FIPS 140–2 Compliance for Caché Database Encryption

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Caché Version 2018.1 2024-04-03

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FIPS 140–2 Compliance for Caché Database Encryption

On specific platforms, Caché 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 https://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf.)

1 Supported Platforms

This version of Caché supports FIPS 140-2–compliant cryptography for database encryption on Red Hat Enterprise Linux 6.6 (or later minor versions) and Red Hat Enterprise Linux 7.1 (or later minor versions) 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 6.6

- 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 7.0 – 7.3

- The libraries are libcrypto.so.1.0.1e and libssl.so.1.0.1e.
- The certificates are https://csrc.nist.gov/projects/cryptographic-module-validation-program/Certificate/2441, https://csrc.nist.gov/projects/cryptographic-module-validation-program/certificate/3538, and https://csrc.nist.gov/projects/cryptographic-module-validation-program/certificate/3867.

Red Hat 7.4 – 7.9

- 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, https://csrc.nist.gov/projects/cryptographic-module-validation-program/certificate/3538, and https://csrc.nist.gov/projects/cryptographic-module-validation-program/certificate/3867.

Note: Caché does not support FIPS 140–2 compliant cryptography for Red Hat 8.

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 Caché 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 these instructions, see the article How can I make RHEL 6/7/8 FIPS 140-2 compliant? on the Red Hat web site.

   Note: Access to this article requires Red Hat login credentials.

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 Caché, 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 Caché.
6. Enable and configure encrypted databases as outlined in "Using Encrypted Databases" in the chapter "Managed Key Encryption" in *Caché Security Administration Guide*.

3 Startup Behavior and cconsole.log

When Caché is started:

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

  ```
  FIPS 140-2 compliant cryptography for database encryption is not configured in cache.cpf
  ```

- If **FIPSMode** is 1, Caché 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, Caché writes the following to cconsole.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, Caché does not start. In this case, cconsole.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, Caché native cryptography is used, and Caché writes the following to cconsole.log:

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