Mobile Application Languages and Framework— XML, Java, JME, Python and DotNet

Lesson 03

Java Platform, Micro Edition (Java ME Earlier J2ME)

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Devices Resource constraints

- Mobile smart phone, embedded devices, TV set-top boxes, Handheld computing system, Network and other constraints

J2SE

- Needs 512 kB ROM and 512 kB RAM in a device.

- JME─ a set of Java APIs which require small memory while developing Java applications

- Also a platform for development of mobile phone games

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Java Micro Edition (JME)

- A micro edition of J2SE which provides for configuring the run time environment

- Examples of configuring─ are deleting the exception-handling classes, user-defined class loaders, file classes, AWT classes, synchronized threads, thread groups, multi-dimensional arrays, and long and floating data types

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JME

- Only one object is created at a time when running multiple threads
- The objects─ reused instead of using a larger number of objects

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JME

- JME or Java-based virtual machine not supported by Windows Mobile devices do not support

- JME platform binary implementations and virtual machine implementation are done by another source not from Windows

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Java ME devices

- Implement a profile
- MIDP (Mobile Information Device Profile)
- Profiles— subsets of configurations
- Two configurations ─ Connected Limited Device Configuration (CLDC) and the Connected Device Configuration (CDC).

JME, CLDC and CDC

- Provide the development platform for small memory devices and systems

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Profile

- Means a standardized agreed-upon subset and interpretation of a specification

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Profile

- Also mean a specification for a set of configuration seetings and other data which are used in the APIs for a device, user, or group of devices

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Profile

- Also mean a standardized specification for the APIs for a device, user, or group of devices

- JME-framework-based devices use Java APIs specified in a Profile

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Profiles

- Foundation Profile— APIs of J2SE without GUIs

- PersonalProfile— Profile for embedded devices, for example, PDAs and set-top boxes and contains the APIs of Foundation Profile, complete AWT as well as lightweight GUIs, and Applet Classes

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Mobile Information Device Profile (MIDP)

- Profile for mobile devices with small screen option for GUIs, wireless connectivity, and greater than 128 kB flash memory

- MIDP— a specification of APIs for mobile information, smart phone, and gaming devices

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MIDLET

- A JME application (similar to an Applet) for embedded devices which runs with MIDP

- MIDlet main class is a subclass of javax.microedition.midlet

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MIDLET

- MIDlets are programmed to run games and phone applications

- Also they are compiled once and are platform-independent. A MIDlet has to fulfill certain requirements in order to run on a mobile phone

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MIDP source packages and sets of Java class libraries

- java.lang─ Standard java types and classes for String, Integer, Math, Thread, Security, and Exception

- java.io ─ Standard java types and classes for Input and Output streams

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MIDP source packages and sets of Java class libraries

- javax.microedition.lcdui— LCDUI for mobile devices with no Internet connectivity, provides a limited set of UIs in mobile devices

- TextBox, Form, List, and Canvas (low-level graphics as well as full screen games graphic mode)

- Graphics needed for games

- MIDP controls the GUIs

MIDP source packages and sets of Java class libraries

- java.util— A set of classes such as TImers, Calendars, Dates, Hashtables, Vectors, and others

- javax.microedition.rms— A record management system (RMS) API to retrieve and save data and limited querying capability

MIDP source packages and sets of Java class libraries

- javax.microedition.pim─   Personal information management API (optional), access the device's address book.

- javax.microedition.pki─   Secure connections authenticate APIs

- javax.microedition.messaging─ Wireless messaging APIs used when sending SMS and MMS messages

MIDP 3.0

- A Profile for special-featured phones and handheld devices

- Provides improved UIs, UI extensibility, and interoperability between the devices

- Moreover, it supports multiple network interfaces in a device

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MIDP 3.0

- IPv6 (Internet protocol version 6 for broadband Internet)

- Large display devices

- High performance games

MIDP 3.0

- Provisioning for MIDlets using SyncML DM/DS (device management and device synchronization) protocol, Bluetooth, removable media (e.g., memory stick or card), and MMS

MIDP 3.0

(i) auto-starting of MIDlets on device booting

(ii) running several MIDlets concurrently and sharing the class libraries for MIDlets

(iii) running background MIDlets (MIDlets without a UI)

(iv) specifications of the runtime behaviour

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MIDP 3.0

(v) proper firewalling and lifecycle managing functions for MIDlets

(vi) enabling MIDlets to draw to secondary display(s)

(vii) specifications of the behaviour of MIDlets in the CLDC and CDC

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MIDP 3.0

- Inter-MIDlet communication (similar to inter-process communication between the processes controlled by an OS) which in turn allows querying of device capabilities required to be done when a server sevice is to discover the device services

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Information module Profile (IMP)

- For embedded devices for example, security systems or vending machines which have no display UIs and game APIs

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IMLET

- An application created from IMP APIs
- IMlet is inherited from MIDlet

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Auto and TV Profiles

- Auto Profile (AutoP)— a Profile for automobile application develoment

- TV Profile (TVP)— a Profile for TV set-top box application develoment

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Configuration- CLDC

- A configuration for limited connected devices

- Defines a base set of APIs and VM for the resource-constrained mobile phones or handheld computers

- A subset of MIDP

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Configuration- CLDC

- Used for developing Java applications

- Usually CLDC can just connect to mobile application service provider and have less than 64 kbps data transfer rate

- CLDC has minimal needed subset of the Java class libraries running on virtual machine for a CLDC

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Configuration- CDC

- A configuration for connected devices

- A Java framework for developing an application that can be shared in networked devices, for example, set-top boxes

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Configuration- CDC

- CDC provides a JME framework for and applications which run on wirelessly connected devices and APIs for HTTP. The devices will need 2.5 MB flash or ROM and 2 MB RAM. Set-top box is an example of connected device.

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CLDC Profiles and source packages

- A configuration for the MIDP which does not provide for the applets, awt, beans, math, net, rmi, security, sql, and text packages in the java.lang.

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CDC Profiles and source packages

- A configuration for the Foundation and Personal Profiles, TV Profile, or Auto Profile which includes classes inherited from a limited number of classes at *net*, *security*, *io*, *reflect*, *security.cert*, *text*, *text.resources*, *util*, *jar*, and *zip* packages

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CLDC Virtual machine

- KVM—does not support weak reference which means full object reference to the object must be used for reaching to the object in the application program

KVM

- A virtual machine which has no floating point mathematical operations support (supports only integers), limited exceptional handling, no automatic garbage collection (memory freeing)

KVM

- No native support using JNI (Java native interface) to use C/C++ application interface with the Java APIs, and no ThreadGroup

CDC VIRTUAL MACHINE

- CVM (coherent virtual machine) for multi-protocol and multi-threading support

Summary

- JME A micro edition of J2SE which provides for configuring the run time environment
- MIDP a mobile information device profile
- MIDlet or mobile applications
- CLDC
- CDC

End of Lesson 03

Java Platform, Micro Edition (Java ME Earlier J2ME)