

Software Design & Architecture

Reid Holmes

Lecture Summary

Administrivia

Expectations

Project

Quick Assignment

Discussion

Dates and Times

Lectures in MC 2034 T/Th @ 1000 - 1120

I will be available after but not before

Classes will often comprise of a video portion that you are to watch in advance; in-class time will be spent on collaborative design activities.

The video material will not be reviewed and will be integral to the activity.

Tutorials will NOT be held this year

Office Hours will be by appointment



Why flip?

Looking back at past course feedback, the
number one **student request**
was for the course to be more
concrete.

Directory

► **Instructor:** Dr. Reid Holmes

Office: DC 3351 (by appointment)

Email: rth.se2@gmail (ensures best response)

TA: Laura Inozemtseva

Office: DC 3334 (by appointment)

Email: lminozem@uwaterloo

TA: Adriaan Labuschagne

Office: DC 3334 (by appointment)

Email: alabusch@uwaterloo

IMPORTANT: Please do not leave your messages to the last minute or expect a response time of less than 24h.

Key Information Source

<http://www.cs.uwaterloo.ca/~rtholmes/>

<http://twitter.com/cs446>

Slide/Video Availability

I will mostly work on the chalk boards

Slides and video will be available online

- The course web page will be updated by EOD Friday for the next week's lecture
- The slides will not be heavy on concrete examples as these will be covered in class.
- In-class activities will not be posted.

The slides/videos **cannot** take the place of the lectures

Textbooks

- ▶ **No** textbooks are required
- ▶ These may be **helpful**:
 - ▶ Software Architecture: Foundations, Theory, and Practice
 - ▶ Essential Software Architecture
 - ▶ Freely available to students in digital form
 - ▶ Design of Design
 - ▶ Mythical Man Month
- ▶ Links are provided on the web page along with slides for SA and ESA

Intended Learning Outcomes

By the end of the course you should be able to:

Critique an existing architecture or design.

Differentiate how various architectural styles and design patterns enhance and degrade a system's functional-and non-functional properties.

Generate and **justify** an architecture and/or design given a collection of requirements.

Produce and **present** concise and unambiguous architecture and design descriptions.

Create and **implement** an architecture and design, refining it into a complete system.

My Expectations

Be professional

questions in class, email, interacting with TAs

Attend lectures

talk to class or team mates if you are away

Participate

during discussions, activities, group project

Your Expectations?



Project

- ▶ Will be completed in teams of four
 - ▶ Select your own teams
- ▶ If you do not have a team by Jan 13 or your team is too small, we will sort it out in class
 - ▶ (you _will_ be assigned to a team, so please try to find one yourself/fill up your team)
- ▶ One team member must email me your:
 - ▶ The names of your teammates
 - ▶ Due 0800 Jan 15 @ 0800 via email

Project (Mobile Apps)

- ▶ Goal:
 - ▶ To make something *useful*
 - ▶ To learn something *new*
 - ▶ To leverage current *technology*
 - ▶ To have ***fun***

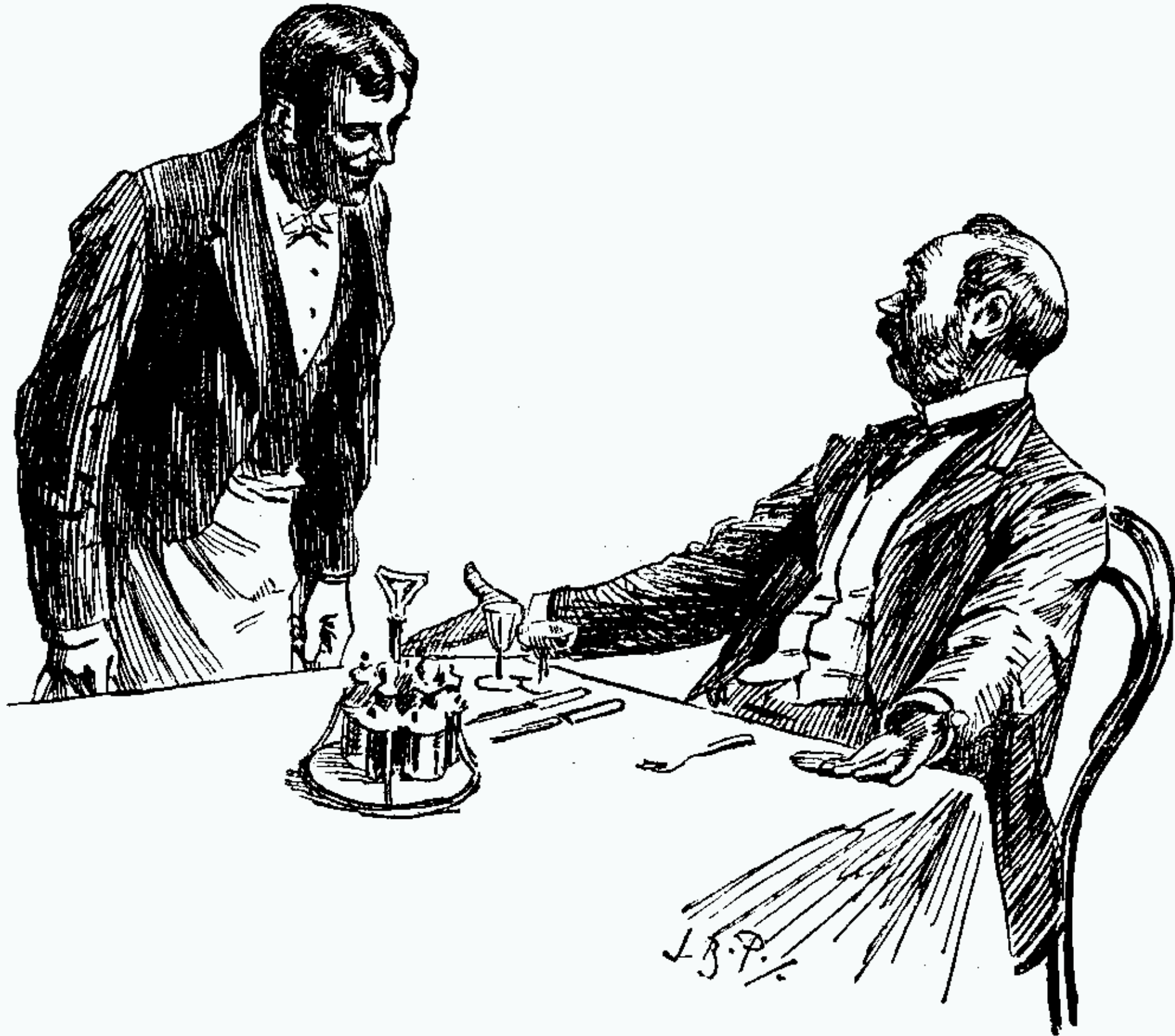
Project (Mobile Apps)

- ▶ Goal:
 - ▶ To make something *useful*
 - ▶ To learn something *new*
 - ▶ To leverage current *technology*
 - ▶ To have ***fun***
- ▶ Constraints:
 - ▶ Be useful, novel, and leverage technology***
 - ▶ Cannot require crowd involvement
 - ▶ Cannot be a CRUD application, web front-end, or require extensive server-side code

App platforms

- ▶ Must be demoed on a mobile phone from any of the following platforms:
 - ▶ iOS, Android, BB10, WP8, FirefoxOS
- ▶ App should conform to the platform (e.g., support hardware back button if available while hiding on-screen navigation controls).
- ▶ Integrate with appropriate platform services.
- ▶ This is an **opportunity** to do something **_great_**. The project is **flexible** and is worth a significant portion of your final grade. Use this to design and **build something special**.

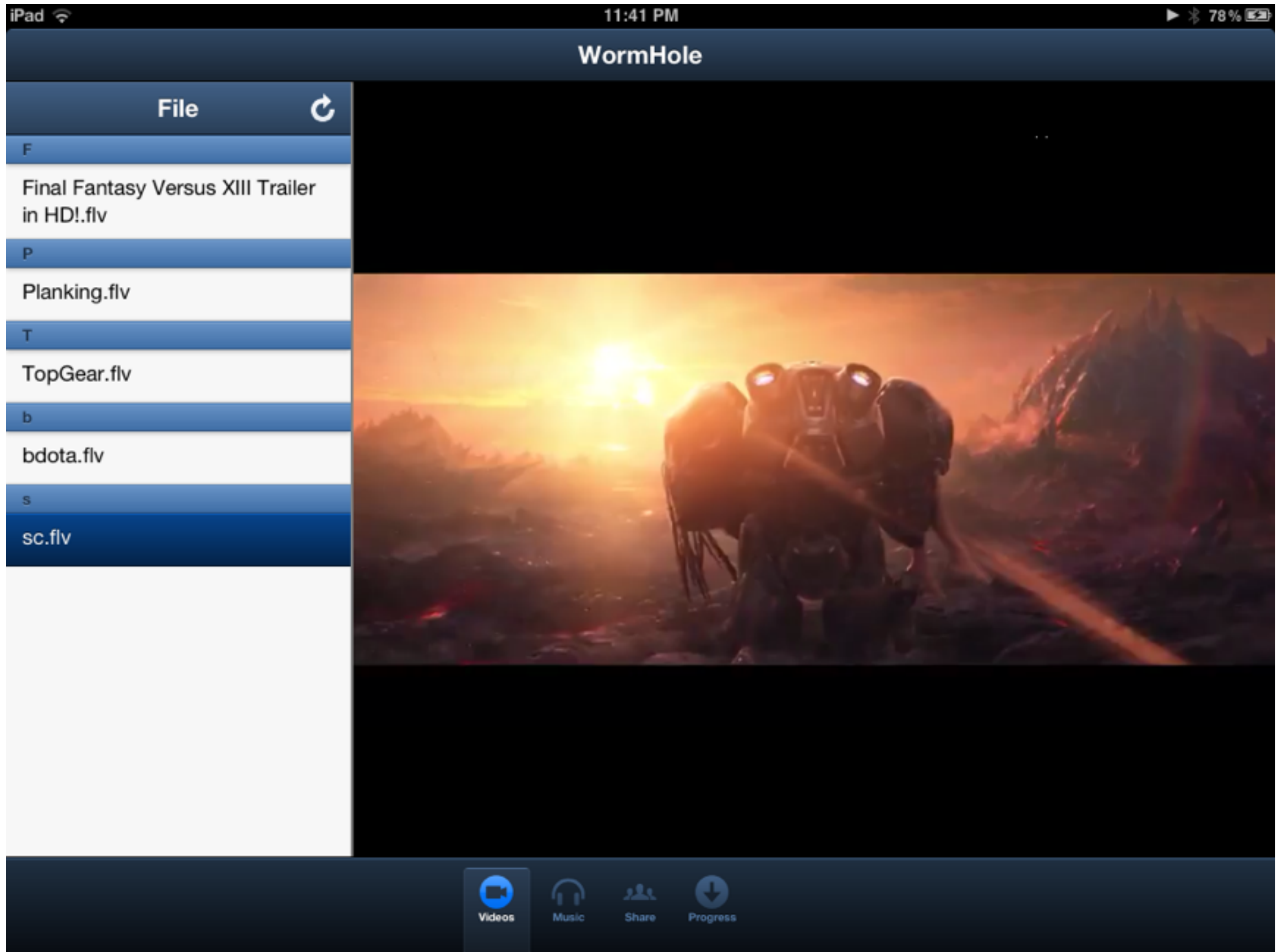
Connoisseur





CS446 – PROJECT WORMHOLE

Developers:
David
Andy
Dennis
Kuen



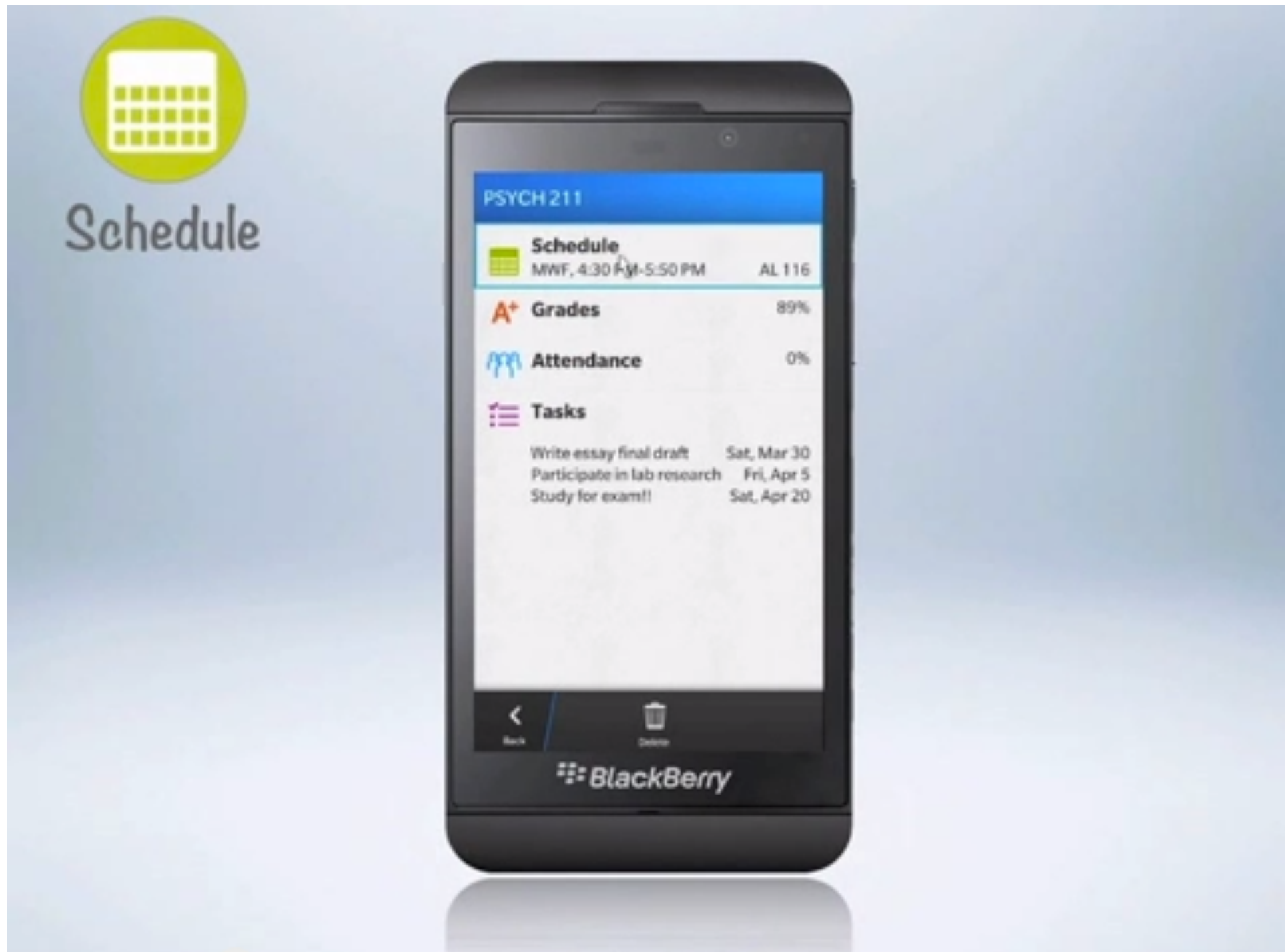
Point

Mark locations



- ▶ <https://www.youtube.com/watch?v=Qxg3vLJY74M>

Of Course!



► <https://www.youtube.com/watch?v=3Uzf6KiEMnE>

HACK

Description

- H.A.C.K is a mobile app that controls and monitors electronic devices remotely.
- The app communicates with a special piece of hardware in the user's home.

MoPhoCon

The MoPhoCon Breakdown

Mobile
Phone
Controller



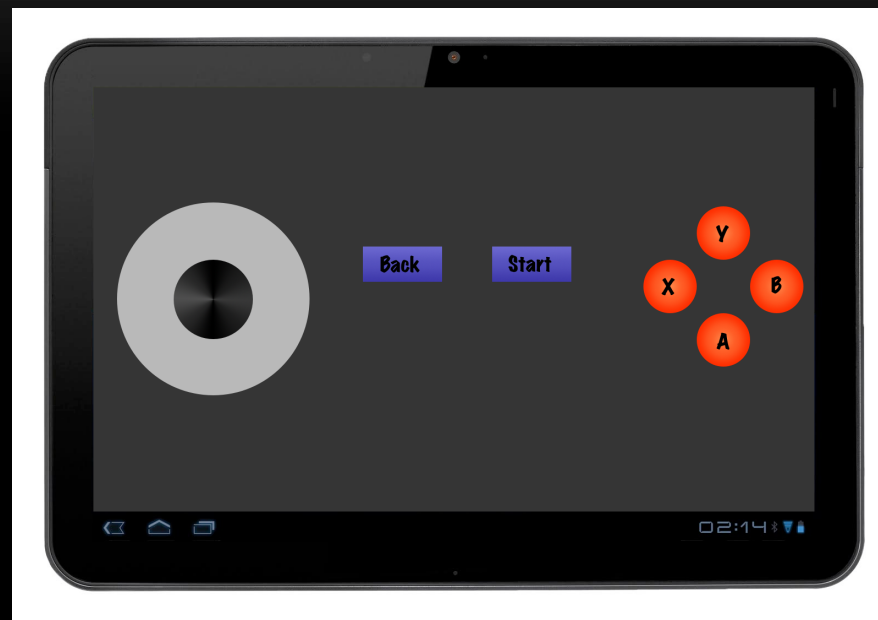
Turn your mobile phone into a controller for your PC!

MoPhoCon

Controller Mode



First Person Shooter Mode



Platformer Mode

Radius

Project Radius >> Introduction

- Top-down 2D endless runner
- Games are a great weapon in the fight against boredom

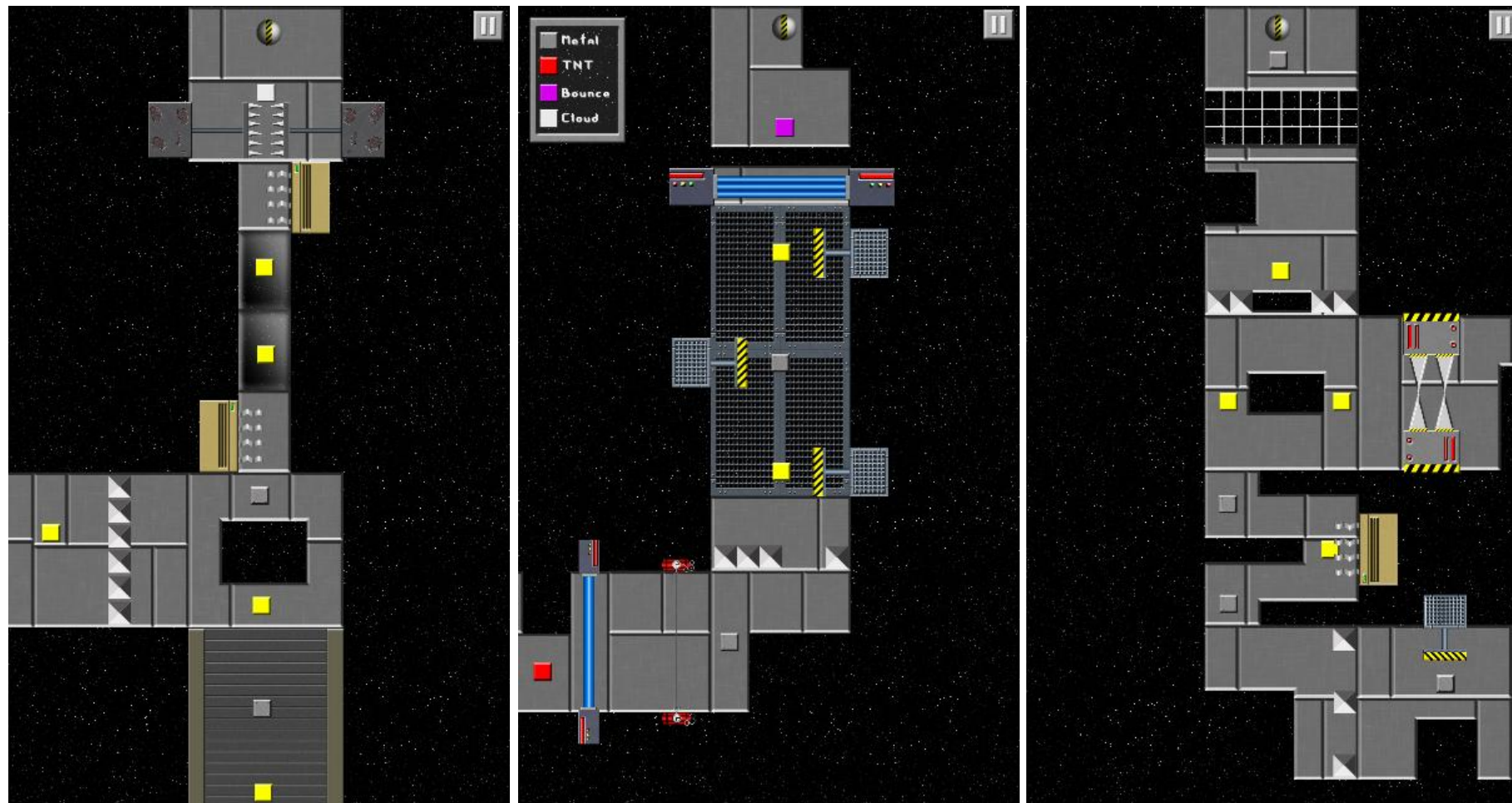


Get it at  BlackBerry World™

ANDROID APP ON
 Google play

Radius

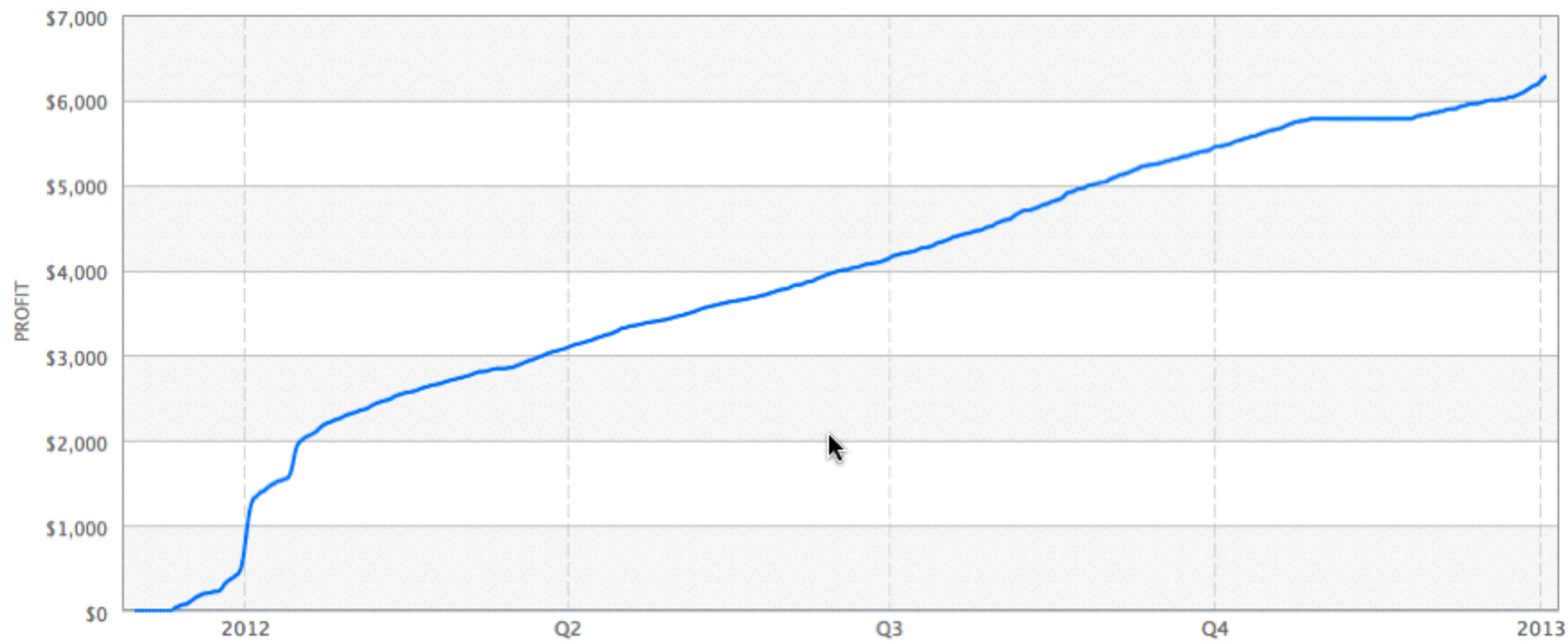
Project Radius >> Gameplay



Demention



- <https://www.youtube.com/watch?v=DqT9uCcfKQA>



Deliverables

- ▶ Deliverable 0: Background (P/F)
- ▶ Deliverable 1: Project proposal + presentation (5%)
- ▶ Deliverable 2: Architecture activity (P/F)
- ▶ Deliverable 3: Prototype demo (5%)
- ▶ PIVOT
- ▶ Deliverable 4: Design activity (P/F)
- ▶ Deliverable 5: Project arch + design (30%)
- ▶ Deliverable 5: Project presentation + video (10%)

Assessment

- ▶ Project deliverables: 50%
 - ▶ + 2% best proposal (most useful + best idea)
 - ▶ +2% best prototype demo
 - ▶ +2% best final demo (most useful + best app)
 - ▶ +2% accepted to curated app store
- ▶ Final Exam 50%
- ▶ Some project deliverables will be pass/fail
- ▶ MUST pass final exam and ALL pass/fail elements

Project Scaling

- ▶ Project deliverables: 50%

$$\begin{aligned} & (\text{project} + \text{bonus}) * \text{scale} \\ & = \text{final project grade} \end{aligned}$$

- ▶ Scale will range between 0.75 and 1.0 (25 points)
 - ▶ 5: completeness (compared to proposal)
 - ▶ 5: utility
 - ▶ 5: polish
 - ▶ 10: difficulty

D1: Project proposal

- ▶ Email: Jan 26
- ▶ Presentation: Jan 27, in class
- ▶ Value: 5%
- ▶ Written description of your project.
- ▶ In-class 5 minute 'pitch' to the class.
- ▶ Full details already posted online.

D2: Architecture activity

- ▶ Activity: Feb 3/5/10/12 in class
- ▶ Value: P/F
- ▶ Each group will be assigned an architectural style.
- ▶ Your job will be to come up with a project idea that takes advantage of the style.
- ▶ Each project will be discussed concretely in class.

D3: Prototype demo

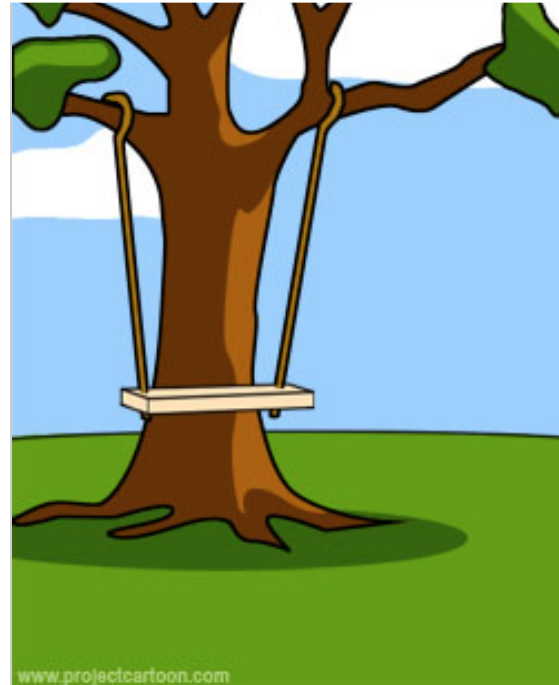
- ▶ Email: Mar 2
- ▶ Presentation: Mar 3/5 in class
- ▶ Value: 5%

- ▶ Apps will be demoed in class.
- ▶ ~10 minutes per group.
- ▶ Apps should be ~80% complete.

Pivot



How the customer explained it



How the project leader understood it



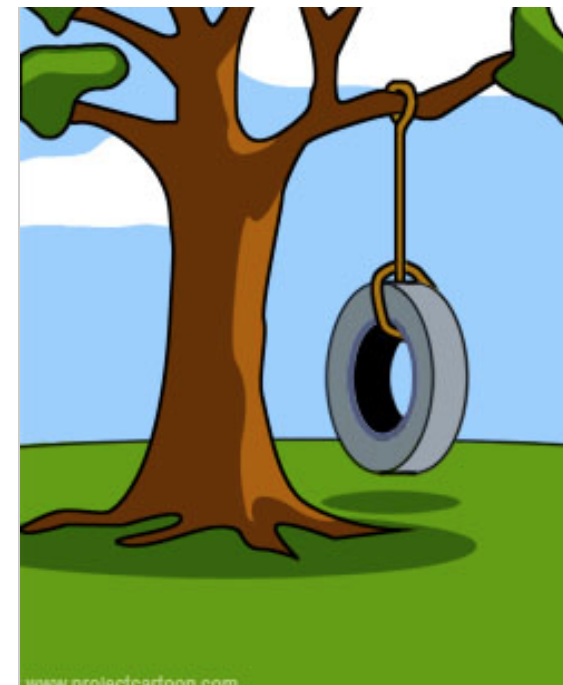
How the programmer wrote it



How the analyst designed it



How the business consultant described it



What the customer really needed

Pivot

- ▶ Email (from me): Mar 6
- ▶ The architecture and design of your app will facilitate certain kinds of software evolution.
- ▶ As your client, I will ask for some kind of new feature or other change.
- ▶ You will add this feature to your project for the final demo, and reflect on how your design enabled / inhibited this change.

D4: Design activity

- ▶ Activity: Mar 10/12/17/19 in class
- ▶ Value: P/F
- ▶ Each group will be assigned design pattern.
- ▶ Your job will be to come up with a project idea that takes advantage of the pattern.
- ▶ Each project will be discussed concretely in class.

D5: Arch + Design

- ▶ Email: Mar 23
- ▶ Oral Exam: Mar 23/24/25/26/27 (30-45mins)
- ▶ Value: 30%
- ▶ A medium-length description of your app's architecture and design, and why you made the design decisions you did will be submitted by email.
- ▶ Each group will take part in a 30-45 minute oral exam describing (and answering questions about) their design decisions.

D6: Presentation + Video

- ▶ Email: Mar 30
- ▶ Presentation: Mar 31/Apr 1 in class
- ▶ Value: 10%
- ▶ A short description of how the project turned out, along with a reflection on the pivot will be submitted by email.
- ▶ Final demos (~10-15 minutes) will be given in class.

Academic Integrity

collaboration vs. plagiarism

collaboration vs. cheating

This is **important**. The project will have **team** and **individual** components.

Deliverable 0

- ▶ Write, or send me a two paragraph email:
 - ▶ First paragraph: RTH.SE2@GMAIL.COM
 - ▶ Your name and a high level overview of development experience. Include a sentence about what you would like from this course.
 - ▶ Second paragraph:
 - ▶ A description of how you have encountered “architecture” and/or “design” in your experience.
- ▶ Due in 15 minutes; deliverable is Pass/Fail
- ▶ Have a stretch: discussion after completion

Upcoming Deadlines

- ▶ Form project groups (we will talk about this on Jan 13 in class if you do not have a group!)
 - ▶ Send to rth.se2@gmail by **0800 Jan 15:**
 - ▶ Team member names, quest id's, student #s
 - ▶ This is important
- ▶ Deliverable #1: Project proposal
 - ▶ Send to rth.se2@gmail by **0800 Jan 26**
 - ▶ Short presentation in class
 - ▶ Start thinking about this now!