MIDlets and Ant

April 3, 2003

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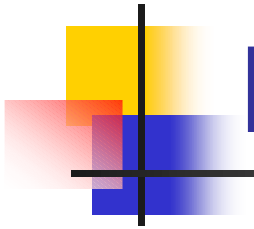
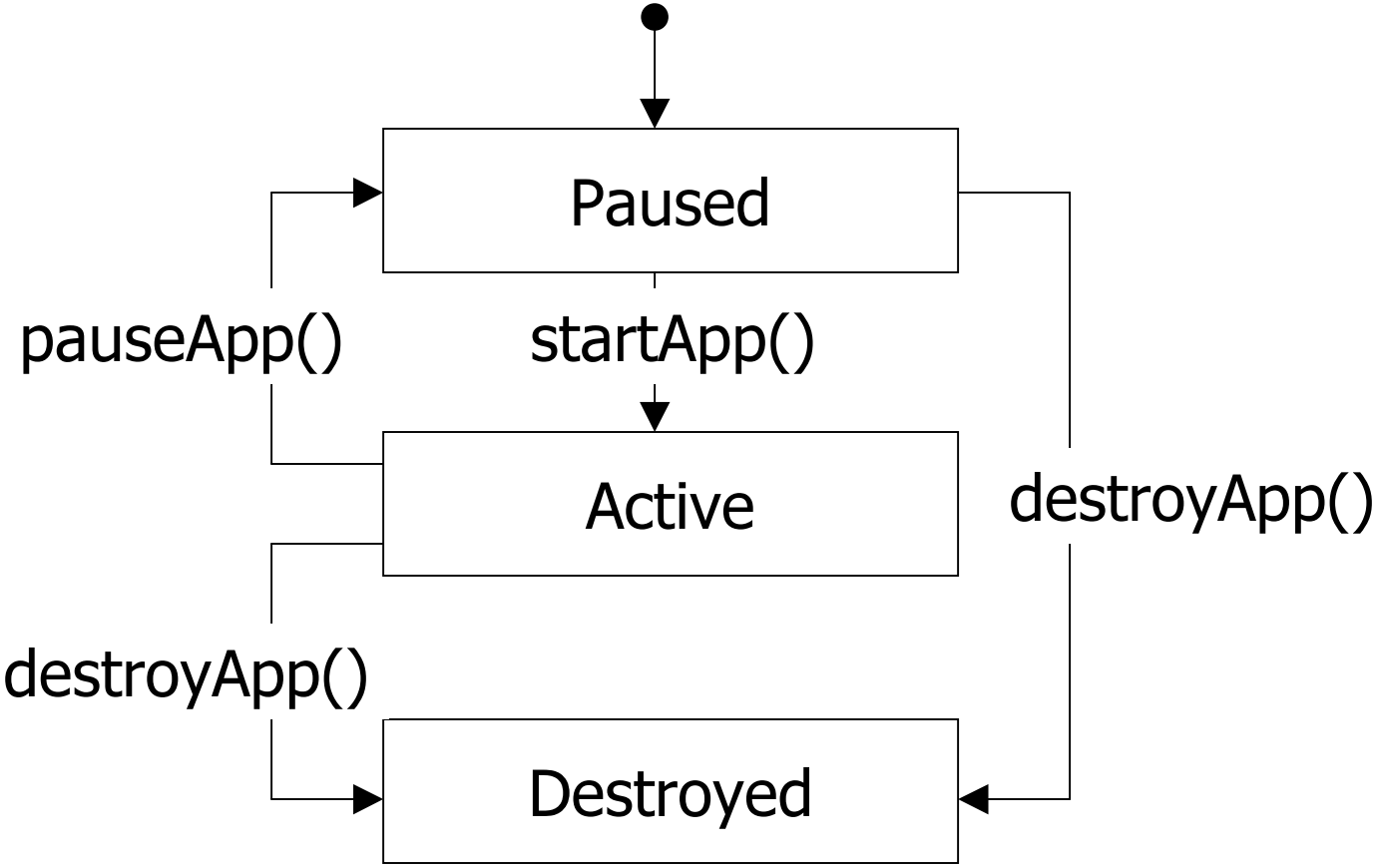
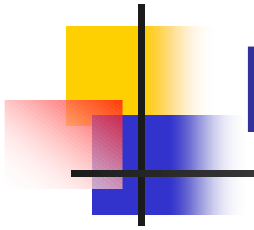


MIDlet: Skeleton

```
import javax.microedition.midlet.*;

public class MyMIDlet extends MIDlet {
   public MyMIDlet() {}          // constructor
   public void startApp() {}     // entering active state
   public void pauseApp() {}     // entering paused state
                                 // entering destroyed state
   public void destroyApp(boolean unconditional) {}
}
```

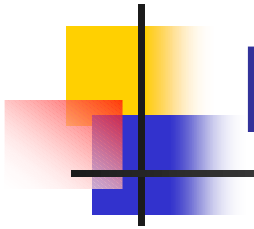
MIDlet: State Transitions





MIDlet: Resources

- Official J2ME WTK 1.0.4 Page
  - http://java.sun.com/products/j2mewtoolkit/
- API reference
  - file://C:/WTK104/doc/api/index.html



MIDlet: JAD file

MIDlet-Name: Introductory Midlets

MIDlet-1: Properties,,PView

MIDlet-2: Accounts,,AccountViewer

MIDlet-Vendor: Univ of Washington

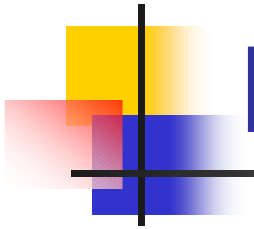
MIDlet-Version: 1.13

MIDlet-Jar-Size: 23919

MIDlet-Jar-URL: HW1.jar

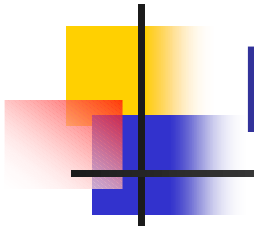
Image-1-name: Ant

Image-1-location: /res/ant.gif



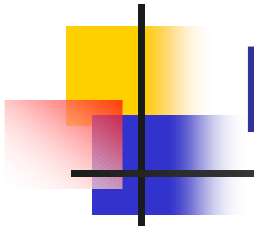
MIDlet: Getting Properties

- Class javax.microedition.midlet.MIDlet
  - String getAppProperty(String key)
  - property = getAppProperty("Image-1-name");



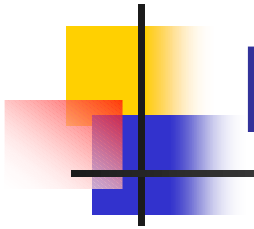
MIDlet: Displayable classes

- package javax.microedition.lcdui.*
- Class Screen
  - abstract for classes Alert, Form, List, and TextBox, which allows use of basic GUI elements
- Class Canvas
  - allows full control over painting and input handling



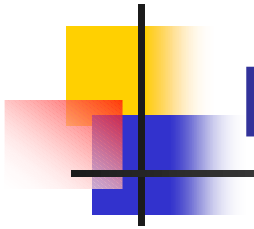
MIDlet: Using Displayable

```
// from within a MIDlet class...

  // Get the display for this MIDlet
Display display = Display.getDisplay(this);

  // Create the displayable object
Displayable displayable = new MyDisplayableClass();

  // Select the displayable object to show the user
display.setCurrent(displayable);
```



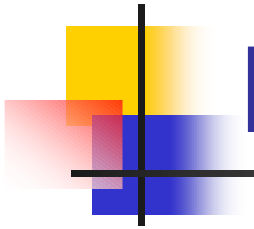
MIDlet: Class Form

- useful functions
  - int append(...)
    - ChoiceGroup, DateField, Gauge, ImageItem, StringItem, TextField
  - void setItemStateListener(ItemStateListener iListener)



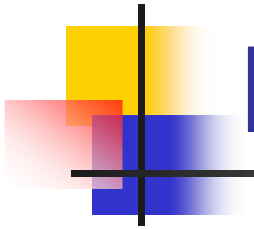
MIDlet: Interface ItemStateListener

- key function to implement
  - itemStateChanged(Item item)
- Class Item
  - void setLabel(string label)
  - String getLabel()



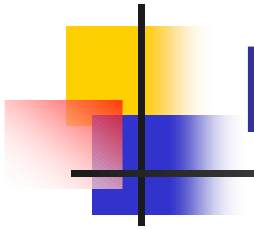
MIDlet: Class Canvas

- key functions to implement
  - void paint(Graphics g)
  - void keyPressed(int keyCode)
- other useful functions
  - int getGameAction(int keyCode)
    - Needed to use arrow buttons!
  - int getWidth()
  - int getHeight()



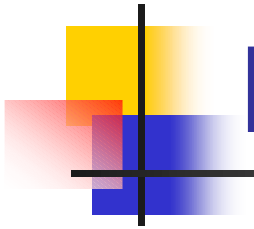
MIDlet: Internet Classes

- Class Connection
  - DatagramConnection
    - Datagram (Warning: A separate Datagram object is needed for both input and output!)
    - = Connector.open("datagram://somewhere.com:8000")
    - = Connector.open("datagram://:8000")
  - StreamConnection
    - oStream, iStream
    - = Connector.open("socket://somewhere.com:8000")
  - HttpConnection
    - = Connector.open("http://www.somewhere.com:80")



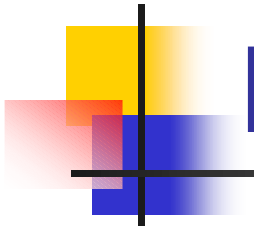
MIDlet: Class RecordStore

- package javax.microedition.rms.*
- useful functions
  - static void deleteRecordStore(...)
  - static RecordStore openRecordStore(...)
  - int getSize()
  - int getSizeAvailable()
  - int addRecord(...)
  - int getRecord(...)
  - RecordEnumeration enumerateRecords(...)



Design Points

- Limitations
  - MIDlet JARs: ~64k or less
  - awkward user input
- Good Design
  - wait animations
  - remember old inputs after error message
    - (for example, remember the user name if the password was entered incorrectly)



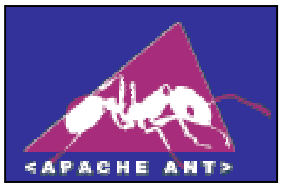
Programming Guidelines

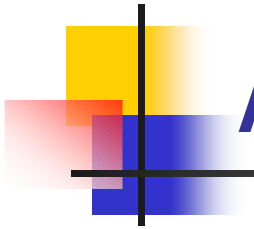
- Use local variables instead of fields.
  - Local variables are faster than class members.
- Avoid unnecessary method calls.
- Avoid string concatenation; make use of StringBuffer instead.
- Reuse (recycle) objects whenever possible.
  - Memory is limited and garbage collecting takes time.
- Use multi-threading to keep the MIDlet responsive.

Apache Ant

- xml based build tool using Java
- extended using Java classes
- Ant Is Not a Scripting Language!

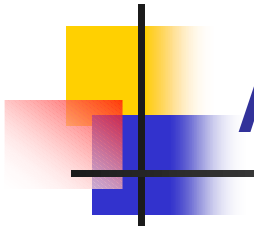
- http://ant.apache.org/





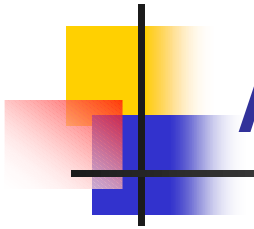
Ant: Basic Example

```
<project default="dist" name="BuildFile" basedir=".">
  <description>
    Build file description...
  </description>

  <!-- This is a comment. -->
  <property location="dist" name="dist"/>
  <property file="build.properties"/>

  <target name="dist" description="Generate the distribution.">
    ...
  </target>
</project>
```



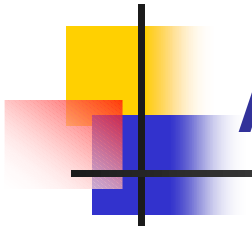
Ant: Properties File Example

```
# This file defines properties for an Ant midlet builder.
# The properties can be changed at run time by specifying
# new values on the ant command line with the -D switch.
# For example, -Demulator=DefaultColorPhone would request the
# Default Color Phone instead of the Motorola i85s.
#
# $Id: build.properties,v 1.2 2003/04/01 04:26:18 finson Exp $

# Location of the Wireless Toolkit installation.
wtk.home = c:/wtk104

# Default emulator.  Can be any valid device as listed
# in the WTK104/wtklib/devices directory.
emulator = Motorola_i85s
```



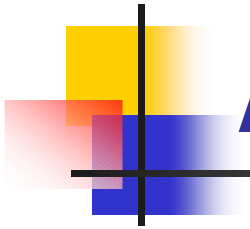
Ant: Properties

- <property name="src" location="source" />
  - The name of the property. Specified by "${src}" in this case.
  - The directory value that it represents is relative to the basedir (unless the location is absolute).
- <property name="src" value="source" />
  - The value stays as "source".
- <property file="build.properties"/>
  - Uses properties listed in the given file.



Ant: Targets

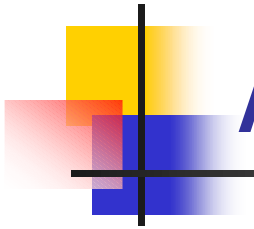
- <target name="A">
- <target name="B" depends="A">
- <target name="C" depends="A">
- <target name="C" depends="A,C,B">



Ant: Filesets

```
<fileset dir="${basedir}" casesensitive="yes" id="doc.files">
  <include name="**/*.txt"/>
  <exclude name="**/*.zip"/>
  <exclude name="build.xml"/>
  <exclude name="total.txt"/>
</fileset>
```

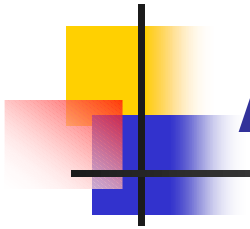
- Collects the list of files matching the provided attributes and gives them the reference provided by ‘id’.



Ant: Pathconverts

```
<pathconvert pathsep=" " property="files" refid="doc.files"/>
```

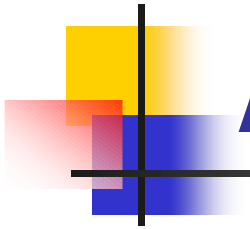
- makes a list of the files separated by spaces
  - (Warning: If any of the paths have spaces, this will cause problems!)
- refid = fileset id
- property = destination id
- pathsep = separation string



Ant: Executing Shell Programs

```
<exec executable="F:\AntTest\collector.app\collector.exe"
   dir="${basedir}">
  <arg line="${basedir}/../total.txt"/>
  <arg line="${files}"/>
</exec>
```

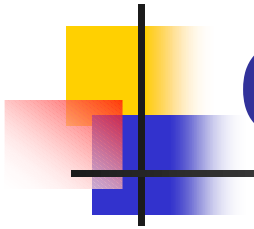
- runs collector.exe from ${basedir} with the arguments providedmakes a list of the files separated by spaces



Ant: Taskdefs

```
<taskdef name="wtkjad" classname="de.pleumann.antenna.WtkJad"/>
```

- allows you to refer to the plugin class WtkJad as wtkjad in your Ant build file
- inherit task classes from *org.apache.tools.ant.Task*
  - file://C:/jakarta-ant-1.5.1/docs/manual/api/index.html



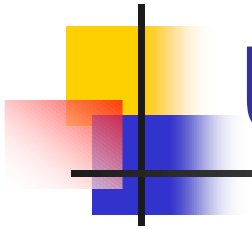
Other Tasks

- javac
- copy, delete, move, mkdir
- zip, unzip, jar, war
  - It is possible to extract specific files from a zip file using a patternset.
- mail
  - for SMTP email (must not require a password)
- waitfor
- echo

Ant from the prompt

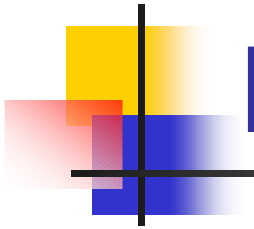
- ant –buildfile build403.xml clean

- a build file of build.xml is default
- ant run



Unix Setup

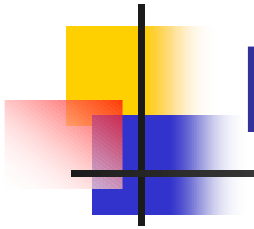
- Ant Path
  - /usr/local/ant/bin
- Wireless Toolkit Path
  - /usr/local/wtk-1.0.4



Environment Variables

- ANT_HOME = c:\jakarta-ant-1.5.1
- JAVA_HOME = c:\j2sdk1.4.1_01
- Path = %PATH%;%ANT_HOME%\bin;c:\wtk104\bin;%JAVA_HOME%\bin

- Comments:
  - Remember to avoid spaces in your target directory and file names!
  - If your MIDlet does not run by selecting the JAD file, then it does not count as release worthy. (For example, running your MIDlet through the KToolbar does not count as complete.)

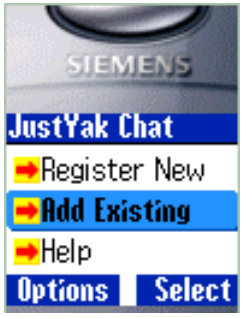


Homework Comments

- You are adding the "dist" target to the provided *build.xml* file.
- The directory structure, ${dist.dir}, and other variables are defined in *build.xml*.
- Don't forget to refer to the Ant web site (or Ant installation docs) for more task information and examples.
- Don't forget to send questions to either the email list or all three of us.

MIDlets

- Free MIDlet programs
  - http://midlet.org/index2.jsp



- Cannons:ME (multiplayer game)
  - http://games.macrospace.com/cannonsme/