

CPET 565/499

Mobile Computing Systems

Lecture on

Android Applications Development, Design, and Design Patterns

Fall 2014

A Specialty Course for Purdue University's M.S. in Technology
Graduate Program

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1

Android Applications Development and Design Patterns

References

1. Android Developers

- **Patterns**, <http://developer.android.com/design/patterns/index.html>
- **Patterns Definition: Design apps that behave in a consistent, predictable fashion**

2. Android Patterns, Shared by UNITiD and Contributors, <http://unitid.nl/androidpatterns/>

3. Android Design Patterns – Interaction Design Solutions for Developers, by Greg Nudelman

- **Book's companion web site**, <http://www.androiddesignbook.com/>

4. Android UI Patterns and Anti-Patterns, Mobile Tech Conference 2012 Presentations, 57 min, <http://www.youtube.com/watch?v=EisUfFS1IZk>

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2

Android Applications Design Topics

Android Developers

- **Patterns**, <http://developer.android.com/design/patterns/index.html>
- **Patterns Definition:** Design apps that behave in a consistent, predictable fashion
- **Gestures**, <http://developer.android.com/design/patterns/gestures.html>
 - **Touch: Action – Press, lift**
 - **Long Press: Action – Press, wait, lift**
 - **Swipe or drag: Action - move, lift**
 - **Long press drag: Action – Long press, move, lift**
 - **Double touch**
 - **Double touch drag**
 - **Pinch open**
 - **Pinch close**

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3

Android Applications Design Topics

- **App Structure**, <http://developer.android.com/design/patterns/app-structure.html#general-structure>
 - **App Examples**
 - **Calculator or Camera – single focused activity from a single screen**
 - **Phone – switch between activities without deep navigation**
 - **Gmail or Play Store – combine a broad set of data views with deep navigation**
 - **General Structure**
 - **Top level views and Detail/Edit views**
 - **Category view can be used to connect top-level view and Detail/edit view**

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4

Android Applications Design Topics

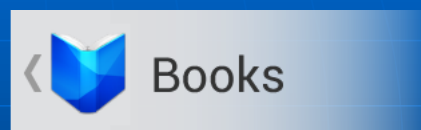
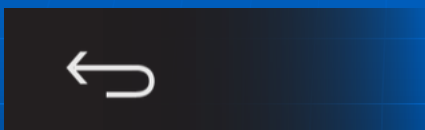
- App Structure, <http://developer.android.com/design/patterns/app-structure.html#general-structure>
- Top Level Switching with View Controls
 - Fix tabs
 - Spinners (drop-down menu)
 - Navigation drawers (slide-out menu)
- Categories
- Details
 - Layout
 - Checklist

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5

Android Applications Design Topics

- Navigation with Back & Up, <http://developer.android.com/design/patterns/navigation.html>



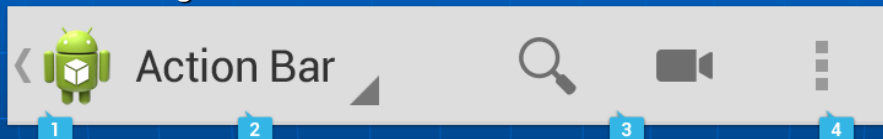
- Navigation Within Your App
- Navigation into Your App via Home Screen Widgets and Notifications
- Navigation Between Apps

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6

Android Applications Design Topics

- Action Bar, <http://developer.android.com/design/patterns/actionbar.html>
- A dedicated piece of real estate at the top of each screen that is generally persistent throughout the app.
- General Organization



- Adapting to Rotation and Different Screen Size
- Layout Considerations for Split Action Bars
 - Main action bar, Top bar, Bottom bar
- Action Buttons
 - Sample Action button used in Gmail



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7

Android Applications Design Topics

- Action Bar, <http://developer.android.com/design/patterns/actionbar.html>
- ...
- Contextual Action Bars
- Action Bar Checklist

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8

Android Applications Design Topics

- **Navigation Drawer,**
<http://developer.android.com/design/patterns/navigation-drawer.html>
 - A panel that transitions in from the left edge of the screen and displays the app's main navigation options.
- **Multiple-pane Layouts,**
<http://developer.android.com/design/patterns/multi-pane-layouts.html>
- **Swipe Views,** <http://developer.android.com/design/patterns/swipe-views.html>

Android Applications Design Topics

- **Full Screens,**
<http://developer.android.com/design/patterns/fullscreen.html>
- **Selection,**
<http://developer.android.com/design/patterns/selection.html>
- **Confirming & Acknowledging,**
<http://developer.android.com/design/patterns/confirming-acknowledging.html>
- **Notifications,**
<http://developer.android.com/design/patterns/notifications.html>
- **Widgets,** <http://developer.android.com/design/patterns/widgets.html>
- **Settings,** <http://developer.android.com/design/patterns/settings.html>
- **Help,** <http://developer.android.com/design/patterns/help.html>
- **Compatibility,**
<http://developer.android.com/design/patterns/compatibility.html>
- **Accessibility,**
<http://developer.android.com/design/patterns/accessibility.html>

Android Patterns, <http://unitid.nl/androidpatterns/>

Shared by UNITiD and Contributors:

- Dealing with Data
- Getting Input
- Navigation
- Notifications
- Personalize
- Screen Interactions
- Social

Android Patterns:

<http://unitid.nl/androidpatterns/>

- **Dealing with Data / a Set of Data**
 - Displaying
 - Viewing
 - Sorting
 - Browsing
 - Searching
- **Change view on a set of data:**
 - Options Menu, Dedicated Button, Tab Bar
- **Let users load more items:** Dynamic loading of a list, Pull to refresh
- **Let users search:** Search bar, Main menu, Dedicated item
- **Let users sort data:** Drag & drop, Sort-key Dialog
- **Show a vast amount of content:** Expandable list, Segmented control, Data dill down, Dynamic loading of a list, Static list, Sliding layer

Android Patterns:

<http://unitid.nl/androidpatterns/>

- **Getting Input**
 - Let users enter a value
 - Slider, Spinner
 - Let user enter text
 - Soft keyboard – Pan & scan
 - Soft keyboard - Extract
 - Let users select a predefined value
 - Spinner
 - Let users select multiple items
 - Checkbox
 - Set time & date
 - Date & Time picker – Plus, Minus
 - Date & Time picker - Wheel

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13

Android Patterns:

<http://unitid.nl/androidpatterns/>

- **Navigation**
 - Highlight important functionalities
 - Action bar, Dashboard – Categories, Dashboard – Features
 - Let users find their way through a vast amount of contents
 - Drill down navigation, List navigation, Segmented control, Expandable list, Mode Selector, Tabs, Window shade, Scroll thumb, Slideable top navigation, Scrollable rows, Scrolling tabs, Horizontal scrolling – Page indicator
 - Let users move through content
 - Carousel, Stepping, Scroll thumb, Scrollable rows, Contextual navigation

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14

Android Patterns:

<http://unitid.nl/androidpatterns/>

■ Notifications

- Notify users of an activity in my app
 - Toast message
 - Progress bar dialog
 - Progress wheel dialog
 - Progress wheel
- Request a response from users
 - Alert dialog
 - Status bar – Event driven notification
 - Status bar – Ongoing notifications

Android Patterns:

<http://unitid.nl/androidpatterns/>

■ Personalize

- Let users manage their account
 - Login
 - Create account
 - Add account – Dedicated button
 - Add account – Options menu
- Let users set favorite items
 - Favorites
 - Bookmark – Options menu

Android Patterns:

<http://unitid.nl/androidpatterns/>

■ Screen Interactions

- Let users move content around the screen?
 - Drag to move
- Let users scroll through content
 - Slide to scroll
 - Fling to scroll
 - Scroll thumb
- Let user zoom in on content
 - Double tap to zoom
 - Pinch & Spread

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17

Android Patterns:

<http://unitid.nl/androidpatterns/>

■ Social

- Let users respond to content
 - Comments
 - Rating – Stars
 - Thumb up/down
 - Share button

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18

Android Design Patterns

A book on *Android Design Patterns* – Interaction Design Solutions for Developers, by Greg Nudelman

- **Book's companion web site,**
<http://www.androiddesignbook.com/>
- **Patterns**
 - Welcome Animation
 - Tutorial

Android Design Patterns: Home Screen

Android Design Patterns – Interaction Design Solutions for Developers, by Greg Nudelman

- **Home Screen**
 - List of Links
 - Dashboard
 - Updates
 - Browse
 - Map
 - History

Android Design Patterns: Search

Android Design Patterns – Interaction Design Solutions for Developers, by Greg Nudelman

- **Search – Patterns**
 - Voice Search
 - Auto-Complete & Auto-Suggest
 - Tap-Ahead
 - Pull to Refresh
 - Search from Menu
 - Search from Action Bar
 - Dedicated Search
 - Search in the Content Page
- **Anti-pattern**
 - Separate Search and Refinement

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21

Android Design Patterns: Sorting and Filtering

Android Design Patterns – Interaction Design Solutions for Developers, by Greg Nudelman

- **Sorting and Filtering - Pattern**
 - Refinement Page
 - Filter Strip
 - Tabs

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22

Android Design Patterns: Avoiding Missing and Undesirable Results

Android Design Patterns – Interaction Design Solutions for Developers, by Greg Nudelman

- **Patterns:**
 - Partial Match
 - Local Results
- **Anti-patterns:**
 - Ignoring Visibility of System Status
 - Anti-pattern: Lack of Interface Efficiency
 - Anti-pattern: Useless Controls
 - Pattern: Did You Mean?

Android Design Patterns: Data Entry

- Slider
- Stepper
- Scrolling Calendar
- Data and Time Wheel
- Drop Down
- Multiple Select
- Free-Form Text Input & Extract
- Textbox with Input Mask
- Textbox with Atomic Entities

Android Design Patterns: Forms

- Pop-up Alert
- Callback Validation
- Cancel/OK
- Top-Aligned Labels
- Getting Input from the Environment
- Input Accelerators

Android Design Patterns: Mobile Banking

- Logic Accelerator
- Dedicated Selection Page
- Form First
- Dedicated Pages Wizard Flow
- Wizard Flow with Form
- Verification-Confirmation
- Near Field Communication (NFC)

Android Design Patterns: Navigation

- **Patterns**
 - Watermark
 - Swiss-Army-Knife Navigation
 - Integration – The Final Frontier
- **Anti-Patterns**
 - Pogo-sticking
 - Multiple Featured Areas
 - Carousel
 - Pop-over Menu

Summary