Oracle® Java ME Embedded

Getting Started Guide for the Windows 32 Platform

Release 3.2

E35132-01

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This book describes how to install and run Oracle Java ME Embedded software on the Windows 32 platform.

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Preface

This book describes how to install Oracle Java ME Embedded software onto the Windows 32 platform. Readers using this guide should be familiar with the *Information Module Profile - Next Generation (IMP-NG) 1.0 Specification*.

Audience

This document is intended for developers who want to run Oracle Java ME Embedded on a Windows platform.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc`.

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Oracle customers have access to electronic support through My Oracle Support. For information, visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info` or visit `http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs` if you are hearing impaired.

Related Documents

For a complete list of documents with the Oracle Java ME Embedded software, see the Release Notes.

Operating System Commands

This document does not contain information on basic commands and procedures such as opening a terminal window, changing directories, and setting environment variables. See the software documentation that you received with your system for this information.

Shell Prompts

Shell	Prompt
Bourne shell and Korn shell	`$`
Windows	*directory*>

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

Running the Oracle Java ME Embedded Software on Windows

The Windows emulation environment provides you with a platform for testing and running IMP-NG IMlet suites without having to install those IMlet suites onto an embedded device. This chapter describes running the emulation environment.

This chapter also shows you how to run the software on a Microsoft Windows system using the emulation environment that is provided in the reference binary. It assumes that you have downloaded the reference binary onto a Windows-based desktop platform.

Verifying the Java SE Platform

The first step is to verify your current Java SE Platform. Tools that are provided with the software are based on the Java Platform, Standard Edition (Java SE), Version 7, Update 5. To properly use these tools, you must have a compatible version of the Java Runtime Environment (JRE) installed on your computer and set as the default version.

To check if you have an appropriate version of the Java SE platform installed on your computer, use the `java -version` command, as shown here:

```
C:\>java -version
java version "1.7.0_03"
Java(TM) SE Runtime Environment (build 1.7.0_03-b05)
Java HotSpot(TM) Client VM (build 22.1-b02, mixed mode, sharing)
```

The version number shown in the output should be version 1.7.0_01 or higher.

If you need to install a compatible version of the Java SE platform, you can download it from the following address:

`http://www.oracle.com/technetwork/java/index.html`

Finding the Java ME Embedded Emulator

You can find the Java ME Embedded emulator within the `bin` directory of the Java ME SDK 3.2 installation.

For example, if the Java ME SDK 3.2 is installed in `C:\Java_ME_platform_SDK_3.2`, then the emulator would be located at: `C:\Java_ME_platform_SDK_3.2\bin\emulator.exe`

Using the Java ME Embedded Emulator

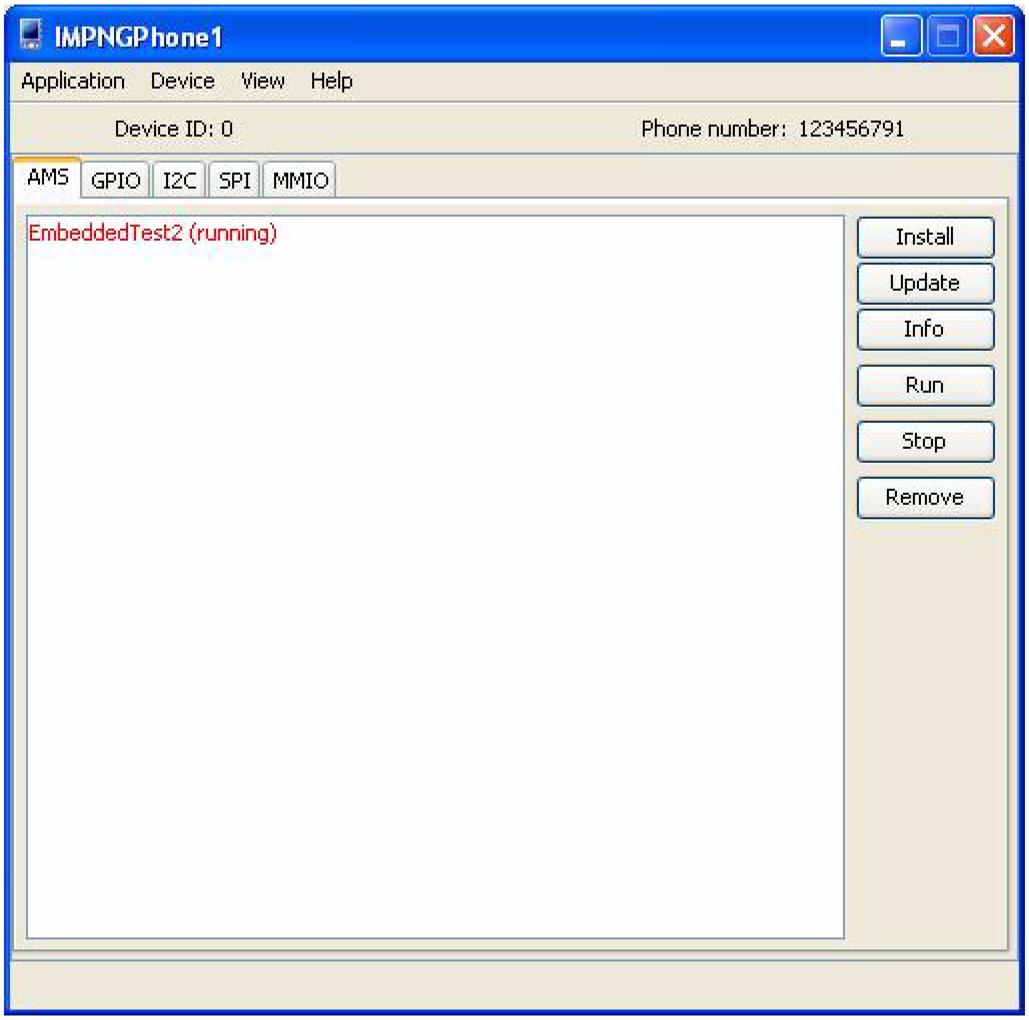
To start the emulator and open an emulator window, enter the following command from the `bin` directory:

```
EmulatorDir>emulator.exe -Xdevice:IMPNGPhone1 -Xdescriptor:location_of_jad_file
```

The emulator's main screen appears as shown in Figure 1–1. The first tab in the emulator, AMS (Application Management System), displays which Java ME Embedded applications are installed, including those that are currently running or stopped. You can use the buttons on the right side to install or update additional applications, obtain information about the currently selected application, start or stop an application, or remove (uninstall) an application from the AMS.

The current status of each Java ME Embedded application is shown in the panel on the left side as shown in Figure 1–1.

Figure 1–1 The Java ME Embedded Emulator Screen on Windows



Device ID: 0

Phone number: 123456791

EmbeddedTest2 (running)

Note: You can run the `emulator` command without the `.exe` extension. It works both ways, with the extension and without.

If no `-Xdevice` option is specified, the `IMPNGPhone1` device is started by default.

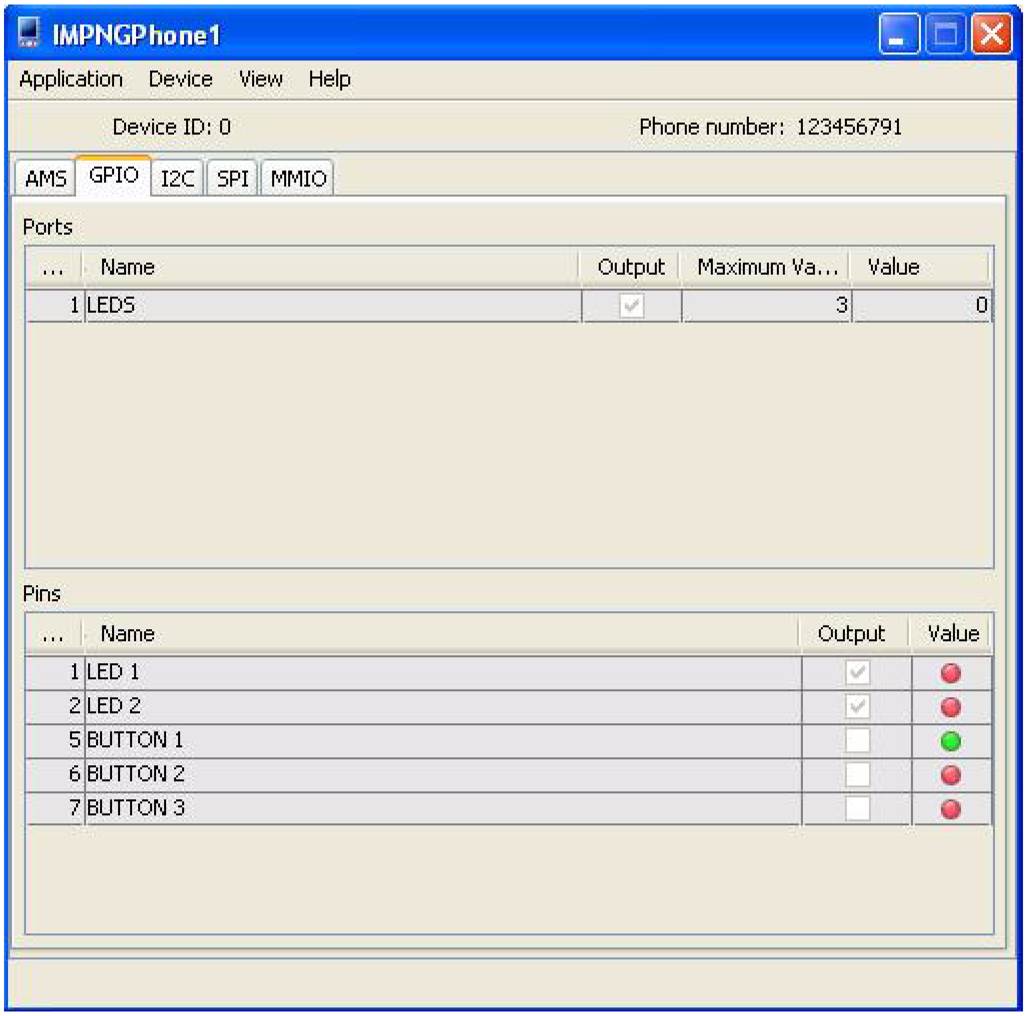
For information on other emulator commands and options, see "Other Common Emulator Commands" on page 1-10.

The GPIO Tab

The GPIO tab lists the emulator's current General Purpose I/O (GPIO) pins and ports, and their directional states (input or output). For GPIO pins, the current value is shown as a color-coded circle on the right side: *high* is colored green, while *low* is red. For GPIO ports, the maximum and current value is shown. If a GPIO port or pin is named, it is shown in this tab as well.

The GPIO tab is shown in Figure 1–2:

Figure 1–2 Emulator General Purpose I/O (GPIO) Tab



Device ID: 0

Phone number: 123456791

Ports

...	Name	Output	Maximum Va...	Value
1	LEDS	✓	3	0

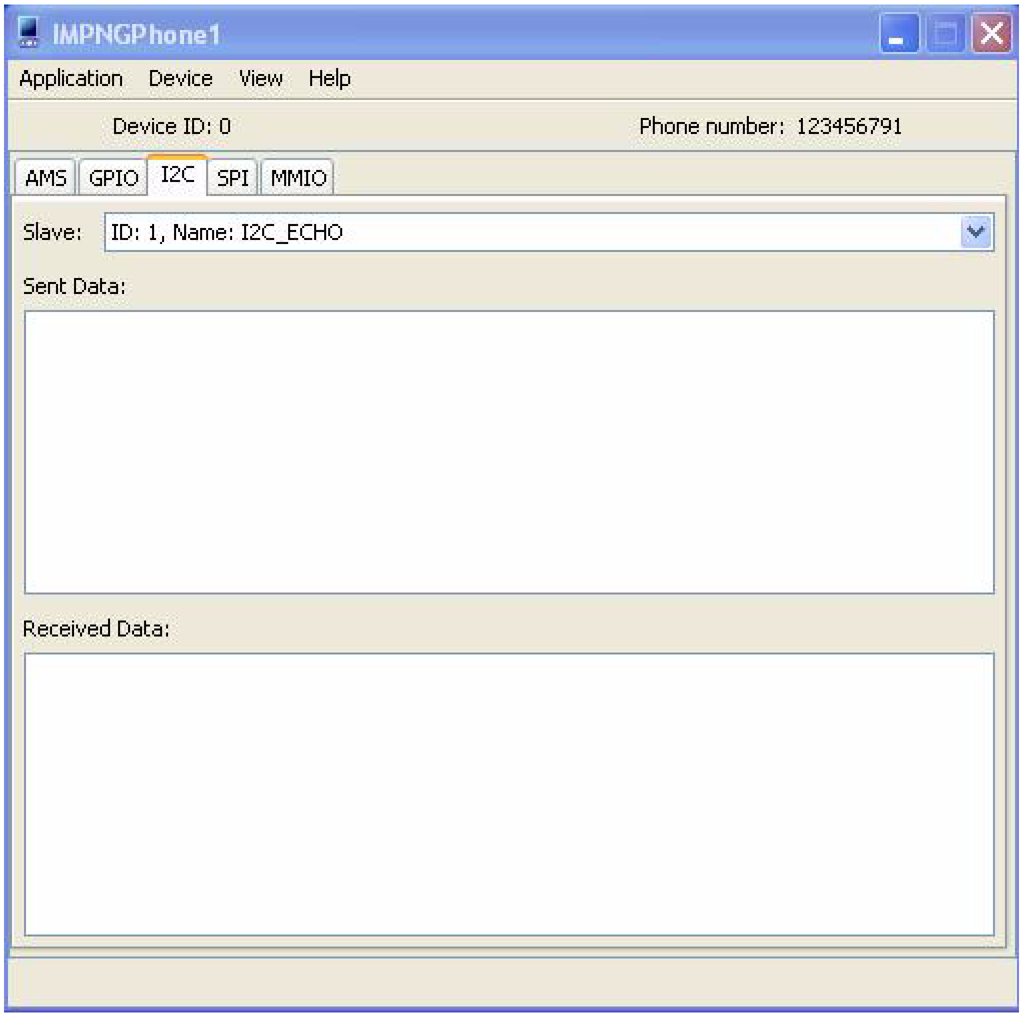
Pins

...	Name	Output	Value
1	LED 1	✓	🔴
2	LED 2	✓	🔴
5	BUTTON 1		🟢
6	BUTTON 2		🔴
7	BUTTON 3		🔴

The I2C Tab

The Inter-Integrated Circuit (I2C) tab emulates a simple peripheral slave device that echoes back any data that is sent to it. Both the sent and received data are shown in their appropriate window panes, as shown in Figure 1–3:

Figure 1–3 Inter-Integrated Circuit (I2C) Tab



Device ID: 0

Phone number: 123456791

Slave: ID: 1, Name: I2C_ECHO

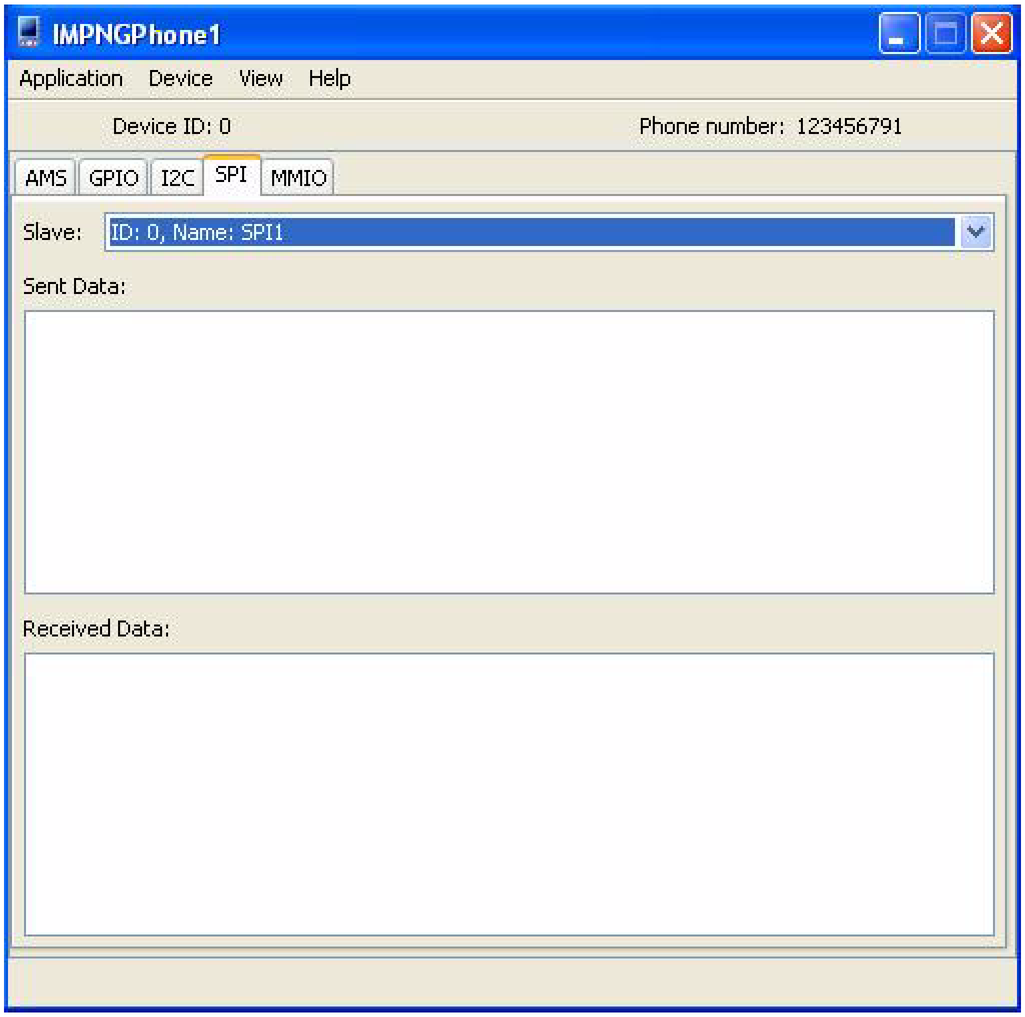
Sent Data:

Received Data:

The SPI Tab

The Serial Peripheral Interface (SPI) tab is similar to the I2C tab. It emulates a simple peripheral slave device that echoes back any data that is sent to it. Both the sent and received data are shown in their appropriate tabs, as shown inFigure 1–4:

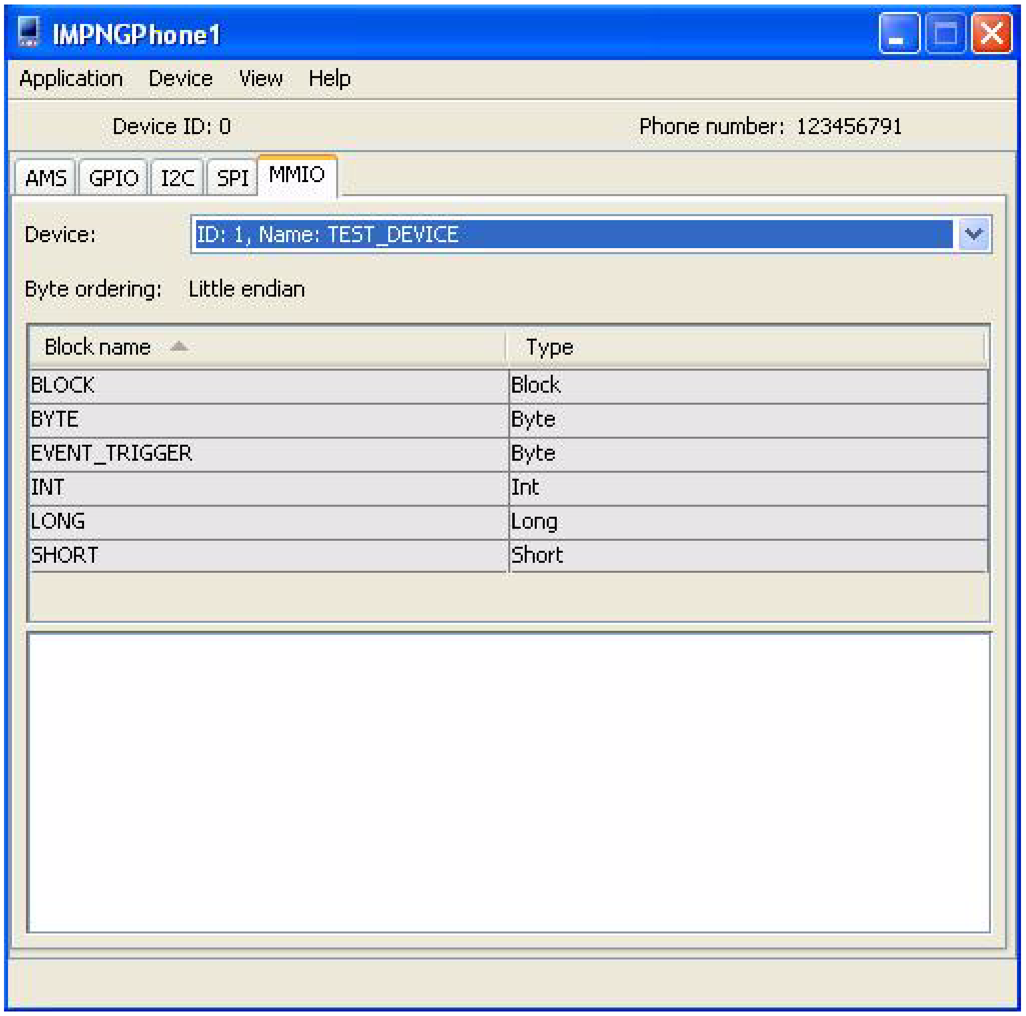
Figure 1–4 Serial Peripheral Interface Tab



The MMIO Tab

Finally, the MMIO tab emulates the Memory-Mapped I/O (MMIO) interface bus. The MMIO interface creates four separate devices that can be used for testing: TEST_DEVICE, WDOG_LOG, RTC, and BIG_ENDIAN_DEVICE. Each type of device displays its appropriate block configuration in an information table, as shown in Figure 1–5:

Figure 1–5 Memory-Mapped IO (MMIO) Tab



Device ID: 0

Phone number: 123456791

Device: ID: 1, Name: TEST_DEVICE

Byte ordering: Little endian

Block name	Type
BLOCK	Block
BYTE	Byte
EVENT_TRIGGER	Byte
INT	Int
LONG	Long
SHORT	Short

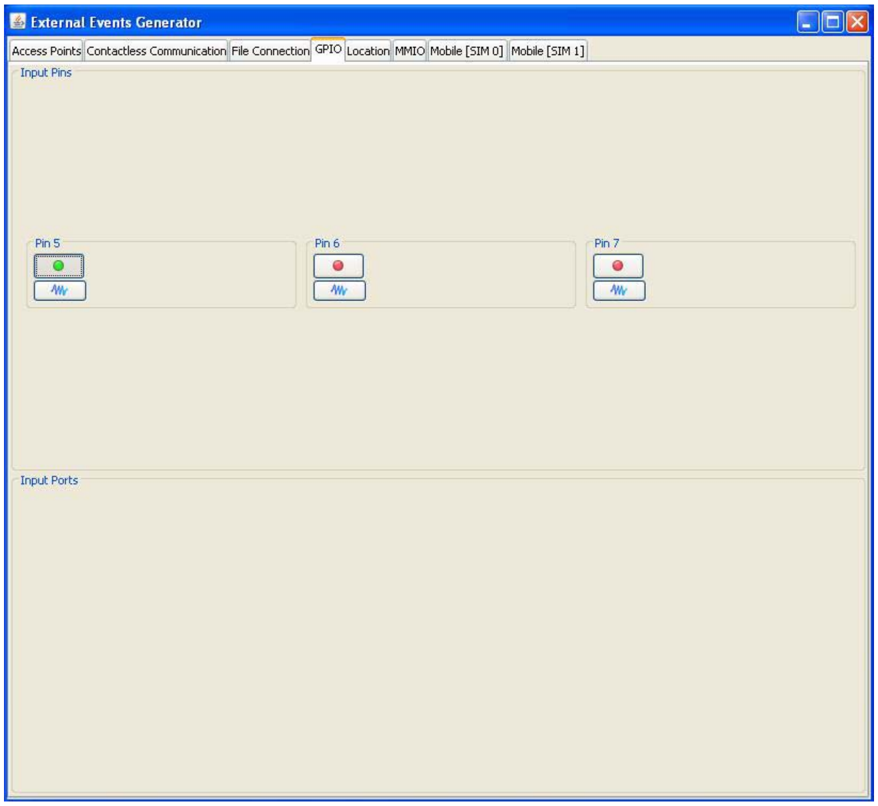
Configuring the Emulated Device

Selecting the Device menu allows the user to configure several items on the device. The Access Points tab allows the user to configure the settings returned by various methods of the Access Point API, including Wi-Fi and carrier networks.

The File Connection tab allows the user to mount external file systems. In addition, the Location tab allows the device to specify the simulated location, orientation, and speed of the device. The SIM 0 and SIM 1 tabs allow the user to specify the hardware values of one of two subscriber identity module (SIM) cards that are typically installed in mobile devices.

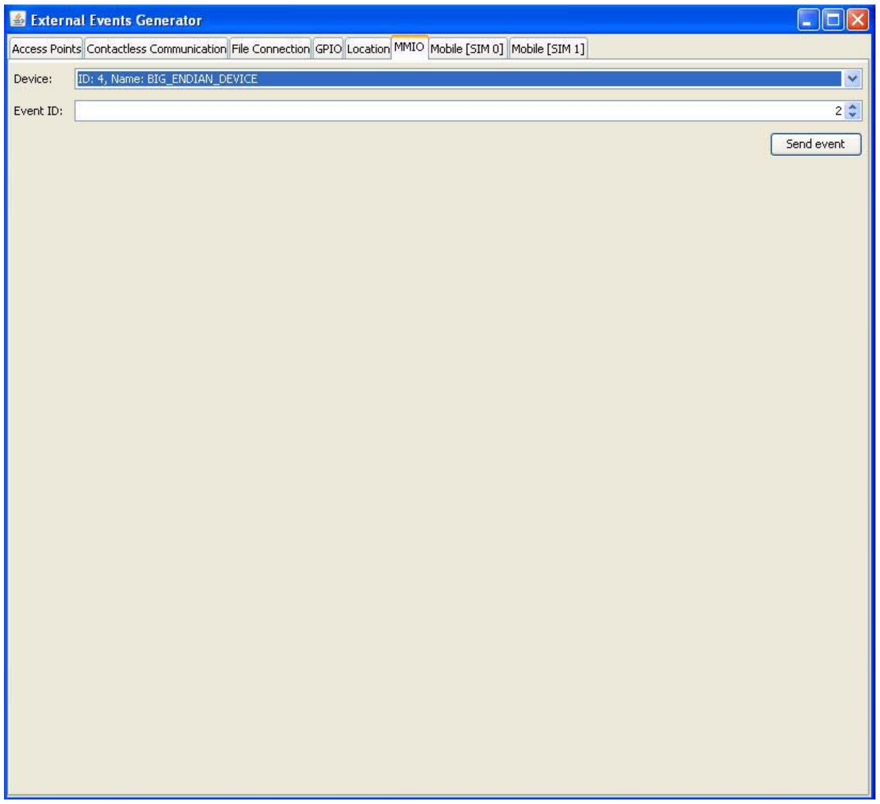
To generate input events for General Purpose I/O (GPIO), select the GPIO menu item under the Device menu. This action raises the External Events Generator window. Here, you can toggle the value of each of the pins from high to low and vice versa, and use a wave generator to simulate a more complex signal to the emulator. The GPIO External Events Generator is shown in Figure 1–6:

Figure 1–6 GPIO Tab of the External Events Generator



In addition, selecting the MMIO tab of the External Events Generator allows the user to simulate sending input event IDs from one of the four different peripheral device types. This tab is shown in Figure 1–7:

Figure 1–7 MMIO Tab of the External Events Generator



Device: ID: 4, Name: BIG_ENDIAN_DEVICE

Event ID: 2

Using the Device Manager

The Device Manager is started the first time the emulator is started. Its purpose is to manage multiple devices and device storage, so that multiple devices can be emulated without overwriting or colliding with each other.

When the Device Manager is started, it stays running as an icon in your system tray. To interact with the Device Manager, right-click the icon to display the Device Manager menu.

Running Sample Projects with the Emulator

The Oracle Java ME Embedded platform comes with a number of sample applications. This section describes how to use demos created specifically for the Oracle Java ME Embedded platform. Because IMP-NG is headless, the only user interface is to observe application status in the emulator's external events generator, or in the Output window (or the console if you execute the demo from the command line).

With the exception of I2CDemo, the sample projects provided with the Oracle Java ME Embedded release can be run on the emulator or on a real device.

Note that in the `_policy.txt` file of the distribution (typically located in the `runtimes/impng/lib` directory), the developer may need to add the following entries to avoid security exceptions when running the samples:

To both the domains:

```
domain: untrusted, unsecured
```

```
domain: unidentified_third_party, unsecured
```

Add the following entry:

```
allow: device_access
```

GPIODemo

This demo can be run on an IMP-NG emulator using the external events generator:

- Click the GPIO tab. This view approximates the device actions.
- Choose Device > GPIO to open the external events generator, and click the GPIO tab. A single click on a button turns on LEDs indicating the button pushed and the pin affected. This information is also written to the Output window.

  Beneath each pin you can click the blue wave button to open the wave generator. The wave generator simulates the frequency and duration of the signal to the LED.
- Press Pin 5 (button 1) to turn on LED 1, press again to turn off LED 1.
- Press Pin 6 (button 2) to turn on LED 2, press again to turn off LED 2.
- Press Pin 7 (button 3) and check whether PORT 1's output value is 3. Press PIN 7 and check whether PORT 1's output value is 0.

I2CDemo

This demo is designed to work with the IMP-NG runtime for Windows 32. It has no user interaction.

- Launch the I2C demo.
- In the emulator, click the I2C tab.

  The demo acquires a slave named I2C_Echo, writes data to the slave, and retrieves it. The demo is successful if the Sent Data and Received Data matches.

NetworkDemoIMPNG

This demo can be configured as a server or as a client by editing the application descriptor. You launch two instances of this demo, the first one acts as a server and the second one acts as a client. The client instance attempts to connect to the server instance and if the connection is successful they exchange a message.

- Create two instance projects of the NetworkDemoIMPNG sample project.
- Right click on the first project and select Properties. In the Platform category choose the device IMPNGPhone1. In the Application Description category set the value of the property Oracle-Demo-Network-Mode to **Server** and click OK.
- Launch the first project. It opens on the emulator IMPNGPhone1 and waits for a connection.
- Right click on the second project and select Properties. In the Platform category choose the device IMPNGPhone2. In the Application Description category set the value of the property Oracle-Demo-Network-Mode to **Client** and click OK.
- Launch the second project. It opens on the emulator IMPNGPhone2.
- The client attempts to connect to the server. If successful, you see the following in the output tab of the first project (the server):

  ```
  Connection accepted
  Message received - Client messages
  ```

The output of the second project (the client) shows the following:

```
Connected to server localhost on port 5000
Message received - Server String
```

PDAPDemoIMPNG

Follow these steps to run the demo on the IMP-NG emulator:

- Create test files and directories inside the emulator's file system:

  `Documents and Settings\`*user*`\javame-sdk\`*version*`\work\IMPNGPhone1\appdb\filesystem\root1`

- Right click on the project and select Properties. In the Platform category choose the device IMPNGPhone1 and click OK.
- Launch the project. It runs on IMPNGPhone1.
- On the emulator menu, select Device > File Connection to see a list of mounted file systems.
- Open a terminal emulator and create a raw connection to localhost on port 5001.
- A command line opens where you can browse the emulator's file system. You can use the following commands:
  - `cd` - change directory
  - `ls` - list information about the FILEs for the current directory)
  - `new` - create new file or directory
  - `prop` - show properties of a file
  - `rm` - remove the file
  - `view` -View a file's content

Other Common Emulator Commands

This section provides emulator commands.

Note: For a full list of Emulator commands, type: `emulator -help`.

- To show a list of installed IMlets, use the `-Xjam:list` subcommand:

  EmulatorDir>`emulator -Xjam:list`

- To see a list of all supported devices, use the `-Xquery` subcommand:

  EmulatorDir>`emulator -Xquery`

- To install a JAD over the air (OTA) and execute a IMlet, use the `-Xjam:install` subcommand:

  EmulatorDir>`emulator -Xjam:install=<JAD_file_URL>`

  For example:

  EmulatorDir>`emulator -Xjam:install=http://www.appstore.com/TestJAD.jad`

- To run an installed IMlet, use the `-Xjam:run` subcommand:

EmulatorDir>`emulator -Xjam:run=[storage_name | storage_number]`

Provide either the storage name or storage number for the IMlet to run. You can get the storage name and storage number from the list of IMlets shown by the `-Xjam:list` subcommand.

- To remove an installed IMlet, use the `-Xjam:remove` subcommand:

  EmulatorDir>`emulator -Xjam:remove=[storage_name | storage_number | all]`

  Provide either the storage name or storage number for the IMlet to remove. To remove all IMlets, use `all`. You can get the storage name and storage number from the list of IMlets shown by the `-Xjam:list` subcommand.

- To install a JAD file, execute the IMlet locally, and remove the IMlet when completed, use the `-Xdescriptor` subcommand:

  EmulatorDir>`emulator -Xdescriptor:<JAD_file_name>`

- To set an IMlet's security domain, use the `-Xdomain` subcommand:

  EmulatorDir>`emulator -Xdomain:<domain_name>`

- To run in autotest mode, use the `-Xautotest` subcommand:

  EmulatorDir>`emulator -Xautotest:<JAD_file_URL>`

  For example:

  EmulatorDir>`emulator -Xautotest:http://127.0.0.1:8080/getNextApp.jad`

2 Using the Oracle Java ME Embedded Software with NetBeans

This chapter discusses how to install the Oracle Java ME Embedded software for the Windows platform on the NetBeans Integrated Development Environment (IDE).

The examples below use NetBeans 7.1, although it works with NetBeans 7.0 as well. With the NetBeans integrated development environment, you can create and test mobile applications using a graphical development environment.

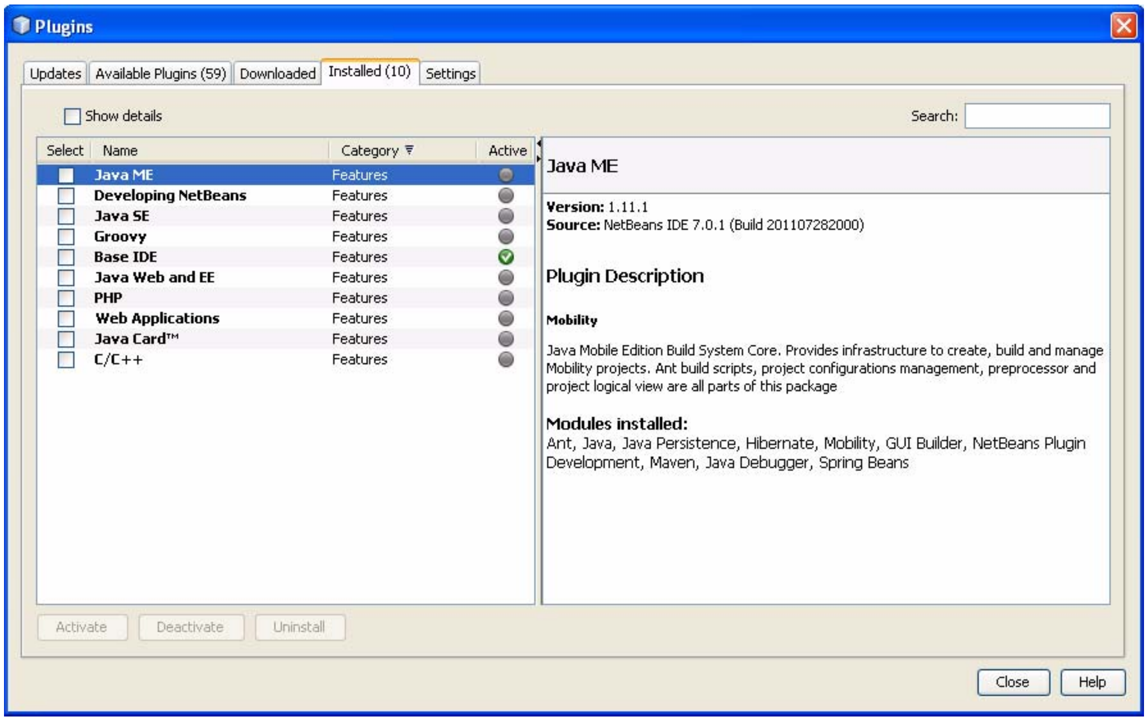
Installing on NetBeans

This section walks you through installing the Oracle Java ME Embedded software.

1. Start the NetBeans IDE and choose the Tools>Plugins menu item.

   A dialog box appears, as shown in Figure 2–1:

Figure 2–1 NetBeans Plugins Dialog



Select	Name	Category	Active
☐	Java ME	Features	●
☐	Developing NetBeans	Features	●
☐	Java SE	Features	●
☐	Groovy	Features	●
☐	Base IDE	Features	✓
☐	Java Web and EE	Features	●
☐	PHP	Features	●
☐	Web Applications	Features	●
☐	Java Card™	Features	●
☐	C/C++	Features	●

Java ME

Version: 1.11.1
Source: NetBeans IDE 7.0.1 (Build 201107282000)

Plugin Description

Mobility

Java Mobile Edition Build System Core. Provides infrastructure to create, build and manage Mobility projects. Ant build scripts, project configurations management, preprocessor and project logical view are all parts of this package

Modules installed:
Ant, Java, Java Persistence, Hibernate, Mobility, GUI Builder, NetBeans Plugin Development, Maven, Java Debugger, Spring Beans

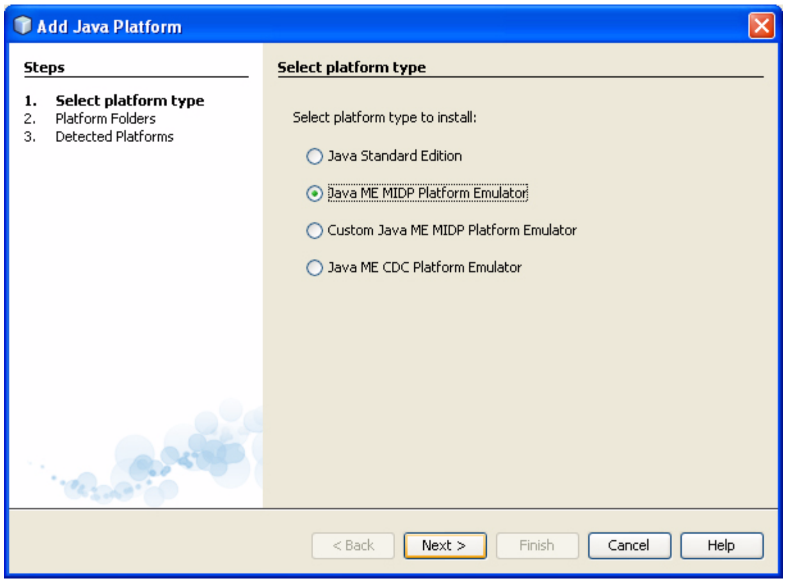
2. Choose the Installed tab, and ensure that the Java ME plugin is activated.

If it is not, select Java ME from the list and press the Activate button. Activating the Java ME plugin requires installing the Java Profiler plugin as well.

3. Close the NetBeans Plugin dialog box when completed.
4. Install the Oracle Java ME Embedded platform in NetBeans.
   a. Choose the Tools>Java Platforms menu item.
   b. Add the new Oracle Java ME Embedded platform by pressing the "Add Platform..." button in the lower-left corner of the dialog.

      This step shows the dialog in Figure 2–2:

Figure 2–2 Add Java Platform Dialog


Add Java Platform

Steps
1. Select platform type
2. Platform Folders
3. Detected Platforms

Select platform type

Select platform type to install:

- ○ Java Standard Edition
- ● Java ME MIDP Platform Emulator
- ○ Custom Java ME MIDP Platform Emulator
- ○ Java ME CDC Platform Emulator

   c. Choose the second option, "Java ME MIDP Platform Emulator", as the Oracle Java ME Embedded is a Java ME MIDP Platform Emulator, and press the Next button.
   d. NetBeans lists all known Java ME MIDP platforms. If the Oracle Java ME Embedded is not shown, press the "Find More Java ME Platform Folders..." button near the bottom. Then, select the distribution folder and press the Open button.

      NetBeans automatically detects the Oracle Java ME Embedded platform.
   e. Press the Next button.

      If successful, NetBeans presents a report of the detected platform.
   f. Press the Finish button.

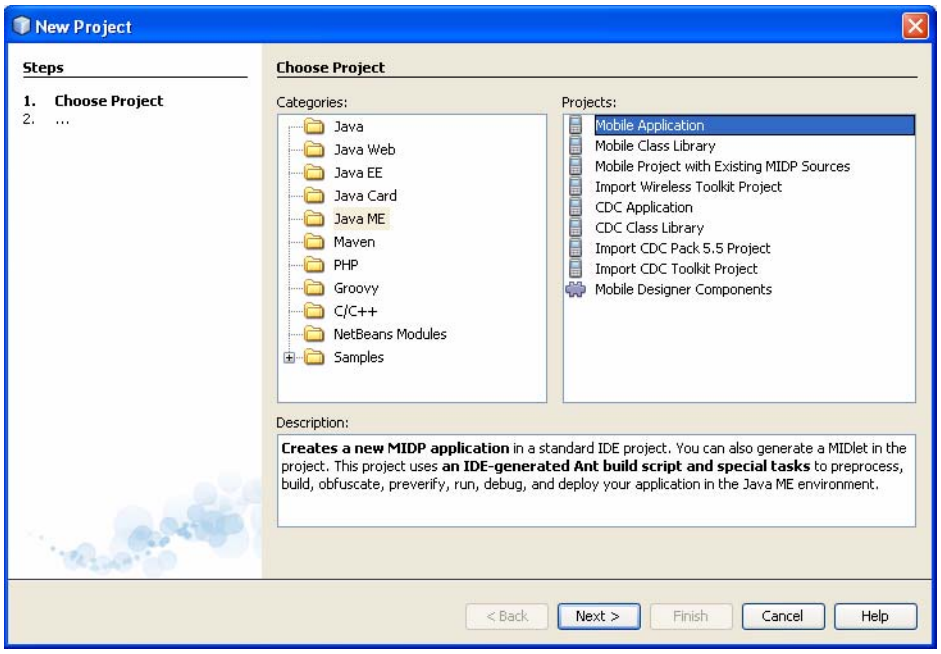
      The platform is added to the Java Platform Manager.
   g. Finally, close the Java Platform Manager dialog.

Creating a New Project

This section walks you through creating a new project using the Oracle Java ME Embedded platform.

1. Choose File>New Project. The New Project dialog appears, as shown inFigure 2–3:

Figure 2–3 New Project Dialog



Description:

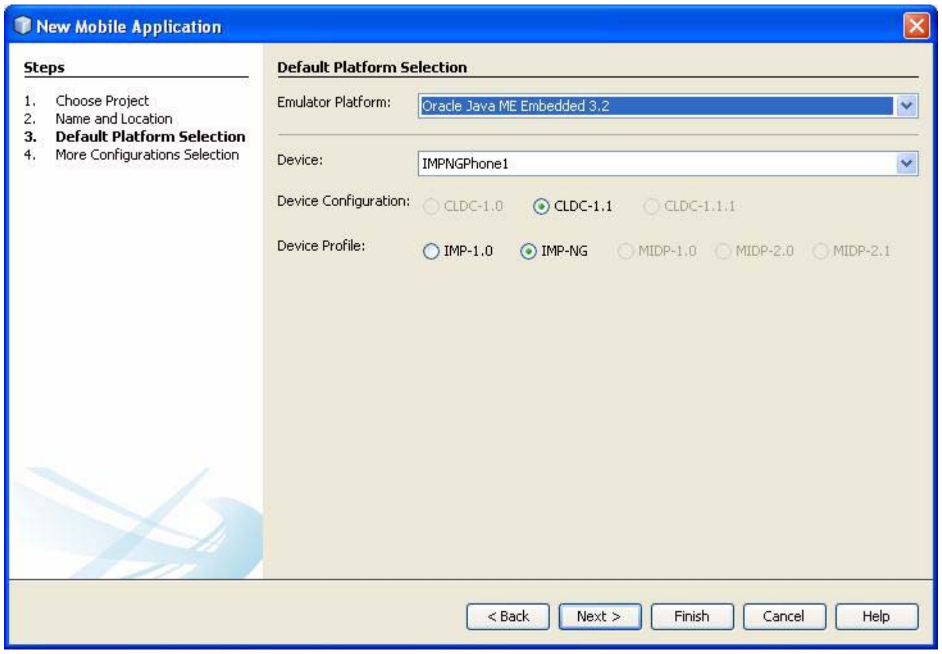
Creates a new MIDP application in a standard IDE project. You can also generate a MIDlet in the project. This project uses **an IDE-generated Ant build script and special tasks** to preprocess, build, obfuscate, preverify, run, debug, and deploy your application in the Java ME environment.

2. Choose Java ME from the Categories list, and Mobile Application from the Projects list, then press the Next button.

   The dialog shows the "Name and Location" panel.

3. Choose an appropriate name and location for the project. Be sure to uncheck the "Create Hello MIDlet" option, as this may create a sample project that uses the mobile libraries, and then press Next to arrive at the panel shown in Figure 2–4:

Figure 2–4 New Embedded Application Dialog



Emulator Platform: Oracle Java ME Embedded 3.2

Device: IMPNGPhone1

Device Configuration: CLDC-1.0 [✓ CLDC-1.1] CLDC-1.1.1

Device Profile: IMP-1.0 [✓ IMP-NG] MIDP-1.0 MIDP-2.0 MIDP-2.1

Here, you can choose the desired platform for the Java Wireless Client project.

4. Choose "Oracle Java ME Embedded 3.2" in the drop-down selection at the top of the dialog.
5. Press Finish.

   A new Oracle Java ME Embedded project is created. At this point, you can use the skeleton code shown in Example 2–1 to start building an embedded project.

Example 2–1 Skeleton Code for an Oracle Java ME Embedded Project

```
import com.oracle.deviceaccess.PeripheralTypeNotSupportedException;
import javax.microedition.midlet.MIDlet;

public class GPIODemo extends MIDlet {

    boolean bFirst = false;
    boolean loopFlag = true;


    public void startApp() {

        if (bFirst == false) {

            try {
                //  Perform startup operations
            } catch (PeripheralTypeNotSupportedException ex) {
                ex.printStackTrace();
                return;
            } catch (Exception ex) {
                ex.printStackTrace();
                return;
            }

            bFirst = true;
        } else {
            System.out.println("GPIO Demo is already started..");
        }

        //  Start program here, including accessing peripheral devices

    }

    public void pauseApp() {
        //  Pause the application
    }

    public void destroyApp(boolean unconditional) {
        bFirst = false;

        //  Close all resources that have been opened
    }


}
```

Note that in the `_policy.txt` file of the Oracle Java ME Embedded distribution (typically located in the `runtimes/impng/lib` directory), the developer must add the following entries to avoid security exceptions when running the example:

To both the domains:

```
domain: untrusted, unsecured
```

```
domain: unidentified_third_party, unsecured
```

Add the following entry:

```
allow: device_access
```

Including the Oracle Java ME Embedded Class Libraries

The final step involves modifying the project properties to include the desired Oracle Java ME Embedded class definitions. The following packages are available.

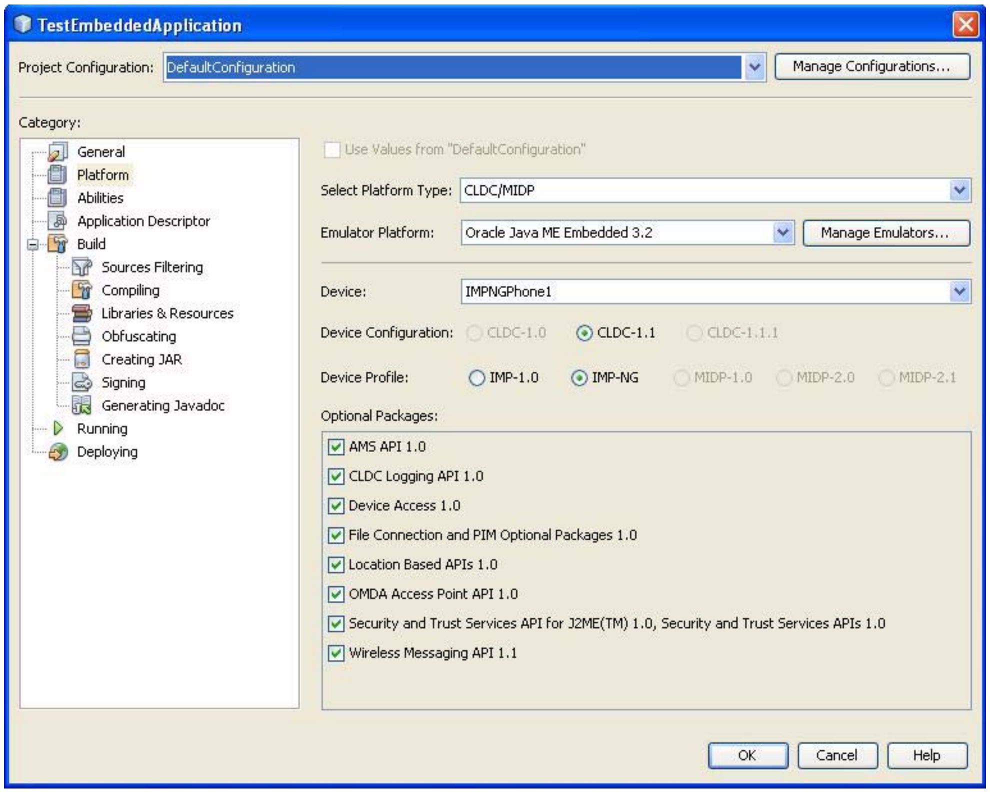
- Application Management System (AMS) API
- CLDC Logging API
- File Connection and PIM Optional Packages 1.0
- Location Based API
- OMDA Access Point API
- Security and Trust Services API for J2ME
- Wireless Messaging API

Here are the steps to include optional packages.

1. Choose File>Project Properties for the project you just created.

   You should see a dialog similar to Figure 2–5:

Figure 2–5 Modifying the Project Properties



Project Configuration: DefaultConfiguration

Use Values from "DefaultConfiguration"

Select Platform Type: CLDC/MIDP

Emulator Platform: Oracle Java ME Embedded 3.2

Device: IMPNGPhone1

Device Configuration: CLDC-1.0 [✓ CLDC-1.1] CLDC-1.1.1

Device Profile: IMP-1.0 [✓ IMP-NG] MIDP-1.0 MIDP-2.0 MIDP-2.1

Optional Packages:

- [✓] AMS API 1.0
- [✓] CLDC Logging API 1.0
- [✓] Device Access 1.0
- [✓] File Connection and PIM Optional Packages 1.0
- [✓] Location Based APIs 1.0
- [✓] OMDA Access Point API 1.0
- [✓] Security and Trust Services API for J2ME(TM) 1.0, Security and Trust Services APIs 1.0
- [✓] Wireless Messaging API 1.1

2. Select the Platform option from the list on the left side, and note the optional packages on the bottom right side of the dialog.
3. Ensure that any libraries used by the embedded application are checked.
4. Click OK to close the dialog.

   At this point, you can compile and run the newly-created Oracle Java ME Embedded project. If it is successful, you should see the Oracle Java ME Embedded emulator.

Glossary

3GPP

Third Generation Partnership Project. A collaboration between groups of telecommunications associations, for the purpose of making a globally applicable third generation (3G) mobile phone system specification.

Access Point

A network-connectivity configuration that is predefined on a device. An access point can represent different network profiles for the same bearer type, such as different cellular network access point names (APN), or for different bearers that may be available on a device, such as WiFi or bluetooth.

AID

Application Identifier. A string used to uniquely identify card applet applications and certain types of files in card file systems. An AID consists of two distinct pieces: a 5-byte RID (resource identifier) and a 0 to 11-byte PIX (proprietary identifier extension).

AMS

Application Management Service. The system functionality that completes tasks such as installing applications, updating applications, and switching foregrounds.

APDU

Application Protocol Data Unit. A communication mechanism used by SIM Cards and smart cards to communicate with card reader software or a card reader device.

API

Application Programming Interface. A set of classes used by programmers to write applications that provide standard methods and interfaces and eliminate the need for programmers to reinvent commonly used code.

Applet

A small program that runs in the **APDU** application environment.

Application list

The screen that lists all of the installed applications. The user gets to this screen by pressing the Apps soft key on the home screen. The application list uses text color to show which applications are running. It also provides a system menu that enables the user to perform application management tasks on the highlighted application.

ARM

A reduced instruction set computer (RISC) instruction set architecture (ISA) developed by ARM Holdings.

AXF

ARM Executable Format is an ARM executable image generated by ARM tools.

Background

An application state in which the application does not receive events from its input stream and its display is not rendered to the screen.

BIP

Bearer Independent Protocol. Allows an application on the SIM Card to establish a data channel with a terminal (that is, an Oracle Java Wireless Client-enabled handset), and through the terminal to a remote server in the network.

CDC

Connected Device Configuration. A Java ME platform configuration for devices. It requires a minimum of 2 megabytes of memory and a network connection that is always on.

CDMA

Code Division Multiple Access. A mobile telephone network standard used primarily in the United States and Canada as an alternative to **GSM**.

CLDC

Connected Limited Device Configuration. A Java ME platform configuration for devices with limited memory and network connectivity. It uses a low-footprint Java virtual machine such as the CLDC HotSpot Implementation, and several minimalist Java platform APIs for application services.

Configuration

Defines the minimum Java runtime environment (for example, the combination of a Java virtual machine and a core set of Java platform APIs) for a family of Java ME platform devices.

ETSI

European Telecommunications Standards Institute. An independent, non-profit standardizations group responsible for the standardization of Information and Communication Technologies (TCI) within Europe. Although based in Europe, it carries worldwide influence in the telecommunications industry.

Foreground

The application state in which the application is rendered to the device display and the input stream is passed to it.

Foreground switching

Changing which application is in the foreground by shifting the focus from one application to another.

GCF

Generic Connection Framework. A part of **CLDC**, it is a Java ME API consisting of a hierarchy of interfaces and classes to create connections (such as HTTP, datagram, or streams) and perform I/O.

GSM

Global System for Mobile Communications. A 3G mobile telephone network standard used widely in Europe, Asia, and other parts of the world.

HTTP

HyperText Transfer Protocol. The most commonly used Internet protocol, based on **TCP/IP** that is used to fetch documents and other hypertext objects from remote hosts.

HTTPS

Secure HyperText Transfer Protocol. A protocol for transferring encrypted hypertext data using Secure Socket Layer (SSL) technology.

ICCID

Integrated Circuit Card Identification. The unique serial number assigned to an individual SIM Card.

IMP-NG

Information Module Profile Next Generation. A profile for embedded "headless" devices, the specification for JSR 228, is a subset of MIDP 2.0 that leverages the latest security and networking types and APIs of MIDP 2.0 but does not include UI APIs.

IMEI

International Mobile Equipment Identifier. A number unique to every mobile phone. It is used by a GSM or UMTS network to identify valid devices and can be used to stop a stolen or blocked phone from accessing the network. It is usually printed inside the battery compartment of the phone.

IMlet

An application written for **IMP-NG**. An IMlet does not differ from MIDP 2.0 **MIDlet**, except by the fact that an IMlet can not refer to MIDP classes that are not part of IMP(-NG). An IMlet can only use the APIs defined by the IMP(-NG) and **CLDC** specifications.

IMSI

International Mobile Subscriber Identity. A unique number associated with all **GSM** and **UMTS** network mobile phone users. It is stored on the SIM Card inside a phone and is used to identify itself to the network.

JAD file

Java Application Descriptor file. A file provided in a **MIDlet suite** that contains attributes used by application management software (**AMS**) to manage the MIDlet's life cycle, and other application-specific attributes used by the MIDlet suite itself.

JAR file

Java Archive file. A platform-independent file format that aggregates many files into one. Multiple applications written in the Java programming language and their required components (class files, images, sounds, and other resource files) can be bundled in a JAR file and provided as part of a **MIDlet suite**.

Java ME platform

Java Platform, Micro Edition. A group of specifications and technologies that pertain to running the Java platform on small devices, such as cell phones, pagers, PDAs, and set-top boxes. More specifically, the Java ME platform consists of a configuration (such as **CLDC** or **CDC**) and a profile (such as **MIDP** or Personal Basis Profile) tailored to a specific class of device.

Java Specification Request (JSR)

A proposal for developing new Java platform technology, which is reviewed, developed, and finalized into a formal specification by the JCP program.

Java Virtual Machine

A software "execution engine" that safely and compatibly executes the byte codes in Java class files on a microprocessor.

KVM

A Java virtual machine designed to run in small devices, such as cell phones and pagers. The CLDC configuration was initially designed to run in a KVM.

LCDUI

Liquid Crystal Display User Interface. A user interface toolkit for interacting with Liquid Crystal Display (LCD) screens in small devices. More generally, a shorthand way of referring to the MIDP user interface APIs.

LWUIT

Lightweight User Interface Toolkit (LWUIT). A versatile and compact API for creating attractive mobile user interfaces. LWUIT provides sophisticated Swing-like capabilities and employs a similar design as Swing, but without the tremendous power and complexity. LWUIT makes it easy to apply consistent look-and-feel's, called themes, across disparate devices using an advanced graphical user interface (GUI) customization tool.

MIDlet

An application written for **MIDP**.

MIDlet suite

A way of packaging one or more midlets for easy distribution and use. Each MIDlet suite contains a Java application descriptor file (`.jad`), which lists the class names and files names for each MIDlet, and a Java Archive file (`.jar`), which contains the class files and resource files for each MIDlet.

MIDP

Mobile Information Device Profile. A specification for a Java ME platform profile, running on top of a CLDC configuration that provides APIs for application life cycle, user interface, networking, and persistent storage in small devices.

MSISDN

Mobile Station Integrated Services Digital Network. A number uniquely identifying a subscription in a **GSM** or **UMTS** mobile network. It is the telephone number to the SIM Card in a mobile phone and used for voice, FAX, SMS, and data services.

Obfuscation

A technique used to complicate code by making it harder to understand when it is decompiled. Obfuscation makes it harder to reverse-engineer applications and therefore, steal them.

Optional Package

A set of Java ME platform APIs that provides additional functionality by extending the runtime capabilities of an existing configuration and profile.

Oracle Java Device Test Suite

A set of Java programming language tests developed specifically for the wireless marketplace, providing targeted, standardized testing for CLDC and MIDP on small and handheld devices.

Preemption

Taking a resource, such as the foreground, from another application.

Preverification

Due to limited memory and processing power on small devices, the process of verifying Java technology classes is split into two parts. The first part is preverification which is done off-device using the preverify tool. The second part, which is verification, occurs on the device at runtime.

Profile

A set of APIs added to a configuration to support specific uses of a mobile device. Along with its underlying configuration, a profile defines a complete and self-contained application environment.

Provisioning

A mechanism for providing services, data, or both to a mobile device over a network.

Push Registry

The list of inbound connections, across which entities can push data, maintained by the Oracle Java Wireless Client software. Each item in the list contains the URL (protocol, host, and port) for the connection, the entity permitted to push data through the connection, and the application that receives the connection.

RL-ARM

Refers to the Real-Time Library that is a group of tightly coupled libraries designed to solve the real-time and communication challenges of embedded systems based on **ARM** processor-based microcontroller devices.

RMI

Remote Method Invocation. A feature of Java SE technology that enables Java technology objects running in one virtual machine to seamlessly invoke objects running in another virtual machine.

RMS

Record Management System. A simple record-oriented database that enables a **MIDlet** to persistently store information and retrieve it later. MIDlets can also use the RMS to share data.

RTSP

Real Time Streaming Protocol. A network control protocol designed to control streaming media servers and media sessions.

SCWS

Smart Card Web Server. A web server embedded in a smart card (such as a SIM Card) that allows **HTTP** transactions with the card.

SIM

Subscriber Identity Module or Subscriber Identification Module. An integrated circuit embedded into a removable SIM card that securely stores the International Mobile Subscriber Identity (**IMSI**) and the related key used to identify and authenticate subscribers on mobile telephony devices such as mobile phones and computers.

Smart Card

A card that stores and processes information through the electronic circuits embedded in silicon in the substrate of its body. Smart cards carry both processing power and information. A SIM Card is a special kind of smart card for use in a mobile device.

SMS

Short Message Service. A protocol allowing transmission of short text-based messages over a wireless network. SMS messaging is the most widely-used data application in the world.

SMSC

Short Message Service Center. The SMSC routes messages and regulates **SMS** traffic. When an SMS message is sent, it goes to an SMS center first, then gets forwarded to the destination. If the destination is unavailable (for example, the recipient's handset is turned off), the message is stored in the SMSC until the recipient becomes available.

SOAP

Simple Object Access Protocol. An XML-based protocol that enables objects of any type to communicate in a distributed environment, it is most commonly used to develop web services.

SSL

Secure Sockets Layer. A protocol for transmitting data over the Internet using encryption and authentication, including the use of digital certificates and both public and private keys.

SVM

Single Virtual Machine. A software mode that can run only one **MIDlet** or **IMlet** at a time.

Task

At the platform level, each separate application that runs within a single Java virtual machine is called a task. The **API** used to instantiate each task is a stripped-down version of the Isolate API defined in JSR 121.

TCP/IP

Transmission Control Protocol/Internet Protocol. A fundamental Internet protocol that provides for reliable delivery of streams of data from one host to another.

Terminal Profile

Device characteristics of a handset (terminal) passed from the handset to the SIM Card along with the **IMEI** at SIM Card initialization. The terminal profile tells the SIM Card what values are supported by the device.

UICC

Universal Integrated Circuit Card. The smart card used in mobile terminals in **GSM** and **UMTS** networks. The UICC ensures the integrity and security of personal data on the card.

UMTS

Universal Mobile Telecommunications System. A third-generation (3G) mobile communications technology. It utilizes the radio spectrum in a fundamentally different way than **GSM**.

URI

Uniform Resource Identifier. A compact string of characters used to identify or name an abstract or physical resource. A URI can be further classified as a uniform resource locator (URL), a uniform resource name (URN), or both.

USAT

Universal SIM Application Toolkit. A software development kit intended for 3G networks. It enables **USIM** to initiate actions that can be used for various value-added services, such as those required for banking and other privacy related applications. USAT is defined in standard 3GPP 31.111 for 3G.

USIM

Universal Subscriber Identity Module. An updated version of a **SIM** designed for use over 3G networks. USIM is able to process small applications securely using better cryptographic authentication and stronger keys. Larger memory on USIM enables the addition of thousands of contact details including subscriber information, contact details, and other custom settings.

WAE

Wireless Application Environment. It provides an application framework for small devices, by leveraging other technologies such as Wireless Application Protocol (**WAP**), Wireless Transaction Protocol (WTP), and Wireless Session Protocol (WSP).

WAP

Wireless Application Protocol. A protocol for transmitting data between a server and a client (such as a cell phone) over a wireless network. WAP in the wireless world is analogous to **HTTP** in the World Wide Web.

WCDMA

Wideband Code Division Multiple Access. A detailed protocol that defines how a mobile phone communicates with the tower, how its signals are modulated, how datagrams are structured, and how system interfaces are specified.

WMA

Wireless Messaging API. A set of classes for sending and receiving Short Message Service (**SMS**) messages.

XML Schema

A set of rules to which an XML document must conform to be considered valid.

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