Mobile Application (Design and) Development

4th class

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Great!


9:23 AM
Weather
Noom
NUMAD - Bostwick ...
NUMAD - CSTURKS
NUMAD- alexterry
NUMAD Cheetham
NUMAD- Cheetham
NUMAD- DroidMD
NUMAD- Illegal Bro...
Khaji
NUMAD- KHAJI
NUMAD- Metzger
NUMAD- NAVWEI
NUMAD- Nikolayev
NUMAD- PAPERPLA...
NUMAD- Paras
NUMAD- Rottman
NUMAD- RumaPrat...
NUMAD- RumaPrat...
NUMAD- Shplorf
NUMAD- SSQUARE
NUMAD- tasontag
NUMAD- teamAndr...

Administrivia

- Questions via email:
  - Answer benefits everyone: Wiki discussion
  - Specific to you/your team: email me
- Putting apps on the Market
  - Two accounts: numobileappdevelopment and mobileappdevelopment2
  - **Minimize uploading**
  - Deemphasize capability & check valid phone

Administrivia

- Anyone looking for a team?
- Syllabus set for this week and next
- Review upcoming assignments
- Paper presentation format

Today

- Comments on Programming Assignment 1
  - What went well?
  - Where'd you have trouble?
  - Review of Activity stack structure
- Your thoughts from Design Assignment 1
- Design reading: Angry Birds Teardown

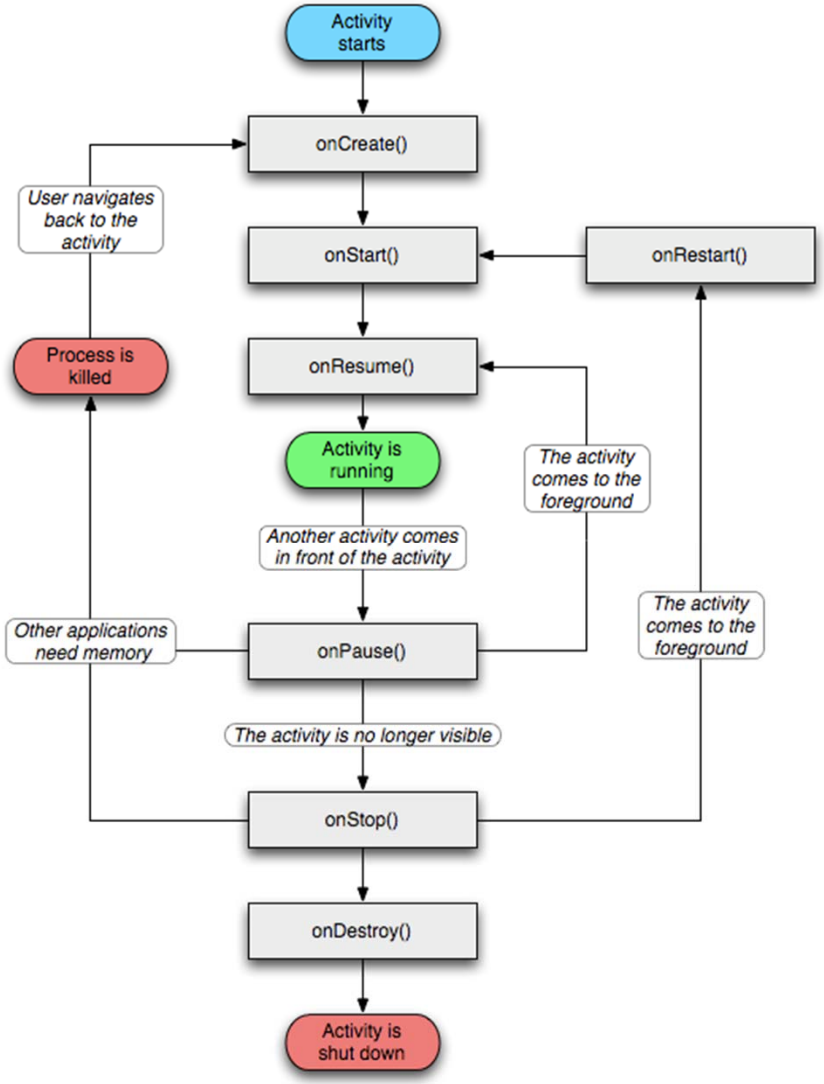
Assignment 1

- Small issues in some submissions...
  - Prevent outsiders from running code
  - Displaying the PhoneID
  - Music off on home screen
  - Assume orientation change possible
    (or prevent with android:screenOrientation="portrait“ in manifest)
  - Need unique icon
  - Formatting – small things make a difference
    - Inconsistent alignment and capitalization, typos
  - Nice to offer “quit” button

Assignment 1

- Version:name
  - Human readable number that can indicate major/minor release changes
    - 1.1, 1.2, 2.1, etc.
- Version: code
  - Integer number Market cares about ... Increase by 1 each time

Activity Lifecycle



- Paused
  - Lost focus, but visible (e.g. transparent); retains state
- Stopped
  - Completely obscured; retains state; often killed

Important: In either case, system can drop the activity by asking it to finish or by killing the process

Activity lifecycle

- Lifetime
  - onCreate (setup "global" state)
  - onDestroy (release all major resources)
- Visible lifetime
  - onStart (register BroadcastReceivers)
  - onStop (unregister)
- Foreground lifetime (frequent switching)
  - onResume (user interacting; lightweight code)
  - onPause (commit changes;lightweight code)

Typical activity

```
public class Activity extends ApplicationContext {
     protected void onCreate(Bundle savedInstanceState);

     protected void onStart();

     protected void onRestart();

     protected void onResume();

     protected void onPause();

     protected void onStop();

     protected void onDestroy();
 }
```

Implications on UI navigation

- Back button on hardware
- Back button in UI
- Need to think carefully about how to save state at all times
- Time passing MUST be considered by onResume!
  - State of data on Internet
  - Changes due to actual time passing

Configuration changes

- Change in screen orientation, language, input devices, etc)
- Causes current activity to be ***destroyed***
  - onPause(), onStop(), then onDestroy()
  - Then, new isntance created with whatever savedInstanceState previous instance generated from onSaveInstanceState(Bundle)
    - Bundle stores instance state (e.g. cursor positions)
  - Required because resource files update

Starting activities; passing data

- Use startActivity(Intent)
- Intent describes activity to be executed

- Can pass a value using
  - startActivityForResult (Intent, int)
  - onActivityResult (int, int, Intent)
  - setResult(int)

onActivityResult example

```
public class MyActivity extends Activity {
    ...

    static final int PICK_CONTACT_REQUEST = 0;

    protected boolean onKeyDown(int keyCode, KeyEvent event) {
        if (keyCode == KeyEvent.KEYCODE_DPAD_CENTER) {
            // When the user center presses, let them pick a contact.
            startActivityForResult(
                new Intent(Intent.ACTION_PICK,
                new Uri("content://contacts")),
                PICK_CONTACT_REQUEST);
           return true;
        }
        return false;
    }

    protected void onActivityResult(int requestCode, int resultCode,
            Intent data) {
        if (requestCode == PICK_CONTACT_REQUEST) {
            if (resultCode == RESULT_OK) {
                // A contact was picked.  Here we will just display it
                // to the user.
                startActivity(new Intent(Intent.ACTION_VIEW, data));
            }
        }
    }
}
```

Sending more info via intents

```
Intent i = new Intent(aContext, ActivityCalling.class);
//intent.setAction(Intent.ACTION_VIEW);
//intent.addFlags(Intent.FLAG_ACTIVITY_NEW_TASK);
i.putExtra(ActivityCalling.EXTRA_MY_NAME, “Stephen”)
startActivity(intent);
```

To grab data, use

```
String name = getIntent().getStringExtra(EXTRA_MY_NAME);
int age= getIntent().getIntExtra(EXTRA_AGE, DEFAULT_AGE);
```

Saving state (given lifecycle)

```
public class CalendarActivity extends Activity {
    ...

    static final int DAY_VIEW_MODE = 0;
    static final int WEEK_VIEW_MODE = 1;

    private SharedPreferences mPrefs;
    private int mCurViewMode;

    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        SharedPreferences mPrefs = getSharedPreferences();
        mCurViewMode = mPrefs.getInt("view_mode" DAY_VIEW_MODE);
    }

    protected void onPause() {
        super.onPause();

        SharedPreferences.Editor ed = mPrefs.edit();
        ed.putInt("view_mode", mCurViewMode);
        ed.commit();
    }
}
```

Process Lifecycle

- Importance:
  1. Foreground activity
     Last resort only if device runs out of memory
  2. Visible activity
     Not killed unless needed to run 1
  3. Background activity
  4. Empty process
     Hosting no activities and not Service or BroadcastReceiver

     (Therefore, any background operation you do outside of an activity must be executed in the context of an activity BroadcastReceiver or Service to ensure that the system knows it needs to keep your process around)

Tools I use....

- Logcat (constantly)

```
@echo off
cd "C:\Program Files (x86)\AndroidSDK\platform-tools\"
adb logcat
```

- Real time display of screen
  - http://codaset.com/jens-riboe/droidatscreen/wiki

Tools I use…

- DDM Device Screen Capture

```
@echo off
cd "C:\Program Files(x86)\AndroidSDK\platform-tools\”
ddms
```

- Script to copy data from device to Temp

```
@echo off
cd "C:\Program Files(x86)\AndroidSDK\platform-tools\“
adb pull /sdcard/.city C:/Temp
```

Tools I use...

- Script to uninstall everything
  (also have one to delete all SD card data)

```
@echo off
cd "C:\Program Files (x86)\AndroidSDK\platform-tools\"
adb uninstall edu.mit.android.citydev1
adb uninstall edu.mit.android.cityver1
```

Tools I use...

- Script to change package name from development to release version so I can run both on the same phone

Apps you found...

- Inspirational health apps?

Design reading questions

- What is the benefit of having more than one type of bird?

Angry Birds

- Over 50 million downloads

- Not sure about source, but...
  - 200 million hours per day
  - 1.2 billion hours per year

Angry Birds

- **Simple** yet engaging interaction
  - Not procedurally simple
  - Mental model simple and progresses
    - First User Experience (FUE)
    - Skill acquisition
    - Users construct schema quickly
- Challenge: maintain engagement

Addictive…

- "Carefully scripted expansion of the user's mental model of the strategy component and incremental increases in problem/solution methodology"

- Examples:
  - Bird traits
  - Physics
  - Misc. stuff in scene

Use of timing/pacing

- Faster response time not always better
- Flight path and slow pigs
  - Solves error correction problem
  - Relax and think / pacing
- "Fast is good, clever is better"

Memory game

- Many addictive games have short-term memory component
- Bend but not break short-term memory

Lightweight content generation

- Clever pig houses
  - Curious
  - Funny
  - Topical
- Small variations dramatically change complexity

Action via motion on stills

- Simple storyline in between-level transition scenes
  - Curious
  - Funny
- Action when new pig houses introduced
  - Activates STM challenge

Mystery

- Conceptual depth
- "Why did they do that" vs. "What were they thinking?"
- Examples
  - Tiny bananas
  - Background/ground
  - Strange home designs
  - Why birds? Pigs?
  - What will happen? New birds/pigs?

Sound

- More addictive with sound
  - Character's taunt
  - Off-screen action
  - Background sound builds tension but not overbearing

Visuals

- Visual design “Hygiene factor”
  - Negative if missing
  - But doesn’t overcome bad interaction design

Levels of challenge

- Simultaneous levels of challenge
  - Current bird
  - Set of birds
  - Levels
- Levels of reward
  - Individual pigs
  - Helmeted pigs
  - Spectacular building collapse (“hole in one”)
  - Completion of level

(un)predictability

- Unexplained randomness will irritate user
- Yet, randomness can make game more interesting
- Physics is a plausible way to introduce randomness

Tracking apps

- E.g. (many more mentioned)
  - Livestrong
  - LoseIt!
  - MyFitnessPal
  - Calorie Counter
  - PushupFu
  - Calorific/Noob

- Unique take (some mentioned)
  - PushupFu
  - Nike/iPod
  - Sleep as an Droid
  - Instant Heart Rate
  - Diet2Go (point of decision)

Apps

- Likes?
  - Large DBs, big buttons, creative ideas (SpecTrek), many features, easy to get started, tutorials, limited stuff on screen, "beautiful" look and feel, # downloads, positive reviews, companion web apps, social networking, graphs (?), personalized advice, free, ...

Apps

- Needs improvement?
  - Confusing screens/options, Phone and physical movement incompatible, many features, difficulty entering info, too much on screen, crashing, account sign in, mistrust of DB, busy screens, small text, sensing work?, connection to Internet required to use, GPS limitations, paid, draining battery, nagging to register, buttons that don't relate to task, inconsistent behavior, monotony, ...

Gut questions

- ***In real life***, does notifying you of a time you scheduled a workout *really* help you out?

- ***In real life***, for how long do you think a highly motivated person could keep up food tracking?

  How about a person still gaining weight?

Feature creep

- Avoid the tendency to judge apps based on number of features!
- What are the features that 80% of users **need** to accomplish their key **task(s)**?

Angry Birds and Noob

- Mash up?
- Context?