Release and Monetization

CS 2046

Mobile Application Development

Fall 2010

Announcements

- Assignment 3 due Friday, 11/19
- Office Hours next week (on course website):
  - Jeff: MF 11:15 - 12:15
  - Jae: W 12 - 1
- Final lecture today!
- Course evaluations

Prototype → Release

- Where we stand:
  - Working prototype of application
    - Works on emulator, or personal device
    - Full-featured
  - Expects some API version for full functionality
    - Perhaps started with 3, incremented as new features were needed

Release Checklist

- **Finalize Functionality**
- Prepare for Business Model
- Release

Supporting Multiple Versions

http://android-developers.blogspot.com/2010/07/how-to-have-your-cupcake-and-eat-it-too.html

Optional Features

- Which features are required?
- Which features are nice, but not necessary?

- Step 1: Declare with <uses-feature>
- Step 2: Dynamic loading of classes

<uses-feature>

- Informs Android (Market) of the hardware and software on which your application depends.
- Examples:
  - <uses-feature android:name=“android.hardware.bluetooth” />
  - <uses-feature android:name=“android.hardware.camera” />
- android:required attribute specifies need.
- List of features & Market filtering rules: http://developer.android.com/guide/topics/manifest/uses-feature-element.html

Targeting an SDK

- Set the build target to the lowest version supporting all *optional* components.

- Set <uses-sdk android:minSdkVersion="…" /> in Manifest to lowest version supporting all *required* components.

- Simply declaring feature as optional is clearly not enough
  - Must make sure program functions in both cases

Reflection

- Reflection is a method of dynamically loading classes.
  - If class/method is present, it is used.
  - Otherwise, we catch the event (instead of crashing) and respond accordingly.

Example - ScaleGestureDetector

```
public class ScaleGestureWrapper {
    private ScaleGestureDetector mInstance;

    static {
        try {
            Class.forName("ScaleGestureDetector");
        } catch (Exception ex) {
            throw new RuntimeException(ex);
        }
    }
    public static void checkAvailable() {}

    public ScaleGestureWrapper(Context c, OnScaleGestureListener osl) {
        mInstance = new ScaleGestureDetector(c, osl);
    }

    public boolean onTouchEvent(MotionEvent event) {
        return mInstance.onTouchEvent(event);
    }
}
```

Using ScaleGestureWrapper

```
public class ScaleGestureActivity extends Activity {
    private static boolean mAvailable = false;
    private ScaleGestureWrapper mWrapper;

    static {
        try {
            ScaleGestureWrapper.checkAvailable();
            mAvailable = true;
        } catch (Throwable t) {}
    }

    public void onCreate(Bundle savedInstanceState) {
        if (mAvailable) {
            mWrapper = new ScaleGestureWrapper(this, null);
        }
    }

    public boolean onTouchEvent(MotionEvent e) {
        if (mAvailable) {
            return mWrapper.onTouchEvent(e);
        }
        return super.onTouchEvent(e);
    }
}
```

Avoiding Reflection

- With too many new features, reflection can get messy and cumbersome to use.
- Alternative approach: singletons and lazy class loading.
- Example – gestures on Cupcake-Froyo
  http://android-developers.blogspot.com/2010/07/how-to-have-your-cupcake-and-eat-it-too.html

Finishing Application

- Recall: UI guidelines
  - http://developer.android.com/guide/practices/ui_guidelines/index.html
- Other pages listed under "Best Practices":
  - Compatibility
  - Supporting Multiple Screens
  - Designing for:
    - Performance
    - Responsiveness
    - Seamlessness
- Run through each guideline and make sure you meet them where appropriate.

Finishing Application

- Design icon, specify label
- Remove android:debuggable="true" from <application> tag in Manifest.
- Remove unnecessary files from project.
- Remove any calls to Log (or System.out)

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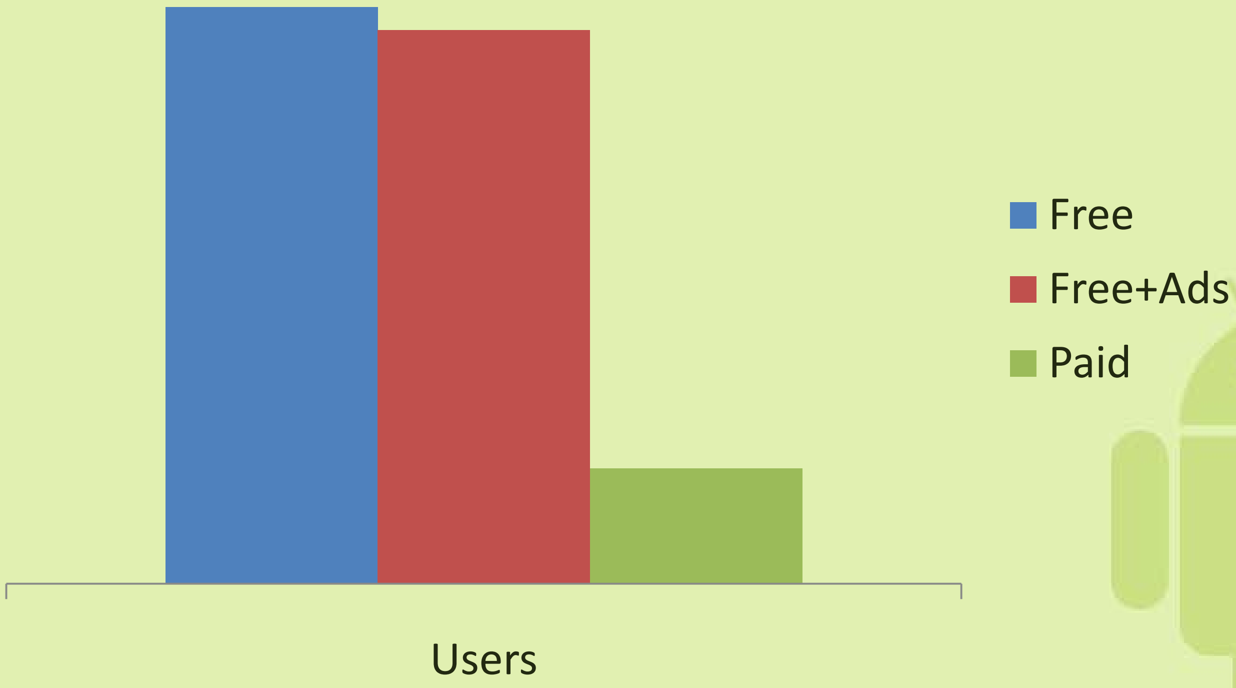
Three Models

- Free, Ad-Supported, Paid
  - Can also mix between some subset
- Tradeoff:



The “Freemium” Model

- Akin to “shareware” that was big in the 1990s
- Two versions:
  - Free, but hampered
    - Time-limited or use-limited trial
    - Missing extra functionality
    - Advertising
    - Or, some combination of above.
  - Full featured, but for a price
- Aim: Same expected earnings for both versions
  - Reality – very tough to calculate

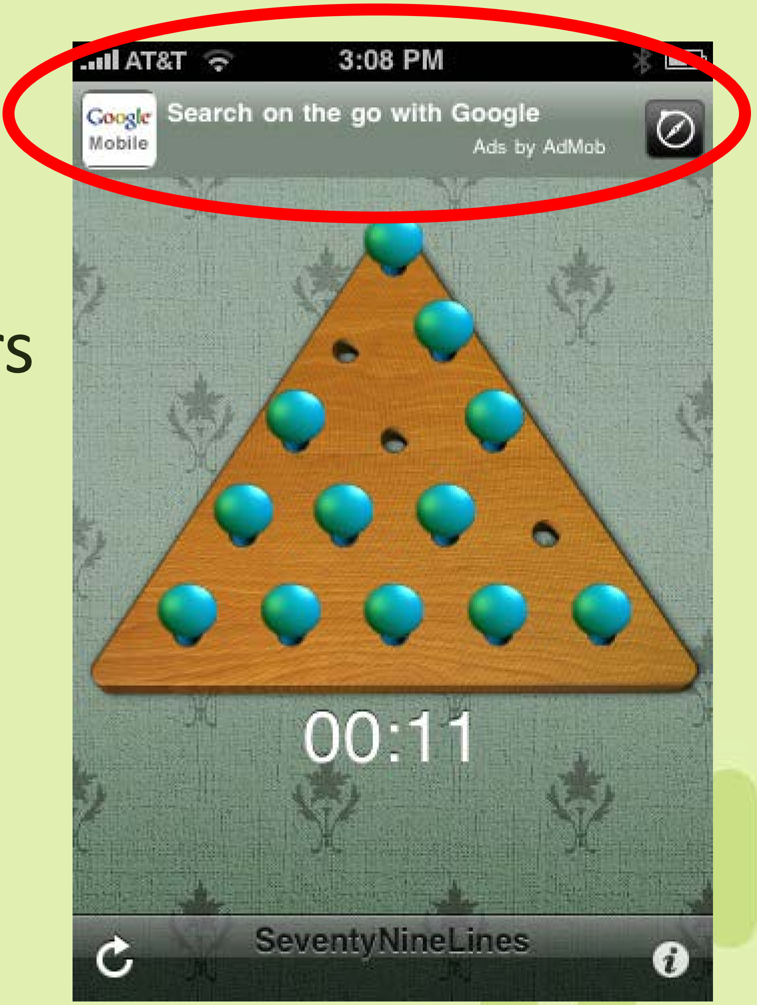
Implementing Freemium on Android

- Android Market keys based on package.
  - Copy program to new package name (e.g. *.free)

- Modify free version as desired
  - Integrate mobile ad framework
  - Remove features
    - Can leave menu item in, but replace functionality with link to premium app.

Mobile Ads

- Advertisers sign up with ad networks, give ads to display.
- Ad networks show these ads in applications developed by others
- Equivalent to Google Adsense
- Examples of networks:
  - Admob (Google Mobile Ads), Mobclix, Smaato, iAd

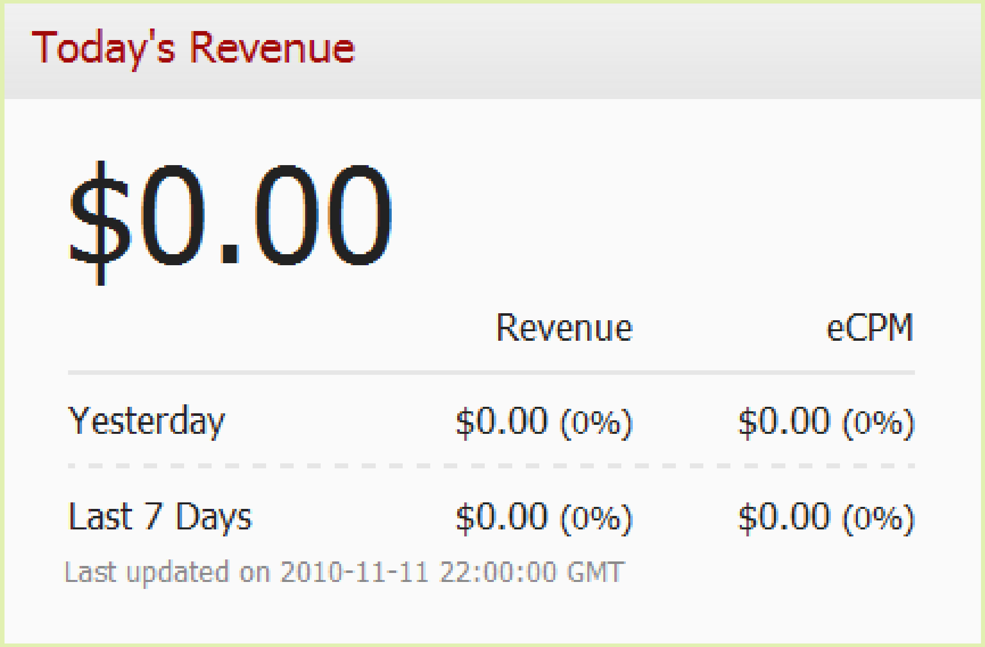


Example – Integrating AdMob

- Register at http://www.admob.com
- Add new Android App
- Download Android SDK
  - Includes admob-sdk-android.jar
  - Import into Eclipse workspace, right click, add to build path.
    - Side note: works for other 3rd party Java libraries
- Add entries to AndroidManifest
- Add com.admob.android.ads.AdView to your application.

Ad Dashboard

- Advanced tracking of revenue
  - Measure if ad placement is successful
  - Help ensure ad revenues match paid product revenue.

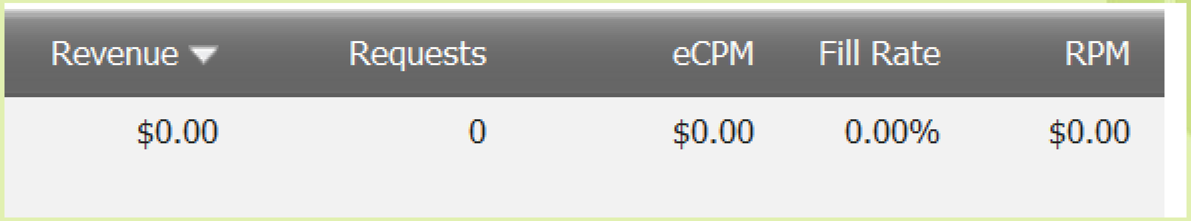


Today's Revenue

$0.00

	Revenue	eCPM
Yesterday	$0.00 (0%)	$0.00 (0%)
Last 7 Days	$0.00 (0%)	$0.00 (0%)

Last updated on 2010-11-11 22:00:00 GMT



Revenue ▼	Requests	eCPM	Fill Rate	RPM
$0.00	0	$0.00	0.00%	$0.00

Licensing

- Ads insure earnings on free version.
- Market sales insure earnings on paid version.
  - But how to stop piracy?
    - Impossible battle to win 100% of the time
    - But, possible to win 90% with far less effort.

- Solution: Android Market Licensing
  - Downloadable component of Android SDK

Android Market Licensing Overview

- Network-based service
- Query licensing server to determine whether current device is licensed.
  - Application responsible for reaction
- Prevents basic copying from device to device
  - With additional obfuscation, can make it even more difficult to copy.
- Main interface: License Verification Library (LVL)

Integrating LVL

- Choose a Policy
  - What to do for a given user with a given license
  - Two provided implementations:
    - ServerManagedPolicy – flexible, cache responses if network is down
    - StrictPolicy – only runs application if server says licensed
  - Can also implement custom policy

- Check license from main Activity
- For full guide, see: http://developer.android.com/guide/publishing/licensing.html

Additional Steps

- LVL prevents casual privacy – these make it even more difficult.
  - From: http://android-developers.blogspot.com/2010/09/securing-android-lvl-applications.html
- Obfuscate application
  - Prevents looking at strings in disassembled code to figure out what program is doing.
- Modify license library
  - (Library itself is actually open source)
  - Interface is fixed, but can change behavior so that no two apps work the same way.
- Prevent tampering
  - Checksum application code and verify at runtime
- Offload validation to a trusted server

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Testing

- JUnit instrumentation tests
  - Important for avoiding regressions
- UI/Application Exerciser Monkey
  - Test atypical user flows
- Test on different emulators
  - Different versions of Android SDK
  - Different configurations - -dpi, -device, -scale, -netspeed, -netdelay, -cpu-delay…
- Test on as many hardware devices as possible.
  - Beta test groups

Android Market

- Centrally hosted service for nearly all users of Android phone to purchase and/or download your app.
  - Android is open – other app stores can and do exist.

- Register at http://market.android.com/publish/
  - $25 to become a developer
    - vs. $99/year for the iOS App Store
  - Central dashboard for posting updates, viewing statistics, reviews, crashes, etc.

Release Checklist

- ☑ Finalize Functionality
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- ☑ Release
- And we’re done!
  - Of course, for updates, process repeats.