

2D User Interfaces - Exercises

Tutorial 3

Loading & Storing Real-World Data

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Overview

- Eclipse Tips&Tricks
- Introduction
- Accessing the Filesystem
- Parsing XML
- Writing XML
- Assignment and Tips

Eclipse Tips and Tricks

Idea: Keyboard is faster and you never get a Mouse-Finger (aka Sehenscheidenentzündung)

- Use `Ctrl-F11` to start your program
 - Window-> Preferences
 - Run/Debug -> Launching
 - Set: Launch Operation to ‚Always launch previously launched app‘
- Use `F3` to navigate into a Type/Declaration/Method
 - Just place your text cursor on the ‚word‘ and type `F3`
- Use `Alt-LeftArrow` & `Alt-RightArrow` to navigate between navigation location history (back and forward)
 - Ist cool!!! Especially in combination with the `F3`-thingy
- Use CodeInsight and CodeCompletion
 - NEVER write out a ‚word‘! Always use `Ctrl-Space` to complete a type name, ...

Introduction

- Goal: load and store data from an external source
- Format: „poor man's database“ = XML
- Example: directory listing (larger example file provided on Website: `music.xml`)

```
<list name="code" >
  <group name="." >
    <item name="SimpleList.java" />
    <item name="SimpleListExample.java" />
    <item name="SimpleListExampleCanvas.java" />
    <item name="SimpleXMLParser.java" />
    <group name=".svn" >
      <item name="SimpleList.java.svn-base" />
      <item name="SimpleListExample.java.svn-base" />
      <item name="SimpleListExampleCanvas.java.svn-base" />
      <item name="SimpleXMLParser.java.svn-base" />
    </group>
  </group>
</list>
```

Access to the File System

- Via the FileConnection API of J2ME

```
import javax.microedition.io.Connector;  
import javax.microedition.io.file.*;
```

- Example: get all root devices (e.g. internal flash + memory card)

```
Enumeration e = null;  
e = FileSystemRegistry.listRoots();
```

Access to the File System (ctd)

- Example: list a directory

```
Enumeration e = null;
FileConnection current = null;
current = (FileConnection)
    Connector.open( "file://localhost/" + dirName, Connector.READ );
e = current.list();
```

- Of course, the filesystem is also a hierarchical list.. :-)
- Use your list implementation to select and load an XML file
- WTK Mobile Phone root:
C:\Dokumente und Einstellungen\...\j2mewtk\2.5.2\appdb\DefaultColorPhone\filesystem\root1
- Almost impossible to run on Motorola phones due to midlet signature requirements. Use the emulator instead.

Parsing XML

- Luckily, we don't have to write an XML parser

```
import org.xml.sax.*;
import org.xml.sax.helpers.*;
import javax.xml.parsers.*;
```

- Packages provide the Simple API for XML (SAX)
- SAX operates via callback methods, e.g.:
 - start/endDocument
 - start/endElement
 - characters

Parsing XML (ctd)

- Callbacks are provided by class `DefaultHandler`
- Derive from this class and overwrite `start/endElement` methods

```
InputStream is; // Created from FileConnection object
MyCallbackHandler cb; // Your impl derived from DefaultHandler
SAXParserFactory factory = SAXParserFactory.newInstance();
SAXParser parser = factory.newSAXParser();
parser.parse(is, cb);
```

- Hint: if your midlet might throw an `OutOfMemoryError` during parsing
- Go to *Run -> Run Configs...* in Eclipse, open the Emulation tab of your configuration and add `-Xheapsize:1M` (or more) to *Extra Emulator Parameters*

Writing XML

- XML is a tree, your list implementation too (hopefully ;-)
- Create a, e.g., recursive method `public String dump()`
- Write the resulting string to a file, e.g., with a `DataOutputStream`
- Restart your applet and load the new file
- MIDlet must show same contents

Exercise Assignment

- Write a midlet which allows the user to..
 - Select a XML file (e.g. the one from the lecture website)
 - Browse through the contained hierarchy
 - modify the data with your simple list implementation
 - Dump the current list into a new XML file
- Questions
 - ‘Your MIDlet wants to read from the file system...’
 - Reasonable to avoid steady requests? How?
 - If (How == yes): How does this affect your memory consumption?
 - ‘Warning: To avoid potential deadlock, operations that may block, such as networking, should be performed in a different thread than the `commandAction()` handler.’
 - How?
 - Where?
 - Synchronization

Exercise Assignment (ctd)

- When you finished your work
 - Come by in our office (with appointment) and present your work before the next tutorial is held (for today's exercise before the tutorial session on 20.11.08 at 13.00h)
 - If you are fast, you can present your solution in the lab session (13.11.08)
 - Room: 03.13.035
- Q/A: maierp@in.tum.de / toennis@in.tum.de
- See you back here on 13.11.08 at 13.00h for the lab session