Monetizing Android: In-app billing and Ads

Trifork GeekNight

24. November 2011

About me

- Christian Melchior
- Android Developer at Trifork
- This talk is based on the experience gained during the development of a hobby project: Meter Readings.

- Email: cme@trifork.com

Program

- Ads (approx 40 min)
- Break (Sandwiches) (approx. 15 min)
- In-app billing (approx. 45-60 min)

Why not just make paid apps?

- 20% of free apps and 80% of paid apps has been downloaded less than 100 times.
- 52% of total revenue from top200 games come from In-app purchase, up from 8% in 2010.

Source: Distimo, 2011

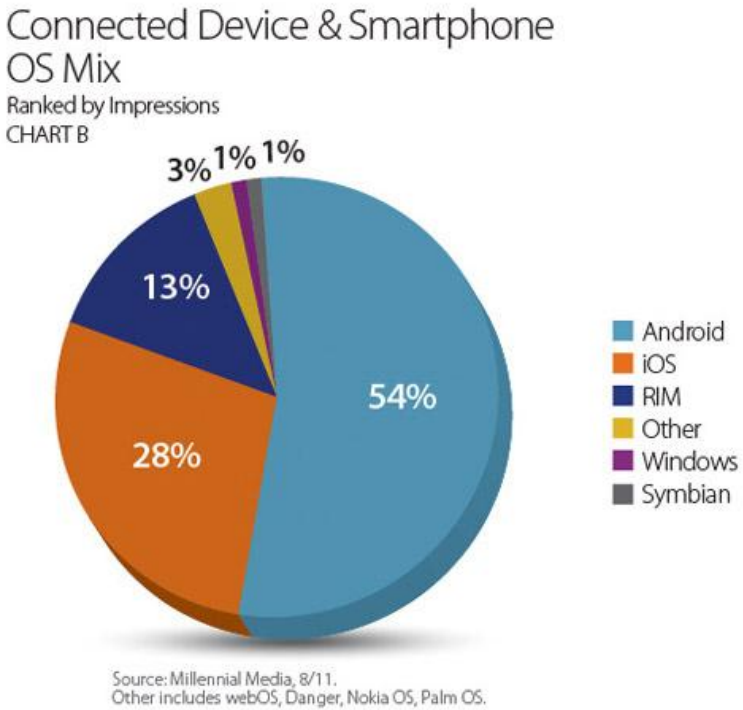
ADS

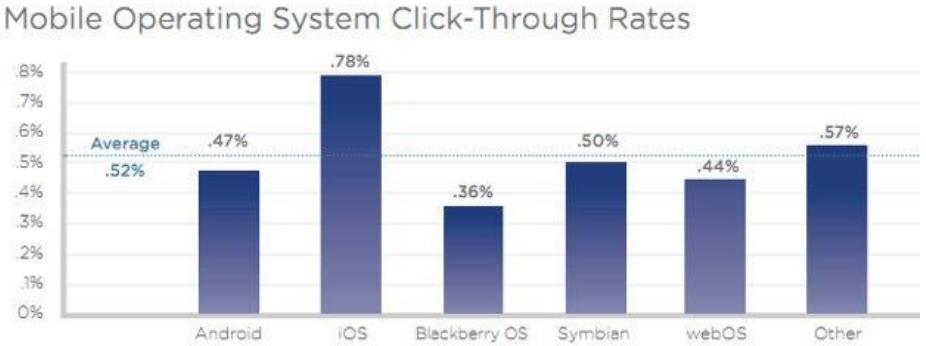
Ads 101

- **Fillrate** How many add requests return an ad?
- **CTR** Click-through-rate. The percentage of ads clicked
- **eCPM (RPM)** Effective cost pr. 1000 impressions.

$$\frac{\text{Total Earnings}}{\text{Impressions}} \times 1000 = \text{eCPM}$$

Ad numbers





millennialmedia
the mobile advertising platform

Source: JumpTap

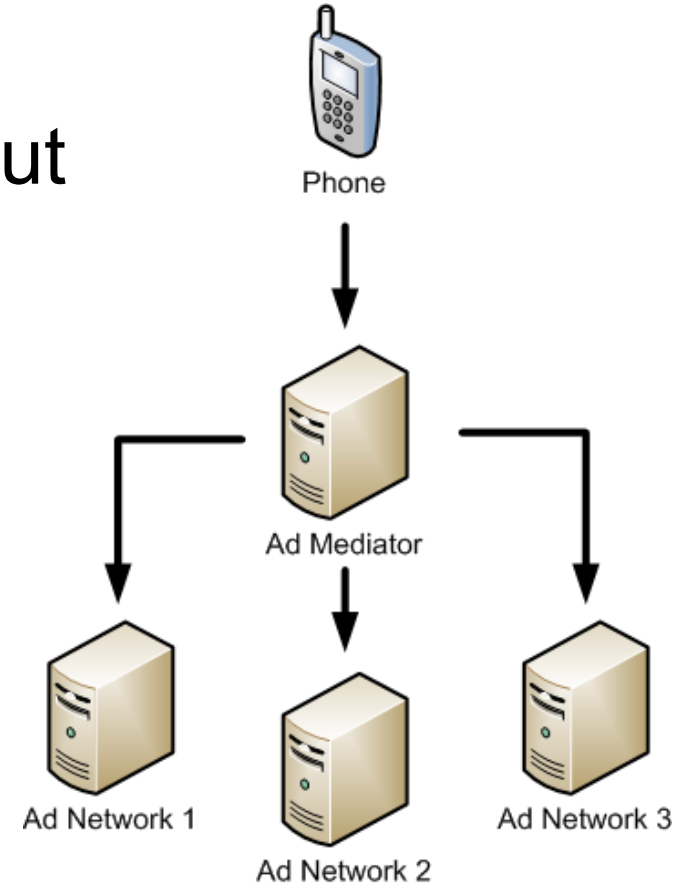
Which ad network?

and many more…

Why choose?

- Use a Ad mediator.
- Change ad network without updating the app.
- Maximize fillrate and revenue.

- AdWhirl, Tapjoy, MobClix.



AdWhirl

- **AdWhirl** is a open source project from AdMob.
- Connectors to most common Ad networks.
- Possible to write custom connectors.
- Supports house ads.
- Requires accounts at all relevant ad networks.

CODE

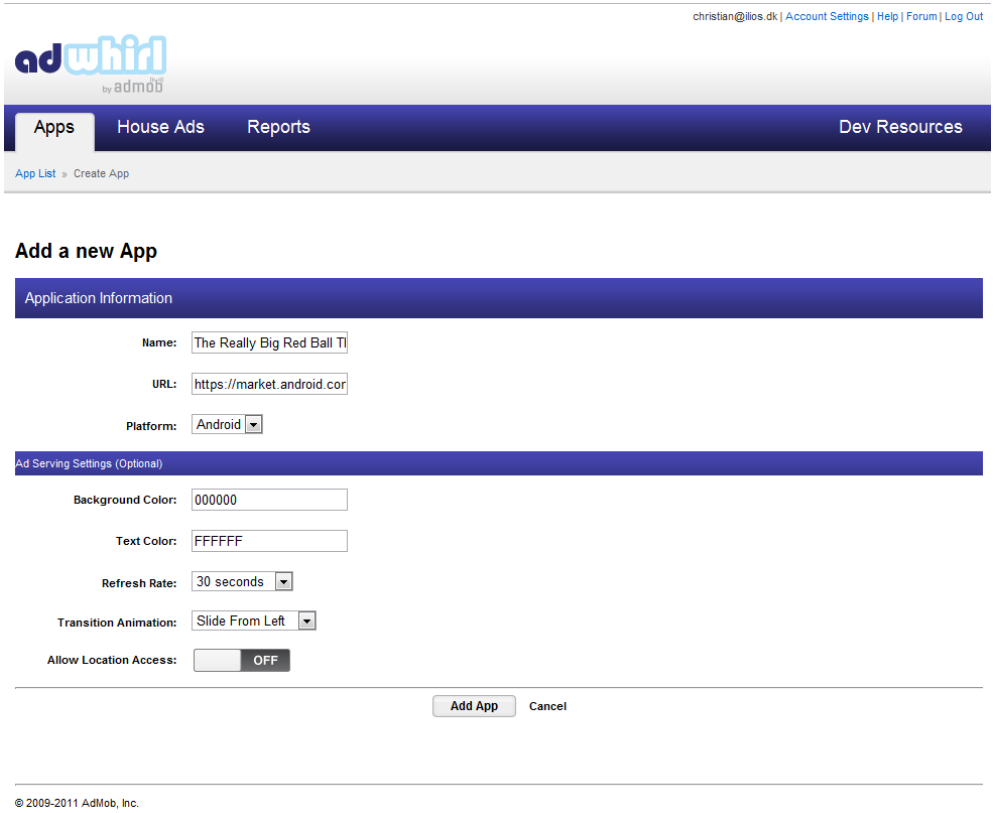
AdWhirl + AdMob + InMobi

Also available at GitHub:

https://github.com/cmelchior/Monetizing-Android-Demo-Project

DEMO

Register app



AndroidManifest.xml

Required:

```
<uses-permission android:name="android.permission.INTERNET" />
```

Optional:

```
<uses-permission android:name="android.permission.READ_PHONE_STATE" />
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
```

AdMobs:

```
<activity
   android:configChanges="keyboard|keyboardHidden|orientation"
   android:name="com.google.ads.AdActivity" />
```

InMobi:

```
<activity
   android:configChanges="keyboardHidden|orientation|keyboard"
   android:name="com.inmobi.androidsdk.IMBrowserActivity" />
```

AndroidManifest.xml

AdMobs:

```
<activity
   android:configChanges="keyboard|keyboardHidden|orientation"
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```

InMobi:

```
<activity
   android:configChanges="keyboardHidden|orientation|keyboard"
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```
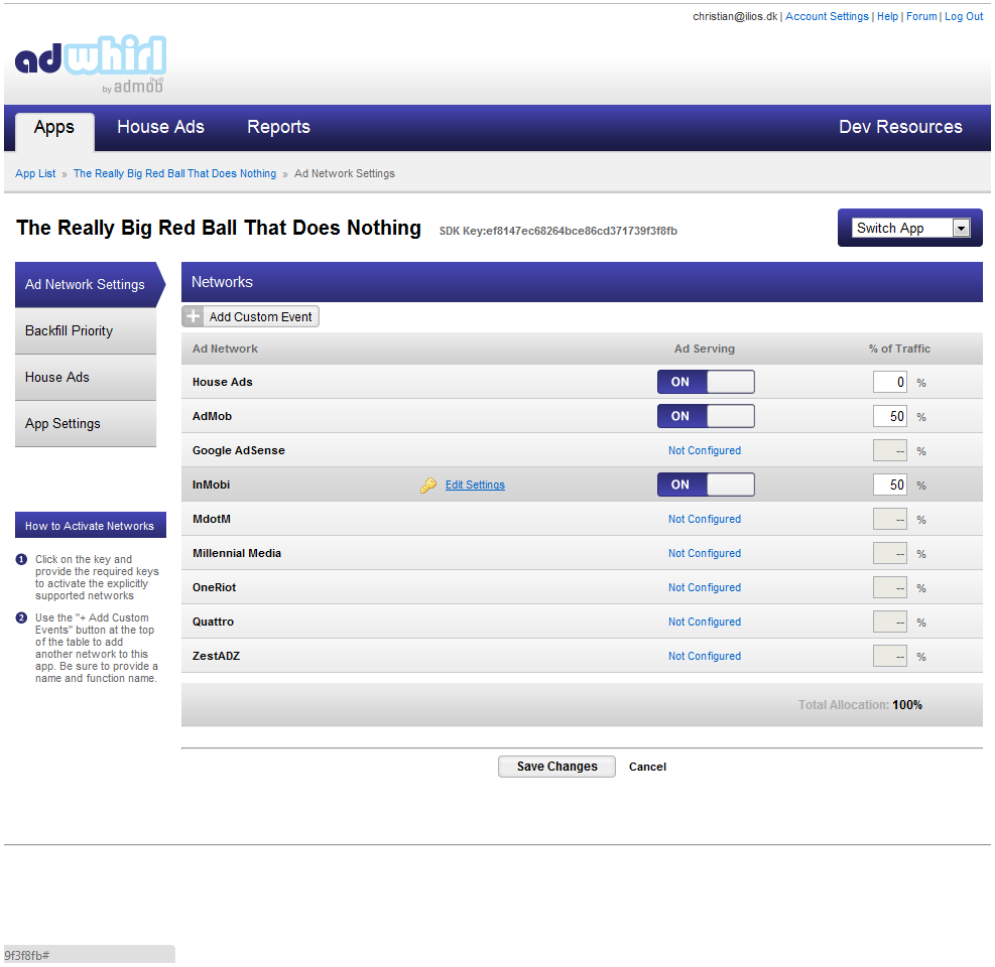

Main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent" >

    ...

    <FrameLayout
        android:id="@+id/ads"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentBottom="true"
        android:background="@android:color/black" >
    </FrameLayout>

</RelativeLayout>
```

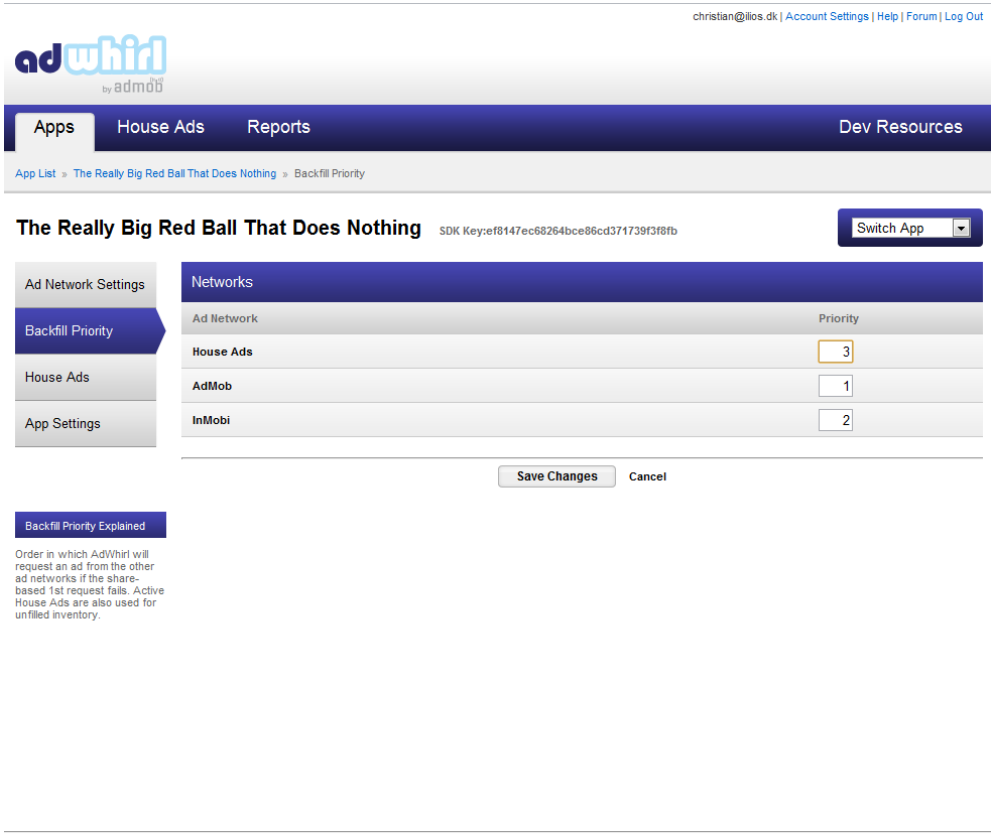
Initialize ads

```
FrameLayout container = (FrameLayout) findViewById(R.id.ads);

// Setup AdWhirl
AdWhirlManager.setConfigExpireTimeout(1*60*60*1000); // Timeout - 1h
AdWhirlTargeting.setTestMode(true);
AdWhirlTargeting.setKeywords("red button fun game");

// Setup
AdWhirlLayout adsLayout = new AdWhirlLayout(this, "your adwhirl sdk key here");
int diWidth = 320;
int diHeight = 52;
float density = getResources().getDisplayMetrics().density;

adsLayout.setAdWhirlInterface(this);
adsLayout.setMaxWidth((int)(diWidth * density));
adsLayout.setMaxHeight((int)(diHeight * density));

container.addView(adsLayout);
```

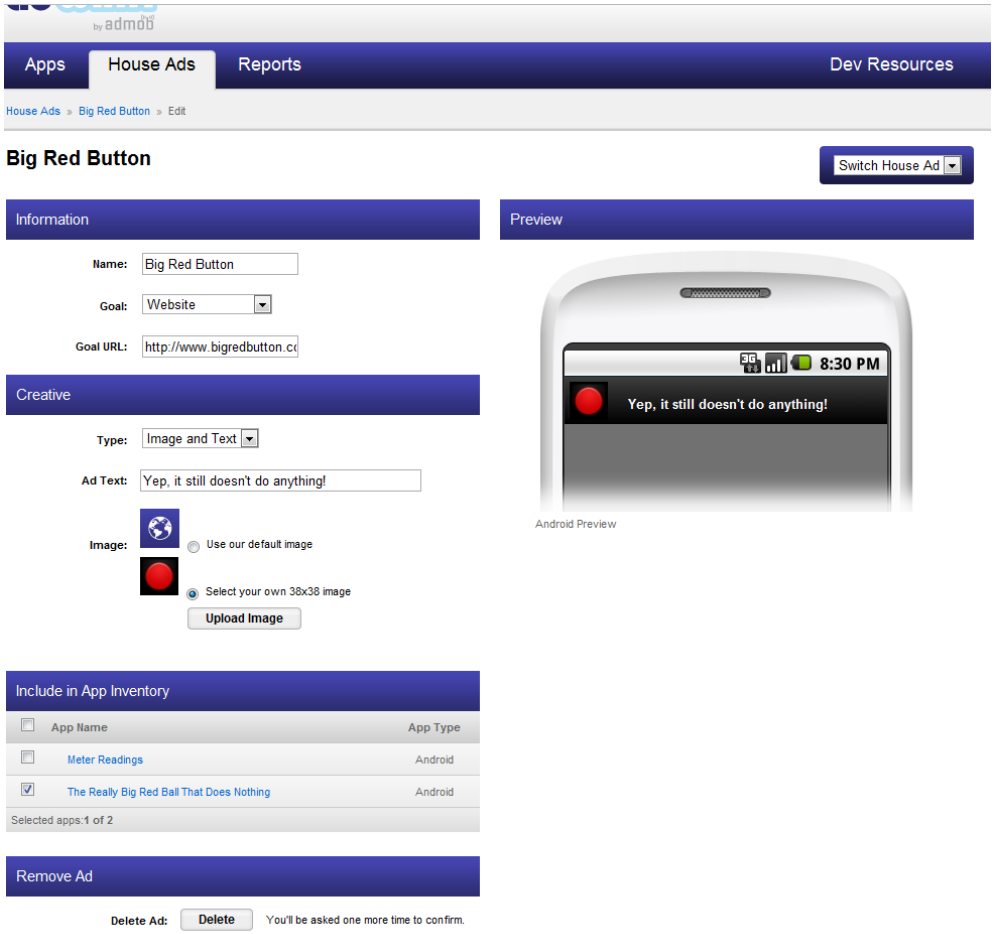
Add ad networks



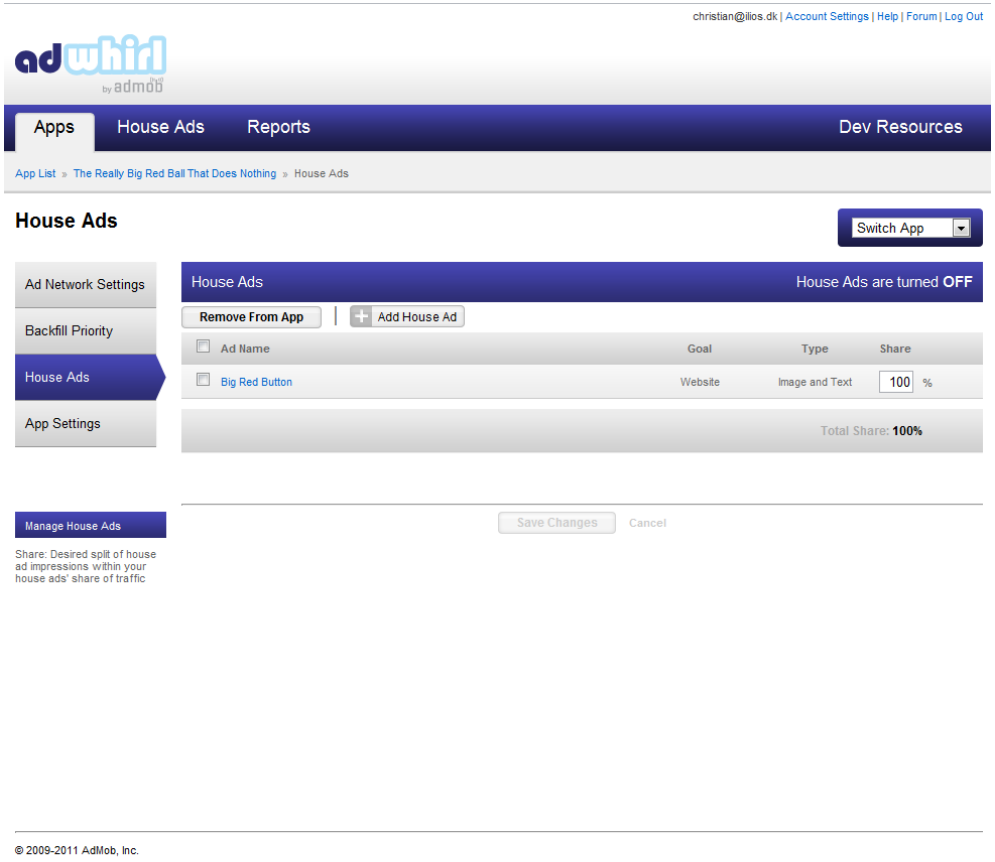
Set backfill



Configure house ads

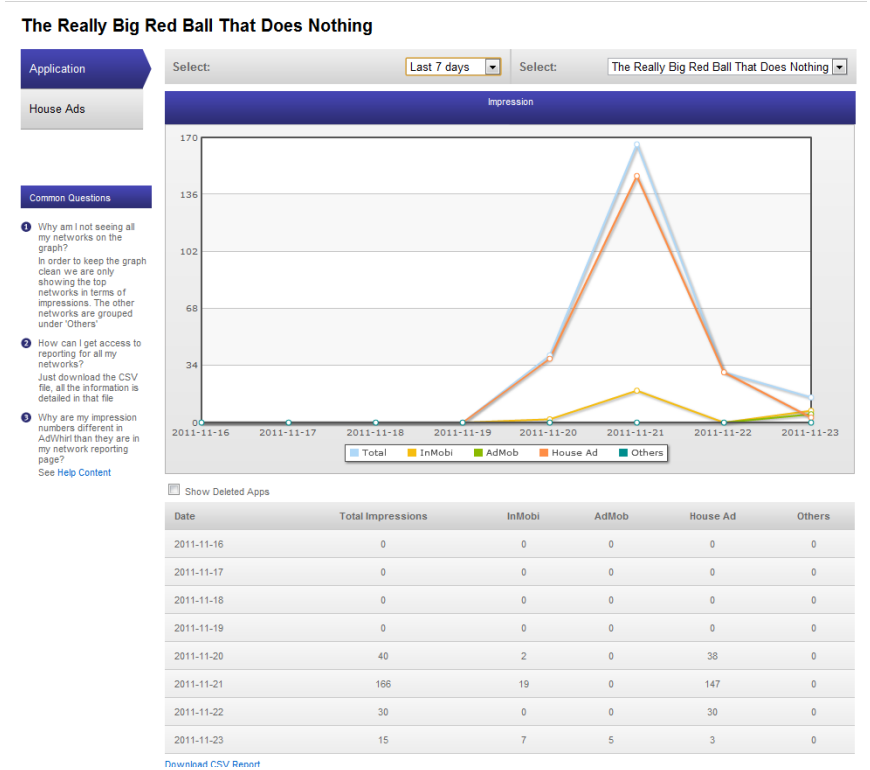


Select house ads



Statistics

- AdWhirl can only track impressions.
- Go to individual networks for futher data.



DEMO

Common problems

- Out-dated adapters.
- AdWhirl is not well documented.
- “Sum of ration weights is 0 - no ads to be shown” : Remember to enable ad networks in AdWhirl control panel.
- Images in House ads not scaling properly: http://code.google.com/p/adwhirl/issues/detail?id=137

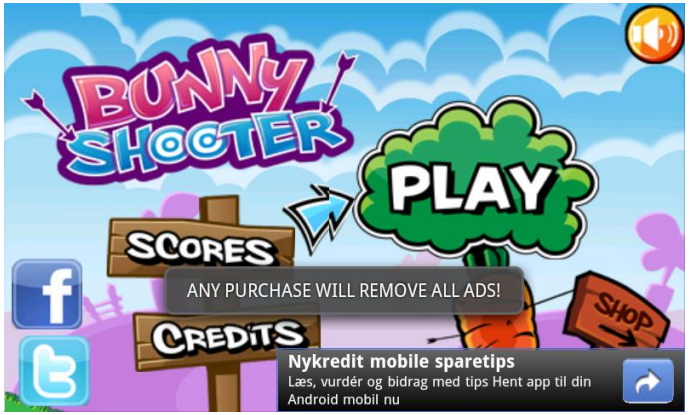
Increased APK size

- Increases apk file size
  - Adwhirl: 55 kB
  - AdMob: 56 kB
  - InMobi: 160 kB

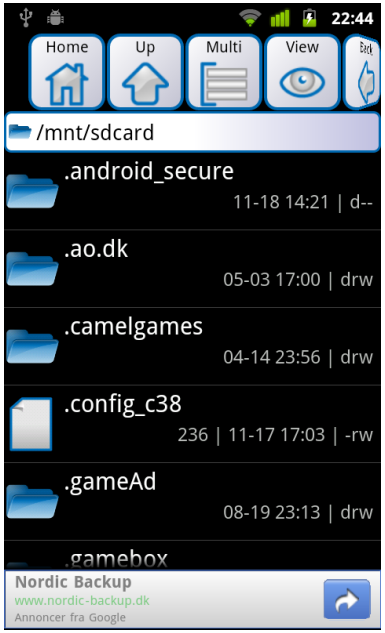
Ad size

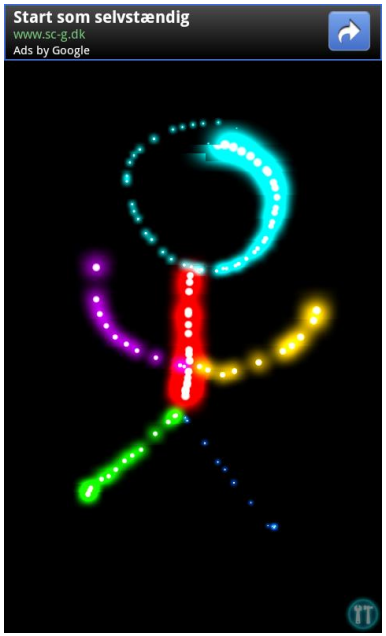
- Standard size is ~320x50dp
- xhdpi: 1280x800 (640x100px) = 6,3%
- hdpi: 480x800 (480x75px) = 9,4%
- mdpi: 320x480 (320x50px) = 10,4%
- ldpi: 240x320 (240x38px) = 11,7%

Ad placement – Don’ts



Ad placement – Do's





Free vs. Paid - An Example

- Example: A free app with ads vs. a paid 1$ app (0,7$ after Googles cut).
- With an avg. eCPM of 0,5$ you need 1400 impressions to make the same amount of money.
- 1400 impressions at a refresh rate of 30 sec:
  - ~ 11,7 hours of In-app time for a single user.
  - ~ 2,5 hours if x5 users
  - ~ 1,2 hours if x10 users.

Free vs. Paid – iPhone data

- Free apps are used 6.6 times more than paid apps.
- Apps are in average used 12 times.
- 5% of users still use the app 30 days after download. The number drops to 1% after 90 days.

Source: PinchMedia, 2009

Free vs. Paid

- Ads will most likely not finance your app.
  - Yes, we all heard of Angry Birds!
- Trial versions is a good idea (and also encouraged by Google).
- Experiment when you know your users.
  - Google Analytics

BREAK

IN-APP BILLING

Difference from standard paid apps?

- One APK provides different features.
- Never leaves the app.
- No 15 min. trial period.

- **Managed purchase** One-time purchases.
- **Unmanaged purchase** Able to purchase multiple times.

Managed purchases

- One time purchases, and Google keeps track.

- Upgrade from trial version.
- Remove ads.
- Access to content (eg. articles or comics).

Unmanaged purchases

- Nobody keeps track of purchases done. It is up to the developer.

- Game currency.
- Subscriptions.

Drawbacks

- Bad reviews. No free app to hide behind.
- You handle all refunds.
  - Users don’t have any rights by default.
- Not possible to deploy app on other markets than Android Market.
- You can only sell digitial goods.
- Google still take 30%.

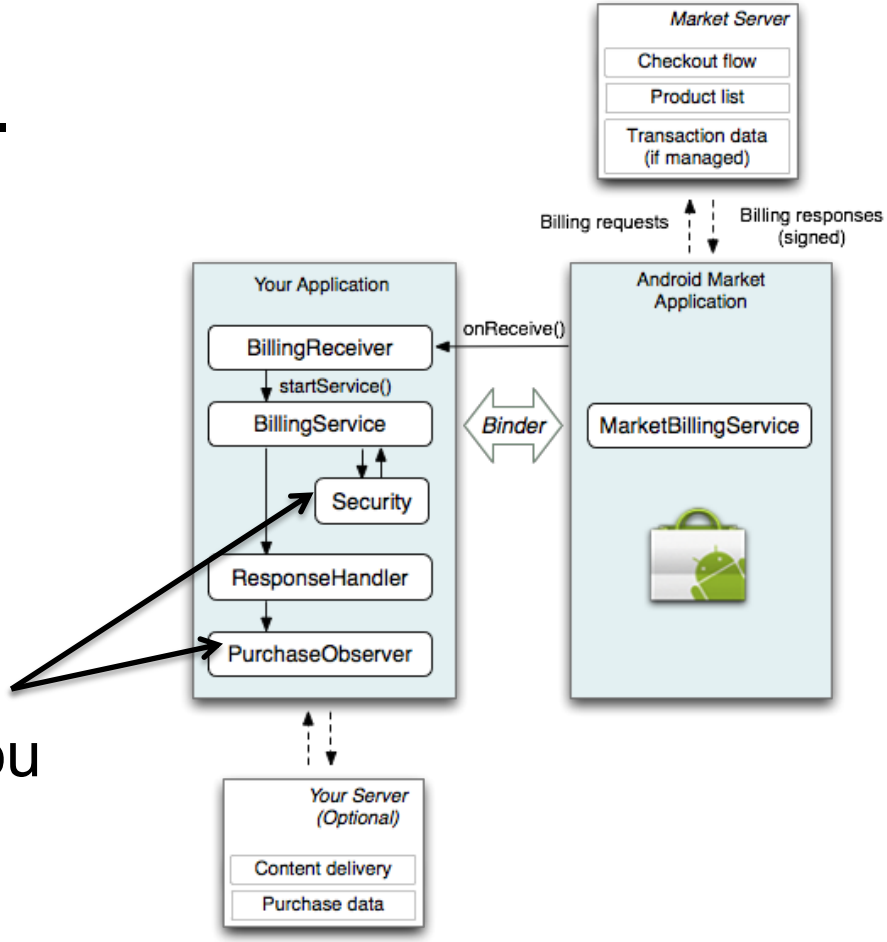
Requirements

- Google Android Market Account (25$)
- Google Checkout Account (Free)
- Android Market installed (v. 2.3.4)
  - API level 4 (1.6) and above.

Don’t use your phone account. End-to-end testing becomes impossible.

App architecture

- It looks complicated.
- It's not.



Implement this and you are done.

CODE

Also available at GitHub:
https://github.com/cmelchior/Monetizing-Android-Demo-Project

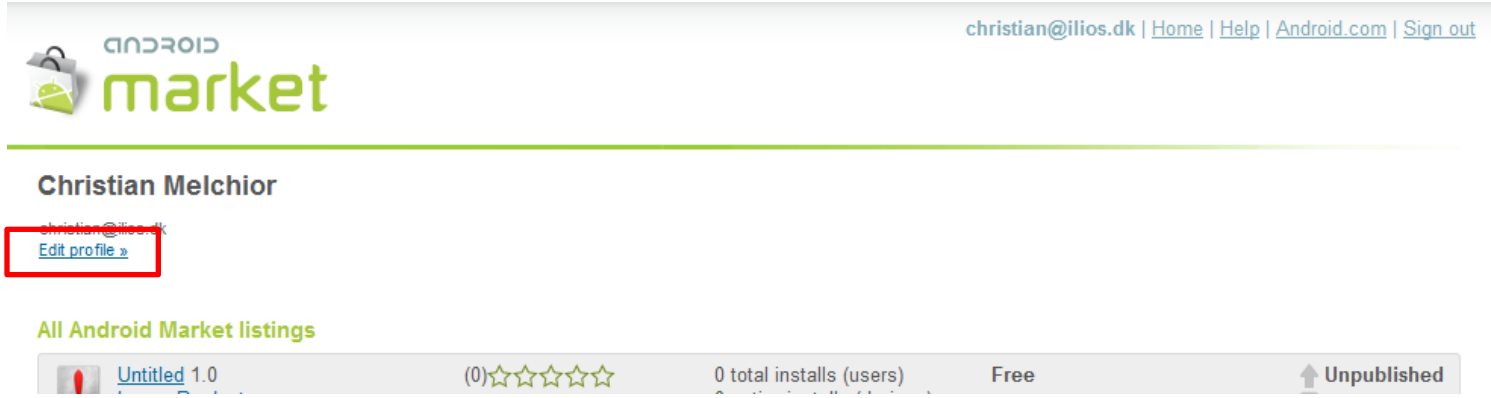
AndroidManifest.xml

```
<uses-sdk android:minSdkVersion="4" />

<!-- Permissions -->
<uses-permission android:name="com.android.vending.BILLING" />

<!-- Services -->
<service android:name="dk.trifork.geeknight.billing.BillingService" />

<!-- BroadcastReceivers -->
<receiver android:name="dk.trifork.geeknight.billing.BillingReceiver">
   <intent-filter>
      <action android:name="com.android.vending.billing.IN_APP_NOTIFY" />
      <action android:name="com.android.vending.billing.RESPONSE_CODE" />
      <action android:name="com.android.vending.billing.PURCHASE_STATE_CHANGED" />
   </intent-filter>
</receiver>
```

No INTERNET permission!

Security.java

- Add Android Market public key to Security.java
- Find it under your market account profile settings..




```
String base64EncodedPublicKey = ”your public key here";
```

MainActivity

- Abstract class InAppBillingActivity handles all the boring stuff.
- All we need is these four:

```
protected void onBillingSupported(boolean supported);

protected void onRequestPurchaseResponse(RequestPurchase request,
        ResponseCode responseCode);

protected void onRestoreTransactionsResponse(RestoreTransactions request,
        ResponseCode responseCode);

protected void onPurchaseStateChange(PurchaseState purchaseState, String itemId,
int quantity, long purchaseTime, String developerPayload);
```

Implementation #1

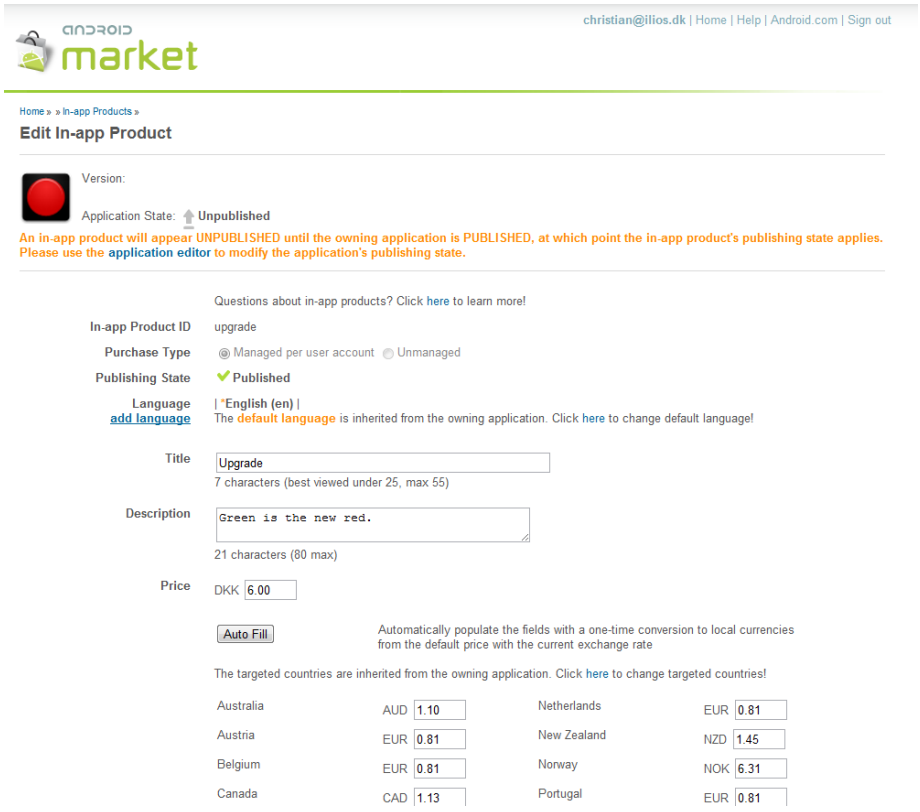
```
@Override
protected void onBillingSupported(boolean supported) {
    // Do nothing
}

@Override
protected void onRequestPurchaseResponse(RequestPurchase request,
        ResponseCode responseCode) {
    if (responseCode != ResponseCode.RESULT_OK) {
        // Request to purchase failed
        // Chance to show a message to the user
    }
}

@Override
protected void onRestoreTransactionsResponse(RestoreTransactions request,
        ResponseCode responseCode) {
    if (responseCode == ResponseCode.RESULT_OK) {
        PersistentState.setPurchasesInitialized(true);
    }
}
```

Implementation #2

```
@Override
protected void onPurchaseStateChange(PurchaseState purchaseState, String
itemId, int quantity, long purchaseTime, String developerPayload) {

   if (itemId.equals(”upgrade")) {
      if (purchaseState == PurchaseState.PURCHASED) {
         PersistentState.setAppUpgraded(true);
         button.setBackgroundDrawable(getResources()
            .getDrawable(R.drawable.green_button));

      } else {
         PersistentState.setAppUpgraded(false);
         button.setBackgroundDrawable(getResources()
            .getDrawable(R.drawable.red_button));
   }
}
```

Creating In-app product

- Upload draft app.
- Create product.
  - Publish product



Purchase/restore products

- Functions available

```
restorePurchases();
requestPurchase(String productId);
requestPurchase (String productId, String developerPayload);
```

- Easy to implement

```
@Override
public boolean onOptionsItemSelected(MenuItem item) {

   switch(item.getItemId()) {
   case OPTION_RESTORE: restorePurchases();
   case OPTION_PURCHASE: requestPurchase("upgrade");
   case OPTION_TEST_PURCHASED: requestPurchase("android.test.purchased"); break;
   case OPTION_TEST_CANCELED: requestPurchase("android.test.canceled"); break;
   case OPTION_TEST_REFUNDED: requestPurchase("android.test.refunded"); break;
   case OPTION_TEST_ITEM_UNAVAILABLE: requestPurchase("android.test.item_unavailable"); break;
   default:
      return super.onOptionsItemSelected(item);
  }

   return true;
}
```

Testing

- Start with static responses
  - ”android.test.purchased”
  - ”android.test.canceled”
  - ”android.test.refunded”
  - ”android.test.item_unavailable”

- Real purchases
  - Test accounts

Remember to refund your test purchases.

DEMO

Saving purchases

- SharedPreferences
- Purchase database
- Remotely

- Loosing unmaged purchases will piss your users off. Backup the data.
  - Google Cloud Backup API from API8.

Security

- Preferences and databases are not safe.
  - SharedPreferences in clear text.
  - Database is not bound to the app.
  - Both can be copied independently of app.
- Decompiling is easy.
  - APK_OneClick

Raising the bar

- Disable logging output.
- Use ProGuard.
- Encryption of clear text values.
  - SimpleCrypto
- Not ”real security”, but a hacker will need to work harder.

Logging

- Use a special logger class. Easy to disable/enable logging.

```
public class Logger {

   public static void e(String tag,String msg){
      if( isLoggingEnabled()){
         Log.e(tag, (msg != null) ? msg : "null");
      }
   }

   private static boolean isLoggingEnabled() {
      return true;
   }
}
```

Enabling Proguard

- Create build.xml

```
C:\PathToProject> android update project --name Monetizing-Android-
Demo-Project --target 8 --path .
```

- Update ant.properties

```
key.store=keystore/demo.keystore
key.alias=geeknight_demo
key.store.password=Trifork1234
key.alias.password=Trifork1234
```

- Update local.properties

```
proguard.config=proguard.cfg
```

- Update proguard.cfg

-keep class com.android.vending.billing.**

```
C:\PathToProject>ant release
```

Encrypting clear text

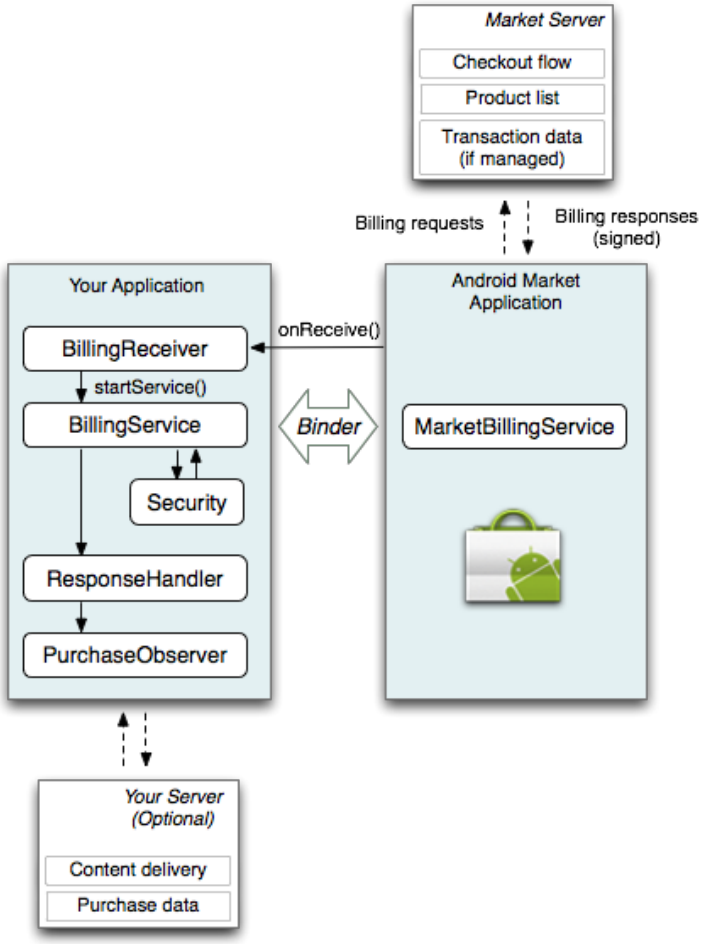
- Introduce a PersistentState wrapper.
- Encrypt all keys with a device specific key using SimpleCrypto.

```
public static void setAppUpgraded(boolean isUpgraded) {
    SharedPreferences.Editor editor = prefs.edit();
    if (isUpgraded) {
        editor.putBoolean(encryptKey("upgraded"), isUpgraded);
    } else {
        editor.remove(encryptKey("upgraded"));
    }

    editor.commit();
}
```

Real security

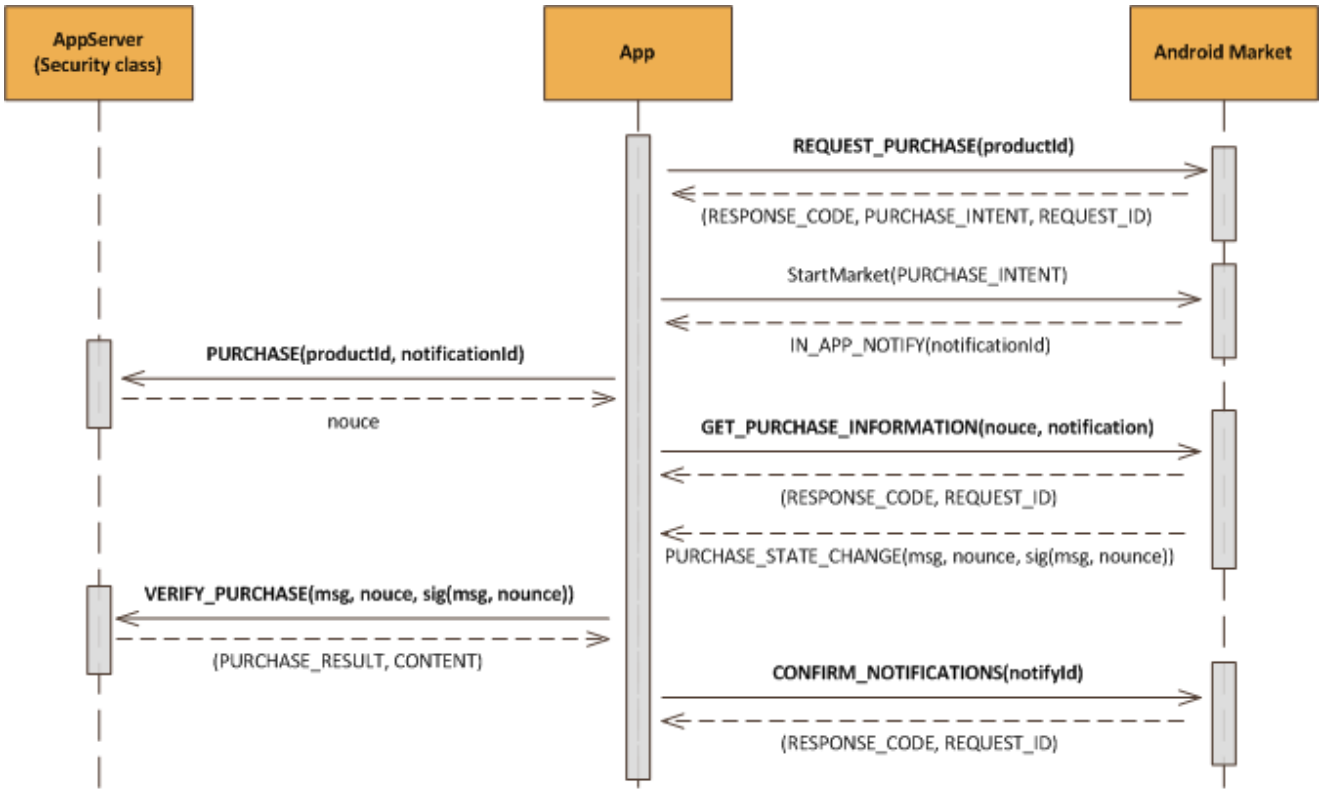
- Don’t trust the client.
- Server needed.

- Remember this?
- Not so easy anymore

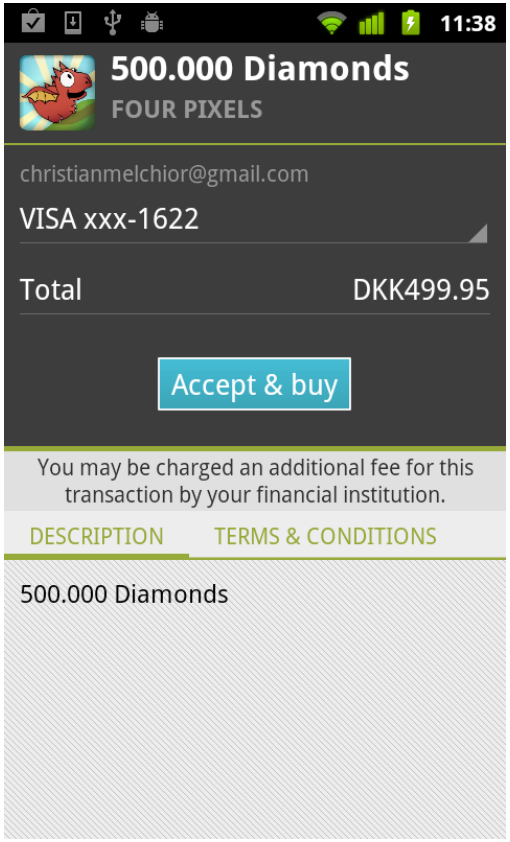


Validation is server side

- Security/validation must move to server.
- Verify purchase state on startup.



In-app Billing – Don’ts



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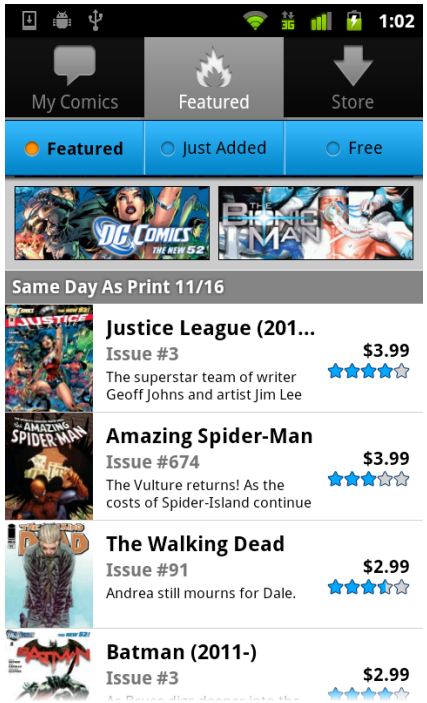


QUESTIONS
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