migration of instances running on Windows Cluster.

Known Issues

See the [Known Issues](#) section for workarounds to any known issues in the migration process.

Special Cases

See the appendixes if any of the following situations applies to you:

[Installing Caché or Ensemble and InterSystems IRIS on the Same Machine](#)

[Migrating a Health Connect/HSAP instance on Windows that was previously upgraded from a full HealthShare instance](#)

[Migrating instances having custom HL7 schema global mappings](#)

[Migrating from older versions of Caché or Ensemble](#)

[Migrating iFind and iKnow data from Caché or Ensemble to InterSystems IRIS](#)

[Migrating Object Gateways from Caché or Ensemble to InterSystems IRIS](#)

About This Book

This document describes how to:

- [Perform any needed pre-migration tasks.](#)
- [Perform a migration in a non-mirrored environment.](#)
- [Perform a migration in a mirrored environment.](#)
- [Use a manifest to load code or files during the migration process.](#)

The document also contains appendixes that:

- [Detail the changes made by the installer or installation kit during the conversion process.](#)
- [List the classes that are updated, re-implemented, or removed in Health Connect 2020.1 or later \(based on InterSystems IRIS\) and InterSystems IRIS for Health.](#)
- [Describe memory considerations that apply when migrating from Caché 2016.2 or Ensemble 2016.2 to InterSystems IRIS for Health 2020.1 or later](#)
- [Provide guidance on migrating additional mirror components, such as a disaster recovery async member or an arbiter](#)
- [Describe issues you need to be aware of if you are installing Caché or Ensemble and InterSystems IRIS on the same machine](#)

- Describe how to migrate a Health Connect/HSAP instance on Windows that was previously upgraded from a full HealthShare instance
- Describe how to migrate instances having custom HL7 schema global mappings
- Provide fixes to any compiler errors you may encounter while converting an instance to InterSystems IRIS or while compiling classes after the conversion
- Provide guidance to customers running older versions of a product that cannot be migrated directly to InterSystems IRIS
- Describe how to migrate iFind and iKnow data from Caché or Ensemble to InterSystems IRIS
- Describe how to migrate Object Gateways from Caché or Ensemble to InterSystems IRIS
- Provide workarounds to any known issues with the migration process
- List the changes made to this document

Note: The term “migration” is used in this document to refer to the entire process of migrating from a Caché or Ensemble-based product to an InterSystems IRIS-based product. The term “conversion” is used to describe the changes made by the installation script or installer to an existing instance, as a part of the overall migration process.

1

Performing Pre-Migration Tasks

Perform these tasks before you migrate your instance of Caché or Ensemble to InterSystems IRIS:

1. *Read the [Supported Platforms](#) for the version of InterSystems IRIS to which you are migrating* — You may need to upgrade your operating system to one that InterSystems IRIS supports.
2. *Review the [InterSystems IRIS Migration Guide](#)* — This guide will supply you with background information on the differences between Caché or Ensemble and InterSystems IRIS. You can download the guide from the InterSystems Worldwide Response Center [documents distribution page](#).
3. *Read the [Upgrade Compatibility Checklist](#) in the release notes for the version of InterSystems IRIS to which you are migrating* — You should also read the Upgrade Compatibility Checklist for any intervening versions between the starting product and the destination product. Find the release notes for the appropriate products from the [InterSystems Documentation](#) page.
4. *Identify any classes you are running in deployed mode* — Before performing a migration, you must import the source code for any classes that are running in deployed mode, as it must be compiled under InterSystems IRIS. (See [Compile Namespaces](#).) You can again place these classes under deployed mode after the migration is complete. Alternatively, you can load a new, compiled version of your application with an installation manifest. (See [Using an Installation Manifest](#).) If the source code is not available to recompile, or the vendor has not supplied a new version of the application, you will not be able to run your application after the migration.
5. *Identify any CSP (*.csp) files that must be reloaded from disk* — Make sure that source code for any CSP pages is available, as it must be reloaded from disk and compiled under InterSystems IRIS. (See [Compile Namespaces](#).) Alternatively, you can load new, compiled versions of these items with an installation manifest. (See [Using an Installation Manifest](#).)
6. *Decide whether to create an installation manifest* — If your application relies on code libraries, CSS files, JavaScript files, or other components that are not included as part of InterSystems IRIS, you can use a manifest to install them as part of the migration process. See [Using an Installation Manifest](#).
7. *Determine whether you have any user code that runs on startup* — If your application calls any user code at instance startup (using `%ZSTART`, `ZAUTHENTICATE`, or other means), you must precompile it on an instance of InterSystems IRIS and use an installation manifest to install it as part of the migration process. See [Using an Installation Manifest](#).

CAUTION: If your application calls any user code at instance startup and you do not install updated code with an installation manifest, the instance will not start up after the installation script or installer completes.

8. *Validate your application in InterSystems IRIS* — Validate your application in a test instance of InterSystems IRIS before performing the migration. This ensures that your application will run on the new platform.
9. *Obtain a InterSystems IRIS license key* — See the “[Managing InterSystems IRIS Licensing](#)” chapter of the *System Administration Guide* for more information.

10. *Validate the Configuration Parameter File* — Validate that the CPF file is syntactically correct. You can validate the CPF file by installing a test instance of the target version of InterSystems IRIS and running the class method `##Class(Config.CPF).Validate(CPFFile)` from the Terminal, where CPFFile is the name of the CPF file, including the path.
11. *Check system integrity* — Run a system integrity check on existing directories to ensure there is no corruption in any of the databases. See the “[Introduction to Data Integrity](#)” chapter of the *Data Integrity Guide* for more information.
12. *Back up the system* — Make a complete backup of the system that is running the Caché or Ensemble instance. Use your customary full operating system backup procedures. If the migration is not successful, you may need to restore from this backup. As a best practice, InterSystems recommends that you restore this backup to another system and run a system integrity check to make sure that it is good.
13. *Save custom classes, routines and globals* — To prevent your own classes, routines and globals in the %SYS namespace from being affected by the conversion to InterSystems IRIS, 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 during the conversion.

The CACHELIB, CACHETEMP, and CACHE databases are completely replaced.

The SAMPLES, ENSDEMO, and DOCBOOK databases are deleted.

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

14. *Save user files* — To ensure that your user files are not deleted or replaced during the conversion to InterSystems IRIS, save them in the *install-dir/mgr/user* directory, which is the only directory that is not subject to modification during conversion (that is, except for the *install-dir/mgr/user* directory, any files and directories in the install directory may be deleted or replaced during conversion).
15. *Make note of whether your operating system is using huge or large memory pages* — Check your cconsole.log file to see if you have configured one of these memory settings. When you restart your instance after the installation script or installer completes, you will need to make sure the instance is allocating memory in accordance with your configuration. (If the instance cannot allocate memory using this configuration, a server reboot is required to prevent an error condition from occurring.)

Linux example:

```
Allocated 1342MB shared memory using Huge Pages: 1024MB global buffers, 35MB routine buffers
```

Windows example:

```
Allocated 8920MB shared memory (large pages): 8192MB global buffers, 256MB routine buffers
```

16. *Check the Windows Service controller logon information* — If you are on a Windows system, open Windows Services and find the service Caché Controller (or Ensemble Controller) for *instname*. Right-click the service, click **Properties**, and then click the **Log On** tab. If the tab specifies the Local System account or an account of the form *domainname\username*, no action is necessary. If the account is of the form *username@domainname*, make a note of this account and make sure that you know the password associated with the account. You will need to reenter this information after the installation finishes.
17. *Check user privileges* — For migrations run on UNIX® or Linux, make sure the user who is performing the migration has **sudo** privileges, as some commands must be run with root access.
18. *Check available disk space* — Your system must have free disk space of at least 200 MB plus the size of the file */<installdir>/mgr/cache.dat* prior to performing the migration. The installation script or installer will not attempt the conversion if it detects that insufficient disk space is available.
19. *Check license server* — If your instances use a remote license server, note that this license server will also need to be migrated to InterSystems IRIS, as a Caché or Ensemble-based license server cannot be used with InterSystems IRIS. Alternatively, you can set up a new InterSystems IRIS license server and use it as the remote license server. Also, if

the Caché or Ensemble-based license server uses the default port of 4001, the conversion process will change it to the InterSystems IRIS default of 4002. Check your firewall settings to allow the appropriate UDP traffic to this port.

20. *If you are migrating a Health Connect/HSAP instance on Windows, check to see if the instance was previously upgraded from a full HealthShare instance* — If this situation applies to you, or you think it might, read [Migrating a Health Connect/HSAP Instance That Was Previously Upgraded from a Full HealthShare Instance](#) before performing the migration.
21. *If you are on the UNIX® platform, make sure your system-level scripts start and stop ISCAgent appropriately* — In particular, you must start ISCAgent automatically upon system startup. To start ISCAgent, run the command `/etc/rc.d/init.d/ISCAgent start`. To stop it, run the command `/etc/rc.d/init.d/ISCAgent stop`. For more information, see [Starting the ISCAgent on UNIX® and macOS Systems](#).
22. *Check any client applications that use ActiveX* — ActiveX is deprecated in InterSystems IRIS. To continue to use Caché Object Server for ActiveX in legacy applications, you must use the latest version of CacheActiveX.dll, which is installed in the Program Files\Common Files\InterSystems\IRIS directory. For information on updating a legacy Visual Basic application, see [Configuring a Visual Basic Project](#). The %Activate package is removed in InterSystems IRIS.
23. *If you are migrating from a Caché or Ensemble-based product to InterSystems IRIS for Health, make sure that SQL delimited identifier support is turned on* — See [Illegal Regular SQL Identifier Errors](#).

2

Performing a Migration in a Non-Mirrored Environment

Use this checklist to perform a migration in a non-mirrored environment. InterSystems recommends printing this checklist and marking off each step when you have completed it. Complete all steps in the order specified.

Table 2–1: Non-Mirrored Environment Migration Checklist

Step	Done	Description and Link
1		Perform pre-migration tasks
2		Uncompress the installation kit (UNIX® or Linux only)
3		Turn off system-wide production auto-start (Ensemble or Health Connect only)
4		Stop all Ensemble productions (Ensemble or Health Connect only)
5		Shut down the Caché or Ensemble instance
6		Run the installation script or installer
7		Upgrade FHIR Repositories (If migrating to InterSystems IRIS for Health only)
8		Update user code, compile namespaces, and start productions
9		Turn on system-wide production auto-start

CAUTION: Make sure you have validated the migration in a development or test environment and fully tested your application under InterSystems IRIS before running the migration on a production instance.

Important: After you migrate the instance to InterSystems IRIS and it is fully validated, InterSystems recommends that you make a complete backup of the system. Use your customary full operating system backup procedures.

Important: If you are migrating from Caché 2016.2 or Ensemble 2016.2 to InterSystems IRIS for Health 2020.1 or later, see [InterSystems IRIS for Health Memory Considerations](#) for needed post-migration steps.

Note: If you are performing the InterSystems IRIS migration on UNIX® or Linux, use **sudo** to run any commands that require root permissions.

Note: To launch the Terminal in InterSystems IRIS, use **iris terminal <instname>**, instead of **csession <instname>**.
On Windows, run the command from the *install-dir\bin* directory (or with *install-dir\bin* in the PATH environment variable). Or, launch the Terminal using the System Tray icon.

2.1 Perform Pre-Migration Tasks

To ensure a smooth and efficient migration, make sure you have performed the [pre-migration tasks](#) before starting the migration.

2.2 Uncompress the Installation Kit (UNIX® or Linux Only)

If your installation kit is in the form of a .tar file, for example IRIS-lnxrhx64.tar.gz, uncompress the file into a temporary directory to avoid permissions issues, as shown in the following example.

```
# mkdir /tmp/iriskit
# chmod og+rx /tmp/iriskit
# gunzip -c /download/IRIS-lnxrhx64.tar.gz | ( cd /tmp/iriskit ; tar xf - )
```

The installation files uncompress into a directory with the same name as the .tar file, for example /tmp/iriskit/IRIS-lnxrhx64 in the preceding example.

Important: Do not uncompress the file into or run the InterSystems IRIS installation script from the /home directory, or any of its subdirectories.

Note: The pathname of the temporary directory cannot contain spaces.

Because legacy **tar** commands may fail silently if they encounter long pathnames, InterSystems recommends that you use **GNU tar** to untar this file. To determine if your **tar** command is a GNU **tar**, run **tar --version**.

2.3 Turn Off System-Wide Production Auto-Start (Ensemble or Health Connect Only)

As the migration process leaves the instance running upon completion, turn off production auto-start so that Ensemble productions remain off after the migration.

1. In the Management Portal, select **System Administration > Configuration > Additional Settings > Startup**.
2. On the Startup Settings page, next to the **EnsembleAutoStart** setting, click **Edit**.
3. Clear the **EnsembleAutoStart** check box.
4. Click **Save**.

2.4 Stop All Ensemble Productions (Ensemble or Health Connect Only)

To prevent Ensemble productions from entering a problem state, stop all productions before shutting down the instance. This is an InterSystems best practice and allows large transactions to complete and remaining messages in production queues to be processed.

Perform the following procedure in each namespace that contains Ensemble productions:

1. In the Management Portal, select **Ensemble > List > Productions**.
2. On the Production List page, click the production that you want to stop.
3. Click **Open**.
4. On the Production Configuration page, click **Stop**.
5. When the browser asks if you wish to stop this production, click **OK**.

Note: If any Terminal windows open as a result of stopping the production, do not close them.

6. When the Stop Production dialog box shows it is “Done,” click **OK**.
7. If portal displays a message “Production could not stop, do you want to force a shut down?”, click **Yes - Force to Shut Down**.

CAUTION: A production acquires the *Suspended* status when, at the end of the shutdown sequence, some queues still contain any messages. If the production becomes *Suspended*, contact the [InterSystems Worldwide Response Center](#) before proceeding.

A production acquires a status of *Troubled* if the production did not shut down properly. On the Production Configuration page, click **Recover** to shut down and clean up the production. If this does not clean up the production, you may need to run the following method in the Terminal:

```
do ##class(Ens.Director).RecoverProduction()
```

Note: If you have a large number of productions and stopping them individually would be very time consuming, run the following command from the Terminal:

```
do ##class(%EnsembleMgr).OnSystemShutdown(.pConsoleLog)
```

Then run the following command to make sure all productions have been stopped:

```
zwrite pConsoleLog
```

You should see messages similar to the following:

```
pConsoleLog=2
pConsoleLog(1)=$lb(0,"Stopping Ensemble production in namespace 'MYNAMESPACE' initiated at
15:03:32")
pConsoleLog(2)=$lb(0,"All Ensemble productions stopped.")
```

2.5 Shut Down the Caché or Ensemble Instance

Shut down the Caché or Ensemble instance from the command line:

```
# ccontrol stop <instname>
```

On Windows, run the command from the *install-dir\bin* directory (or with *install-dir\bin* in the PATH environment variable). Or, stop the instance using the System Tray icon.

CAUTION: Prior to performing a migration on a Caché or Ensemble instance, it is essential that the instance be shut down cleanly. To verify that the shutdown was clean, examine the *cconsole.log* file after the shutdown finishes. If the log contains entries similar to the following, then the shutdown was clean:

```
Journal restore not required at next startup  
Transaction rollback not required at next startup
```

If these entries are not present, the instance did not shut down cleanly. Please contact the [InterSystems Worldwide Response Center](#) before proceeding with the migration.

2.6 Run the Installation Script or Installer

Now that the instance is down, you are ready to perform the installation, which will convert the instance to InterSystems IRIS.

Important: If the installation fails with any error messages, correct the issues and restart the installation script or installer. Do not interrupt the installation while it is in progress.

Note: If you are using a manifest as part of your migration process, see the instructions in [Using a Manifest](#), instead of performing the standard installation step.

On UNIX® or Linux

The installation script, **irisinstall**, provides all the functionality required to convert an existing Caché or Ensemble instance to InterSystems IRIS.

Note: If the profile of the user executing **irisinstall** has a value set for the *CDPATH* variable, the installation fails.

To perform the conversion:

1. As a user with root privileges, start the installation procedure by running the **irisinstall** script, located at the top level of the installation files:

```
# sudo sh /<pathname>/irisinstall
```

where *pathname* is the location of the installation kit, typically the temporary directory to which you have extracted the kit, as described in “[Uncompress the Installation Kit](#)”.

2. The script displays a list of any existing Caché, Ensemble, InterSystems IRIS, and Health Connect instances on the host.
3. At the **Enter instance name:** prompt, type the name of the Caché or Ensemble instance you want to convert to InterSystems IRIS, and press **Enter**.

4. When asked if you want to convert the instance to InterSystems IRIS, press **Enter** to confirm. (An existing Health Connect 15.03 instance may be identified as “HealthShare.”)
5. When prompted for a license key file, type *keypath\iris.key*, where *keypath* is the location of the new *iris.key* file.

Note: If the installation script finds the new key file in the *install-dir/mgr* directory, the script will proceed without prompting you for the license key file.
6. If you are converting a Health Connect instance, when prompted, optionally configure the Web Gateway.
7. The installation script summarizes the conversion options and again asks you to confirm the conversion. Press **Enter** to continue with the conversion.
8. Examine *messages.log* (formerly known as *cconsole.log*), *iboot.log*, and *ensinstall.log* in the *install-dir/mgr* directory for any errors. If any fatal error is found, correct the error, and then run the installation script again.

Note: If you see an error in *messages.log* similar to `ERROR #5529: Illegal Regular SQL identifier: 'Module' is an SQL Reserved word please specify a different SQL name for this table`, see [Illegal Regular SQL Identifier Errors](#).

After the conversion finishes, the instance restarts, and any user installation manifest is run. For more information on installation manifests, see “[Using an Installation Manifest](#)”.

Important: If your operating system is configured to use huge memory pages, check the startup messages to make sure shared memory is being allocated in accordance with these settings. If you see a message similar to the following, reboot your server to avoid an out-of-memory situation.

```
Failed to allocate 1468MB shared memory using Huge Pages. Startup will retry with standard pages.
```

Then, start the InterSystems IRIS instance from the command line:

```
# iris start <instname>
```

On Windows

The installer provides all the functionality required to convert an existing Caché or Ensemble instance to InterSystems IRIS.

To perform the conversion:

1. Double-click the installer file, for example, *IRIS-win_x64.exe*.
2. The installer displays a list of any existing Caché, Ensemble, InterSystems IRIS, and Health Connect instances on the host. Any instances that can be converted are marked with the text (CONVERSION).
3. Select the name of the Caché or Ensemble instance you want to convert to InterSystems IRIS, and click **OK**.
4. When prompted for an IRIS license key, click **License** and browse for the new *iris.key* file.

Note: If the installer finds the new key file in the *install-dir/mgr* directory, it will proceed without prompting you for the license key file.

5. After the installer validates the license key, click **Convert**.
6. After the conversion is completed, click **Finish**.
7. Examine *messages.log* (formerly known as *cconsole.log*), *iboot.log*, and *ensinstall.log* in the *install-dir\mgr* directory for any errors. If any fatal error is found, correct the error, and then run the installer again.

Note: If you see an error in `messages.log` similar to `ERROR #5529: Illegal Regular SQL identifier: 'Module' is an SQL Reserved word` please specify a different SQL name for this table, see [Illegal Regular SQL Identifier Errors](#).

After the conversion finishes, the instance restarts, and any user installation manifest is run. For more information on installation manifests, see “[Using an Installation Manifest](#)”.

Important: If your operating system is configured to use large memory pages, check the startup messages to make sure shared memory is being allocated in accordance with these settings. If you see a message similar to the following, reboot your server to avoid an out-of-memory situation.

```
Failed to allocate 592MB shared memory using large pages. Switching to small pages.
```

Then, start the InterSystems IRIS instance from the System Tray icon.

Important: If `messages.log` contains entries like the following, you need to reenter the logon information for the Windows Service controller:

```
Unable to update Windows Service controller with username <username>@<domain>,
now running as 'Local System Account' user
You will need to update the Windows Service named 'InterSystems IRIS controller
for <instname>' with username <username>@<domain> and password
```

1. Open Windows Services and find the service InterSystems IRIS (or Health Connect) Controller for *instname*.
2. Right-click the service, click **Properties**, and then click the **Log On** tab.
3. Click **This Account**, and then enter the correct username and password.
4. Click **OK**.
5. Stop and restart the service.

2.7 Upgrade FHIR Repositories (If Migrating to InterSystems IRIS for Health Only)

If you are migrating from Health Connect to InterSystems IRIS for Health, and are using a FHIR repository or FHIR productions, run the FHIR upgrade utility. This regenerates the FHIR repository search tables and converts the FHIR repository streamlets and productions so that they use the re-implemented FHIR classes.

Run the following command from the Terminal, in each FHIR namespace:

```
do ##class(HS.HC.Util.Installer.Upgrade.FHIR1503).RunAll()
```

2.8 Update User Code, Compile Namespaces, and Start Productions

This step involves three distinct tasks that need to be performed for each namespace:

1. [Updating User Code](#)
2. [Compiling Namespaces](#)
3. [Starting Productions \(if migrating an Ensemble or Health Connect instance\)](#)

You can take one of two approaches:

- To minimize downtime, you can run these three tasks sequentially on each namespace, starting with the highest priority namespace.
- To perform like tasks together, you can run each task on each namespace before proceeding to the next task.

CAUTION: You may need to perform these three tasks in the following namespaces:

- ENSEMBLE
- USER
- HSCUSTOM (Health Connect only)
- any user-created namespace

Any user classes or routines (with names `Z*`, `z*`, `%Z*`, and `%z*`) that are mapped to the `%SYS` namespace are automatically converted and recompiled. Other user code or data stored in system directories and databases may be lost in the conversion process.

2.8.1 Update User Code

After performing the InterSystems IRIS conversion, you may need to update the user code in each namespace, due to system artifacts that have been renamed or removed between Caché/Ensemble and InterSystems IRIS.

This task may vary, depending on your application's specific implementation. Review the *InterSystems IRIS Migration Guide* for information on how your code may be affected. For Health Connect, also review the list of "[Updated and Re-Implemented Health Connect Classes](#)".

Note: If you have previously performed and validated a migration in another environment, importing any updated classes exported from that environment will allow you to update your code quickly, minimizing downtime. Make sure you import each of your classes into the appropriate namespace.

You can also load previously updated code (or an updated and pre-compiled database) using a manifest as part of your migration process. See the instructions in [Using an Installation Manifest](#).

2.8.2 Compile Namespaces

Next, you must compile the code in each namespace so that it runs under InterSystems IRIS.

Note: If you are using a manifest as part of your migration process, you can use the manifest to compile your code (or to install an updated and pre-compiled database). See the instructions in [Using an Installation Manifest](#).

Note: If the compiler detects any errors while following the instructions in this section, you may need to re-compile one or more times for the compiler to resolve all dependencies.

If errors persist, see [Fixing Compiler Errors](#).

Classes

To compile the classes in all namespaces, at once, from the Terminal:

```
do $system.OBJ.CompileAllNamespaces("cuk")
```

To compile the classes in a single namespace, from the Terminal:

```
set $namespace = "<namespace>"  
do $system.OBJ.CompileAll("cuk")
```

Note: If you are compiling classes in a namespace that contains mapped classes, include the `/mapped` qualifier in the call to **CompileAllNamespaces()** or **CompileAll()**, for example:

```
do $system.OBJ.CompileAll("cuk /mapped")
```

CSP Pages

Any CSP pages stored on disk need to be reloaded and compiled. This applies to CSP pages defined as `.csp` files on the file system, not to CSP pages defined in `.cls` files.

To reload and compile the CSP pages in a single namespace, from the Terminal:

```
set $namespace = "<namespace>"  
do $system.CSP.LoadPageDir("<web application name>")
```

The web application name is the directory containing the CSP pages and is often `/csp/<namespace>`. If you have multiple web applications in the namespace, run `LoadPageDir()` on each of them.

Note: To launch the Terminal in InterSystems IRIS, use **iris terminal <instname>**, instead of **csession <instname>**.

On Windows, run the command from the `install-dir\bin` directory (or with `install-dir\bin` in the `PATH` environment variable). Or, launch the Terminal using the System Tray icon.

Note: After your code compiles successfully, you may want to export any updated classes, in case you need to run the migration in any additional environments. Importing these classes during future migrations will allow you to update your code quickly, minimizing downtime.

2.8.3 Start Productions (If Migrating an Ensemble or Health Connect Instance)

After updating your user code and recompiling each namespace, you are ready to start any Interoperability productions in the namespace.

1. In the Management Portal, select **Interoperability > List > Productions**.
2. On the Production List page, click the production that you want to start.
3. Click **Open**.
4. On the Production Configuration page, click **Start**.
5. In the confirmation dialog box, click **OK**.

Note: If any Terminal windows open as a result of starting the production, do not close them.

6. When the progress dialog box shows it is “Done,” click **OK**.

2.9 Turn On System-Wide Production Auto-Start

After the instance is fully migrated, turn on production auto-start.

1. In the Management Portal, select **System Administration** > **Configuration** > **Additional Settings** > **Startup** .
2. On the Startup Settings page, click **Edit** next to the **EnsembleAutoStart** setting.
3. Enable the check box.
4. Click **Save**.

3

Performing a Migration in a Mirrored Environment

Use this checklist to perform a migration in a mirrored environment. InterSystems recommends printing this checklist and marking off each step when you have completed it. Complete all steps in the order specified.

At a high level, you will:

1. Convert the backup failover member to InterSystems IRIS.
2. Fail over to the backup failover member and validate InterSystems IRIS in a non-mirrored environment.
3. Convert the original primary failover member to InterSystems IRIS.
4. Optionally, fail back to the original primary failover member.

Important: If your mirror configuration includes a [disaster recovery async member](#) or an [arbiter](#) (a system that is not a mirror member and hosts an ISCAgent), read [Migrating Additional Mirror Components](#) before starting the migration process.

Table 3–1: Mirrored Environment Migration Checklist

Sep	Dre	Server A (Original Primary Failover Member)	Server B (Original Backup Failover Member)	Downtime
1		Perform pre-migration tasks	Perform pre-migration tasks	
2			Uncompress the installation kit (UNIX® or Linux only)	
3			Set mirror No Failover	
4			Turn off system-wide production auto-start (Ensemble or Health Connect only)	
5			Delete %ALL namespace (if using)	
6			Shut down the Caché or Ensemble instance	
7			Stop and disable ISCAgent (Linux only)	
8			Run the installation script or installer	

Step	Done	Server A (Original Primary Failover Member)	Server B (Original Backup Failover Member)	Downtime
9			Start and enable ISCAgent (Linux only)	
10			Make sure Server B is backup member	
11			Clear mirror No Failover	
12		Turn off system-wide production auto-start (Ensemble or Health Connect only)		
13		Stop all Ensemble productions (Ensemble or Health Connect only)		Y
14		Delete %ALL namespace (if using)		Y
15		Shut down the Caché or Ensemble instance		Y
16			Make sure mirror failed over to Server B	Y
17			Create %ALL namespace (if using)	Y
18			Upgrade FHIR Repositories (If migrating to InterSystems IRIS for Health only)	Y
19			Update user code, compile namespaces, and start productions	Y
20			Set mirror No Failover	
21			Validate non-mirrored InterSystems IRIS instance	
22		Uncompress the installation kit (UNIX® or Linux only)		
23		Stop and disable ISCAgent (Linux only)		
24		Run the installation script or installer		
25		Create %ALL namespace (if using)		
26		Start and enable ISCAgent (Linux only)		
27		Make sure Server A is backup member		
28		Turn on system-wide production auto-start		
29			Clear mirror No Failover	
30			Turn on system-wide production auto-start	
		<i>If you want to run with Server B as the primary member, skip to step 36.</i>	<i>To fail back to Server A, complete the remaining steps.</i>	
31			Stop all Interoperability productions (Ensemble or Health Connect only)	Y

Step	Do	Server A (Original Primary Failover Member)	Server B (Original Backup Failover Member)	Downtime
32			Shut down the InterSystems IRIS instance	Y
33		Make sure mirror failed over to Server A		Y
34			Start the InterSystems IRIS instance	
35			Make sure Server B is backup member	
36		Compile code in non-mirrored databases		

CAUTION: Make sure you have validated the migration in a development or test environment and fully tested your application under InterSystems IRIS before running the migration on a production instance.

Important: After you migrate the instance to InterSystems IRIS and it is fully validated, InterSystems recommends that you make a complete backup of the system. Use your customary full operating system backup procedures.

Important: If you are migrating from Caché 2016.2 or Ensemble 2016.2 to InterSystems IRIS for Health 2020.1 or later, see [InterSystems IRIS for Health Memory Considerations](#) for needed post-migration steps.

Note: If you are performing the InterSystems IRIS migration on UNIX® or Linux, use **sudo** to run any commands that require root permissions.

Note: To launch the Terminal in InterSystems IRIS, use **iris terminal <instname>**, instead of **csession <instname>**.
On Windows, run the command from the *install-dir\bin* directory (or with *install-dir\bin* in the PATH environment variable). Or, launch the Terminal using the System Tray icon.

3.1 Perform Pre-Migration Tasks

To ensure a smooth and efficient migration, make sure you have performed the [pre-migration tasks](#) before starting the migration.

3.2 Uncompress the Installation Kit (UNIX® or Linux Only) — Server B

You will start the migration process by working on the backup failover member first.

If your installation kit is in the form of a .tar file, for example IRIS-lnxrhx64.tar.gz, uncompress the file into a temporary directory to avoid permissions issues, as shown in the following example.

```
# mkdir /tmp/iriskit
# chmod og+rx /tmp/iriskit
# gunzip -c /download/IRIS-lnxrhx64.tar.gz | ( cd /tmp/iriskit ; tar xf - )
```

The installation files uncompress into a directory with the same name as the .tar file, for example /tmp/iriskit/IRIS-Inxrhx64 in the preceding example.

Important: Do not uncompress the file into or run the InterSystems IRIS installation script from the /home directory, or any of its subdirectories.

Note: The pathname of the temporary directory cannot contain spaces.

Because legacy **tar** commands may fail silently if they encounter long pathnames, InterSystems recommends that you use **GNU tar** to untar this file. To determine if your **tar** command is a GNU **tar**, run **tar --version**.

3.3 Set Mirror No Failover — Server B

To prevent unwanted failover during the migration process, set No Failover.

1. In the Management Portal, select **System Operation > Mirror Monitor**.
2. On the Mirror Monitor page, click **Set No Failover**.

3.4 Turn Off System-Wide Production Auto-Start (Ensemble or Health Connect Only) — Server B

As the migration process leaves the instance running upon completion, turn off production auto-start so that Ensemble productions remain off after the migration.

1. In the Management Portal, select **System Administration > Configuration > Additional Settings > Startup**.
2. On the Startup Settings page, next to the **EnsembleAutoStart** setting, click **Edit**.
3. Clear the **EnsembleAutoStart** check box.
4. Click **Save**.

3.5 Delete %ALL Namespace (If Using) — Server B

CAUTION: Do not perform a migration in a mirrored environment where the %ALL namespace is defined. The migration will fail and leave the instance in a non-recoverable state.

If you are using the %ALL namespace, you must delete it before running the installation script or installer. Then, create the %ALL namespace again, when instructed.

If the %ALL namespace is defined for the instance:

1. In the Management Portal, select **System Administration > Configuration > System Configuration > Namespaces**.
2. On the Namespaces page, check the mappings defined for the %ALL namespace and record them for future use.
3. At the end of the %ALL row, click **Delete**.
4. When asked to confirm the action, click **Finish**.

3.6 Shut Down the Caché or Ensemble Instance — Server B

Shut down the Caché or Ensemble instance from the command line:

```
# ccontrol stop <instname>
```

On Windows, run the command from the *install-dir\bin* directory (or with *install-dir\bin* in the PATH environment variable). Or, stop the instance using the System Tray icon.

CAUTION: Prior to performing a migration on a Caché or Ensemble instance, it is essential that the instance be shut down cleanly. To verify that the shutdown was clean, examine the *cconsole.log* file after the shutdown finishes. If the log contains entries similar to the following, then the shutdown was clean:

```
Journal restore not required at next startup
Transaction rollback not required at next startup
```

If these entries are not present, the instance did not shut down cleanly. Please contact the [InterSystems Worldwide Response Center](#) before proceeding with the migration.

3.7 Stop and Disable ISCAgent (Linux Only) — Server B

On Linux systems, the location of the ISCAgent service has changed. Before running the installation script, stop and disable the old version of the service from the command line.

1. Stop the ISCAgent service:

```
# systemctl stop ISCAgent.service
```

2. Disable the ISCAgent service:

```
# sudo systemctl disable ISCAgent.service
```

3. Check the status of the ISCAgent service and make sure it shows that the service is inactive:

```
# systemctl status ISCAgent
```

3.8 Run the Installation Script or Installer — Server B

Now that the instance is down, you are ready to perform the installation, which will convert the instance to InterSystems IRIS.

Important: If the installation fails with any error messages, correct the issues and restart the installation script or installer. Do not interrupt the installation while it is in progress.

Note: If you are using a manifest as part of your migration process, see the instructions in [Using a Manifest](#), instead of performing the standard installation step.

On UNIX® or Linux

The installation script, **irisinstall**, provides all the functionality required to convert an existing Caché or Ensemble instance to InterSystems IRIS.

Note: If the profile of the user executing **irisinstall** has a value set for the *CDPATH* variable, the installation fails.

To perform the conversion:

1. As a user with root privileges, start the installation procedure by running the **irisinstall** script, located at the top level of the installation files:

```
# sudo sh /<pathname>/irisinstall
```

where *pathname* is the location of the installation kit, typically the temporary directory to which you have extracted the kit, as described in “[Uncompress the Installation Kit](#)”.

2. The script displays a list of any existing Caché, Ensemble, InterSystems IRIS, and Health Connect instances on the host.
3. At the **Enter instance name:** prompt, type the name of the Caché or Ensemble instance you want to convert to InterSystems IRIS, and press **Enter**.
4. When asked if you want to convert the instance to InterSystems IRIS, press **Enter** to confirm. (An existing Health Connect 15.03 instance may be identified as “HealthShare.”)
5. When prompted for a license key file, type *keypath*\iris.key, where *keypath* is the location of the new iris.key file.

Note: If the installation script finds the new key file in the *install-dir*\mgr directory, the script will proceed without prompting you for the license key file.

6. If you are converting a Health Connect instance, when prompted, optionally configure the Web Gateway.
7. The installation script summarizes the conversion options and again asks you to confirm the conversion. Press **Enter** to continue with the conversion.

8. Examine `messages.log` (formerly known as `cconsole.log`), `iboot.log`, and `ensinstall.log` in the `install-dir/mgr` directory for any errors. If any fatal error is found, correct the error, and then run the installation script again.

Note: If you see an error in `messages.log` similar to `ERROR #5529: Illegal Regular SQL identifier: 'Module' is an SQL Reserved word please specify a different SQL name for this table`, see [Illegal Regular SQL Identifier Errors](#).

After the conversion finishes, the instance restarts, and any user installation manifest is run. For more information on installation manifests, see “[Using an Installation Manifest](#)”.

Important: If your operating system is configured to use huge memory pages, check the startup messages to make sure shared memory is being allocated in accordance with these settings. If you see a message similar to the following, reboot your server to avoid an out-of-memory situation.

```
Failed to allocate 1468MB shared memory using Huge Pages. Startup will retry with standard pages.
```

Then, start the InterSystems IRIS instance from the command line:

```
# iris start <instname>
```

Note: When the instance starts after conversion, you may notice an alert:

```
Failed to become either Primary or Backup at startup
```

This alert occurs because ISCAgent is not running. The problem will correct itself after ISCAgent is enabled and the instance becomes the backup failover member.

On Windows

The installer provides all the functionality required to convert an existing Caché or Ensemble instance to InterSystems IRIS.

To perform the conversion:

1. Double-click the installer file, for example, `IRIS-win_x64.exe`.
2. The installer displays a list of any existing Caché, Ensemble, InterSystems IRIS, and Health Connect instances on the host. Any instances that can be converted are marked with the text `(CONVERSION)`.
3. Select the name of the Caché or Ensemble instance you want to convert to InterSystems IRIS, and click **OK**.
4. When prompted for an IRIS license key, click **License** and browse for the new `iris.key` file.

Note: If the installer finds the new key file in the `install-dir/mgr` directory, it will proceed without prompting you for the license key file.

5. After the installer validates the license key, click **Convert**.
6. After the conversion is completed, click **Finish**.
7. Examine `messages.log` (formerly known as `cconsole.log`), `iboot.log`, and `ensinstall.log` in the `install-dir\mgr` directory for any errors. If any fatal error is found, correct the error, and then run the installer again.

Note: If you see an error in `messages.log` similar to `ERROR #5529: Illegal Regular SQL identifier: 'Module' is an SQL Reserved word please specify a different SQL name for this table`, see [Illegal Regular SQL Identifier Errors](#).

After the conversion finishes, the instance restarts, and any user installation manifest is run. For more information on installation manifests, see “[Using an Installation Manifest](#)”.

Important: If your operating system is configured to use large memory pages, check the startup messages to make sure shared memory is being allocated in accordance with these settings. If you see a message similar to the following, reboot your server to avoid an out-of-memory situation.

```
Failed to allocate 592MB shared memory using large pages. Switching to small pages.
```

Then, start the InterSystems IRIS instance from the System Tray icon.

Important: If messages.log contains entries like the following, you need to reenter the logon information for the Windows Service controller:

```
Unable to update Windows Service controller with username <username>@<domain>,
now running as 'Local System Account' user
You will need to update the Windows Service named 'InterSystems IRIS controller
for <instname> with username <username>@<domain> and password
```

1. Open Windows Services and find the service InterSystems IRIS (or Health Connect) Controller for *instname*.
2. Right-click the service, click **Properties**, and then click the **Log On** tab.
3. Click **This Account**, and then enter the correct username and password.
4. Click **OK**.
5. Stop and restart the service.

Note: When the instance starts after conversion, you may notice an alert:

```
Failed to become either Primary or Backup at startup
```

This alert occurs because ISCAgent is updated and the service is temporarily not running. The problem will correct itself as the updated ISCAgent service is enabled and the instance becomes the backup failover member.

3.9 Start and Enable ISCAgent (Linux Only) — Server B

After the installation script finishes, start and then enable the updated version of the ISCAgent service from the command line.

```
# systemctl start ISCAgent.service
# sudo systemctl enable ISCAgent.service
```

Important: If you run the installation script without first stopping and disabling ISCAgent, follow these steps to make sure you are running the correct version of the service.

1. Run the following command:

```
# systemctl status ISCAgent
```

2. The output of the command contains this warning:

```
Warning: Unit file changed on disk, 'systemctl daemon-reload' recommended.
```

3. Run the following command:

```
# systemctl daemon-reload
```

4. Then stop and restart the ISCAgent:

```
# systemctl stop ISCAgent.service  
# systemctl start ISCAgent.service
```

3.10 Make Sure Server is the Backup Failover Member — Server B

Now that InterSystems IRIS is installed on the backup failover member, prepare to make it the primary failover member. Start by confirming that it is currently the backup failover member.

1. In the Management Portal, select **System Operation > Mirror Monitor**.
2. On the Mirror Monitor page, under Mirror Member Status, make sure the correct server appears with the Status of **Backup**.

Note: Check this from the Mirror Monitor page on the backup failover member. If the primary and the backup are on different versions of ISCAgent, the Mirror Monitor page on the primary failover member will show the backup failover member as having a Status of **Down**.

3.11 Clear Mirror No Failover — Server B

Next, clear No Failover. This will allow the backup failover member to take over as the primary failover member when the original primary failover member is shut down.

1. In the Management Portal, select **System Operation > Mirror Monitor**.
2. On the Mirror Monitor page, click **Clear No Failover**.

3.12 Turn Off System-Wide Production Auto-Start (Ensemble or Health Connect Only) — Server A

Before shutting down the original primary failover member, prepare it to also be migrated.

As the migration process leaves the instance running upon completion, turn off production auto-start so that Ensemble productions remain off after the migration.

For details, see “[Turn Off System-Wide Production Auto-Start — Server B](#)”.

3.13 Stop All Ensemble Productions (Ensemble or Health Connect Only) — Server A

To prevent Ensemble productions from entering a problem state, stop all productions before shutting down the instance. This is an InterSystems best practice and allows large transactions to complete and remaining messages in production queues to be processed.

Perform the following procedure in each namespace that contains Ensemble productions:

1. In the Management Portal, select **Ensemble > List > Productions**.
 2. On the Production List page, click the production that you want to stop.
 3. Click **Open**.
 4. On the Production Configuration page, click **Stop**.
 5. When the browser asks if you wish to stop this production, click **OK**.
- Note:** If any Terminal windows open as a result of stopping the production, do not close them.
6. When the Stop Production dialog box shows it is “Done,” click **OK**.
 7. If portal displays a message “Production could not stop, do you want to force a shut down?”, click **Yes - Force to Shut Down**.

CAUTION: A production acquires the *Suspended* status when, at the end of the shutdown sequence, some queues still contain any messages. If the production becomes *Suspended*, contact the [InterSystems Worldwide Response Center](#) before proceeding.

A production acquires a status of *Troubled* if the production did not shut down properly. On the Production Configuration page, click **Recover** to shut down and clean up the production. If this does not clean up the production, you may need to run the following method in the Terminal:

```
do ##class(Ens.Director).RecoverProduction()
```

Note: If you have a large number of productions and stopping them individually would be very time consuming, run the following command from the Terminal:

```
do ##class(%EnsembleMgr).OnSystemShutdown(.pConsoleLog)
```

Then run the following command to make sure all productions have been stopped:

```
zwrite pConsoleLog
```

You should see messages similar to the following:

```
pConsoleLog=2
pConsoleLog(1)=$lb(0,"Stopping Ensemble production in namespace 'MYNAMESPACE' initiated at
15:03:32")
pConsoleLog(2)=$lb(0,"All Ensemble productions stopped.")
```

3.14 Delete %ALL Namespace (If Using) — Server A

Again, if you are using the %ALL namespace, you will need to delete it before this instance can be migrated to InterSystems IRIS.

For details, see “[Delete %ALL Namespace \(If Using\) — Server B](#)”.

3.15 Shut Down the Caché or Ensemble Instance — Server A

Shut down the original primary failover member to cause a failover to the original backup failover member.

For details, see “[Shut Down the Caché or Ensemble Instance — Server B](#)”.

3.16 Make Sure Mirror Failed Over — Server B

After mirror failover, make sure that the correct server is the primary failover member.

1. In the Management Portal, select **System Operation > Mirror Monitor**.
2. On the Mirror Monitor page, under Mirror Member Status, make sure the correct server appears with the Status of **Primary**.

3.17 Create %ALL Namespace (If Using) — Server B

If you deleted the %ALL namespace before running the installation script or installer, re-create it now.

1. In the Management Portal, select **System Administration > Configuration > System Configuration > Namespaces**.

2. The installation kit for some InterSystems IRIS-based products creates the %ALL namespace automatically. If you see %ALL in the list of namespaces, skip to step 7.
3. On the Namespaces page, click **Create New Namespace**.
4. On the New Namespace page, in the **Name of the Namespace** box, type %ALL.
5. Click **Save**.
6. When asked to confirm, click **OK**.
7. In the %ALL row, re-create the mappings you recorded earlier.

3.18 Upgrade FHIR Repositories (If Migrating to InterSystems IRIS for Health Only) — Server B

If you are migrating from Health Connect to InterSystems IRIS for Health, and are using a FHIR repository or FHIR productions, run the FHIR upgrade utility. This regenerates the FHIR repository search tables and converts the FHIR repository streamlets and productions so that they use the re-implemented FHIR classes.

Run the following command from the Terminal, in each FHIR namespace:

```
do ##class(HS.HC.Util.Installer.Upgrade.FHIR1503).RunAll()
```

3.19 Update User Code, Compile Namespaces, and Start Productions — Server B

This step involves three distinct tasks that need to be performed for each namespace:

1. [Updating User Code](#)
2. [Compiling Namespaces](#)
3. [Starting Productions \(if migrating an Ensemble or Health Connect instance\)](#)

You can take one of two approaches:

- To minimize downtime, you can run these three tasks sequentially on each namespace, starting with the highest priority namespace.

- To perform like tasks together, you can run each task on each namespace before proceeding to the next task.

CAUTION: You may need to perform these three tasks in the following namespaces:

- ENSEMBLE
- USER
- HSCUSTOM (Health Connect only)
- any user-created namespace

Any user classes or routines (with names Z*, z*, %Z*, and %z*) that are mapped to the %SYS namespace are automatically converted and recompiled. Other user code or data stored in system directories and databases may be lost in the conversion process.

3.19.1 Update User Code

After performing the InterSystems IRIS conversion, you may need to update the user code in each namespace, due to system artifacts that have been renamed or removed between Caché/Ensemble and InterSystems IRIS.

This task may vary, depending on your application's specific implementation. Review the *InterSystems IRIS Migration Guide* for information on how your code may be affected. For Health Connect, also review the list of “[Updated and Re-Implemented Health Connect Classes](#)”.

Note: If you have previously performed and validated a migration in another environment, importing any updated classes exported from that environment will allow you to update your code quickly, minimizing downtime. Make sure you import each of your classes into the appropriate namespace.

You can also load previously updated code (or an updated and pre-compiled database) using a manifest as part of your migration process. See the instructions in [Using an Installation Manifest](#).

3.19.2 Compile Namespaces

Next, you must compile the code in each namespace so that it runs under InterSystems IRIS.

Note: If you are using a manifest as part of your migration process, you can use the manifest to compile your code (or to install an updated and pre-compiled database). See the instructions in [Using an Installation Manifest](#).

Note: If the compiler detects any errors while following the instructions in this section, you may need to re-compile one or more times for the compiler to resolve all dependencies.

If errors persist, see [Fixing Compiler Errors](#).

Classes

To compile the classes in all namespaces, at once, from the Terminal:

```
do $system.OBJ.CompileAllNamespaces("cuk")
```

To compile the classes in a single namespace, from the Terminal:

```
set $namespace = "<namespace>"
do $system.OBJ.CompileAll("cuk")
```

Note: If you are compiling classes in a namespace that contains mapped classes, include the `/mapped` qualifier in the call to **CompileAllNamespaces()** or **CompileAll()**, for example:

```
do $system.OBJ.CompileAll("cuk /mapped")
```

CSP Pages

Any CSP pages stored on disk need to be reloaded and compiled. This applies to CSP pages defined as `.csp` files on the file system, not to CSP pages defined in `.cls` files.

To reload and compile the CSP pages in a single namespace, from the Terminal:

```
set $namespace = "<namespace>"
do $system.CSP.LoadPageDir("<web application name>")
```

The web application name is the directory containing the CSP pages and is often `/csp/<namespace>`. If you have multiple web applications in the namespace, run `LoadPageDir()` on each of them.

Note: To launch the Terminal in InterSystems IRIS, use **iris terminal <instname>**, instead of **csession <instname>**.

On Windows, run the command from the `install-dir\bin` directory (or with `install-dir\bin` in the `PATH` environment variable). Or, launch the Terminal using the System Tray icon.

Note: After your code compiles successfully, you may want to export any updated classes, in case you need to run the migration in any additional environments. Importing these classes during future migrations will allow you to update your code quickly, minimizing downtime.

3.19.3 Start Productions (If Migrating an Ensemble or Health Connect Instance)

After updating your user code and recompiling each namespace, you are ready to start the Interoperability productions in the namespace.

1. In the Management Portal, select **Interoperability > List > Productions**.
2. On the Production List page, click the production that you want to start.
3. Click **Open**.
4. On the Production Configuration page, click **Start**.
5. In the confirmation dialog box, click **OK**.

Note: If any Terminal windows open as a result of starting the production, do not close them.

6. When the progress dialog box shows it is “Done,” click **OK**.

3.20 Set Mirror No Failover — Server B

The original backup failover member is now fully migrated to InterSystems IRIS. To prevent it from failing back to the original primary failover member before it is migrated to InterSystems IRIS, set No Failover.

For details, see “[Set Mirror No Failover — Server B](#)”.

3.21 Validate Non-Mirrored InterSystems IRIS — Server B

Once your application is up and running under InterSystems IRIS on the original backup failover member, validate the updated instance according to your company's best practices before running the installer on the original primary failover member.

CAUTION: Do not run the installer on the original primary failover member (Server A) until you are confident that the original backup failover member (Server B) is running InterSystems IRIS without any issues. Once the original primary failover member has also been migrated to InterSystems IRIS, there is no path back to Caché or Ensemble.

Important: You cannot failover the original backup failover member (Server B) back to original primary failover member (Server A) until it has also been migrated to InterSystems IRIS. This rule does not apply if Server A is running Caché or Ensemble 2018.1.3 or later.

3.22 Uncompress the Installation Kit (UNIX® or Linux Only) — Server A

While the original primary failover member is down, convert it to InterSystems IRIS, starting by uncompressing the installation kit.

For details, see “[Uncompress the Installation Kit \(UNIX® or Linux Only\) — Server B](#)”.

3.23 Stop and Disable ISCAgent (Linux Only) — Server A

On Linux systems, the location of the ISCAgent service has changed. Before running the installation script, stop and disable the old version of the service from the command line.

For details, see “[Stop and Disable ISCAgent \(Linux Only\) — Server B](#)”.

3.24 Run the Installation Script or Installer — Server A

Now you are ready to perform the installation on the original primary failover member.

For details, see “[Run the Installation Script or Installer — Server B](#)”.

3.25 Create %ALL Namespace (If Using) — Server A

If you deleted the %ALL namespace before running the installation script or installer, re-create it now.

For details, see “[Create %ALL Namespace \(If Using\) — Server B](#)”.

3.26 Start and Enable ISCAgent (Linux Only) — Server A

Start and then enable the updated version of the ISCAgent service from the command line.

For details, see “[Start and Enable ISCAgent \(Linux Only\) — Server B](#)”.

3.27 Make Sure Server is the Backup Failover Member — Server A

Now that InterSystems IRIS is installed on the original primary failover member, prepare to make it the primary failover member again. Start by confirming that it is currently the backup failover member.

For details, see “[Make Sure Server is the Backup Failover Member — Server B](#)”.

3.28 Turn On System-Wide Production Auto-Start — Server A

Before failing back to the original primary failover member, turn on production auto-start.

1. In the Management Portal, select **System Administration** > **Configuration** > **Additional Settings** > **Startup**.
2. On the Startup Settings page, click **Edit** next to the **EnsembleAutoStart** setting.
3. Enable the check box.
4. Click **Save**.

3.29 Clear Mirror No Failover — Server B

On the original backup failover member, clear No Failover. This will allow the original primary failover member to take over as the primary failover member when the original backup failover member is shut down.

For details, see “[Clear Mirror No Failover — Server B](#)”.

3.30 Turn On System-Wide Production Auto-Start — Server B

Turn on system-wide production auto-start on the original backup failover member to prepare for future failovers.

For details, see “[Turn On System-Wide Production Auto-Start — Server A](#)”.

3.31 Stop All Interoperability Productions (Ensemble or Health Connect Only) — Server B

To prevent Interoperability productions from entering a problem state, stop all productions before shutting down the instance. This is an InterSystems best practice and allows large transactions to complete and remaining messages in production queues to be processed.

Perform the following procedure in each namespace that contains Interoperability productions:

1. In the Management Portal, select **Interoperability** > **List** > **Productions**.
2. On the Production List page, click the production that you want to stop.
3. Click **Open**.
4. On the Production Configuration page, click **Stop**.
5. When the browser asks if you wish to stop this production, click **OK**.

Note: If any Terminal windows open as a result of stopping the production, do not close them.

6. When the Stop Production dialog box shows it is “Done,” click **OK**.
7. If portal displays a message “Production could not stop, do you want to force a shut down?”, click **Yes - Force to Shut Down**.

CAUTION: A production acquires the **Suspended** status when, at the end of the shutdown sequence, some queues still contain any messages. If the production becomes **Suspended**, contact the [InterSystems Worldwide Response Center](#) before proceeding.

A production acquires a status of **Troubled** if the production did not shut down properly. On the Production Configuration page, click **Recover** to shut down and clean up the production. If this does not clean up the production, you may need to run the following method in the Terminal:

```
do ##class(Ens.Director).RecoverProduction()
```

Note: If you have a large number of productions and stopping them individually would be very time consuming, run the following command from the Terminal:

```
do ##class(%EnsembleMgr).OnSystemShutdown(.pConsoleLog)
```

Then run the following command to make sure all productions have been stopped:

```
zwrite pConsoleLog
```

You should see messages similar to the following:

```
pConsoleLog=2
pConsoleLog(1)=$1b(0,"Stopping Ensemble production in namespace 'MYNAMESPACE' initiated at
15:03:32")
pConsoleLog(2)=$1b(0,"All Ensemble productions stopped.")
```

3.32 Shut Down the InterSystems IRIS Instance — Server B

Shut down the original backup failover member to fail back to the original primary failover member.

From the command line:

```
# iris stop <instname>
```

On Windows, run the command from the *install-dir\bin* directory (or with *install-dir\bin* in the PATH environment variable). Or, stop the instance using the System Tray icon.

CAUTION: Prior to performing a migration on a Caché or Ensemble instance, it is essential that the instance be shut down cleanly. To verify that the shutdown was clean, examine the *cconsole.log* file after the shutdown finishes. If the log contains entries similar to the following, then the shutdown was clean:

```
Journal restore not required at next startup
Transaction rollback not required at next startup
```

If these entries are not present, the instance did not shut down cleanly. Please contact the [InterSystems Worldwide Response Center](#) before proceeding with the migration.

3.33 Make Sure Mirror Failed Over — Server A

Make sure the original primary failover member is again primary.

For details, see “[Make Sure Mirror Failed Over — Server B](#)”.

3.34 Start the InterSystems IRIS Instance — Server B

Once the original primary failover member is fully migrated to InterSystems IRIS, start InterSystems IRIS on the original backup failover member from the command line:

```
# iris start <instname>
```

On Windows, run the command from the *install-dir\bin* directory (or with *install-dir\bin* in the PATH environment variable). Or, start the instance using the System Tray icon.

Important: If your operating system is configured to use huge or large memory pages, check the startup messages to make sure shared memory is being allocated in accordance with these settings. If you see a message similar to the following, reboot your server to avoid an out-of-memory situation.

```
Failed to allocate 1468MB shared memory using Huge Pages. Startup will retry with standard pages.
```

Then, start the InterSystems IRIS instance from the command line:

```
# iris start <instname>
```

Note: When the instance starts after migration, you may notice an alert:

```
Preserving all mirror journal files for offline failover member
```

This alert is normal and can safely be ignored.

3.35 Make Sure Server is the Backup Failover Member — Server B

Make sure that the original backup failover member is again the backup failover member.

For details, see “[Make Sure Server is the Backup Failover Member — Server B](#)”.

3.36 Compile Code in Non-Mirrored Databases — Server A

When the mirror fails over to the original primary failover member, the updated code stored in any mirrored databases is copied over. If you have any code stored in any non-mirrored databases, update and recompile it now.

This step involves two distinct tasks that need to be performed for each namespace in a non-mirrored database:

1. [Updating User Code](#)
2. [Compiling Namespaces](#)

3.36.1 Update User Code

After performing the InterSystems IRIS conversion, you may need to update the user code in each namespace, due to system artifacts that have been renamed or removed between Caché/Ensemble and InterSystems IRIS.

This task may vary, depending on your application's specific implementation. Review the *InterSystems IRIS Migration Guide* for information on how your code may be affected. For Health Connect, also review the list of “[Updated and Re-Implemented Health Connect Classes](#)”.

Note: If you have previously performed and validated a migration in another environment, importing any updated classes exported from that environment will allow you to update your code quickly, minimizing downtime. Make sure you import each of your classes into the appropriate namespace.

You can also load previously updated code (or an updated and pre-compiled database) using a manifest as part of your migration process. See the instructions in [Using an Installation Manifest](#).

3.36.2 Compile Namespaces

Next, you must compile the code in each namespace stored in a non-mirrored database.

Note: If you are using a manifest as part of your migration process, you can use the manifest to compile your code (or to install an updated and pre-compiled database). See the instructions in [Using an Installation Manifest](#).

Note: If the compiler detects any errors while following the instructions in this section, you may need to re-compile one or more times for the compiler to resolve all dependencies.

If errors persist, see [Fixing Compiler Errors](#).

Classes

For each namespace stored in a non-mirrored database, from the Terminal:

```
set $namespace = "<namespace>"
do $system.OBJ.CompileAll("cuk")
```

Note: If you are compiling classes in a namespace that contains mapped classes, include the `/mapped` qualifier in the call to **CompileAll()**, for example:

```
do $system.OBJ.CompileAll("cuk /mapped")
```

CSP Pages

Any CSP pages stored on disk need to be reloaded and compiled. This applies to CSP pages defined as `.csp` files on the file system, not to CSP pages defined in `.cls` files.

For each namespace stored in a non-mirrored database, from the Terminal:

```
set $namespace = "<namespace>"
do $system.CSP.LoadPageDir("<web application name>")
```

The web application name is the directory containing the CSP pages and is often `/csp/<namespace>`. If you have multiple web applications in the namespace, run `LoadPageDir()` on each of them.

Note: To launch the Terminal in InterSystems IRIS, use **iris terminal <instname>**, instead of **csession <instname>**.

On Windows, run the command from the `install-dir\bin` directory (or with `install-dir\bin` in the `PATH` environment variable). Or, launch the Terminal using the System Tray icon.

Note: After your code compiles successfully, you may want to export any updated classes, in case you need to run the migration in any additional environments. Importing these classes during future migrations will allow you to update your code quickly, minimizing downtime.

4

Using an Installation Manifest

If your application relies on code libraries, CSS files, JavaScript files, or other components that are not included as part of InterSystems IRIS, you can use a manifest to install them as an additional option to the migration process. A manifest is also useful for silent installs, as you can invoke methods from the manifest, eliminating the need for interactive steps.

Creating a manifest is done with the help of the %Installer utility.

4.1 Creating a Class That Defines a Manifest

To create a class that defines an installation manifest, create a class according to the following rules:

- The class must include the %occInclude include file.
- It must contain an XData block specifying the details of the installation.

You can specify any legal name for the XData block; you use this name later as an argument.

If you use [XMLNamespace = INSTALLER] after the name of the XData block, Studio provides assistance as you type the XData block.

The root element in the XData block must be <Manifest>.

- It must define the **setup()** method.
- The **setup()** method must refer to the XData block by name.

You can use the following code as a template:

```
Include %occInclude

/// Simple example of installation instructions (Manifest)
Class MyInstallerPackage.SimpleManifest
{

XData SimpleManifest [ XMLNamespace = INSTALLER ]
{
<Manifest>
  <Log Level="3" Text="Start manifest" />
  <Namespace Name="">
    <Import File="" />
    <Invoke Class="" Method="" CheckStatus="" Return="">
      <Arg Value="" />
    </Invoke>
  </Namespace>
  <CopyFile Src="" Target="" IgnoreErrors="" />
  <CopyDir Src="" Target="" IgnoreErrors="" />
  <Log Level="3" Text="End manifest" />
</Manifest>
}
```

```
/// This is a method generator whose code is generated by XGL.
ClassMethod setup(ByRef pVars, pLogLevel As %Integer = 3,
    pInstaller As %Installer.Installer,
    pLogger As %Installer.AbstractLogger)
    As %Status [ CodeMode = objectgenerator, Internal ]
{
    #; Let our XGL document generate code for this method.
    Quit ##class(%Installer.Manifest).%Generate(%compiledclass, %code, "SimpleManifest")
}
}
```

For a comprehensive list of tags that can be used in a manifest, see “[List of <Manifest> Tags](#)” in the *Installation Guide*.

4.2 Running the Manifest

4.2.1 Running the Manifest Manually

To run a manifest manually, enter the following command in the Terminal.

```
do ##class(MyInstallerPackage.SimpleManifest).setup()
```

4.2.2 Running the Manifest with the Installation

Note: Before you use the manifest along with the InterSystems migration, InterSystems recommends that you run it manually in a test instance of InterSystems IRIS to make sure it functions as expected.

If you are running the manifest as part of a silent installation, make sure to copy the new InterSystems IRIS key to the mgr directory of the instance to be migrated before performing the installation, as you will not be able to specify the key location interactively.

Make sure that the user running the installation has write permission to the manifest log file directory. The installation will not proceed if the log file cannot be written.

To run the manifest in conjunction with the installation process, export the manifest class as an XML file. You can name the XML file `DefaultInstallerClass.xml` and copy it to the same directory where the installation script or installer is run, or you can specify the location and name of the file on the command line. The manifest will be run at the end of the installation process. The manifest class is imported into the %SYS namespace and compiled, and the **setup()** method is executed.

To run the manifest in conjunction with the installation process, use a command similar to the following examples.

On UNIX® or Linux

Set the necessary environment variables on the command line prior to running either **irisinstall** or **irisinstall_silent**, as shown in the following example:

```
sudo ISC_PACKAGE_INSTANCENAME="CACHECONV"
ISC_INSTALLER_MANIFEST="/Conversion/manifest.xml"
ISC_INSTALLER_LOGFILE="/Conversion/ManifestLogs/manifest.log"
ISC_INSTALLER_LOGLEVEL="3" ./irisinstall_silent
```

The log level must be in the range of 0 to 3, where 0 is “none” and 3 is “verbose.”

For more information, see the [complete list of Linux unattended installation command-line options](#) in the *Installation Guide*.

On Windows

Pass command-line arguments to the installer as shown in the following example. Use the `/qn` option if you want a silent installation. If you are running a silent installation, run the Windows command prompt in Administrator mode.

```
IRISUPG.85.0-win_x64.exe /instance CACHECONV /qn
INSTALLDIR="C:\InterSystems\CacheConv"
INSTALLERMANIFEST="C:\InterSystems\Conversion\manifest.xml"
INSTALLERMANIFESTLOGFILE="C:\InterSystems\Conversion\ManifestLogs\manifest.log"
INSTALLERMANIFESTLOGLEVEL="3"
```

The log level must be in the range of 0 to 3, where 0 is “none” and 3 is “verbose.”

For more information, see the [complete list of Windows unattended installation command-line options](#) in the *Installation Guide*.

4.3 Manifest Examples

This section presents some sample manifests to illustrate concepts that should be useful in a range of situations. These examples are not intended to provide a comprehensive overview of the capabilities of manifests. For more information, see the “[Creating and Using an Installation Manifest](#)” chapter in the *Installation Guide*.

4.3.1 Copying an IRIS Code-Only Database

In this scenario, you have successfully converted an instance to IRIS, updated your application code, and compiled it under InterSystems IRIS. Now, you want to perform conversions on other instances and install this pre-compiled code by copying the entire database. This example uses Windows path names.

This example assumes:

- Your code is contained in a code-only database, in this example, AppTestCode.
- You have compiled the code in under InterSystems IRIS and copied the IRIS.DAT file to the directory `C:\InterSystems\Conversion\AppTestCode`.

The XData block of the manifest class:

1. Writes a message to the manifest log indicating the start of the manifest installation process.
2. Invokes the method `SYS.Database.DismountDatabase()` to dismount the code-only database AppTestCode.
3. Copies the pre-compiled IRIS.DAT file to the proper namespace directory.
4. Invokes `SYS.Database.MountDatabase()` to mount the database again.
5. Writes a message to the manifest log indicating the end of the manifest installation process.

Class Definition

```
Include %occInclude

/// Simple example of installation instructions (Manifest)
Class MyInstallerPackage.SimpleManifest
{
  XData SimpleManifest [ XMLNamespace = INSTALLER ]
  {
    <Manifest>
      <Log Level="3" Text="The Installer Manifest is running."/>
      <Invoke Class="SYS.Database" Method="DismountDatabase" CheckStatus="1">
        <Arg Value="C:\InterSystems\InstallDir\mgr\AppTestCode\"/>
      </Invoke>
    </Manifest>
  }
}
```

```
<CopyFile Src="C:\InterSystems\Conversion\AppTestCode\IRIS.DAT"
  Target="C:\InterSystems\InstallDir\mgr\AppTestCode\"
  IgnoreErrors="1"/>
<Invoke Class="SYS.Database" Method="MountDatabase" CheckStatus="1">
  <Arg Value="C:\InterSystems\InstallDir\mgr\AppTestCode\"/>
</Invoke>
<Log Level="3" Text="The Installer Manifest has completed."/>
</Manifest>
}

/// This is a method generator whose code is generated by XGL.
ClassMethod setup(ByRef pVars, pLogLevel As %Integer = 3,
  pInstaller As %Installer.Installer,
  pLogger As %Installer.AbstractLogger)
  As %Status [ CodeMode = objectgenerator, Internal ]
{
  #; Let our XGL document generate code for this method.
  Quit ##class(%Installer.Manifest).%Generate(%compiledclass, %code, "SimpleManifest")
}
}
```

4.3.2 Importing Code from an XML Export

In this scenario, you have successfully converted an instance to IRIS, updated your application code, and compiled it under InterSystems IRIS. Now, you want to perform conversions on other instances and install this updated code by importing your code from an XML export. This example uses Linux path names.

This example assumes:

- Your code is contained in the namespace APPTEST.
- You have compiled the code under InterSystems IRIS, exported the code into an XML file, and copied the file to the directory /intersystems/conversion.

The XData block of the manifest class:

1. Writes a message to the manifest log indicating the start of the manifest installation process.
2. Sets the current namespace to APPTEST.
3. Invokes the method **%SYSTEM.OBJ.Upgrade()** to upgrade the class definitions in the namespace. Specifying the /mapped qualifier will also upgrade class definitions in mapped databases. (Included for completeness. Not needed for recent versions of InterSystems IRIS.)
4. Imports the XML file (or files) in the directory /intersystems/conversion.
5. Invokes the method **%SYSTEM.OBJ.CompileAll()** to compile the classes in the namespace. Specifying the /mapped qualifier will also compile classes in mapped databases. (Included for completeness. May not be needed if the code is already compiled under InterSystems IRIS.)
6. Invokes the method **%SYSTEM.CSP.LoadPageDir()** to load and compile the CSP pages in the namespace.
7. Writes a message to the manifest log indicating the end of the manifest installation process.

Class Definition

```
Include %occInclude

/// Simple example of installation instructions (Manifest)
Class MyInstallerPackage.SimpleManifest
{
  XData SimpleManifest [ XMLNamespace = INSTALLER ]
  {
    <Manifest>
      <Log Level="3" Text="The Installer Manifest is running."/>
      <Namespace Name="APPTTEST">
        <Invoke Class="%SYSTEM.OBJ" Method="Upgrade" CheckStatus="1">
          <Arg Value="/mapped"/>

```

```

        </Invoke>
        <Import File = "/intersystems/conversion/" />
        <Invoke Class="%SYSTEM.OBJ" Method="CompileAll" CheckStatus="1">
            <Arg Value="cuk /mapped" />
        </Invoke>
        <Invoke Class="%SYSTEM.CSP" Method="LoadPageDir" CheckStatus="1">
            <Arg Value="/csp/apptest" />
        </Invoke>
    </Namespace>
    <Log Level="3" Text="The Installer Manifest has completed." />
</Manifest>
}

/// This is a method generator whose code is generated by XGL.
ClassMethod setup(ByRef pVars, pLogLevel As %Integer = 3,
    pInstaller As %Installer.Installer,
    pLogger As %Installer.AbstractLogger)
    As %Status [ CodeMode = objectgenerator, Internal ]
{
    #; Let our XGL document generate code for this method.
    Quit ##class(%Installer.Manifest).%Generate(%compiledclass, %code, "SimpleManifest")
}
}

```

4.3.3 Upgrading a FHIR Repository

In this scenario, you are migrating a Health Connect instance to IRIS for Health and you want to automatically upgrade an existing FHIR repository for use with IRIS for Health. This example uses Windows path names.

This example assumes that your FHIR namespace is called FHIRSERVER.

The XData block of the manifest class:

1. Writes a message to the manifest log indicating the start of the manifest installation process.
2. Sets the current namespace to FHIRSERVER.
3. Invokes the method **HS.HC.Util.Installer.Upgrade.FHIR1503.RunAll()** to update the FHIR repository in this namespace.
4. Writes a message to the manifest log indicating the end of the manifest installation process.

Class Definition

```

Include %occInclude

/// Simple example of installation instructions (Manifest)
Class MyInstallerPackage.SimpleManifest
{
    XData SimpleManifest [ XMLNamespace = INSTALLER ]
    {
        <Manifest>
            <Log Level="3" Text="The Installer Manifest is running." />
            <Namespace Name="FHIRSERVER">
                <Invoke Class="HS.HC.Util.Installer.Upgrade.FHIR1503" Method="RunAll" />
            </Namespace>
            <Log Level="3" Text="The Installer Manifest has completed." />
        </Manifest>
    }

    /// This is a method generator whose code is generated by XGL.
    ClassMethod setup(ByRef pVars, pLogLevel As %Integer = 3,
        pInstaller As %Installer.Installer,
        pLogger As %Installer.AbstractLogger)
        As %Status [ CodeMode = objectgenerator, Internal ]
    {
        #; Let our XGL document generate code for this method.
        Quit ##class(%Installer.Manifest).%Generate(%compiledclass, %code, "SimpleManifest")
    }
}

```

4.3.4 Loading Library Code into a Read-Only Database

In this scenario, you want to load a set of library classes into a read-only database and copy a number of associated images, CSS files, and JavaScript files to the instance. This example uses Linux path names.

This example assumes:

- You have downloaded an export of the library classes to the directory `/Conversion/Classes`.
- You have downloaded the associated images, CSS files, and JavaScript files to the directory `/Conversion/AuxFiles`.

The XData block of the manifest class:

1. Writes a message to the manifest log indicating the start of the manifest installation process.
2. Sets the current namespace to `USERLIB`, where the library classes are to be stored.
3. Invokes a method in the manifest class, `MyInstallerPackage.SimpleManifest.SetDBReadOnly()`, to set the userlib database to not be read-only.
4. Imports the library classes.
5. Invokes `SetDBReadOnly()` to set the userlib database to be read-only again.
6. Sets the current namespace to `USER`, where the application using the library is stored.
7. Invokes the method `%SYSTEM.OBJ.CompileAll()` to compile all classes in the namespace to run under InterSystems IRIS.
8. Copies the images, CSS files, and JavaScript files to `/<installdir>/csp/broker`.
9. Writes a message to the manifest log indicating the end of the manifest installation process.

Class Definition

```
Include %occInclude

/// Simple example of installation instructions (Manifest)
Class MyInstallerPackage.SimpleManifest
{
XData SimpleManifest [ XMLNamespace = INSTALLER ]
{
<Manifest>
  <Log Level="3" Text="Start manifest" />
  <Namespace Name="USERLIB">
    <Invoke Class="MyInstallerPackage.SimpleManifest" Method="SetDBReadOnly" CheckStatus="1">
      <Arg Value="userlib"/>
      <Arg Value="0"/>
    </Invoke>
    <Import File="/Conversion/Classes" />
    <Invoke Class="MyInstallerPackage.SimpleManifest" Method="SetDBReadOnly" CheckStatus="1">
      <Arg Value="userlib"/>
      <Arg Value="1"/>
    </Invoke>
  </Namespace>
  <Namespace Name="USER">
    <Invoke Class="%SYSTEM.OBJ" Method="CompileAll" CheckStatus="1">
      <Arg Value="cuk"/>
    </Invoke>
  </Namespace>
  <CopyDir Src="/Conversion/AuxFiles/" Target="/InterSystems/InstallDir/csp/broker/" IgnoreErrors="1" />
  <Log Level="3" Text="End manifest" />
</Manifest>
}

/// Set ReadOnly property of a database.
ClassMethod setDBReadOnly(db As %String, ReadOnly As %Boolean) As %Status
{
  Set db = ##Class(SYS.Database).%OpenId(db)
  Set db.ReadOnly = ReadOnly
}
```

```

    Set status = db.%Save()
    Return status
}

/// This is a method generator whose code is generated by XGL.
ClassMethod setup(ByRef pVars, pLogLevel As %Integer = 3,
    pInstaller As %Installer.Installer,
    pLogger As %Installer.AbstractLogger)
    As %Status [ CodeMode = objectgenerator, Internal ]
{
    #; Let our XGL document generate code for this method.
    Quit ##class(%Installer.Manifest).%Generate(%compiledclass, %code, "SimpleManifest")
}
}

```

Note: As Zen Mojo is not included in InterSystems IRIS, this example can be tailored to install the Zen Mojo core classes and copy the associated plugins to the directory `<installdir>/csp/broker`.

To reinstall Zen Mojo you will need to download it from the InterSystems Worldwide Response Center [components distribution page](#):

- Download the Zen Mojo zip file and copy the export file of the Zen Mojo core classes, Zen Mojo 1.1.2.xml, to a directory of your choosing.
- Download the Zen Mojo demo zip file, and unzip and copy the plugins to a directory of your choosing.

Then make the following changes to the manifest example:

- In the first `<Namespace>` tag, change the namespace from `USERLIB` to `%SYS`.
- In the first two `<Invoke>` tags, change the first argument from `userlib` to `irislib`.
- In the `<Import>` tag, specify the directory where you copied the Zen Mojo core classes.
- In the second `<Namespace>` tag, change the namespace from `USER` to the namespace where your Zen Mojo application is stored.
- In the `<CopyDir>` tag, specify the directory where you copied the Zen Mojo plugins.

A

Conversion Details

A.1 InterSystems IRIS Conversion Details

When performing a conversion, the InterSystems IRIS installation script or installer performs the following tasks within the install directory:

- Deletes all InterSystems supplied binaries, DLLs, Locales, CSP files, Dev, and Java Libraries and replaces them with InterSystems IRIS files. As entire directories are deleted and replaced, be careful not to store any user code or databases in these InterSystems directories.
- Deletes and recreates the mgr/Temp directory, which holds temporary system and user files.
- Retains all user databases, renaming them iris.dat. It does not alter the contents of the user databases.
- Retains the csp.ini file, which contains user CSP settings.
- Retains the journal directories and files. The journal files in InterSystems IRIS are backwards compatible with existing journal files.
- Converts the cacheodbc.ini file to InterSystems IRIS format and renames it irisodbc.ini, retaining any user settings.
- Converts cache.cpf to InterSystems IRIS format and renames it iris.cpf. A list of the conversions is appended to the end of the CPF file.
- Removes the SAMPLES, ENSDEMO, and DOCBOOK databases and namespaces. The USER and ENSEMBLE databases are retained.
- Updates the Caché and Ensemble System databases to their InterSystems IRIS counterparts (for example, CACHELIB to IRISLIB).
- Converts and renames the CACHESYS database (mgr) to IRISYS. User data, routines and classes stored in the %SYS namespace are retained and recompiled.
- Loads the current locale definitions and NLS settings, including custom locales created by the user.
- Changes the %DB_CACHE* resource names in the system databases to %DB_IRIS*.
- If the audit directory was previously mgr/cacheaudit, changes the audit directory is to mgr/irisaudit. If auditing was performed to an alternate directory, that directory will remain the audit directory.
- If the CACHE directory (now IRISLOCALDATA) was previously mgr/cache, changes the directory to mgr/irislocaldata. If it was an alternate directory, that directory will be the IRISLOCALDATA directory.
- If the CACHETEMP directory (now IRISTEMP) was previously mgr/cachetemp, changes the directory to mgr/iristemp. If it was an alternate directory, that directory will be the IRISTEMP directory.

- Renames the log file cconsole.log to messages.log.
- Applies any database updates contained in the write image journaling file CACHE.WIJ and renames the file IRIS.WIJ.
- In Windows, updates all system and user ODBC data source names (DSNs) to use the InterSystems IRIS ODBC driver. All DSNs that use the SAMPLES namespace are deleted.
- Changes the default license server port from 4001 to 4002.
- Removes the Caché Object Server for ActiveX, CacheActiveX.dll, from the Program Files\Common Files\InterSystems\Cache directory and installs the latest version in Program Files\Common Files\InterSystems\IRIS. Removes the %Activate package.

A.2 Security Database Conversion Details

The security database is converted as follows:

- The audit database stored in the ^CacheAuditD global is converted to ^IRIS.AuditD
- LDAP configuration information is moved into its own class, Security.LDAPConfigs, in order to support multiple LDAP domains.
- The following roles and resources have been removed:
 - %DB_DOCBOOK
 - %DB_SAMPLES
 - %DB_ENSDemo
 - %DB_CACHESYS
 - %DB_CACHELIB
 - %DB_CACHETEMP
 - %DB_CACHEAUDIT
 - %DB_CACHE
- The following roles and resources have been added:
 - %DB_IRISSYS
 - %DB_IRISLIB
 - %DB_IRISTEMP
 - %DB_IRISAUDIT
 - %DB_IRISLOCALDATA
- The following Service has been removed:
 - %Service_MSMAActivate

B

Updated, Re-Implemented, and Removed Health Connect Classes

B.1 Updated and Re-Implemented Classes

Depending on your application, you may need to update any references to any Health Connect 15.03 classes and files that have been renamed or re-implemented in Health Connect 2020.1 or later (based on InterSystems IRIS) and InterSystems IRIS for Health.

Check any namespace where user code is to be updated (such as, HSCUSTOM, USER, and any user-created namespace), and rename or remediate any affected references, as listed in the table below:

Table II-1: Updated and Re-Implemented Health Connect Classes

Health Connect 15.03 Class	New Class
HS.Audit.ConsolidationService	HS.HC.Audit.ConsolidationService
HS.FHIR.MHD*	Deprecated Use HS.FHIR.vDSTU2.MHD.* instead
HS.FHIR.Model.*	Deprecated Use HS.FHIR.vDSTU2.Model.* instead.
HS.FHIR.Operation.Process	HS.FHIR.vDSTU2.Repository.OperationProcessor
HS.FHIR.PDQm.*	Deprecated Use HS.FHIR.vDSTU2.PDQm.* instead.
HS.FHIR.PIXm.*	Deprecated Use HS.FHIR.vDSTU2.PIXm.* instead.
HS.FHIR.REST.Handler	Deprecated Use HS.FHIR.vDSTU2.REST.Handler instead.
HS.FHIR.Utils.DateConversion	Deprecated

Health Connect 15.03 Class	New Class
HS.FHIR.Utills.SearchTableBuilder	HS.FHIR.vDSTU2.SearchTableBuilder
HS.IHE.DSUB.Publisher.Process	HS.HC.IHE.DSUB.Publisher.Process
HS.IHE.XDR.Recipient.CommonProcess	HS.HC.IHE.XDR.Recipient.CommonProcess
HS.IHE.XDSb.Consumer.Operations	HS.HC.IHE.XDSb.Consumer.Operations
HS.IHE.XDSb.Registry.Operations	HS.HC.IHE.XDSb.Registry.Operations
HS.Message.ECRUpdateRequest	Removed If HS.Message.ECRUpdateRequest was previously used as an input message type for HS.FHIR.FromSDA.DTL.Transaction.Process, then modify the input to use HS.Message.XMLMessage or Ens.StreamContainer, instead.
HS.MPI.Manager	HS.HC.MPI.Manager
HS.UI.AssigningAuthorities	HS.HC.UI.AssigningAuthorities
HS.UI.Home	HS.HC.UI.Home
HS.UI.Installer.Welcome	HS.HC.UI.Installer.Welcome
HS.Util.Installer	HS.HC.Util.Installer
HS.Util.Installer.Kit.FHIR.*	HS.HC.Util.Installer.Kit.FHIR.*
HS.Util.Trace.Helper	HS.HC.Util.Trace.Helper

Table II-2: Other Updated and Re-Implemented Health Connect Files

Health Connect 15.03 File	New File
HS.Common.inc	HS.HC.inc
HS.Errors.inc	HS.HC.Errors.inc

B.2 Removed Classes

In addition, certain other classes and artifacts available in Health Connect 15.03 are no longer available in Health Connect 2020.1 or later (based on InterSystems IRIS) or InterSystems IRIS for Health. InterSystems believes that these classes are rarely used by Health Connect customers.

The removed classes include, but are not limited to, the following:

Table II-3: Removed Health Connect Classes

Removed Health Connect 15.03 Class
HS.FHIR.Gateway.*
HS.FHIR.Repository.* (except HS.FHIR.Repository.Operations)
HS.Hub.HSWS.WebServices
HS.Hub.HSWS.WebServicesClient
HS.IHE.XDR.Recipient.DirectProcess
HS.IHE.XDSb.Consumer.Base
HS.Message.Push.CreateClinicalMessageRequest
HS.Test.UI.FHIR.LoggedOut
HS.Test.UI.FHIR.ServerSelect
HS.Test.UI.FHIR.ServerSelectOAuth2

Table II-4: Other Removed Health Connect Artifacts

Removed Health Connect 15.03 Artifacts
MPRLLIB database

If you see any error messages while running the installation kit or during compilation saying that any other classes or databases cannot be found, please contact the [InterSystems Worldwide Response Center](#) for assistance.

C

InterSystems IRIS for Health Memory Considerations

If you are migrating from Caché 2016.2 or Ensemble 2016.2 to InterSystems IRIS for Health 2020.1 or later, you may need to perform some post-migration steps to adjust certain memory settings on your instance. The settings carried over from your Caché or Ensemble instance may not be sufficient to make use of some InterSystems IRIS for Health functionality, such as the FHIR data load utility.

Guidelines for the important settings are as follows:

- Maximum Per-Process Memory (should be at least 262144KB)
- Memory Allocated for 8KB Database Cache (should be at least 165MB)
- Maximum Lock Table Size (should be at least 16777216 bytes)
- Memory Allocated for Routine Cache (should be at least 299MB)

Follow the steps in this appendix to adjust your memory settings, if necessary. You can use either Terminal or the Management Portal to make these changes.

C.1 Use Terminal

To use Terminal to adjust the key memory settings:

1. In Terminal, change to the %SYS namespace and get the current properties:

```
Set $Namespace = "%SYS"  
Do ##Class(Config.config).Get(.Properties)
```

2. Write the current properties:

```
Zwrite Properties
```

3. Examine the output, and set any properties that do not meet the guidelines listed above, for example:

```
Set Properties("bbsiz") = 262144  
Set Properties("globals8kb") = 165  
Set Properties("locksiz") = 16777216  
Set Properties("routines") = 299
```

4. Store the new values:

```
Do ##Class(Config.config).Modify(.Properties)
```

5. Restart the instance.

C.2 Use the Management Portal

To use the Management Portal to adjust the key memory settings:

1. In the Management Portal, select **System Administration > Configuration > Additional Settings > Advanced Memory**.
2. On the Advanced Memory Settings screen, next to `locksiz`, click **Edit**.
3. On the Edit: `locksiz` screen, check the current value.
4. If the value is less than in the guidelines listed above, enter 16777216, and click **Save**.
5. Select **System Administration > Configuration > System Configuration > Memory and Startup**.
6. On the Memory and Startup screen, examine the current memory settings to see if they meet the guidelines, using one of the following methods:
 - If **Configure Memory Settings** is set to **Automatically**, the actual memory settings may not be reflected in the values shown on the screen. Follow steps 1 and 2 in the [Use Terminal](#) section to view the actual values.
 - If **Configure Memory Settings** is set to **Manually**, check the values shown on the screen.
7. Set **Configure Memory Settings** to **Manually**.
8. Set any values that do not meet the guidelines, for example:
 - **Memory Allocated for Routine Cache (MB):** 299
 - **Memory Allocated for 8KB Database Cache (MB):** 165
 - **Maximum Per-Process Memory (KB):** 262144
9. Click **Save**.
10. Restart the instance.

D

Migrating Additional Mirror Components

If your mirror configuration includes a disaster recovery async (D/R Async) member or an arbiter (a system that is not a mirror member and hosts an ISCAgent), read this appendix before starting the migration process.

D.1 Disaster Recovery Async (D/R Async) Member

If your mirror configuration includes a [D/R Async member](#), isolate it from the rest of the network before starting the migration process to prevent changes from being written to it when the primary and backup failover members are migrated. This allows you to use the D/R Async member for disaster recovery should an unrecoverable error occur while migrating the primary and backup failover members. For information on disaster recovery, see “[Disaster Recovery Procedures](#)” in the *High Availability Guide*.

For configurations that include a D/R Async member, follow this outline:

1. Isolate the D/R Async member from the network using one of the following methods:
 - From the Mirror Monitor on the D/R Async member, click **Stop Mirror on This Member**.
 - Disable the network between the D/R Async member and the primary and backup failover members.
2. Migrate the primary and backup failover members by performing the steps in [Performing a Migration in a Mirrored Environment](#).
3. Migrate the D/R Async member by performing the following steps:
 - a. [Delete %ALL Namespace \(If Using\)](#)
 - b. [Shut down the Caché or Ensemble instance](#)
 - c. [Uncompress the installation kit \(UNIX® or Linux only\)](#)
 - d. [Stop and disable ISCAgent \(Linux only\)](#)
 - e. [Run the installation script or installer](#)
 - f. [Create %ALL Namespace \(If Using\)](#)
 - g. [Start and Enable ISCAgent \(Linux Only\)](#)
4. Reconnect the D/R Async member to the network using the appropriate method:
 - From the Mirror Monitor on the D/R Async member, click **Start Mirror on This Member**.
 - Enable the network between the D/R Async member and the primary and backup failover members.

5. If the D/R Async member uses code in any non-mirrored databases, perform the following step: [Compile Code in Non-Mirrored Databases](#).

D.2 Arbiter

If your system includes an [arbiter](#), you should upgrade the ISCAgent on that system to the same version (or a higher version) than that of the mirror members. This upgrade can be performed after you migrate the mirror members.

To upgrade the arbiter, download the latest ISCAgent installation kit for the appropriate operating system from the InterSystems Worldwide Response Center [components distribution page](#).

On Windows systems, double-click the installer, for example, `ISCAgent-win_x64.exe`.

On UNIX® or Linux systems, unpack the installation kit, and then execute `agentinstall` at the top level of the installation kit, as shown in the following example:

```
# gunzip ISCAgent-lnxrhx64.tar.gz
# tar -xf ISCAgent-lnxrhx64.tar
# ./ISCAgent-lnxrhx64/agentinstall
```

You can perform this installation as an unattended installation by setting `ISC_PACKAGE_MODE` to `unattended`. For example:

```
# ISC_PACKAGE_MODE="unattended" ./ISCAgent-lnxrhx64/agentinstall
```

Important: Ensure that the ISCAgent process on the arbiter system is configured to start at system startup. See [Starting and Stopping the ISCAgent](#) for more information.

E

Issues with Caché or Ensemble and InterSystems IRIS on the Same Machine

Several potential issues can occur if you attempt to install Caché or Ensemble and InterSystems IRIS on the same machine. In general, these issues occur because InterSystems IRIS has a different registry than Caché and Ensemble. Installers that are too old to include conversion capabilities are not aware of instances defined in the other registry:

- Caché and Ensemble installers prior to version 2018.1.4
- Health Connect installers prior to version 2019.1
- InterSystems IRIS installers prior to 2019.1.1
- InterSystems IRIS for Health installers prior to version 2020.1

The [ISCAgent version conflict](#) is a separate issue.

E.1 ISCAgent Version Conflict (Linux Only)

Under certain circumstances, if you perform a migration of Caché or Ensemble on a machine that already contains an instance of InterSystems IRIS, it may cause a mismatch in versions of ISCAgent. This mismatch can prevent mirror members from communicating with one another.

This issue arises in the following scenario:

1. You install InterSystems IRIS on the machine.
2. You then install, on the same machine, a version of Caché or Ensemble earlier than version 2018.1, for example, version 2017.2.2.
3. You then convert the instance of Caché or Ensemble to a version of InterSystems IRIS earlier than the one already installed on the machine.

In this scenario, the installation of Caché or Ensemble overwrites the version of ISCAgent already installed by InterSystems IRIS, and the installation script sees the later version of InterSystems IRIS and does not update ISCAgent.

To fix this issue, perform a standalone installation of ISCAgent on the machine. You must install a version of ISCAgent equal to or later than the latest instance of InterSystems IRIS on the machine. Download the ISCAgent installer from the InterSystems Worldwide Distribution Center [components distribution page](#).

E.2 Port Number Conflict

Caché and Ensemble use a different default series of numbers for the Web Server and Superserver ports than InterSystems IRIS does. However, if you perform a conversion, these port numbers are retained. If you then install another instance of Caché or Ensemble prior to version 2018.1.4 on that machine, the installer will not be aware of the InterSystems IRIS instance and will reuse the same port numbers, resulting in a conflict.

To prevent this scenario from occurring, either change the Web Server and Superserver port numbers of the InterSystems IRIS instance prior to installing the Caché or Ensemble instance, or perform a custom installation of Caché or Ensemble and specify unique port numbers.

E.3 Instance Name Conflict

If you attempt to install an instance of Caché or Ensemble prior to version 2018.1.4 using the same instance name as an existing instance of InterSystems IRIS, one or both instances may become inoperable. A similar scenario can also occur when installing an instance of InterSystems IRIS with the same name as an existing Caché or Ensemble instance, where the InterSystems IRIS installer does not have conversion capability.

When installing an instance of any InterSystems product, avoid specifying an instance name that is the same as an existing instance name, except in the cases of performing a migration or an upgrade to the existing instance.

F

Migrating a Health Connect/HSAP Instance That Was Previously Upgraded from a Full HealthShare Instance

If you attempt to migrate a Health Connect/HSAP instance on Windows that was previously upgraded from a full HealthShare instance, the HealthConnect 2020+ or InterSystems IRIS for Health 2020+ installation script or installer may not recognize the instance as being a candidate for conversion. (When you run the installer, any instances that can be converted are marked with the text (CONVERSION).)

If your instance was upgraded from a full HealthShare instance, or you have reason to believe that it might have been, perform the following procedure before beginning the conversion.

Important: If the procedure asks you to make any changes to the Windows registry, back up the registry appropriately before doing so.

1. Launch the Windows registry editor.
2. If you find any of the following registry keys, delete them:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\HSAA]  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\HSDocbook]  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\HSPI]  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\HSViewer]
```

3. Make sure that the following registry keys are present:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\HSCore]  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\MPRL]  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\InterSystems\Cache\Configurations\<InstanceName>\HSFDocbook]
```

4. If any of the above registry keys is missing, create an empty key with the same name as the missing key.

Once you have confirmed that the registry is in order, you can perform the migration normally, as described in this document.

G

Migrating Instances Having Custom HL7 Schema Global Mappings

The information in this appendix may affect customers of Ensemble or Health Connect/HSAP (based on the Caché/Ensemble platform) who have defined custom HL7 schemas and are migrating to InterSystems IRIS for Health or Health Connect 2020.1 or later (based on the InterSystems IRIS platform).

Some of these customers choose to store their custom HL7 schema definitions in one location (a shared code or library database) and make them available to other namespaces via global mappings. The globals involved are `^EnsHL7.Description` and `^EnsHL7.Schema`.

These global mappings appear in the .cpf file as something like:

```
Global_EnsHL7.Description("<schema name>")=<namespace>  
Global_EnsHL7.Schema("<schema name>")=<namespace>
```

While the default HL7 schema global mappings are retained, any custom mappings of globals matching the pattern `^EnsHL7*` may be removed during the conversion to InterSystems IRIS.

If you have custom mappings of any `^EnsHL7*` globals, make a note of them before starting the conversion and reapply them manually after the conversion is completed.

Note: Before starting the conversion, make a copy of `cache.cpf` so that you have a record of all mappings prior to the conversion.

H

Fixing Compiler Errors

This appendix explains how to fix errors you may encounter during the conversion to InterSystems IRIS or while compiling namespaces after you have converted an instance to InterSystems IRIS:

- [Protect Errors](#)
- [Class Dictionary Out of Date Errors](#)
- [Illegal Regular SQL Identifier Errors](#)
- [Other Errors](#)

H.1 Protect Errors

If you see a <PROTECT> error while compiling your classes, it means that one or more of your databases are mounted read-only.

To fix this issue:

1. In the Management Portal, select **System Administration > Configuration > System Configuration > Local Databases**.
2. For each database that is mounted read-only, click the name of the database, clear the **Mount Read-Only** box, and then click **Save**.
3. Recompile the classes or in any namespace where <PROTECT> errors were reported.
4. In the Management Portal, for each database that you temporarily mounted read/write, click the name of the database, check the **Mount Read-Only** box, and then click **Save**.

Note: While it is possible to perform this procedure using the **DismountDatabase()** and **MountDatabase()** methods of the class SYS.Database, **MountDatabase()** will not let you mount certain system-provided databases in read/write mode. The method completes without error, but the database remains read-only. Using the Management Portal will work as expected for such databases.

H.2 Class Dictionary Out of Date Errors

When you compile your classes under recent versions of InterSystems IRIS, the process also converts the class dictionary to the latest version. However, some older versions of InterSystems IRIS may not do this step.

If you see an error that says `Class dictionary out of date` while compiling your classes, upgrade the class definitions manually.

To upgrade the class definitions in all namespaces at once, from the Terminal:

```
do $system.OBJ.UpgradeAll()
```

To upgrade the class definitions in a single namespace, from the Terminal:

```
set $namespace = "<namespace>"
do $system.OBJ.Upgrade()
```

Note: If you are compiling classes in a namespace that contains mapped classes, use `$system.OBJ.UpgradeAll("/mapped")` or `$system.OBJ.Upgrade("/mapped")`.

Then, after upgrading the class definitions, compile your classes again.

H.3 Illegal Regular SQL Identifier Errors

If you attempt to convert a Caché or Ensemble-based product to InterSystems IRIS for Health, you may see a compilation error similar to `ERROR #5529: Illegal Regular SQL identifier: 'Module' is an SQL Reserved word please specify a different SQL name for this table`. This means that your instance has SQL delimited identifier support disabled. This section explains how to prevent the error and how to fix it if it does occur.

For more information on SQL delimited identifiers, see [Delimited Identifiers](#) in the document *Using InterSystems SQL*.

H.3.1 Preventing the Error

As noted in the [Pre-Migration Tasks](#), before converting an Caché or Ensemble-based product to InterSystems IRIS for Health, make sure that SQL delimited identifier support is turned on. This is the default setting.

To check this setting, run the following command from the Terminal:

```
do $SYSTEM.SQL.CurrentSettings()
```

The settings should include the following line:

```
Support delimited identifiers: 1 (Default)
```

If this value is 0, turn on delimited identifier support by running the SQL statement `SET OPTION SUPPORT_DELIMITED_IDENTIFIERS = TRUE`.

Then, proceed with the migration process outlined in this document.

If necessary, turn off delimited identifier support again after the migration by running the SQL statement `SET OPTION SUPPORT_DELIMITED_IDENTIFIERS = FALSE`.

H.3.2 Fixing the Error

If you attempt to convert an Caché or Ensemble-based product to InterSystems IRIS for Health, and you see an error in `messages.log` (formerly known as `cconsole.log`) similar to `ERROR #5529: Illegal Regular SQL identifier: 'Module' is an SQL Reserved word please specify a different SQL name for this table`, it means you have disabled SQL delimited identifier support. With this feature disabled, compiling classes in the `%ZHS LIB.PackageManager` package will fail, since some of the classes include `Module` in the name. “Module” is an SQL reserved word and must be treated as a delimited identifier in order for these classes to be compiled.

To fix this issue:

1. Turn on delimited identifier support by running the SQL statement `SET OPTION SUPPORT_DELIMITED_IDENTIFIERS = TRUE.`
2. Compile the classes in %ZHSLIB.PackageManager by running the following command in the Terminal:

```
do $system.OBJ.CompilePackage( "%ZHSLIB.PackageManager" )
```

3. If necessary, turn off delimited identifier support again by running the SQL statement `SET OPTION SUPPORT_DELIMITED_IDENTIFIERS = FALSE.`

H.4 Other Errors

If the error you are experiencing does not fall into any of the categories in the sections above, see if the any of the following conditions apply to you:

- When you compile classes, some errors are caused by other classes not yet being compiled. You may need to compile the classes in a namespace two or more times to ensure that all dependencies are resolved.
- If you are migrating an instance of Health Connect/HSAP, see [Updated, Re-Implemented, and Removed Health Connect Classes](#).

If you are seeing an error not described here, review the *InterSystems IRIS Migration Guide* and make sure you have not missed anything, or contact the [InterSystems Worldwide Response Center](#) for assistance.

Migrating from Older Versions of Caché or Ensemble

If you are migrating to InterSystems IRIS from an older version of Caché/Ensemble or Health Connect/HSAP (based on the Caché/Ensemble platform) than is supported for conversion using an installation kit (see [Supported Versions](#)), follow the guidelines in this appendix.

I.1 Same Server Method

If a direct migration path to InterSystems IRIS is not supported for your current version of Caché/Ensemble or Health Connect/HSAP, you can first upgrade to the latest version of your current product and then follow the steps described in this document from the beginning to migrate to InterSystems IRIS. This is the simplest, most straightforward path.

For example, if you are running Caché 2015.x, you can upgrade to Caché 2018.x, and then migrate to the destination product. For comprehensive upgrade information, see [Upgrading Caché](#).

Note: If you are running a version of Caché/Ensemble prior to 2009.1, or if you are running an instance containing any 2K block size databases, you will need to upgrade to 2011.1 first (if not on this version already) and convert all 2K databases to 8K format. For complete details, read [Upgrading Caché](#).

Some older platforms that are supported for Caché or Ensemble are no longer supported for InterSystems IRIS. Read [Supported Platforms](#) for the version of InterSystems IRIS to which you are migrating. You may need to upgrade your operating system to one that InterSystems IRIS supports.

I.2 New Server Method

If you want or need to move to a new server, for example, if your current platform is not supported for InterSystems IRIS, you can migrate to a new server and then migrate that server to InterSystems IRIS. While this method is more involved, it leaves your existing server intact.

Note: If you are running a version of Caché/Ensemble prior to 2009.1, or if you are running an instance containing any 2K block size databases, you will need to upgrade to 2011.1 first (if not on this version already) and convert all 2K databases to 8K format. For complete details, read [Upgrading Caché](#).

At a high level, the procedure is as follows:

- Migrate your security settings to a new server running the same product and same version of the Caché or Ensemble-based product you are using now.
- Upgrade to new server the latest version of your Caché or Ensemble-based product.
- Run the InterSystems IRIS installation kit on the new server to convert it to InterSystems IRIS.
- Replicate the settings contained in your old Configuration Parameter File (CPF) on the new server.
- Migrate your code and data to the new server.
- Migrate any additional artifacts to the new server.

More detailed steps are given in the remainder of this section. This is a modified version of the procedure outlined in the [InterSystems IRIS Server Migration Guide](#).

Important: All migrations are unique. This section provides general guidelines to help you with your migration. If you need assistance in determining the best course of action to take, contact the [InterSystems Worldwide Response Center](#).

I.2.1 Provision the Target Server

Unless you are purposely downsizing your server, make sure that the target server equals or exceeds the source server in terms of:

- CPU
- Memory
- Disk space

For more information on sizing a server, see [Vertically Scaling InterSystems IRIS](#).

I.2.2 Perform the Initial Installation

After procuring the target server, perform the initial installation on the target server:

1. Install a supported operating system. See [Supported Platforms](#) for the version of InterSystems IRIS to which you are migrating.
2. Perform the following:
 - Make sure necessary users at the operating system-level are configured.
 - Make sure large or huge pages are configured.
 - Make sure swap space or page file configurations are consistent with those on the source server.
 - Make sure all drives or filesystems are available with the same names and permissions.
 - Make sure the new machine has the same IP address, or if it has a new IP address then consider if other systems need to allow the new IP address through their firewalls.
3. Install the same product and same version of the Caché or Ensemble-based product you are using now. Place your existing cache.key file in the /<installdir>/mgr/ directory of the target server or import it using the Management Portal.
4. Install the web server and configure the web server and the web gateway (if required). For more information, see the [Web Gateway Configuration Guide](#).

5. Install any necessary security certificates.
6. Configure any needed firewall settings.

I.2.3 Migrate Security Settings

Migrate your security settings from the source server to the target server using one of the following techniques:

- Use the **ExportAll()** and **ImportAll()** methods of the `Security.System` class.
- Use the **Export()** and **Import()** methods of the individual classes in the `Security` package.
- Use the `^SECURITY` routine.

For more information, see [Security Settings](#) in the InterSystems IRIS Server Migration Guide.

I.2.4 Upgrade to the Latest Version of Your Caché or Ensemble-Based Product

Run the installation kit for the latest version of your Caché or Ensemble-based product. This should be version 2018.1.x.

I.2.5 Perform an In-Place conversion to InterSystems IRIS

Run the installation kit for the version of the InterSystems IRIS-based product to which you are migrating. Place your valid `iris.key` file in the `/<installdir>/mgr/` directory of the target server or import it using the Management Portal.

I.2.6 Configuration Parameter File (CPF)

Next, replicate the settings in the source server's CPF on the target server.

The CPF in InterSystems IRIS is called `iris.cpf`. While many of the sections in the file are similar to those in `cache.cpf`, some sections and settings have changed and you cannot just rename your old CPF and copy it to the target server. You can, however, use it as a reference to help you configure your databases, namespaces, mappings, startup settings, and so forth, on the target server.

If you are using interoperability productions in a namespace, you must enable the namespace to use productions on the target server. You can do this when you create the namespaces or you can run the following command for each namespace to be interoperability enabled:

```
do ##class(%Library.EnsembleMgr).EnableNamespace("<namespace>",1)
```

For more information on the InterSystems IRIS CPF format, see [Introduction to the Configuration Parameter File](#).

I.2.7 Migrate User-Created Databases

Any user-created databases that you want to retain on the target server should be migrated to the target server. System-supplied databases (such as `CACHE`, `CACHEAUDIT`, `CACHELIB`, `CACHETEMP`, and `ENSLIB`) should not be migrated, as InterSystems IRIS equivalents are provided by the installation kit.

If you have placed custom code in the `ENSLIB` database, InterSystems recommends that you implement this code in a user-created database in InterSystems IRIS.

Before migrating your databases, perform a clean shutdown on the instances on both the source and target servers.

Copy the `CACHE.DAT` files to be migrated to the same locations on the target server. Then rename each `CACHE.DAT` file to `IRIS.DAT` on the target server.

Note: If you see any cache.lck files with the CACHE.DAT files on the source server, the source instance is running or did not shutdown cleanly. Shut down the instance cleanly and try again.

Note: If you have already created empty databases on the target server with the same names as on the source server, you can delete the empty IRIS.DAT files before copying the CACHE.DAT files.

I.2.8 Migrate Custom Items in %SYS Namespace

Export any custom classes, routines, or globals from the %SYS namespace of the source server and import them to the %SYS namespace on the target server.

For example, migrate the following routines if you are using them:

- **^ZWELCOME**
- **^ZAUTHENTICATE** and **^ZAUTHORIZE**
- **^ZMIRROR**
- **^%ZSTART** and **^%ZSTOP**
- **^%ZLANG***
- **^%ZJREAD**

I.2.9 Copy CSP, JS, and CSS Files

Copy all files and directories for any custom CSP applications from the source server to the same locations on the target server.

I.2.10 Update User Code and Compile

You need to update the code on your target server and compile it on InterSystems IRIS for it to be able to be run. The procedure is much the same as is outlined in [Update User Code, Compile Namespaces, and Start Productions](#). You may need to fix your code and recompile it several times until all of the code is successfully updated.

I.2.11 Migrate Task Manager Tasks

On the source server, export any Task Manager tasks you want to migrate by exporting individual tasks from within the Task Manager or by using the **%SYS.Task.ExportTasks()** method. You can then import the tasks to the target server by using the Task Manager. Then configure your Task Manager email settings on the target server, as these do not come over in the Task Manager tasks export.

For more information, see [Task Manager Tasks](#) in the InterSystems IRIS Server Migration Guide and [Configuring Task Manager Email Settings](#) in the System Administration Guide.

I.2.12 Migrate External Linked Libraries and Custom Shared Libraries

If you are using any external linked libraries or custom shared libraries, copy these from the source server to the target server.

This procedure is site specific and instructions are not provided in this document.

I.2.13 Set Up Mirroring

Once your migrated system is fully tested, you can set up mirroring as required. For complete information on mirroring, see the [High Availability Guide](#).

J

Migrating iFind and iKnow Data

In InterSystems IRIS, iFind has been renamed SQL Search, and iKnow has been renamed Natural Language Processing (NLP). Also, the globals used to store iFind and iKnow data have changed between Caché/Ensemble and InterSystems IRIS. If you are using iFind and/or iKnow, follow the steps in this appendix to rebuild your iFind indexes and iKnow domains after performing your migration to InterSystems IRIS.

J.1 Rebuilding iFind Indexes

If you are migrating iFind data from Caché/Ensemble to InterSystems IRIS, follow the steps outlined in this section. Note that iFind indexes are called SQL Search indexes in InterSystems IRIS.

1. Compile the classes containing SQL Search indexes, if you have not done so already. For example, execute the following statements for each namespace containing SQL Search indexes:

```
set $namespace = "<namespace>"
do $system.OBJ.CompileAll("cuk")
```

2. Rebuild the indexes for each class containing SQL Search indexes:

```
do ##class(<package>.<class>).%BuildIndices()
```

The new SQL Search indexes are now located in the globals `^IRIS.IF.*`. After confirming that these new globals have been populated, or after successfully performing some SQL Search queries, you can safely delete the old globals `^ISC.IF.*`.

J.2 Rebuilding iKnow Domains

If you are migrating iKnow data from Caché/Ensemble to InterSystems IRIS, follow the steps outlined in this section. Note that iKnow domains are called NLP domains in InterSystems IRIS.

1. Compile the classes in each namespace containing NLP domains, if you have not done so already:

```
set $namespace = "<namespace>"
do $system.OBJ.CompileAll("cuk")
```

2. For each namespace containing NLP domains, turn on Text Analytics:

- a. In the Management Portal, go to **System Administration > Security > Applications > Web Applications**.

- b. On the **Web Applications** screen, click the name of the web application, for example `/csp/<namespace>`.
- c. On the **Edit Web Application** screen, check the **Analytics** box, and then click **Save**.

You can now access the Domain Architect and Domain Explorer from the **Analytics > Text Analytics** menu in the Management Portal. (In Caché/Ensemble, these are accessed from **System Explorer > iKnow**.)

3. Open each NLP domain in the Domain Architect (**Analytics > Text Analytics > Domain Architect**) and click **Build** to build the domain.

Alternatively, from the terminal, call the **%Build** method on each class that is a subclass of `%iKnow.DomainDefinition`:

```
do ##class(<package>.<class>).%Build()
```

The new NLP domains are now located in the globals `^IRIS.IK.*`. After confirming that these new globals have been populated, or by verifying the domains have been rebuilt using the Domain Explorer, you can safely delete the old globals `^ISC.IK.*`.

Note: The new NLP domains match the existing domains only if the original source data remains unchanged. Otherwise, the rebuilt domains reflect the current state of the source data. For example, if you initially built a domain using a SQL table as a data source and you have since added rows to the table, the rebuilt domain reflects the added data in addition to the original data.

K

Migrating Object Gateways for .NET

If you are using one or more Object Gateways for .NET, read this section for instructions on how to migrate them to InterSystems IRIS. Note that the details vary depending on the version of InterSystems IRIS to which you are migrating.

In InterSystems IRIS 2021 or later, Object Gateways have been replaced by External Language Servers. Existing Object Gateways are converted to External Language Servers.

K.1 Migrating to InterSystems IRIS 2020 (Version 2020.1.4 or Later)

InterSystems IRIS 2020 adds additional security to Object Gateways. The **Use Passphrase** option defaults to 1 for all new Object Gateways and all existing gateways have this option set to 1 after migration from Caché/Ensemble. You can check this setting for a gateway in the Management Portal by going to **System Administration > Configuration > Connectivity > Object Gateways** and clicking **Edit** next to the name of the gateway.

If your Object Gateways in Caché/Ensemble had **Use Passphrase** set to 0, you can set this option back to 0 after performing your migration to InterSystems IRIS, and your gateways will function as they did before. However, this is not recommended for security reasons.

After the migration, to administer Object Gateways in the Management Portal, a user must have Use permission on the %Admin_ExternalLanguageServerEdit resource. If **Use Passphrase** is set to 1, to use an Object Gateway, a user must have Use permission on the %Admin_ExternalLanguageServerEdit resource or the %Gateway_Object resource.

Note: If you see an error when trying to start your Object Gateway, in the **.NET Version** drop-down list, select **4.0** or **4.5**.

K.2 Migrating to InterSystems IRIS 2021 (Version 2021.1.3 or Later)

In InterSystems IRIS 2021, Object Gateways have been replaced by External Language servers. Any existing Object Gateways in Caché/Ensemble become External Language Servers after migration to InterSystems IRIS 2021. You can administer External Language Servers in the Management Portal by going to **System Administration > Configuration >**

Connectivity > External Language Servers. You will notice a number of built-in External Language Servers listed on the page, in addition to any previous Object Gateways. Click the name of the an External Language Server to edit its settings.

Note: If you see an error when trying to start your External Language Server, in the **.NET Version** drop-down list, select **Framework 4.5**.

After the migration, to administer External Language Servers in the Management Portal, a user must have Use permission on the %Admin_ExternalLanguageServerEdit resource. To use an External Language Server, a user must have Use permission on the %Admin_ExternalLanguageServerEdit resource or the %Gateway_Object resource. In other respects, your existing External Language Servers can be used without modifications.

K.3 Migrating to InterSystems IRIS 2022 (Version 2022.1.2 or Later) or Beyond

In InterSystems IRIS 2022 or beyond, Object Gateways have been replaced by External Language servers. Any existing Object Gateways in Caché/Ensemble become External Language Servers after migration to InterSystems IRIS 2022 or beyond. You can administer External Language Servers in the Management Portal by going to **System Administration > Configuration > Connectivity > External Language Servers**. You will notice a number of built-in External Language Servers listed on the page, in addition to any previous Object Gateways. Click the name of the an External Language Server to edit its settings.

Note: If you see an error when trying to start your External Language Server, in the **.NET Version** drop-down list, select **Framework 4.6.2**.

After the migration, to administer External Language Servers in the Management Portal, a user must have Use permission on the %Admin_ExternalLanguageServerEdit resource. To use an External Language Server, a user must have Use permission on the %Admin_ExternalLanguageServerEdit resource or the %Gateway_Object resource.

In InterSystems IRIS 2022 or beyond, connect to your External Language Server using the server name, instead of the port number. For example, if you used the following code to connect to your Object Gateway in Caché/Ensemble:

```
set connection = ##class(%Net.Remote.Gateway).%New()  
set status = connection.%Connect("127.0.0.1", 55000, "USER")
```

Instead, use the following code to connect to your External Language Server in InterSystems IRIS 2022 or beyond:

```
set connection = ##class(%Net.Remote.Gateway).%New()  
set status = connection.%Connect("", "MyMerver", "USER")
```

Here, the empty string in the first argument in the call to the **%Connect()** method indicates that you want to connect using the server name, instead of the port number, and “MyServer” is the name of your External Language Server.

Your External Language Servers can be used without additional modifications.



Known Issues

This section provides workarounds to any known issues in the migration process. These issues will be fixed in later releases.

L.1 System Mode Setting Is Lost During Conversion

The System Mode setting places a label in the header of the Management Portal so that the purpose of the instance is readily apparent. If you use the System Mode to identify whether an instance is a Live, Test, Development, or Failover server, converting the instance from Caché or Ensemble to some versions of InterSystems IRIS may cause this setting to be lost.

If you complete the migration process and notice that your instance is not marked with a label that identifies the System Mode, you can set the desired value, as follows:

- In the Management Portal, select **System Administration** > **Configuration** > **System Configuration** > **Memory and Startup**.
- On the **Memory and Startup** page, select the desired value in the **System Mode** drop-down list.
- Click **Save**.

For more information, see [System Mode](#) in the Configuration Parameter File Reference.

L.2 Lingering Reference to Removed Database MPRLLIB

If you migrate an instance from Health Connect/HSAP (based on the Caché/Ensemble platform) to Health Connect based on the InterSystems IRIS Platform or InterSystems IRIS for Health, the MPRLLIB database is removed because it is no longer needed. However a stray reference to this database is left in the Components.ini file. This can cause a misleading error message in messages.log similar to the following when performing future upgrades on the instance:

```
ZN Error ERROR #6046: Database doesn't exist: c:\intersystems\healthshare\mgr\mprllib\
```

To prevent this spurious error message, after completing the migration, edit the file `<installdir>/Components.ini` and comment out the `[MPRLLIB]` section by placing semicolons at the beginning of the line, similar to the following example:

```
;[MPRLLIB]
;Version=15.032.9686
[HSLIB]
Version=2018.1.0
Compatibility_HSAALIB=15.0
Compatibility_HSPILIB=14.0
Compatibility_VIEWERLIB=17.0
```

Note: If you perform a future upgrade without performing this workaround and do see an error message in the log saying that the `MPRLLIB` database doesn't exist, it is safe to ignore it. This error message will no longer occur after performing a clean shutdown and restart of the instance.

L.3 SQL %ID and COUNT() Data Types Have Changed from INTEGER to BIGINT

Starting with Caché/Ensemble 2018, InterSystems changed the data type of SQL internal identifiers (the `%ID` column in tables created with default settings) and the return type of the `COUNT()` aggregate function from `INTEGER` to `BIGINT` to accommodate larger values. InterSystems IRIS also uses the `BIGINT` data type for `%ID` and `COUNT()`. While this change occurred prior to InterSystems IRIS, it impacts users migrating from Caché/Ensemble versions prior to 2018 (or Health Connect/HSAP based on these versions) to products on the InterSystems IRIS platform.

An issue occurs when client applications that use InterSystems language bindings, such as .NET applications using ODBC, execute a query that returns either the `%ID` or the `COUNT()` aggregate function and a variable of data type `INTEGER` is then set to that value. This results in an error saying that the `BIGINT` value cannot be cast into the `INTEGER` variable. Other aggregate functions, such as `MAX()`, `MIN()`, and `SUM()`, inherit their data types from the field they are aggregating and can also return values of type `BIGINT`.

InterSystems recommends testing such client applications after migrating to InterSystems IRIS to see if errors occur. Variables in the application may need to be redefined as `BIGINT`, rather than `INTEGER`. You can also use the `CAST()` function to convert the `BIGINT` to `INTEGER`, though this is less desirable as it does not accommodate the larger values that `BIGINT` is able to hold. For example, the following query casts `COUNT(*)` from the `Aviation.Aircraft` table into an `INTEGER` value:

```
SELECT CAST(COUNT(*) AS INTEGER) AS ct FROM Aviation.Aircraft
```

L.4 Custom Diffie-Hellman Bits Setting Is Lost During Conversion

Starting with Caché/Ensemble and Health Connect/HSAP 2018.1.6, SSL/TLS configurations allow the user to select a custom value for the number of Diffie-Hellman Bits used for the key length. This setting can be lost upon migrating to InterSystems IRIS. If this occurs, you must reset this setting after performing the migration. (This setting applies to Server SSL/TLS configurations only.)

After you complete the migration process, you can set the desired value for the Diffie-Hellman Bits setting, as follows:

- In the Management Portal, select **System Administration > Security > SSL/TLS Configurations**.

- On the **SSL/TLS Configurations** page, in the row for your configuration, click **Edit**.
- On the **Edit SSL/TLS Configuration** page, in the **Cryptographic Settings** section, select the desired setting for **Diffie Hellman Bits**.
- Click **Save**.

This issue is fixed in InterSystems IRIS products on version 2022.1.1 and later. If migrating to one of these versions, the custom Diffie-Hellman Bits setting is retained.



Version History

Table XIII–1: History of Document Versions and Changes Made

Version	Date	Changes
DRAFT 1.3	June 17, 2019	Draft distributed to first-round testers.
DRAFT 1.4	June 21, 2019	Added more information on using <code>\$system.OBJ.Upgrade()</code> to upgrade the class definitions in a database prior to compiling code. Added information on loading and compiling CSP pages with <code>\$system.CSP.LoadPageDir()</code> . Updated the “Importing Code” manifest example to make it more robust. In the Pre-Migration Tasks chapter, noted that the SAMPLES, ENSDEMO, and DOCBOOK databases are deleted during the conversion. (This was previously noted only in Appendix A.) Made minor fixes and clarifications.
DRAFT 1.5	June 26, 2019	In the Introduction, added (1) feedback email address and (2) information on mirroring and ECP limitations. In the Pre-Migration Tasks chapter, added information related to (1) instances that call user code on startup and (2) disk space requirements.
DRAFT 1.6	July 30, 2019	Added information on checking/restoring the logon information for the Windows controller service for Caché/InterSystems IRIS. In the Pre-Migration Tasks chapter, added tasks to identify any custom routines or CSP for which you do not have source code loaded. In the Pre-Migration Tasks chapter, added information to the task on making a complete backup. In the Conversion Details, removed the item on renaming the user and group <code>cacheusr</code> to <code>irisusr</code> , as this is no longer part of the migration process. Made minor clarifications.
DRAFT 1.7	August 27, 2019	In the migration instructions, added information on running <code>##class(%EnsembleMgr).OnSystemShutdown()</code> if you have a large number of Ensemble productions to stop. In the pre-migration tasks, added a more accurate calculation of the disk space required to do the migration. Made minor clarifications.
1.8	September 16, 2019	Version for 2019.1.1 preview. Added HealthShare Health Connect migration information. Added clarifications to Supported Versions section. In Limitations section, clarified ECP information and added KMIP Server information. Removed document version history.

Version	Date	Changes
1.9	November 4, 2019	Version for InterSystems IRIS 2019.1.1 general release. Remove preview notice. Added back document version history. In Appendix B, added HC.Common.inc as a file that has been re-implemented in Health Connect 2019.1 and IRIS for Health. Fixed minor typo.
DRAFT 2.0	November 4, 2019	Draft for InterSystems IRIS for Health migration field test. In the Introduction, added information on the valid migration paths and supported versions. Added information on how to upgrade a FHIR repository and added a manifest example. Made minor clarifications.
DRAFT 2.1	November 7, 2019	Added note that the InterSystems IRIS for Health field test installation build is for evaluation purposes only and should not be used to migrate production instances. Made minor clarifications.
2.2	December 19, 2019	In the Introduction, added the limitation that migration is not currently supported for instances running on Windows Cluster. Added information on applicable products at the beginning of document, not just under Requirements. In Appendix A, added details on WIJ files. Updated trademarks. Made minor clarifications.
2.3	January 23, 2020	Version for 2020.1 preview. In the mirrored environment section, added information on migrating a disaster recovery async member and more descriptive text regarding mirror failover strategy. In Appendix B, added a note regarding additional classes available in Health Connect 15.03 that are not available in Health Connect 2019.1 or later (based on InterSystems IRIS) or in InterSystems IRIS for Health.
2.4	February 5, 2020	In the Introduction, clarified the limitations on mixed mirror configurations and added a note that migration is not supported for platforms that are supported only for development purposes. In the Pre-Migration Tasks chapter, added a note that a Caché or Ensemble-based license server cannot be used with InterSystems IRIS. In Appendix B, added HS.Errors.inc as a renamed Health Connect file.
2.5	March 30, 2020	Version for 2020.1 general release. In the Introduction, added HSAP to the places Health Connect is mentioned. If you know your product as HSAP, follow the instructions for Health Connect. Clarified Health Connect migration paths. Clarified that supported versions apply to both mirrored and non-mirrored configurations. Removed 2020.1 preview notice. Added Appendix C on InterSystems IRIS for Health memory considerations.
2.6	June 1, 2020	In the Introduction, updated the Supported Migration Paths section to include support for migrating Ensemble to Health Connect 2020.1 or later and made additional clarifications. Moved the disaster recovery async member migration guidelines to Appendix D. Added Appendix E to cover considerations regarding machines where both Caché or Ensemble and InterSystems IRIS are installed. Changed references of zn to set \$namespace in accordance with InterSystems best practices.
2.7	June 3, 2020	In Appendix E, clarified the ISCAgent version conflict issue.
2.8	August 4, 2020	In Appendix A, mentioned that the Windows conversion updates all ODBC DSNs to the InterSystems IRIS drivers. Added Appendix F to cover an issue that can arise if migrating a Health Connect/HSAP instance on Windows that was previously upgraded from a full HealthShare instance.

Version	Date	Changes
2.9	December 28, 2020	In the Introduction, clarified the section on ECP limitations. Clarified the use of LoadPageDir() in the instructions on compiling CSP pages. In Appendix E, clarified which versions of the Caché and Ensemble installers are not aware of the InterSystems IRIS registry. Added Appendix G to cover an issue related to migrating instances having custom HL7 schema global mappings.
2.10	March 1, 2021	Updated steps where classes are compiled to use the flags “cuk”. Clarified which steps pertain to UNIX®, in addition to Linux. Clarified the scenarios where code in non-mirrored databases may need to be compiled. In the Pre-Migration Tasks chapter, added a task for UNIX users to check their start/stop scripts to make sure they start or stop ISCAgent properly.
2.11	April 15, 2021	Updated the Pre-Migration Tasks chapter and Appendix A to note that the conversion process changes the default license server port from 4001 on a Caché or Ensemble-based license server to 4002 on an InterSystems IRIS-based license server. Updated the Pre-Migration Tasks chapter to add a task to read the Upgrade Compatibility Checklists in the release notes for the version of InterSystems IRIS to which you are migrating and for any intervening versions between the starting product and the destination product. Updated the Pre-Migration Tasks chapter and Appendix A with information on support for legacy applications that use ActiveX. Updated the section on creating the %ALL namespace to note that some installation kits automatically create the namespace.
2.12	June 2, 2021	In the Supported Migration Paths section, added supported paths to version 2021.1.x of InterSystems IRIS, InterSystems IRIS for Health, and Health Connect. In Appendix B, listed some of the classes removed from Health Connect 15.03. Changed the title of the document from <i>InterSystems IRIS In-Place Conversion Guide</i> to <i>Migrating to InterSystems IRIS</i> . The term “migration” is now used in this document to refer to the entire process of migrating from a Caché or Ensemble-based product to an InterSystems IRIS-based product. The term “conversion” is used to describe the changes made by the installation script or installer to the instance, as a part of the overall migration process.
2.13	July 30, 2021	Changed the title of the document from <i>Migrating to InterSystems IRIS</i> to <i>How to Migrate to InterSystems IRIS</i> . Updated references to the <i>InterSystems IRIS Adoption Guide</i> , as it has been renamed the <i>InterSystems IRIS Migration Guide</i> . In the Introduction, stressed that the user should test the entire migration process in a test environment that matches the production environment. In Appendix D, added information on migrating an arbiter. Updated links to the High Availability Guide that have changed.
2.14	October 12, 2021	Added Appendix H to present fixes for common compilation errors. In the Pre-Migration Tasks chapter, updated link to “Configuring a Visual Basic Project.”

Version	Date	Changes
2.15	March 26, 2022	Added Appendix I to outline the options for customers running older versions of Caché or Ensemble-based products for which there is no direct migration path to InterSystems IRIS. Added additional classes to the lists of removed and re-implemented classes in Appendix B and alphabetized the lists. Added a note on using the <code>/mapped</code> qualifier when compiling classes in namespaces with mapped classes. In the Pre-Migration Tasks and in Appendix H, added information on making sure that SQL delimited identifier support is turned on before converting a Caché or Ensemble-based product to InterSystems IRIS for Health. Removed the step to recompile routines after converting an instance. This was determined to be unnecessary, as no major changes have been made to the code generated when compiling routines. Updated the Supported Migration Paths section to include versions 2021.2 and 2022.1 of InterSystems IRIS-based products. Added a workaround for a missing System Mode setting in a Known Issues section.
2.16	April 13, 2022	In Appendix I, in the New Server Method section, added a note to configure the Task Manager email settings on the target server, as these do not come over in the Task Manager tasks export. In the Known Issues section, added a workaround for an issue where a stray reference to the removed MPRLLIB database causes a misleading error message on future upgrades to an instance migrated from Health Connect/HSAP to an InterSystems IRIS-based product.
2.17	August 3, 2022	Added Appendix J to cover migrating iFind and iKnow data to InterSystems IRIS.
2.18	September 29, 2022	In the Known Issues section, added workaround for migration issues related to the data types of SQL <code>%ID</code> and COUNT() changing from INTEGER to BIGINT. In the Known Issues section, added workaround for issue where the custom Diffie-Hellman Bits setting in SSL/TLS configurations is lost during migration. Updated the Supported Migration Paths section to include version 2022.2 of InterSystems IRIS-based products.
2.19	April 14, 2023	Added Appendix K to cover migrating Object Gateways to InterSystems IRIS. Updated the Supported Migration Paths section to include version 2022.3.x and 2023.1.x of InterSystems IRIS-based products and to remove version 2019.1.x.