

# *How to set up the Java Card development environment under Windows?*

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## I. Development tools

### I.1. Hardware

1. A Java Card platform (Java smart card).
2. A card reader.

### I.2. Software

- a) Download and install JDK 1.7 (use this link to download: <http://www.oracle.com/technetwork/java/javase/downloads/jdk7-downloads-1637583.html> ).
- b) Download Eclipse IDE for Java Developers (<http://www.eclipse.org/downloads/> ).
- c) Download the file JSR268TK.zip from: ([http://cedric.cnam.fr/~bouzefra/cours/cours\\_SEM/JSR268TK.zip](http://cedric.cnam.fr/~bouzefra/cours/cours_SEM/JSR268TK.zip) ) and store it in a local folder. This file is an eclipse project that includes some tools used to install the application on the card.
- d) Install if necessary the driver of the card reader. If you use Windows 7, the card reader is detected automatically by the operating system. If you use Windows XP for example, you need to install the driver from a CD or Internet.

## II. Development steps

### II.1 import the eclipse project:

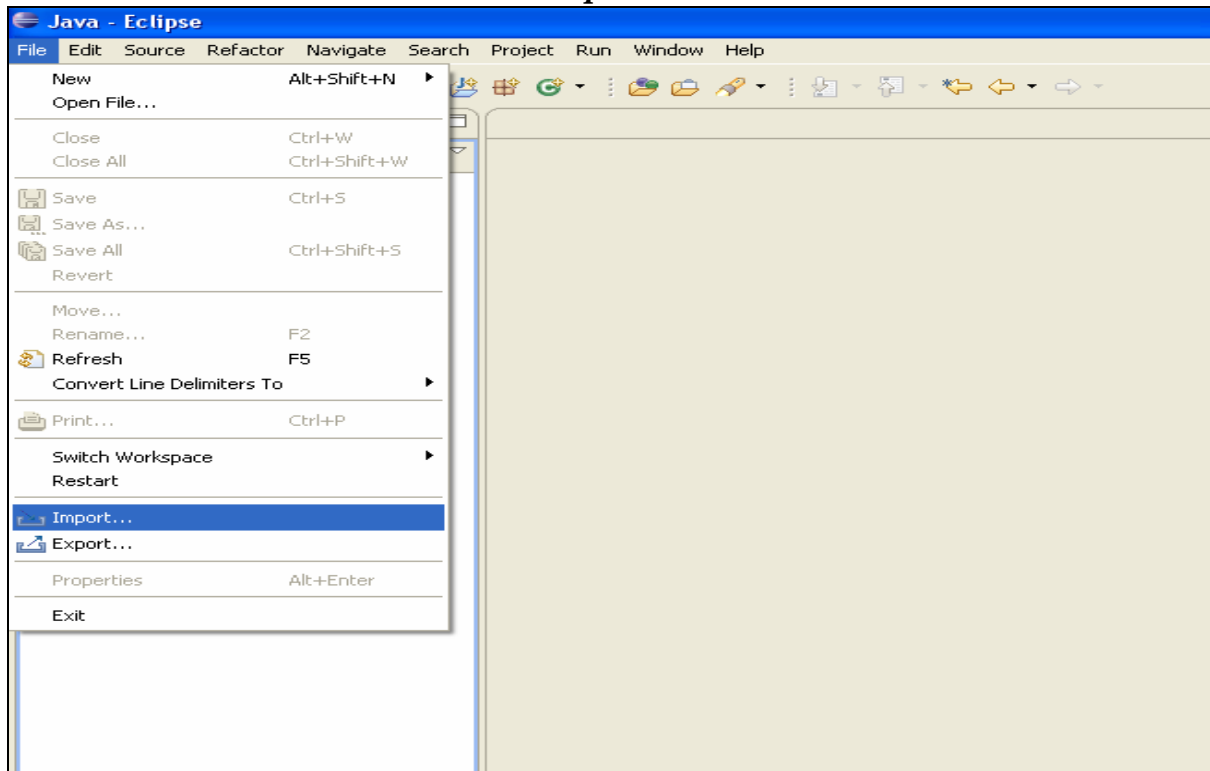
- a) Unzip the project that is stored in this folder for example:  
C:\JavaCard\JSR268TK.zip.
- b) Launch Eclipse.
- c) Import the eclipse project  
C:\JavaCard\JSR268TK\JSR268TK\JSR268TK-2 as in the following :

***File → Import → General → Existing Project into Workspace → Browse***

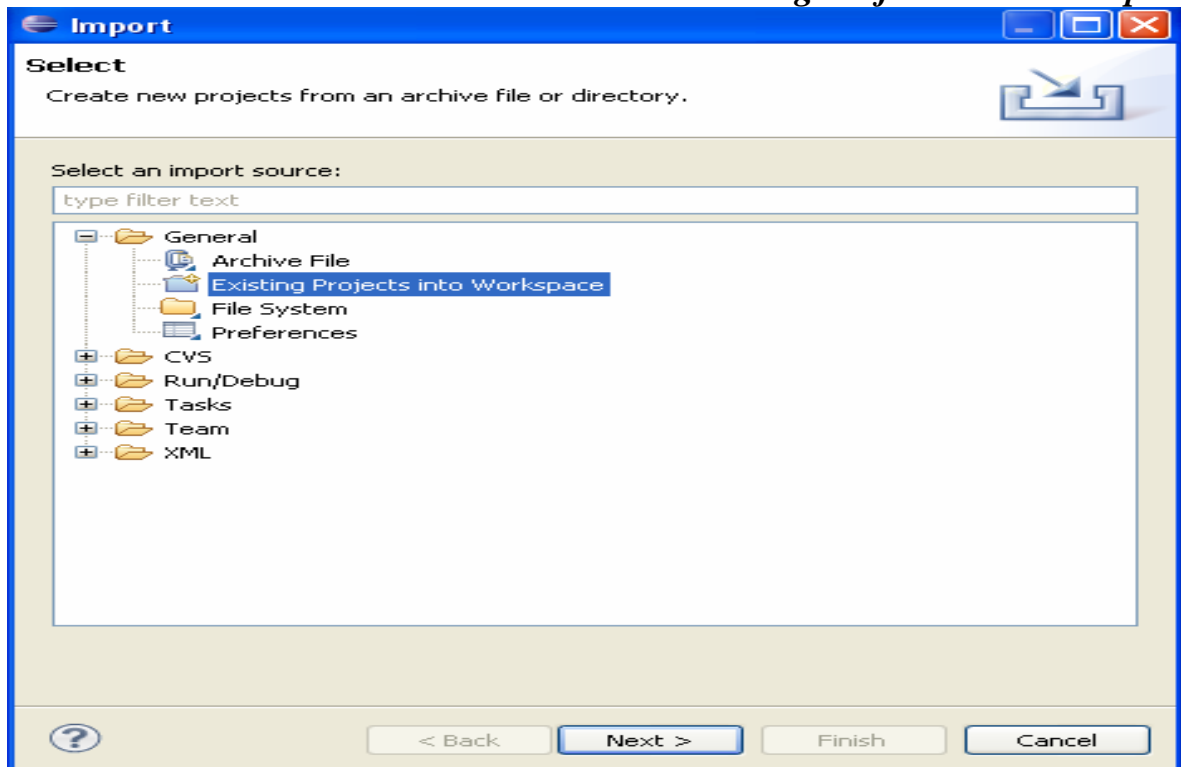
In our example, we import the following folder: C:\JavaCard\JSR268TK\JSR268TK-2. Choose the folder JSR268TK-2 and click OK.

These steps are shown through the following windows:

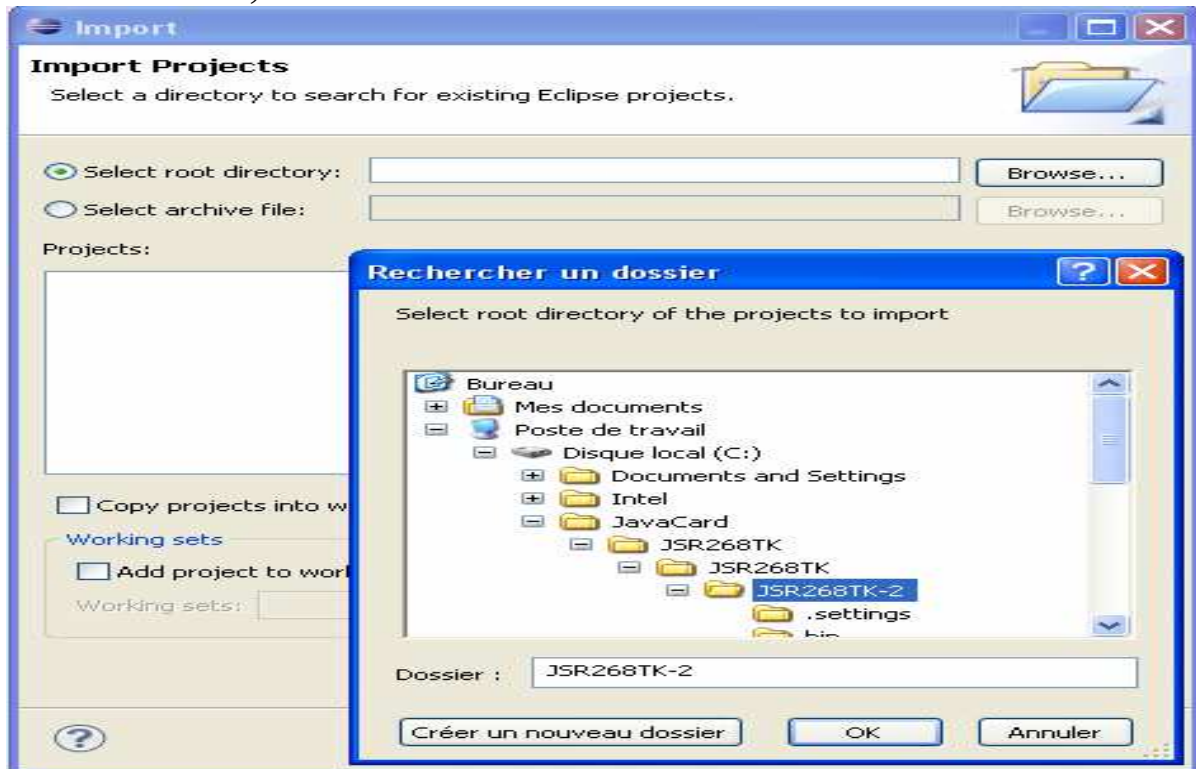
Click on the menu **File** and then on **Import** item.



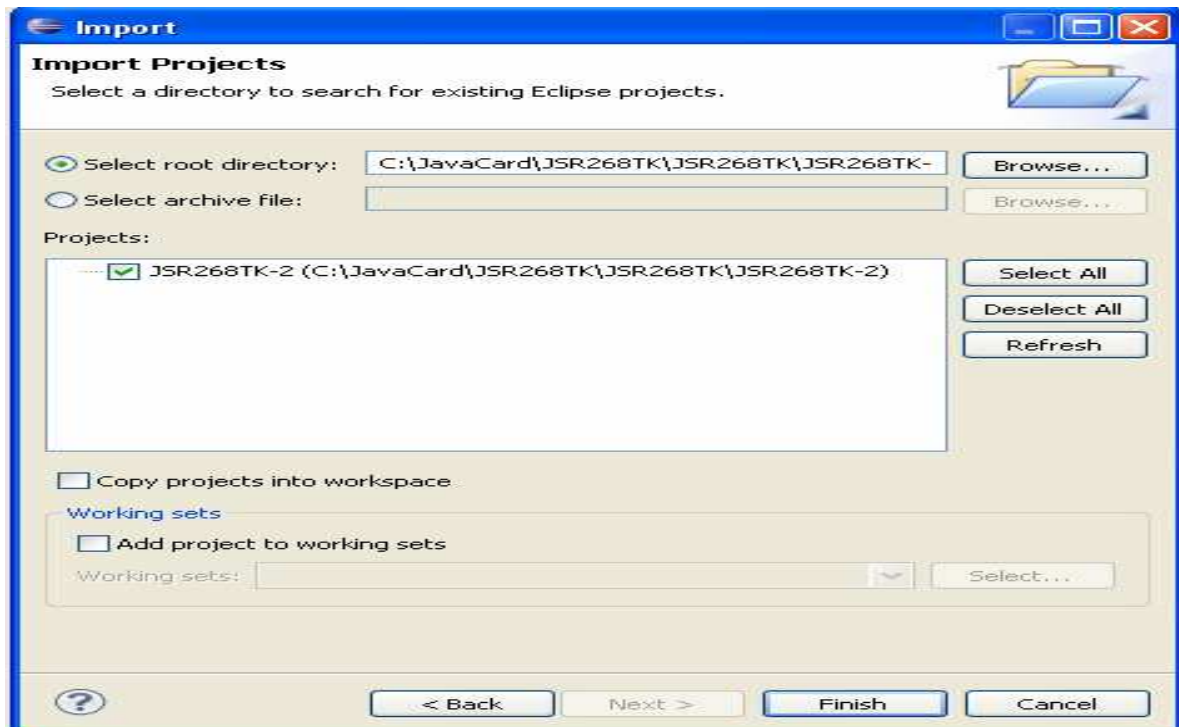
Click on “+” that is near **General** → Click on **Existing Projects into Workspace**



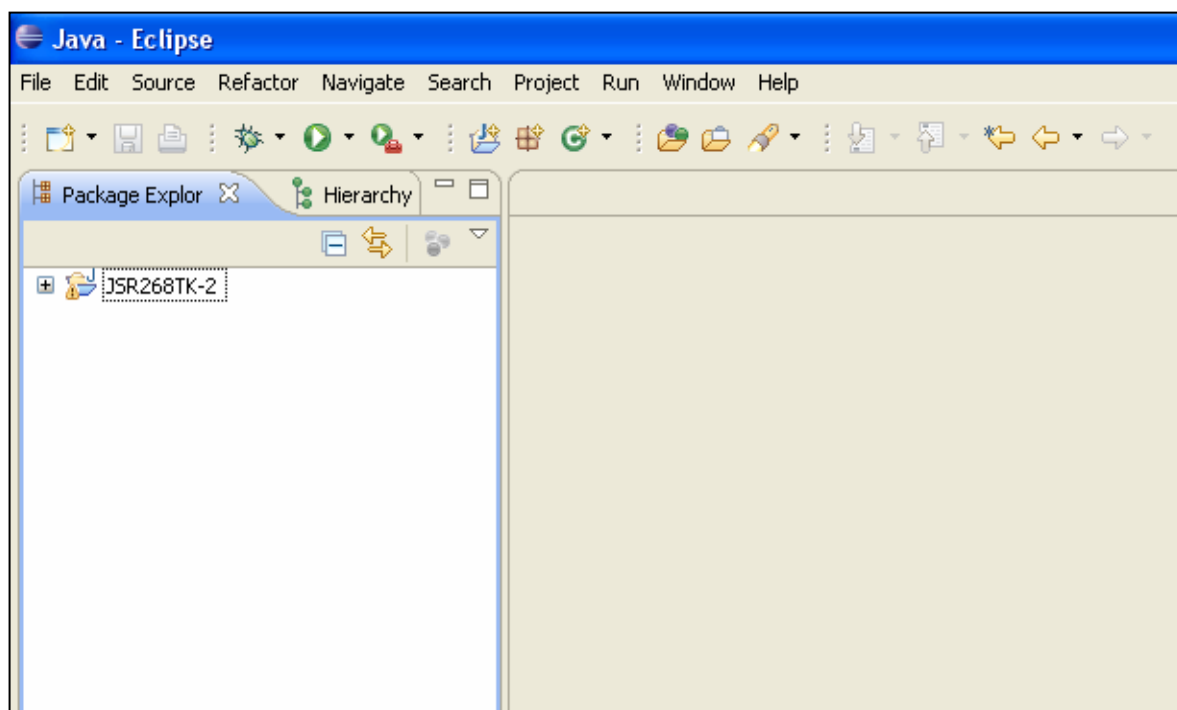
Click on **Browse**, find the folder JSR268TK-2 and click on OK.



Click on Finish



You must have this window. To show the packages of JSR268TK-2 project, click on “+”.



In the following window, you have different parts of the project. It includes some scripts (tools) necessary to install an applet and then to interact with it from the terminal.

**build.xml:** includes three scripts  
*deleter*: to delete an existing applet.  
*loader*: to load an applet into the card.  
*run*: to launch a program running in the terminal.

**ManagerConfig.xml:** allows to configure the card reader by inserting its name in this xml file.

**SampleTestApplet.java:** contains the applet

**Build.xml :** compiles *SampleTestApplet.java* and generates the file *SampleTestApplet.cap* tha will be installed on the card. This file contains the AID of the applet and the one of the package to which belongs the applet.

**SampleClient.java :** is the Java program that interacts with the card from the terminal

## II.2 Configuration and implementation steps :

- Modify *ManagerConfig.xml* file but typing the appropriate card-reader name.
- Write the program of the applet (*SampleTestApplet.java*).
- Compile the applet.
- Write the program of the terminal (*SampleClient.java*).
- Install the applet on the card and launch the client on the terminal.

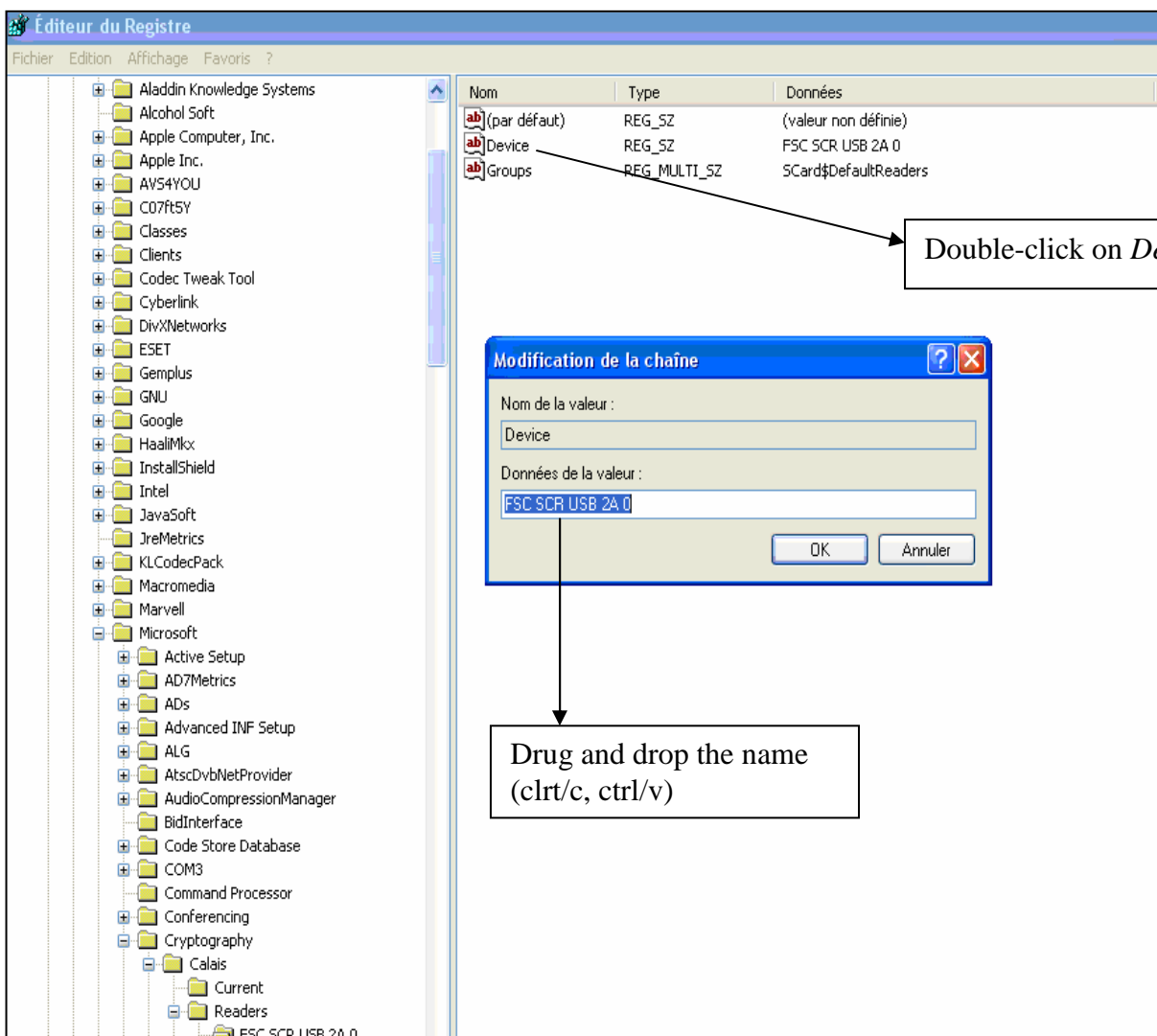
### a) Configuration of *ManagerConfig.xml*

- The first step consists in modifying the file *ManagerConfig.xml* by inserting the name of the card reader. For this purpose, you need to find the exact name of the reader by accessing to the register base. We obtain it as in the following:

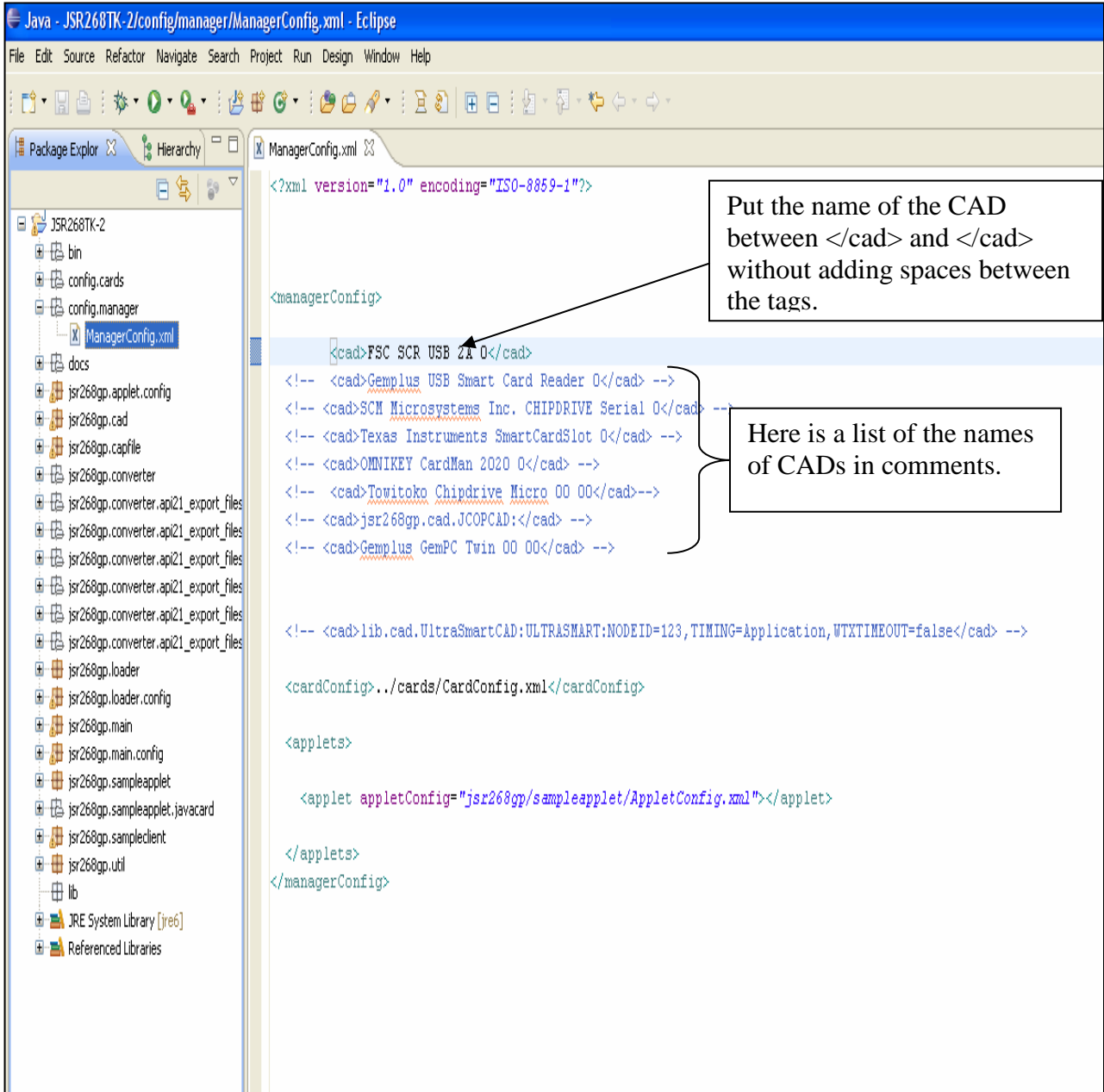
**Start Button → Execute → Type: regedit**

The name of the card reader is found in the following path:

Click on « + » behind *Hkey local machine* → + *software* → + *Microsoft* → + *cryptography* → + *calais* → + *readers*



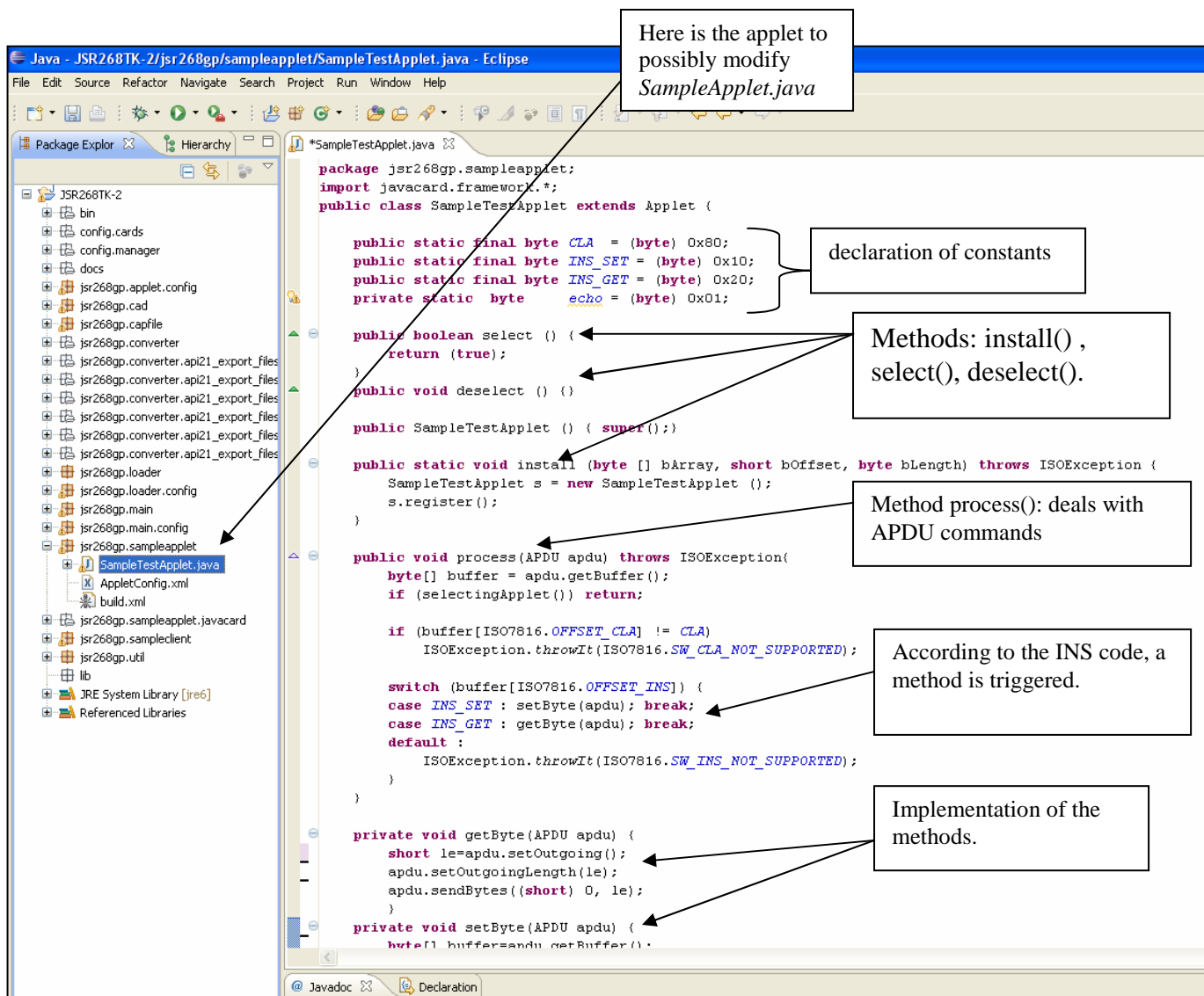
- Double-click on the file *ManagerConfig.xml* to open it and to insert the name of the card reader.
- Save the modifications with Ctrl/S.





**b) Write the code of the applet *SampleTestApplet.java*.**

Double-click on the file *SampleTestApplet.java* to open it. You have an example integrated with the project JSR268TK-2, but you can modify the integrated code. In this case, you need to save the new code with Ctrl/S.



If you click on « + » near *jsr268.sampleApplet*, you find three files:

- *SampleTestApplet.java* : is the applet to install on the card
- *Appletconfig.xml* : is used to configure the card (don't modify it).
- *build.xml* : contains the AID of the applet and the AID of the package. It is used to generate the CAP file that will be installed on the card.

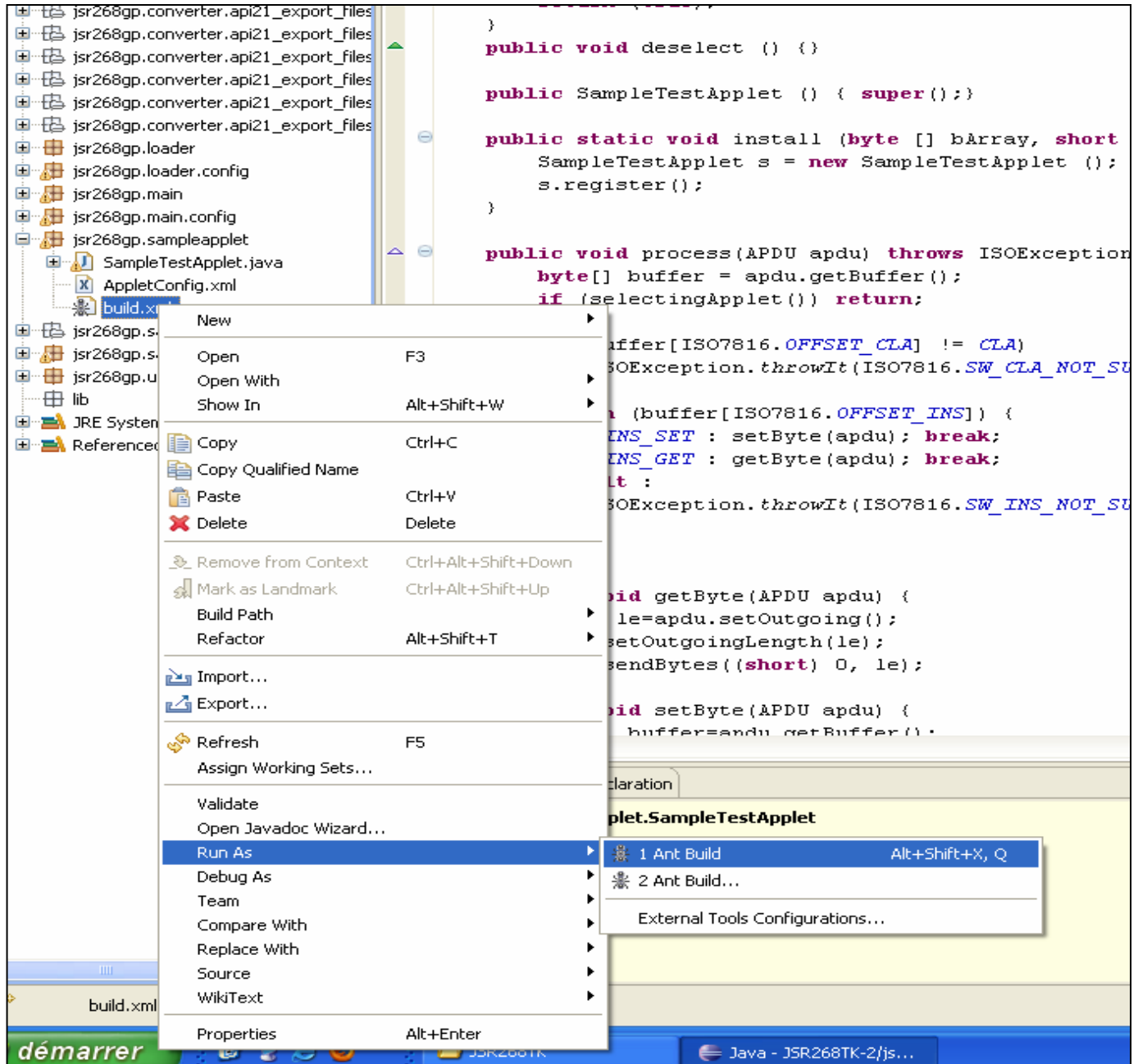
**c) Compile the applet**

To compile the applet, perform the following steps:

- Right-click on the file *build.xml*

- Select **Run As**
- Click on **Ant Build**

If there is no error, a CAP file is generated from *SampleTestApplet.java*. It remains only to load the file on the card and to run the client.



#### d) Write the client program (terminal):

- Double-click on the file *SampleClient.java* to open it.
- You have the following window:

```

Java - JSR268TK-2/jsr268gp/sampleclient/SampleClient.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help

Package Explorer | Hierarchy | SampleClient.java
JSR268TK-2
├── bin
├── config.cards
├── config.manager
├── docs
├── jsr268gp.applet.config
├── jsr268gp.cad
├── jsr268gp.capfile
├── jsr268gp.converter
├── jsr268gp.converter.api21_export_files
├── jsr268gp.converter.api21_export_files
├── jsr268gp.converter.api21_export_files
├── jsr268gp.converter.api21_export_files
├── jsr268gp.converter.api21_export_files
├── jsr268gp.loader
├── jsr268gp.loader.config
├── jsr268gp.main
├── jsr268gp.main.config
├── jsr268gp.sampleapplet
├── jsr268gp.sampleapplet.javacard
├── jsr268gp.sampleclient
├── SampleClient.java
├── jsr268gp.util
├── lib
├── JRE System Library [jre6]
└── Referenced Libraries

package jsr268gp.sampleclient;
import javax.smartcardio.ATR;

public class SampleClient {
    public static final byte CLA = (byte) 0x80;
    public static final byte INS_SET = (byte) 0x10;
    public static final byte INS_GET = (byte) 0x20;

    static byte AID [] = {
        (byte) 0xA0, (byte) 0x00, (byte) 0x00, (byte) 0x18,
        (byte) 0x50, (byte) 0x00, (byte) 0x00, (byte) 0x00,
        (byte) 0x00, (byte) 0x00, (byte) 0x00, (byte) 0x52,
        (byte) 0x41, (byte) 0x44, (byte) 0x41
    };

    public SampleClient() {
        super();
        // TODO Auto-generated constructor stub
    }

    /**
     * @param args
     */
    public static void main(String[] args) {
        //Sélectionner votre lecteur de carte
        TerminalFactory tf = TerminalFactory.getDefault();
        CardTerminals list = tf.terminals();
        CardTerminal cad = list.getTerminal("USB CCID Smart Card Reader 0");

        if (cad == null) {
            System.out.println("debug1");
        }

        try {
            // Remarque: pour le transtypage de tableau byte vers une variable string en hexa
            // utiliser la méthode byteArrayToHexString de la classe Util

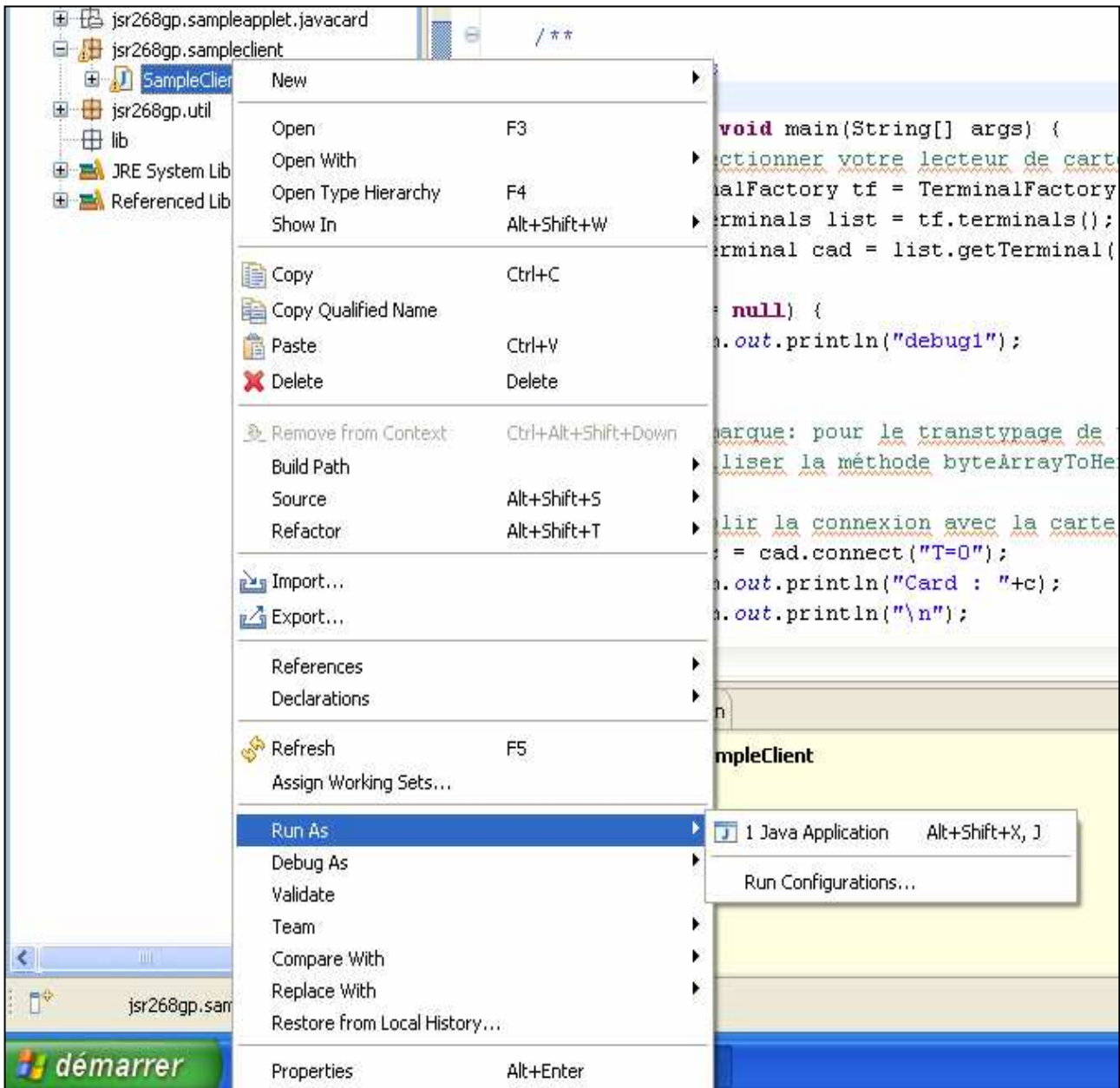
            //Etablir la connexion avec la carte à puce
            Card c = cad.connect("T=0");
            System.out.println("Card : "+c);
            System.out.println("\n");
        }
    }
}

```

To compile and run the client:

- Click on « + » near jsr268.sampleClient.
- Right-click on the file *SampleClient.java*.
- Select **Run As**.
- Click on **Java Application**.

At this stage, check only if the compilation is correct because the execution will generate errors since that the applet is not yet installed.



### e) Installation of the applet on the card

- To load the CAP file on the card:
  - Click on « + » near the package *bin*.
  - Right-click on the file *build.xml*
  - Select **Run As**
  - Click on **Ant Build**

- The file *build.xml* will execute three scripts to:
  - delete* : delete the applet if it already exists in the card.
  - load* : install the CAP file generated from *SampleTestApplet.java*.
  - run* : run the client *SampleClient.java* to send APDU commands to the applet.

Each time the applet is modified, it needs recompilation and installation on the card.

