This edition applies to GSKCapiCmd version 8.0.15 and to all subsequent releases and modifications until otherwise indicated in new editions.

**Note:** The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2219].

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<td>101</td>
</tr>
</tbody>
</table>
Preface

This guide describes how to use the GSKCapiCmd utility to manage keys, certificates, and certificate requests within a key database.

This document assumes that Global Security Kit (GSKit) is installed, configured, and running on your network.

Who should read this book

This manual is intended for network or system security administrators who have installed GSKit and want to use the GSKCapiCmd program to modify Certificate Management System (CMS) or PKCS#11 key databases. This manual assumes that the reader is familiar with the GSKit product range and the functionality of the CMS key database.

Before continuing to read this manual, ensure that you have read and understood the following prerequisite readings. This will ensure that you understand the required concepts and terms used throughout the manual:

• Appendix A, “CMS key databases,” on page 85.
• Appendix B, “A Simple Example,” on page 89.

Accessibility

Accessibility features help users with a physical disability, such as restricted mobility or limited vision, to use software products successfully. Standard shortcut and accelerator keys are used by the product and are documented by the operating system. See the documentation provided by your operating system for more information.

IBM and accessibility

See the IBM® Human Ability and Accessibility Center (http://www.ibm.com/able) for more information about the commitment that IBM has to accessibility.

Contacting software support

Before contacting IBM Tivoli® Software Support with a problem, see the IBM Tivoli Software Support portal (http://www.ibm.com/software/sysmgmt/products/support/).

If you need additional help, contact software support by using the methods described in the Software Support Handbook (http://www14.software.ibm.com/webapp/set2/sas/1/support/home.html).

The guide provides the following information:
• Registration and eligibility requirements for receiving support.
• Telephone numbers, depending on the country in which you are located.
• A list of information you should gather before contacting customer support.
Conventions used in this book

This reference uses several conventions for special terms and actions and for operating system-dependent commands and paths.

**Typeface conventions**

The following typeface conventions are used in this reference:

**Bold**  Lowercase commands or mixed case commands that are difficult to distinguish from surrounding text, keywords, parameters, options, names of Java™™ classes, and objects are in **bold**.

**Italic** Variables, non-specific command-line options or identifiers, and special words are in *italic*.

**Monospace**  
Code examples, command lines, screen output, file and directory names that are difficult to distinguish from surrounding text, system messages, text that the user must type, and values for arguments or command options are in monospace.

**Symbol conventions**

[ ] - Identifies an option that is optional, if an option is not surrounded by this style of brackets the option is required.

| - Indicates an “OR” relationship between the options on either side of it.

[] – Identifies mutually exclusive set of options.

**Operating system differences**

This book uses the UNIX™™ convention for specifying environment variables and for directory notation. When using the Windows™™ command line, replace $variable with %variable% for environment variables and replace each forward slash (/) with a backslash (\) in directory paths. If you are using the bash shell on a Windows system, you can use the UNIX conventions.
Chapter 1. Using the GSKCapiCmd program

GSKCapiCmd is a tool that can be used to manage keys, certificates, and certificate requests within a key database. The following chapters go into detail for each of the functions supported by GSKCapiCmd.

GSKCapiCmd uses some encoding rules, and implements aspects of certain RFCs and standards. It is not strictly necessary for users to have a full understanding of these items in order to use this utility. However, if you want to learn more then you can examine the resources contained in Appendix D, “Resources,” on page 95.

Language support overview

IBM Global Security Kit (GSKit) software is built using the International Components For Unicode toolkit (ICU) to provide Internationalization support.

Notwithstanding the lack of translated message catalogs, ICU provides other localization functions that are independent of translation, notably the formatting of date and time strings.

Locale environment variables

For most current operating systems, localized behavior is obtained by specifying the desired locale in the user environment. For gsk8capicmd on UNIX like systems, you can set the LANG environment variable to the desired locale name as specified by POSIX, X/Open, or other open systems standards.

If you are in a Windows environment, you can modify the language setting in the Regional Settings of the Control Panel.

LANG variable on UNIX or Linux systems

Most UNIX or Linux systems use the LANG variable to specify the desired locale. However, different UNIX and Linux operating systems require different locale name values to specify the same language. Always use a value for LANG that is supported by the UNIX or Linux operating system you are using. To obtain the locale names for your UNIX or Linux system, enter the following command: locale –a.

If you specify the LANG environment variable and also modify the regional settings then the LANG environment variable will override the regional setting. As specified by open systems standards, other environment variables override LANG for some or all locale categories. These variables include the following:

• LC_COLLATE
• LC_CTYPE
• LC_MONETARY
• LC_NUMERIC
• LC_TIME
• LC_MESSAGES
• LC_ALL
If any of the previous variables are set, you must remove their setting for the LANG variable to have full effect.

**Forcing output to a different locale**

You can use the `-locale` command-line option to select the desired display language if:

- The operating system does not support the LANG environment variable, or
- You want to display messages in a different locale to the current environment settings.

To do this, set the locale option to the appropriate canonical name, based on the ISO language or territory codes.

For example, to display the help message in German issue the command:

```
gsk8capicmd -help -locale de
```

Some example ISO language codes are:

<table>
<thead>
<tr>
<th>Table 1. ISO Language Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO Language Code</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>de</td>
</tr>
<tr>
<td>en</td>
</tr>
<tr>
<td>es</td>
</tr>
<tr>
<td>fr</td>
</tr>
<tr>
<td>it</td>
</tr>
<tr>
<td>ja</td>
</tr>
<tr>
<td>ko</td>
</tr>
<tr>
<td>pt_BR</td>
</tr>
<tr>
<td>zh_CN</td>
</tr>
<tr>
<td>zh_TW</td>
</tr>
</tbody>
</table>

**Using locale variants**

Although `gsk8capicmd` currently provides only one translated version for each language, you can specify a preferred locale variant to find the corresponding language translation if it is available.

If a message catalog is not found for the desired language, the English message catalogs are used. For example, suppose you specify the AIX® locale for German in Switzerland as follows:

```
LANG=de_CH.IBM-850
```

In this example, the catalogs are searched in the following order to locate the specified locale:

1. de_CH
2. de
3. en
Since gsk8capicmd does not provide a German in Switzerland language pack, de_CH is not found. If the German language package is available, de is used. Otherwise, the default locale en is used, causing text to be displayed in English.

**Text encoding (code set) support**

Different operating systems encode text in different ways. For example, Windows systems use SJIS (code page 932) for Japanese text, but UNIX or Linux systems often use eucJP.

In addition, you can provide multiple locales for the same language so that different code sets are used for the same language on the same machine. Message catalogs are encoded using UTF-8, and the text is converted to the locale encoding before being presented to the user. In this way, the same French message catalog files can be used to support a variety of Latin 1 code sets, such as ISO8859-1, Microsoft 1252, IBM PC 850, and IBM MVS™ 1047.

Interoperability across your domain depends on code set files, which are used to perform UTF-8 conversion and other types of encoding-specific text processing.

For messages to display correctly on some platforms, you might need to specify the correct code set that supports your locale.

**KeyStore Overview**

KeyStores are databases used to store Private Keys and Public Keys contained in X.509 Certificates. The database may exist as a file or Hardware storage device e.g. Smart Card. The database may also be used to store certificate requests, secret keys, and key generation parameters. The KeyStore used maybe one of a number of supported formats. The following table lists the format and relevant capabilities:

<table>
<thead>
<tr>
<th></th>
<th>CMS¹</th>
<th>P12²</th>
<th>P11³</th>
<th>MSCAPI⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Key Storage</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Trust Anchor Source</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Default Attribute⁵</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Trusted Attribute⁶</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Support Secondary CMS/P12 KeyStore for Trust Anchors</td>
<td>No</td>
<td>No</td>
<td>Yes⁷</td>
<td>No</td>
</tr>
<tr>
<td>Stash File Support</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Password⁸ Expiry⁹</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>GSKCapiCmd Supported</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No⁰</td>
</tr>
<tr>
<td>Vendor Tools Supported</td>
<td>N/A</td>
<td>N/A</td>
<td>No¹¹</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Footnotes:**

- ¹IBM Proprietary Format
- ²PKCS#12 Format transparently supported and interchanged with CMS format by GSKit
- ³PKCS#11 Format
- ⁴Microsoft Key Store
- ⁵Deprecated
GSKCapiCmd command-line syntax

The syntax for the GSKCapiCmd program is as follows:

```
gsk8capicmd <modifiers> <object> <action> <options>
```

where:

**modifiers**

May include the following:

- `-fips [true] | [false]`
  
  Enable or disable forced Federal Information Processing Standards (FIPS) mode.

  In FIPS mode, `gsk8capicmd` initializes the underlaying cryptographic provider in FIPS mode so that it only uses algorithms that have been FIPS 140-2 validated.

  The program runs in FIPS mode by default. If however the `-fips true` is set and the provider cannot be initialized in FIPS mode then the `gsk8capicmd` operation will fail. If FIPS mode is not forced and the provider cannot be initialized in FIPS mode then the utility will fall back to a non-fips mode of operation.

- `-locale <language>`
  
  Set the display language preference.

- `-trace <pathname>`
  
  Enable trace logging to the named file.

**object**

Is one of the following:

- `-keydb`
  
  Actions acted on a key database.

- `-cert`
  
  Actions acted on a certificate stored within an identified key database.

- `-certreq`
  
  Actions acted on a certificate request stored within an identified key database.

- `-random`
  
  Generates a random string of characters that can be used as a password for other commands.

- `-version`
  
  Displays version information for GSKCapiCmd.

- `-help`
  
  Displays help for the GSKCapiCmd commands.

**action**

Is the specific action to be taken on the object.

**options**

Are the options associated with the specified object and task.
The following chapters of this manual describe each particular object, its associated actions, and what options are available.
Chapter 2. Key database commands

The key database commands are associated with the `keydb` object. This object supports the following actions:

- "Create a key database (-create)" on page 8
- "Delete a key database (-delete)" on page 10
- "Change the password of an existing key database (-changepw)" on page 10
- "Stash the password of an existing key database (-stashpw)" on page 12
- "List the supported key databases (-list)" on page 12
- "Convert a key database (-convert)" on page 13
- "Display the expiry date associated with a key database (-expiry) [deprecated]" on page 15

Note: This feature is deprecated as CMS keystores no longer have this capability. Keystore password lifetime management must be done outside of the `gskcapicmd` utility.

Each of the following sections details the key database commands and the options available for each command.

After creating a key database (or keystore), it is the user's responsibility to maintain the contents of the keystore in order to maintain security of any application using that keystore. The trusted default CA certificates are particularly important as they are the trust anchors for all user certificates. The presence of a CA certificate in the keystore is enough to make it, and all valid certificates that it signs, trusted by the application using the keystore.

Specifically, the user must:

1. Monitor certificates for expiry and remove any expired certificates. The presence of expired CA certificates does not compromise security as they will fail validation if used.
2. Review the default CA certificates and remove any unnecessary ones. If a CA certificate does not need to be trusted by the application using the keystore then it should be removed.

Keystore access control

The keystore content is protected by encryption and MAC by using keys derived from a password that is chosen for each keystore. The keystore owner is responsible for this password. The password must be managed with respect to its purpose of protecting the keystore contents from unauthorized use or disclosure.

The access control settings of the keystore file default to those settings of the user running the create operation. The user can change the access control settings to provide additional protection to the default encryption by using the appropriate operating system services. That is, services such as "cacle" on Windows before Windows Vista and "icacls" for Windows Vista+ or "chmod" on UNIX operating systems.

You can stash the keystore password in a file that can automatically provide the password when required. Stashing the password removes the need for an
administrator to manually enter the password to open a keystore. When accessing a key database, the system first checks for the existence of a stash file. If one exists, the contents of the file is decrypted and used as input for the password.

If you elect to create a stash file when creating a key database, the password is stashed into a file named as follows: `<key_database_name>.sth`. The access control settings for the stash file are set so that the stash file is readable only by the owner of the file. It is not recommended that multiple users be given access to the stash file. However, it is possible to change the access control settings on the stash file by using the appropriate operating system services. That is, services such as "cacls" on Windows before Windows Vista and "icacls" for Windows Vista+ or "chmod" on UNIX operating systems.

Create a key database (-create)

The `create` command creates a new CMS or PKCS#12 key database.

The syntax for creating a key database with `GSKCapiCmd` is as follows:

```
```

where:

**object** -keydb

**action** -create

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (" "). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: `gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj"` When prompted by `gsk8capicmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

**-db <filename>**

Fully qualified path name of a key database. A good example of a key database file name might be `/home/<user_name>/keydb.db`.

**-pw <passwd>**

The password for the key database identified by the -db tag. If you want to create a keystore without a password simply leave the -pw tag out of the command.

**-type <cms | kdb | pkcs12 | p12>**

The type of the key database to be created. This tool only supports the creation of a CMS or PKCS#12 format key database. If this tag is omitted then the tool creates a CMS key database by default. The value 'kdb' can be used as a synonym for 'cms' and 'p12' for 'pkcs12'.

A CMS key database consists of three files:
• The first file is the certificate key database itself. By convention, the name of this file should include the .kdb extension (for example, key.kdb). This extension is not required, but it is a good idea as it makes it easy to identify the file as a key database.

• The second file created is used to store certificate requests associated with the key database. This file is created with the same name as given to the key database, but with a .rdb extension.

• The third file is used to hold the certificate revocation list used by the key database. This file has become obsolete and is no longer used. This file is created with the same name as the key database, but with a .crl extension.

A PKCS#12 keystore is a single file, which by convention is created with the .p12 extension.

-expire <days>
(Deprecated). The number of days before the password for the key database is to expire. If this tag is not used then the key database password will never expire. If specified, the duration must be from 1 to 7300 days (20 years).

Note: This parameter is ignored for PKCS#12 keystores.

-stash
Stash the password for the key database after creation. See “Keystore access control” on page 7 for further details.

-strong
Check that the password entered satisfies the following minimum requirements for password strength:
• The minimum password length is 14 characters.
• A password must have at least one lower case character, one uppercase character, and one digit or special character (for example, *$#% etc.). A space is classified as a special character.
• Each character must not occur more than three times in a password.
• No more than two consecutive characters of the password can be identical.
• All characters are in the standard ASCII printable character set within the range from 0x20 to 0x7E inclusive.

-empty | -populate
The –empty option has no action and is deprecated. A keystore is empty when created.

The keystore can optionally be populated with a number of predefined trusted certificate authority (CA) certificates. To load the default CA certificates the –populate option must be given. Alternatively the options ”-cert -populate” may be used to add trusted CA certificates to an existing keystore.

The CA certificates loaded should be reviewed by inspecting the output of the list certificates command. Any or all of these CA certificates can be removed from the key database. If you want to remove any of the certificates, use the delete certificate command in this manual.
The gsk8capicmd utility will not normally let you overwrite an existing database. Use this option to force the removal of an existing keystore before creating a new one of the same name.

Delete a key database (-delete)

The delete key database command simply deletes the identified key database. To identify the key database, simply specify the correct file name of the key database. The request database (.rdb) and certificate revocation list (.crl) files are removed automatically during the process. If a stash file was created, it is not removed.

If a password was provided for this command, it is used to ensure that the user is actually allowed to delete the key database. If the password is not correct, the key database is not deleted.

The syntax for deleting a key database with GSKCapiCmd is as follows:

gsk8capicmd -keydb -delete -db <name> [-pw <passwd>]

where:

object -keydb
action -delete
options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', '

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "*/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.

-pw <passwd>
The password for the key database that has been identified by the -db tag. The -pw tag is required if the key database was created with a password. It is an additional check to ensure that the user deleting the key database is authorized to do so. If the key database does not have a password, the -pw tag is not required.

If a password is provided and it does not match the password for the identified key database, the key database is not deleted.

Change the password of an existing key database (-changepw)

The change password command allows the user to change the password associated with the specified key database. When changing the password for a key database, all key records containing encrypted private key information have the private key data re-encrypted. The new password is used as input to create the decryption key that will be used during the encryption process.
The syntax for changing the password of an existing key database with GSKCapiCmd is as follows:

```
```

where:

**object**  -keydb  
**action**  -changepw  
**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: `gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj"`. When prompted by `gsk8capicmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

**-db <filename>**
The fully qualified path name of a key database.

**-crypto <module_name>**
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

**-tokenlabel <token_label>**
The PKCS#11 cryptographic device token label.

**-pw <passwd>**
The password for the key database identified by the -db tag.

**-new_pw <new_passwd>**
The new password for the key database.

**-expire <days>**
(Deprecated.) The number of days before the new password is to expire. If this tag is not specified the key databases password never expires. If specified the duration must be within the range of 1 to 7300 days (20 years).

**Note:** This parameter is ignored for PKCS#12 type keystores.

**-stash**
Stash the password for the key database. See "Keystore access control" on page 7 for further details.

**-strong**
Check that the password entered satisfies the following minimum requirements for password strength:

- The minimum password length is 14 characters.
A password must have at least one lower case character, one uppercase character, and one digit or special character (for example, *$#% etc.). A space is classified as a special character.

Each character must not occur more than three times in a password.

No more than two consecutive characters of the password can be identical.

All characters are in the standard ASCII printable character set within the range from 0x20 to 0x7E inclusive.

**Stash the password of an existing key database (-stashpw)**

The **stash password** command takes an existing key databases password and stashes it to a specified file. Stashing the password for a key database allows the password to be recovered from the file when automatic login is required. See "Keystore access control" on page 7 for further details regarding the stash file.

The syntax for stashing the password of an existing key database with GSKCapiCmd is as follows:

`gsk8capicmd -keydb -stashpw -db <name> [-pw <passwd>]`

where:

- **object** -keydb
- **action** -stashpw
- **options**
  - ***IMPORTANT***: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:
    - `!`, `\`, `*`, `'

This will prevent some command-line shells from interpreting specific characters within these values. For example: `gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj"`. When prompted by `gsk8capicmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

- **-db <filename>**
  - The fully qualified path name of a key database.

- **-pw <passwd>**
  - The password for the key database identified by the -db tag.

**List the supported key databases (-list)**

The **list supported key databases** command performs one of the following functions depending on the options that you specify:

- Lists all of the key database types that the GSKCapiCmd supports. For example, CMS and PKCS#11.
- Lists the token labels associated with a specified PKCS#11 cryptographic driver.
- Verifies that a specified keystore is in a usable format.

The syntax for listing the key databases supported by GSKCapiCmd is as follows:
gsk8capicmd -keydb -list [-crypto <driver_name> | -db <name> [-pw <password>] [-stashed]]

where:
object  -keydb
action  -list
options
    -crypto <driver_name>
        Lists the token labels for the named PKCS#11 cryptographic device.
    -db <name>
        Keystore name for format validation. The program checks that the
        named keystore is usable.
    -pw <passwd>
        The password for the key database identified by the -db tag.
    -stashed
        The password for the key database is recovered from the stash file.

---

**Convert a key database (-convert)**

The **convert key database** command converts an old version CMS key database to
the new version of CMS key database. The latest version of CMS is more secure
because it uses more secure algorithms to protect the contents of the key databases
during creation.

This command requires that you assign a name to the new key database that is
different to the existing old key database. That is, the name cannot be the same as
the existing one. This requirement is to ensure that the old key database is not
destroyed until the user destroys it. Once all testing of the new version key
database has been completed, the user can remove the old key database and
rename the new key database to the old key databases name (if required).

The syntax for converting a key database to the latest CMS version by
GSKCapiCmd is as follows:

```
gsk8capicmd -keydb -convert -db <name> [-pw <password>] [[-type|-old_format]
<cms|kdb|pkcs12|p12>] [[-new_db|-target] <name>][-new_pw <password>]
[-new_format <cms|kdb|pkcs12|p12>] [-preserve]-populate] [-expire <days>]
[-strong] [-stash]
```

where:
object  -keydb
action  -convert
options
    IMPORTANT: On UNIX operating systems, always encapsulate string
    values associated with all tags in double quotation marks ("""). You must
    also use a backslash (\') character to escape the following characters if
    they appear in the string values:
    '!', '\', '''', '''

    This will prevent some command-line shells from interpreting specific
    characters within these values. For example: gsk8capicmd -keydb -create
    -db "/tmp/key.kdb" -pw "j\ljj". When prompted by gsk8capicmd for a
value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-**db** <filename>
The fully qualified path name of a key database.

-**type** | -**old_format** <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program uses the file extension of the database path name to determine the keystore type.

-**pw** <passwd>
The password for the key database identified by the –db tag.

-**new_db** | -**target** <filename>
Fully qualified path name of a new key database to be created during the conversion.

-**new_pw** <passwd>
The password for the key database identified by the –new_db tag.

-**new_format** <cms | kdb | pkcs12 | p12>
The type of the new keystore. If this option is not specified, the program uses the file name suffix of the new database path name to determine the keystore type.

-**preserve** | -**populate**
The preserve option has no action and is deprecated. The newly created key database will include the same certificates as the old key database, unless the populate option is selected.

The populate option adds a number of predefined trusted certificate authority (CA) certificates to the newly created key database. The CA certificates loaded should be reviewed by inspecting the output of the list certificates command. Any or all of the added CA certificates can be removed from the key database. If you want to remove any of the certificates, use the delete certificate command in this manual.

-**expire** <days>
(Deprecated.) The number of days before the password is to expire. If this tag is not specified the key databases password never expires. If specified the duration must be within the range of 1 to 7300 days (20 years).

Note: This parameter is ignored when converting to PKCS#12 type keystores.

-**strong**
Check that the password entered satisfies the following minimum requirements for the password strength:
- The minimum password length is 14 characters.
- A password must have at least one lower case character, one uppercase character, and one digit or special character (for example, *#$% etc.). A space is classified as a special character.
- Each character must not occur more than three times in a password.
- No more than two consecutive characters of the password can be identical.
-stash  Stash the password for the new key database. See "Keystore access control" on page 7 for further details regarding the stash file.

Display the expiry date associated with a key database (-expiry) [deprecated]

This command is deprecated. The expiry key database command simply displays the date that the password associated with the identified key database will expire. When identifying the key database you need to specify the file name of the key database.

The syntax for displaying the expiry of the password associated with a key database with GSKCapiCmd is as follows:

gsk8capicmd -keydb -expiry -db <name> -type <cms | kdb | pkcs12 | p12>
[-pw <passwd>]

where:

object  -keydb

action   -expiry (Deprecated.)

options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.

-pw <passwd>
The password for the key database identified by the -db tag. The -pw tag is required if the key database was created with a password. If the key database does not have a password the -pw tag is not required.

-type <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program uses the file name suffix of the database path name to determine the keystore type.

IMPORTANT: An expiry of 0 means that the password associated with the key database does not expire.
Chapter 3. Certificate commands

The certificate commands are associated with the -cert object. This object supports the following actions:

- “Create a self-signed certificate in a keystore (-create)” on page 19
- “Add a certificate to a keystore (-add)” on page 22
- “Delete a certificate from a keystore (-delete)” on page 24
- “Display details of a certificate (-details)” on page 25
- “Export a certificate (-export)” on page 26
- “Receive a certificate into a keystore (-receive)” on page 28
- “Import a certificate (-import)” on page 29
- “Extract a certificate from a keystore (-extract)” on page 31
- “List details of the default certificate (-getdefault) [deprecated]” on page 32
- “Set default certificate in a keystore (-setdefault) [deprecated]” on page 33
- “Rename a certificate in a keystore (-rename)” on page 34
- “List the certificates stored in a keystore (-list)” on page 36
- “Modify a certificate in a keystore (-modify)” on page 38
- “Sign a certificate (-sign)” on page 39
- “Validate a certificate (-validate)” on page 41

The following sections describe how to use each of the identified certificate actions and what options are available. Supporting information to assist with generating and manipulating certificates is also included:

Signature algorithms

The following signature algorithms are supported for use with commands that accept the -sigalg parameter:

<table>
<thead>
<tr>
<th>md5</th>
<th>MD5_WITH_RSA</th>
<th>MD5WithRSA</th>
<th>sha1</th>
<th>SHA1_WITH_RSA</th>
<th>SHAWithRSA</th>
<th>SHA1WithRSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>sha224</td>
<td>SHA224_WITH_RSA</td>
<td>SHA224WithRSA</td>
<td>sha256</td>
<td>SHA256_WITH_RSA</td>
<td>SHA256WithRSA</td>
<td></td>
</tr>
<tr>
<td>SHA256WithRSA</td>
<td>SHA256WithRSA (deprecated)</td>
<td>sha384</td>
<td>SHA384_WITH_RSA</td>
<td>SHA384WithRSA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHA3WithRSA</td>
<td>SHA3WithRSA (deprecated)</td>
<td>sha512</td>
<td>SHA512_WITH_RSA</td>
<td>SHA512WithRSA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHA5WithRSA</td>
<td>SHA5WithRSA (deprecated)</td>
<td>SHA5_WITH_DSA</td>
<td>SHA5WithDSA</td>
<td>SHA5WithDSA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHA5WithECDSA</td>
<td>EC_ecdsa_with_SHA5</td>
<td>SHA5WithECDSA</td>
<td>EC_ecdsa_with_SHA256</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHA256WithECDSA</td>
<td>EC_ecdsa_with_SHA256</td>
<td>SHA384WithECDSA</td>
<td>EC_ecdsa_with_SHA384</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHA512WithECDSA</td>
<td>EC_ecdsa_with_SHA512</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that the deprecated algorithms SHA2WithRSA, SHA3WithRSA and SHA5WithRSA were just aliases for SHA256WithRSA, SHA384WithRSA and SHA512WithRSA respectively, which have not been deprecated. SHA3 is a new hash algorithm and the name clash caused confusion.

The following table shows the key types matched with their corresponding signature algorithms.
Table 2. Signature algorithms

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Signing algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSA</td>
<td>md5</td>
</tr>
<tr>
<td>EC</td>
<td>EC_ecdsa_with_SHA1</td>
</tr>
<tr>
<td>DSA</td>
<td>SHA_WITH_DSA</td>
</tr>
<tr>
<td>DH</td>
<td>DH (key/cert gen only)</td>
</tr>
</tbody>
</table>

Information about key sizes

The following table indicates the key sizes that are available for each of the supported algorithms. If a key size is not specified in the API calls to generate keys then a default key size is used.

Table 3. Key sizes

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Size (bits)</th>
<th>Default value (bits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSA</td>
<td>512-4096; key sizes in this range should be selected as per NIST SP800-131; 8192 is supported for validation only. <strong>Note:</strong> Available key sizes might vary according to security configurations. For example, you cannot generate 512 bit RSA keys in FIPS mode.</td>
<td>1024</td>
</tr>
<tr>
<td>EC</td>
<td>256, 384 and- 512 <strong>Note:</strong> GSKit EC key generation only supports P256, P384, and P521 curves. P521 curve keys use a 512 bit SHA2 hash.</td>
<td>256 (SHA256); 384 (SHA384); 512 (SHA512)</td>
</tr>
<tr>
<td>DSA</td>
<td>512-4096; key sizes in this range should be selected as per NIST SP800-131; 8192 is supported for validation only.</td>
<td>1024</td>
</tr>
<tr>
<td>DH</td>
<td>512-4096; key sizes in this range should be selected as per NIST SP800-131; 8192 is supported for validation only.</td>
<td>1024</td>
</tr>
</tbody>
</table>
Information about elliptic curves

GSKit uses the elliptic curves P-256, P-384, and P-521 as defined by FIPS186-3 for EC signature algorithms. For clarity the RFC4492-equivalent names are also shown:

<table>
<thead>
<tr>
<th>EC Key Size (bits)</th>
<th>FIPS186-3 curve name</th>
<th>RFC4492 curve name</th>
</tr>
</thead>
<tbody>
<tr>
<td>256</td>
<td>P-256</td>
<td>secp256r1</td>
</tr>
<tr>
<td>384</td>
<td>P-384</td>
<td>secp384r1</td>
</tr>
<tr>
<td>512</td>
<td>P-521</td>
<td>secp521r1</td>
</tr>
</tbody>
</table>

Suite B algorithm and key size selection

GSKit *might* optionally operate in Suite B mode. Suite B Mode is an NSA/NIST mode of operation that has specific key length, hash size, and cipher suite requirements as specified by RFC 5430. Suite B is a subset of FIPS-Approved mode.

To operate in Suite B Mode, certificates must be created with specific key and algorithm choices as specified in RFC 5430. Refer to 4.1 and 4.2 of RFC 5430 for specific details on the available choices. The following table provides a mapping of the security levels to signing algorithms:

<table>
<thead>
<tr>
<th>Suite B security level</th>
<th>Signing algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 bit</td>
<td>EC_ecdsa_with_SHA256</td>
</tr>
<tr>
<td>192 bit</td>
<td>EC_ecdsa_with_SHA384</td>
</tr>
</tbody>
</table>

Create a self-signed certificate in a keystore (-create)

A self-signed certificate provides a certificate that can be used for testing while waiting for the officially signed certificate to be returned from the CA. Both a private and public key are created during this process.

The **create self-signed certificate** command creates a self-signed X509 certificate in the identified key database. A self-signed certificate has the same issuer name as its subject name.

The syntax for creating a certificate in an existing key database with GSKCapiCmd is as follows:

```

where:

**object**  -cert

**action**  -create
options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', ','

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd –keydb –create –db "/tmp/key.kdb" –pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
  Fully qualified path name of a key database to store the self-signed certificate.

type <cms | kdb | pkcs12 | p12>
  Type of the keystore.

crypto <module_name>
  Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

tokenlabel <token_label>
  The PKCS#11 cryptographic device token label.

-pw <passwd>
  The password for the key database identified by the -db or -tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
  The password for the key database will be recovered from the stash file.

-label <label>
  Label attached to the certificate. The label is used to uniquely identify the certificate by a human user.

dn <dist_name>
  The X.500 distinguished name that uniquely identifies the certificate. The input must be a quoted string of the following format (only CN is required):

  CN=common name
  O=organization
  OU=organization unit
  L=location
  ST=state, province
  C=country
  DC=domain component
  EMAIL=email address


  Multiple OU values are now supported. Simply add additional OU key\value pairs to the specified distinguished name. If the OU value requires a comma (,') then you must escape it with \\\

For Example: “CN=weblinux.Raleigh.ibm.com,O=ibm,OU=IBM HTTP Server,OU=GSKit\, Gold Coast,L=RTP,ST=NC,C=US”

-size <key_size>
The size of the new key pair to be created. This size ranges in value depending on the key type. Consult Table 3 on page 18 for valid values.

Note: For some algorithms, you can specify a zero (0) value to use the default key size. This is typically the minimum size that is considered secure.

-x509version <1 | 2 | 3>
The version of X.509 certificate to create, default is 3.

-default_cert <yes | no>
(Deprecated). Sets the newly created certificate as the default certificate for the key database. By default the newly created self-signed certificate is not set as the default (no). A default certificate in the key database is used when a specific certificate is not specified for an operation.

-expire <days>
Expiration time of the certificate in days, default 365 days. The duration is 1 to 7300 days (20 years).

Note: To avoid possible timezone issues, the actual valid-from time for the certificate will be set one day in the past.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
The type of the secondary key database.

-ca <true | false>
This tag adds the Basic Constraint extension to the self-signed certificate. The Basic Constraint extension value is set to true or false depending on what value is associated with the tag.

-san_dnsname <name>
The Subject Alternative Name (SAN) DNS name(s) for the entry being created.

-san_emailaddr <address>
The Subject Alternative Name (SAN) email address(es) for the entry being created. Multiple values can be separated with commas.

-san_ipaddr <address>
The Subject Alternative Name (SAN) IP address(es) for the entry being created.
-certpolicy <policy>
   The certificate policy. A named set of rules limiting the
   applicability of the certificate. Multiple values can be separated
   with commas.

-ku <list>
   Key usage property list. Specifies the valid uses for the private key
   or certificate.

-eku <list>
   Extended key usage property list. Specifies the valid uses for the
certificate.

-sigalg | -sig_alg <signature_algorithm>
   The signing algorithm used during the creation of the self-signed
   certificate. This algorithm is used to create the signature associated
   with the new self-signed certificate. The generated key type is
   chosen to match this signing algorithm. See "Signature algorithms"
   on page 17 for the allowed values.

-ca_label <label>
   The label of the CA key to use to sign the certificate.

---

**Add a certificate to a keystore (-add)**

The add certificate command stores a CA certificate in the identified key database. The CA certificate is received as a file with the data encoded as either Base64 (ASCII) or binary. It is important to identify the correct format of the file otherwise the operation will fail.

The syntax for adding a certificate in an existing key database with GSKCapiCmd is as follows:

```
```

where:

* object  -cert
* action  -add
* options

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', '

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create
-db "/tmp/key.kdb" -pw "j!ljj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
   The fully qualified path name of a key database.
-type <cms | kdb | pkcs12 | p12>
Type of the key database. If this option is not present, the type is implied by the file extension of database path name.

-crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

-pw <passwd>
The password for the key database identified by the –db or –tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

-label <label>
Label attached to the certificate.

-file <name>
File name of the certificate to add. If the extension is “.p7”, “.smime” or “.eml” then it is assumed to be a PKCS#7 encoding. The first certificate will take the ‘label’ given and all other certificates that are present, will be labelled with their subject name. PEM (extension “.pem”) single or multi certificate encodings may also be added.

-format <ascii | binary>
Format of a certificate The default is Base64 encoded ASCII. Additional information about Base64 encoding can be found in RFC 2045 and RFC 3548. The binary format is a binary dump of the DER encoded certificate structure. For additional information, see ITU-T Rec. X.690 (2002) | ISO/IEC 8825-1:2002.

-trust <enable | disable>
(Deprecated). Trust status of a CA certificate, where the default is ‘enable’. When a CAs certificate trust status is enabled then that CA certificate is permitted to be involved in a certificate chain validation. If the CAs certificate trust status is disabled then it cannot be used to validate any certificates. For example if certificate “ABC” is signed by the CA certificate “VeriSign CA” and “VeriSign CA” is not marked as trusted then the validation of “ABC” will fail.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the PKCS#11 device.
-secondaryDBtype <cms | kdb | pkcs12 | p12>

Keystore type of the secondary key database.

**Delete a certificate from a keystore (-delete)**

The **delete certificate** command removes the certificate with the identified label. Once the delete operation is complete, there is no way of recovering the certificate unless you add the certificate back into the key database.

The syntax for deleting a certificate in an existing key database with GSKCapiCmd is as follows:

```
GSKCapiCmd -cert -delete {-db <name> -type <cms | kdb | pkcs12 | p12> | -crypto <module_name> -tokenlabel <token_label>} [-pw <passwd> | -stashed] -label <label> [-secondaryDB <filename> -secondaryDBpw <password> -secondaryDBtype <cms | kdb | pkcs12 | p12>]
```

where:

**object**  
-cert

**action**  
-delete

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (" "). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', '

This will prevent some command-line shells from interpreting specific characters within these values. For example: `GSKCapiCmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj"`. When prompted by `GSKCapiCmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

- **-db <filename>**  
The fully qualified path name of a key database.

- **-type <cms | kdb | pkcs12>**  
Type of the key database. If this option is not present, the type is implied by the database file extension.

- **-crypto <module_name>**  
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

- **-tokenlabel <token_label>**  
The PKCS#11 cryptographic device token label.

- **-pw <passwd>**  
The password for the key database identified by the -db or -tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

- **-stashed**  
The password for the key database will be recovered from the stash file.
-label <label>
  Label attached to the certificate that is to be deleted.

-secondaryDB <filename>
  A CMS key database used to support the PKCS#11 device. A
  PKCS#11 device does not normally have a large amount of space
  available to store a lot of signer certificates. The signer certificates
  are used for the validation of certificates when they are added to
  the PKCS#11 device.

-secondaryDBpw <password>
  Password for the secondary CMS key database supporting the
  PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
  Keystore type of the secondary key database.

Display details of a certificate (-details)

The display certificate details command displays the different details associated
with the identified certificate. The details displayed include:
  • The label of the certificate.
  • The size of the key associated with the certificate.
  • The X509 version that the certificate was created.
  • The serial number for the certificate.
  • The issuer and subject distinguished names.
  • The certificates validity period.
  • The fingerprint of the certificate.
  • The signature of the algorithm used during creation of the certificate.
  • An indication of the certificates trust status.

If more details for the certificate are required, use the -showOID option. This
option displays a more detailed listing of the certificate details.

The syntax for displaying the details for a certificate in an existing key database
with GSKCapiCmd is as follows:

```
gsk8capicmd -cert -details [-showOID] [-file <name>] {-db <name> -type
<cms | kdb | pkcs12 | p12> | -crypto <module_name> -tokenlabel
<token_label>} [-pw <passwd> | -stashed] -label <label>
[-secondaryDB <filename> -secondaryDBpw <password>
-secondaryDBtype <cms | kdb | pkcs12 | p12>]
```

where:

object  -cert
action  -details

options

  IMPORTANT: On UNIX operating systems, always encapsulate string
  values associated with all tags in double quotation marks (“””). You must
  also use a backslash (‘\’) character to escape the following characters if
  they appear in the string values:
  ‘!’, ‘\’, ‘”’, ‘’

This will prevent some command-line shells from interpreting specific
characters within these values. For example: gsk8capicmd -keydb -create
-db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-showOID
  Display a more in-depth listing of the certificate.

-file <name>
  File name of the certificate to display. ASCII or binary encoded certificate.

-db <filename>
  The fully qualified path name of a key database.

-type <cms | kdb | pkcs12 | p12 | pkcs7>
  Type of the key database. If this option is not present, the type is implied by the file extension of the database path name.

-crypto <module_name>
  Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

-tokenlabel <token_label>
  The PKCS#11 cryptographic device token label.

-pw <passwd>
  The password for the key database identified by the –db or –tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
  The password for the key database will be recovered from the stash file.

-label <label>
  Label attached to the certificate that is to be displayed.

-secondaryDB <filename>
  A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
  Password for the secondary CMS key database supporting the PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
  Keystore type of the secondary key database.

### Export a certificate (-export)

The export certificate command exports a single certificate and its private key (if one exists) from one key database to another key database. Use the label to identify the certificate that you want to export.

During this process no key generation occurs. On successful completion, the identified certificate will be in both the source and destination key databases.
The syntax to export a certificate from an existing key database to another key database with GSKCapiCmd is as follows:

```
gsk8capicmd -cert -export -db <name> [-pw <passwd> | -stashed] -label <label>
[-type <cms | kdb | pkcs12 | p12 | pkcs7 | pkcs11> ] -target <name>
[-target_pw <passwd>] [-target_type <cms | kdb | pkcs12 | p12>]
[-encryption <strong | weak>]
```

where:

- **object** - cert
- **action** - export

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\') character to escape the following characters if they appear in the string values:

'!', '\', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create

```
-db "/tmp/key.kdb" -pw "j\!jj"
```

When prompted by **gsk8capicmd** for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

- **-db <filename>**
  The fully qualified file name of the key database that contains the certificate to export. If the supplied file name has an extension of either ".p12" or ".pfx" then it is assumed that it is in PKCS#12 format. If it is ".p7", ".smime" or ".eml" then it is assumed to be a PKCS#7 encoding.

- **-pw <passwd>**
  The password for the key database identified by the -db or -tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

- **-stashed**
  The password for the key database will be recovered from the stash file.

- **-label <label>**
  Label attached to the certificate that is to be exported.

- **-type <cms | kdb | pkcs12 | p12>**
  The type of the key database that contains the certificate to export. The default is **cms**.

- **-target <name>**
  Destination key database or file where the certificate is to be exported. If the supplied file name has an extension of either ".p12" or ".pfx" then it is assumed that it is in PKCS#12 format. If the target keystore does not exist, it will be created.

- **-target_pw <passwd>**
  The password of the destination key database or file.

- **-target_type <cms | kdb | pkcs12 | p12>**
  The type of the destination key database or file where the certificate is to be exported. The default is **cms**.
The strength of encryption used during the export. The default is **strong**. This tag is no longer used as the export restrictions in the USA have eased. This tag is simply added to this command-line tool for backward compatibility reasons. It has no effect on the operation. **Strong** is always used.

**Receive a certificate into a keystore (-receive)**

The **receive certificate** command stores a certificate received from a CA that was requested to sign a certificate request. The certificate being received can be in either binary or Base64 encoded ASCII. Additional information about base64 encoding can be found in RFC 2045 and RFC 3548. The binary format is a binary dump of the DER encoded certificate structure. For additional information, see ITU-T Rec. X.690 (2002) | ISO/IEC 8825-1:2002. During the receive process, the certificate is matched to its corresponding certificate request. This certificate request is removed from the key database as it is no longer needed.

If the certificate request is required after receiving the certificate, you will need to use the recreate certificate request command: **“Re-create certificate requests (-recreate)” on page 53.**

The syntax for receiving a certificate to an existing key database with GSKCapiCmd is as follows:

```
gsk8capicmd -cert -receive -file <name> [-format <ascii | binary>] [-db <name>
-type <cms | kdb | pkcs12 | p12> | -crypto <module_name> -tokenlabel <token_label>]
[-pw <passwd> | -stashed] [-default_cert <yes | no>] [-t61]
```

where:

- **object** - cert
- **action** - receive
- **options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks ("""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', '"'

This will prevent some command-line shells from interpreting specific characters within these values. For example: `gsk8capicmd -keydb -create
-db "/tmp/key.kdb" -pw "j\!jj"`. When prompted by `gsk8capicmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

- **-file <name>**
  
  The file name of the certificate that is to be received. This file can be either binary or base64 encoded.

- **-format <ascii | binary>**
  
  Format of a certificate. The default is Base64 encoded ASCII. Additional information about base64 encoding can be found in RFC 2045 and RFC 3548. The binary format is a binary dump of the DER encoded certificate structure. For additional information, see ITU-T Rec. X.690 (2002) | ISO/IEC 8825-1:2002
-db <filename>
The fully qualified path name of a key database.

-type <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program will use the database path name extension to determine the keystore type.

crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

-pw <passwd>
The password for the key database identified by the -db or -tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

-default_cert <yes | no>
(Deprecated) Sets the newly created certificate as the default certificate for the key database. By default the newly created self-signed certificate is not set as the default (no). A default certificate in a key database is used during operations where a specific certificate is not specified.

-t61
Substitute ISO8859-1 character set encodings for malformed TELETEX strings.

---

Import a certificate (-import)

The import certificate command imports certificates from either one key database (CMS or PKCS#12) to another key database (CMS, PKCS#12 or PKCS#11). During this process no key generation occurs. On successful completion, the identified certificates will be in both the source and destination key databases.

The syntax for importing a certificate from an existing key database to another key database with GSKCapICmd is as follows:


where:

object -cert
action -import
options

IMPORTANT: On UNIX operating systems, always encapsulate string
values associated with all tags in double quotation marks (""'). You must also use a backslash (\') character to escape the following characters if they appear in the string values:
'!', '\', '*', '

This will prevent some command-line shells from interpreting specific characters within these values. For example: gskcapicmd -keydb -create -db "*/tmp/key.kdb" -pw "j\!jj". When prompted by gskcapicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of the source key database that contains the certificate to be imported. If the supplied file name has an extension of either "p12" or .pfx" then it is assumed that it is in PKCS#12 format. If it is "p7", "smime" or "eml" then it is assumed to be a PKCS#7 encoding.

-file <filename>
The fully qualified path name of a PKCS#12, PKCS#7 or PFX format file of:
  • The certificate to be imported, or
  • An import script (.txt file).

-pw <passwd>
The password for the key database or PKCS#11 cryptographic device identified by either the -db or -crypto tags respectively. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

-label <label>
Label attached to the certificate that is to be imported. If the label tag is missing from the command line then the operation will transfer all certificates from the source key database to the target key database. If a certificate in the source key database already exists in the target key database then that certificate is not imported.

-type <cms | kdb | pkcs12 | p12 | pkcs7>
The type of the source key database. The default is cms.

-pfx
A switch indicating whether the import file is a .pfx file. Use of this option is unnecessary if the file extension of the file name is .pfx.

-target <name>
Destination key database to which the certificate is to be imported. If the supplied file name has an extension of either "p12" or .pfx" then it is assumed that it is in PKCS#12 format.

-crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.
-tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A
PKCS#11 device does not normally have a large amount of space
available to store a lot of signer certificates. The signer certificates
are used for the validation of certificates when they are added to
the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the
PKCS#11 device.

-secondaryDBtype <cms | kdb| pkcs12 | p12>
Keystore type of the secondary key database.

-target_pw <passwd>
The password of the destination key database.

-target_type <cms | kdb | pkcs11 | pkcs12 | p12>
The type of the destination key database. The default is cms.

-new_label <label>
The label to be used in the destination key database to identify the
imported certificate.

-t61 Substitute ISO8859-1 character set encodings for malformed
TELETEX strings.

Extract a certificate from a keystore (-extract)
The extract certificate command simply extracts the certificate data from the key
database and places it into the identified file. If the file does not exist then it will
be created. If the file already exists, an error indicating this will be returned. The
data will be saved as either base64 encoding or binary. No private key components
are extracted.

The syntax to extract a certificate from an existing key database with GSKCapiCmd
is as follows:
gsk8capicmd -cert -extract {-db <name> | -crypto <module_name> -tokenlabel
<token_label>} [-pw <passwd> | -stashed] -label <label> -param <dsa|dh>
-target <name> [-format
<ascii | binary>] [-secondaryDB <filename> -secondaryDBpw <password>
-secondaryDBtype <cms | kdb | pkcs12 | p12>]

where:
object -cert
action -extract
options
IMPORTANT: On UNIX operating systems, always encapsulate string
values associated with all tags in double quotation marks (""). You must
also use a backslash (\) character to escape the following characters if
they appear in the string values:
', ',', '', ''
This will prevent some command-line shells from interpreting specific
characters within these values. For example: gsk8capicmd –keydb –create
-db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.

crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

-pw <passwd>
The password for the key database identified by the –db or –tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

-label <label>
Label attached to the certificate that is to be extracted.

-param <dsa|dh>
Extract Diffie Hellman or DSA parameters.

-target <name>
Destination file to which the certificate or parameters is to be extracted.

-format <ascii | binary>
Format of an output file. The default is Base64 encoded ASCII. Additional information about base64 encoding can be found in RFC 2045 and RFC 3548. The binary format is a binary dump of the DER encoded certificate structure. For additional information, see ITU-T Rec. X.690 (2002) | ISO/IEC 8825-1:2002

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
Keystore type of the secondary key database.

---

**List details of the default certificate (-getdefault) [deprecated]**

This feature is deprecated. Use the explicit label of the desired certificate/key instead.
The **list default certificate details** command lists the following details for the default certificate of the identified key database:

- The label of the default certificate.
- The size of the key associated with the default certificate.
- The X509 version that the default certificate was created.
- The serial number for the default certificate.
- The issuer and subject distinguished names.
- The default certificates validity period.
- The fingerprint of the default certificate.
- The signature of the algorithm used during creation of the default certificate.
- An indication of the default certificates trust status.

The syntax for listing the details for the default certificate in an existing key database with GSKCapicmd is as follows:

```
gsk8capicmd -cert -getdefault -db <name> [-type <cms | kdb | pkcs12 | p12>] [-pw <passwd> | -stashed]
```

where:

**object** -cert

**action** -getdefault (deprecated)

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!' ', ', '', ''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

- **-db <filename>**
  The fully qualified path name of a key database.

- **-pw <passwd>**
  The password for the key database identified by the -db tag.
  Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

- **-stashed**
  The password for the key database will be recovered from the stash file.

- **-type <cms | kdb | pkcs12 | p12>**
  The keystore type. If this option is not specified, the program uses the file extension of the database file name to determine the keystore type.

---

**Set default certificate in a keystore (-setdefault) [deprecated]**

This feature is **deprecated**. Use the explicit label of the desired certificate/key instead.
The **set default certificate** command sets a certificate to be used as the default certificate for the identified key database. During this command the current default certificate, if there is one, has its default setting removed. The new certificate is then set as the default certificate. There can only ever be one default certificate in a key database.

The syntax for setting the default certificate in an existing key database with GSKCapiCmd is as follows:

```
gsk8capicmd -cert -setdefault -db <name> [-pw <passwd> | -stashed] -label <label> [-type <cms | kdb | pkcs12 | p12>]
```

where:

**object** -cert

**action** -setdefault (deprecated)

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (" "). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', ' ' 

This will prevent some command-line shells from interpreting specific characters within these values. For example: `gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj"`. When prompted by `gsk8capicmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

**-db <filename>**

The fully qualified path name of a key database.

**-pw <passwd>**

The password for the key database identified by the -db tag. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

**-stashed**

The password for the key database will be recovered from the stash file.

**-label <label>**

Label that uniquely identifies the certificate that is to be set as the default certificate in the identified key database.

**-type <cms | kdb | pkcs12 | p12>**

The keystore type. If this option is not specified, the program uses the file extension of the database file name to determine the keystore type.

---

**Rename a certificate in a keystore (-rename)**

The **rename certificate** command changes the label attached to a certificate contained in a CMS keystore.

The syntax for changing a certificate label name in an existing key database with GSKCapiCmd is as follows:

where:

object -cert
action -rename
options

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\') character to escape the following characters if they appear in the string values:

'!', '\', '', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-**db** <filename>
The fully qualified path name of a key database.

-**crypto** <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

-**tokenlabel** <token_label>
The PKCS#11 cryptographic device token label.

-**pw** <passwd>
The password for the key database identified by the -db tag. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-**stashed**
The password for the key database will be recovered from the stash file.

-**label** <label>
Label attached to the certificate that is to be renamed.

-**new_label** <new_name>
A new label name to uniquely identify the certificate in the key database.

-**type** <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program uses the file extension of the database file name to determine the keystore type.

-**secondaryDB** <filename>
A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.
-secondaryDBpw <password>
  Password for the secondary CMS key database supporting the
  PKCS#11 device.

-secondaryDBtype <cms | kdb| pkcs12 | p12>
  Keystore type of the secondary key database.

List the certificates stored in a keystore (-list)

The list certificate command lists all of the certificates and secret keys stored
within the identified key database.

The syntax to list the certificates in an existing key database is as follows:

```
gsk8capicmd -cert -list [<all | personal | CA>] [-expiry [<number of days>]
{-db <name> | -crypto <module_name> -tokenlabel <token_label>]}[-pw <passwd> | 
-stashed] [-type <cms | kdb | pkcs12 | p12>] [-secondaryDB <filename> -secondaryDBpw
<password> secondaryDBtype <cms | kdb | pkcs12 | p12>]
```

where:

object -cert

action -list

The list command has optional special tags that can be associated with it.
These tags are used to identify what type of certificates you are requesting
 to be displayed. The tags are not required. By default all certificate stored
within the key database will be displayed. The following list describes
these tags:

all  List the labels of all certificates in the identified key database. This
     is the default for the list command.

personal  List all personal certificates in the identified key database.

CA  List all of the certificate authority (CA) certificates in the identified
     key database.

options

IMPORTANT: On UNIX operating systems, always encapsulate string
values associated with all tags in double quotation marks (""). You must
also use a backslash (\) character to escape the following characters if
they appear in the string values:

'!', '\', '*', '

This will prevent some command-line shells from interpreting specific
characters within these values. For example: gsk8capicmd -keydb -create
-db "/tmp/key.kdb" -pw "$jjj". When prompted by gsk8capicmd for a
value (for example, a password) do not quote the string and add the
escape characters, as the shell is no longer influencing this input.

-expiry <number of days>

The expiry tag identifies the number of days from today that a
certificate remains valid. If a certificate is due to expire within this
number of days then its validity range ("Not Before" and "Not
After") displays along with the certificate name. The list also
includes the name and validity range details for expired
certificates. A certificate that is not expiring within this number of
days has only its name listed. You can enter the value 0 to list
expired certificates. If you do not specify this tag, it is not applied
during the execution of the command.

-\textbf{db <filename>}
\begin{itemize}
\item The fully qualified path name of a key database. If the supplied
\item file name has an extension of either \texttt{.p12} or \texttt{.pfx} then it is
\item assumed that it is in PKCS#12 format. If it is \texttt{.p7}, \texttt{.smime} or
\item \texttt{.eml} then it is assumed to be a PKCS#7 encoding.
\end{itemize}

-\textbf{crypto <module_name>}
\begin{itemize}
\item Indicates a PKCS#11 cryptographic device operation, where
\item <module_name> is the path to the module to manage the crypto
device.
\end{itemize}

-\textbf{tokenlabel <token_label>}
\begin{itemize}
\item The PKCS#11 cryptographic device token label.
\end{itemize}

-\textbf{pw <passwd>}
\begin{itemize}
\item The password for the key database identified by the \texttt{-db} or
\item \texttt{-tokenlabel} tags. Specify a hyphen (-) as the password to cause the
\item program to read the password from stdin. This allows you to pipe
\item in the password.
\end{itemize}

-\textbf{stashed}
\begin{itemize}
\item The password for the key database will be recovered from the
\item stash file.
\end{itemize}

-\textbf{type <cms | kdb | pkcs12 | p12>}
\begin{itemize}
\item The key database type. The default is \texttt{cms}.
\end{itemize}

-\textbf{secondaryDB <filename>}
\begin{itemize}
\item A CMS key database used to support the PKCS#11 device. A
\item PKCS#11 device does not normally have a large amount of space
\item available to store a lot of signer certificates. The signer certificates
\item are used for the validation of certificates when they are added to
\item the PKCS#11 device.
\end{itemize}

-\textbf{secondaryDBpw <password>}
\begin{itemize}
\item Password for the secondary CMS key database supporting the
\item PKCS#11 device.
\end{itemize}

-\textbf{secondaryDBtype <cms | kdb | pkcs12 | p12>}
\begin{itemize}
\item Keystore type of the secondary key database.
\end{itemize}

As an example, the following certificate list is displayed for a new key
database created with the GSKCapiCmd program. The command used to
create this list is as follows:

\begin{verbatim}
gsk8capicmd -cert -list -db <database name> [-pw <password>]
\end{verbatim}

Certificates found:
\begin{itemize}
\item * default, - has private key, ! trusted, # secret key
\item Entrust.net Global Secure Server Certification Authority
\item Entrust.net Global Client Certification Authority
\item Entrust.net Client Certification Authority
\item Entrust.net Certification Authority (2048)
\item Entrust.net Secure Server Certification Authority
\item VeriSign Class 3 Public Primary Certification Authority
\item VeriSign Class 2 Public Primary Certification Authority
\item VeriSign Class 1 Public Primary Certification Authority
\item VeriSign Class 4 Public Primary Certification Authority - G2
\item VeriSign Class 3 Public Primary Certification Authority - G2
\item VeriSign Class 2 Public Primary Certification Authority - G2
\item VeriSign Class 1 Public Primary Certification Authority - G2
\item VeriSign Class 4 Public Primary Certification Authority - G3
\end{itemize}
VeriSign Class 3 Public Primary Certification Authority - G3
VeriSign Class 2 Public Primary Certification Authority - G3
VeriSign Class 1 Public Primary Certification Authority - G3
Thawte Personal Premium CA
Thawte Personal Freemail CA
Thawte Personal Basic CA
Thawte Premium Server CA
Thawte Server CA
RSA Secure Server Certification Authority

The default key is marked with the “*” symbol (deprecated) and all trusted self-signed (root) certs are listed with a ‘!’ symbol. (deprecated) The ‘-’ symbol is used to show where a private key is present.

Modify a certificate in a keystore (-modify)

The modify certificate command allows a CA's certificate trust status to be enabled or disabled. When a CA's certificate trust status is enabled then that CA certificate is permitted to be involved in a certificate chain validation. If the CA's certificate trust status is disabled then it cannot be used to validate any certificates. For example if certificate “ABC” is signed by the CA certificate “VeriSign CA” and “VeriSign CA” is not marked as trusted then the validation of “ABC” will fail. You are able to have any number of trusted CA certificates in the single key database.

The syntax for modifying the trust status of a certificate in an existing key database with GSKCapiCmd is as follows:

gsk8capicmd -cert -modify -db <name> [-pw <passwd> | -stashed] -label <label> -trust <enable | disable>

where:
-object -cert
-action -modify
-options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (“”). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', ','

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.

-pw <passwd>
The password for the key database identified by the -db tag. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.
-label <label>
  Label attached to the certificate.

-trust <enable | disable>
  (Deprecated). Trust status of a CA certificate. The default is enable. When a CA certificate trust status is enabled then that CA certificate is permitted to be involved in a certificate chain validation. If the CA certificate trust status is disabled then it cannot be used to validate any certificates. For example if certificate “ABC” is signed by the CA certificate “VeriSign CA” and “VeriSign CA” is not marked as trusted then the validation of “ABC” will fail.

Sign a certificate (-sign)

The sign certificate command allows the signing of a certificate request by an existing certificate stored within a key database. The command accepts a certificate request in a specified file format and details of the certificate that contains the private key to be used during the signing process.

If a certificate is not identified, the private key of the default certificate in the key database is used during the signing process. (deprecated)

The syntax for signing a certificate with GSKCapiCmd is as follows:

```
```

where:

object -cert
action -sign
options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (" "). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
  The fully qualified path name of a key database.

-type <cms | kdb | pkcs12 | p12>
  The keystore type. If this option is not specified, the program uses the file name extension to determine the keystore type.
-crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where
<module_name> is the path to the module to manage the crypto
device.

-tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

-pw <passwd>
The password for the key database identified by the –db tag.
Specify a hyphen (-) as the password to cause the program to read
the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the
stash file.

-label <label>
Label of the certificate that has the private key to use for the
signing operation.

-target <name>
The name of the file that will contain the signed certificate.

-format <acss | binary>
The format of the signed certificate. The default is Base64 encoded
ASCII. Additional information about base64 encoding can be found
in RFC 2045 and RFC 3548. The binary format is a binary dump of
the DER encoded certificate structure. For additional information,

-expire <number of days>
The expiry tag identifies the number of days from today that a
certificate is valid. The default is 365 days.

Note: To avoid possible timezone issues the actual valid-from time
for the certificate will be set one day in the past.

-file <name>
The name and location of the certificate request to be signed.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A
PKCS#11 device does not normally have a large amount of space
available to store a lot of signer certificates. The signer certificates
are used for the validation of certificates when they are added to
the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the
PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
Keystore type of the secondary key database.

-ca <true | false>
This tag adds the Basic Constraint extension to the self-signed
certificate. The Basic Constraint extension value is set to true or
false depending on what value is associated with the tag.
-san_dnsname <name>
   The Subject Alternative Name (SAN) DNS name(s) for the entry
   being created.

-san_emailaddr <address>
   The Subject Alternative Name (SAN) email address(es) for the
   entry being created. Multiple values can be separated with
   commas.

-san_ipaddr <address>
   The Subject Alternative Name (SAN) IP address(es) for the entry
   being created.

-certpolicy <policy>
   The certificate policy. A named set of rules limiting the
   applicability of the certificate. Multiple values can be separated
   with commas.

-ku <list>
   Key usage property list. Specifies the valid uses for the private key
   or certificate.

-eku <list>
   Extended key usage property list. Specifies the valid uses for the
   certificate.

-preserve
   Preserve/merge the certificate request attributes in the final
   certificate extensions.

-sigalg | -sig_alg <signature_algorithm>
   The signing algorithm to be used during the signing of the
   certificate. This algorithm is used to create the signature associated
   with the new signed certificate. This algorithm must match the
   keytype of the key being used for signing. That is, the key
   contained in the certificate that is specified by the –label parameter.
   See “Signature algorithms” on page 17 for the allowed values.

-ssnum
   The serial number in conjunction with the issuers name uniquely
   identifies a certificate. A serial number is normally assigned to a
   certificate by the certificate authority (CA) that signed the
   certificate request. This tag has been included to allow the
   emulation of this process. The -ssnum tag accepts two types of
   values:

   1. Hexadecimal - A hexadecimal value can be passed as the
      -ssnum tags value by prepending a “0x” to the front of the
      serial number.

   2. String - A string representation of the serial number. The string
      representation of the serial number is normally displayed in
      ASCII format.

   If the –ssnum tag is not passed, a random serial number is
   assigned to the signed certificate.

Validate a certificate (-validate)

The validate certificate command is used to validate a certificate held in the
keystore. The validation includes ensuring that:
All necessary intermediate and root certificates used to validate the certificate are present, and
These certificates have not expired.

The syntax for validating a certificate in an existing key database with GSKCapiCmd is as follows:
```
gsk8capicmd -cert -validate {-db <filename> | -crypto <module_name> -tokenlabel <token_label>} [-pw <passwd> | -stashed] [-type <cms | kdb | pkcs12 | p12>]
-label <label> -ldap <location> [-secondaryDB <filename> -secondaryDBpw <password> -secondaryDBtype <cms | kdb | pkcs12 | p12>]
```

where:
object  -cert
action   -validate
options

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

`'`, `\`, `"`, `'`

This will prevent some command-line shells from interpreting specific characters within these values. For example:
```
gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by `gsk8capicmd` for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.
```

-db <filename>
The fully qualified path name of a key database.

crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

pw <passwd>
The password for the key database identified by the –db tag.
Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

-label <label>
Label attached to the certificate that is to be validated.

type <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program uses the file extension of the database file name to determine the keystore type.

-ldap <location>
TCP/IP name or address of the LDAP server that is to be used for certificate revocation checking.
-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A
PKCS#11 device does not normally have a large amount of space
available to store a lot of signer certificates. The signer certificates
are used for the validation of certificates when they are added to
the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the
PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
Keystore type of the secondary key database.
Chapter 4. Certificate request commands

The certificate request commands are associated with the -certreq object. This object supports the following actions:

- "Create a certificate request (-create)"
- "Delete certificate request (-delete)" on page 47
- "List certificate request details (-details)" on page 49
- "Extract certificate request (-extract)" on page 50
- "List all certificate requests (-list)" on page 51
- "Re-create certificate requests (-recreate)" on page 53

The following sections provide details on how to use each of the identified certificate request actions and what options are available.

Create a certificate request (-create)

The create certificate request command creates a new RSA private-public key pair and a PKCS10 certificate request in the specified key database. For CMS key databases, the certificate request information is stored in the file with the "rdb" extension that is associated with the key database. During the creation process, the certificate request is also extracted to a file that can be used to send the certificate request to a CA for signing.

The syntax for creating a certificate request in an existing key database with GSKCapicmd is as follows:


where:

object -certreq
action -create
options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""'). You must also use a backslash (\') character to escape the following characters if they appear in the string values:

'|', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.
**-crypto <module_name>**
Indicates a PKCS#11 cryptographic device operation, where
<module_name> is the path to the module to manage the crypto
device.

**-tokenlabel <token_label>**
The PKCS#11 cryptographic device token label.

**-pw <passwd>**
The password for the key database identified by the –db or
–tokenlabel tags. Specify a hyphen (-) as the password to cause the
program to read the password from stdin. This allows you to pipe
in the password.

**-stashed**
The password for the key database will be recovered from the
stash file.

**-type <cms | kdb | pkcs12 | p12>**
The keystore type. If this option is not specified, the program will
use the database path name suffix to determine the keystore type.

**-label <label>**
Label to be attached to the certificate request on creation. The user
uses this label to uniquely identify the certificate request.

**-dn <dist_name>**
The X.500 distinguished name that will uniquely identify the
certificate. The input must be a quoted string of the following
format (only CN is required):

```
CN=common name
O=organization
OU=organization unit
L=location
ST=state, province
C=country
DC=domain component
EMAIL=email address
```

For example: “CN=weblinux.Raleigh.ibm.com,O=ibm,OU=IBM HTTP
Server,L=RTP,ST=NC,C=US”

Multiple OU values are now supported. Simply add additional OU
key\value pairs to the specified distinguished name. If the OU
value requires a comma (‘,’) then you must escape it with ‘\’.

For example: “CN=weblinux.Raleigh.ibm.com,O=ibm,OU=IBM HTTP
Server,OU=GSKit\\, Gold Coast,L=RTP,ST=NC,C=US”

**-size <key_size>**
The size of the new key pair to be created. This size ranges in
value depending on the key type. Consult Table 3 on page 18 for
valid values.

**Note:** For some algorithms, you can specify a zero (0) value to use
the default key size. This is typically the minimum size that
is considered secure.

**-target | -file <name>**
The file name that the certificate request will be extracted to during
the certificate request creation process.
Note: "-file <name> continues to operate for this command for
backwards compatibility.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A
PKCS#11 device does not normally have a large amount of space
available to store a lot of signer certificates. The signer certificates
are used for the validation of certificates when they are added to
the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the
PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
Keystore type of the secondary key database.

-san_dnsname <name>
The Subject Alternative Name (SAN) DNS name(s) for the entry
being created.

-san_emailaddr <address>
The Subject Alternative Name (SAN) email address(es) for the
entry being created. Multiple values can be separated with
commas.

-san_ipaddr <address>
The Subject Alternative Name (SAN) IP address(es) for the entry
being created.

-certpolicy <policy>
The certificate policy. A named set of rules limiting the
applicability of the certificate. Multiple values can be separated
with commas.

-ku <list>
Key usage property list. Specifies the valid uses for the private key
or certificate.

-eku <list>
Extended key usage property list. Specifies the valid uses for the
certificate.

-sigalg | -sig_alg <signature_algorithm>
The signing algorithm to be used during the creation of the
certificate request. This algorithm is used to create the signature
associated with the new certificate request. The generated key type
will be chosen to match this signing algorithm. See "Signature
algorithms" on page 17 for the allowed values.

### Delete certificate request (-delete)

The delete certificate request removes the certificate request from the identified
key database. This means that the entry in the ".rdb" associated with the certificate
request is deleted.

The syntax for deleting a certificate request in an existing key database with
GSKCapiCmd is as follows:

where:

object  -certreq
action  -delete
options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '*', '

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.

crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

tokenlabel <token_label>
The PKCS#11 cryptographic device token label.

-pw <passwd>
The password for the key database identified by the -db or -tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

type <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program will use the database path name suffix to determine the keystore type.

-label <label>
Label attached to the certificate request that is to be deleted.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the PKCS#11 device.
List certificate request details (-details)

The list certificate request details command simple lists the identified certificate requests details. These details include:

- The label of the certificate request.
- The size of the key associated with the certificate request.
- The subject distinguished name.
- The fingerprint of the certificate.
- The signature of the algorithm used during creation of the certificate.

For a more detailed listing of the certificate request details use the -showOID option in the command.

The syntax for listing a certificate requests details in an existing key database with GSKCapiCmd is as follows:


where:

object -certreq
action -details
options

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (" "). You must also use a backslash (\) character to escape the following characters if they appear in the string values:
'
', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-showOID
   Display a more in-depth listing of the certificate requests.

-file <name>
   File name of the certificate request to display. Ascii or binary encoded certificate request.

-db <filename>
   The fully qualified path name of a key database.

-crypto <module_name>
   Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

-tokenlabel <token_label>
   The PKCS#11 cryptographic device token label.
-pw <passwd>
  The password for the key database identified by the –db or –tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
  The password for the key database will be recovered from the stash file.

-type <cms | kdb | pkcs12 | p12>
  The keystore type. If this option is not specified, the program will use the database path name suffix to determine the keystore type.

-label <label>
  Label attached to the certificate request that is to be displayed.

-secondaryDB <filename>
  A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
  Password for the secondary CMS key database supporting the PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
  Keystore type of the secondary key database.

Extract certificate request (-extract)

The **extract certificate request** command extracts an existing certificate request stored in the specified key database to the identified file in base64 format. The certificate request will still exist within the key database so you are able to extract it as many times as needed. The file that is extracted is the file that is dispatched to a CA for signing.

The syntax for extracting a certificate request from an existing key database with GSKCapiCmd is as follows:

```
```

where:

<table>
<thead>
<tr>
<th>object</th>
<th>-certreq</th>
</tr>
</thead>
<tbody>
<tr>
<td>action</td>
<td>-extract</td>
</tr>
<tr>
<td>options</td>
<td></td>
</tr>
<tr>
<td>IMPORTANT:</td>
<td>On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (&quot;&quot;). You must also use a backslash (') character to escape the following characters if they appear in the string values: '!', '', '*', ';'</td>
</tr>
</tbody>
</table>

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd -keydb -create
-db "/<tmp/key.kdb" -pw "\jj\jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-db <filename>
The fully qualified path name of a key database.

-crypto <module_name>
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

token_label <token_label>
The PKCS#11 cryptographic device token label.

-pw <passwd>
The password for the key database identified by the –db or –tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-stashed
The password for the key database will be recovered from the stash file.

-type <cms | kdb | pkcs12 | p12>
The keystore type. If this option is not specified, the program will use the database path name suffix to determine the keystore type.

-label <label>
Label attached to the certificate request that is to be extracted.

target <name>
Destination file to which the certificate request is to be extracted.

-secondaryDB <filename>
A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-secondaryDBpw <password>
Password for the secondary CMS key database supporting the PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
Keystore type of the secondary key database.

List all certificate requests (-list)
The list certificate request command lists all of the certificate request labels stored within the identified key database.

The syntax for listing the certificate requests stored within an existing key database with GSKCapicmd is as follows:
gsk8capicmd -certreq -list { -db <name> | -crypto <module_name> -tokenlabel <token_label> } [-pw <passwd> | -stashed] [-type <cms | kdb | pkcs12 | p12>]
[-secondaryDB <filename> -secondaryDBpw <password> -secondaryDBtype <cms | kdb | pkcs12 | p12>]

where:
**object**  -certreq

**action**  -list

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks ("""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '``', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd –keydb –create –db "/tmp/key.kdb" –pw "j\!jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

-\**db <filename>**
   The fully qualified path name of a key database.

-\**crypto <module_name>**
   Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

-\**tokenlabel <token_label>**
   The PKCS#11 cryptographic device token label.

-\**pw <passwd>**
   The password for the key database identified by the –db tag or the -crypto tag. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

-\**stashed**
   The password for the key database will be recovered from the stash file.

-\**type <cms | kdb | pkcs12 | p12>**
   The keystore type. If this option is not specified, the program will use the database path name suffix to determine the keystore type.

-\**secondaryDB <filename>**
   A CMS key database used to support the PKCS#11 device. A PKCS#11 device does not normally have a large amount of space available to store a lot of signer certificates. The signer certificates are used for the validation of certificates when they are added to the PKCS#11 device.

-\**secondaryDBpw <password>**
   Password for the secondary CMS key database supporting the PKCS#11 device.

-\**secondaryDBtype <cms | kdb | pkcs12 | p12>**
   Keystore type of the secondary key database.
Re-create certificate requests (-recreate)

The **re-create certificate request** command recreates a certificate request from an existing certificate stored within the specified key database. The recreation of a certificate may be required to allow a certificate to be signed by another CA if there was a problem with the CA that originally signed it.

The syntax to recreate a certificate request in an existing key database with GSKCapiCmd is as follows:

```bash
```

where:

**object**  
- -certreq

**action**  
- -recreate

**options**

**IMPORTANT:** On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks (""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', ',', ' ', ' 'This will prevent some command-line shells from interpreting specific characters within these values. For example: `gsk8capicmd -keydb -create -db "/tmp/key.kdb" -pw "j\!jj"`. When prompted by **gsk8capicmd** for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.

**-db <filename>**  
The fully qualified path name of a key database.

**-crypto <module_name>**  
Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

**-tokenlabel <token_label>**  
The PKCS#11 cryptographic device token label.

**-type <cms | kdb | pkcs12 | p12>**  
The keystore type. If this option is not specified, the program will use the database path name suffix to determine the keystore type.

**-pw <passwd>**  
The password for the key database identified by the -db tag or the -crypto tag. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

**-stashed**  
The password for the key database will be recovered from the stash file.
-label <label>
  Label attached to the certificate request that is to be recreated.

-target <name>
  Destination file to which the certificate request is to be recreated.

-secondaryDB <filename>
  A CMS key database used to support the PKCS#11 device. A
  PKCS#11 device does not normally have a large amount of space
  available to store a lot of signer certificates. The signer certificates
  are used for the validation of certificates when they are added to
  the PKCS#11 device.

-secondaryDBpw <password>
  Password for the secondary CMS key database supporting the
  PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
  Keystore type of the secondary key database.

-san_dnsname <name>
  The Subject Alternative Name (SAN) DNS name(s) for the entry
  being created.

-san_emailaddr <address>
  The Subject Alternative Name (SAN) email address(es) for the
  entry being created. Multiple values can be separated with
  commas.

-san_ipaddr <address>
  The Subject Alternative Name (SAN) IP address(es) for the entry
  being created.

-certpolicy <policy>
  The certificate policy. A named set of rules limiting the
  applicability of the certificate. Multiple values can be separated
  with commas.

-ku <list>
  Key usage property list. Specifies the valid uses for the private key
  or certificate.

-eku <list>
  Extended key usage property list. Specifies the valid uses for the
  certificate.

-sigalg | -sig_alg <signature_algorithm>
  The signing algorithm to be used during the creation of the
  self-signed certificate. This algorithm is used to create the signature
  associated with the new self-signed certificate. The key type must
  match this signing algorithm. See “Signature algorithms” on page
  17 for the allowed values.
Chapter 5. Secret Key commands

Note: "-cert -list" and "-cert -details" will function on secret keys providing information regarding the specific secret key.

Add a secret key to a keystore (-add)

The syntax for adding a certificate in an existing key database with GSKCapicmd is as follows:

```
```

where:

- **db** <filename>
  The fully qualified path name of a key database.

- **type** <cms | kdb | pkcs12 | p12>
  Type of the key database. If this option is not present, the type is implied by the file extension of database path name.

- **crypto** <module_name>
  Indicates a PKCS#11 cryptographic device operation, where <module_name> is the path to the module to manage the crypto device.

- **tokenlabel** <token_label>
  The PKCS#11 cryptographic device token label.

- **pw** <passwd>
  The password for the key database identified by the -db or -tokenlabel tags. Specify a hyphen (-) as the password to cause the program to read the password from stdin. This allows you to pipe in the password.

- **stashed**
  The password for the key database will be recovered from the stash file.

IMPORTANT: On UNIX operating systems, always encapsulate string values associated with all tags in double quotation marks ("""). You must also use a backslash (\) character to escape the following characters if they appear in the string values:

'!', '\', '"', '''

This will prevent some command-line shells from interpreting specific characters within these values. For example: gsk8capicmd –keydb –create –db "/tmp/key.kdb" –pw "\jj". When prompted by gsk8capicmd for a value (for example, a password) do not quote the string and add the escape characters, as the shell is no longer influencing this input.
-label <label>
    Label attached to the key.

file <name>
    File name of the key to add.

-format <ascii | binary>
    Format of a certificate The default is Base64 encoded ASCII.
    Additional information about Base64 encoding can be found in
    RFC 2045 and RFC 3548. The binary format is a binary dump of
    key.

-secondaryDB <filename>
    A CMS key database used to support the PKCS#11 device.

-secondaryDBpw <password>
    Password for the secondary CMS key database supporting the
    PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
    Keystore type of the secondary key database.

---

**Extract a Secret Key from a keystore (-extract)**

The extract secret key command simply extracts the key data from the key
database and places it into the identified file. If the file does not exist then it will
be created. If the file already exists, an error indicating this will be returned. The
data will be saved as either base64 encoding or binary.

The syntax to extract a secret key from an existing key database with
GSKCapiCmd is as follows:

```
gsk8capicmd -secretkey -extract {-db <name> | -crypto <module_name>
-tokenlabel <token_label>} [-pw <passwd> | -stashed] -label <label>
-target <name> [-format <ascii | binary>] [-secondaryDB <filename>
-secondaryDBpw <password> -secondaryDBtype <cms | kdb | pkcs12 | p12>]
```

where:

**object**  
-secretkey

**action**  
-extract

**options**  

**IMPORTANT:** On UNIX operating systems, always encapsulate string
values associated with all tags in double quotation marks ("""). You must
also use a backslash (\) character to escape the following characters if
they appear in the string values:

'\', '"', '"', '\'

This will prevent some command-line shells from interpreting specific
characters within these values. For example: gsk8capicmd -keydb -create
-db "/tmp/key.kdb" -pw "$\$ujj". When prompted by gsk8capicmd for a
value (for example, a password) do not quote the string and add the
escape characters, as the shell is no longer influencing this input.

-db <filename>
    The fully qualified path name of a key database.
-crypto <module_name>
  Indicates a PKCS#11 cryptographic device operation, where
  <module_name> is the path to the module to manage the crypto
device.

-tokenlabel <token_label>
  The PKCS#11 cryptographic device token label.

-pw <passwd>
  The password for the key database identified by the -db or
  -tokenlabel tags. Specify a hyphen (-) as the password to cause the
  program to read the password from stdin. This allows you to pipe
  in the password.

-stashed
  The password for the key database will be recovered from the
  stash file.

-label <label>
  Label attached to the key that is to be extracted.

-target <name>
  Destination file to which the key is to be extracted.

-format <ascii | binary>
  Format of data. The default is Base64 encoded ASCII. Additional
  information about base64 encoding can be found in RFC 2045 and
  RFC 3548. The binary format is a binary dump of the key data.

-secondaryDB <filename>
  A CMS key database used to support the PKCS#11 device.

-secondaryDBpw <password>
  Password for the secondary CMS key database supporting the
  PKCS#11 device.

-secondaryDBtype <cms | kdb | pkcs12 | p12>
  Keystore type of the secondary key database.
Chapter 6. Random commands

The GSKCapiCmd program provides its users with the ability to generate random passwords. Users can specify the password length and whether the generated password is required to conform to GSKits minimum password requirements.

The random commands are associated with the -random object. This object supports the following action:

"Create a random password of a specified length (-create)"

The following section describes how to use and what options are available for this random action.

Create a random password of a specified length (-create)

The create random password command creates a random string of characters that can be used with other GSKCapiCmd commands that require a password. This command can be used if the user is looking for a truly random password.

The syntax for creating a random password with GSKCapiCmd is as follows:

```
gsk8capicmd -random -create -length <password_length> -strong
```

where:

object  -random
action   -create
options

- **-length <password_length>**
  The length of the random password. There is a maximum length when the -strong tag is used for this command. The maximum length is 125 character.

- **-strong**
  Check that the password entered satisfies the minimum requirements for the passwords strength. The minimum requirements for a password are as follows:
  - The minimum password length is 14 characters.
  - A password must have at least one lower case character, one uppercase character, and one digit or special character (for example, *$#% etc). A space is classified as a special character.
  - Each character must not occur more than three times in a password.
  - No more than two consecutive characters of the password can be identical.
  - All characters are in the standard ASCII printable character set within the range from 0x20 to 0x7E inclusive.
Chapter 7. Help commands

GSKCapiCmd has an extensive help command system. You are able to get help on what objects are available, what actions are associated with a particular object, and how to use each of the actions.

The help commands are associated with the -help object. The syntax for the help commands is as follows:

gsk8capicmd -help <object> <action>

where:

<object>
The object you want to find out information about.

<action>
The action you are wanting to find out information about. This action must be associated with the identified object. If it is not the system will display the help associated with the requested object.

Examples:
• Listing all of the objects and their associated actions: gsk8capicmd -help
• Listing the actions for the -keybd object: gsk8capicmd -help -keydb
• Listing the specific help for the -create action associated with the -keydb object: gsk8capicmd -help -keydb -create

To find out the different objects and their associated actions see:
• Chapter 2, “Key database commands,” on page 7
• Chapter 3, “Certificate commands,” on page 17
• Chapter 4, “Certificate request commands,” on page 45
Chapter 8. Version command

The *version* command displays version information associated with the currently installed GSKCapiCmd program.

The version command is associated with the `-version` object. The syntax is as follows:

gsk&capicmd -version

The version command has no associated actions or objects.
Chapter 9. Runtime messages

This chapter describes the messages displayed by GSKCapiCmd.

Table 6. Runtime Messages

<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message Details</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTGSK2000W</td>
<td>The task completed successfully.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2001W</td>
<td>Unknown error occurred</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2002W</td>
<td>An ASN.1 encoding/decoding error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2003W</td>
<td>An error occurred while initializing ASN.1 encoder/decoder.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2004W</td>
<td>An ASN.1 encoding/decoding error occurred because of an out-of-range index or non-existent optional field.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2005W</td>
<td>A database error occurred</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2006W</td>
<td>An error occurred while opening the database file, check for file existence and permission.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2007W</td>
<td>An error occurred while re-opening the database file.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2008W</td>
<td>Database creation failed</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2009W</td>
<td>The database already exists</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2010W</td>
<td>An error occurred while deleting the database file.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2011W</td>
<td>The database could not be opened</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2012W</td>
<td>An error occurred while reading the database file.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2013W</td>
<td>An error occurred while writing data to the database file.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2014W</td>
<td>A database validation error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2015W</td>
<td>An invalid database version was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2016W</td>
<td>An invalid database password was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2017W</td>
<td>An invalid database file type was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2018W</td>
<td>The specified database has been corrupted.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2019W</td>
<td>An invalid password was provided or the key database has been tampered or corrupted.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2020W</td>
<td>A database key entry integrity error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2021W</td>
<td>A duplicate certificate already exists in the database.</td>
<td>See message.</td>
</tr>
</tbody>
</table>
Table 6. Runtime Messages (continued)

<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message Details</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTGSK2022W</td>
<td>A duplicate key already exists in the database (Record ID).</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2023W</td>
<td>A certificate with the same label already existed in the key database.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2024W</td>
<td>A duplicate key already exists in the database (Signature).</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2025W</td>
<td>A duplicate key already exists in the database (Unsigned Certificate).</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2026W</td>
<td>A duplicate key already exists in the database (Issuer and Serial Number).</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2027W</td>
<td>A duplicate key already exists in the database (Subject Public Key Info).</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2028W</td>
<td>A duplicate key already exists in the database (Unsigned Certificate Revocation List (CRL)).</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2029W</td>
<td>The label has been used in the database.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2030W</td>
<td>A password encryption error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2031W</td>
<td>An LDAP related error occurred.</td>
<td>Reserved for future use.</td>
</tr>
<tr>
<td>CTGSK2032W</td>
<td>A cryptographic error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2033W</td>
<td>An encryption/decryption error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2034W</td>
<td>An invalid cryptographic algorithm was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2035W</td>
<td>An error occurred while signing data.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2036W</td>
<td>An error occurred while verifying data.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2037W</td>
<td>An error occurred while computing digest of data.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2038W</td>
<td>An invalid cryptographic parameter was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2039W</td>
<td>An unsupported cryptographic algorithm was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2040W</td>
<td>The specified input size is greater than the supported modulus size.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2041W</td>
<td>An unsupported modulus size was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2042W</td>
<td>A database validation error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2043W</td>
<td>Key entry validation failed.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2044W</td>
<td>A duplicate extension field exists.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2045W</td>
<td>The version of the key is wrong.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2046W</td>
<td>A required extension field does not exist.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2047W</td>
<td>The validity period does not include today or does not fall within its issuer's validity period.</td>
<td>See message.</td>
</tr>
</tbody>
</table>
Table 6. Runtime Messages (continued)

<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message Details</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTGSK2048W</td>
<td>The validity period does not include today or does not fall within its issuer's validity period.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2049W</td>
<td>An error occurred while validating validity private key usage extension.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2050W</td>
<td>The issuer of the key was not found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2051W</td>
<td>A required certificate extension is missing.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2052W</td>
<td>An invalid basic constraint extension was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2053W</td>
<td>The key signature validation failed.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2054W</td>
<td>The root key of the key is not trusted.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2055W</td>
<td>The key has been revoked.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2056W</td>
<td>An error occurred while validating authority key identifier extension.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2057W</td>
<td>An error occurred while validating private key usage extension.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2058W</td>
<td>An error occurred while validating subject alternative name extension.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2059W</td>
<td>An error occurred while validating issuer alternative name extension.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2060W</td>
<td>An error occurred while validating key usage extension.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2061W</td>
<td>An unknown critical extension was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2062W</td>
<td>An error occurred while validating key pair entries.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2063W</td>
<td>An error occurred while validating CRL.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2064W</td>
<td>A mutex error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2065W</td>
<td>An invalid parameter was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2066W</td>
<td>A null parameter or memory allocation error was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2067W</td>
<td>Number or size is too large or too small.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2068W</td>
<td>The old password is invalid.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2069W</td>
<td>The new password is invalid.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2070W</td>
<td>The password has expired.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2071W</td>
<td>A thread related error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2072W</td>
<td>An error occurred while creating threads.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2073W</td>
<td>An error occurred while a thread was waiting to exit.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2074W</td>
<td>An I/O error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2075W</td>
<td>An error occurred while loading CMS.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2076W</td>
<td>A cryptography hardware related error occurred.</td>
<td>See message.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>CTGSK2077W</td>
<td>The library initialization routine was not successfully called.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2078W</td>
<td>The internal database handle table is corrupted.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2079W</td>
<td>A memory allocation error occurred.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2080W</td>
<td>An unrecognized option was found.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2081W</td>
<td>An error occurred while getting time information.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2082W</td>
<td>Mutex creation error occurred.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2083W</td>
<td>An error occurred while opening message catalog.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2084W</td>
<td>An error occurred while opening error message catalog.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2085W</td>
<td>An null file name was found.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2086W</td>
<td>An error occurred while opening files, check for file existence and permissions.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2087W</td>
<td>An error occurred while opening files to read.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2088W</td>
<td>An error occurred while opening files to write.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2089W</td>
<td>There is no such file.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2090W</td>
<td>The file cannot be opened because of its permission setting.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2091W</td>
<td>An error occurred while writing data to files.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2092W</td>
<td>An error occurred while deleting files.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2093W</td>
<td>Invalid Base64-encoded data was found.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2094W</td>
<td>An invalid Base64 message type was found.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2095W</td>
<td>An error occurred while encoding data with Base64 encoding rule.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2096W</td>
<td>An error occurred while decoding Base64-encoded data.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2097W</td>
<td>An error occurred while getting a distinguished name tag.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2098W</td>
<td>The required common name field is empty.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2099W</td>
<td>The required country or region name field is empty.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2100W</td>
<td>An invalid database handle was found.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2101W</td>
<td>The key database does not exist.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2102W</td>
<td>The request key pair database does not exist.</td>
<td>See message</td>
</tr>
<tr>
<td>CTGSK2103W</td>
<td>The password file does not exist.</td>
<td>See message</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>CTGSK2104W</td>
<td>The new password is identical to the old one.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2105W</td>
<td>No key was found in the key database.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2106W</td>
<td>No request key was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2107W</td>
<td>No trusted CA was found</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2108W</td>
<td>No request key was found for the certificate.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2109W</td>
<td>There is no private key in the key database.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2110W</td>
<td>There is no default key in the key database.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2111W</td>
<td>There is no private key in the key record.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2112W</td>
<td>There is no certificate in the key record.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2113W</td>
<td>There is no CRL entry.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2114W</td>
<td>An invalid key database file name was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2115W</td>
<td>An unrecognized private key type was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2116W</td>
<td>An invalid distinguished name input was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2117W</td>
<td>No key entry was found that has the specified key label.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2118W</td>
<td>The key label list has been corrupted.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2119W</td>
<td>The input data is not valid PKCS#12 data.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2120W</td>
<td>The password is invalid or the PKCS#12 data has been corrupted or been created with a later version of PKCS#12.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2121W</td>
<td>An unrecognized key export type was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2122W</td>
<td>An unsupported password-based encryption algorithm was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2123W</td>
<td>An error occurred while converting the key ring file to a CMS key database.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2124W</td>
<td>An error occurred while converting the CMS key database to a keyring file.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2125W</td>
<td>An error occurred while creating a certificate for the certificate request.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2126W</td>
<td>A complete issuer chain cannot be built.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2127W</td>
<td>Invalid WEBDB data was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2128W</td>
<td>There is no data to be written to the key ring file.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2129W</td>
<td>The number of days that you entered extends beyond the permitted validity period.</td>
<td>See message.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>CTGSK2130W</td>
<td>The password is too short.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2131W</td>
<td>A password must contain at least one numeric digit.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2132W</td>
<td>All characters in the password are either alphabetic or numeric characters.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2133W</td>
<td>An unrecognized or unsupported signature algorithm was specified.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2134W</td>
<td>An invalid database type was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2135W</td>
<td>The specified secondary key database is in use by another PKCS#11 device.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2136W</td>
<td>No secondary key database was specified.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2137W</td>
<td>The label does not exist on the PKCS#11 device.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2138W</td>
<td>Password required to access the PKCS#11 device.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2139W</td>
<td>Password not required to access the PKCS#11 device.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2140W</td>
<td>Unable to load the cryptographic library.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2141W</td>
<td>PKCS#11 is not supported for this operation.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2142W</td>
<td>An operation on a PKCS#11 device has failed.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2143W</td>
<td>The LDAP user is not a valid user.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2144W</td>
<td>The LDAP user password is not valid.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2145W</td>
<td>The LDAP query failed.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2146W</td>
<td>An invalid certificate chain was found.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2147W</td>
<td>The root certificate is not trusted.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2148W</td>
<td>A revoked certificate was encountered.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2149W</td>
<td>A cryptographic object function failed.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2150W</td>
<td>There is no certificate revocation list data source available.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2151W</td>
<td>There is no cryptographic token available.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2152W</td>
<td>FIPS mode is not available.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2153W</td>
<td>There is a conflict with the FIPS mode settings.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK2154W</td>
<td>The password entered does not meet the minimum required strength.</td>
<td>See message.</td>
</tr>
<tr>
<td>CTGSK3000W</td>
<td>An action must be specified for this object.</td>
<td>An expected command line option was missing.</td>
</tr>
</tbody>
</table>

**Operator response:** Reissue the command and include all of the required options.
<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message Details</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTGSK3001W</td>
<td>Cannot load keystore: filename</td>
<td>The nominated keystore cannot be opened.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Ensure that the keystore is valid and of the correct type.</td>
</tr>
<tr>
<td>CTGSK3002W</td>
<td>Error creating certificate.</td>
<td>An error occurred while trying to create a certificate with the selected options.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3003W</td>
<td>A certificate error has occurred.</td>
<td>An error occurred trying to set the trust state of the certificate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the details of the certificate and ensure the attempted action matches the certificate details.</td>
</tr>
<tr>
<td>CTGSK3004W</td>
<td>Error decoding certificate request for label name.</td>
<td>The certificate request file may have been corrupted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Ensure the certificate request file is valid and readable.</td>
</tr>
<tr>
<td>CTGSK3005W</td>
<td>Error storing one or more certificates.</td>
<td>The certificate could not be stored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Ensure the certificate data is valid and readable.</td>
</tr>
<tr>
<td>CTGSK3006W</td>
<td>The private key for entry &quot;filename&quot; cannot be decrypted. It may have been corrupted.</td>
<td>There is no private key in the key record.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Ensure the certificate data is valid and readable.</td>
</tr>
<tr>
<td>CTGSK3007W</td>
<td>The database password has expired.</td>
<td>The password of the key database has expired or the database cannot be accessed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> The password must be reset before the keystore can be opened.</td>
</tr>
<tr>
<td>CTGSK3008W</td>
<td>The entry for label &quot;name&quot; could not be deleted.</td>
<td>An attempt to delete an object from a database failed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Ensure the database is accessible and the correct object has been nominated for deletion.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CTGSK3009W</td>
<td>One or more certificates in the keystore could not be loaded.</td>
<td>An attempt to load or renew a certificate failed. Operator response: Ensure the key database is accessible and the certificate has not been corrupted.</td>
</tr>
<tr>
<td>CTGSK3010W</td>
<td>Error loading entry &quot;name&quot;</td>
<td>Cannot load the named certificate from the keystore. Operator response: Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3011W</td>
<td>Failed to delete file &quot;name&quot;</td>
<td>Cannot delete the specified file. Operator response: Check the file name and file permissions are correct.</td>
</tr>
<tr>
<td>CTGSK3012W</td>
<td>The input file &quot;name&quot; could not be found.</td>
<td>Cannot find the specified file. Operator response: Check the database path.</td>
</tr>
<tr>
<td>CTGSK3013W</td>
<td>&quot;other&quot; is not a valid action for this object.</td>
<td>The specified action does not apply to the selected object. Operator response: Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3014W</td>
<td>An invalid parameter was specified: name</td>
<td>An unknown or invalid algorithm was specified. Operator response: Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3015W</td>
<td>Invalid certificate details: name</td>
<td>The certificate inspected was not valid. Operator response: No action is required.</td>
</tr>
<tr>
<td>CTGSK3016W</td>
<td>Cannot parse certificates in file &quot;name&quot;. It is not a valid certificate file.</td>
<td>The wrong file has been specified or it has been corrupted. Operator response: Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3017W</td>
<td>The database type &quot;name&quot; is not recognized.</td>
<td>The database type is not known or not supported for this command. Operator response: Change the database type and try again.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CTGSK3018W</td>
<td>The action &quot;name&quot; is not supported for database type &quot;other&quot;.</td>
<td>The attempted action was not supported for the database.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3019W</td>
<td>Invalid DN.</td>
<td>The DN was not complete or contained errors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> A valid DN consists of a comma delimited list of attribute value pairs; e.g. “CN=John Smith, OU=Tivoli, O=IBM, C=US”</td>
</tr>
<tr>
<td>CTGSK3020W</td>
<td>Invalid object: other</td>
<td>An unknown command line option was specified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3021W</td>
<td>Invalid parameter: name</td>
<td>An illegal value was specified for a command line parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3022W</td>
<td>An invalid parameter was provided for the command: name</td>
<td>An invalid value was specified for a command line parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3023W</td>
<td>An invalid password was provided, the key database has been corrupted or it is of the wrong type.</td>
<td>The supplied password did not unlock the selected database.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Ensure that the database is of the correct type and that the correct password was given.</td>
</tr>
<tr>
<td>CTGSK3024W</td>
<td>Invalid value for parameter &quot;other&quot; (other).</td>
<td>The supplied value is not valid for the named parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CTGSK3025W</td>
<td>An invalid version was provided for certificate &quot;name&quot;.</td>
<td>The X509 version is not valid. Some features are not supported by all X509 versions. For example, SAN extensions are only supported by version 3 and above.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3026W</td>
<td>The key file &quot;name&quot; does not exist or cannot be read.</td>
<td>The specified key file could not be opened.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check that the file exists and that you have read permissions.</td>
</tr>
<tr>
<td>CTGSK3027W</td>
<td>An error has occurred while closing the keystore.</td>
<td>An error occurred accessing the keystore file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check that the directory and file permissions allow access to the file.</td>
</tr>
<tr>
<td>CTGSK3028W</td>
<td>An error has occurred while accessing the keystore.</td>
<td>An unknown error occurred while accessing the keystore file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check that the directory and file permissions allow access to the file.</td>
</tr>
<tr>
<td>CTGSK3029W</td>
<td>The database does not contain a certificate with label &quot;name&quot;</td>
<td>No certificate exists with that name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check the label and try again.</td>
</tr>
<tr>
<td>CTGSK3030W</td>
<td>The database does not contain an entry with label &quot;name&quot;</td>
<td>No certificate exists with that name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check the label and try again.</td>
</tr>
<tr>
<td>CTGSK3031W</td>
<td>The file name cannot be null.</td>
<td>A legal file name must be supplied.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3032W</td>
<td>The database does not contain a key entry with label &quot;name&quot;</td>
<td>No certificate exists with that name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check the label and try again.</td>
</tr>
</tbody>
</table>
### Table 6. Runtime Messages (continued)

<table>
<thead>
<tr>
<th>Message ID</th>
<th>Message Details</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTGSK3033W</td>
<td>No read permissions for file &quot;name&quot;</td>
<td>The file cannot be accessed.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Check the file path and ensure that you have read/write permissions to the directory and file.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3034W</td>
<td>The certificate request created for the certificate is not in the key database.</td>
<td>No request exists for the named certificate.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Check that you are using the correct keystore.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3035W</td>
<td>The database does not contain a certificate request with label &quot;name&quot;</td>
<td>No request exists for the named certificate.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Check the label and try again.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3036W</td>
<td>The output file &quot;name&quot; already exists.</td>
<td>An existing file will not be overwritten.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Choose a different name or delete the file if it is no longer required.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3037W</td>
<td>The output file &quot;name&quot; could not be created.</td>
<td>A file could not be created.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Check the file path and ensure that you have read/write permissions to the directory.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3038W</td>
<td>An error occurred while trying to change the password of the request database.</td>
<td>The changed password could not be written to the password stash file.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Check the file path to the key database and stash files and ensure that you have appropriate read/write permissions to the directory.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3039W</td>
<td>Certificate request &quot;name&quot; could not be created.</td>
<td>The certificate request could not be created.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
<td></td>
</tr>
<tr>
<td>CTGSK3040W</td>
<td>A required value for the command was not specified: name</td>
<td>The request action is missing a required option.</td>
</tr>
<tr>
<td></td>
<td><strong>Operator response:</strong> Review the command line options selected, correct any problems and retry the operation.</td>
<td></td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CTGSK3041W</td>
<td>A signature error has occurred while signing item &quot;name&quot;</td>
<td>A problem occurred while attempting to issue a signed certificate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Review the command line options to ensure the selected options are valid and compatible. Retry the operation.</td>
</tr>
<tr>
<td>CTGSK3042W</td>
<td>Invalid value for parameter &quot;name&quot; was specified: other</td>
<td>An invalid value was supplied for an option.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Replace the parameters that are not valid and try again.</td>
</tr>
<tr>
<td>CTGSK3043W</td>
<td>Unknown parameter &quot;name&quot;</td>
<td>An unknown parameter was supplied for an option.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3044W</td>
<td>No value for parameter &quot;name&quot; was provided.</td>
<td>A value was expected but none was found.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Add a valid value for the parameter and re-run the command.</td>
</tr>
<tr>
<td>CTGSK3045W</td>
<td>An error has occurred while reading the keystore.</td>
<td>The keystore cannot be read.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Check the path to the key database and ensure that you have read/write permissions to the file.</td>
</tr>
<tr>
<td>CTGSK3046W</td>
<td>The key file &quot;name&quot; could not be imported.</td>
<td>An error occurred reading the keystore.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Check the path to the key database and ensure that you have read/write permissions to the file.</td>
</tr>
<tr>
<td>CTGSK3047W</td>
<td>Option &quot;name&quot; is not supported in FIPS mode.</td>
<td>The operation is not supported in FIPS mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Review the command line options selected, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3048W</td>
<td>The password is weak.</td>
<td>The supplied password is too weak.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response</strong>: Try a different password.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CTGSK3049W</td>
<td>An attempted operation has failed: name other : detail</td>
<td>An unexpected internal error occurred.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Contact your support team.</td>
</tr>
<tr>
<td>CTGSK3050W</td>
<td>An internal error occurred while attempting to work with an ASN extension: error</td>
<td>An unexpected internal error occurred. The first parameter is the reported GSK error code.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Contact your support team.</td>
</tr>
<tr>
<td>CTGSK3051W</td>
<td>The current codepage &quot;id&quot; is not supported, encoding for codepage &quot;name&quot; instead.</td>
<td>No ICU converter exists for the codepage the console has been set to.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Set the console codepage to something else compatible with the locale's output.</td>
</tr>
<tr>
<td>CTGSK3052W</td>
<td>&quot;name&quot; is not a supported signature algorithm.</td>
<td>The chosen signature algorithm is not supported for this operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Retry the operation using a different signature algorithm.</td>
</tr>
<tr>
<td>CTGSK3053W</td>
<td>The database already contains a certificate with label &quot;name&quot;</td>
<td>A certificate exists with that name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check the label and try again.</td>
</tr>
<tr>
<td>CTGSK3054W</td>
<td>An error occurred while trying to stash the password for the database &quot;name&quot;.</td>
<td>The changed password could not be written to the password stash file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Check the file path to the key database and stash files and ensure that you have appropriate read/write permissions to the directory.</td>
</tr>
<tr>
<td>CTGSK3055W</td>
<td>A &quot;error&quot; error occurred while formatting the date and time information for locale &quot;name&quot;.</td>
<td>An error occurred formatting the date and time information for the locale. This is an error reported from the ICU package.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Retry the command specifying a different locale. Contact your support team.</td>
</tr>
<tr>
<td>CTGSK3056W</td>
<td>The file is not of the correct type.</td>
<td>The file type is not known or not supported for this command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Change the file type and try again.</td>
</tr>
<tr>
<td>Message ID</td>
<td>Message Details</td>
<td>Explanation</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CTGSK3057W</td>
<td>Too many choices were selected, &quot;name&quot; is not valid in this context.</td>
<td>Conflicting options have been selected on the command line.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> Review the command line options, correct any problems and retry the operation.</td>
</tr>
<tr>
<td>CTGSK3058W</td>
<td>There is no data to write to file &quot;name&quot;. An empty file will not be created.</td>
<td>There is no data to write to the file and an empty file is not valid.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Operator response:</strong> No action is required.</td>
</tr>
</tbody>
</table>
Chapter 10. Error codes and messages

GSKCapiCmd, returns GSKKM_OK (0) on success or a positive number indicating the error that has occurred. The following table lists all of the error codes and their associated error messages.

Table 7. Error Messages

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown error occurred</td>
</tr>
<tr>
<td>2</td>
<td>An asn.1 encoding/decoding error occurred.</td>
</tr>
<tr>
<td>3</td>
<td>An error occurred while initializing asn.1 encoder/decoder.</td>
</tr>
<tr>
<td>4</td>
<td>An asn.1 encoding/decoding error occurred because of an out-of-range index or non-existent optional field.</td>
</tr>
<tr>
<td>5</td>
<td>A database error occurred.</td>
</tr>
<tr>
<td>6</td>
<td>An error occurred while opening the database file, check for file existence and permission.</td>
</tr>
<tr>
<td>7</td>
<td>An error occurred while re-opening the database file.</td>
</tr>
<tr>
<td>8</td>
<td>Database creation failed.</td>
</tr>
<tr>
<td>9</td>
<td>The database already exists.</td>
</tr>
<tr>
<td>10</td>
<td>An error occurred while deleting the database file.</td>
</tr>
<tr>
<td>11</td>
<td>The database could not be opened.</td>
</tr>
<tr>
<td>12</td>
<td>An error occurred while reading the database file.</td>
</tr>
<tr>
<td>13</td>
<td>An error occurred while writing data to the database file.</td>
</tr>
<tr>
<td>14</td>
<td>A database validation error occurred.</td>
</tr>
<tr>
<td>15</td>
<td>An invalid database version was encountered.</td>
</tr>
<tr>
<td>16</td>
<td>An invalid database password was encountered.</td>
</tr>
<tr>
<td>17</td>
<td>An invalid database file type was encountered.</td>
</tr>
<tr>
<td>18</td>
<td>The specified database has been corrupted.</td>
</tr>
<tr>
<td>19</td>
<td>An invalid password was provided or the key database has been tampered or corrupted.</td>
</tr>
<tr>
<td>20</td>
<td>A database key entry integrity error occurred.</td>
</tr>
<tr>
<td>21</td>
<td>A duplicate certificate already exists in the database.</td>
</tr>
<tr>
<td>22</td>
<td>A duplicate key already exists in the database (Record ID).</td>
</tr>
<tr>
<td>23</td>
<td>A certificate with the same label already existed in the key database.</td>
</tr>
<tr>
<td>24</td>
<td>A duplicate key already exists in the database (Signature).</td>
</tr>
<tr>
<td>25</td>
<td>A duplicate key already exists in the database (Unsigned Certificate).</td>
</tr>
<tr>
<td>26</td>
<td>A duplicate key already exists in the database (Issuer and Serial Number).</td>
</tr>
<tr>
<td>27</td>
<td>A duplicate key already exists in the database (Subject Public Key Info).</td>
</tr>
<tr>
<td>28</td>
<td>A duplicate key already exists in the database (Unsigned CRL).</td>
</tr>
<tr>
<td>29</td>
<td>The label has been used in the database.</td>
</tr>
<tr>
<td>30</td>
<td>A password encryption error occurred.</td>
</tr>
<tr>
<td>31</td>
<td>An LDAP related error occurred.</td>
</tr>
</tbody>
</table>
Table 7. Error Messages (continued)

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>A cryptographic error occurred.</td>
</tr>
<tr>
<td>33</td>
<td>An encryption/decryption error occurred.</td>
</tr>
<tr>
<td>34</td>
<td>An invalid cryptographic algorithm was found.</td>
</tr>
<tr>
<td>35</td>
<td>An error occurred while signing data.</td>
</tr>
<tr>
<td>36</td>
<td>An error occurred while verifying data.</td>
</tr>
<tr>
<td>37</td>
<td>An error occurred while computing digest of data.</td>
</tr>
<tr>
<td>38</td>
<td>An invalid cryptographic parameter was found.</td>
</tr>
<tr>
<td>39</td>
<td>An unsupported cryptographic algorithm was encountered.</td>
</tr>
<tr>
<td>40</td>
<td>The specified input size is greater than the supported modulus size.</td>
</tr>
<tr>
<td>41</td>
<td>An unsupported modulus size was found.</td>
</tr>
<tr>
<td>42</td>
<td>A database validation error occurred.</td>
</tr>
<tr>
<td>43</td>
<td>Key entry validation failed.</td>
</tr>
<tr>
<td>44</td>
<td>A duplicate extension field exists.</td>
</tr>
<tr>
<td>45</td>
<td>The version of the key is wrong.</td>
</tr>
<tr>
<td>46</td>
<td>A required extension field does not exist.</td>
</tr>
<tr>
<td>47</td>
<td>The validity period does not include today or does not fall within its issuer's validity period.</td>
</tr>
<tr>
<td>48</td>
<td>The validity period does not include today or does not fall within its issuer's validity period.</td>
</tr>
<tr>
<td>49</td>
<td>An error occurred while validating validity private key usage extension.</td>
</tr>
<tr>
<td>50</td>
<td>The issuer of the key was not found.</td>
</tr>
<tr>
<td>51</td>
<td>A required certificate extension is missing.</td>
</tr>
<tr>
<td>52</td>
<td>An invalid basic constraint extension was found.</td>
</tr>
<tr>
<td>53</td>
<td>The key signature validation failed.</td>
</tr>
<tr>
<td>54</td>
<td>The root key of the key is not trusted.</td>
</tr>
<tr>
<td>55</td>
<td>The key has been revoked.</td>
</tr>
<tr>
<td>56</td>
<td>An error occurred while validating authority key identifier extension.</td>
</tr>
<tr>
<td>57</td>
<td>An error occurred while validating private key usage extension.</td>
</tr>
<tr>
<td>58</td>
<td>An error occurred while validating subject alternative name extension.</td>
</tr>
<tr>
<td>59</td>
<td>An error occurred while validating issuer alternative name extension.</td>
</tr>
<tr>
<td>60</td>
<td>An error occurred while validating key usage extension.</td>
</tr>
<tr>
<td>61</td>
<td>An unknown critical extension was found.</td>
</tr>
<tr>
<td>62</td>
<td>An error occurred while validating key pair entries.</td>
</tr>
<tr>
<td>63</td>
<td>An error occurred while validating CRL.</td>
</tr>
<tr>
<td>64</td>
<td>A mutex error occurred.</td>
</tr>
<tr>
<td>65</td>
<td>An invalid parameter was found.</td>
</tr>
<tr>
<td>66</td>
<td>A null parameter or memory allocation error was encountered.</td>
</tr>
<tr>
<td>67</td>
<td>Number or size is too large or too small.</td>
</tr>
<tr>
<td>68</td>
<td>The old password is invalid.</td>
</tr>
<tr>
<td>69</td>
<td>The new password is invalid.</td>
</tr>
<tr>
<td>Error Code</td>
<td>Error Message</td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
</tr>
<tr>
<td>70</td>
<td>The password has expired. <em>(deprecated)</em></td>
</tr>
<tr>
<td>71</td>
<td>A thread related error occurred.</td>
</tr>
<tr>
<td>72</td>
<td>An error occurred while creating threads.</td>
</tr>
<tr>
<td>73</td>
<td>An error occurred while a thread was waiting to exit.</td>
</tr>
<tr>
<td>74</td>
<td>An I/O error occurred.</td>
</tr>
<tr>
<td>75</td>
<td>An error occurred while loading CMS.</td>
</tr>
<tr>
<td>76</td>
<td>A cryptography hardware related error occurred.</td>
</tr>
<tr>
<td>77</td>
<td>The library initialization routine was not successfully called.</td>
</tr>
<tr>
<td>78</td>
<td>The internal database handle table is corrupted.</td>
</tr>
<tr>
<td>79</td>
<td>A memory allocation error occurred.</td>
</tr>
<tr>
<td>80</td>
<td>An unrecognized option was found.</td>
</tr>
<tr>
<td>81</td>
<td>An error occurred while getting time information.</td>
</tr>
<tr>
<td>82</td>
<td>Mutex creation error occurred.</td>
</tr>
<tr>
<td>83</td>
<td>An error occurred while opening message catalog.</td>
</tr>
<tr>
<td>84</td>
<td>An error occurred while opening error message catalog.</td>
</tr>
<tr>
<td>85</td>
<td>A null file name was found.</td>
</tr>
<tr>
<td>86</td>
<td>An error occurred while opening files, check for file existence and permissions.</td>
</tr>
<tr>
<td>87</td>
<td>An error occurred while opening files to read.</td>
</tr>
<tr>
<td>88</td>
<td>An error occurred while opening files to write.</td>
</tr>
<tr>
<td>89</td>
<td>There is no such file.</td>
</tr>
<tr>
<td>90</td>
<td>The file cannot be opened because of its permission setting.</td>
</tr>
<tr>
<td>91</td>
<td>An error occurred while writing data to files.</td>
</tr>
<tr>
<td>92</td>
<td>An error occurred while deleting files.</td>
</tr>
<tr>
<td>93</td>
<td>Invalid Base64-encoded data was found.</td>
</tr>
<tr>
<td>94</td>
<td>An invalid Base64 message type was found.</td>
</tr>
<tr>
<td>95</td>
<td>An error occurred while encoding data with Base64 encoding rule.</td>
</tr>
<tr>
<td>96</td>
<td>An error occurred while decoding Base64-encoded data.</td>
</tr>
<tr>
<td>97</td>
<td>An error occurred while getting a distinguished name tag.</td>
</tr>
<tr>
<td>98</td>
<td>The required common name field is empty.</td>
</tr>
<tr>
<td>99</td>
<td>The required country or region name field is empty.</td>
</tr>
<tr>
<td>100</td>
<td>An invalid database handle was found.</td>
</tr>
<tr>
<td>101</td>
<td>The key database does not exist.</td>
</tr>
<tr>
<td>102</td>
<td>The request key pair database does not exist.</td>
</tr>
<tr>
<td>103</td>
<td>The password file does not exist.</td>
</tr>
<tr>
<td>104</td>
<td>The new password is identical to the old one.</td>
</tr>
<tr>
<td>105</td>
<td>No key was found in the key database.</td>
</tr>
<tr>
<td>106</td>
<td>No request key was found.</td>
</tr>
<tr>
<td>107</td>
<td>No trusted CA was found</td>
</tr>
<tr>
<td>108</td>
<td>No request key was found for the certificate.</td>
</tr>
<tr>
<td>Error Code</td>
<td>Error Message</td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
</tr>
<tr>
<td>109</td>
<td>There is no private key in the key database</td>
</tr>
<tr>
<td>110</td>
<td>There is no default key in the key database. <em>(deprecated)</em></td>
</tr>
<tr>
<td>111</td>
<td>There is no private key in the key record.</td>
</tr>
<tr>
<td>112</td>
<td>There is no certificate in the key record.</td>
</tr>
<tr>
<td>113</td>
<td>There is no CRL entry.</td>
</tr>
<tr>
<td>114</td>
<td>An invalid key database file name was found.</td>
</tr>
<tr>
<td>115</td>
<td>An unrecognized private key type was found.</td>
</tr>
<tr>
<td>116</td>
<td>An invalid distinguished name input was found.</td>
</tr>
<tr>
<td>117</td>
<td>No key entry was found that has the specified key label.</td>
</tr>
<tr>
<td>118</td>
<td>The key label list has been corrupted.</td>
</tr>
<tr>
<td>119</td>
<td>The input data is not valid PKCS#12 data.</td>
</tr>
<tr>
<td>120</td>
<td>The password is invalid or the PKCS#12 data has been corrupted or been created with later version of PKCS#12.</td>
</tr>
<tr>
<td>121</td>
<td>An unrecognized key export type was found.</td>
</tr>
<tr>
<td>122</td>
<td>An unsupported password-based encryption algorithm was found.</td>
</tr>
<tr>
<td>123</td>
<td>An error occurred while converting the key ring file to a CMS key database.</td>
</tr>
<tr>
<td>124</td>
<td>An error occurred while converting the CMS key database to a key ring file.</td>
</tr>
<tr>
<td>125</td>
<td>An error occurred while creating a certificate for the certificate request.</td>
</tr>
<tr>
<td>126</td>
<td>A complete issuer chain cannot be built.</td>
</tr>
<tr>
<td>127</td>
<td>Invalid WEBDB data was found.</td>
</tr>
<tr>
<td>128</td>
<td>There is no data to be written to the key ring file.</td>
</tr>
<tr>
<td>129</td>
<td>The number of days that you entered extends beyond the permitted validity period.</td>
</tr>
<tr>
<td>130</td>
<td>The password is too short; it must consist of at least {0} characters.</td>
</tr>
<tr>
<td>131</td>
<td>A password must contain at least one numeric digit.</td>
</tr>
<tr>
<td>132</td>
<td>All characters in the password are either alphabetic or numeric characters.</td>
</tr>
<tr>
<td>133</td>
<td>An unrecognized or unsupported signature algorithm was specified.</td>
</tr>
<tr>
<td>134</td>
<td>An invalid database type was encountered.</td>
</tr>
<tr>
<td>135</td>
<td>The specified secondary key database is in use by another PKCS#11 device.</td>
</tr>
<tr>
<td>136</td>
<td>No secondary key database was specified.</td>
</tr>
<tr>
<td>137</td>
<td>The label does not exist on the PKCS#11 device.</td>
</tr>
<tr>
<td>138</td>
<td>Password required to access the PKCS#11 device.</td>
</tr>
<tr>
<td>139</td>
<td>Password not required to access the PKCS#11 device.</td>
</tr>
<tr>
<td>140</td>
<td>Unable to load the cryptographic library.</td>
</tr>
<tr>
<td>141</td>
<td>PKCS#11 is not supported for this operation.</td>
</tr>
<tr>
<td>142</td>
<td>An operation on a PKCS#11 device has failed.</td>
</tr>
<tr>
<td>143</td>
<td>The LDAP user is not a valid user.</td>
</tr>
<tr>
<td>144</td>
<td>The LDAP user password is not valid.</td>
</tr>
<tr>
<td>145</td>
<td>The LDAP query failed.</td>
</tr>
<tr>
<td>146</td>
<td>An invalid certificate chain was found.</td>
</tr>
</tbody>
</table>
### Table 7. Error Messages (continued)

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>147</td>
<td>The root certificate is not trusted.</td>
</tr>
<tr>
<td>148</td>
<td>A revoked certificate was encountered.</td>
</tr>
<tr>
<td>149</td>
<td>A cryptographic object function failed.</td>
</tr>
<tr>
<td>150</td>
<td>There is no certificate revocation list data source available.</td>
</tr>
<tr>
<td>151</td>
<td>There is no cryptographic token available.</td>
</tr>
<tr>
<td>152</td>
<td>FIPS mode is not available.</td>
</tr>
<tr>
<td>153</td>
<td>There is a conflict with the FIPS mode settings.</td>
</tr>
<tr>
<td>154</td>
<td>The password entered does not meet the minimum required strength.</td>
</tr>
<tr>
<td>200</td>
<td>There was a failure during initialization of the program.</td>
</tr>
<tr>
<td>201</td>
<td>Tokenization of the arguments passed to the GSKCapiCmd Program failed.</td>
</tr>
<tr>
<td>202</td>
<td>The object identified in the command is not a recognized object.</td>
</tr>
<tr>
<td>203</td>
<td>The action passed is not a known -keydb action.</td>
</tr>
<tr>
<td>204</td>
<td>The action passed is not a known -cert action.</td>
</tr>
<tr>
<td>205</td>
<td>The action passed is not a known -certreq action.</td>
</tr>
<tr>
<td>206</td>
<td>There is a tag missing for the requested command.</td>
</tr>
<tr>
<td>207</td>
<td>The value passed with the –version tag is not a recognized value.</td>
</tr>
<tr>
<td>208</td>
<td>The value passed with the –size tag is not a recognized value.</td>
</tr>
<tr>
<td>209</td>
<td>The value passed in with the –dn tag is not in the correct format.</td>
</tr>
<tr>
<td>210</td>
<td>The value passed in with the –format tag is not a recognized value.</td>
</tr>
<tr>
<td>211</td>
<td>There was an error associated with opening the file.</td>
</tr>
<tr>
<td>212</td>
<td>PKCS#12 is not supported at this stage.</td>
</tr>
<tr>
<td>213</td>
<td>The cryptographic token you are trying to change the password for is not password protected.</td>
</tr>
<tr>
<td>214</td>
<td>PKCS#12 is not supported at this stage.</td>
</tr>
<tr>
<td>215</td>
<td>The password entered does not meet the minimum required strength.</td>
</tr>
<tr>
<td>216</td>
<td>FIPS mode is not available.</td>
</tr>
<tr>
<td>217</td>
<td>The number of days you have entered as the expiry date is out of the allowed range.</td>
</tr>
<tr>
<td>218</td>
<td>Password strength failed the minimum requirements.</td>
</tr>
<tr>
<td>219</td>
<td>No Default certificate was found in the requested key database. (deprecated)</td>
</tr>
<tr>
<td>220</td>
<td>An invalid trust status was encountered.</td>
</tr>
<tr>
<td>221</td>
<td>An unsupported signature algorithm was encountered. At this stage only MD5 and SHA1 are supported.</td>
</tr>
<tr>
<td>222</td>
<td>PKCS#11 not supported for that particular operation.</td>
</tr>
<tr>
<td>223</td>
<td>The action passed is not a known –random action.</td>
</tr>
<tr>
<td>224</td>
<td>A length than less than zero is not allowed.</td>
</tr>
<tr>
<td>225</td>
<td>When using the –strong tag the minimum length password is 14 characters.</td>
</tr>
<tr>
<td>226</td>
<td>When using the –strong tag the maximum length password is 300 characters.</td>
</tr>
<tr>
<td>227</td>
<td>The MD5 algorithm is not supported when in FIPS mode.</td>
</tr>
<tr>
<td>228</td>
<td>The site tag is not supported for the –cert –list command. This attribute is simply added for backward compatibility and potential future enhancement.</td>
</tr>
</tbody>
</table>
Table 7. Error Messages (continued)

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Error Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>229</td>
<td>The value associated with the -ca tag is not recognized. The value must be</td>
</tr>
<tr>
<td></td>
<td>either ‘true’ or ‘false’.</td>
</tr>
<tr>
<td>230</td>
<td>The value passed in with the –type tag is not valid.</td>
</tr>
<tr>
<td>231</td>
<td>The value passed in with the –expire tag is below the allowed range.</td>
</tr>
<tr>
<td>232</td>
<td>The encryption algorithm used or requested is not supported.</td>
</tr>
<tr>
<td>233</td>
<td>The target already exists.</td>
</tr>
</tbody>
</table>
Appendix A. CMS key databases

What is a CMS key database?

Certificate Management System (CMS) is the native GSKit key database (keystore) containing:

- X.509 certificates
- Certificate requests (ones pending signing by an authority), and
- Private keys for the stored certificates where applicable.

Typically, only personal certificates contain private keys. If a certificate has an associated private key, it is stored encrypted in the keystore with its associated certificate. Private keys cannot be stored without an associated certificate.

How is a CMS key database organized?

A CMS keystore consists of a file with extension .kdb and optionally two other files with extension .rdb and .crl respectively.

A key record in a .kdb file is either a certificate on its own or a certificate plus its encrypted private key information. Private keys cannot be stored in a CMS keystore without a corresponding certificate.

When a certificate request is created, a .rdb file with the same file stem as the key database file is created. This file is used to store the requested key pair, along with the PKCS#10 certificate request data. The request entry is only deleted from the request key database when a signed certificate is obtained from a signing authority and received into the key database. The signed certificate is matched up with the private key in the .rdb file and together they are added to the .kdb file as a certificate with private key information.

A .crl file is also created, purely for legacy reasons (in the past it contained Certificate Revocation Lists (CRLs)). This file is no longer used and is always empty.

How is a CMS key database protected

GSKit implements password protection for access control, confidentiality, and integrity of the CMS key database. The password must be provided before any access to the keystore database.

The access control does not limit unauthorized users from reading and writing the file. GSKit relies on the OS for these protections, but access to sensitive data is effectively controlled because all sensitive data in the keystore is encrypted, all records hashed, and the index to all records is hashed. This ensures that any modification to the file is detectable. If tampering is detected, GSKit will deny access to the keystore (the behaviour is similar to receipt of an incorrect password).
**What can I put in a CMS key database?**

The CMS keystore contains X.509 certificates along with any associated private key information. For example when using the GSKCapiCmd tool to maintain a CMS keystore the following items may typically end up in the keystore:

- **CA Certificates.**
  
  Each valid X.509 certificate needs to be signed. Typically, this is done by a trusted Certificate Authority (CA). To validate a certificate signed by a CA, the public certificate for that CA must be in the CMS keystore. The GSKCapiCmd tool automatically populates a new CMS keystore with a number of CA certificates. If the CMS keystore does not already contain a required CA certificate, an administrator uses GSKCapiCmd to add it. Any valid X.509 certificate can be imported into a CMS keystore. For the import or add operation to succeed, the incoming certificate must be validated. For this reason, the certificate needed for the validation chain must already exist in the keystore.

- **Intermediate Certificates.**
  
  A valid certificate does not necessarily need to be signed by a CA. Instead it can be signed by what is known as an intermediate certificate that has itself been signed by a CA. If this is the case then both the CA certificate and the intermediate certificate must be in the CMS keystore in order to validate that certificate. This is known as a certificate validation chain. An administrator typically uses GSKCapiCmd to add their intermediate certificate. The keystore treats intermediate certificates in the same way as CA certificates.

- **Personal Certificates.**
  
  In a client-server relationship, the server may ask the client for its certificate. When acting as a client, GSKit attempts to use a personal certificate from the keystore to present to the server. Typically, GSKit picks the certificate that is marked as the default, or another certificate indicated by the client application. A personal certificate can also be used for signing other certificates. For example, an Intermediate certificate together with its private key may be in a CMS keystore and used to sign other certificates. An extracted version (without the private key) of the intermediate certificate is then added to other CMS keystores, to be used in a validation chain. An administrator typically uses GSKCapiCmd to add and extract their personal certificate(s). The final use for a personal certificate is for a server application. The server may present a personal certificate to the client during an SSL handshake.

GSKCapiCmd supports two certificate transfer formats (for commands such as add, import, extract, and so forth). These are referred to as ASCII and binary throughout this document. The default is Base64 encoded ASCII. Additional information about base64 encoding can be found in RFC 2045 and RFC 3548. The binary format is a binary dump of the DER encoded certificate structure. For additional information refer to ITU-T Rec. X.690 (2002) | ISO/IEC 8825-1:2002.

**What is a label?**

A label is a friendly name that an administrator can attach to a certificate that is contained in a CMS keystore. It is a convenient, human readable way to refer to a certificate. Only the UTF-8 character set is supported for keystore labels. Use of characters outside of UTF-8 is unsupported and behaviour is undefined.
How can I manipulate certificates in a CMS keystore?

Certificates in a CMS keystore are standard X.509 certificates. X.509 entities can be:
- imported (for personal certificates),
- added (for a certificate needed in a validation chain such as a CA or intermediate certificate),
- exported (from one CMS keystore to another - this takes the private key with it if one exists), or
- extracted (extract the public certificate – the private key is not extracted).

An administrator can also change the trust status of a certificate. When a certificate's trust status is enabled, it is permitted to be involved in a certificate chain validation. If the certificates trust status is disabled then it cannot be used to validate any other certificates. For example, if certificate “ABC” is signed by the CA certificate “VeriSign CA”, but “VeriSign CA” is not marked as trusted, the validation of “ABC” will fail.
Appendix B. A Simple Example

The example below offers an example scenario for a company setting up a web site for its employees to access business-sensitive information. It is assumed that the web server chosen by the company uses GSKit as its SSL provider. The example does not cover all issues for such a scenario, but instead concentrates on what an administrator would typically need to do to set up a CMS keystore in such an environment.

The requirement

The ACME company wishes to set up a web site for its employees to access certain sensitive business information across a wide geographical area. Some employees are more senior than others and therefore will be allowed access to more resources on the server than the junior employees. It is expected that employees can be assured they are connecting to their company web site (not some fraudulent site pretending to be their company site). Employees use a customized web browser that can read CMS keystores to access certificates contained in them.

The CEO of ACME has asked the system administrator to implement this system in a manner that is secure and cost conscious.

Considerations for the administrator

The administrator makes the following decisions based on the requirements:

• As the employees are located at different geographical locations, a secure channel for the web traffic must be used. The administrator decides to use SSL.

• As employees will have different levels of access to web content, the administrator decides that the server will operate in client authentication mode where each connecting client must present a valid certificate in order to gain access. Information from this presented certificate will be used to limit access to authorized areas of the web server only. (This is outside the scope of this scenario).

• As cost is an issue, the administrator decides that it is too costly to have every employee certificate signed by a CA. The administrator decides to use a company wide intermediate certificate to sign all employee certificates.

• Employees must be able to validate the servers certificate thereby proving the authenticity of the web server.

• The administrator notes that it is bad practice to use a certificate for more than one purpose so decides that another certificate must be produced and signed by the CA. This certificate will be the server certificate used for the web site. Using the Intermediate Certificate for this purpose would be poor practice.

Step 1 – Obtain a company-wide intermediate certificate

The administrator needs to create a certificate that can be used to sign each employee's certificate. This intermediate certificate itself may be publicly published so it needs to be signed by a trusted CA. To achieve this, the administrator performs the following actions:

1. The administrator creates a new CMS keystore in the default FIPS mode using the "Create a Key Database" command:
2. The administrator notices that the new keystore, while containing a number of CA certificates, does not contain the certificate of the CA he would like to use to sign his Intermediate Certificate. He obtains the CA certificate (this is usually done by visiting a well know site that publishes these) and adds it to his CMS keystore via the “Add a Certificate” command:

```
gsk8capicmd -cert -add -db acme.kdb -pw offs64b -label OurCA -file CACert.arm -format ascii
```

3. The administrator then creates a new certificate request to be sent to the CA that he has chosen to sign our Intermediate Certificate using the “Create a Certificate Request” command:

```
gsk8capicmd -certreq -create -db acme.kdb –pw offs64b -label OurIntermediate -dn "CN=acme.com,O=acme,C=US" -file certreq.arm -sigalg sha1
```

4. The administrator takes the request file (certreq.arm in this case) and sends it to the CA for signing. Sometime later the signed certificate is returned by the CA. The administrator then receives the certificate into the CMS keystore using the “Receive a Certificate” command:

```
gsk8capicmd -cert -receive -file signedCert.arm -db acme.kdb -pw offs64b
```

5. Make the new certificate the default one. This means that it will be used by default to sign other certificate request if no other certificate label is given. The administrator makes it the default certificate using the following command:

```
gsk8capicmd -cert -setdefault -db acme.kdb -pw offs64b -label OurIntermediate
```

---

**Step 2 – Sign all employee certificates using the ACME intermediate**

The administrator now has a CMS keystore containing ACMEs intermediate certificate and the CA certificate that signed that intermediate certificate. The administrator now needs to use ACMEs intermediate certificate to sign all the employee certificates. To achieve this, the administrator performs the following actions:

1. The administrator asks each employee to obtain the CA certificate and add it to their respective CMS keystores. Note that employees may first need to create their own CMS keystore in the same manner as the administrator did in item 1 of step 1. The employee adds the CA certificate using the “Add a Certificate” command:

```
gsk8capicmd -cert -add -db Dave.kdb -pw Davepwd -label OurCA -file CACert.arm -format ascii
```

2. The administrator extracts the Intermediate Certificate (note that this does not extract the private key of the certificate) using the “Extract a Certificate” command:

```
gsk8capicmd -cert -extract -db acme.kdb -pw offs64b -label acmeCert -target acmeCert.arm
```

3. The administrator sends the ACME intermediate certificate to each employee asking them to add it to their keystore. Employees do this via the “Add a Certificate” command:

```
gsk8capicmd -cert -add -db Dave.kdb -pw Davepwd -label acmeCert -file acmeCert.arm -format ascii
```

4. The administrator asks each employee to create a certificate request putting their employee email address in the CN field. The employees use the “Create a Certificate Request” command:

```
gsk8capicmd -certreq -create -db Dave.kdb -pw Davepwd -label myCert -dn "CN=dave@acme.com,O=acme,C=US" -file DavesCertReq.arm -sigalg sha1
```

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5. Upon receipt of each employee's certificate request the administrator signs it and returns the signed certificate to the employee. The administrator uses the “Sign a Certificate” command to achieve this:

```
gsk8capicmd -cert -sign -db acme.kdb -pw offs64b -label acmeCert -target DavesCertReq.arm -expire 365 -file DavesSignedCert.arm -sigalg sha1
```

6. As each employee obtains their signed certificate they receive it into their CMS keystore. Employees use the “Receive a Certificate” command:

```
gsk8capicmd -cert -receive -file DavesSignedCert.arm -db Dave.kdb -pw Davepwd
```

7. Make the new certificate the default one. This means that it will be the certificate sent to the web server when it requests one via SSL for client authentication purposes. The employee makes it the default certificate using the following command:

```
gsk8capicmd -cert -setdefault -db Dave.kdb -pw Davepwd -label myCert
```

---

**Step 3. Create the web server certificate**

At this stage the administrator has a CMS database containing the CA certificate and the ACME Intermediate certificate (with its corresponding private key). The administrator puts this CMS keystore in a safe place using it only to sign new employee certificates.

Each employee has a CMS keystore containing the CA certificate, the ACME Intermediate Certificate (minus the corresponding private key), and their own certificate that has been signed by the ACME Intermediate Certificate.

The remaining task for the administrator is to create a CMS keystore with a certificate to be used by the web server. Although the administrator could have used the ACME Intermediate Certificate for this purpose, as stated previously, it is considered bad practice to use a certificate for more than one purpose. The intermediate certificate is already being used to sign employees' certificates. To create a keystore and server certificate the administrator performs the following actions:

1. The administrator creates a new CMS keystore using the “Create a Key Database” command:

```
gsk8capicmd -keydb -create -db acmeWebServer.kdb -pw ejed43dA
```

2. The administrator adds the CA certificate to the keystore using the “Add a Certificate” command:

```
gsk8capicmd -cert -add -db acmeWebServer.kdb -pw ejed43dA -label OurCA -file CACert.arm -format ascii
```

3. The administrator creates a new certificate request to be sent to the CA that he has chosen to sign our web server certificate using the “Create a Certificate Request” command:

```
gsk8capicmd -certreq -create -db acmeWebServer.kdb -pw ejed43dA -label OurServerCert -dn "CN=web.acme.com,O=acme,C=US" -file serverCertReq.arm -sigalg sha1
```

4. The administrator takes the request file (serverCertReq.arm in this case) and sends it to the CA for signing. Sometime later the signed certificate is returned by the CA. The administrator then receives the certificate into the CMS keystore using the “Receive a Certificate” command:

```
gsk8capicmd -cert -receive -file signedServerCert.arm -db acmeWebServer.kdb -pw ejed43dA
```

5. Make the new certificate the default one. This means that when a client connects to the web server the server will offer this certificate to the client. The administrator makes it the default certificate using the following command:
6. The administrator now has a CMS keystore with a server certificate ready for use by the web server application.

---

**So do we meet the requirements?**

Let's look at each requirement in turn:

- **As the employees are located at different geographical locations a secure channel for the web traffic must be used.** The administrator decides to use SSL.
  - For a web server to make use of SSL it must have a server side certificate to offer to clients during the SSL handshake. The certificate labeled “OurServerCert” in the keystore acmeWebServer.kdb can be used for this purpose.

- **As employees will have different levels of access to web content the administrator decides that the server will operate in client authentication mode where each connecting client must present a valid certificate to gain access.** Information from this presented certificate will be used to limit access to authorized areas of the web server only. (This is outside the scope of this scenario).
  - Each employee has their own certificate to offer to the server when it requests one during the SSL handshake. The server can first validate the client certificate as it has the signer chain, that is, the client certificate is signed by the ACME Intermediate Certificate, and the ACME intermediate certificate is in turn signed by the CA certificate. The server keystore (acmeWebServer.kdb) contains both of these certificates. Once the client certificate has been validated the application can inspect the CN of the certificate and extract the employee email address from it. The application can then use the employee email address to determine the level of access allowed for the connection.

- **As cost is an issue the administrator decides that it so too costly to have every employee certificate signed by a CA. The administrator decides to use a company wide intermediate certificate to sign all employee certificates.**
  - The administrator only incurred the expense of two CA signing operations. One for the Intermediate Certificate and one for the signer certificate.

- **Employees must be able to validate the servers certificate to prove the authenticity of the web server.**
  - When the client application receives (as part of the SSL handshake) the server certificate it can verify the validity of that certificate as it has the CA certificate that signed it.

- **The administrator notes that it is bad practice to use a certificate for more than one purpose so decides that another certificate must be produced and signed by the CA.** This certificate will be the server certificate used for the web site. Using the Intermediate Certificate for this purpose would be poor practice.
  - Two certificates have been created. “OurServerCert” for use by the ACME web server and “OurIntermediate” for the administrator to use to sign employee certificates.
Appendix C. Troubleshooting

Use this troubleshooting information to help resolve any certificate management problems that you encounter.

Certificate not validating

GSKit validates all certificates when they are used. The validation process involves checking the digital signatures by following the certificate chain. The check usually starts with the issuer name and then continues back to a trusted root certificate. You must ensure that all the certificates in the chain are available in the keystore for this validation process to be successful.

A common error is to forget to install some certificates on the chain. There might be one or more certificates in the chain that are missing or invalid. For example, expired certificates.

You can use the following command to check a certificate chain that is in the keystore:

```
gskcapicmd -cert -validate -db key.kdb -pw **** -label endentity
```

You can use the following command to list a certificate chain from a selected label to the trusted root certificate:

```
gskcapicmd -cert -list -db key.kdb -pw **** -label endentity
```

You can find the name of the certificate issuer by listing the certificate details with the following command:

```
gskcapicmd -cert -details -db key.kdb -pw **** -label endentity
```

Case sensitivity

GSKit is fully case-sensitive on its certificate label lookups. Other tools such as iKeyman, OpenSSL for PKCS12 keystores, and PKCS11 vendor tools might be able to process keystores. These tools might not be case-sensitive. Some tools might even change the case of the key and certificate label names when displaying them. It is important to use the case-sensitive name exactly as displayed by `gskcapicmd`, which is the native GSKit utility for managing keystores.

You can list all certificate labels with the following command:

```
gskcapicmd -cert -list -db key.kdb -pw ****
```
Appendix D. Resources

ASN.1 Project

[ASN.1 and OID project website](http://asn1.elibel.tm.fr/en/standards/index.htm).

Basic Encoding Rules (BER)

BER encoding is defined in the specification ITU-T Rec. X.690 (2002).

Distinguished Encoding Rules (DER)

DER encoding is defined in the specification ITU-T Rec. X.690 (2002). See the [Internet RFC/STD/FYI/BCP Archives](http://www.faqs.org/rfcs).

X.509


PKCS#7

PKCS 7 v1.5: Cryptographic Message Syntax, RSA Laboratories, March 1998.

PKCS#10


PKCS#11

Cryptographic Token Interface Standard.

PKCS#12

PKCS 12 v1.0: Personal Information Exchange Syntax, RSA Laboratories, June 24, 1999.

Certificate Management System (CMS)

[Appendix A, “CMS key databases,” on page 85](#) offers additional information concerning the format and use of a CMS keystore.

[Appendix B, “A Simple Example,” on page 89](#) provides a simple example of how CMS keystores can be used to enable SSL communication between a server and client application.
Appendix E. FIPS mode operational considerations

**Note:** This section MUST be read in conjunction with the document "Using the Global Security Toolkit version 8 in FIPS-Approved Mode", which can be downloaded from the GSKit website https://w3.tap.ibm.com/w3ki/display/GSKit/Home

This section covers some of the FIPS considerations when using the gskcapicmd tool

**FIPS considerations for the CAPICMD tool**

The gskcapicmd command line utility puts the underlaying ICC module into FIPS operational mode whenever the “-FIPS” flag is passed on the command line. Should gskcapicmd be unable to go into FIPS mode the operation will fail with the exit code value 152 (FIPS mode processing is unavailable). The solution for the user in this case is to perform the operation again but this time without the “-FIPS” flag. Assuming that gskcapicmd could find another provider (eg. ICC in non-FIPS mode) then the operation will complete in the same manner as if gskcapicmd had been in FIPS mode. Note: It is also possible for this utility to be configured to use a FIPS certified PKCS#11 module in which case the usage of ICC is not required.

**Warning:** When using the utility, ensure that the user or application only uses FIPS approved algorithms to be FIPS compliant. For example, do not use MD5 for hash and signature functions.
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