



FIPS 140–2 Compliance for Database Encryption

Version 2019.2
2019-09-12

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InterSystems IRIS Data Platform Version 2019.2 2019-09-12

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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

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FIPS 140–2 Compliance for Database Encryption

On specific platforms, InterSystems IRIS™ supports FIPS 140–2 compliant cryptography for database encryption. (FIPS 140–2 refers to Federal Information Processing Standard Publication 140-2, which is available at <http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf>.)

1 Supported Platforms

InterSystems IRIS supports FIPS 140-2–compliant cryptography for database encryption on Red Hat Enterprise Linux for x86-64. For each supported version, Red Hat has a certificate of validation for the OpenSSL libcrypto.so and libssl.so libraries; this certificate is available at the site listed below.

Red Hat 7.1, 7.2, and 7.3

- The libraries are libcrypto.so.1.0.1e and libssl.so.1.0.1e
- The certificate is <https://csrc.nist.gov/projects/cryptographic-module-validation-program/Certificate/2441>

Red Hat 7.4 and later

- The libraries are libcrypto.so.1.0.2k and libssl.so.1.0.2k
- The certificate is <https://csrc.nist.gov/projects/cryptographic-module-validation-program/Certificate/3016>

For information about Red Hat support for government standards, see <https://www.redhat.com/en/technologies/industries/government/standards>.

2 Enabling FIPS Support

To enable InterSystems IRIS support for FIPS 140–2 compliant cryptography for database encryption, do the following:

1. Download and install the openssl package from the RedHat repository (rhel-6-server-rpms or rhel-7-server-rpms, depending on which version of Red Hat Enterprise Linux for x86-64 you are using).
2. Enable FIPS mode for the operating system. For information, see one of the following:
 - https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/6/html/Security_Guide/sect-Security_Guide-Federal_Standards_And_Regulations-Federal_Information_Processing_Standard.html
 - https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Security_Guide/chap-Federal_Standards_and_Regulations.html

Be sure to reboot and to check that FIPS mode is enabled.

3. Check the directory `/usr/lib64` for the following symbolic links. If these do not exist, create them:

- The symbolic link `libssl.so` should point to the appropriate file (such as `libssl.so.1.0.2k`), in the same directory.
 - The symbolic link `libcrypto.so` should point to the appropriate file (such as `libcrypto.so.1.0.2k`), in the same directory.
4. In InterSystems IRIS, specify the **FIPSMODE** CPF parameter as **True** (1). To do so:
 - a. Open the Management Portal.
 - b. Select **System Administration > Configuration > Additional Settings > Startup**.
Here you will see a row for **FIPSMODE**.
 - c. Specify the value for **FIPSMODE** as **True** and save your change.
 5. Restart InterSystems IRIS.
 6. Enable and configure encrypted databases as outlined in “[Using Encrypted Databases](#)” in the chapter “[Managed Key Encryption](#)” in *Security Administration Guide*.

3 Startup Behavior and messages.log

When InterSystems IRIS is started:

- If **FIPSMODE** is 0, InterSystems IRIS native cryptography is used, including optimized assembly code using Intel AES-NI hardware instructions, if supported by the CPU. In this mode, InterSystems IRIS writes the following to `messages.log` upon startup:

```
FIPS 140-2 compliant cryptography for database encryption is not configured in iris.cpf
```
- If **FIPSMODE** is 1, InterSystems IRIS attempts to resolve references to functions in the `/usr/lib64/libcrypto.so` FIPS-validated library, and then attempts to initialize the library in FIPS mode. If these steps are successful, InterSystems IRIS writes the following to `messages.log`:

```
FIPS 140-2 compliant cryptography for database encryption is enabled for this instance.
```
- If **FIPSMODE** is 1, but the initialization of the library is unsuccessful, InterSystems IRIS does not start. In this case, `messages.log` contains the following message:

```
FIPS 140-2 compliant cryptography for database encryption initialization failed. Aborting.
```
- On platforms other than `lnxrhx64`, if **FIPSMODE** is 1, InterSystems IRIS native cryptography is used, and InterSystems IRIS writes the following to `messages.log`:

```
FIPS 140-2 compliant cryptography for database encryption is not supported on this platform.
```