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180. Java Wireless Programming

Version 2.1

This four-day course introduces experienced Java programmers to the Java Micro Edition, or Java ME, and develops skills in Java programming for wireless devices via the Mobile Information Device Profile, or MIDP. The course begins with a top-down tour of the ME architecture, focusing on wireless programming via the Connected, Limited Device Configuration, or CLDC, and the MIDP. Students learn the simple Core API of the CLDC -- primarily by contrast to the Java Standard Edition Core API - and then move into the individual packages of the MIDP.

We then study MIDP development in detail, working through several chapters on user interfaces and event handling, to local record storage and network connectivity, and on to threads and timers. The course concludes with chapters on advanced topics including memory management, best practices, and "over the air provisioning," which is a standard deployment model for MIDP applications to wireless devices via HTTP, including a security model using digital signatures.

Prerequisites

- This course is intended for experienced Java programmers: Course 103 would be a good starting point for those without significant Java experience.



Learning Objectives

- Understand the Java Micro Edition architecture, and the stacking of virtual machine, configuration, and profile to address different types of micro devices.
- Understand the mission of the Mobile Information Device Profile, and see how programming for mobile devices is fundamentally different from Java SE programming.
- Build a simple, functioning "MIDlet."
- Understand the framework for packaging and deploying MIDlets to devices.
- Build user interfaces for mobile devices, including text presentation, graphics, keypad and pointer event handling, and multi-screen navigation.
- Save and re-load information from one MIDlet run to the next using the MIDP Record Management System.
- Make HTTP network connections from the mobile device.
- Use multiple threads and MIDP timers effectively.
- Manage memory usage conservatively in MIDP applications.
- Deploy completed MIDlet suites to mobile devices over the air.

Timeline: 4 days.





Chapter 1. The Java ME Architecture

- Micro Devices
- The Need for Java ME
- The Java ME Software Stack
- Virtual Machine
- Configuration
- Profile
- Development Process
- The Java Wireless Toolkit
- VM Speed Emulation

Chapter 2. The Connected, Limited Device Configuration

- Classification of CLDC Target Devices
- Limitations of Java Language Support in CLDC
- The java.lang Package
- CLDC Collections API
- The Streams Model
- The Generic Connection Framework

Chapter 3. The Mobile Information Device Profile

- Relationship of MIDP to CLDC
- MIDlets
- MIDlet Lifecycle
- Application Descriptors
- The Java Application Manager
- MIDlet Suites
- Loading Resources

Chapter 4. The High-Level User-Interface API

- Application Descriptors
- The Displayable Hierarchy
- Forms and Items
- Text Fields, Dates, and Times
- Choice Groups
- Alerts
- Tickerts

Chapter 5. The Low-Level User-Interface API





- The Canvas Class
- The Graphics Object
- Drawing Graphics
- Drawing Text
- Controlling Fonts

Chapter 6. Event Handling

- MIDP Event Architecture
- High-Level Event Handling
- Commands
- Item State Changes
- Low-Level Event Handling
- Keypad Input
- Pointer Input
- MVC in MIDP
- Model Events

Chapter 7. The Record Management System

- Persistence on Mobile Devices
- Scope of Record Management
- Opening a Record Store
- Managing Records
- Using Streams for Record I/O
- Persistence Strategies
- Filtering and Sorting Records

Chapter 8. Networking

- The Generic Connection Framework
- MIDP Connection Types
- Creating an HTTP Connection
- Building Query Strings
- Reading HTTP Responses
- Bandwidth Emulation
- The WTK Network Monitor
- Threading

Chapter 9. Threads and Timers

- The Need for Threads
- Thread and Runnable





Synchronization Strategies
Timers
Timer Tasks

Chapter 10. Memory Management

Memory Management Techniques
The WTK Memory Monitor
Efficient Data Representation
Controlling Object Creation
Using Arrays Effectively
String Manipulation

Chapter 11. Best Practices

Exception Handling
Cleaning Up Resources
UI Design Considerations
UI Responsiveness
Portability Considerations
Making Tasks Cancelable
Conditional Features

Chapter 12. Over-the-Air Provisioning

Application Management Software
Requirements for OTA Provisioning
Downloading JADs and JARs
MIDlet Suite Lifecycle
Security Considerations
Signing MIDlet Suites
MIDP PKI

Appendix A. Learning Resources

System Requirements

Hardware Requirements (Minimum)	1 GHz, 512 meg RAM, 500 meg disk space.
Hardware Requirements (Recommended)	1.5 GHz, 1 gig RAM, 1 gig disk space.
Operating System	Tested on Windows XP Professional.
Network and Security	Limited privileges required -- please see our standard security requirements at http://capcourse.com/Guides/Security.html .





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Outline

Software Requirements

All free downloadable tools.

