

Study of Java Card and its Application

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Abstract: Sun Microsystems defined a set of specifications for a subset of Java technology to create applications for them, Java Card applets. A device that supports these specifications is referred to as a Java Card platform. On a Java Card platform, multiple applications from different vendors can coexist securely. The Java Card platform is the tiniest of Java targeted for embedded devices. It is an open, interoperable platform for smart cards and secure tokens. The technology is widely used in SIM cards (it's used in GSM mobile phones) and ATM cards. Java Card gives users the ability to program a device and make it application specific and lets smart card developers use a common card platform. Smart cards, unlike magnetic stripe cards, can carry all necessary functions and information on the card; therefore, they do not require access to remote databases at the time of the transaction.

Keywords: Java, object, application, programming, SIM.

I. INTRODUCTION

A Java card is a multi-programmable, platform independent card. Standard Java is too big to fit on a smart card. Hence a flavour of Java card is used [8]. The elements of Java card include a back-end application, a host (off-card) application, an interface driver, On-card applet, user credentials, supporting software [3]. Also, SIM card, which is an application of java card is discussed here. Its architecture includes memory-size of RAM, ROM, EEPROM and Processor [1]. There are certain steps from writing a java code for application, converting it to applet file, and downloading it to the card. There are mainly 3 types of SIM cards used: Mini, Micro and Nano SIM. Finally, the new technology of virtual card is introduced [6].

A. Java card is:

- A programmable smart card: It supports Java (programming language).
- Uses Object oriented language
- Multi programmable: More than one program can be written and run on a single card.
- Platform independent: Write once read many times. Once the program is written, it can be run anywhere independent of the platform. [3]

B. Why put Java on card?

A Java card is a smart card that is able to execute Java byte code, similar to the way Java-enabled browsers can. But standard Java with all of its libraries is far too big to fit on a smart card [1]. A solution to this problem is to create a stripped-down flavour of Java. Card Java is just such a flavour. Besides, Card Java also allows smart cards to have multiple applications on them. [1]

II. ELEMENTS OF JAVA CARD

- A back-end application
- A host (off-card) application

- An interface driver
- On-card applet
- User credentials
- Supporting software

The Back-End Application and Systems: Back-end applications provide services that support in-card Java applets. For example, a back-end application could provide connectivity to security systems that, together with in-card credentials, provide strong security. [2]

The Reader-Side Host Application: The host application resides on a desktop or a terminal such as a PC, an electronic payment terminal, a cell-phone, or a security subsystem. The host application handles communication among the user, the Java Card applet, and the provider's back-end application. [4]

The Reader-Side Card Acceptance Device: The Card Acceptance Device (CAD) is the interface device that sits between the host application and the Java Card device.

- A CAD provides power to the card, as well as electrical or RF communication with it.
- A CAD may be a card -reader attached to a desktop computer using a serial port, or it may be integrated into a terminal such as an electronic payment terminal at a restaurant or a gas station. [3]

Card-Side Applets and Environment:

- The Java Card platform is a multiple-application environment.
- One or more Java Card applets may reside on the card, along with supporting software - the card's operating system and the Java Card Runtime Environment (JCRE). [6]
- The JCRE consists of the Java Card VM, the Java Card Framework and APIs, and some extension APIs. [2]

III. SIM cards (An application of Java card)

Architecture:

- ROM : 256 KB
- EEPROM : 4 – 64 KB (Persistent Storage)
- RAM : 4 KB
- Slow and simple microprocessor (8 Bit). [3]

FIGURE: - 1

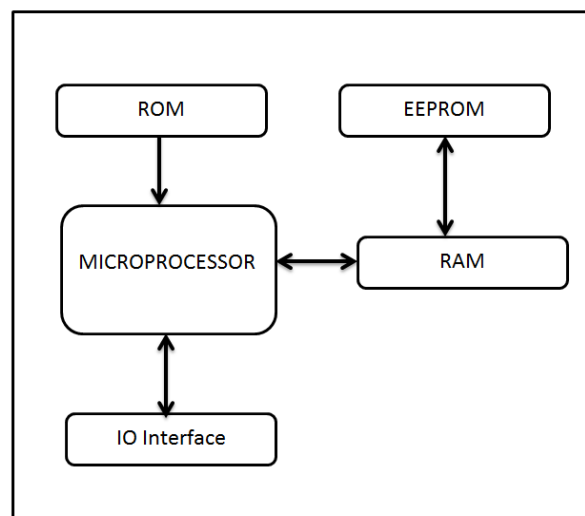
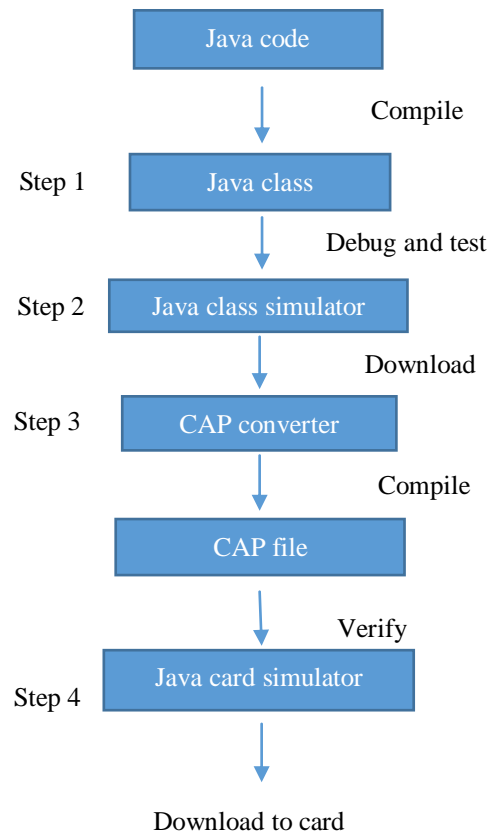


FIGURE: - 2 How Java is coded to SIM card



- Write a Java source
- Compile the source
- Covert the class files into a Converted Applet (CAP) file
- Install the CAP file. [5]

IV. Types of SIM card:

1. *Mini-SIM:*

The Mini-SIM (or 2FF) card has the same contact arrangement as the full-size SIM card and is normally supplied within a full-size card carrier, attached by a number of linking pieces. [6]

2. *Micro-SIM:*

- The Micro-SIM (or 3FF) card has the same thickness and contact arrangements, but the length and width are further reduced.
- The micro-SIM was designed for backward compatibility.
- The major issue for backward compatibility was the contact area of the chip.
- The SIM was also designed to run at the same speed (5 MHz) as the prior version. [2]

3. *Nano-SIM:*

- The Nano-SIM (or 3FF) measures $12.3 \times 8.8 \times 0.67$ mm.
- It reduces the previous format to the contact area while maintaining the existing contact arrangements.
- The 0.67 mm thickness of the NANOSIM is about 12% less than the 0.76 mm of normal SIM. [6]

V. Something new about SIM card

Virtual SIM card:

This technology is aimed to create a fully software based SIM card that is executed by the phones operating system, bypassing the need of a physical SIM card and enabling multiple phone numbers for one physical handset. [7] Very high security is demanded if such a virtual SIM is to be possible to move between phones and to avoid data duplication and tampering. [5]

VI. CONCLUSION

Java Card can be used in all fields where the smart card is now being used. Java Card can be used as an ID card which contains personal information, as a medical card which stores medical information, as a credit/debit bank card, as an electronic purse etc. Multi-Application Java Cards, that is, more than one application in a single card is also available. Java Card Technology defines a run time environment that supports the smart card memory, communication, security and application execution model. Java Card Technology fits java system software in a smartcard while conserving enough space for applications.

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