References


Other references given per slide
Mobile Phone Market 2007

3.3 Billion mobile accounts

90% of world population has cell coverage
# SmartPhone

"mobile phone offering advanced capabilities beyond a typical mobile phone, often with PC-like functionality"

Wikipedia

<table>
<thead>
<tr>
<th>Year</th>
<th>Model/Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>Simon (IBM)</td>
</tr>
<tr>
<td>1996</td>
<td>Nokia 9000</td>
</tr>
<tr>
<td></td>
<td>Nokia Communicator series</td>
</tr>
<tr>
<td>2001</td>
<td>BlackBerry (RIM)</td>
</tr>
<tr>
<td></td>
<td>BREW (Qualcomm)</td>
</tr>
<tr>
<td>2002</td>
<td>Windows Mobile</td>
</tr>
<tr>
<td>2007</td>
<td>iPhone</td>
</tr>
<tr>
<td>2008</td>
<td>Android</td>
</tr>
</tbody>
</table>
Smartphone Market

39.9 million sold Q3 2008

13% of mobile phone market

28% increase

## Mobile Phone OS & Market Share

<table>
<thead>
<tr>
<th></th>
<th>Q4 2007</th>
<th>Q2 2008</th>
<th>Q3 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbian (Nokia)</td>
<td>65%</td>
<td>57.1%</td>
<td>46.6%</td>
</tr>
<tr>
<td>iPhone</td>
<td>7%</td>
<td>2.8%</td>
<td>17.3%</td>
</tr>
<tr>
<td>BlackBerry</td>
<td>11%</td>
<td>17.4%</td>
<td>15.2%</td>
</tr>
<tr>
<td>Windows Mobile</td>
<td>12%</td>
<td>12.0%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Linux</td>
<td>5%</td>
<td>7.3%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Palm OS</td>
<td></td>
<td>2.3%</td>
<td></td>
</tr>
<tr>
<td>Brew</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Android</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Jobs for mobile phone developers

Work for mobile phone company
  Qualcomm
  Motorola
  Nokia
  etc

Third party developer
  Hard to make money
And then came iPhone App Store

Trism
iPhone game
Costs $5.00
Two month revenues $250,000

2across
iPhone crossword puzzle application
Costs $6.00
Earned $2,000 per day for a while

Exceptional cases get press

Not clear on revenues over longer time

Android

Google's mobile phone OS and SDK

Java only
  Special VM
  Nonstandard byte code

Eclipse is development IDE

Linux

Application framework
  2D & 3D graphics
  Audio, video and still image support
  SQLite database
  Embeddable web browser

Hardware dependent

GSM
  Bluetooth, EDGE, 3G, WIFI
  Camera, GPS, compass
  Accelerometer
Android SDK

http://code.google.com/android/documentation.html
See Getting Started at Android Docs

Supported OS
  Windows XP, Vista
  Mac OS X 10.4.8 or later (intel processor only)
  Linux (Tested on Ubuntu Dapper Drake)

IDE
  Eclipse 3.3 or 3.4
  Java JDK 5 or JDK 6
Design Issues for Mobile Phone Apps

Screen Size
User input
Memory constraints
Limited CPU
Battery life
Security
G1 - First Android Phone

Source: T-Mobile Ad
Why Android

Why did Google create Android
  Google search, maps, talk part of Android

Why study Android in this course
  New generation of mobile app development
  Google App store
Emulators

Very useful in developing applications

Not the same as running on real device
  Emulator has bugs
  Device has different bugs
  Device has restriction and limitations
  Device as resources not on your development machine

Eclipse starts emulator when run Android app
  Can recompile and run app without exiting and restarting emulator
Hello World
Following "Hello Android" section of "Getting Started"

Auto generated parts of application

Hello.java
Source code

R.java
Provides access to resources

Resources
icon.png (Application icon)
main.xml (Optional Layout of application view)
strings.xml (Allows separation of source code and display text)

AndroidManifest.xml
Describes application contents
package edu.sdsu.cs683.hello;

import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

public class Hello extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        TextView tv = new TextView(this);
        tv.setText("This is a test");
        setContentView(tv);
    }
}

Bold text indicates text added or modified from auto-generated code
Println does not work

package edu.sdsu.cs683.hello;

import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

public class Hello extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        System.out.println("I am here"); // no output that I can see
        TextView tv = new TextView(this);
        tv.setText("This is a test");
        setContentView(tv);
    }
}
Use the Eclipse debugger
Views

View
  Displays content in rectangular area of screen
  Handles
    Layout, focus, scrolling
    Keyboard events
    Gestures

ViewGroups
  Manages set of views and view groups
  Composite pattern
Some Views

AutoCompleteTextView  MultiAutoCompleteTextView
Button                RadioButton
CheckBox              RatingBar
CheckBox              ScrollView
Chronometer           SeekBar
DatePicker            Spinner
DigitalClock          TabHost
EditText              TabWidget
ExpandableListView    TableRow
Gallery               TimePicker
GridView              ToggleButton
ImageButton           TwoLineListItem
ListView              VideoView
MapView,               ViewAnimator
WebView               WebView
ZoomButton            ZoomControls
Activity

Single, focused thing that a user can do

Usually each screen has its own activity

An application may have multiple screens, hence multiple activities

An application runs in its own Linux process
Activity Lifecycle

Active
  Running activity in foreground of screen

Paused
  Lost focus, but still visible
  Retains all state information
  In extreme memory situations may be killed

Stopped
  Not visible
  Retains all state information
  Often will be killed

Killed
package edu.sdsu.cs683;

import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

public class CountStates extends Activity {
    int paused = 0;
    int killed = 0;
    int stopped = 0;
    TextView text;
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    if (savedInstanceState != null) {
        paused = savedInstanceState.getInt("paused");
        killed = savedInstanceState.getInt("killed");
        stopped = savedInstanceState.getInt("stopped");
    }
    text = new TextView(this);
    text.setText("Paused: " + paused + " stopped: " + stopped + " killed " + killed);
    setContentView(text);
}
Activity Example

protected void onResume() {
    super.onResume();
    text.setText("Paused: " + paused + " stopped: " + stopped + " killed " + killed);
}

protected void onStart() {
    super.onStart();
    text.setText("Paused: " + paused + " stopped: " + stopped + " killed " + killed);
}

protected void onStop() {
    stopped++;
    super.onStop();
}
Activity Example

protected void onPause() {
    paused++;
    super.onPause();
}

protected void onDestroy() {
    killed++;
    super.onDestroy();
}

protected void onSaveInstanceState(Bundle outState) {
    outState.putInt("paused", paused);
    outState.putInt("killed", killed);
    outState.putInt("stopped", stopped);
}

}