Worksheet 7 – Digital Certificates

Certificate Manipulation with the .NET Framework

Topics:

- Certificate Manipulation with .Net
- Digital Signatures using Digital Certificates
- Confidentiality using Digital Certificates

©2020: { rui.ferreira,marisa.maximiano,ricardo.p.gomes,nuno.reis, alexandre.fernandes }@ipleiria.pt

1. Digital Certificates

The following exercises show how to manipulate Digital Certificates in .Net

The following classes and enums are important:

- X509Certificate2
- X509Certificate2Collection
- X509Certificate2UI // requires the assembly *System.Secutiry* (*References*)
- X509Store e StoreName (enum)
- X509Chain
- ContentInfo
- CmsSigner
- SignedCms
- CmsRecipient
- EnvelopedCms

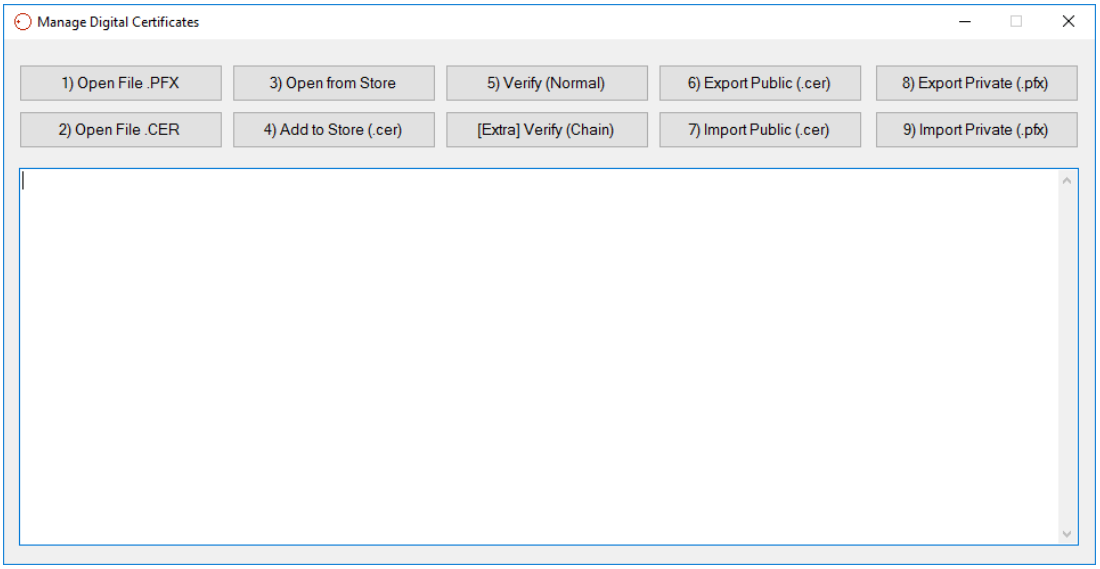
These are their *namespaces*:

- System.Security.Cryptography;
- System.Security.Cryptography.Pkcs;

  Note: requires the assembly System.Security (References)
- System.Security.Cryptography.X509Certificates;

Exercises

1. Download the project "ei.si-worksheet7-ex1.1", from moodle, review the code and:



a) Place the certificates "estg.ei.si.a.cer" and "estg.ei.si.a.pfx" in the folder "bin/debug" and change the constant values accordingly.

b) Implement a method that writes in the textbox (*textBoxInfo.Text*) the main information of a digital certificate:

private void ShowCertificate(X509Certificate2 cert)

c) Implement the following features for each of the buttons:

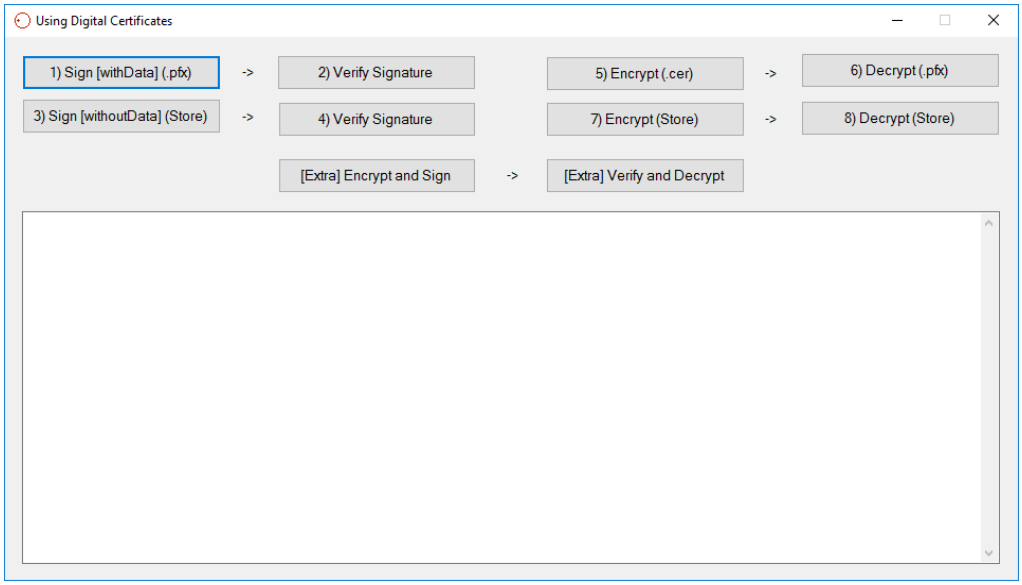
1) Open the file "estg.ei.si.a" (that has the private key) and show its main information in the textbox;
2) Open the file "estg.ei.si.a" (that has only the public key) and show its main information in the textbox;
3) Open a certificate from the Personal folder in the Certificate Store of your operating system and show its main information in the textbox;
4) Add the "estg.ei.si.a" digital certificate to the "Other People" folder of the Certificate *Store*;
5) Verify if the "estg.ei.si.a" certificate is valid;
6) Export, to a "temp.cer" file, the certificate on the file "estg.ei.si.a.cer";
7) Import, the certificate on the "temp.cer" file, to a X509Certificate2 object, using the .Import() method;

8) Export, to a “temp.pfx” file, the certificate and the corresponding private key that are on the “estg.ei.si.a.pfx” file;

   Note: you should assure the security of this file with a password of your choosing;

9) Import the digital certificate and corresponding private key, in the “temp.pfx” file, to a X509Certificate2 object, using the .Import() method;

2. Download the “ei.si-worksheet7-ex1.2” project, from *moodle*, review the code and:



   a) Implement the following features for each button:

      1) Create a digital signature in the PKCS#7 format, using a certificate on your hard drive, that uses as data the content of the textbox. The result should include both the data and the signature;
      2) Verify the signature created;
      3) Create a signature in the PKCS#7 format, using a certificate on certificate store, that uses as data the content of the textbox. The result should include both the data and the signature;
      4) Verify the signature created;
      5) Create a confidential message, with a certificate on your hard drive, in the PKCS#7 format, that uses the content of the textbox as it’s data.
      6) Decrypt the message;
      7) Create a confidential message, with a certificate on the certificate store, in the PKCS#7 format, that uses the content of the textbox as it’s data.
      8) Decrypt the message.

Extra Class:

1) Using the ei.si-worksheet7-ex1.1 project:
    a. Verify that the “estg.ei.si.a” certificate is valid, using the certificate chain.
2) Using the ei.si-worksheet7-ex2.1 project:
    a. Create a confidential message, with its integrity and authentication assured, using a certificate of your choice. The data should be the content of the textbox and the format of the message PKCS#7;
    b. Verify the signature and decrypt the message.