



# CERTivity® KeyStores Manager

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CERTivity® 1.0



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Calea Bucuresti, Bl. 27B, Sc. 1, Ap. 2  
Craiova, DJ, 200675, Romania  
Phone: +40 351 420970  
Fax: +40 351 420971  
E-mail: [office@edulib.ro](mailto:office@edulib.ro)

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## 1. Overview

### 1.1 About

CERTivity® is a powerful pure Java multi-platform visual KeyStores manager. This standalone GUI desktop application provides a natural experience for managing and using KeyStores, Certificates, KeyPairs (Private Key, Certificates Chain), Secret Keys in various formats. It covers and combines functions that otherwise are available through verbose command line tools or other operating system tools or browsers. It is not intended to be just a simple 1:1 visual equivalent of these tools - the features being combined and centralized in an intuitive and productive organization.

Thus developers and system administrator can gain valuable time and ensure the greatest productivity by letting CERTivity taking care of the low level details in a uniform manner on almost all the systems - Windows, Unix/Linux, Mac.

In the long term, CERTivity aims at being a centralized manager and platform for the digital security related assets.

### 1.2 Features Summary

CERTivity has the following main features and advantages:

- **GUI Representation** of the security related items in a Tabbed Document Interface allowing for visualizing in parallel the following types of models: KeyStores, individual Certificates and Test Certificate Scenarios. The GUI representation is taking advantage of the natural approach of using an IDE style interface.

KeyStores entries are represented using a Tree Table structure, each entry and sub-entry being visualized in a Details Panel resembling the view of an e-mail client. As well, KeyStore entries take advantage of contextual menus or natural editing actions such as but not limited to delete, rename, expand, undo/redo. Many of these actions can also be used through Keyboard shortcuts.

Navigation between KeyStore entries is enhanced by positioning based on the first character (case sensitive) of a KeyStore alias or by sorting the table columns.

Many of the application's components expose Context Sensitive Help (default F1), the Table of Contents tree being synchronized with the current context.

Status Bar is displaying useful information including if the KeyStore is case sensitive, or case aware.

- **KeyStore management** - The application is able to work with a wide range of KeyStores types: (JKS, JCEKS, PKCS #12, BKS, UBER and Windows native ones) and supports the following KeyStore operations:

1. Create a new KeyStore;
2. Open an existent KeyStore;
3. Save a KeyStore;
4. Copy and Paste entries from one KeyStore to another;
5. Change a KeyStore's password;
6. Change a Key Pair's password;

7. Emphasizing expired and about to expire Certificates or Key Pairs;
  8. Convert to other KeyStore format;
  9. Delete KeyStore entry;
  10. Change KeyStore entry alias;
  11. Import Key Pairs;
  12. Import trusted Certificates;
  13. Generate self signed Key Pairs (Private Key with corresponding Certificate);
  14. Generate Secret Keys;
  15. Retrieve certificates from servers (e-mail server, web server etc.) - This is based on the underlying SSL/TLS protocols;
  16. View Private Key details;
  17. View Public Key details;
  18. View Certificate Chain details;
  19. Generate CSR files;
  20. Import CA reply;
  21. By generating CSR files, signing CSR and importing CA reply the application can act as a testing purposes CA.
- **Certificates operations:**
    1. Import Certificates/Certificates Chains into KeyStore either from files or from SSL connections;
    2. Open an existing Certificate as standalone (not part of a KeyStore);
    3. Display Certificate Details;
    4. Obtain the revocation status from the signing CA through CRL;
    5. Use/test a certificate against a SSL connection (including plain upgradeable sockets) to an end-point and permitting raw TCP/IP level communication (similar to telnet/nc raw inspections); verbose handshaking information is also available;
    6. View Public Key details for the opened certificate;
    7. View PEM representation;
    8. View ASN.1 representation;
    9. Extend validity for a Key Pair entry;
  - **Sign and verify** - with verbose details:
    1. JAR files;
    2. PDF files;
    3. CSR files;
    4. XML files;
  - **Export options:**
    1. Export Key Pairs;



2. Retrieve and Export Certificates from multiple sources into multiple formats;
3. Export Certificates Chains;
4. Export Private Keys;
5. Export Public Keys

Most of the operations are executed on separate threads, so that for example while generating a key or signing a PDF one can perform other tasks as well.

The existence of some of these features are controlled by the category of your license - either Standard or Professional. For the features matrix of CERTivity see the [Appendix A, CERTivity®'s Features Matrix](#).

## 1.3 Documentation and Samples

CERTivity provides documentation in more format types:

1. documentation file, `CERTivity.pdf`, contained in the `doc` subdirectory from the distribution kit;
2. application help which can easily be accessed using the application's Menu Help;
3. many of the application's components expose Context Sensitive Help (default F1), the Table of Contents tree being synchronized with the current context;

Samples files are contained in the `samples` subdirectory of the `doc` subdirectory from the distribution kit. You have further details (including passwords) in the `Readme.txt` file. The `samples` folder is further divided in 9 subfolders:

1. `keystore` - can be used to observe the KeyStore features;
2. `certificates` - can be used to observe the certificates features;
3. `csr` - can be used to observe the CSR features - generate and sign;
4. `jar` - can be used to observe the sign/verify JAR files features;
5. `pdf` - can be used to observe the sign/verify PDF files features;
6. `xml` - can be used to observe the sign/verify XML files features;
7. `keypair` - contains examples of exported KeyPairs useful to observe the export/import features for keypairs;
8. `privatekey` - contains examples of a Private Key exported in myriad formats. Together with the suitable certificate from the `certificate` directory a KeyPair can be imported in a KeyStore;
9. `publickey` - contains examples of a public key exported in various formats.

## 2. CERTivity®'s Administrative Details

### 2.1 System requirements

CERTivity being a GUI desktop application it requires a Graphical Interface to install and run.

The minimum and recommended hardware configurations are depicted in the table below:

Table 2.1. System Requirements

Minimum Configuration	Recommended Configuration
<b>Processor:</b> 800MHz Intel Pentium III or equivalent	<b>Processor:</b> 2.6 GHz Intel Pentium IV or equivalent
<b>Memory:</b> 512 MB	<b>Memory:</b> 2 GB
<b>Disk space:</b> 100 MB of free disk space	<b>Disk space:</b> 200 MB of free disk space

### 2.2 Platforms and Java Virtual Machines

CERTivity is a Java based application, available for download and install through:

- Bundled JRE Java Native Installers, the recommended option;
- Normal Java Native Installers (standalone, no JRE bundled);
- Plain archives (Zip / TAR.GZ) - manual process.

The recommended CERTivity distribution for Microsoft Windows and Linux platforms (x86/AMD64) is the Installer with the embedded Java Runtime Environment (JRE) as everything is out of the box. If the target operating system is not in the list of the supported embedded JRE distribution, or there are other reasons for which you don't want an embedded JRE, you will need to have an already installed JRE from Sun Microsystems (Oracle) or from Apple (if the target system is a Mac OS). Note that the embedded JRE is exclusively used for running the CERTivity application and is not affecting the existent applications.

Being a Java based application, CERTivity could run anywhere where an Oracle or Apple JRE is available - this covers a wide range of systems such as Microsoft Windows, Linux, Unix and Mac. The exact JRE for the CERTivity application is configured in the file `${certivity_home}/etc/certivity.conf` in the `jdkhome` property, the Installer transparently setting this path according to the installer type:

- If you are using the recommended bundled JRE Installer, then the embedded JRE is used to run the installer itself and is also configured in the `jdkhome` property.
- The standalone (non bundled JRE) Installer will need a JRE to start with and to set for CERTivity. If you are using the standalone Installer make sure your system has a Sun Microsystems (Oracle)/Apple JRE available for the user you intend to use to install CERTivity. If not, then please install JRE 1.6 according to the Java vendors instructions.

The standalone Installer will automatically look for a suitable JRE on your platform for the installation itself and for configuring CERTivity to start with. The minimum required version is 1.6. The first JRE found in this search order is mainly used:

- Environment variables `${JAVA_HOME}`, `${JDK_HOME}`;
- Windows registry (if the OS is Windows) ;
- Standard locations.

If the JVM found is not the standard recommended one a warning message is displayed but the installation will continue.

- If you are using a plain archive distribution, then you will need to install JRE 1.6 according to Sun Microsystems (Oracle)/Apple instructions and to configure the `jdkhome` property from `${certivity_home}/etc/certivity.conf` by uncommenting it and pointing it to the JRE path, for example (`jdkhome=C:\Program Files\Java\jre6`). If you are not configuring `jdkhome`, CERTivity will try to use the default location of JDK/JRE on the platform, but in case the target system has more Java distributions installed, it is safer to expressly point the `jdkhome` property to the exact location.

The exact Java version the CERTivity application started with is displayed in the Help > About menu, for example:

```
Java: 1.6.0_25; Java HotSpot(TM) Server VM 20.0-b11
```

As there are many flavours of hardware, operating systems and versions available it is practically impossible to test each one of these. We have successfully run CERTivity on Microsoft Windows XP, Microsoft Windows 7, Microsoft Windows Server 2003, Linux Debian, Linux Ubuntu, RedHat, Solaris Intel and Mac OS X. Both 32 and 64 bit OS distributions as well as JREs are supported.

Even if there is a wide platform distribution there are just few known issues:

- Default font size being ignored by the GTK Look and Feel on Gnome Desktop Environment on Linux;
- Contextual Help Window is not brought up to front on Mac OS X;
- On Windows 64 bit with JRE 1.6 64 bit distribution [the Windows KeyStores](#) are not functional, though they work with JRE 1.6 32 bits or JRE 1.7 64 bit distribution.

## 2.3 Install and Run

### 2.3.1 Installing CERTivity

On Linux/Unix platforms after downloading the Installer you must make it executable, by opening a shell, going into the downloads directory (via `cd`) and running the command `chmod +x`, for example:

```
chmod +x CERTivity-unix-1.0.sh
```

Then you start the installer either from a file manager or from the command line by running the above executable script in the same directory, for example:

```
./CERTivity-unix-1.0.sh
```

The Installer will guide you through the necessary steps for having CERTivity installed. The default installation directory and other links are containing the version of the product in them. We strongly recommend to keep this naming convention. Default Installation directory examples are given below:

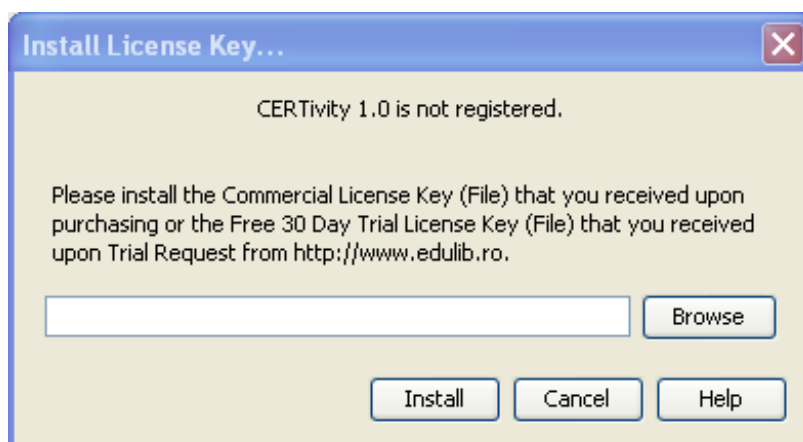
- On Windows: `C:\Program Files\EduLib\CERTivity 1.0`;
- On Linux: `/opt/EduLib/CERTivity 1.0` or `/home/user/EduLib/CERTivity 1.0` depending on the user's rights for the `/opt` directory;

- On Mac: /Applications/EduLib/CERTivity 1.0/.

As stated in the previous section if the Java version that we recommend is not detected the Installer will present a warning dialog, continuing the installation. After the installation finishes, we advise you to install the standard JRE (recommended 1.6) and configure CERTivity to use that standard JRE according to the above section.

### 2.3.2 License Key (File) Registration

After the installation, when you first run CERTivity, you will be asked to activate it either for your trial or for your purchased license. Make sure you correctly point to your license file, then press Install.



A License for a CERTivity version is valid for all the minor versions. For example, if you purchased CERTivity 1.0, installed and registered it you will also be able to install and run CERTivity 1.3 on the same machine, without the need of requesting or registering another license file. So the above dialog will not appear in such a case if you use the same machine.

If you have a trial license you can register a commercial license without the need to uninstall the existent version. Use the menu **Help > License > Install License Key** to change the license to the one that you purchased. In the same way, without uninstalling, you can switch from a Standard to a Professional License activating all the features.

### 2.3.3 Running CERTivity

CERTivity can be started either from the Start Menu/Desktop links or directly using the applications startup launchers from the installation base directory `bin/certivity.exe` on Windows system, `bin/certivity` on the rest of the systems. This later option is the only one available if you installed CERTivity using a plain archive.

The CERTivity application settings are stored outside the application directory under the `EduLib/.certivity/<version>` sub-directory, located under the platform dependent user home directory. The settings are accessible through **Tools>Options** panel as described in [Section 3.6, "Tools Menu"](#). From this panel you can export the settings values from the old version into the new application version via an intermediary archive file. That is the recommended way.

The CERTivity application is also producing log files in the same user location. Its exact sub-path under the platform dependent user home directory is `(.)EduLib/.certivity/`

<version>/var/log/ . The last 3 application runs are logged in `messages.log`, `messages.log.1` and `messages.log.2`. The exact path is dependent on the target OS, for example:

- On Windows XP `C:\Documents and Settings\John\Application Data\EduLib\certivity\1.0\var\log`;
- On Linux `/home/john/.EduLib/.certivity/1.0/var/log`;
- On Mac `/Users/john/Library/Application Support/EduLib/certivity/1.0/var/log`

The Log level can be configured from the Application Options accessible through `Tools>Options` panel as described in [Section 3.6, "Tools Menu"](#), via the option Log level which comes with the default value of `INFO`.

### 2.3.4 Handling Multiple CERTivity versions

Multiple CERTivity versions can be run on the same machine, each one being independent of the other. This is the normal process for upgrades. Each application version has its own installation directory, its own Start Menu links, its own settings.

The CERTivity application settings are accessible through `Tools>Options` panel as described in [Section 3.6, "Tools Menu"](#). From this panel you can export the settings values from the old version into the new application version via an intermediary archive file. We recommend that after installing the new version and becoming familiar with it, you uninstall the previous version.

It is possible as a repairing process to install the same CERTivity version overwriting the previous installation.

## 2.4 Java Virtual Machine settings

Standard Java Virtual Machine parameters can be passed through the configuration file `${certivity_home}/etc/certivity.conf` in the `default_options` property by pre-pending `-J` to the standard parameter, for example `-J-Xmx256m`.

If you handle larger files (especially the PDF operations are memory consuming) or more files at the same time you may run out of JVM Heap memory. By default CERTivity comes with a maximum of 256 MB configured as above. Depending on the memory available on the target machine, the operating system 32/64-bit architecture, you can specify different sizes for memory, for example by modifying `-J-Xmx256m` into `-J-Xmx512m`. After doing this setting you need to restart the application. If the heap memory amount that you specified is too high for that platform/32-bit model, upon starting up a "JVM creation failed" message will be present. You will need to adjust the memory settings according to your architecture - for example on Windows on 32-bit JVM distributions due to the 32-bit Windows process model you cannot specify values larger than about 1100 MB. It is also not recommended to set the maximum JVM heap to be larger than the physical memory.

Note that this file is specific to each CERTivity version, so this allows you to manage each version independently.

CERTivity has a Memory Detection system letting you know when the maximum heap memory passes a threshold. This is configured in the Application Options (accessible through `Tools>Options` panel as described in [Section 3.6, "Tools Menu"](#)) by the property Memory

usage warning max threshold, which comes with the default value of 90%. In such case the following dialog will be presented:



It is possible that after this warning the JVM may issue an OutOfMemory error if the threshold is too tight. In such a case please adjust the JVM heap setting as described above.

The CERTivity application also features a memory toolbar, which by default is on - there you could see the exact memory used and even force a garbage collection.

## 2.5 Purchase and Licensing Model

CERTivity is a commercial product, which is also offered for Trial for 30 days. The trial registration is fully functional, except limitations on the number of KeyStores that can be opened and created during an application instance (run). In order to be able to use a certain version of CERTivity permanently and without any limitation a commercial license is needed.

Facts about the licensing model:

- There are two categories of commercial licenses - Standard and Professional - the feature differences are depicted in [Appendix A, CERTivity®'s Features Matrix](#). The price difference is depicted on [our web site](http://www.edulib.com/products/keystores-manager/purchase/) [http://www.edulib.com/products/keystores-manager/purchase/];
- The license is per number of users and each user can use the software on more machines;
- We offer volume discounts (per number of users) according to the information on our web site;
- If the License Key (File) is for more users, as the file is the same, each user will have to use that file to register the application;
- A License Key (File) covers a major version and all its minor upgrades (e.g. 1.0, 1.1, 1.2..., but not 2.0). The same License Key (File) will unlock all the minor versions. If you purchased a license for a certain major version (e.g. 1.2) you don't have to purchase licenses for any of the next minor versions (e.g. 1.4) if the software is used by the same users;
- If in less than 60 days after you purchase a License Key (File), a major release is out, you are entitled to use the new major version for the category of license you bought. You can download and use it as well as any further minor versions with the same License Key (File);

- For new major versions (e.g. 3.0) existent users of the previous major version (e.g. 2.0) will be able to upgrade their License Key (File) by purchasing that license at an important discount.
- Changing your license category ("migrate") of a certain License Key (File) is possible by paying the difference between the categories; this is available upon request by providing us the previous details of the license;
- We offer a full 30 days refund.

taken from the Download section of the <http://www.edulib.com> site and installed according to the above chapters.

## 2.5.1 Payment details

Our orders are securely handled by our e-commerce and payment partner [Avangate](http://www.avangate.com) [http://www.avangate.com]. Avangate handles all the payment details in a safe and secure manner, starting from using SSL channels for communication up to anti-fraud screening procedures. Upon payment you will be redirected from our site to the Avangate site for the payment. You will benefit from multiple payment methods, 6 currencies and a localized user-friendly store (16 languages supported).

If you want to purchase a license for more users you will get a discount according to the one specified on [our web site](http://www.edulib.com/products/keystores-manager/purchase/) [http://www.edulib.com/products/keystores-manager/purchase/]. The price is automatically adjusted in your shopping cart depending on the quantity you select.

## 2.5.2 What do I get after payment

Our software delivery is electronic only. Even before the payment you can [download](#) the suitable setup package of the last CERTivity version. Shortly after the payment you will get via the e-mail the License Key (File) to activate your CERTivity copy - please store it in a secure place, as you may need it for future installations. For instant payment methods like Credit Card or PayPal, the delivery e-mail will be sent usually within a few minutes after an order has been successfully completed. For payment methods such as Bank Transfer, check or PayPal eCheck, the delivery will be done after the payment is confirmed (usually 2 to 3 business days).

For more details about the payment and the e-mail delivery you can read the [Avangate - Shoppers FAQ](http://www.avangate.com/help/customer-faq.php) [http://www.avangate.com/help/customer-faq.php].

You will use the License Key (File) that you will have been receiving via email to register your CERTivity application. You may be in one of the following scenario

- On a certain machine, you have already installed CERTivity and run it registered with an unexpired trial license. Then start the application and use the menu `Help > License > Install License Key` to change the License Key (File) to the one that you just purchased; the same scenario applies if you migrate from
- On a certain machine, you have already installed CERTivity but the trial license has expired. Then upon application start-up you will be prompted with an Install License Key dialog. There you will provide the License Key (File) that you just purchased.
- You don't have any installation of CERTivity on the target machine or you have other previous major versions of CERTivity. Then you need to download and install the new major version of CERTivity. The installation is done in parallel, not overwriting the

previous version. After the installation, upon the application start-up you will be prompted with an Install License Key dialog. There you will provide the License Key (File) that you just purchased.

If, at a later time, a new minor version is released you will just download and install it in parallel and it will be registered with the same License Key (File). If you need to install the new minor version on a different machine (used by the same user) you will need to provide the License Key (File) that you initially received.



## 3. CERTivity®'s Menus/Tool bar

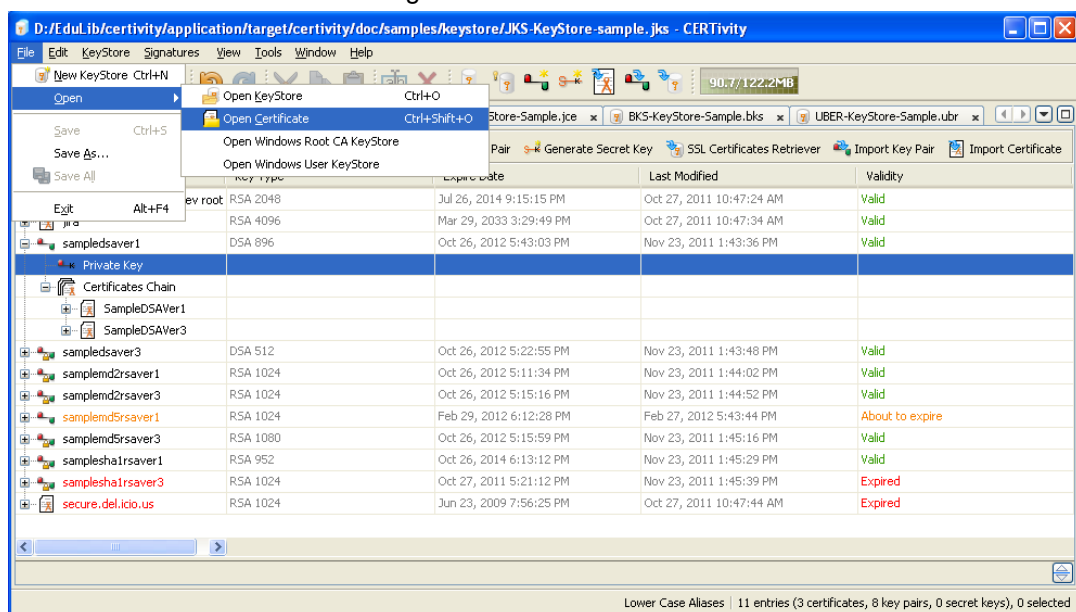
### 3.1 File Menu

The File menu includes the following commands:

- **New KeyStore** - Creates a new KeyStore;
- **Open** - Opens an existing KeyStore, an existing certificate, Windows Root CA KeyStore, Windows User KeyStore;
- **Save** - Saves the current KeyStore, if it has been modified;
- **Save As** - Saves the opened KeyStore under a different name;
- **Save All** - Saves all the opened KeyStores;
- **Exit** - Exits the application.

Note that the features regarding the opening of the native Windows related are available only if run on a Microsoft Windows platform.

A screenshot for the File Menu is given below:



### 3.2 Edit Menu

The Edit menu includes the following commands:

- **Cut** - Removes the currently selected entry from a KeyStore and places it in the clipboard;
- **Copy** - Copies the selected entry into the clipboard;
- **Paste** - Inserts the entry from the clipboard in the KeyStore;
- **Rename** - Renames the KeyStore entry;
- **Delete** - Deletes the KeyStore entry.

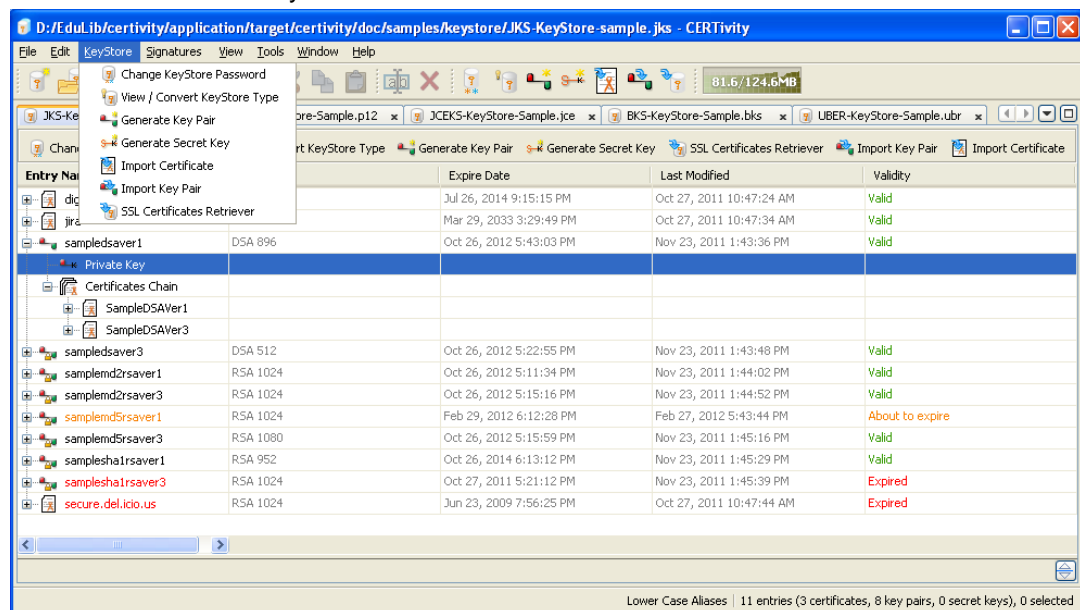
These commands are also having their usual Keyboard Shortcuts by default.

## 3.3 KeyStore Menu

The KeyStore menu is available when a KeyStore is opened and includes the following commands:

- [Change KeyStore Password](#) - Changes the password of the store;
- [View / Convert KeyStore Type](#) - Views the current store type and gives the possibility to change it ;
- [Generate Key Pair](#) - Generates a new Key Pair;
- [Generate Secret Key](#) - Generates a new Secret Key - note that not all of the KeyStore types are able to store Secret Keys;
- [Import Certificate](#) - Import a Certificate from a file into the KeyStore;
- [Import Key Pair](#) - Import a Key Pair from a file into the KeyStore;
- [SSL Certificate Retriever](#) - Connects to a remote SSL socket (host and port) and extracts the certificates used during handshaking. It is then possible to inspect and import the certificates into the KeyStore.

A screenshot for the KeyStore menu can be seen below:



## 3.4 Signatures Menu

The Signatures menu includes the following commands:

- [Verify](#) - validates the following types of files presenting verbose details; it is possible to view and export the certificates embedded in the verified files.
  1. [JAR file](#) - Validates a signed JAR file;
  2. [PDF file](#) - Validates a signed PDF file;
  3. [XML file](#) - Validates a signed XML file.
- [Sign](#) the following types of files using the current KeyPair entry; disabled if no KeyPair is selected. Also accessible from the contextual menu for a KeyPair. Specific sign parameters are presented depending on the file type.

1. [JAR file](#) - Signs a JAR file using the current Key-Pair entry;
2. [PDF file](#) - Signs a PDF file using the current Key-Pair entry;
3. [XML file](#) - Signs an XML file using the current Key-Pair entry;
4. [CSR file](#) - Signs a CSR file using the current Key-Pair entry.

### 3.5 View Menu

The View menu includes the following commands:

- **Toolbars** - Is used to show or hide [toolbar groups](#);
- **Full screen** - Allows application to run using the whole screen. The main toolbar will be hidden during in this mode.

### 3.6 Tools Menu

Using the Tools menu, you can change:

- The application options (use **Certificate Options**) like:
  - Certificate expiry notification period (default 30 days), meaning that if a certificates valid interval ends before the current date + the notification period a certain visual element will alert you;
  - RSA Key Pair default size (default 1024),- the default size for RSA keys which will be used when generating a RSA KeyPair. Change it for your convenience;
  - RSA Key Pair max size (default 4096) - you won't be able to generate a keyPair having more bits than this value. This prevents bigger values that would require a great CPU time to generate;
  - Auto generated Certificate serial number max bit length (default 20);
  - Undo level - the number of undo levels for each opened KeyStore (default 20);
  - Log level;
  - Memory usage warning max threshold, meaning the percentage of used memory after which a warning message will be displayed (default 90);
  - KeyStore persistence - the type of persistence for opened KeyStores when exiting the application. CERTivity<sup>®</sup> can remember the KeyStores which are opened when the application exits, and reload them again when the application is launched next time. There are two options available:
    - Persist only KeyStore file name - meaning that only the name (and path) of the previously opened KeyStores will be remembered to be reopened on the next launch. The passwords of the KeyStores will not be remembered, and you will be prompted to enter the password for each of them when selecting each KeyStore tab first time (recommended);
    - Fully persist - meaning that the name and password of the KeyStores will be remembered so that the KeyStore to be reopened when launching the application, without prompting you for the passwords of the KeyStores. The passwords are stored in an encrypted way.

Although the "Fully Persist" option makes the application more friendly, use this option with care and only when you are sure the machine is exclusively accessible by you;

- Defined KeyBoard shortcuts (use **Keymap**);
- Appearance options (use **Miscellaneous**).

### 3.7 Window Menu

Using Window menu, you can run the following IDE related actions:

- **Close window**;
- **Maximize window**;
- **Unlock window**;
- **Close all documents**;
- **Switch between opened documents**;
- **Reset window**.

### 3.8 Help Menu

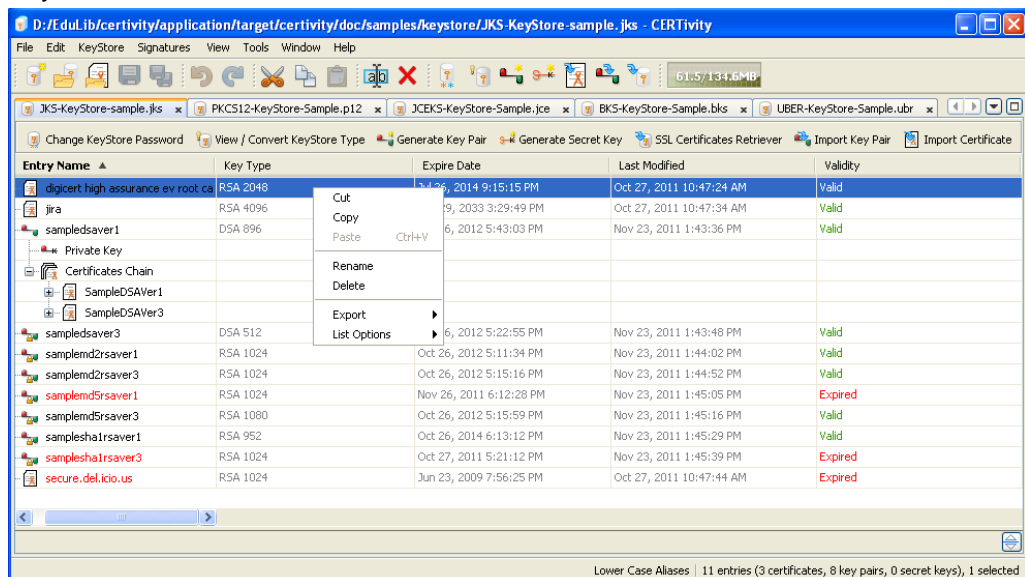
The Help menu includes the following commands:

- **License** - Allows installing a new license and viewing the installed license details;
- **Help Contents** - Access to CERTivity Help;
- **About** - Provides minimal information about the application and system.

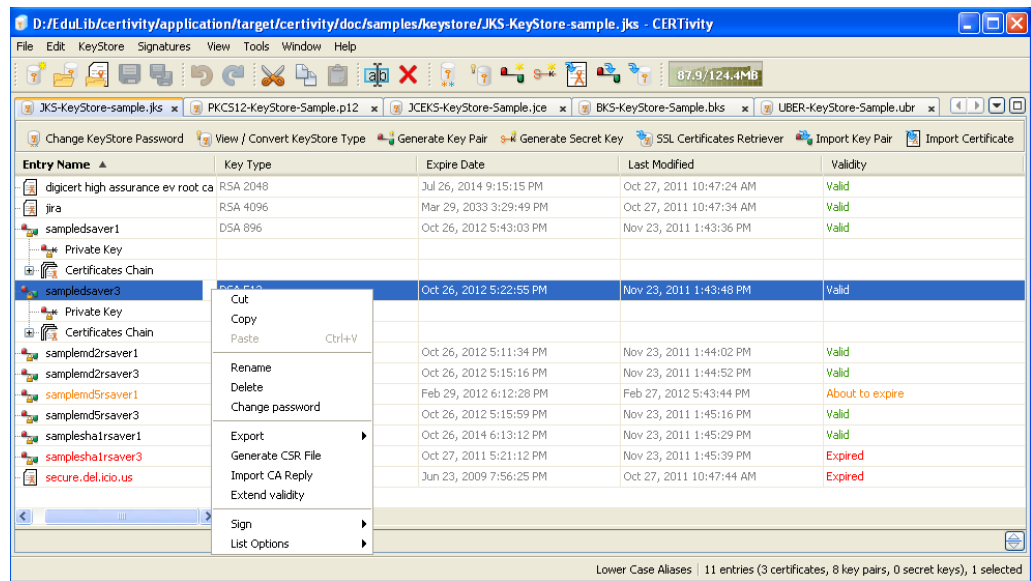
### 3.9 Contextual Menu

Each KeyStore entry or sub-component has a contextual menu associated with it. Things such as rename, delete are commons but the specific ones are presented below:

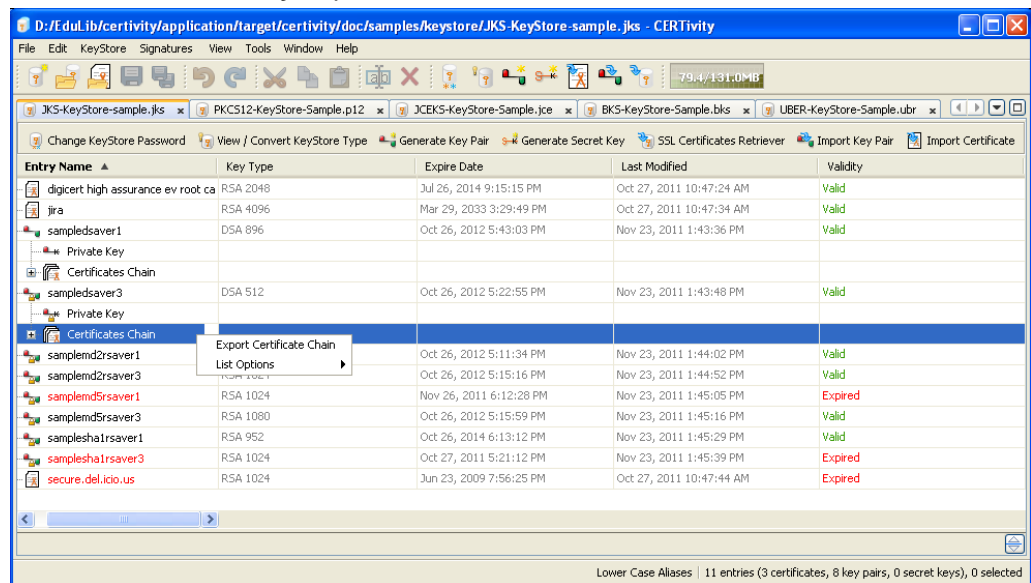
- **Certificate entry**: Cut, Copy, Paste, Rename, Delete, Export Certificate, Export Public Key;



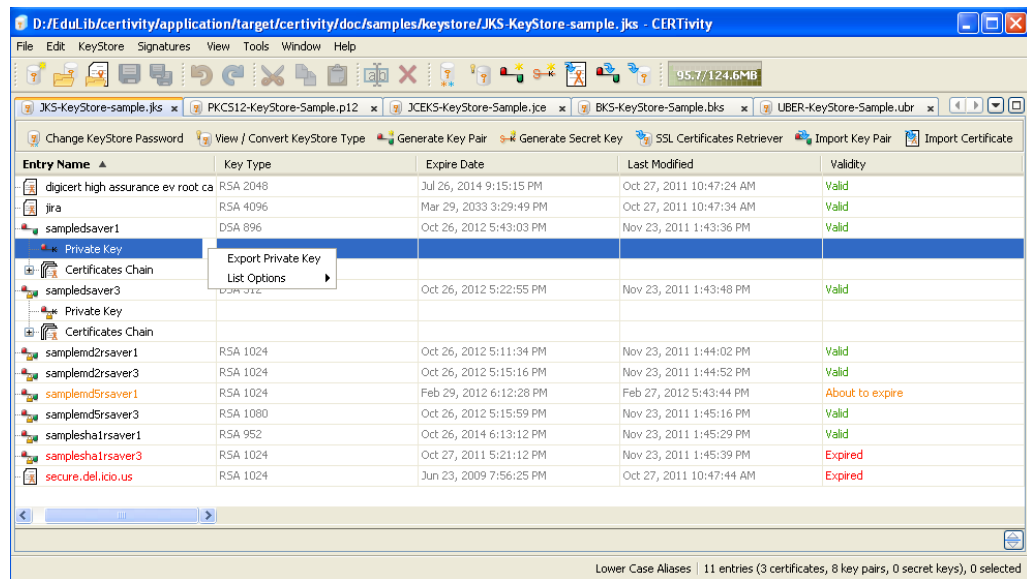
- **Key Pair entry**: Cut, Copy, Paste, Rename, Delete, Change Password, Export Key Pair, Export Private Key, Export Certificate Chain, Generate CSR File, Import CA Reply, Extend Validity, Sign CSR file, Sign XML file, Sign PDF file, Sign JAR file;



- **Certificate Chain entry:Export Certificate Chain;**













- **Private Key entry:Export Private Key.**



### 3.10 Toolbar

The Tools toolbar provides a quick method for invoking tools for using in the application. The toolbar items are grouped in certain categories that can be disabled or enabled using the View > Toolbars menu option:

Icon	Action	Category
	Creates a new KeyStore.	File
	Opens an existing KeyStore.	
	Opens an existing Certificate as Standalone.	
	Saves the active document.	
	Saves all documents.	
	Undo the last action, if possible.	Undo/Redo
	Redo allows commands that have previously been undone with the Undo to be redone.	
	Removes the currently selected data from the active document and put it on the clipboard.	Clipboard
	Copies selected data onto the clipboard.	

	Inserts a copy of the clipboard contents at the insertion point.	
	Changes the alias name for the KeyStore entry.	Edit
	Deletes the KeyStore entry.	
	Changes the KeyStore password.	KeyStore
	Converts the KeyStore type.	
	Generates a Key Pair.	
	Generates a Secret Key.	
	Retrieves Certificates from SSL.	
	Imports a Key Pair.	
	Imports a trusted Certificate.	

There is also a memory usage toolbar icon showing the current memory and the current maximum memory of the Java Heap. When clicking on it, you can force the garbage collection.

Besides the main toolbar, the application provides a secondary toolbar on the KeyStore tab, for quick access.

## 4. CERTivity<sup>®</sup>'s Certificates

### 4.1 Open Certificate

A Certificate embeds a public key belonging to an entity. It certifies the public key and all the information via digitally signature of another entity (the issuer, e.g. - a person, company, etc.), saying that the embedded public key (and some other information) belongs to the declared entity (the subject) and has some specific value. That is why it is also called a Public Key Certificate. The certificate is usually signed by a trusted Certification Authority (CA) or it can be self signed.

CERTivity can handle X.509 certificates types, both version 1 and 3.

In order to open a standalone existing certificate, click on **Menu File > Open > Open Certificate**. After the certificate file (with .cer or .crt extension) is selected, it will be opened in a new tab which is named after the certificate's file name.

The following certificate details will be displayed:

- Format;
- Version;
- Serial Number;
- Validation date period;
- Public Key;
- Signature Algorithm;
- Subject / Issuer;
- Common Name (CN);
- Organization Unit (OU);
- Organization Name (O);
- Locality Name (L);
- State Name (ST);
- Country (C);
- Email (E);
- MD5 Fingerprint;
- SHA1 FingerPrint.

In the certificate window details the following actions are available:

- Test on custom protocol - which will open a new window for testing the certificate against a TCP/IP connection;
- Get revocation status - which will open a new window for the revocation status;
- Open public key - which will complete the window with details about the public key (algorithm, key size, modulus, public exponent, ASN.1);
- PEM - which will open a new window containing the PEM representation of the certificate;
- ASN.1 - which will open a new window containing the ASN.1 representation of the certificate.



The details above, the actions and the display format are mostly the same when a Certificate is visualized from a KeyStore tab, either as a KeyStore entry or as a KeyPair entry sub-component, only that the information will appear in the Details Panel and depending on the resolution it might be scrollable and the Public Key details will not be visible from the beginning in the view from KeyStore, but rather after opening it.

**delicious.cer - CERTivity**

File Edit KeyStore Signatures View Tools Window Help

JKS-KeyStore-sample.jks Windows Root CA KeyStore delicious.cer

Test on custom protocol ☒ Get revocation status

Format: X.509 Version: 3 Subject: CN=secure.del.icio.us, OU=Yahoo!, O=Yahoo! Inc., L=Santa Clara Issuer: OU=Equifax Secure Certificate Authority

Serial Number: 0x5E1B2 Common Name (CN): secure.del.icio.us Common Name (CN):

Valid from: 23 Jun 06 19:56:25 to: 23 Jun 09 19:56:25 Organization Unit (OU): Yahoo! Organization Unit (OU): Equifax Secure Cer

Public Key: RSA 1024 bytes Open Organization Name (O): Yahoo! Inc. Organization Name (O): Equifax

Signature Algorithm: SHA1withRSA Locality Name (L): Santa Clara Locality Name (L):

State Name (ST): California State Name (ST):

Country (C): US Country (C): US

Email (E): Email (E):

MD5 Fingerprint: 80:3D:A1:07:51:D1:27:23:07:AD:29:C5:DE:2C:70:5E

SHA1 Fingerprint: 8C:2B:56:98:7F:D6:57:38:EB:26:D1:B0:C8:7B:EB:07:57:3B:DC:7D

Public Key details

Algorithm: RSA Key Size: 1024 ASN.1:

Fields:

Modulus: 0x995D31797EB9794A43600D6435007A1DACA8F8FDBB730AEB819ECA  
 Public Exponent: DF76ECD5075028898A0AC9E91D9C956F0909E337C8EBBFFF2378E5592  
 DE12E1395298000A677788951FD5EB708D50EC4935FAABFE942A808CB  
 47827BAF3C755DC0F6B9C6FA8F38387D9DC58DB98119F7AE390A03F07  
 32CA0680019C2579609F17A445F525

ASN.1:

DER Sequence  
 DER Sequence  
 ObjectIdentifier (1.2.840.113549.1.1.1)  
 NULL  
 DER Bit String (140, 0)  
 30818902818100995d31797eb9794a43600d6435  
 19ecadf76ecd5075028898a0ac9e91d9c956f090  
 12e1395298000a677788951fd5eb708d50ec4935  
 c755dc0f6b9c6fa8f38387d9dc58db98119f7ae3  
 609f17a445f5250203010001

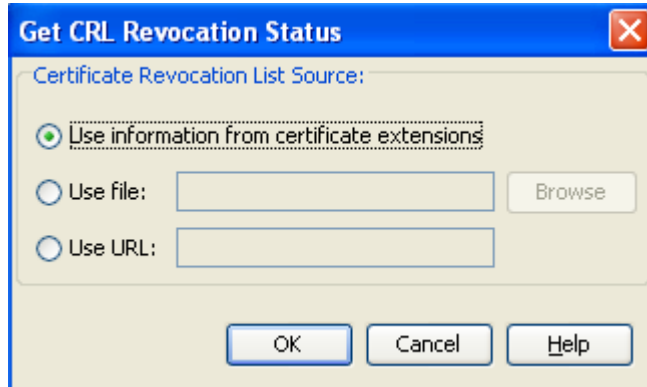
## Note

You can use certificates examples provided in the distribution kit in doc/samples/certificate folder, to test the certificates features.

## 4.2 Get Revocation Status for a Certificate

Checking certificates for revocation excludes the possibility that an application or user will accept credentials that have been revoked by a Certification Authority administrator. A certificate is considered valid until its expiration date. However, various circumstances may cause a certificate to become invalid prior to the expiration of the validity period. Such circumstances include change of name, change of association between subject and Certification Authority and compromise or suspected compromise of the corresponding private key. Under such circumstances, the issuing Certification Authority needs to revoke

the certificate. In order to get the revocation status of a certificate, open the certificate (click on **Menu File > Open > Open Certificate**) and click on **Get revocation status** button.



When checking the revocation status of a certificate, the following situations may be found:

- The certificate has been revoked;
- The certificate has not been revoked;
- No revocation information found;
- Invalid revocation information found;
- An error was encountered while trying to retrieve the revocation status of the certificate.



## 4.3 Test Certificate on Custom Protocol

In order to test or use a certificate against a certain TCP/IP raw text connection, you have to open it first (click on **Menu File > Open > Open Certificate**). After the certificate is opened, click on **Test on custom protocol** on top of the page.

This action will open a new top component window (named "Test Certificate Window"), containing the details needed for testing the certificate. The name of the tested certificate will be written in the "Currently used certificate" field. The certificate can be changed from a file chooser by clicking on **Browse** button.

This functionality is also available for a certificate that is part of a KeyStore.

In order to use the certificate for the secure connection, the following server connection details must be filled in:

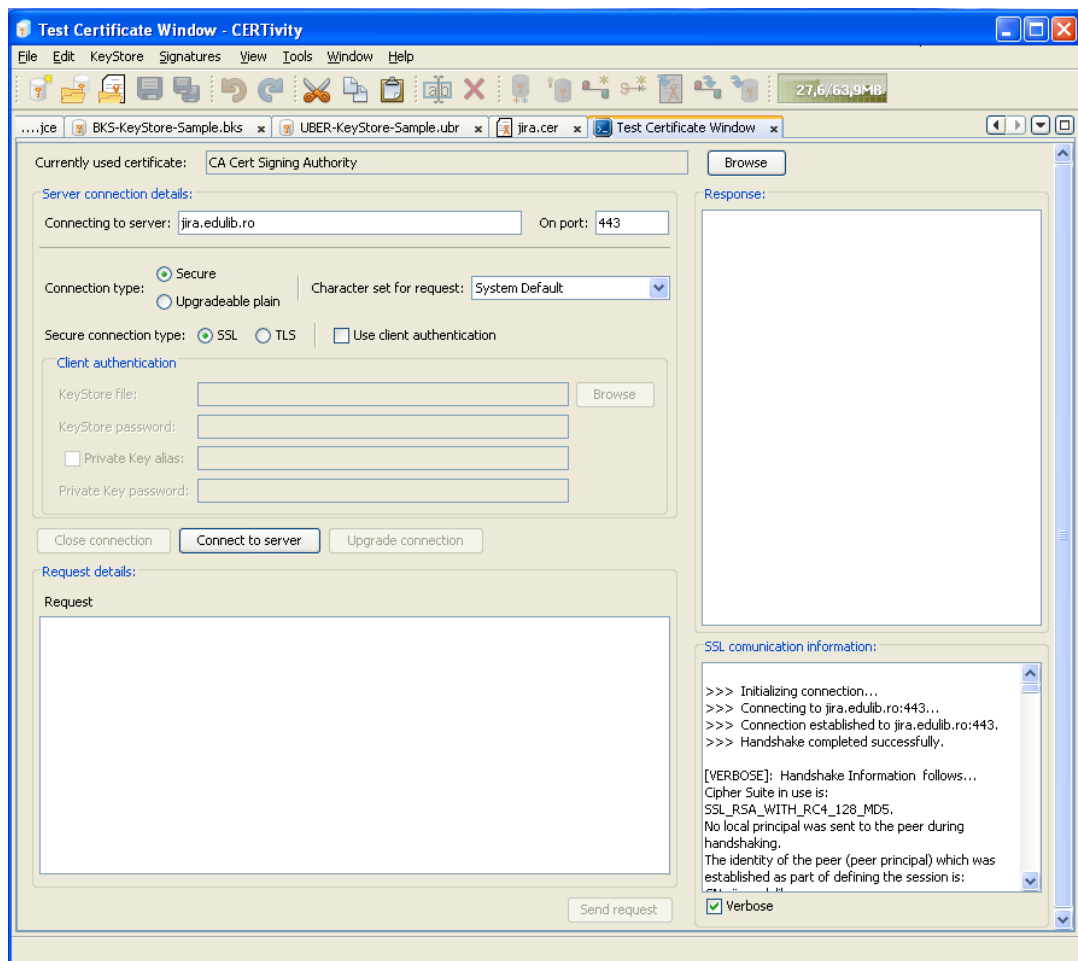
- server name;

- server port;
- connection type;
- secure connection type;
- the charset used for the request;
- client authentication (KeyStore file - can be chosen using **Browse** button; KeyStore password; key pair password, alias). If a Private Key alias will not be provided the default Java selection behaviour of the private key from the provided KeyStore will be used.

The connection to the server can be initiated, closed or upgraded using the corresponding buttons on the page - the buttons changed their state accordingly.

The test window has other three areas for:

- request details area - the location where will be introduced the specific request details. A request will be sent to the server only after clicking on **Send request** button. Note that some protocols require line terminators for delimiting the requests. These should be added manually and the button Send Request must still be pressed.
- response area - where the response from the server will be displayed;
- SSL communication information area - where SSL information will be displayed.



You can also test connections that starts on plain and then upgrades to SSL. For example testing a STARTTLS connection type for a SMTP server would be done according to the following scenario:

1. Configure server connection details;
2. Select Connection type to be Upgradeable plain. Configure client authentication details if necessary;
3. Press `Connect to Server`;
4. Start the handshaking plain messaging by issuing the necessary text commands. Don't forget to add the line terminators before pressing `Send request`;
5. Empty the request window (e.g. select all with `Ctrl+A` and write `STARTTLS` and press `Enter`, then `Send request`;
6. If the server responds with `220 2.0.0 Ready to start TLS` or similar press `Upgrade Connection`. The connection will be switched to secure and the certificate provided will be used for this;
7. Continue messaging on the secured connection.

## 4.4 Certificate's Representations

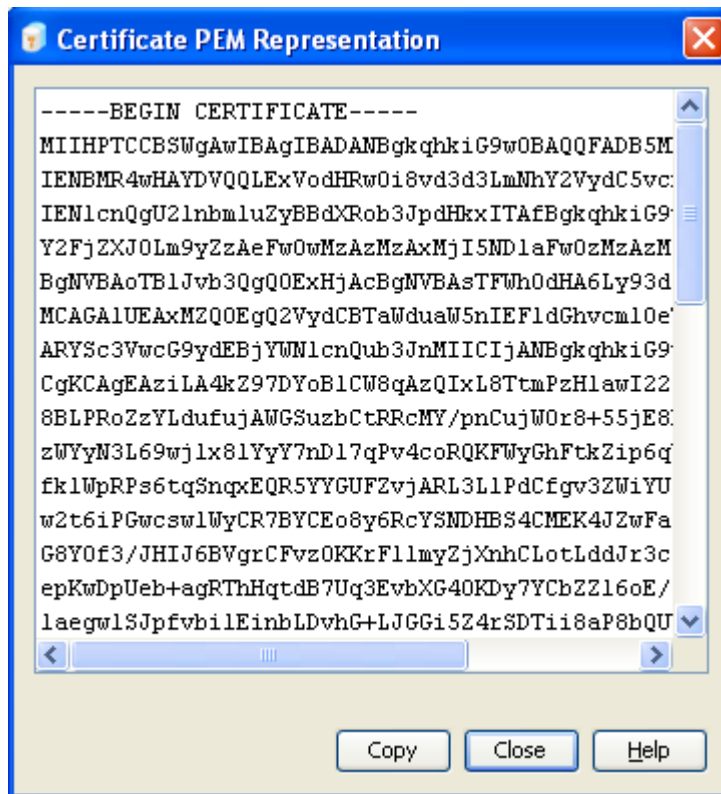
When opening an existent certificate, you can see two representations for the certificate:

- [PEM](#);
- [ASN.1](#) .

### 4.4.1 PEM

PEM (Privacy Enhanced Mail) Base64 encoded DER certificate, enclosed between "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----". In order to see the PEM representation for an existing certificate, open the certificate (click on **Menu File > Open > Open Certificate**) and click on **PEM** button.

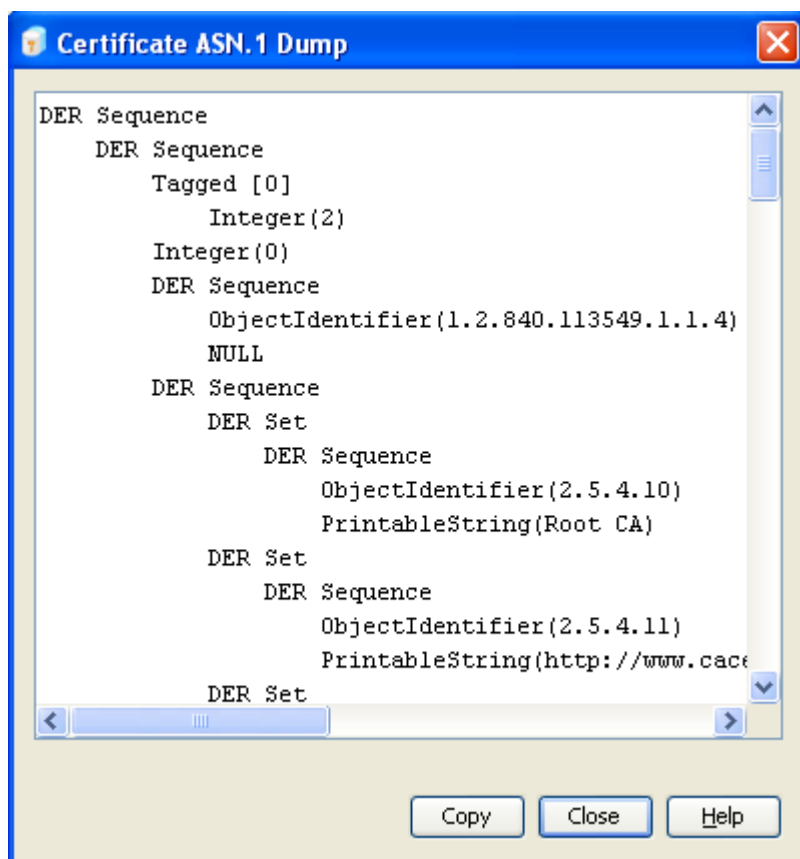
You can copy the content of the PEM certificate representation by clicking on **Copy** button.



#### 4.4.2 ASN.1

Abstract Syntax Notation One (ASN.1) is a standard and flexible notation that describes data structures for representing, encoding, transmitting, and decoding data. DER(Distinguished Encoding Rules) is a subset of Basic Encoding Rules (BER) is used in situations when a unique encoding is needed, such as in cryptography and ensures that a data structure that needs to be digitally signed produces a unique serialized representation.

In order to see the ASN.1 representation for an existing certificate, open the certificate (click on **Menu File > Open > Open Certificate**) and click on **ASN.1** button. You can copy the content of the ASN.1 certificate representation by clicking on **Copy** button.



## 4.5 Certificate's Public Key

In order to see more detail information about a certificate's public key, open the certificate (click on **Menu File > Open > Open Certificate**) and click on **Open** button located near the **Public key** field. The public key details will be displayed in the bottom part of window. There you can find information about:

- algorithm;
- key size;
- ASN.1;
- modulus;
- public exponent.

## 5. CERTivity®'s KeyStore

### 5.1 KeyStores Capabilities

A KeyStore is a protected database of cryptographic keys - private, public, secret. Private keys in a KeyStore have a certificate chain associated with them, which authenticates the corresponding public key - together they form a Key Pair entry - you cannot have just a private key by its own. On the other hand a KeyStore can contain just the certificates from trusted entities.

A Certificate embeds a public key belonging to an entity. It certifies the public key and all the information via digitally signature of another entity (the issuer, e.g. - a person, company, etc.), saying that the embedded public key (and some other information) belongs to the declared entity (the subject) and has some specific value. That is why it is also called a Public Key Certificate. The certificate is usually signed by a trusted Certification Authority (CA) or it can be self signed.

CERTivity can handle X.509 certificates types, both version 1 and 3.

Besides KeyPair and Certificate entries (asymmetric keys) some types of KeyStores can store Secret Keys (symmetric keys) as well.

Hence a KeyStore is a protected collection of KeyPair, Certificate and Secret Keys entries and each such entry is addressable via an unique alias or entry name. KeyStores are stored according to their standards and they are protected by a general password while the Private Keys and Secret Keys are protected by different individual passwords.

CERTivity asks for these passwords when operations are requiring access to the keys. Once a Private key or Secret Key is unlocked it will stay unlocked while the KeyStore is loaded.

CERTivity can manage the following KeyStore types - their main capabilities according to their standard are described below.

Table 5.1. KeyStores capabilities

Keystore type	Keystore password protection	Supports Secret Key	Aliases Case Sensitive	Provider
<b>jks</b> - Java KeyStore (Oracle's KeyStore format)	Yes	No	No - use lower case	Default JCE
<b>pkcs12</b> - Public-Key Cryptography Standards #12 KeyStore (RSA's Personal Information Exchange Syntax Standard)	Yes (for password that is greater than 7 characters, you may need to download and install the Java Cryptography Extension (JCE) Unlimited	No	Half - Case aware	Bouncy Castle

Keystore type	Keystore password protection	Supports Secret Key	Aliases Case Sensitive	Provider
	Strength Jurisdiction Policy Files)			
<b>jceks</b> - Java Cryptography Extension KeyStore (More secure version of JKS)	Yes	Yes	No - use lower case	Default JCE
<b>bks</b> - Bouncy Castle KeyStore (Bouncy Castle's version of JKS);	Yes. Note the empty string ("") universal password.	Yes	Yes	Bouncy Castle
<b>uber</b> - Bouncy Castle UBER KeyStore (More secure version of BKS)	Yes	Yes	Yes	Bouncy Castle
<b>Windows Root CA</b>	Yes	No	Yes	Default JCE (on Oracle - SunMSCAPI )
<b>Windows User</b>	Yes	Yes	Yes	Default JCE (on Oracle - SunMSCAPI )

Please note that PKCS12 KeyStores have no password protection for their key pair entries.

"Case aware" means that an alias can be defined both with low case and upper case, will be saved as this, but there cannot be two aliases which differ just by the case of their letters.

Working with Windows Root CA KeyStore and Windows User KeyStore are available only on Windows platform and additional confirmation and warning panels will be displayed by the Windows system when installing, deleting, renaming a KeyStore entry. Hence, the second confirmation dialogs are not under the control of CERTivity application.

The BKS type of KeyStore allows for being accessed both with the KeyStore password, as well as with the empty string password - this is not under the control of the CERTivity application .

## Note

You can use KeyStore examples provided in the distribution kit in the folder `doc/samples/keystore`, to test the KeyStore features.

## 5.2 KeyStore Interface Organization

The KeyStore Interface contains two main sections:











- Tree Table panel allowing the navigation between the entries;
- Details Panel for visualizing the current selection.

The tree table contains the following sortable columns:

- **entry name** - e.g. the name of the certificate, the name of the key pair;
- **key type** - e.g. RSA 2048, DSA 512 (the type of the key pair or of the certificate);
- **expire date** - the expiration date of the certificate or key pair - e.g. 26.10.2011 17:43:03 (DD.MM.YYYY HH:MM:SS);
- **last modified** - the date of the last modification of the certificate or key pair - e.g. 26.10.2011 17:43:03 (DD.MM.YYYY HH:MM:SS);
- **validity** - the status of the entry (e.g. - valid, expired, about to expire);

Each entry type has a specific icon.

	Certificate entry.
	Certificate Chain entry.
	Unlocked Key Pair entry.
	Locked Key Pair entry.
	Unlocked private key entry.
	Locked private key entry.
	Public key entry.
	Unlocked Secret Key entry
	Locked Secret Key entry

After selecting a KeyStore entry, when clicking on the right button of the mouse, you can use the contextual menu. More detail about contextual menus in [CERTivity's Menus/Tool bar/Contextual menu](#).

The Details Panel is a polymorphic panel, changing according to the current selection type. Using the Details Panel section, you can get more details about the selected entry:

- for certificate entry, you can [view Certificate details](#);
- for key pair entry, you can see the [Private Key details](#) and also [Certificate Chain details](#);
- for certificate chain entry, you can see [Certificate Chain details](#) where you can select a certificate and see its details;

- for Public Key entry, you can see [Public Key details](#) like ASN.1, algorithm, key size;
- for Private Key entry, you can see [Private Key details](#) like ASN.1, algorithm, key size.

The Details Panel can be minimized and maximized, by clicking on the top right corner button of the panel.

### 5.3 Create a New KeyStore

In order to create a new KeyStore, click on **Menu File > New KeyStore** or use the default keyboard shortcut **CTRL+N**. A new window for the new created KeyStore will be opened. The Create New KeyStore File dialog is more complex than in a standard MDI application, because there are more settings to be bound from the beginning such as the KeyStore password and type. Protection being an important factor it is important to bind the KeyStore file name with the password from the beginning.

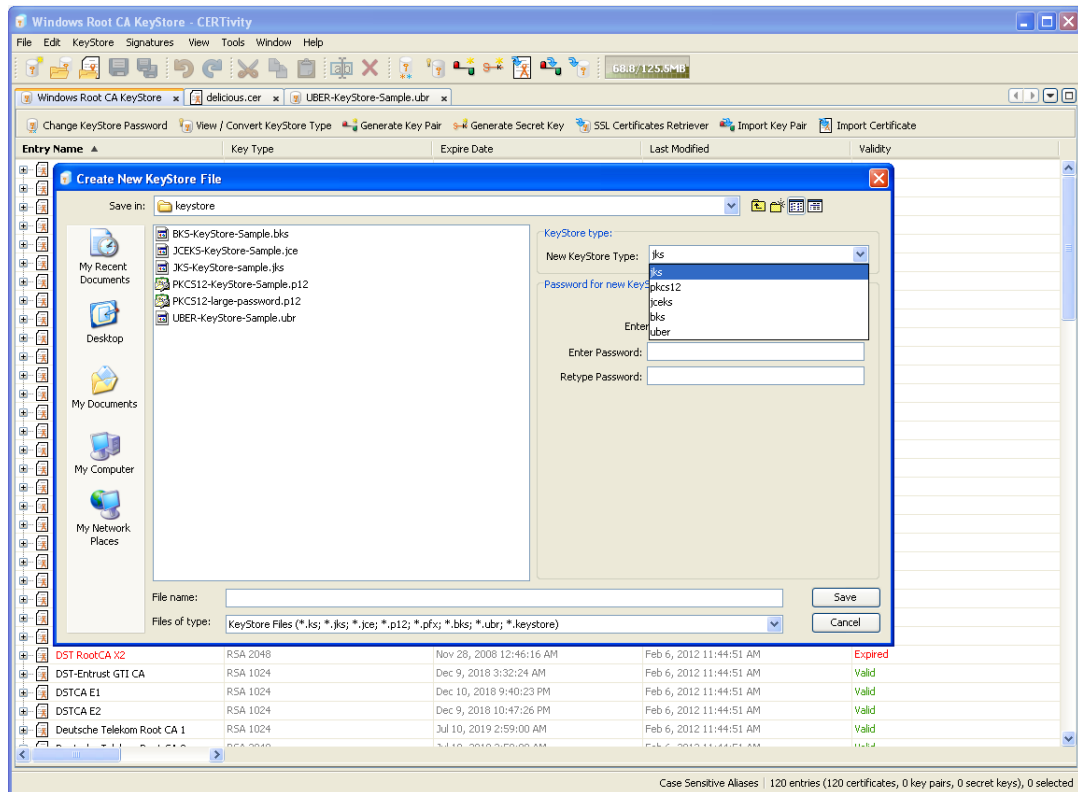
The available KeyStore types are:

- jks - Java KeyStore (Oracle's KeyStore format);
- pkcs12 - Public-Key Cryptography Standards #12 KeyStore (RSA's Personal Information Exchange Syntax Standard);
- jceks - Java Cryptography Extension KeyStore (More secure version of JKS);
- bks - Bouncy Castle KeyStore (Bouncy Castle's version of JKS);
- uber - Bouncy Castle UBER KeyStore (More secure version of BKS).

When creating (and in general handling) a pkcs12 or a uber type KeyStore, longer passwords either for the KeyStore or the KeyPairs requires that you have the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files installed. If you are not allowed to install it then you will need to use smaller passwords (e.g. maximum 7 characters). Otherwise you may encounter "Illegal Key Size" errors when accessing pkcs12 or uber files or keys inside them.

### Note

This is a matter of import control restrictions in most of the countries and is not related to technical reasons.



## 5.4 Open an Existing KeyStore

In order to open an existing KeyStore, click on **Menu File > Open > Open KeyStore** or use the default keyboard shortcut **CTRL+O**. A file chooser dialog box will be opened in order to select the desired KeyStore. The supported files have the following default extensions: `.ks`; `.jks`; `.jce`; `.p12`; `.pfx`; `.bks`; `.ubr`; `.keystore`.

After selecting the KeyStore file, the KeyStore password is required.

## Note

You can see a sample of :

- jks KeyStore type in the samples directory: `doc/samples/keystore/JKS-KeyStore-sample.jks`;
- pkcs12 KeyStore type in the samples directory: `doc/samples/keystore/PKCS12-KeyStore-Sample.p12`;
- jceks KeyStore type in the samples directory: `doc/samples/keystore/JCEKS-KeyStore-Sample.jce`;
- bks KeyStore type in the samples directory: `doc/samples/keystore/BKS-KeyStore-Sample.bks`;
- uber KeyStore type in the samples directory: `doc/samples/keystore/UBER-KeyStore-Sample.ubr`.

## 5.5 KeyStore Persistence (Reloading opened KeyStores)

CERTivity® offers KeyStore persistence between runs by remembering the KeyStores which are opened at the time the application exists. If the KeyStores are not closed before exiting the application, their names and locations are remembered so that on the next launch they will be reloaded (if the KeyStore files still exist, and they can be loaded). When reloading the KeyStores, you can set CERTivity® to either ask you for the password of each KeyStore when each KeyStore tab is selected for the first time, or, you can set it to remember the passwords of each KeyStore as well, so that you won't be prompted for them. All passwords will be encrypted to increase safety.

Although the full persistence option (remembering the KeyStore name and encrypted password) makes the application more friendly we are not recommending the full persistence, unless you are sure the machine is exclusively accessible by you. Otherwise, it is recommended to use the option which only remembers the name and location of each KeyStore.

To change the persistence type, click on **Menu Tools > Options** or use the default keyboard shortcut **ALT+T+O**. The preferences dialog will be opened. In the **Certificates Options** tab, look for the field **Keystore persistence**. This field has a combo list which allows you to select one of the following two options:

- Fully persist (file name & encrypted password) - this is the default value when starting CERTivity® for the first time. When this option is selected, the application will save both the KeyStore name and the encrypted password of each KeyStore which is opened when exiting the application. This is not recommended if the machine is not exclusively accessed by you.
- Persist only KeyStore file name (without password) - When this option is selected, the application will only save the name and location of the KeyStore file, and you will be prompted to enter the password for each KeyStore which was previously opened when selecting the KeyStore tab for the first time after launching the application.

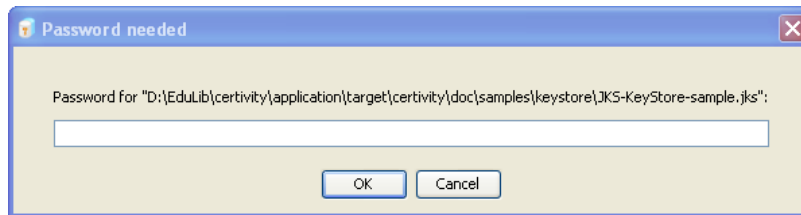
The KeyStore is not loaded until you provide the correct password. If you enter a wrong password, you will be prompted to enter the password again. Also, if the file of the KeyStore has become corrupted since the last run, you will be informed regarding the issue. If you choose to cancel entering a password, the KeyStore tab will be closed, and the KeyStore will not be remembered for opening on the next launch anymore.

Changing the KeyStore persistence type will only take effect when clicking on OK on the preferences dialog. If the dialog is closed otherwise, the new selected persistence type will be disregarded.

### Note

When changing from a lower level of persistence (from "Persist only KeyStore file name" option) to a higher level of persistency (Fully persist option), if you have KeyStores which have not yet been unlocked (for which you have not yet entered the password), and you still do not enter the password before exiting the application, on the next run, you will still be prompted to enter the passwords for the KeyStores for which you did not provide them when having the previous level of persistency.

A screenshot showing the dialog which prompts you to enter a password for opening the KeyStore when the application is launched, can be seen below:



## 5.6 Open Microsoft Windows KeyStores

These operations are functional only on Microsoft Windows platforms. The Windows system native KeyStores are opened and similar visualising and editing actions can be performed on these KeyStores with some limitations:

- Private Key Fields are not available for inspecting;
- DSA KeyPairs cannot be generated;
- KeyPairs cannot be exported or copied;
- Private Keys cannot be exported;
- Undo/Redo functionality is not available due to the fact that all the actions are persistent, no save is needed, and so, it is possible that the KeyStore gets modified from outside between undo and redo, and then the behavior may be unexpected.

Especially for the Root KeyStore a native confirmation dialog will also appear for editing actions. This is not under the control of CERTivity. It is advisable to do the same logical confirmation both in the CERTivity confirmation dialog as well as in the Windows native one. As these are the Operating System KeyStores take care when editing, especially for the Root CA KeyStore. For example when renaming a certificate entry (key pairs can not be renamed), there are 2 native popups appearing: First to confirm deleting of the certificate, and the second to confirm the import of the certificate with the new alias. If on the delete dialog "YES" is selected and on the import dialog "NO" is selected, then the node gets deleted. There is no way to recover the node back.

Due to a JRE 1.6 64-bit distribution limitation opening the Windows KeyStores is not functional on Microsoft Windows 64-bits Releases. JRE 1.7 resolves this issue, as well as using a 32-bit distribution of JRE 1.6. For this reason the bundled CERTivity setup is using the 32-bit distribution of JRE 1.6 also for Windows 64-bits platforms.

### 5.6.1 Open Windows Root KeyStore

The Windows-ROOT KeyStore contains all root CA certificates trusted by the machine.

In order to open the Windows Root KeyStore, click on **Menu File > Open > Open Windows Root CA KeyStore**. A new tab will be opened containing the Windows Root KeyStore entries.

Native confirmation dialogs will be displayed upon, adding, deleting.

If you want to add an entry, but the current KeyStore already contains an entry with the same SHA1 fingerprint, you will have to choose to overwrite the old entry or not because Windows Root CA KeyStore do not allow more entries with the same content. The operating system, will ask for a confirmation of deleting the entry from the Root Store and also a Security Warning from the operating system will be displayed, informing about the installing of a new entry.

## 5.6.2 Open Windows User KeyStore

This operation is functional only on Microsoft Windows platforms. In order to open Windows User KeyStore, click on **Menu File > Open > Open Windows User KeyStore**. A new tab will be opened containing the Windows User KeyStore entries.

Due to a JRE 1.6 64-bit distribution limitation opening the Windows KeyStores is not functional on Microsoft Windows 64-bits Releases. JRE 1.7 resolves this issue, as well as using a 32-bit distribution of JRE 1.6. For this reason the bundled CERTivity setup is using the 32-bit distribution of JRE 1.6.

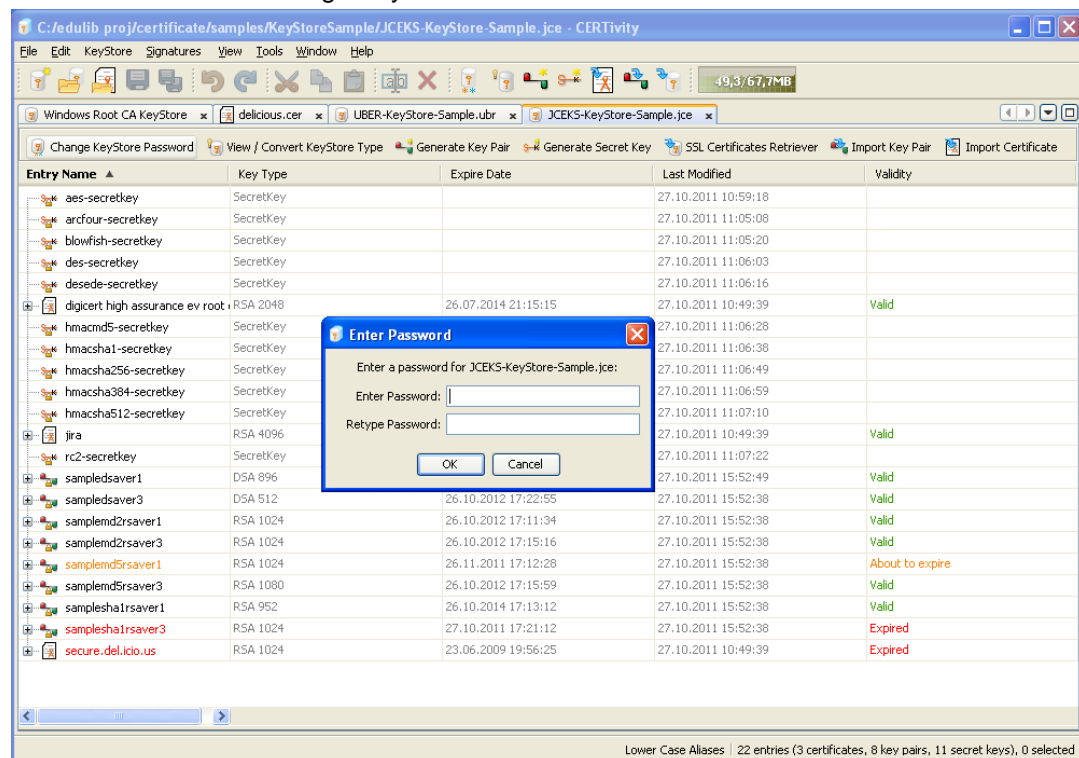
## 5.7 Change KeyStore Password

In order to change a KeyStore password, open the desired KeyStore (**Menu File > Open > Open KeyStore**) and click on **"Change KeyStore password"** or use the toolbar



A new dialog will be opened, for entering the new password. The password must be retyped. In case of error the message "Entered passwords do not match" will appear.

A screenshot for the Change KeyStore Password action can be seen below:



## 5.8 View / Convert KeyStore Type

In order to view / convert a KeyStore type, click on **view / Convert KeyStore type** of the opened KeyStore window. The available KeyStore types are:

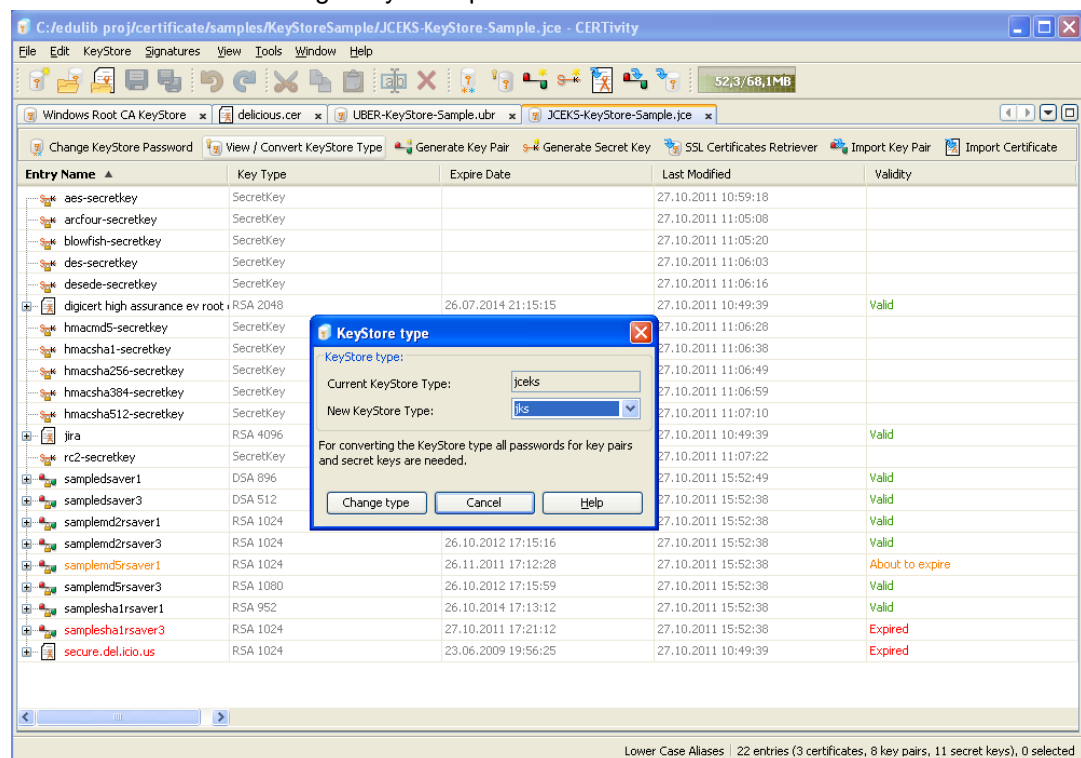
- jks - Java KeyStore (Oracle's KeyStore format);
- pkcs12 - Public-Key Cryptography Standards #12 KeyStore (RSA's Personal Information Exchange Syntax Standard);

- jceks - Java Cryptography Extension KeyStore (More secure version of JKS);
- bks - Bouncy Castle KeyStore (Bouncy Castle's version of JKS);
- uber - Bouncy Castle UBER KeyStore (More secure version of BKS).

After selecting the new desired KeyStore type, click on **Change type** button.

For converting the KeyStore type all passwords for key pairs and secret keys are needed!

A screenshot for the change KeyStore password action can be seen below:



## Note

When converting to a pkcs12 KeyStore type, the KeyStore password and the entry passwords will be lost (because the pkcs12 has no passwords).

When converting from pkcs12 to any other KeyStore type, passwords will be required.

## Note

In uber KeyStore type the alias name is case sensitive.

## 5.9 View Certificate Details

From the KeyStore window, you can view specific details for the selected certificate in the Details Panel. The following certificate details will be displayed, similar to opening a standalone certificate:

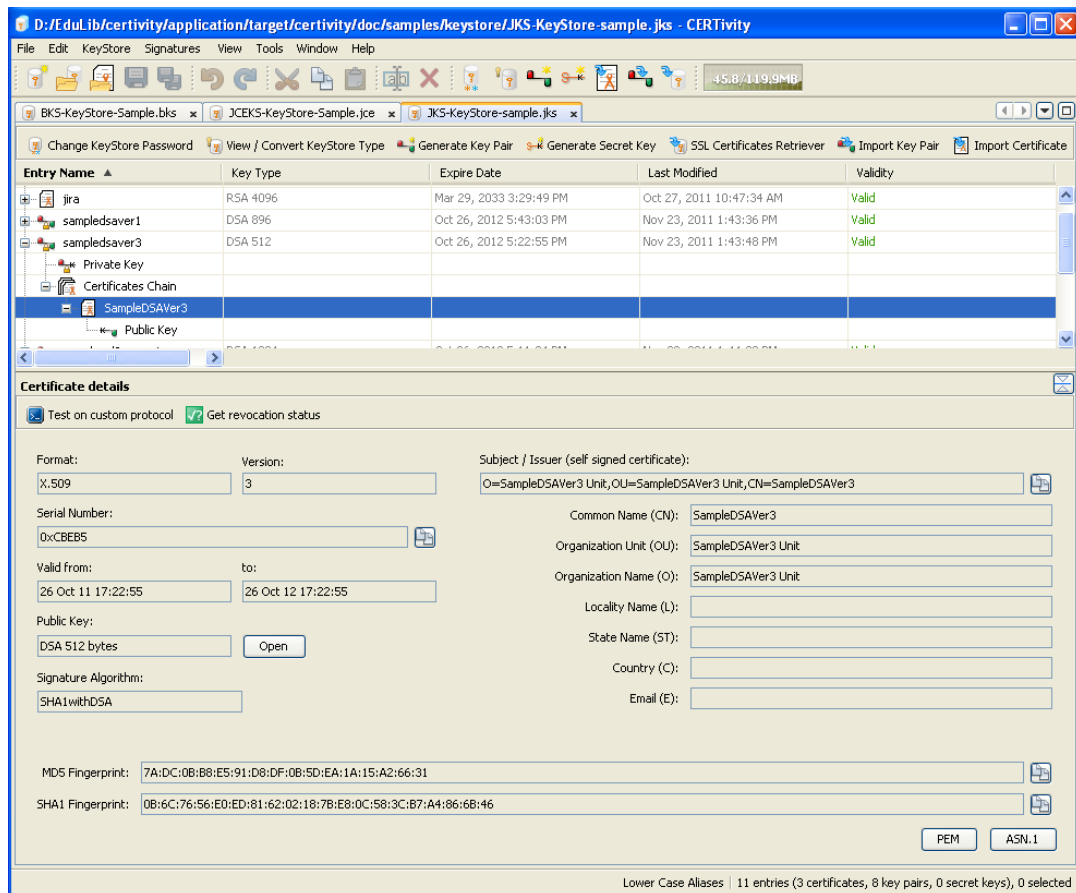
- Format;
- Version;
- Serial Number;
- Validation date period;
- Public Key;
- Signature Algorithm;
- Subject / issuer;
- Common Name (CN);
- Organization Unit (OU);
- Organization Name (O);
- Locality Name (L);
- State Name (ST);
- Country (C);
- Email (E);
- MD5 Fingerprint;
- SHA1 FingerPrint.

The certificate details part of the KeyStore window contains also the following actions available:

- Test on custom protocol - which will open a new window for testing the certificate;
- Get revocation status - which will open a new window for the revocation status;
- Open Public Key - which will position the TreeTable on the Public Key node under the Certificate entry and will populate the Details Panel with details about the Public Key (algorithm, key size, modulus, public exponent, ASN.1);
- PEM - which will open a new window containing the PEM representation of the certificate;
- ASN.1 - which will open a new window containing the ASN.1 representation of the certificate.

A screenshot for Certificate's Details in the KeyStore window can be seen below:



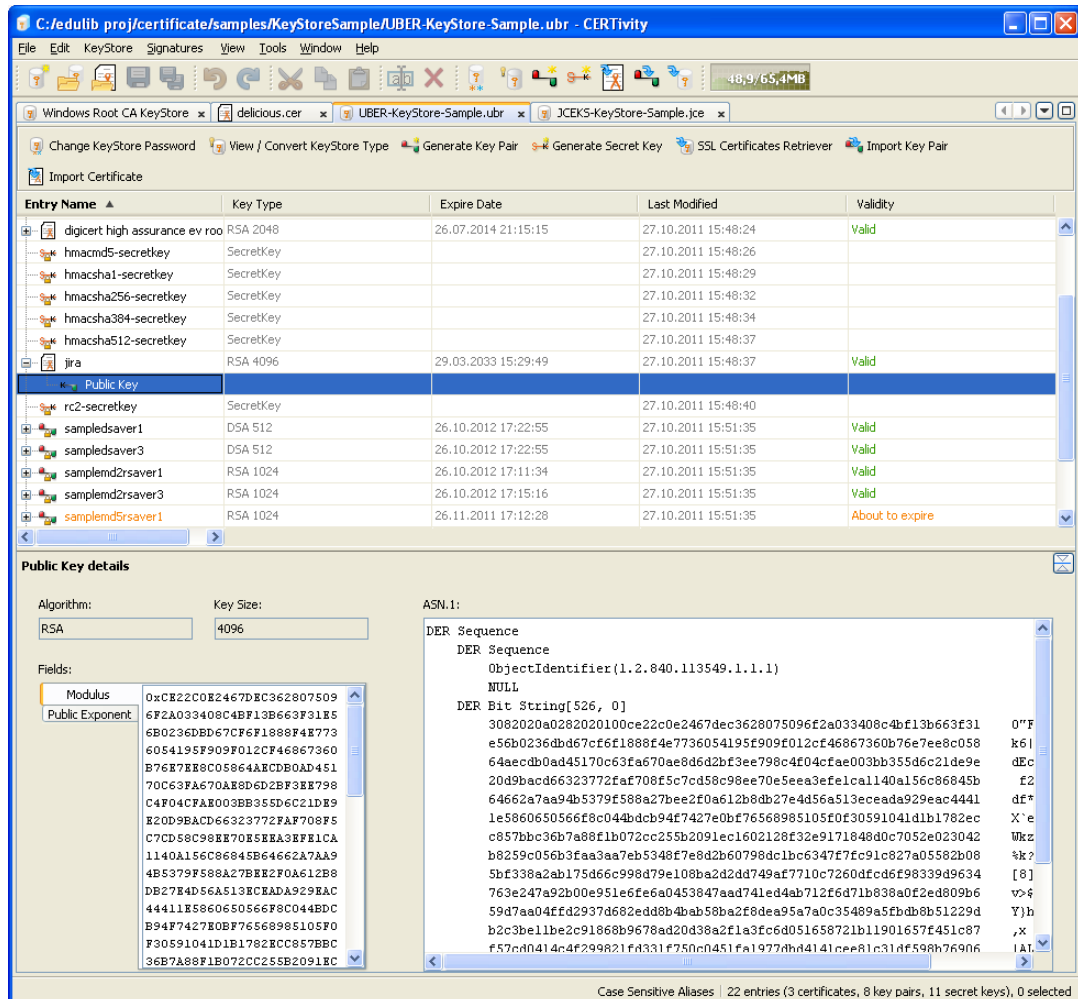


## 5.10 View Public Key Details

When selecting a Public Key entry name in the KeyStore window, the public key details are displayed at the bottom of the window. The Public Key details that can be retrieved this way, are:

- Algorithm;
- Key size;
- ASN.1 representation;
- Modulus;
- Public Exponent;

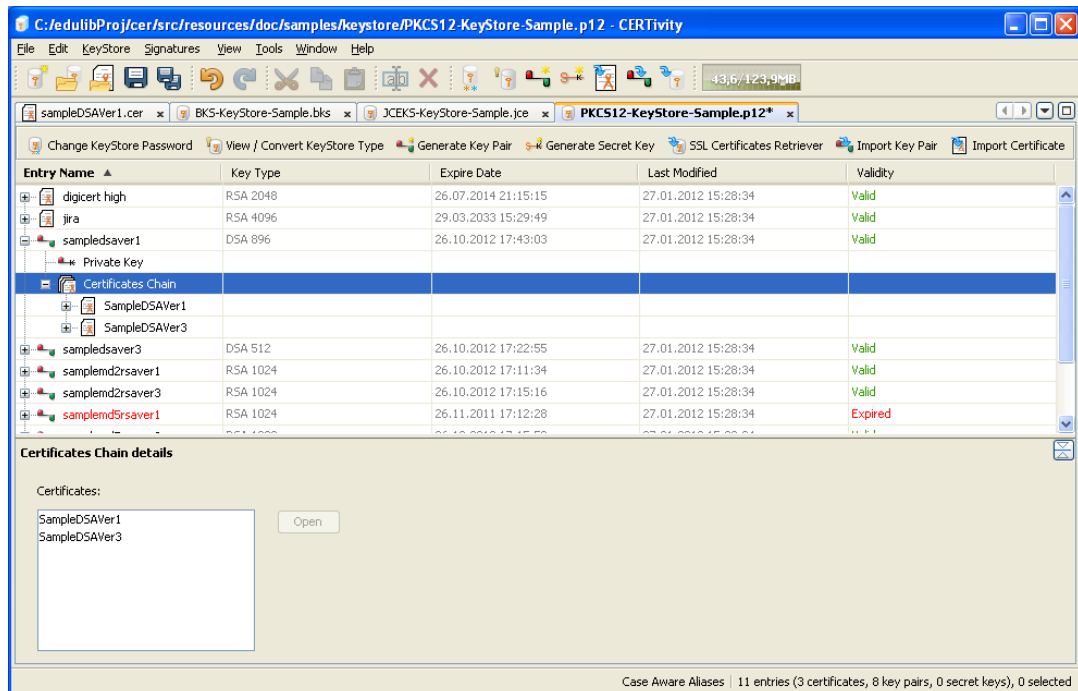
A screenshot for a certificate's public key details can be seen below:



## 5.11 View Certificate Chain Details

In order to view certificate chain details, open the desired KeyStore (Menu **File** > **Open** > **Open KeyStore**) and click on the entry name **Certificate Chain**.

In the bottom part of the window, you can see the list with all the certificates. More details for all the certificates from the list can be obtained by selecting one certificate and clicking on **Open** as well as selecting the certificate directly from the Tree view. It is also possible to select a certificate from the chain and copy it into the clipboard in order to paste it into another KeyStore or even in the current one.

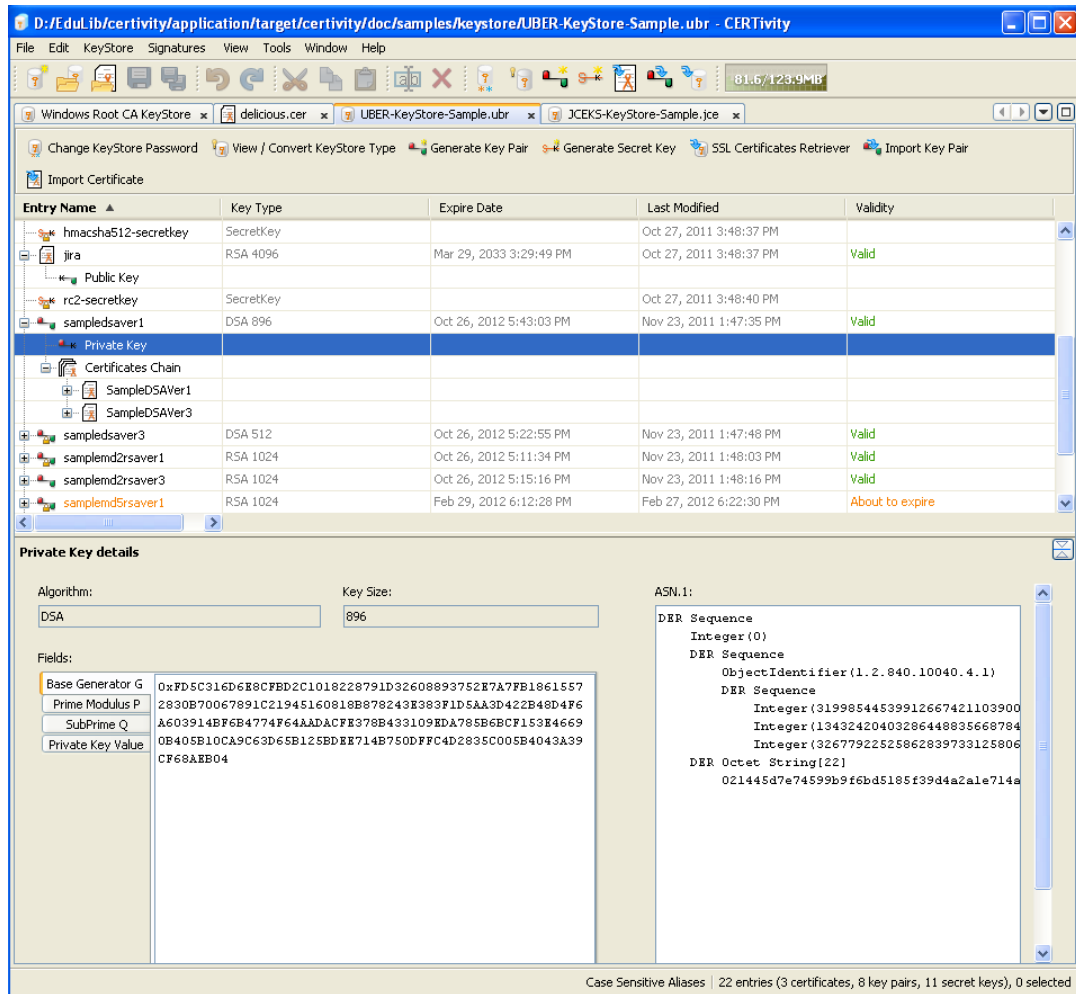


## 5.12 View Private Key Details

When selecting a Private Key entry name in the KeyStore window, after introducing the correct password, the private key details are displayed at the bottom of the window. The Private Key details that can be retrieved this way, are:

- Algorithm;
- Key size;
- ASN.1 representation;
- Base Generator G;
- Prime Modulus P;
- SubPrime Q;
- Private Key value.

A screenshot for private key details can be seen below:

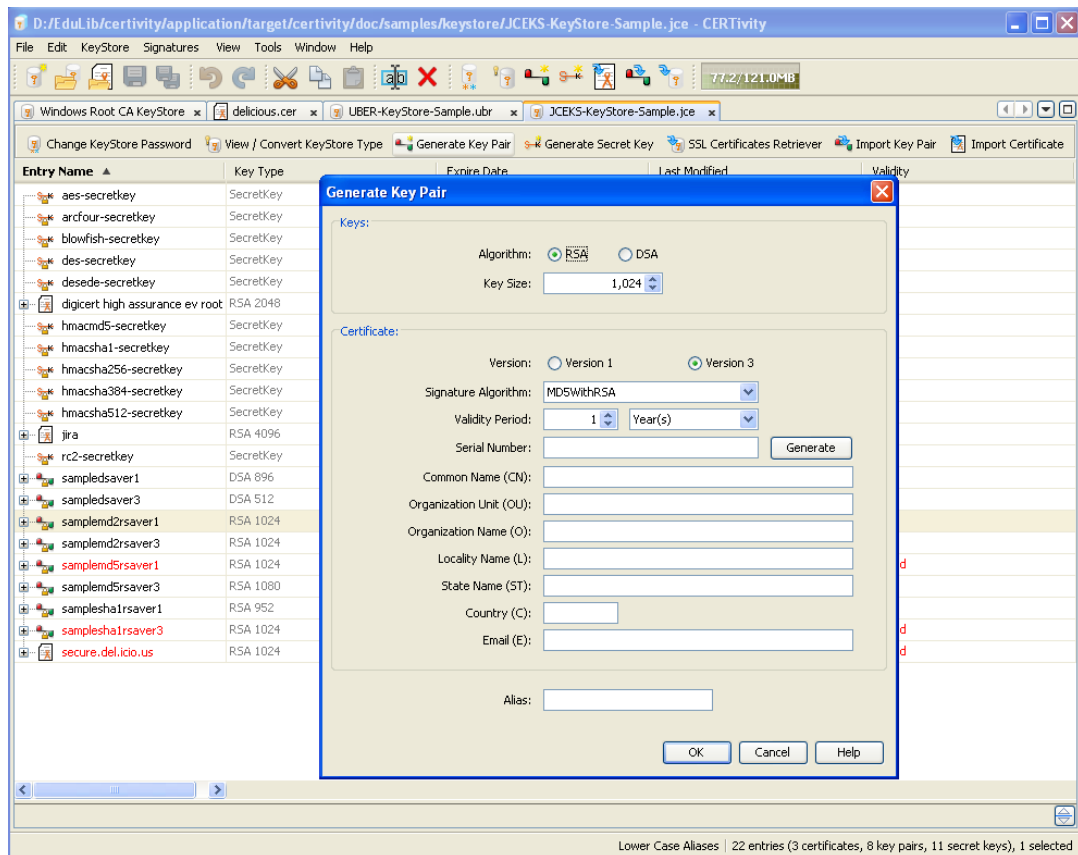


## 5.13 Generate Key Pair

In order to generate a Key Pair and add it into the current KeyStore, click on **Generate Key Pair**. A new window will be opened, containing:

- a section for Keys, where you have to select the desired algorithm and size for the future Key Pair;
- a section for the Certificate, where you have to complete the certificate related fields;
- an alias for the Key Pair entry in the current KeyStore.

A screenshot for generate key pair action can be seen below:



Depending on the algorithm selected the key size and the signature algorithm are different.

- For RSA the minimum key size is 512 bits, while the maximum is configurable from **Menu Tools > Options > RSA Key Pair max size**. The reason for this is that for higher RSA key size values the processing time for creation, as well as for using that key for encrypting/decrypting will be too big which will be very unsuitable in production. The key-size has to be a multiple of 8 - this is also the spinner increment.

If a value out of the range 512–Max is provided then a warning will be issued upon pressing OK.

The default key size value that appears initially in the Generate Key Pair dialog can be set from **Menu Tools > Options > RSA Key Pair default size**.

The signature algorithm for RSA can be one of the followings: MD5WithRSA, MD2WithRSA or SHA1WithRSA. The default signature algorithm is MD5WithRSA.

- For DSA the minimum key size is 512 bits and the maximum is 1024 bits. The key size must also be a multiple of 64 - this is ensured by the spinner. If a value out of the range 512–1024 is provided then a warning will be issued upon pressing OK.

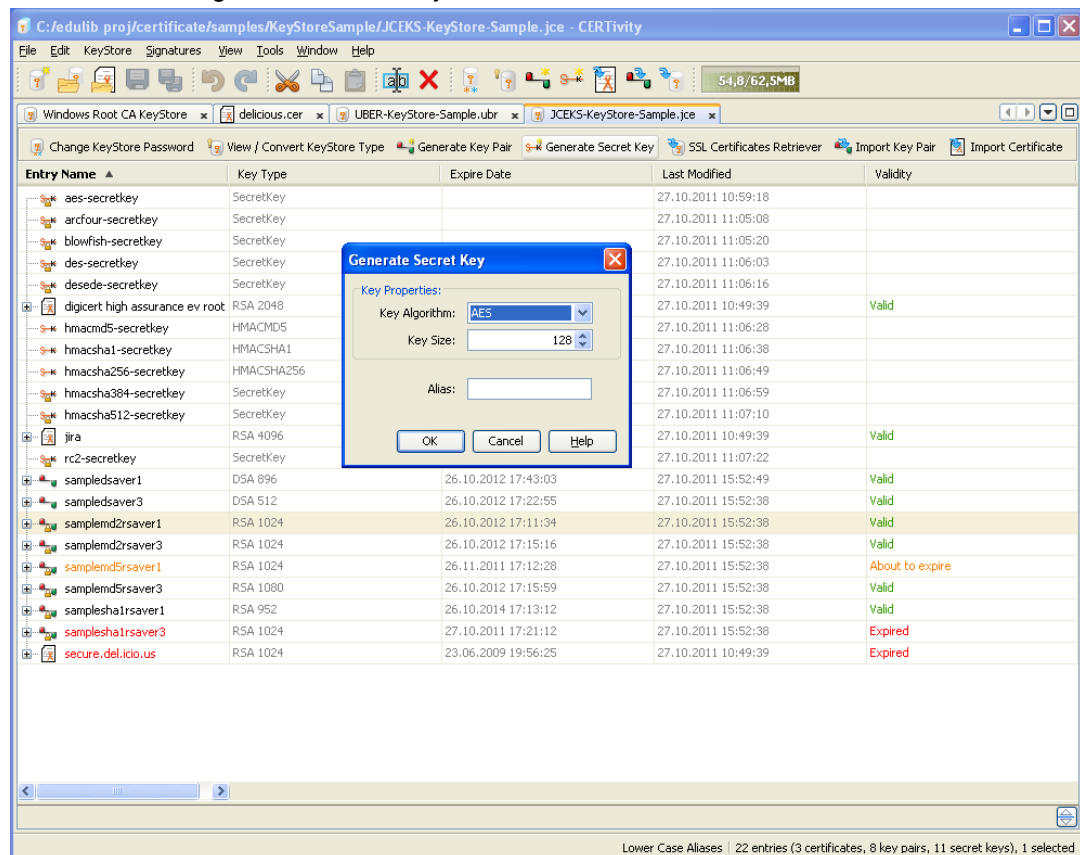
The signature algorithm for DSA can only be SHA1WithDSA.

## 5.14 Generate Secret Key

In order to generate a Secret Key and add it into the current KeyStore, click on **Generate Secret Key**. In the new window, the following fields must be completed:

- Key Algorithm;
- Key Size whose value (range or even exact values) depend on each Key Algorithm; the Key Algorithm also dictates the JCE provider used (Default or Bouncy Castle). See the table from the end of this section for the exact distribution;
- Alias.

A screenshot for generate secret key action can be seen below:



## Note

JKS and PKCS#12 KeyStore types do not support storing Secret Keys. This is a limitation of the standards, not of the CERTivity application.

The key algorithms are dictating the JCE provider and the key sizes supported. These are depicted in the following table.

Table 5.2. Size and Provider for Secret Keys

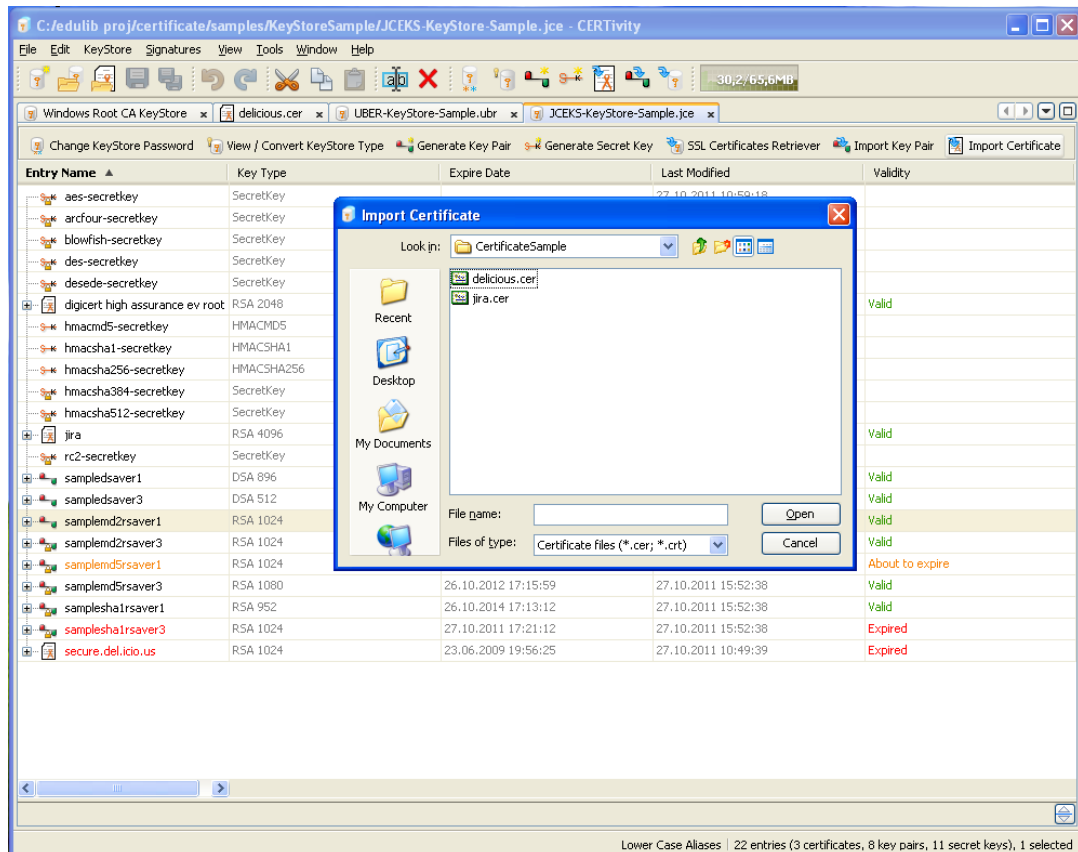
Key Algorithm	Key Size	Provider
AES	128 - 256, multiple of 64	Bouncy Castle
ARCFOUR	40 - 1024	Default
Blowfish	32 - 448, multiple of 8	Bouncy Castle
DES	64	Bouncy Castle
DESede	128,192	Bouncy Castle

Key Algorithm	Key Size	Provider
HmacMD5	1-	Bouncy Castle
HmacSHA1	1-	Bouncy Castle
HmacSHA256	40-	Bouncy Castle
HmacSHA384	40-	Bouncy Castle
HmacSHA512	40-	Bouncy Castle
RC2	40-1024	Bouncy Castle

## 5.15 Import Trusted Certificate

In order to import a trusted certificate, click on **Import trusted certificate** in the KeyStore window. Then, the desired certificate can be selected and an entry alias can be associated with it.

A screenshot for import trusted certificate action can be seen below:



## 5.16 Import Key Pair

In order to import a trusted certificate, click on **Import Key Pair** in the KeyStore window. Three types of Key Pairs can be imported:

- PKCS#12 - which defines a file format commonly used to store private keys with accompanying public key certificates, protected with a password-based symmetric key;
- PKCS#8 - which is used to carry private certificate key pairs (encrypted or unencrypted);

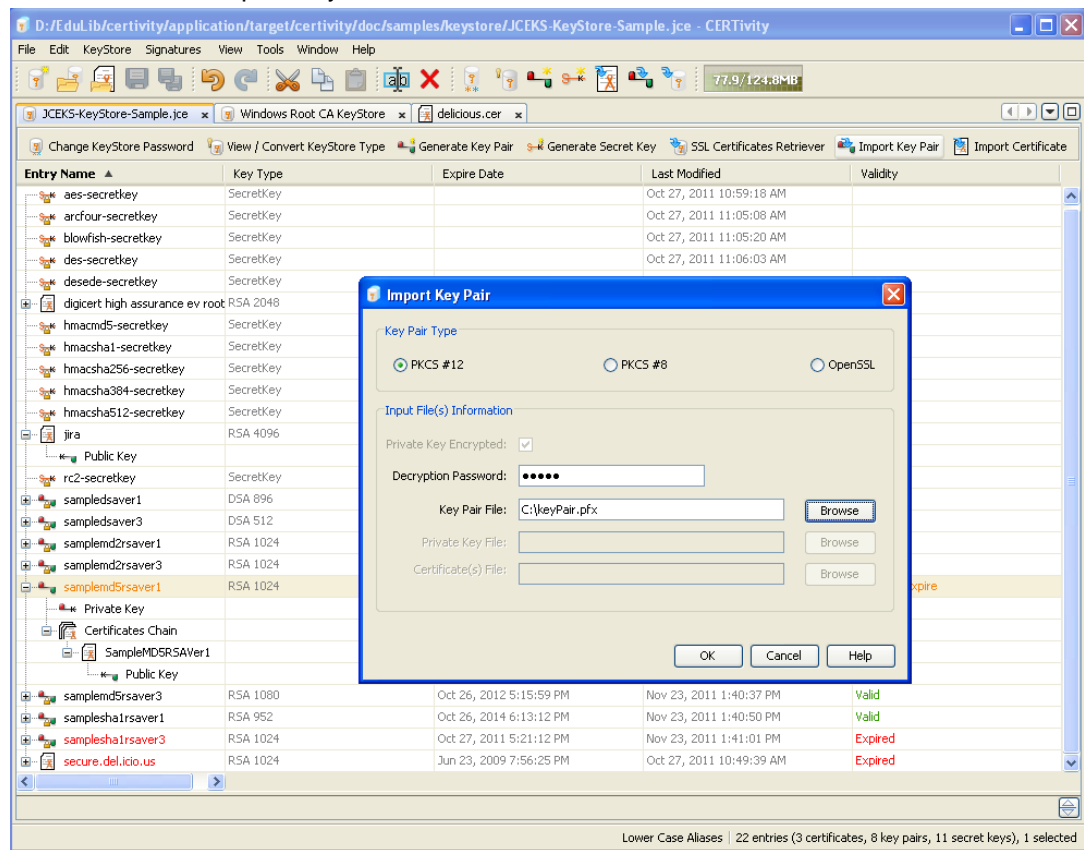
- OpenSSL - with which a public key doesn't need to be generated separately because the private key contains the public key information as well;

In the "Input File(s) Information" area contains the following fields, which are enabled depending on the previously selected Key Pair type:

- the decryption password;
- the Key Pair File;
- the Private Key File;
- the Certificate(s) File.

The files can be selected using the **Browse** button.

A screenshot for Import Key Pair action can be seen below:



## 5.17 SSL Certificates Retriever

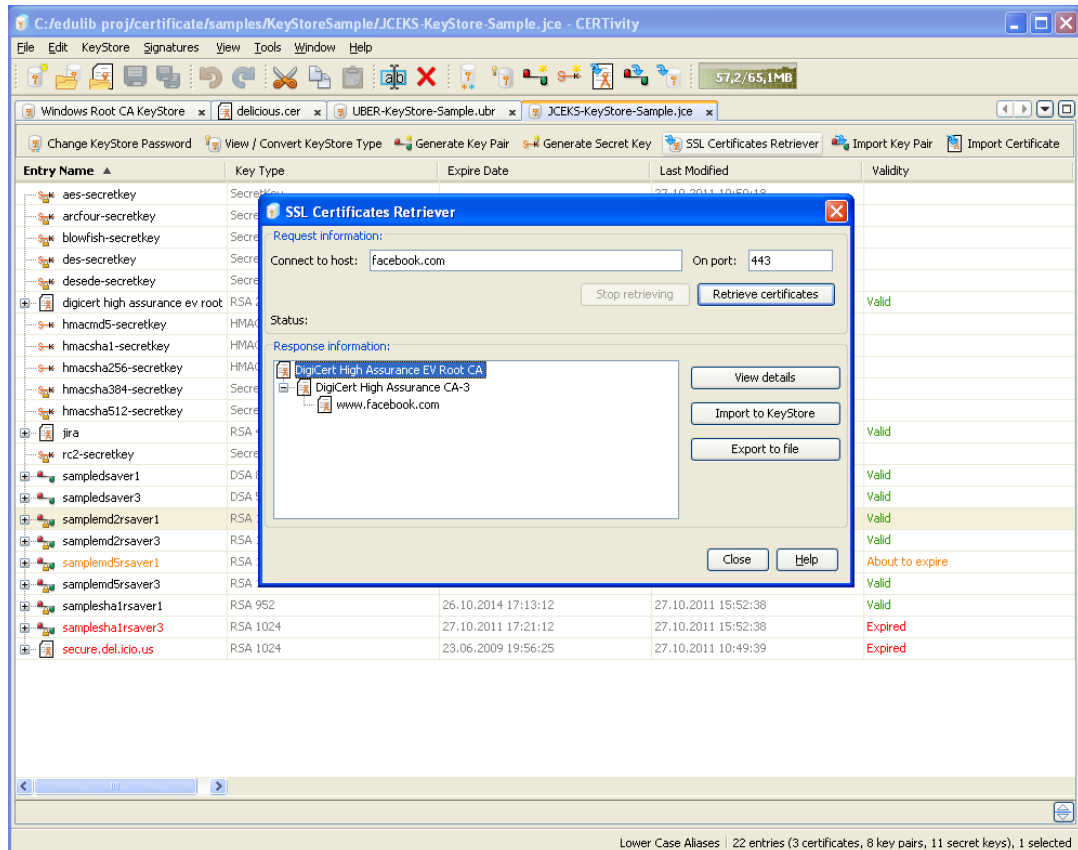
In order to import a trusted certificate, click on **SSL Certificates Retriever** in the KeyStore window. For retrieving certificates, in the host / port fields you must specify the server from which the certificates will be retrieved. If you have a HTTPS URL and you want to retrieve the certificates then you need to enter the host without any path and the port separately. By default the HTTPS port is 443.

The server response is available in the "Response information" area. For the retrieved certificates, the available actions are:



- View details;
- Import to KeyStore;
- Export to file.

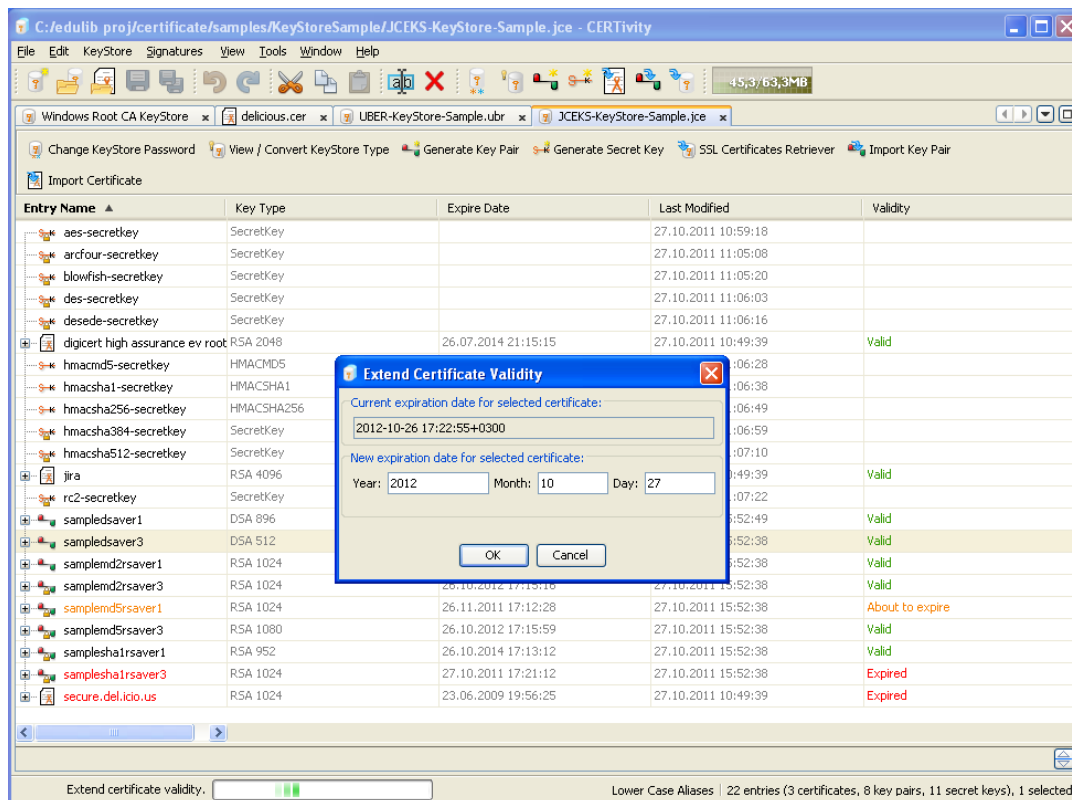
A screenshot for SSL Certificates Retriever action can be seen below:



## 5.18 Extend Validity

In an opened KeyStore window, select the key pair entry and click on the right mouse button. From the popup menu select **Extend validity**. A new expiration date must be selected. This functionality makes sense only for the KeyPairs containing only a self signed certificate.

A screenshot for extend certificate's validity action can be seen below:



## 5.19 Generate CSR File

In order to generate a Certificate Signing Request file for a Key Pair entry, in an opened KeyStore window, select that Key Pair entry and invoke the contextual menu (usually by clicking the right mouse button). In this contextual menu select **Generate CSR File**. For generating a CSR file, you have to specify:

- the name of the generated file;
- the algorithm to use for signing the request; this is automatically adjusted based on the key algorithm used in the KeyPair. For DSA the possible signing one is SHA1withDSA, while for RSA keys the possible selections are: MD2WithRSA, MD5WithRSA, SHA1WithRSA.
- the challenge - the challenge-password attribute, which specifies a password by which the entity may later request certificate revocation.

The supported CSR formats are PKCS #10 and SPKAC (Signed Public Key and Challenge). These are selectable from the file chooser filter list.

## 5.20 Import CA Reply

In an opened KeyStore window, select a key pair entry and invoke the contextual menu (usually by clicking the right mouse button). In this menu select **Import CA Reply**. The CA Reply can be chosen from a file chooser.

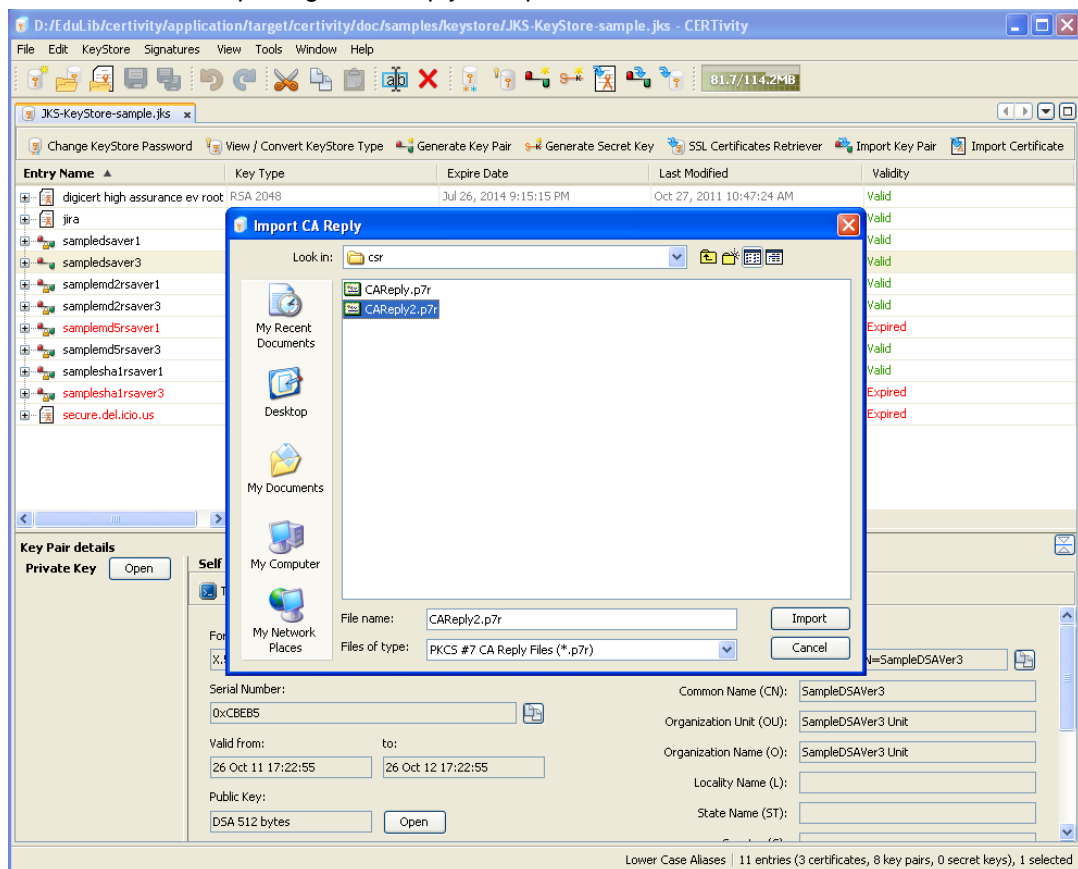
Importing the CA Reply will replace your self-signed certificate with a certificate chain. This chain will be either the one returned by the CA in response to your request (if the CA reply is a chain) or one constructed (if the CA reply is a single certificate) by using the certificate

reply and trusted certificates that are already available in the KeyStore. Each certificate in the chain is verified, using the certificate at the next level higher in the chain by validating the signatures with the public key, and also by verifying that the subject of the certificate is equal with the issuer of the next certificate at the next level.

The process of importing a CA Reply is more detailed and implies a series of validations and steps for constructing (or complete) the chain from the CA Reply if it is a single certificate. There are two types of validations performed: one type which is critical and stops the validation process if it fails, and one type which will inform the user that the CA Reply chain may not be valid or trusted and lets you choose if the import process should continue or not.

The chain of certificates representing the received or constructed CA Reply is considered to be valid if the signature of each certificate is verified by the public key of the certificate on the next higher level in the chain. Also, for the import process to be able to be performed, it is necessary that the chain of the CA Reply to correspond to the entry for which the import is being made. This means that the public key of the first certificate in the chain to be equal to the public key of the self-signed certificate which it should replace in the KeyPair selected for performing the import. Although a certificate chain corresponding to a CA Reply may be valid, and may correspond to the selected entry, it may not be always trusted. The chain is considered to be trusted if the top certificate is trusted, which means, to be present in the KeyStore in which the CA Reply is imported.

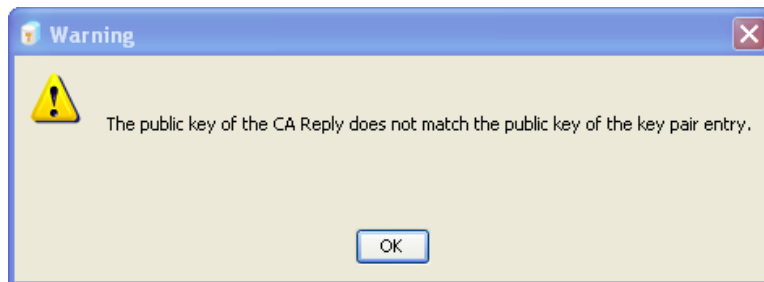
A screenshot for importing a CA Reply is depicted below:



The steps and validations for importing a CA Reply and the order in which they are performed in CERTivity® are as following:

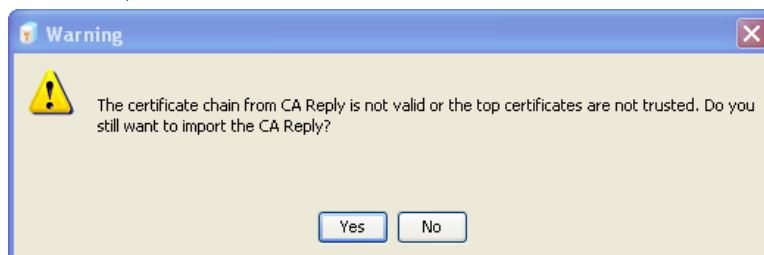
- If the CA Reply contains only a single certificate, a valid certificates chain is attempted to be established using the certificates present in the KeyStore in which the CA Reply is being imported. If this is not possible, you will be prompted to take a decision if the certificate from the CA Reply should be imported as it is or not;
- If the CA Reply contains a chain of certificates, (or if the chain was created using existing certificates) the chain is sorted to have the root certificate last and the user certificate first (if this is not already sorted in this way);
- The chain is then verified for validity which means that for each certificate is checked that its signature is verified by the public key of the certificate at the next higher level in the chain and that its issuer is equal to the subject of the higher level certificate;
- Then, the chain is verified to belong to the entry for which it should be imported, which means that the public key of the first certificate from the chain is tested to be equal to the public key of the self-signed certificate from the KeyPair for which the import attempt is performed. If the chain does not belong to this entry, the import process will stop and you will be informed by an error message that the CA Reply does not belong to that entry.

The error message will contain the information "The public key of the CA Reply does not match the public key of the key pair entry", as it can be seen in the screenshot below:



- The next validation verifies that the top certificate of the chain is trusted, which means that the certificate is searched in the KeyStore in which the import action takes place. If found, then the CA Reply chain is trusted, and it will be imported in the selected KeyPair. Else, a trusted root certificate will be searched for this chain in the KeyStore by verifying if the signature of the top certificate from the chain is verified by any of the certificates from the KeyStore. If found, the certificate is appended to the certificate chain, and the updated valid and trusted certificate chain will be imported as the CA Reply. Else, you will be informed that trust could not be established for the given CA Reply and you will be asked to decide if the CA Reply should be imported or not.

For example, when importing a CA Reply which was created by some authority which is not considered trusted relatively to the current KeyStore (its certificates are not present in the KeyStore), you will be prompted with a warning message, informing you that the CA Reply is either not valid or not trusted, and allowing you to import it anyway, or cancel the action, as it can be seen in the screenshot below:



A CA Reply file can be obtained by sending a CSR (Certificate Signing Request) to a Certificate Authority, which will sign it and send back a CA Reply file (usually a file of the type PKCS#7 CA Reply File, having the extension .p7r). Creating a CSR file can be done using CERTivity® as it is described in the section [Generate CSR File](#).

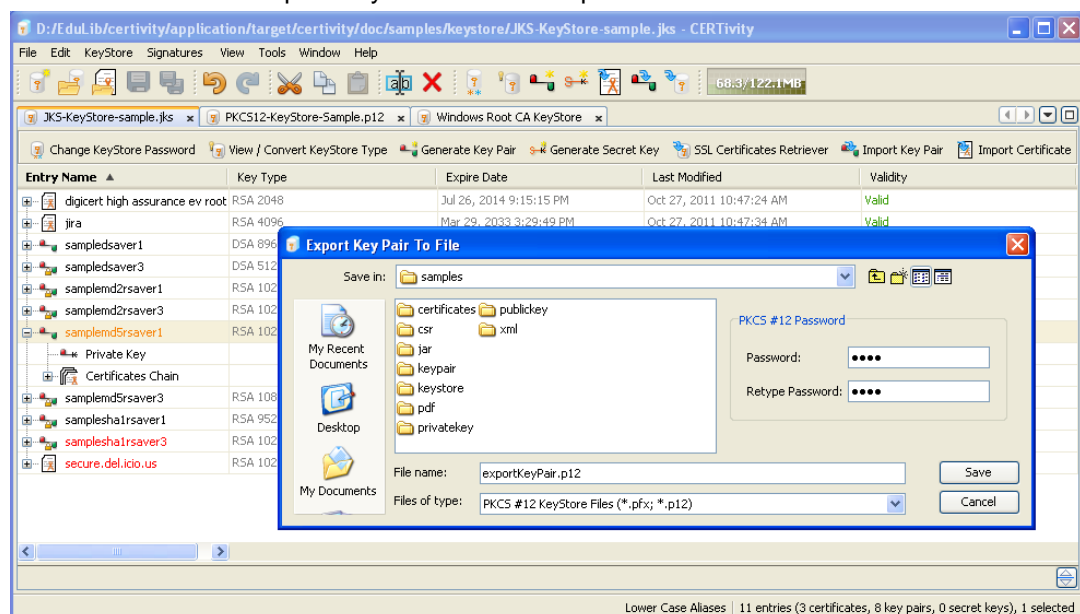
The CA Reply can also be obtained using CERTivity® to sign the CSR file, by performing the following steps:

- Select a KeyPair entry, and generate a CSR file (as described in the section Generate CSR file). A CSR file will be obtained;
- Sign the CSR file obtained at the previous step. The process for signing CSR files is explained in the section [Signing CSR Files](#). The resulting file will be the actual CA Reply file which can then be imported for the KeyPair for which the CSR file was generated;
- Import the CA Reply for the corresponding KeyPair entry.

## 5.21 Export Key Pair

In an opened KeyStore window, select the key pair entry and click on the right mouse button. From the popup menu select **Export** > **Export Key Pair** action. The Key Pair will be exported in the selected file. The Key Pair can be exported in PKCS #12 KeyStore Files format. Also, a PKCS #12 password is required. While exporting a Key Pair, an error might occur if the password length is too long - this has to do with the out of the box Java Cryptography Extension (JCE) limited Strength Jurisdiction Policy Files.

A screenshot for the export Key Pair action is depicted below:



## 5.22 Export Certificate Chain

In an opened KeyStore window, select the key pair entry and click on the right mouse button. From the popup menu select **Export** > **Export Certificate Chain** action. The Certificate Chain will be exported in the selected file, having the following formats:

- PKCS #7 Certificate Files;
- PKCS #7 Certificate Files (PEM encrypted);

- PKI Path Certificate Files.

## 5.23 Export Certificate

In an opened KeyStore window, select the certificate entry and click on the right mouse button. From the popup menu select **Export > Export Certificate**. The certificate will be exported in the selected file. The certificate can be exported in the following formats:

- X.509 Certificate Files;
- X.509 Certificate Files (PEM encrypted);
- PKCS #7 Certificate Files;
- PKCS #7 Certificate Files (PEM encrypted);
- PKI Path Certificate Files.

Note that certificates can also be exported from signed files or from a SSL source.

## 5.24 Export Public Key

In an opened KeyStore window, select the certificate entry and click on the right mouse button. From the popup menu select **Export > Export Public Key** action. The Public Key will be exported in the selected file. The Public key can be exported in the following formats:

- OpenSSL;
- OpenSSL (PEM encrypted).

## 5.25 Export Private Key

In an opened KeyStore window, select the key pair entry and click on the right mouse button - if the private key is not unlocked you will be prompted for the private key password. From the popup menu select **Export > Export Private Key** action. The exported Private Key type can be PKCS #8 (both binary and PEM) or OpenSSL - this is selectable from the right side of the file chooser window. The exported key can also be encrypted (in this case an encryption algorithm and a password must be provided) or not. For PKCS #8 one can further chose to PEM encode the file, by using the File Chooser filter (Files of type: PKCS #8 Private Key Files (PEM encoded) (\*.pkcs8)).

The Private Key will be exported in the selected file, having the following formats, depending on the export Private Key Type and file chooser filter selection:

- PKCS #8 Private Key Files;
- PKCS #8 Private Key Files (PEM encoded);
- OpenSSL Private Key Files (PEM encoded).

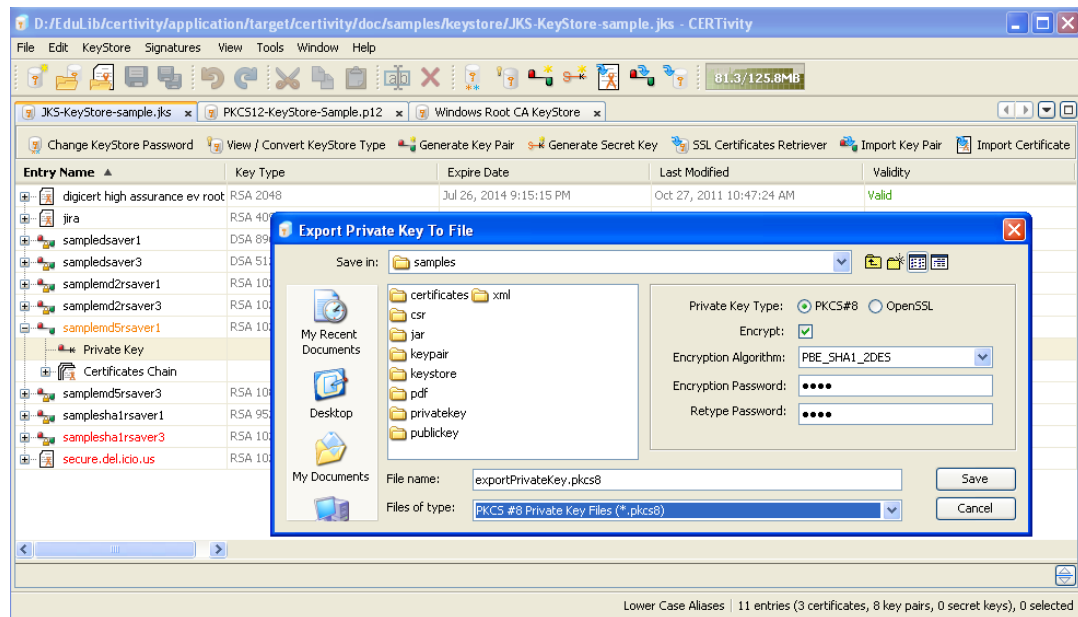
The encryption algorithm is dependent on the selected export Private Key Type and CERTivity automatically changes this in the list.

Table 5.3. Encryption Algorithm for Private Keys

Type	Encryption Algorithm
PKCS #8	PBE_SHA1_2DES

Type	Encryption Algorithm
OpenSSL	PBE_SHA1_3DES
	PBE_SHA1_RC2_128
	PBE_SHA1_RC2_40
	PBE_SHA1_RC4_128
	PBE_SHA1_RC4_40
	AES-128-CBC
	AES-128-CFB
	AES-128-ECB
	AES-128-OFB
	BF-CBC
	BF-CFB
	BF-ECB
	BF-OFB
	DES-CBC
	DES-CFB
	DES-ECB
	DES-EDE-CBC
	DES-EDE-CFB
	DES-EDE-ECB
	DES-EDE-OFB
	DES-EDE
	DES-EDE3-CBC
	DES-EDE3-CFB
	DES-EDE3-ECB
	DES-EDE3-OFB
	DES-EDE3
	DES-OFB
	RC2-40-CBC
	RC2-64-CBC
	RC2-CBC
	RC2-CFB
	RC2-ECB
	RC2-OFB

A screenshot for the export Private Key action is depicted below:



## 5.26 Rename a KeyStore Entry

You can rename an entry contained in a KeyStore. There are more ways to do the renaming action:

- using **Edit Menu > Rename** ;
- using the context menu (by clicking the right mouse button and then on **Rename**);
- using the Rename toolbar icon;
- use the keyboard shortcut, by default **CTRL+R** key.

Note that the alias will not be changed if the alias already exists in the KeyStore. An error message will notify the user in this cases, so the user can give an another alias.

## 5.27 Delete KeyStore Entry

You can delete an entry (either certificate, key pair or secret key) contained in a KeyStore. There are more ways to do the deleting action:

- using **Edit Menu > Delete** ;
- using the context menu (by clicking the right mouse button and then on **Delete**);
- using the Delete toolbar icon;
- use the keyboard shortcut, by default **Delete** key.

Note that a "Confirm Entry Delete" window will be displayed first, so the user has the possibility to change his mind regarding the delete action. In case of the native Windows Root KeyStore the OS will prompt for a native confirmation dialog as well.

## 5.28 Copy KeyStore Entry

You can copy KeyStore entries (Certificates, Key Pairs and Secret Keys) as well as certificates part of a Key Pair's Certificates Chain into the clipboard. There are more ways to do the copying action:



- using **Edit Menu > Copy** ;
- using the context menu (by clicking the right mouse button and then on **Copy**);
- using the Copy toolbar icon;
- use the keyboard shortcut, by default **CTRL+C** key.

## 5.29 Cut KeyStore Entry

You can remove the currently selected entry from a KeyStore and place it in the clipboard. There are more ways to do the cut action:

- using **Edit Menu > Cut**;
- using the context menu (by clicking the right mouse button and then on **Cut**);
- using the Cut toolbar icon;
- use the keyboard shortcut, by default **CTRL+X** key.

## 5.30 Paste KeyStore Entry

You can insert the KeyStore entry (including a Certificate part of a Certificates Chain) from the clipboard in another KeyStore or even in the same KeyStore (an overwrite/rename confirmation dialog is invoked in this case). The paste action is active when, in the target KeyStore, the selection is not on a sub-entry, but on a main entry or there is nothing selected. There are more ways to trigger the paste action:

- using **Edit Menu > Paste**;
- using the context menu (by clicking the right mouse button and then on **Paste**);
- using the Paste toolbar icon;
- use the keyboard shortcut, by default **CTRL+V** key.

In case the alias already exists in the KeyStore, the user has to choose between the following actions:

- Overwrite - in case of pasting a single entry and overwriting the existing entry;
- Overwrite all- in case of pasting more entries and overwriting the existing entries;
- Rename - in case of pasting a single entry;
- Rename all- in case of pasting more entries;
- Skip - in case of skipping the paste for a single entry;
- Skip all - in case of skipping the paste of all entries.

## 6. CERTivity®'s Signatures - Verify and Sign

### 6.1 Verify

Using CERTivity, you can verify signatures for:

- JAR files;
- XML files;
- PDF files.

using **Menu Signature > Verify** command.

### Note

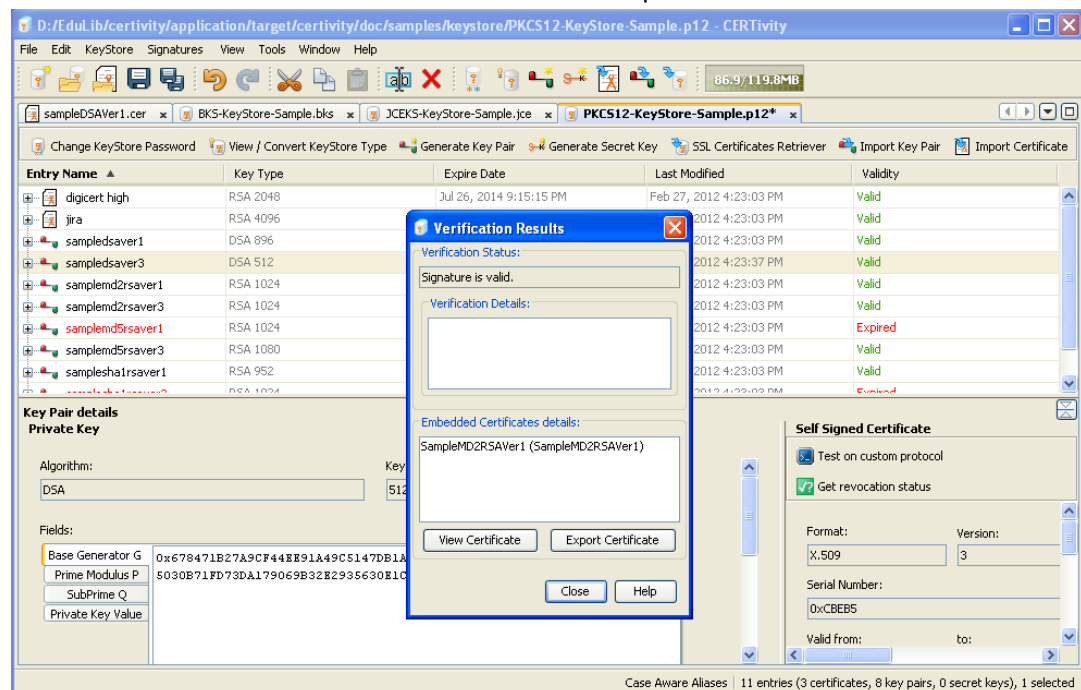
You can use the examples provided in the distribution kit in `doc/samples` folder, to test verify and sign features.

#### 6.1.1 Verify JAR Signatures

When **verifying a JAR signature**, a KeyStore entry can be selected for verifying the entry certificates. In case there is no KeyStore selected, you can continue verification of the JAR signature without checking the existence of the certificates from the jar entries in the KeyStore. An error will be displayed if KeyStore file could not be loaded or if the KeyStore password is wrong or the file is corrupt. A successful JAR file verification occurs if the signature(s) are valid, and none of the files that were in the JAR file when the signatures were generated have been changed since then. After the JAR signature verification operation, the messages that will be displayed are:

- "The JAR file was verified." in case of successful JAR signature verification;
- "The JAR file was not verified." in case the JAR file has not a valid signature.

The embedded certificate can be viewed and even exported into an external file.



## Note

You can use JAR examples provided in the distribution kit in `doc/samples/jar` folder, to test the verify JAR features.

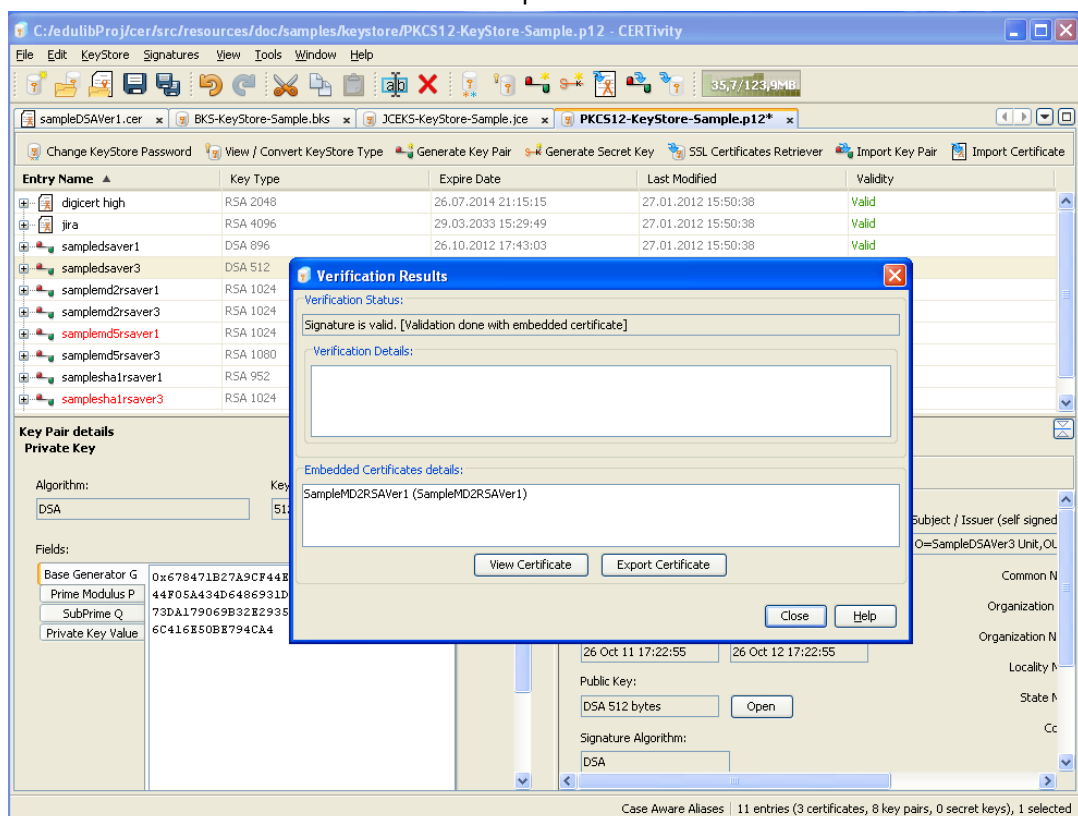
### 6.1.2 Verify XML Signatures

**XML signatures** can be used as authentication credentials or as a way to check data integrity. XML signatures can be applied to XML file, HTML pages, gif files, XML-encoded data. When validating an XML signature, an XML file must be chosen first. If there is no certificate embedded, the certificate identified by the current selected entry is used to validate the XML signature.

After the XML signature verification process, the messages that will be displayed are:

- "File not signed." in case the XML file was not signed;
- "Signature is invalid." in case the XML file signature is not valid;
- "Signature is valid." in case the XML file signature is valid. The trusted state of the embedded certificate is not checked.

If the certificates are embedded these will be shown under the "Certificates details" panel and details can be viewed or Certificates exported.



## Note

You can use XML examples provided in the distribution kit in `doc/samples/xml` folder, to test the verify XML features.

## 6.1.3 Verify PDF Signatures

The **Portable Document Format (PDF)** allows to digitally sign a document by inserting a cryptographic signature value in the file. A signature is in most cases represented by a signature field containing the name and other attributes of the signer. When verifying a PDF signature, a PDF file must be chosen first. The digital signatures CERTivity understands for PDF verification are the public/private-key encrypted document digest with the standard SubFilter values `adbe.x509.rsa_sha1`, `adbe.pkcs7.detached`, and `adbe.pkcs7.sha1`. The exact specified handler (the Filter value) is ignored when verifying the signature according to the PDF Reference "An application may substitute a different handler when verifying the signature, as long as it supports the specified SubFilter format."

After verifying the PDF signature, a dialog called "Verification Results" is presented for the Document containing the global document status and details for each Signature found. The global Verification Status can be one of:

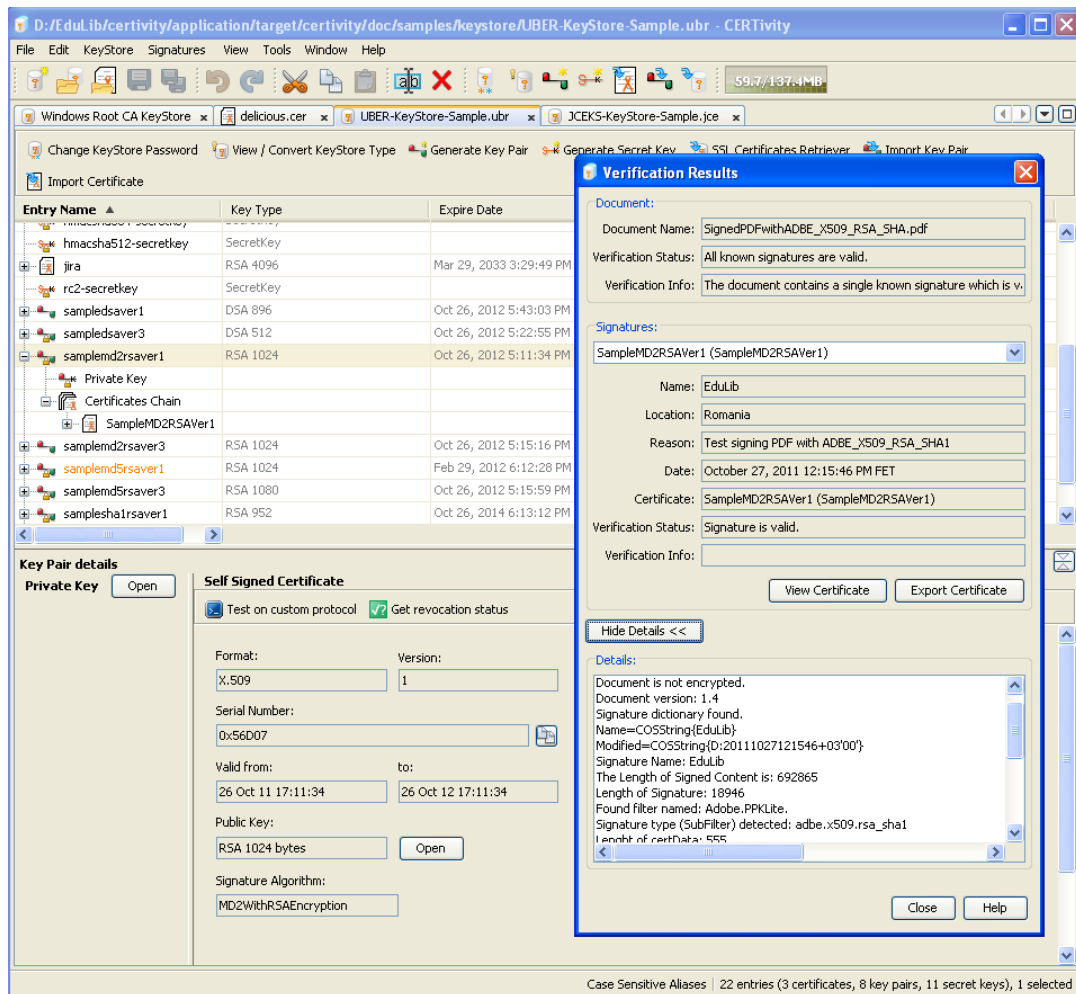
- "File not signed." in case the PDF file was not signed;
- "At least one known signature is invalid." in case at least one of the supported (known) PDF file signature is not valid;
- "All known signatures are valid." in case all of the supported (known) PDF file signatures are valid according to the sub-filter values and algorithm (including the digest being recomputed and compared with the one stored in the signature). The trusted state of the embedded certificates is not checked.
- "Unknown." in case the document is containing only unsupported SubFilters.

For each signature recognized in the document, you can see the signer details, such as name, location, reason, date, certificate, signature verification status and verification info. The embedded certificate of each signature can be viewed and even exported into an external file.

A Verbose text report can be analysed ([Show Details](#)) revealing the reason why, for example, some signatures are not valid, or revealing the value of the SubFilter/Filter. This is especially useful to observe the details for invalid cases as many information is logged. For example, according to the `adbe.pkcs7.sha1` SubFilter the signature process involves two digests - the SHA1 digest of the byte range which is encapsulated in the PKCS#7 signed-data field with ContentInfo of type Data, and then this signed-data field is digested and signed according to the PKCS#7 standard. So there are two digest verified, and if one of these fails the validation fails, and this could be visible by inspecting the Details section, for example:

```
The calculated SHA1 Message Digest coincides with the encapsulated
PKCS#7 signed-data field. Continuing the signature verification
procedure. Digest Mismatch [message-digest attribute value does not
match calculated value].
```

Although a signature may not be valid, the View Certificate/Export Certificate options can be available in many situations (usually if preliminary validation passes) as long as the certificate is embedded according to the PDF standards. For example, in the case above where the second message-digest mismatch the embedded certificate can still be viewed/exported.



## Note

You can use PDF examples provided in the distribution kit in `doc/samples/pdf` folder, to test the verify PDF features.

## Note

Verifying the signature of a PDF which is encrypted is not supported.

## 6.2 Sign

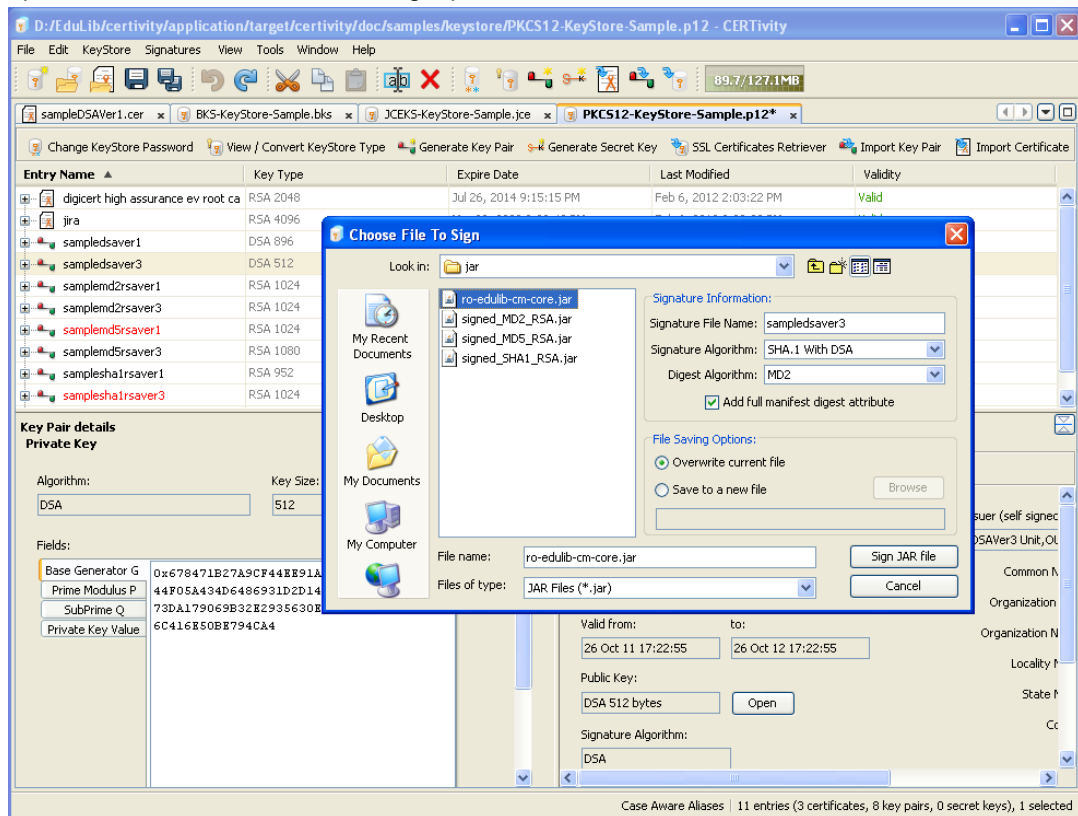
### 6.2.1 Signing JAR Files

In order to sign a JAR file, make the following steps:

- select a KeyPair from the KeyStore tree table;
- either choose the main menu **Signatures > Sign > JAR file** or the contextual menu **Sign > Jar file**;
- unlock the KeyPair if requested by providing its password;

- select the JAR file that will be signed;
- complete the signature information:
  1. signature file name;
  2. digest algorithm:
    - MD2 (reference can be found in RFC 1319);
    - MD5 (reference can be found in RFC 1321);
    - SHA1 (reference can be found in FIPS 180--3);
  3. signature algorithm - SHA1 with DSA;
  4. check the "Add full manifest digest attribute" option in case you want this attribute to be added at the signature;

The signed JAR file can be overwritten or can be saved in an other location, according to the options selected in the "File Saving Options" area.



## Note

You can use JAR examples provided in the distribution kit in `doc/samples/jar` folder, to test the sign JAR features.

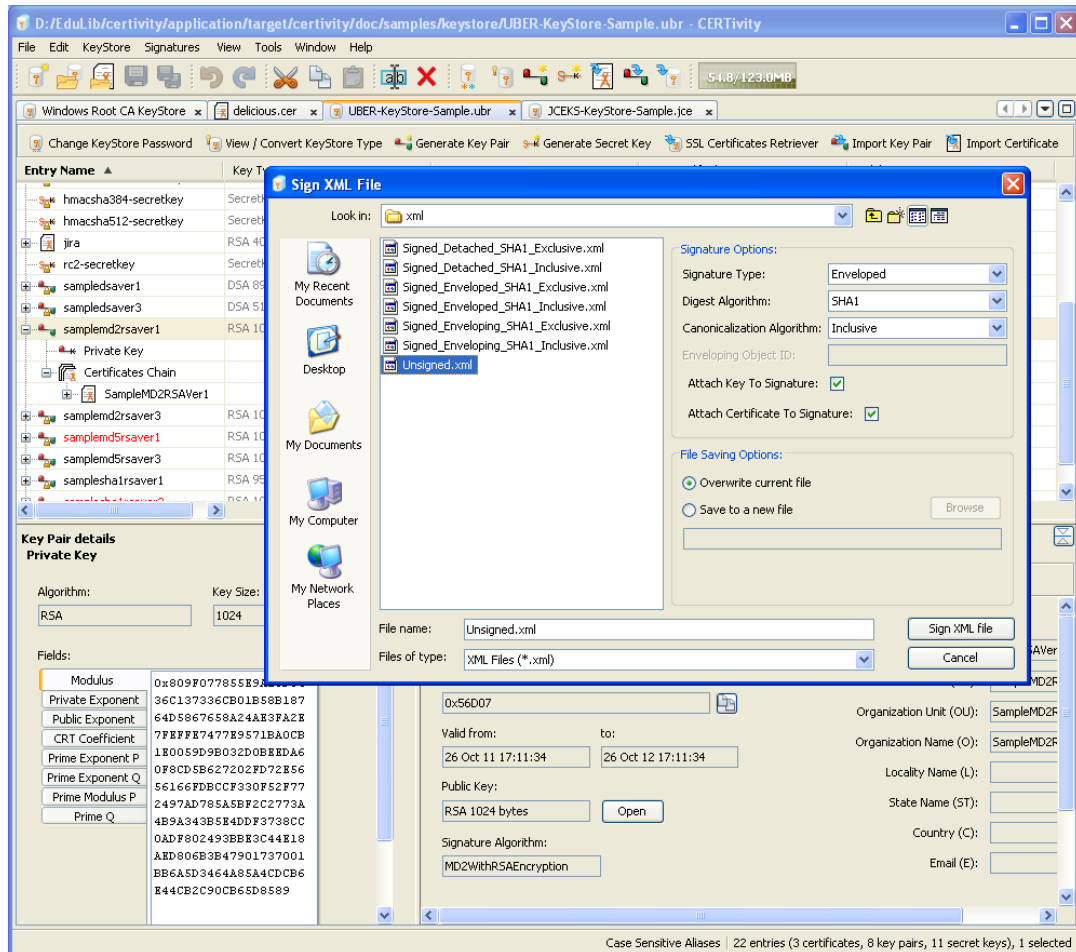
### 6.2.2 Signing XML Files

In order to sign an XML file, make the following steps:

- select a KeyPair from the KeyStore tree table;

- either choose the main menu **Signatures > Sign > XML file** or the contextual menu **sign > XML file**;
- unlock the KeyPair if requested by providing its password;
- select the XML file that will be sign;
- complete the signature options:
  1. signature type:
    - enveloped - the signature applied over the XML content that contains the signature as an element.
    - enveloping - the signature applied over the content found within an Object element of the signature itself.
    - detached - the signature applied over the content external to the Signature element, and it can be identified by way of a URI or a transform.
  2. digest algorithm:
    - SHA1;
    - SHA256;
    - SHA512;
  3. check "Attach key information to signature" and "Attach certificate information to signature" in case you want to attach those information to the signature.

The signed XML file can be overwritten or can be saved in an other location, according to the options selected in the "File Saving Options" area.



## Note

You can use XML examples provided in the distribution kit in `doc/samples/xml` folder, to test the sign XML features.

### 6.2.3 Signing PDF Files

CERTivity can digitally sign by public/private-key encrypted byte range digest a PDF document, supporting the standard SubFilter values `adbe.x509.rsa_sha1`, `adbe.pkcs7.detached`, and `adbe.pkcs7.sha1`. The signature supported by CERTivity is of *document* (or *ordinary*) type (according to the PDF Reference, version 1.7) and without a visual representation. The name of the signature handler (Filter) is `Adobe.PPKLite`. Multiple signatures can be applied incrementally. The signature process is currently not conditioned by the existence of other signature types or by any post-signing changes (DocMDP).

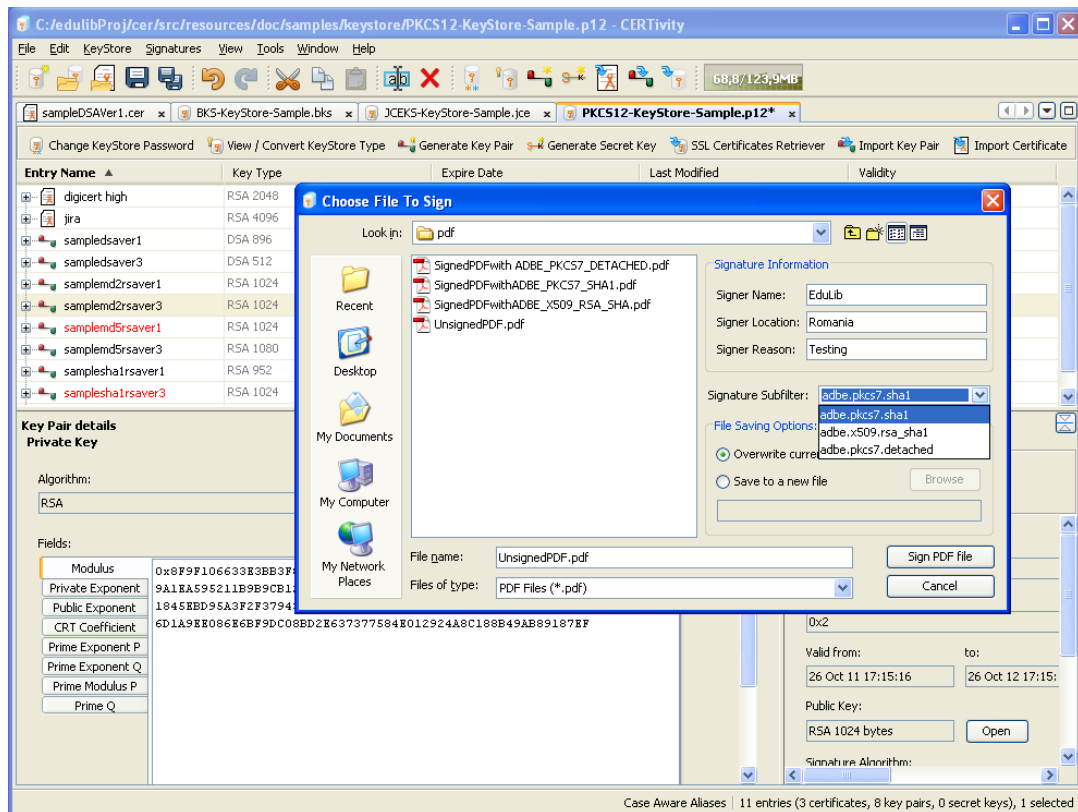
In order to sign a PDF file, make the following steps:

- select a KeyPair from the KeyStore tree table;
- either choose the main menu **Signatures > Sign > PDF file** or the contextual menu **sign > PDF file**;
- unlock the KeyPair if requested by providing its password;



- select the PDF file that will be signed;
- complete the signature information:
  1. Signer Name;
  2. Signer Location;
  3. Signer Reason;
  4. select signature SubFilter - standard value that represents the encoding to use when signing the PDF file:
    - *adbe.pkcs7.sha1* - The adbe.pkcs7.sha1 digest of the byte range is encapsulated in the PKCS#7-signed data field;
    - *adbe.pkcs7.detached* - No data is encapsulated in the PKCS#7-signed data field;
    - *adbe.x509.rsa.sha1* - The adbe.x509.rsa.sha1 digest uses the RSA encryption algorithm and SHA-1 digest method. This SubFilter is available only for RSA KeyPairs.

The signed PDF file can be overwritten or can be saved in another location, according to the options selected in the "File Saving Options" area.



## Note

You can use PDF examples provided in the distribution kit in `doc/samples/pdf` folder, to test the sign PDF features.

## Note

Signing a PDF which is encrypted is not currently supported. Signing a PDF containing xref-streams is not fully supported and for example the size of the generated signed PDF could become much too large and the time for processing is pretty expensive. A warning message is presented if xref-streams are detected, with the option to continue the signing procedure.

### 6.2.4 Signing CSR Files

In order to sign a CSR file, make the following steps:

- select a KeyPair from the KeyStore tree table;
- either choose the main menu **signatures > sign > CSR file** or the contextual menu **sign > CSR file**;
- unlock the KeyPair if requested by providing its password;
- select the CSR file that will be signed;
- select a file where to save the CA Reply.

The certificate details from the CSR will be shown in a new opened dialog requiring to provide a Serial Number and double checking the validity period. Using these details, the CSR file will be signed generating a CA Reply.

## Note

You can use CSR examples provided in the distribution kit in `doc/samples/csr` folder, to test the sign CSR features.

## 7. FAQ

### 7.1 How to Install the Unlimited JCE Jurisdiction Policy?

If you exported your PKCS#12 / Uber KeyStore file from your browser and used a password that is greater than 7 characters, you may need to download and install the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files so you can read the file.

This is a matter of U.S. policy and U.S. export controls (not due to technical reasons).

You can download the required files from:

- <http://www.oracle.com/technetwork/java/javase/downloads/jce-6-download-429243.html> [<http://www.oracle.com/technetwork/java/javase/downloads/jce-6-download-429243.html>].

In order to install Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files, follow the steps:

1. Download the unlimited strength JCE policy files;
2. Uncompress and extract the downloaded file - this will create a subdirectory called `jce`;
3. Install the unlimited strength policy JAR files:
  - the standard place for JCE jurisdiction policy JAR files is: `<java-home>/lib/security` [Unix] or `<java-home>\lib\security` [Win32]

### 7.2 Which Are the Available KeyStores Types in CERTivity Application?

The available KeyStore types are:

- *jks* - Java KeyStore (Oracle's KeyStore format);
- *pkcs12* - Public-Key Cryptography Standards #12 KeyStore (RSA's Personal Information Exchange Syntax Standard);
- *jceks* - Java Cryptography Extension KeyStore (More secure version of JKS);
- *bks* - Bouncy Castle KeyStore (Bouncy Castle's version of JKS);
- *uber* - Bouncy Castle UBER KeyStore (More secure version of BKS);
- *Windows Root CA KeyStore*;
- *Windows User KeyStore*.

### 7.3 Sometimes the Entry Name (Alias) Changes its Case

For UBER KeyStore (Bouncy Castle UBER KeyStore) as well as in PKCS12 KeyStore, the alias name is case sensitive. For other types of KeyStore, the alias name is not case sensitive.

So, when converting from UBER or PKCS12 to other type of KeyStores, or when moving an entry from a UBER or PKCS12 type KeyStore to an other, the alias name will be changed to lower case.

### 7.4 Why is the Application not Rendering Well?

If the system font is too big, on some platforms the application is not rendering well out of the box - especially text is getting out of the editing fields.

If you encounter such a case and you are not using Gnome as a Desktop Environment you can edit the file `${certivity_home}/etc/config/certificates.conf` and under the option `default_options` modify the parameter `--fontsize <size>`.

The default out of the box value for `size` is 11 .

If you are using Linux and Gnome as a Desktop Environment, the default GTK Look and Feel is ignoring the font size specified via the Java command line arguments, as well as any possibility of specifying the font from Java. If this is your case, the options you have are either to set the Gnome system font size to a smaller value or to use the Metal Look and Feel.

To change the font settings in Gnome, use the appropriate menu item in the Gnome menus. The menus differ depending on the OS distribution and version. In recent Gnome releases, it is usually: *System > Preferences > Appearance, tab Fonts, row Application font*

You can switch to the Metal or Motif Look and Feels by editing the file `${certivity_home}/etc/config/certificates.conf` and adding under the option `default_options` the parameter `--laf javax.swing.plaf.metal.MetalLookAndFeel`.

## 7.5 Where is the Help Window on MAC OS?

On MAC OS platforms, the help window might be positioned behind some of the application windows (e.g. dialog windows). In this case, you can move the application window out of the help window in order to be able to read and use the Java Help, or minimize the help window and reopen it.

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## 8.14 Changes to our License Agreement

If we decide to change our License Agreement, we will post those changes on <http://www.edulib.com/products/keystores-manager/license/>, and update the License Agreement modification date below.

**This agreement was last modified on 19<sup>th</sup> March 2012.**

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EduLib software can be obtained from <http://www.edulib.com>.

Terms and Conditions of Sale are available at <http://www.edulib.com/terms-of-sale/>.

## Appendix A. CERTivity®'s Features Matrix

The existence and capabilities of the CERTivity features are controlled by the category of your license - Standard, Professional or Trial versions.

Feature	Trial License	Standard License	Professional License
<b>KeyStore Management</b>			
Create a New KeyStore	Limited to 5 New Actions per instance	+	+
Open an Existent KeyStore	Limited to 5 Open Actions per instance	+	+
Open Windows Root CA KeyStore	+	-	+
Open Windows User KeyStore	+	-	+
Save a KeyStore	+	+	+
Convert KeyStore Type	+	+	+
Change the KeyStore Password	+	+	+
Delete KeyStore Entry	+	+	+
Change KeyStore Entry Alias	+	+	+
Import Certificate into KeyStore	+	+	+
Create a Self-Signed KeyPair	+	+	+
Generate Key Pair	+	+	+
Generate Secret Key	+	+	+
Import Certificate from Server	+	-	+
Import Key Pair	+	+	+
View Private Key Details	+	+	+
Extend Validity of Self Signed KeyPairs	+	+	+
<b>Certificates Operations</b>			
Open a standalone Certificate	+	+	+
View Certificate Details	+	+	+
View Public Key Details	+	+	+
View PEM Representation for a Certificate	+	+	+
View ASN.1 for a Certificate	+	+	+
Obtain the Revocation Status	+	+	+
Test Certificates on Given Protocol	+	-	+
<b>Sign and Verify</b>			
Verify Signatures for JAR Files	+	+	+

Feature	Trial License	Standard License	Professional License
Verify Signatures for XML Files	+	-	+
Verify Signatures for PDF Files	+	-	+
Sign JAR Files	+	+	+
Sign XML Files	+	-	+
Sign PDF Files	+	-	+
Sign CSR Files	+	+	+
Generate CSR Files	+	+	+
Import CA Reply	+	+	+
<b>Export Options</b>			
Export Certificate	+	+	+
Export Certificate Chain	+	+	+
Export Key Pair	+	+	+
Export Private Key	+	+	+