

CIS493 – Fall 2009 - Messages:

Final Report. Course portfolio to be presented **Monday Dec 7 at BU128 (1:00 – 3:00pm).**

Your portfolio contains (1) all your well documented lab assignments, including: Description, Code, Layouts, Screen snapshots, References, Misc., (2) You well documented research project (format similar to lab assignments), (3) an electronic copy of all your materials (preferable in pdf format – all in a single CD). Each entry should be in its own sub-directory: Lab1, Lab2, ..., Final_Project. I will return your hard-copies, but keep the CD version.

Prepare your talk, rehearse in front of other people, make sure it takes no more than 15 minutes.

Final Exam time-slot according to CSU schedule	12:15p-1:20p MW	M, Dec 7	1:00p-3:00p
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Research Projects. List of selected topics (Fall 2009). (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/projects/cis493-research-projects.pdf>)

Portfolio Preparation. Please prepare and submit your final portfolio. Include each homework ([see sample assignment](#)) and you research project. Make sure you have and electronic copy of each item in **pdf** format. Include a CD with all this material into your folder.

Homework5. Android Multi-Threading. (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/misc/cis493-homework05.pdf>)

Lecture Notes. Adonde? – A mapping tutorial. (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/00-Tutorial-Mapping.pdf>)

Download Lecture Notes. Links have been corrected (Ch. 3-18) (27-Oct-2009)

Download Sample Code.

One zipped file (Chapters 3-18, 27-Oct-2009) <http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/code/00-all-code.zip>

Homework4. Multi-Activity Application. (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/misc/cis493-homework04.pdf>)

Homework3. TODO list application. (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/misc/cis493-homework03.pdf>)

Homework2. A simple game: Tic-Tac-Toe (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/misc/cis493-homework02.pdf>)

Download Lecture Notes. Links have been corrected (5-Oct-2009)

Homework1. Implementing a Tip Calculator (<http://grail.cba.csuohio.edu/~matos/notes/cis-493/misc/cis493-homework01.pdf>)

Syllabus on the next page



Mobile Computing – Developing Applications Using the Android Platform (3 credits)

CIS493 / 694 Spec. Topics in CIS
3 credits.

Instructor:
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Mon. & Wed. 12:15 – 1:30 pm.

Course Description

Study of fundamental concepts, design strategies, tools and APIs to create advanced applications for mobile phones and occasionally connected mobile devices. Topics include: design of mobile user interfaces, application life-cycle, multi-threading, inter-process communication, data persistency, content providers, background services, geo-location and mapping, networking and web services, telephony, messaging, graphics and animation, multimedia, peer-to-peer communication, performance, security. The target computing environment may change. Currently the course explores the Android Operating System and its supporting SDK.

Student Outcomes

At the end of the course the student will be able to construct effective software systems for cell phones and other occasionally connected mobile devices based on the selected operating system.

Class Format

The class will be based on the instructor's recitation of material, study of tutorials, weekly lab assignments, and final project. Local mobile developers are invited to share their expertise with the class. In Fall 2009 a series of discussions on the *iPhone Application Platform* will be presented by guest speaker Randy Beiter - Chief Software Engineer of iNomadics – a Cleveland based software company.

Pre-requisites

CIS430, This class is offered as a senior elective course.

Textbooks - References

- The Busy Coder's Guide to Android Development by Mark L. Murphy. CommonsWare Pub., 2009 (available at: <http://commonsware.com/Android/index.html>).
- Unlocking Android - A Developer's Guide. W. Frank Abelson, Charlie Collins, and Robi Sen. Manning Pub. April, 2009, ISBN: 1933988673 (*the attached reading list is based on this book*).
- Android Application Development: Programming with the Google SDK by Rick Rogers, John Lombardo, Zigurd Mednieks, Blake Meike. O'Reilly Pub. May 26, 2009.
- Professional Android Application Development by Reto Meier. Wrox Programmer to Programmer Pub. 2009.

Software/Hardware Requirements

Developing applications for Android may be done from the Windows XP/Vista environment, a Mac OS X (Intel only) environment or a Linux environment. Students could (for free) download the Google Android SDK, and the Eclipse environment along with the Android Developer Tools plug-in for Eclipse. ***It is not necessary to own an Android device as almost all the features to be used could be tested on the Android's simulator.***

Reading List - Tentative Android Topics

Topics covered in this class are delivered in a one-semester course based on traditional lecturing and a number of individual and team oriented lab experiences. The following is a list of possible topics(*)

1 Targeting Android – The Big Picture.

Background and positioning of the Android platform, including comparisons to other popular platforms such as BlackBerry, iPhone, and Windows Mobile. After an introduction to the platform, the balance of the first chapter introduces the high-level architecture of Android applications and the operating system environment.

- 1.1 Introducing Android
- 1.2 Stacking up Android
- 1.3 Booting Android development
- 1.4 An Android application
- 1.5 Summary

Download lecture notes 1: Android Intro

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter01-Intro.pdf>

2 Development environment.

Step-by-step development exercise teaching you the essence of using the Android development environment, including the key tools and concepts for building an application.

- 2.1 The Android SDK
- 2.2 Fitting the pieces together
- 2.3 Building an Android application in Eclipse
- 2.4 The Android Emulator
- 2.5 Debugging
- 2.6 Summary

Lecture notes 2: Android Setup: SDK & Emulator

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter02-Setup1-SDK.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter02-Setup2-Emulator.pdf>

3 User interfaces.

covers the fundamental Android UI components, including View and Layout. Introduces basic concepts such as handling external resources, dealing with events, and the lifecycle of an Android application.

- 3.1 Activity Life Cycle
- 3.2 Creating the Activity
- 3.2 An Overview of User Interfaces
- 3.3 Using XML Layouts
- 3.3 Selection Widgets
- 3.4 Date and Time Tabs
- 3.5 Hardware & Software Keyboards
- 3.6 Using Menus
- 3.7 Using Fonts
- 3.8 The WebView and the WebKit Browser
- 3.9 Dialog Boxes: AlertDialog & Toast
- 3.3 Using resources

Lecture notes 3-11: Life Cycle – User Interfaces

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter03-Life-Cycle.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter04-User-Interfaces.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter05-XML-Layouts.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter06-Selection-Widgets.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter07A-Fancy-Date-Time-Tabs.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter07B-Hard-Soft-Keyboards-IMF.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter08-Menus.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter09-Fonts.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter10-WebKit.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter11-DialogBoxes.pdf>

4 Intents and services.

Expands on the concepts learned in chapter 3 and delves into the Android Intent concept to demonstrate interaction between screens, activities, and entire applications. Also we introduce and utilize the Service, which brings the notion of *background process* into discussion.

- 4.1 Working with Intent classes
- 4.2 Listening in with broadcast receivers
- 4.3 Building a Service
- 4.4 Performing Inter-Process Communication
- 4.5 Summary

Lecture notes 12, 13, 19: Intents & Intent-Filters & Multi-threading

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter12-Intents-1.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter12-Intents-2.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter13-MultiThreading.pdf>

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter19-Intent-Filters.pdf>

Lecture Notes 22. Services

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter22-Services.pdf>

5 Storing and retrieving data.

Incorporates methods and strategies for storing and retrieving data locally. We examine the use of the filesystem, databases, the SD card, and Android specific entities such as the SharedPreferences and ContentProvider classes. At this point we begin combining fundamental concepts with more real-world details, such as handling application state, using a database for persistent storage, and working with SQL.

- 5.1 Using preferences
- 5.2 Using the filesystem
- 5.3 Persisting data to a database
- 5.4 Working with ContentProvider classes
- 5.5 Summary

Lecture Notes 13-17. Resources, Preferences, Files, Databases.

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter14-Preferences.pdf>
<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter15-Files.pdf>
<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter16-Resources.pdf>
<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter17-SQL-Databases.pdf>

6 Networking and web services.

This section deals with storing and retrieving data over the network. Here we include a networking primer before delving into using raw networking concepts such as sockets on Android. From there we progress to using HTTP, and exploring web services (such as REST and SOAP).

- 6.1 An overview of networking
- 6.2 Checking the network status
- 6.3 Communicating with a server socket
- 6.4 Working with HTTP
- 6.5 Web services
- 6.6 Summary

Lecture Notes 18. Networking – Web Services

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter18-Internet-Feeders.pdf>

7 Telephony.

Covers telephony on the Android platform. We touch on basics such as originating and receiving phone calls, as well as more involved topics such as working with SMS (text-messages). We also cover telephony properties and helper classes.

- 7.1 Telephony background and terms
- 7.2 Accessing telephony information
- 7.3 Interacting with the phone
- 7.4 Working with messaging: SMS
- 7.5 Summary

8 Notifications and alarms.

In this section we look at how to notify users of various events such as receiving a SMS message as well as how to manage and set alarms.

- 8.1 Introducing Toast
- 8.2 Introducing notifications
- 8.3 Alarms
- 8.4 Summary

Lecture Notes 23. Notifications

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter23-Notifications.pdf>

9 Graphics and animation.

Introduces Androids Graphics API as well as more advanced concepts such as working with the OpenGL ES library for creating sophisticated 2D and 3D graphics. We will also touch upon animation.

- 9.1 Drawing graphics in Android
- 9.2 Animations
- 9.3 Summary

10 Multimedia.

Reviews Androids support for multimedia. Subjects include both playing multimedia as well as using the camera and microphone to record our own multimedia files.

- 10.1 Introduction to multimedia and OpenCORE
- 10.2 Playing audio
- 10.3 Playing video
- 10.4 Capturing media
- 10.5 Summary

11 Location Services.

Introduces Location-based services. Here we learn about using the mapping APIs on Android, including different location providers and properties that are available, how to build and manipulate map related screens, and how to work with location related concepts within the emulator.

- 11.1 Simulating your location within the emulator
- 11.2 Using LocationManager and LocationProvider
- 11.3 Working with maps
- 11.4 Converting places and addresses with Geocoder
- 11.5 Summary

Lecture Notes 24. Location Services

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter24-LocationServices.pdf>

Lecture Notes 25. Working with MapViews

<http://grail.cba.csuohio.edu/~matos/notes/cis-493/lecture-notes/Android-Chapter25-MapView.zip>

12 Putting it all together—the Field Service Application.

Develop a *complete* (non trivial) application including server communications, persistent storage, multiple Activity navigation, menus, mapping, RSS services, etc.

- 12.1 Field Service Application requirements
- 12.2 Android application tour
- 12.3 Android code
- 12.4 Digging deeper into the code
- 12.5 Server code
- 12.6 Summary

Additional Resources

Visit Android's web site at <http://www.android.com/>

Visit Eclipse's web site at www.eclipse.org

Videos on Android at <http://www.youtube.com/user/androiddevelopers>

Android Development Community <http://www.anddev.org>

Official Android Market <http://www.android.com/market>

Portal to Android & iPhone Market www.cyrket.com

Visit Forbes.com to read article *iPhone and Android Apps 101*

http://www.forbes.com/2008/11/11/mobile-apps-colleges-tech-wire-cx_ew_1111mobileapps.html