CS 891 Overview & Logistics

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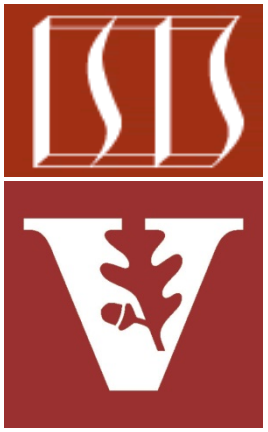


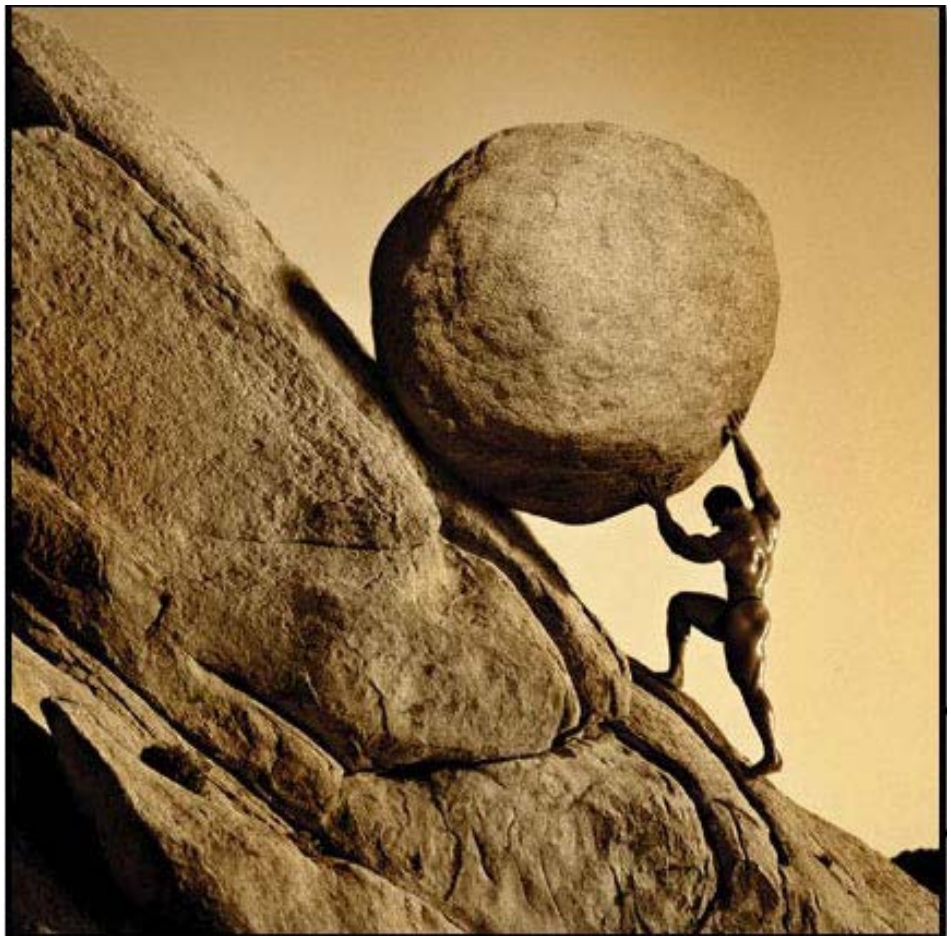
Professor of Computer Science

Institute for Software
Integrated Systems

Vanderbilt University
Nashville, Tennessee, USA

Learning Objectives in this Lesson

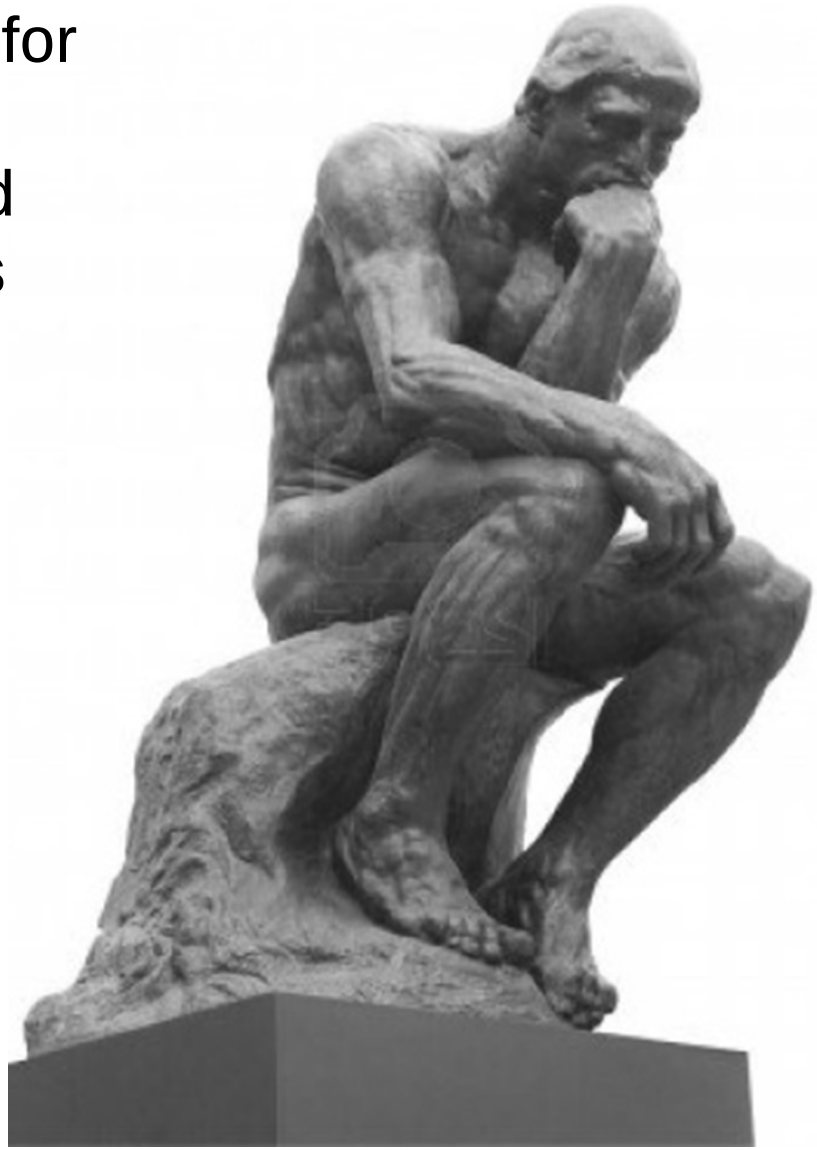
- Understand the course topics & logistics
  - Course philosophy
  - Course contents
  - Structure of the lecture material
  - Overview of the assignments & assessments
  - Setting up the Java & Android IDE on Android Studio
  - Accessing Android & Java source code



Course Philosophy

Course Philosophy

- Effective techniques & practices for developing concurrent & parallel mobile apps are *not* best learned through generalities & platitudes



"Sitting & thinking" is not sufficient...

Course Philosophy

- Instead, it's better to see *by example* how these programs can be made
  - *easier* to write & read,
  - *easier* to maintain & modify,
  - *more* efficient & resilient

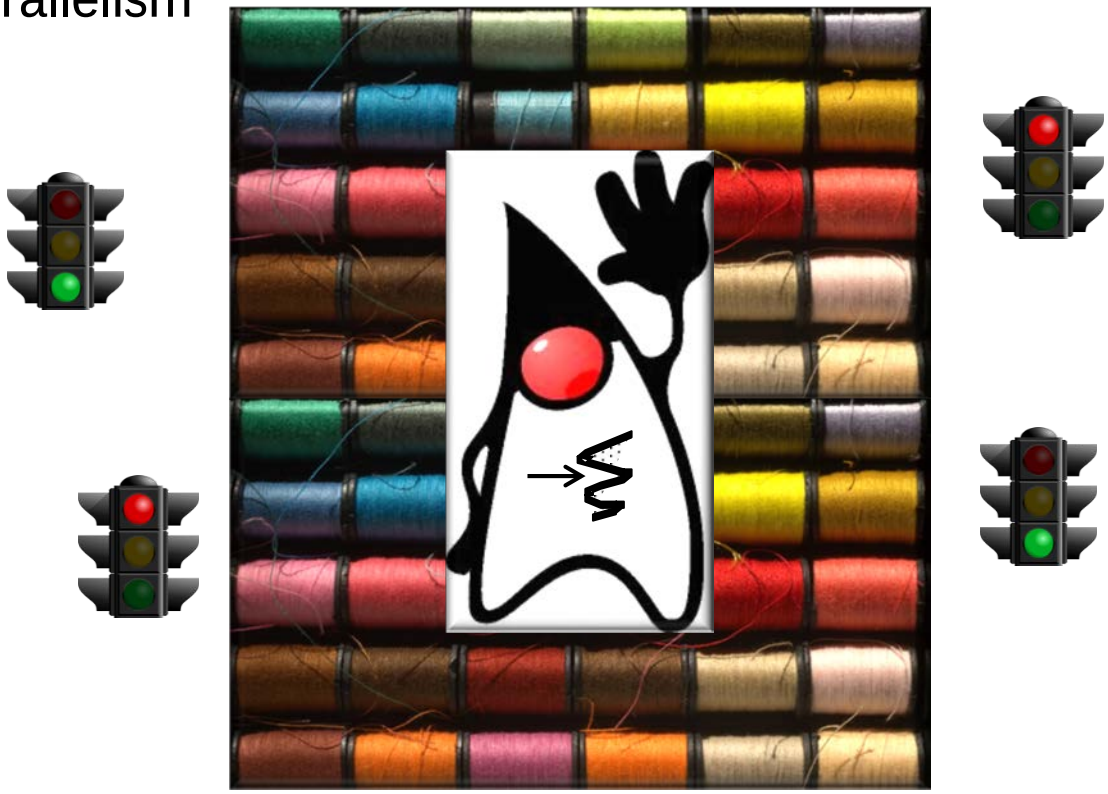
  by applying time-proven software patterns & object-oriented & functional design & programming techniques

This course involves a lot of hands-on software development & testing

Summary of the Course Contents

Summary of Course Contents

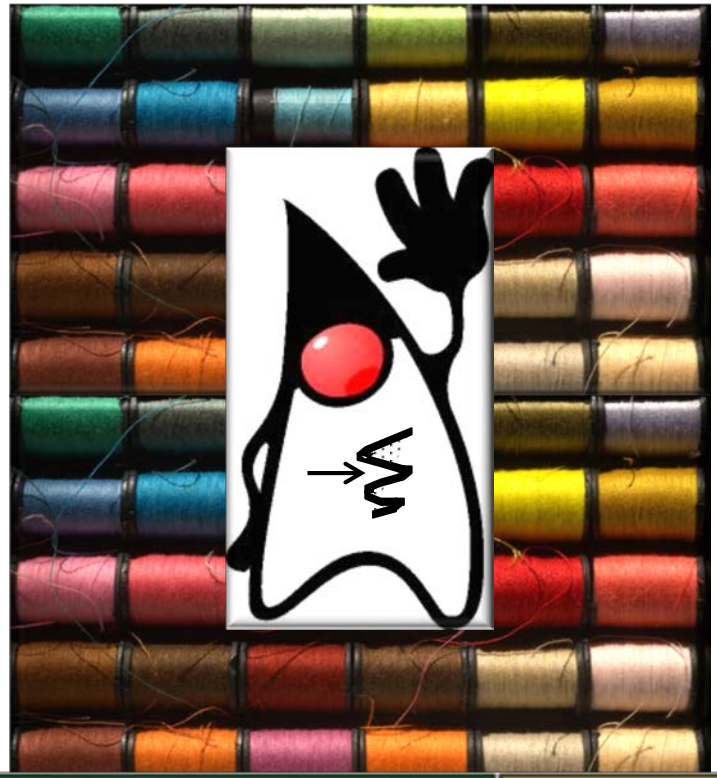
- Key Java 8 concurrency & parallelism frameworks



Including Java 8 object-oriented & functional programming language features

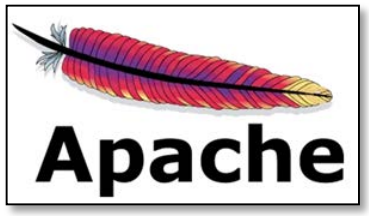
Summary of Course Contents

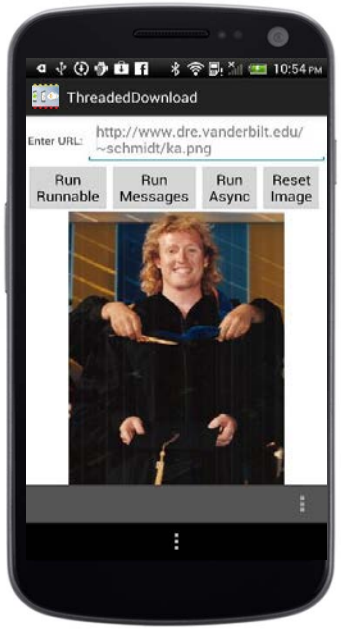
- Key Java 8 concurrency & parallelism frameworks
- Some Android UI & inter-process communication (IPC) mechanisms

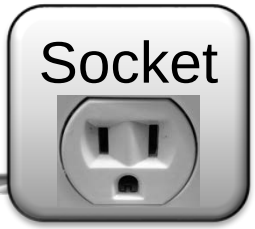


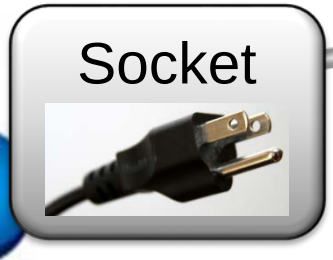
Summary of Course Contents

- Key Java 8 concurrency & parallelism frameworks
- Some Android UI & inter-process communication (IPC) mechanisms
- Some mobile & web communication mechanisms





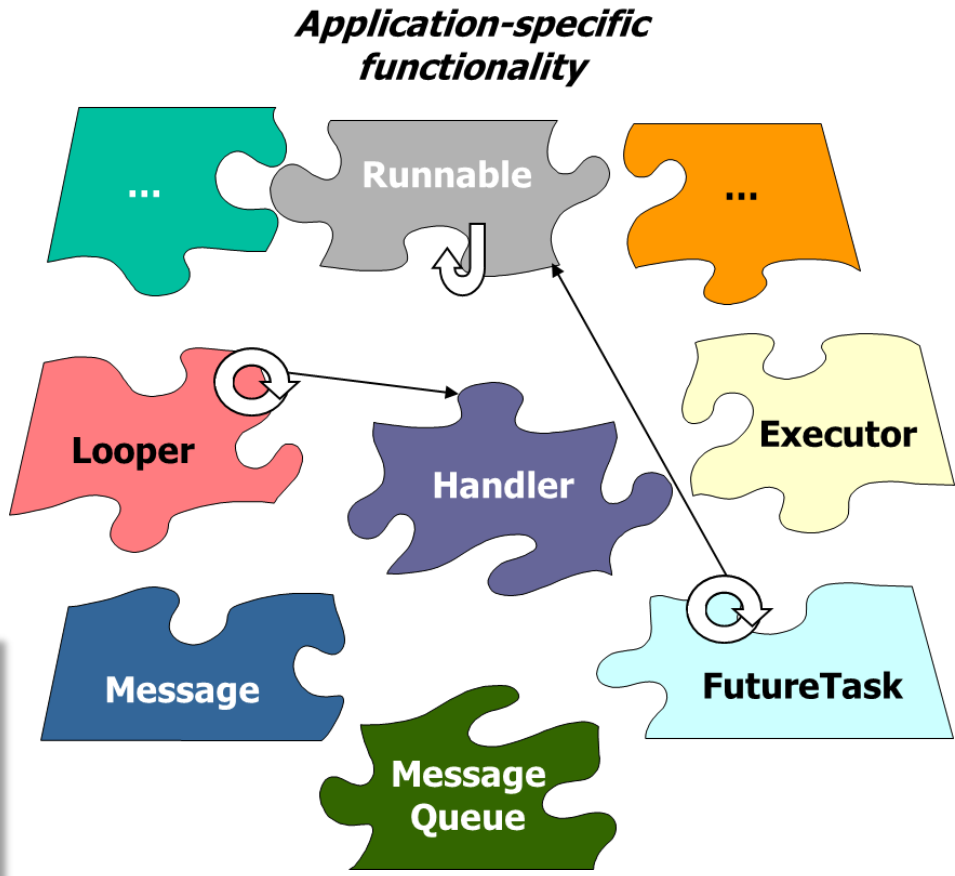


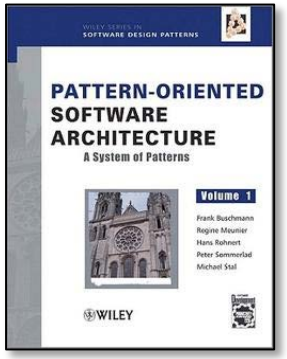


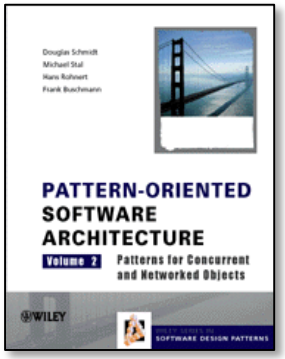
TCP/IP

Summary of Course Contents

- Key Java 8 concurrency & parallelism frameworks
- Some Android UI & inter-process communication (IPC) mechanisms
- Some mobile & web communication mechanisms
- Patterns/frameworks for concurrent & networked programming







Summary of Course Contents

- Key Java 8 concurrency & parallelism frameworks
- Some Android UI & inter-process communication (IPC) mechanisms
- Some mobile & web communication mechanisms
- Patterns/frameworks for concurrent & networked programming
- We assume you know (or can quickly learn) Android, Java, & Git

See www.coursera.org/specializations/android-app-development

Structure of the Lecture Material

Structure of the Lecture Material

- This course has four main modules

Section	Topics

Java object oriented & functional programming features	• Coverage of basic & advanced Java 8 programming features, e.g.
	  • Abstraction, inheritance, & polymorphism
	  • Lamba expressions, method references, & functional interfaces

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Java Concurrency & Parallelism	• Coverage of basic & advanced Java 8 concurrency & parallelism frameworks, e.g.
	  • Java parallel (& sequential) streams
	  • Java completable futures

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	  • Java completable futures

Mobile ⇆ Web Communication	• HTTP communication & parsing libraries

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Mobile ⇆ Web Communication	• HTTP communication & parsing libraries
Software Patterns	• Concurrency & communication patterns

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Java Concurrency & Parallelism	• Coverage of basic & advanced Java 8 concurrency & parallelism frameworks, e.g. • Java parallel (& sequential) streams • Java completable futures
Mobile ⇆ Web Communication	• HTTP communication & parsing libraries
Software Patterns	• Concurrency & communication patterns

We will bounce around a bit when covering these topics

Structure of the Lecture Material

- This course has four main modules
  - Each module is composed of lessons

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  - Each module is composed of lessons
  - Each lesson is composed of parts

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  - Each module is composed of lessons
  - Each lesson is composed of parts
  - Each part is a single lecture

Screencasts of each lesson “part” & PDF versions of the slides will be uploaded to www.dre.vanderbilt.edu/~schmidt/cs891#lectures

Structure of the Lecture Material

- This course has four main modules
  - Each module is composed of lessons
  - Each lesson is composed of parts
  - Each part is a single lecture
    - Each part is composed of segments

Structure of the Lecture Material

- There will be a bi-weekly quizzes on material covered in the lectures

All quizzes (& the final) are “closed book”

Structure of the Lecture Material

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  - 1st quiz will be next Wednesday

Structure of the Lecture Material

- There will be a bi-weekly quizzes on material covered in the lectures
  - 1st quiz will be next Wednesday
  - We'll hand back & review quizzes at the start of the next class

One of the benefits of a smaller class ;-)

Structure of the Lecture Material

- There will be a bi-weekly quizzes on material covered in the lectures
  - 1st quiz will be next Wednesday
  - We'll hand back & review quizzes at the start of the next class

I recommend that you study for quizzes by reviewing slides & watching screencasts available at www.dre.vanderbilt.edu/~schmidt/cs891#lectures

Structure of the Lecture Material

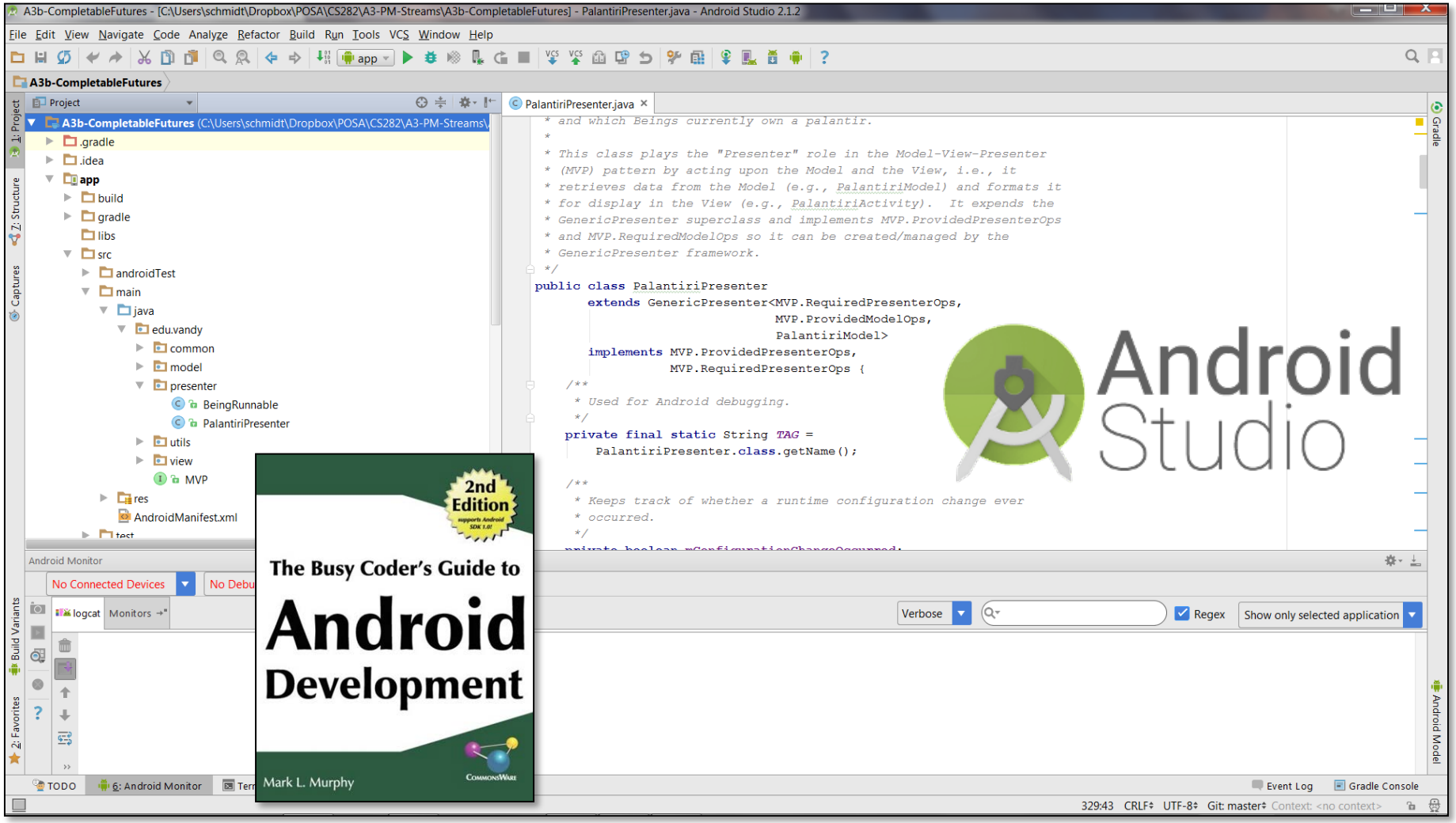
- There will be a cumulative final exam that covers all the lectures

The final exam will be held 9am to noon, Saturday, December 9th in this room

Overview of the Assignments & Assessments

Overview of Assignments & Assessments

- Programming assignments should be written in Java 8 using Android Studio



You can use any IDE, but your final submission *must* build/run with Android Studio 3.x & Android Nougat 7.1 (API 25)

Overview of Assignments & Assessments

- Programming assignments should be written in Java 8 using Android Studio
  - Please install the Java 8 runtime environment (JRE)

See github.com/douglascraigschmidt/CS891/wiki/Installing-Software

Overview of Assignments & Assessments

- Android programming assignments must be submitted using Android Studio

- A wizard for creating new apps
- A visual editor for creating GUIs
- An editor for manipulating Android XML descriptors needed for your app
- An emulator for testing your apps on your PC
- A debugger for finding errors in the emulator or on a device

See developer.android.com/sdk

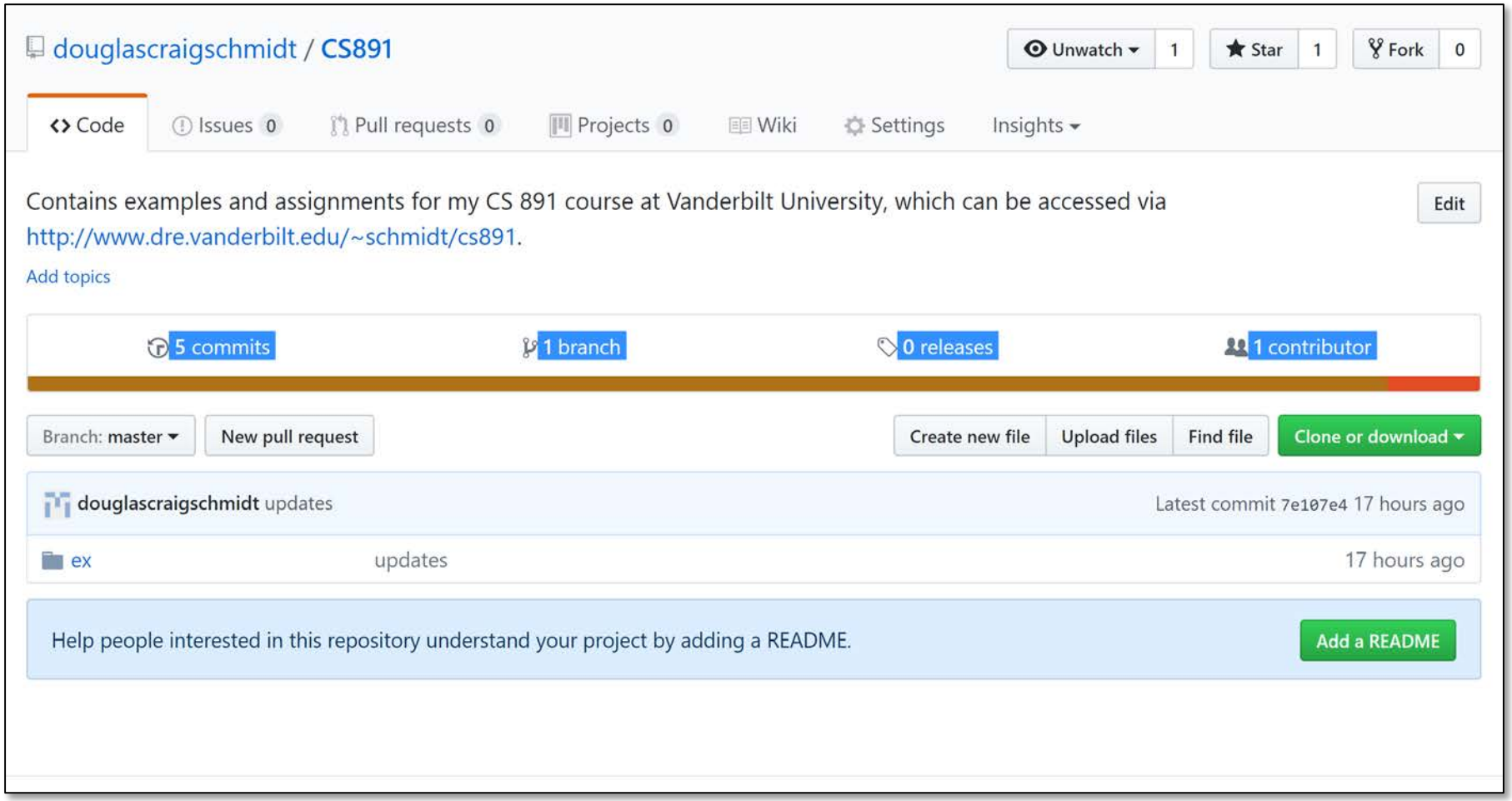
Overview of Assignments & Assessments

- Android programming assignments must be submitted using Android Studio
  - Please install Android 7.1 Nougat (API level 25)

See en.wikipedia.org/wiki/Android_Nougat

Overview of Assignments & Assessments

- All source code for assignments & examples available at GitHub



Go to GitHub at github.com/douglascraigschmidt/CS891

Overview of Assignments & Assessments

- All source code for assignments & examples available at GitHub
  - You will need to learn how to use GitLab et al.

Overview of Assignments & Assessments

- All source code for assignments & exam
  - You will need to learn how to use GitLab et al.
  - Be prepared to update your repositories occasionally

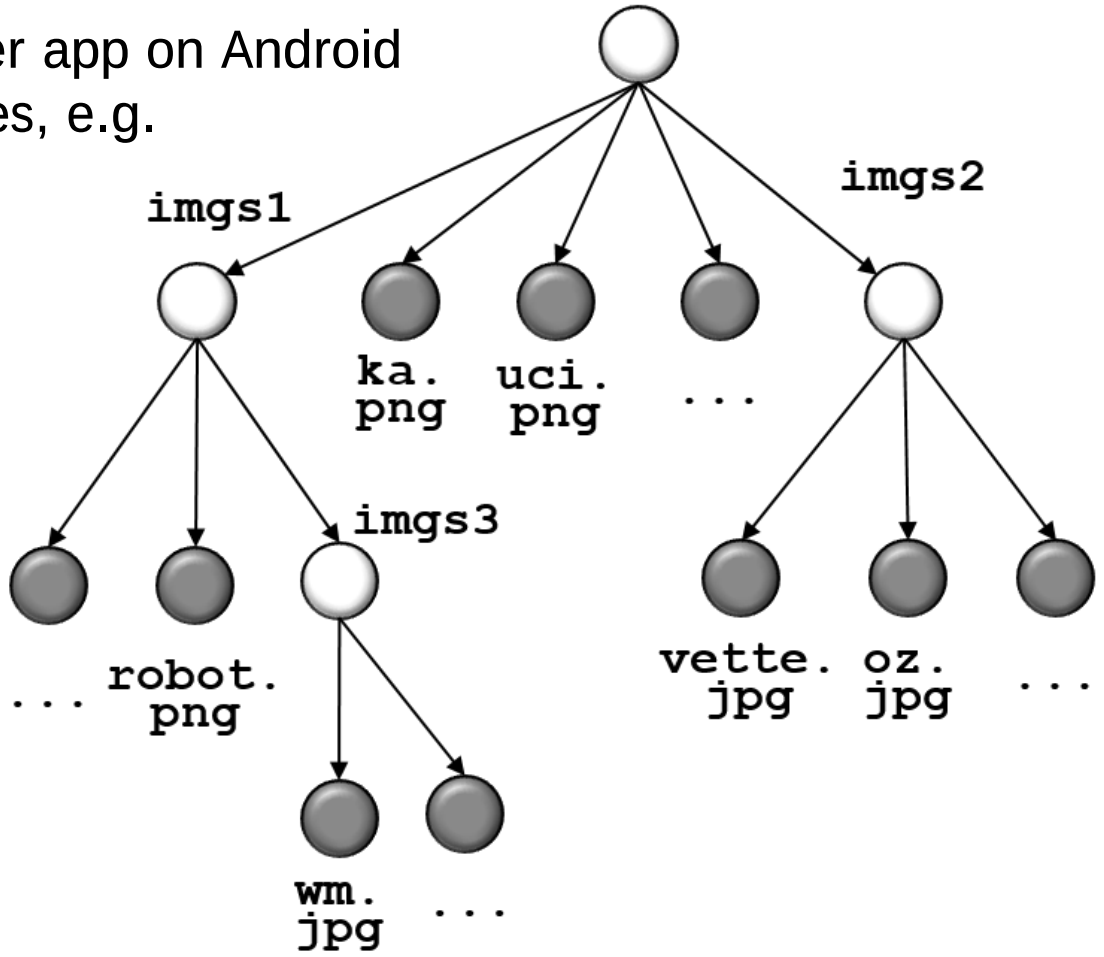
Overview of Assignments & Assessments

- Assignments will provide a range of experience with Java 8 & Android concurrent/parallel programs

See github.com/douglascraigschmidt/CS891/tree/master/assignments

Overview of Assignments & Assessments

- Assignments will provide a range of experience with Java 8 & Android concurrent/parallel programs
  - Implement an image crawler app on Android using various Java 8 features, e.g.
    - Java sequential & parallel streams
    - Java completable futures
    - Java lambda expressions, method references, & functional interfaces



The topics covered by the assignments may change a bit during the semester

Overview of Assignments & Assessments

- Assignment assessments will be done via reviews by course staff

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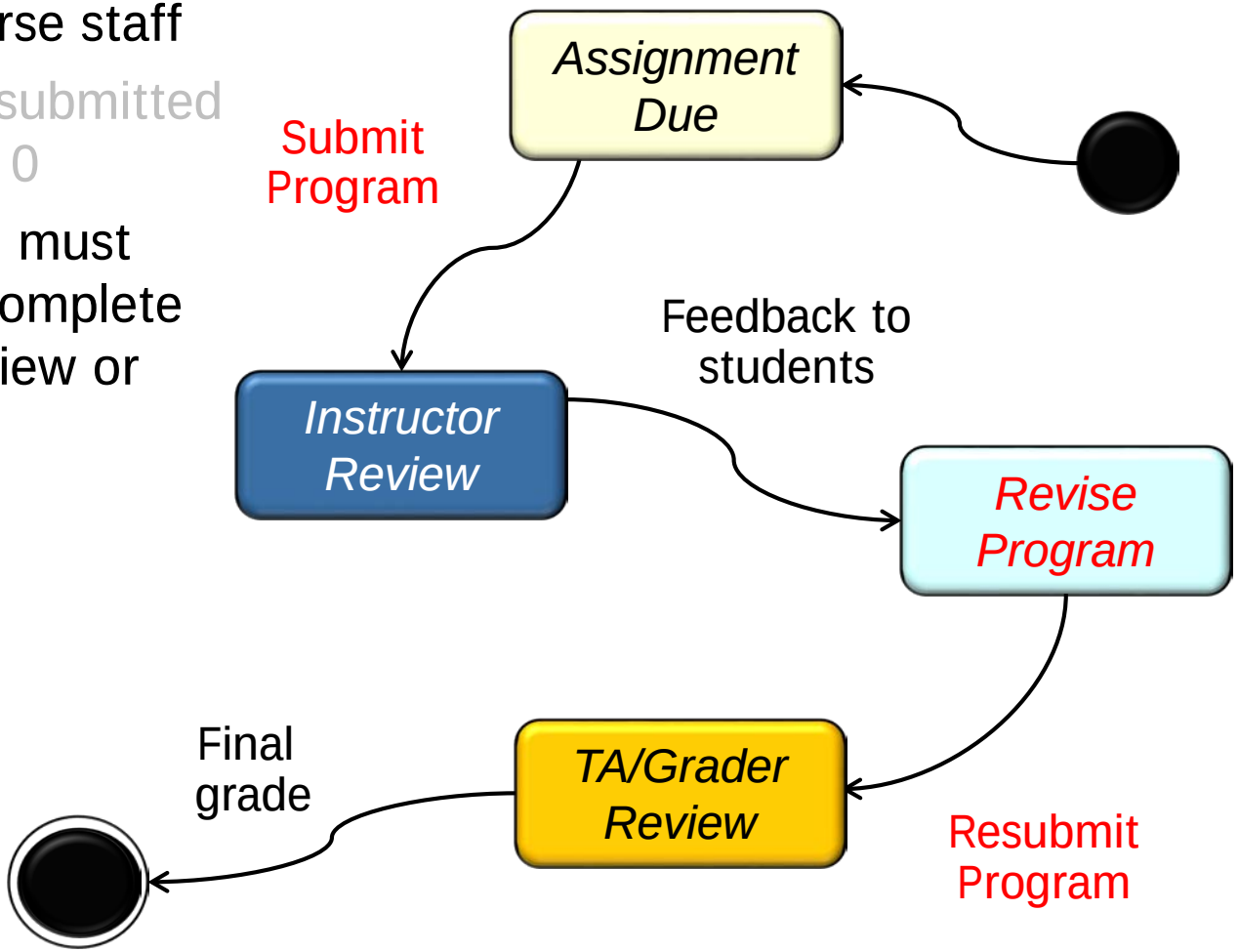
See github.com/douglascraigschmidt/CS891/wiki/CS-891-FAQ

Overview of Assignments & Assessments

- Assignment assessments will be done via reviews by course staff
  - Assignments *must* be submitted on time or you'll get a 0
  - Your initial submission must compile & be largely complete or you won't get a review or a final grade



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  - Assignments *must* be submitted on time or you'll get a 0
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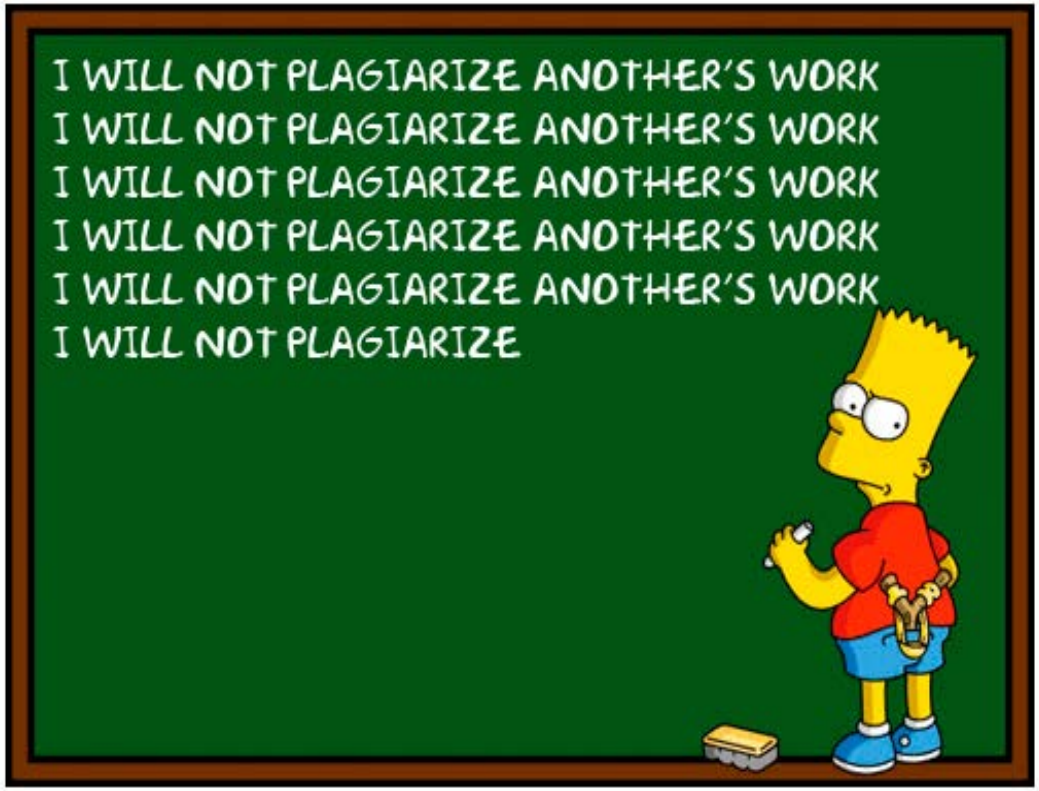
  - Work *must* be your own
    - This goes for quizzes & programming assignments



www.vanderbilt.edu/student_handbook/the-honor-system#statement-of-the-honor-code

Overview of Assignments & Assessments

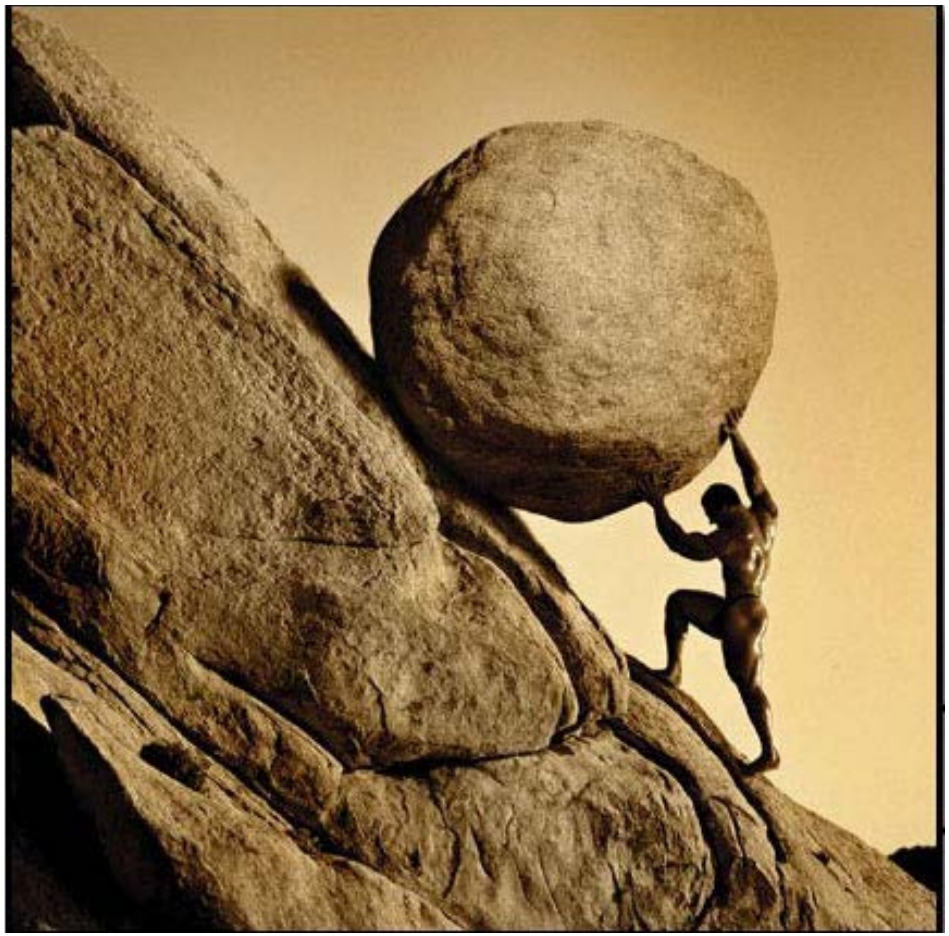
- Assessment criteria

Assessment Category	%
Execution correctness	40%
Structure (e.g., modularization, information hiding, etc.)	30%
Insightful programming (e.g., developing reusable class components, etc.)	10%
Consistent style (e.g., capitalization, indenting, etc.)	10%
Appropriate commenting style	10%

See www.dre.vanderbilt.edu/~schmidt/cs891/assignments.html

Overview of Assignments & Assessments

- The relative weighting of each portion of the course is:
  - 40% Quizzes
  - 40% Programming projects
  - 10% Final exam
  - 10% Participation



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Participation is roughly 5% attendance & 5% in-class involvement in discussions

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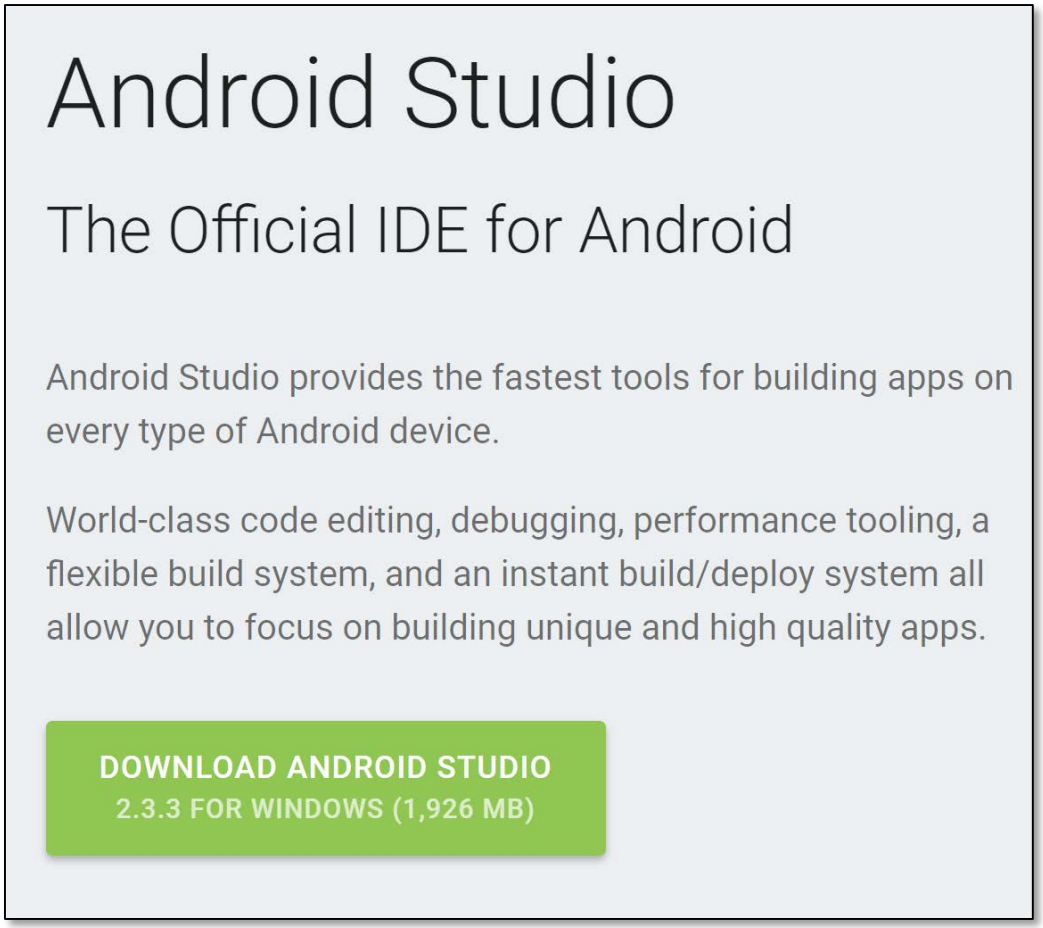
Participation is roughly 5% attendance & 5% in-class involvement in discussions

Don’t expect to get an A in this class if you do not participate!!!!

Setting Up the Android & Java IDE on Android Studio

Installing Eclipse Java/Android Developer Tools

- See developer.android.com/sdk

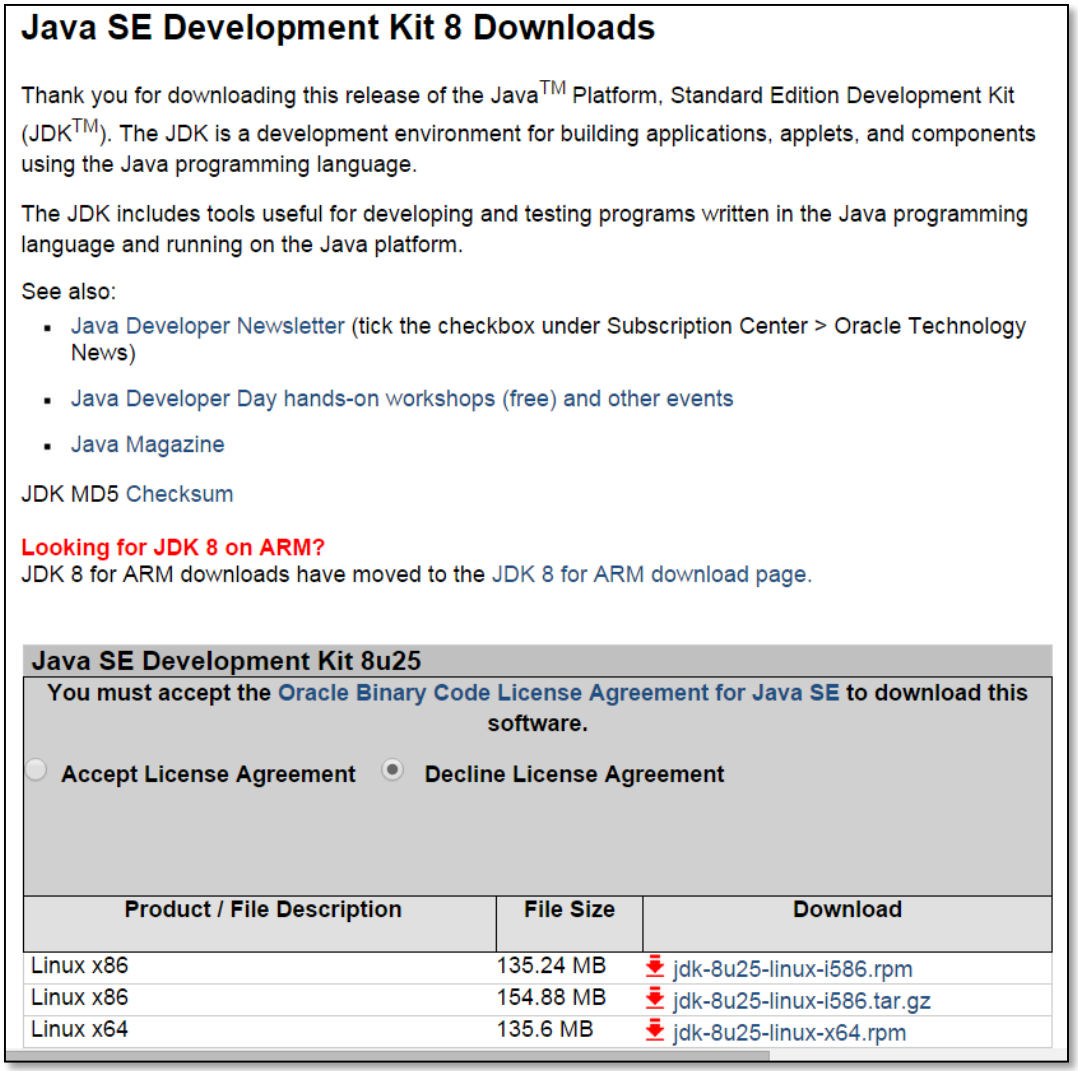


Installing Eclipse Java/Android Developer Tools

- Installation steps

Installing Eclipse Java/Android Developer Tools

- Installation steps
  - Download & install the Java Standard Edition JDK & JRE 8



Java SE Development Kit 8 Downloads

Thank you for downloading this release of the Java™ Platform, Standard Edition Development Kit (JDK™). The JDK is a development environment for building applications, applets, and components using the Java programming language.

The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.

See also:

- Java Developer Newsletter (tick the checkbox under Subscription Center > Oracle Technology News)
- Java Developer Day hands-on workshops (free) and other events
- Java Magazine

JDK MD5 Checksum

Looking for JDK 8 on ARM?
JDK 8 for ARM downloads have moved to the JDK 8 for ARM download page.

Java SE Development Kit 8u25

You must accept the Oracle Binary Code License Agreement for Java SE to download this software.

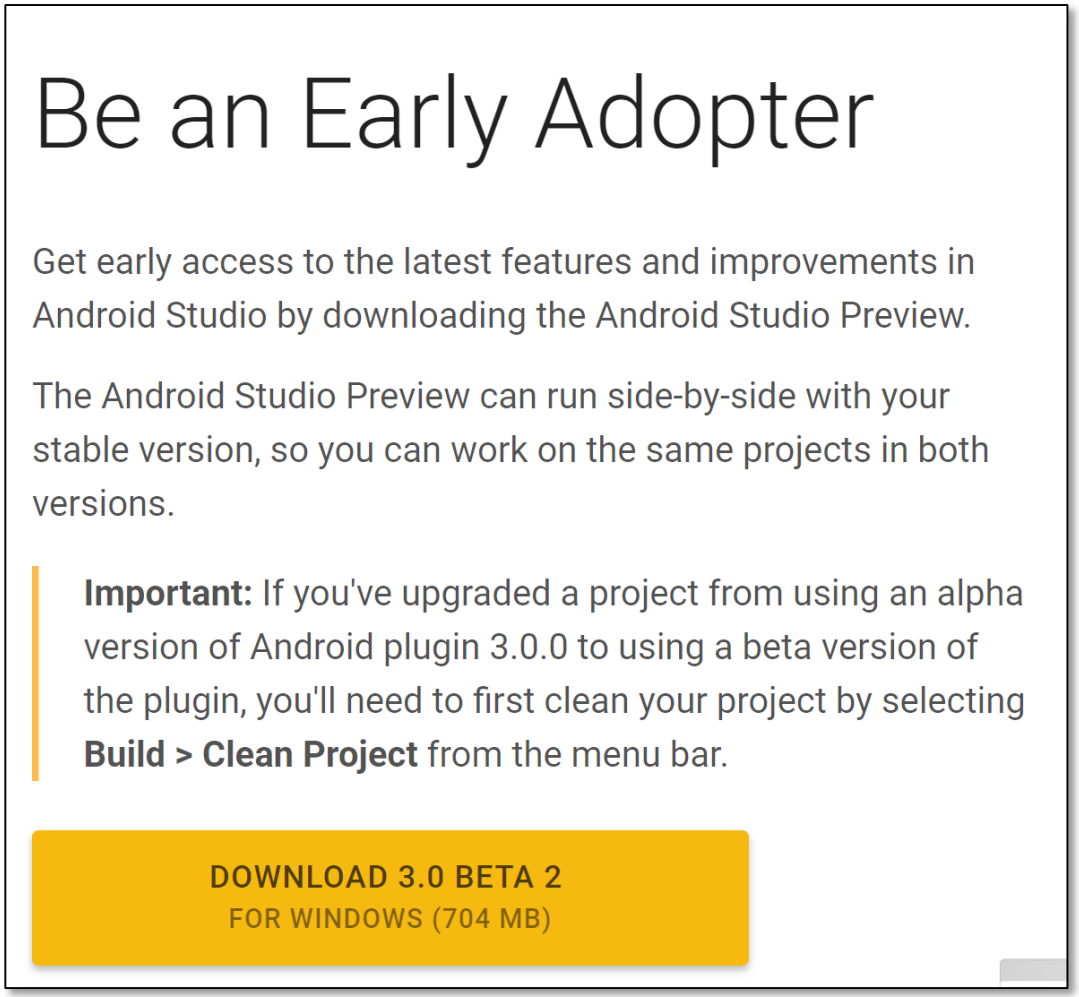
Accept License Agreement **Decline License Agreement**

Product / File Description	File Size	Download
Linux x86	135.24 MB	jdk-8u25-linux-i586.rpm
Linux x86	154.88 MB	jdk-8u25-linux-i586.tar.gz
Linux x64	135.6 MB	jdk-8u25-linux-x64.rpm

www.oracle.com/technetwork/java/javase/downloads

Installing Eclipse Java/Android Developer Tools

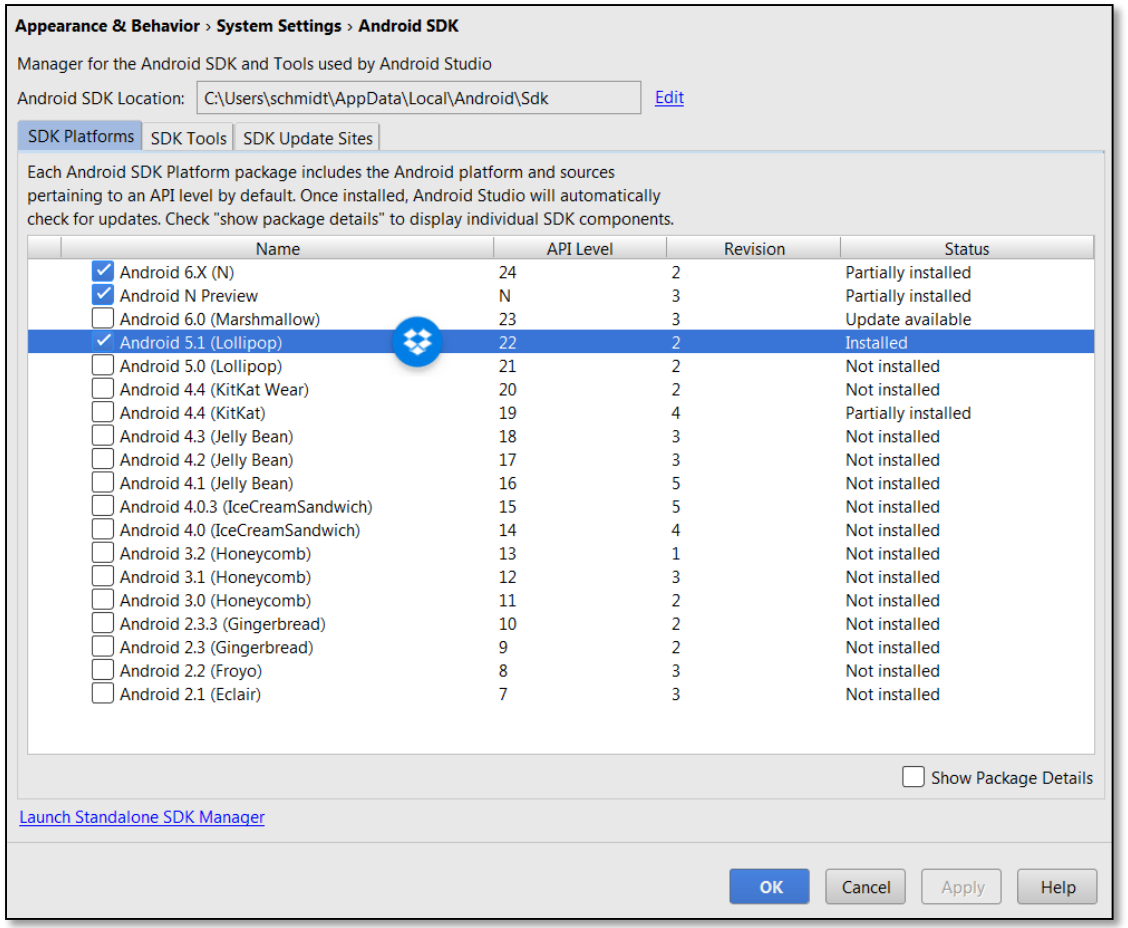
- Installation steps
  - Download & install the Java Standard Edition JDK & JRE 8
  - Download & install Android Studio 3.x



developer.android.com/studio/preview

Add Components to the SDK

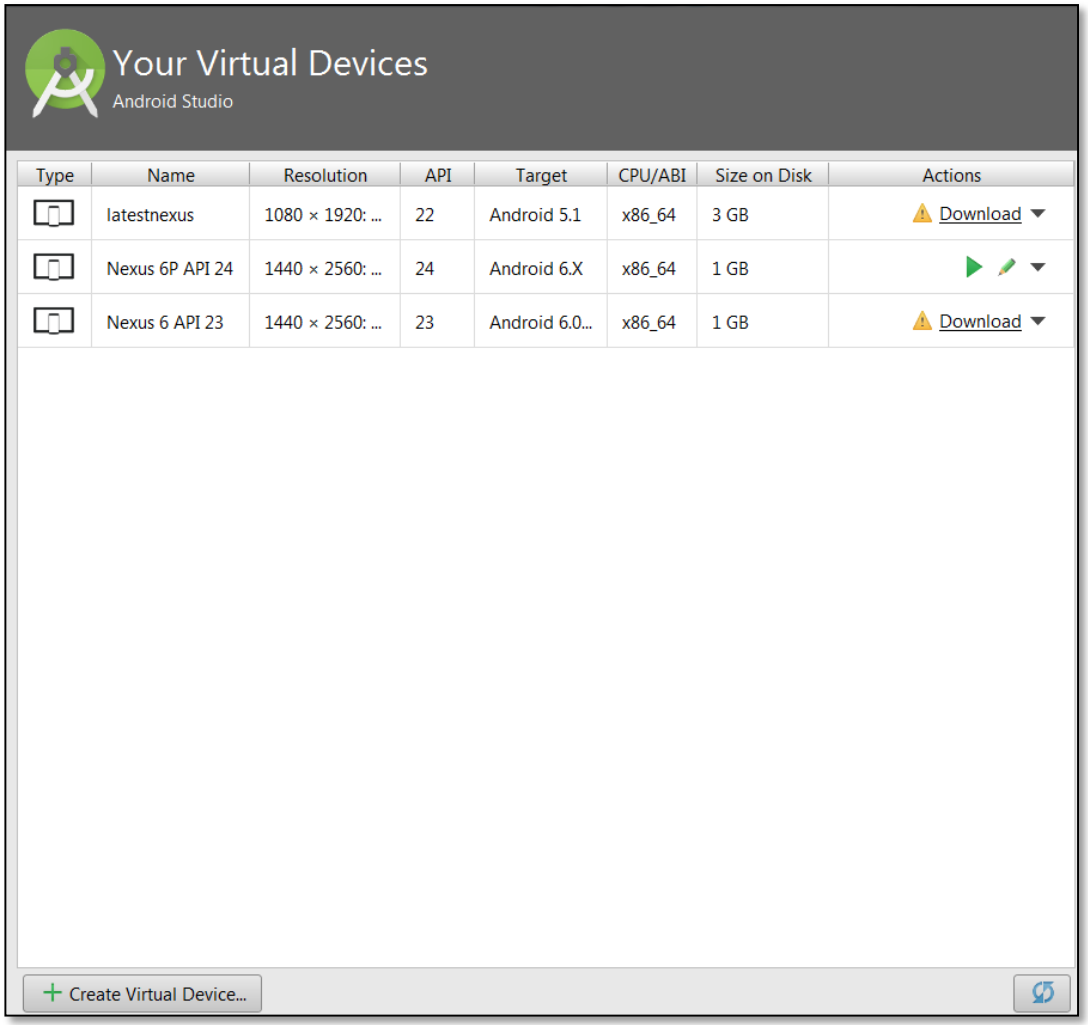
- Launch the Android Studio SDK Manager
  - Select “Nougat” version of Android (7.1, API 25)



See developer.android.com/studio/intro/update.html

Add Components to the SDK

- Launch the Android Studio Virtual Device Manager
  - Create an Android API 25 emulator



developer.android.com/tools/devices/managing-avds.html

Intel HAXM Virtualization Driver

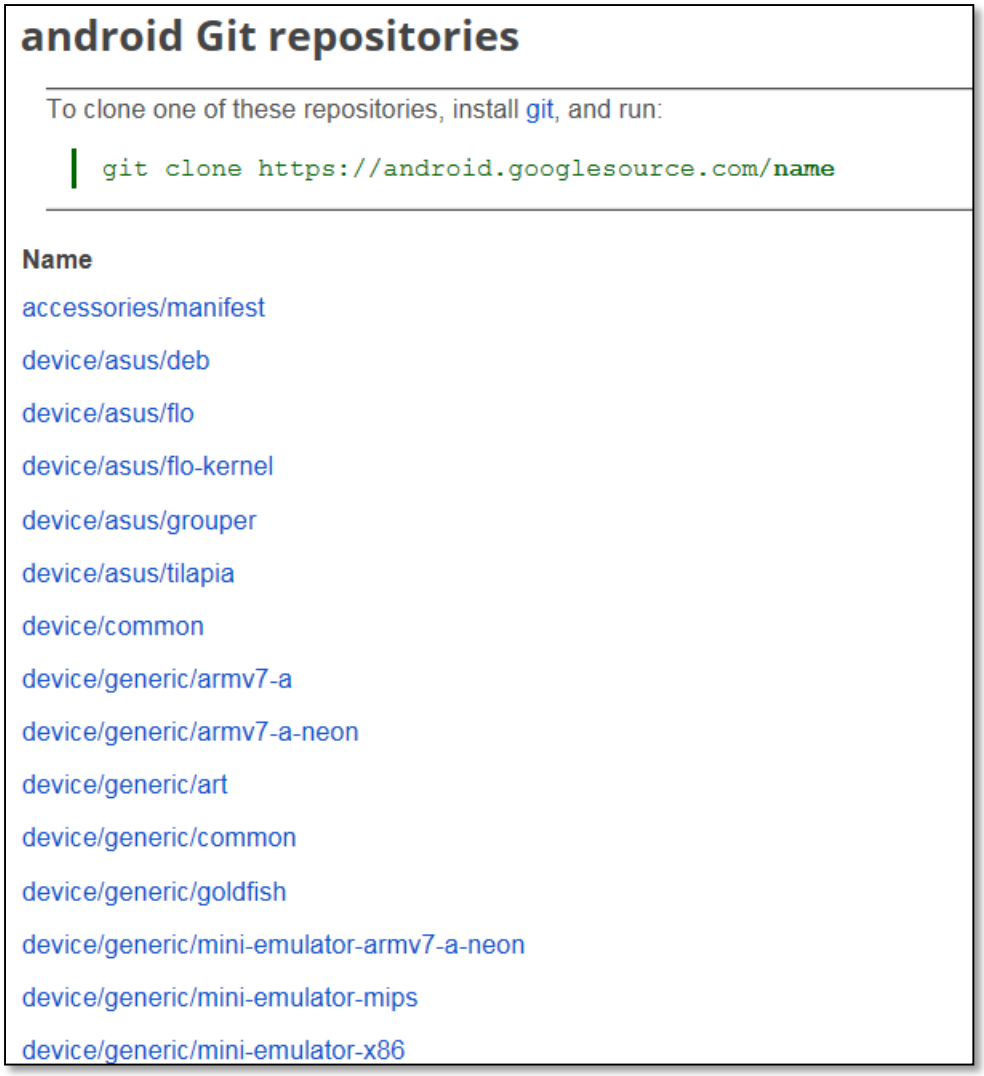
- **Requirements**
  - Intel virtualization extensions (VT, VT-x, vmx)
  - AMD virtualization extensions (AMD-v, SVM) [only supported on Linux]
  - Download an x86 emulator image
- **Windows & Mac OSX**
  - <sdk>/extras/intel/Hardware_Accelerated_Execution_Manager/IntelHAXM.exe/dmg
- **Linux**
  - Install KVM & pass “-enable-kvm” flag to emulator when starting

developer.android.com/tools/devices/emulator.html#acceleration

Accessing Java & Android Source Code

Accessing Java & Android Source Code

- Android source code is available
  - For browsing android.googlesource.com



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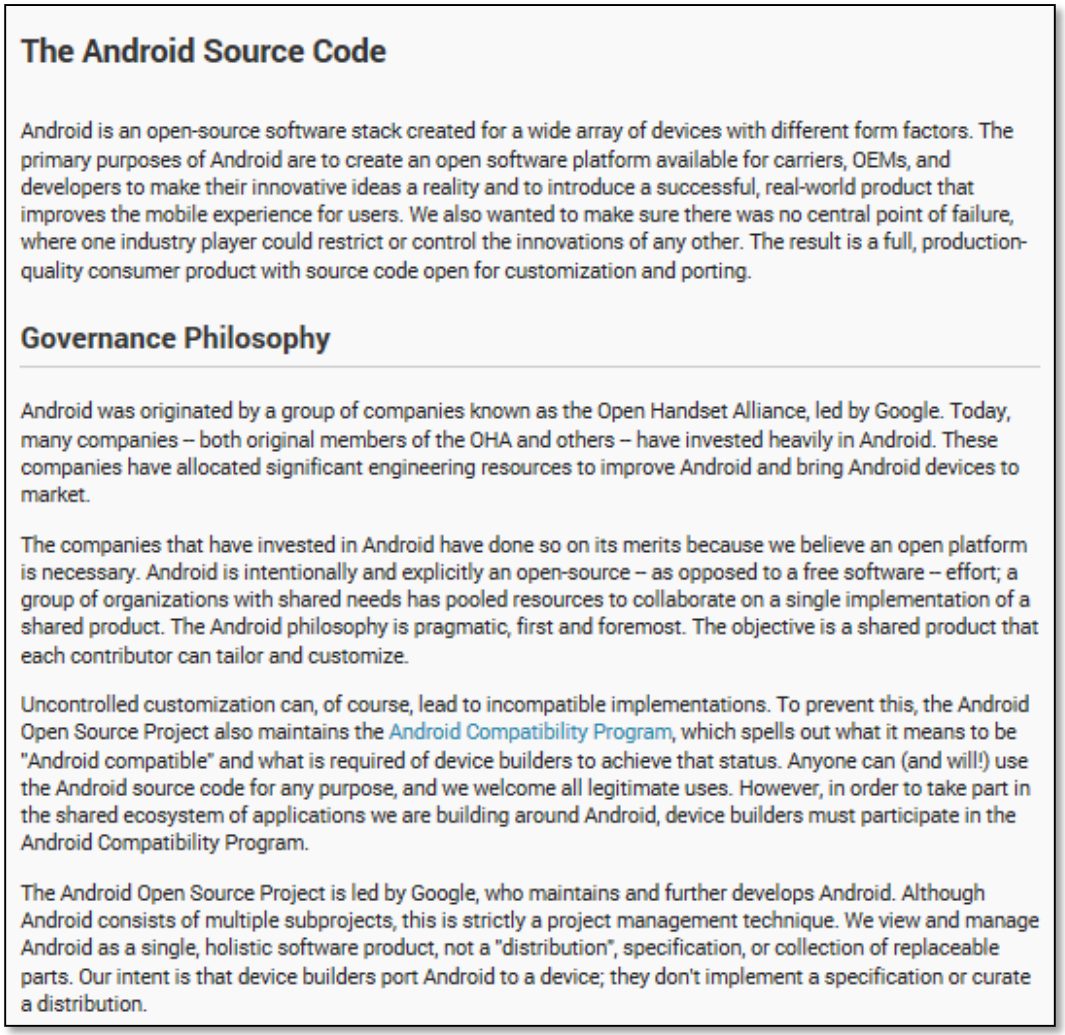

The Android Source Code

Android is an open-source software stack created for a wide array of devices with different form factors. The primary purposes of Android are to create an open software platform available for carriers, OEMs, and developers to make their innovative ideas a reality and to introduce a successful, real-world product that improves the mobile experience for users. We also wanted to make sure there was no central point of failure, where one industry player could restrict or control the innovations of any other. The result is a full, production-quality consumer product with source code open for customization and porting.

Governance Philosophy

Android was originated by a group of companies known as the Open Handset Alliance, led by Google. Today, many companies -- both original members of the OHA and others -- have invested heavily in Android. These companies have allocated significant engineering resources to improve Android and bring Android devices to market.

The companies that have invested in Android have done so on its merits because we believe an open platform is necessary. Android is intentionally and explicitly an open-source -- as opposed to a free software -- effort; a group of organizations with shared needs has pooled resources to collaborate on a single implementation of a shared product. The Android philosophy is pragmatic, first and foremost. The objective is a shared product that each contributor can tailor and customize.

Uncontrolled customization can, of course, lead to incompatible implementations. To prevent this, the Android Open Source Project also maintains the Android Compatibility Program, which spells out what it means to be "Android compatible" and what is required of device builders to achieve that status. Anyone can (and will!) use the Android source code for any purpose, and we welcome all legitimate uses. However, in order to take part in the shared ecosystem of applications we are building around Android, device builders must participate in the Android Compatibility Program.

The Android Open Source Project is led by Google, who maintains and further develops Android. Although Android consists of multiple subprojects, this is strictly a project management technique. We view and manage Android as a single, holistic software product, not a "distribution", specification, or collection of replaceable parts. Our intent is that device builders port Android to a device; they don't implement a specification or curate a distribution.

Accessing Java & Android Source Code

- Java 8 source code is available
  - For Browsing grepcode.com/file/repository.grepcode.com/java/root/jdk/openjdk/8-b132/java

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  - For downloading jdk8.java.net/download.html

Summary

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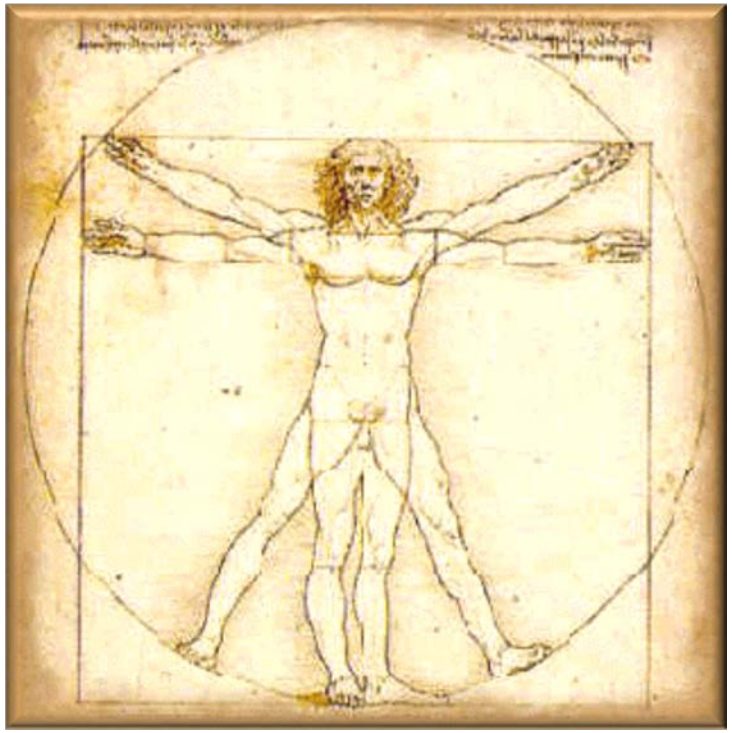
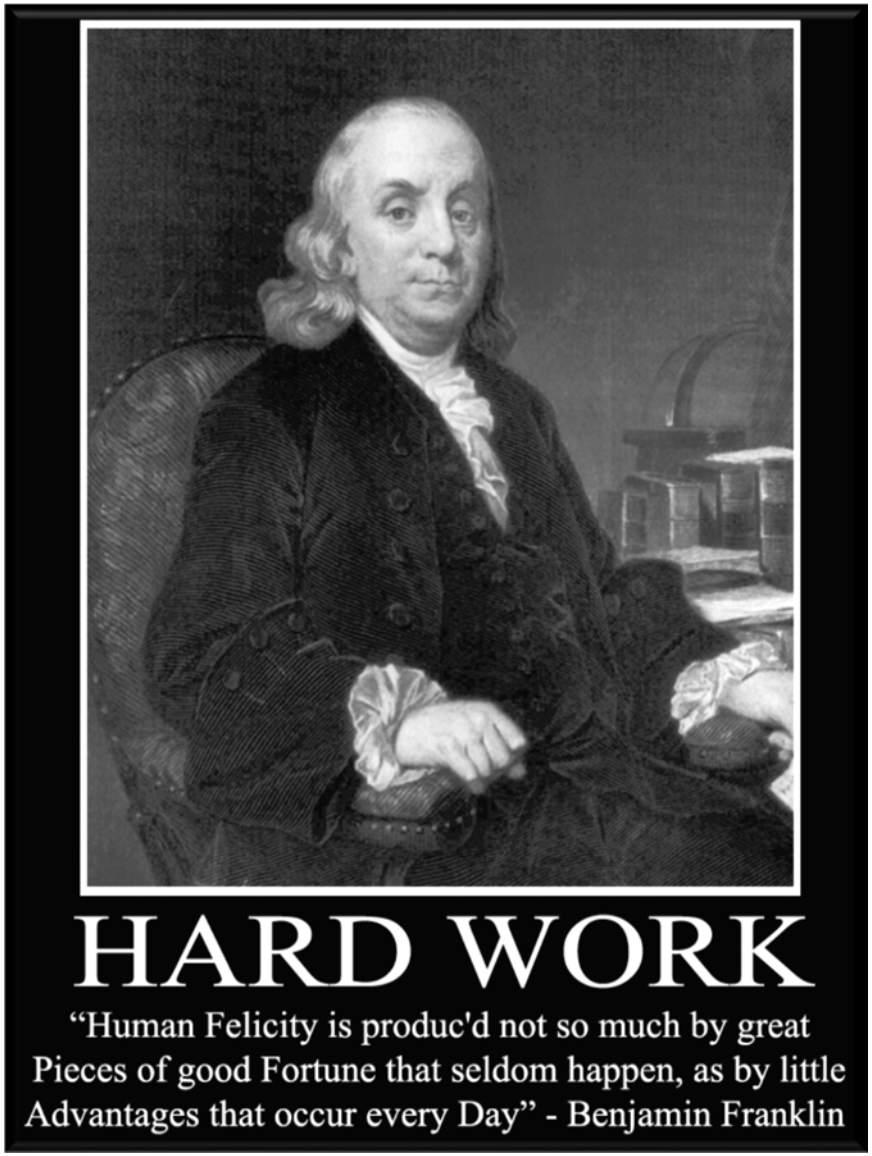
- You will get out of this course what you put into it



Summary

- You will get out of this course what you put into it
  - Be prepared to work hard



Summary

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  - Do *not* miss deadlines...

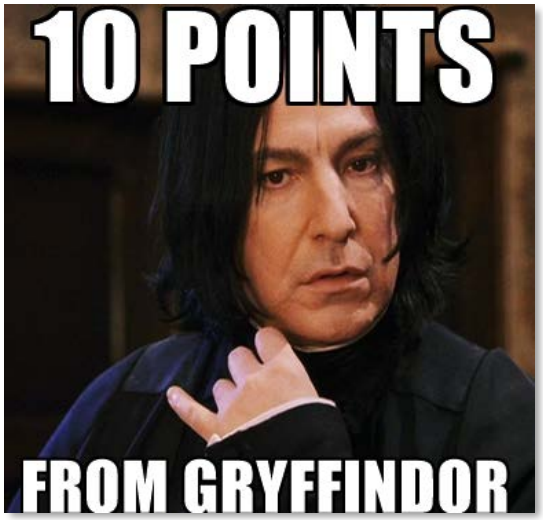
Summary

- You will get out of this course what you put into it
  - Be prepared to work hard
  - Do *not* miss deadlines...
  - Participate in discussions in class & on piazza

See piazza.com/vanderbilt/fall2017/cs891/home

Summary

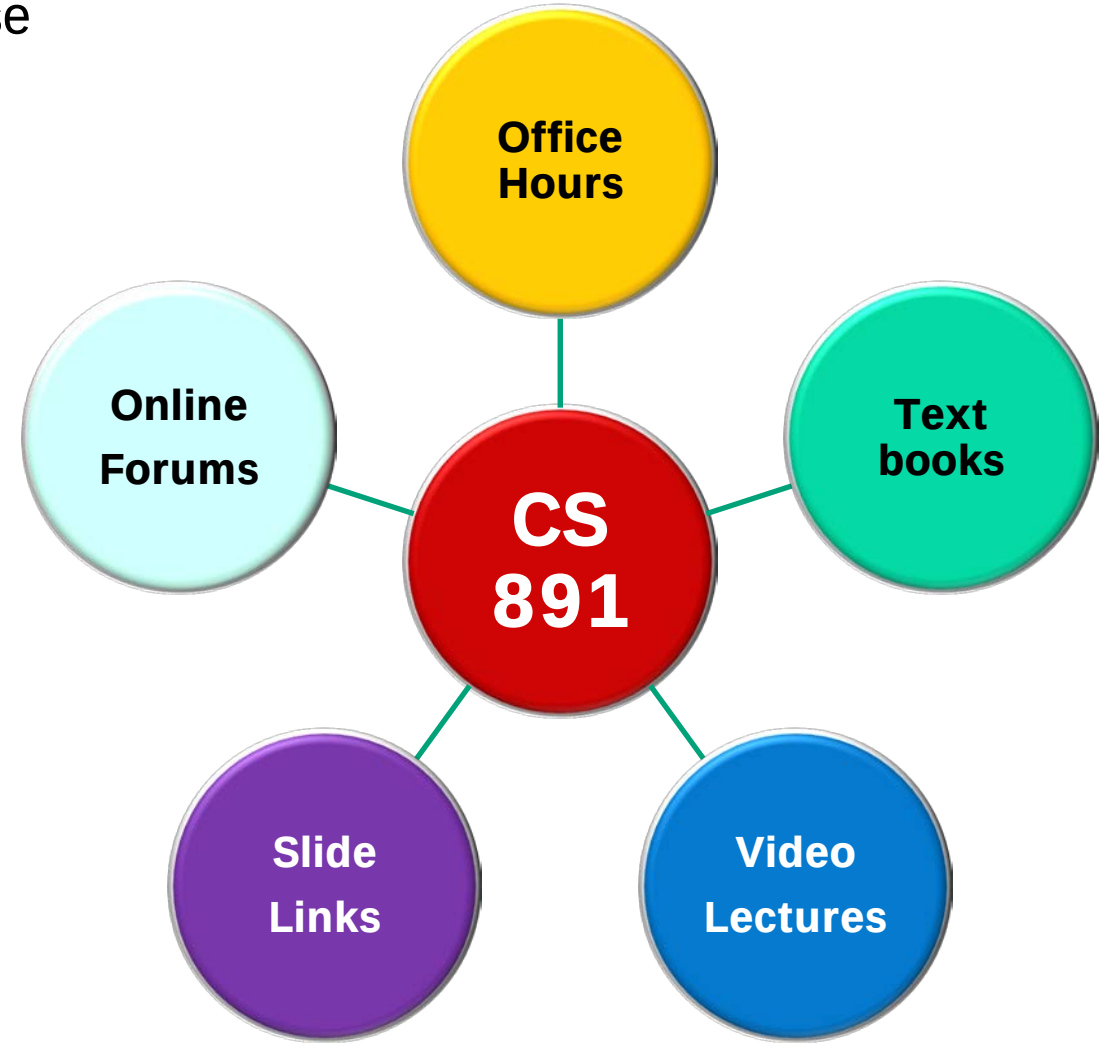
- You will get out of this course what you put into it
  - Be prepared to work hard
  - Do *not* miss deadlines...
  - Participate in discussions in class & on piazza
  - No laptops/phones in class unless explicitly allowed



Failure to comply with this rule will cost you participation points

Summary

- You will get out of this course what you put into it
  - Be prepared to work hard
  - Do *not* miss deadlines...
  - Participate in discussions in class & on piazza
  - No laptops/phones in class unless explicitly allowed
- Avail yourself of available resources



See www.dre.vanderbilt.edu/~schmidt/cs891

Summary

- You will get out of this course what you put into it
  - Be prepared to work hard
  - Do *not* miss deadlines...
  - Participate in discussions in class & on piazza
  - No laptops/phones in class unless explicitly allowed
  - Avail yourself of available resources

Please resist the urge to email me directly unless it's a confidential matter or you'd like to schedule a meeting!

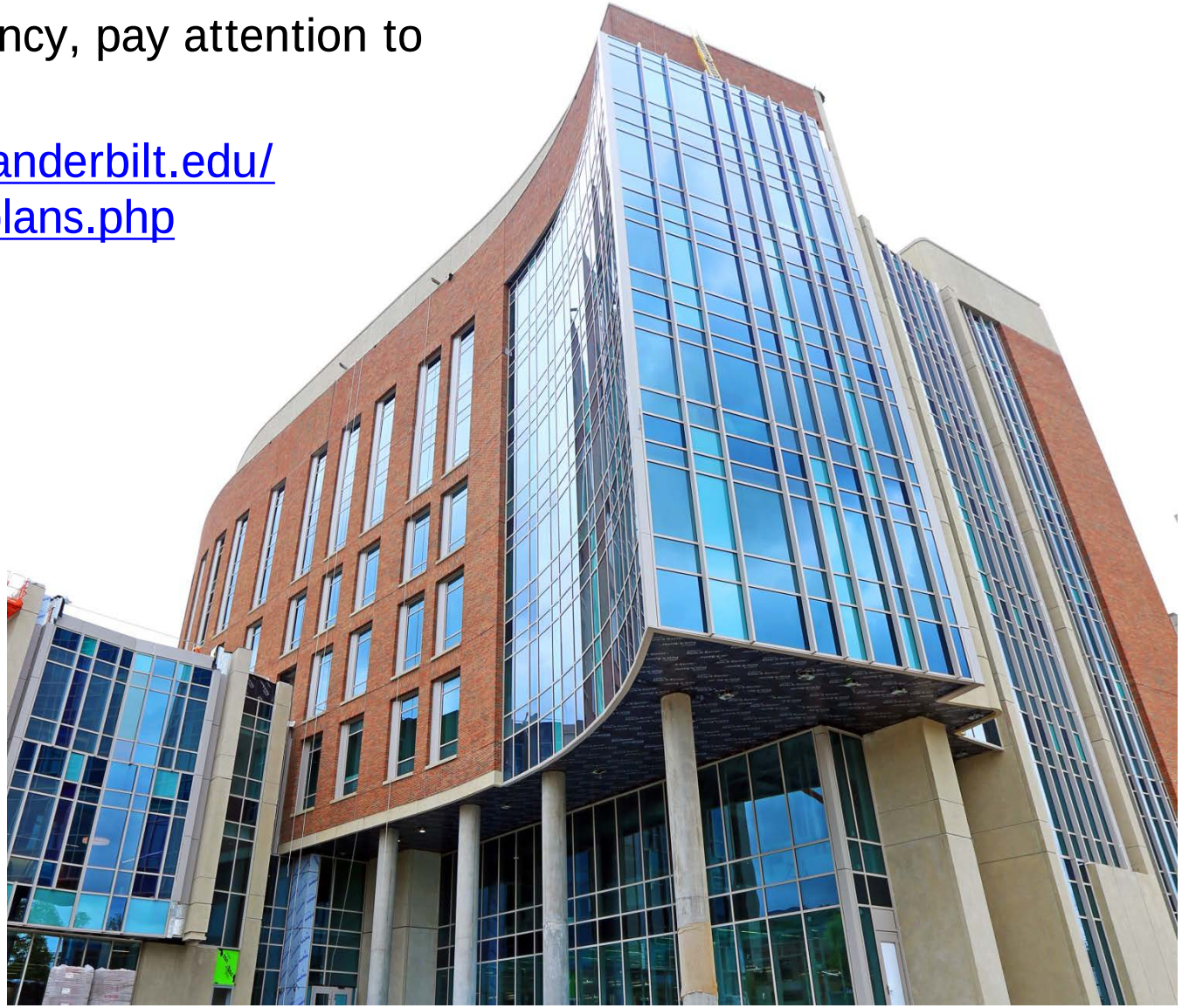
Summary

- You will get out of this course what you put into it
  - Be prepared to work hard
  - Do *not* miss deadlines...
  - Participate in discussions in class & on piazza
  - No laptops/phones in class unless explicitly allowed
  - Avail yourself of available resources
- There are abundant opportunities!

See www.forbes.com/sites/susanadams/2013/04/15/college-degrees-with-the-highest-starting-salaries-3

Summary

- If there's an emergency, pay attention to the escape route!
  - See engineering.vanderbilt.edu/about/evacuationplans.php



See video at www.youtube.com/watch?v=zXpFznXb_vI starting ~20 seconds