the gamedesigninitiative
at cornell university

Lecture 1

Course Overview

Welcome to CS/INFO 5/4152

- Course is **mostly full**
  - Had 100 applications for 72 (8x9) spots
  - Even more than last year.
  - Increased groups to 10 people meet demand
- Still a few possibilities if you are waiting
  - Not everyone has responded to an invite
  - Need to shore up some teams based on skills
- If not in the class, talk to me afterwards

CS/INFO 4152: Advanced Topics

- Sequel to CS/INFO 3152
  - Prereq **unless** a non-Cornell grad (or exempt)
  - Similar format and structure as Intro Game Design
  - Covers topics not touched in Intro Game Design
- Single semester long game project
  - At least 50% of your final grade
  - Interdisciplinary teams of 8-9 people
- Also design documents

CS/INFO 5152: Master's Version

- **Game Labs**: Similar to introductory course
  - Done outside of class for first three weeks
  - Special labs for programming or design
  - Complete according to your project role
  - Only INFO has a choice; CS is programming only
- **Mastery**: Must have major indv. contribution
  - Could be a leadership role (see Assignment 1)
  - Could be development of important subsystem
  - Will be graded separately on this contribution

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4152 students do also; but work is not graded

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  - Will be g y on this contribution

4152 can take the leadership roles too

Game Development

- Uses familiar the **milestone** schedule
  - Deliverables every two weeks (after week 3)
  - One extra prototype beyond 3152 schedule
  - Details on course website:

    http://www.cs.cornell.edu/courses/cs5152

cs4152 redirects

- Games demonstrated at **Showcase**
  - Once again, will open it up to the public
  - Public reaction is part of your grade
  - Submissions posted on the GDIAC website

Course Structure

- Most things happen during the "lecture" section
  - Meets three days a week (M,W,F) 11:20-12:10
  - Mixture of lectures, presentation, and discussions
  - Course is a bit more interactive than CS/INFO 3152
- **Lectures**: Common in first half of course
  - Advanced game development topics unique to course (this is not going to replace a graphics course)
  - **Design Focus**: mechanics, user interfaces and testing
  - **Technical Focus**: mobile platforms, memory management

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  - **Technica** mobile platforms, memory management

There are **NO** C++ lectures.
Learn online and in the labs.

Course Structure

- **Presentations:** Every two weeks
  - In-class critique of your game by your peers
  - Part of your participation grade comes from this
  - Because of class size, held over three sessions
- **Playtesting**: Follows every single deliverable
  - Handled just as in the introductory class
  - Will expect user-test scripts for alpha and onward
- **Critiques**: Ungraded, less formal presentations
  - **Example**: The pitch session **next week**

The Discussion Sections

- Discussion time was biggest request a few years ago
  - Like communication lab from CS/INFO 3152
  - Time to work on Assignments *already assigned*
- We have organized you into sections
  - Groups 1-5 meet Wednesday 12:25-1:15 in **Phillips 203**
  - Groups 6-9 meet Wednesday 2:40-3:30 in **Snee 1120**
- **Undergrads**: You must enroll in ENGRC 4152
  - Extra credit hour for work you are already doing
  - This is ***required***; it is not optional

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ENGRC does not apply to grad students in 5152

Game Requirements

- Should be **mobile game** on iOS or Android
  - Develop cross-platform, but graded only on one
  - Exceptions for 3D must have 5625 alums on team
- Some form of **innovative gameplay**
  - Interface innovation for mobile
  - 3D game should leverage camera control
- Target **public distribution**
  - Mobile apps should try to get on either App Store

I Was So Close…

I Was So Close…

You are welcome to *try* Steam Deck.
But you must *still* target iOS/Android.

Mobile Game Development

- Will use custom **C++ game engine: CUGL**
  - Built on top of SDL (Simple DirectMedia Layer)
  - Made to solve many problems from previous years
- We do **not** provide any hardware
  - New devices are about $200; used are cheaper
  - Just need one device for your whole group
- Either 2D or 3D is acceptable
  - Will need OpenGL ES in either case

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Vulkan is *close*, but not there

Choosing a Platform

- You **must** develop iOS apps on a Macintosh
  - Only XCode can load the app on to a device
  - Do not need Apple Developer membership
  - But need membership ($100) to put on store
- You can develop Android on either platform
  - Android Studio is fully supported and stable
  - But it is not good enough for your main IDE
  - You should target Mac/Windows for testing

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We are testing a Mac server.
Will allow iPhone from Windows.

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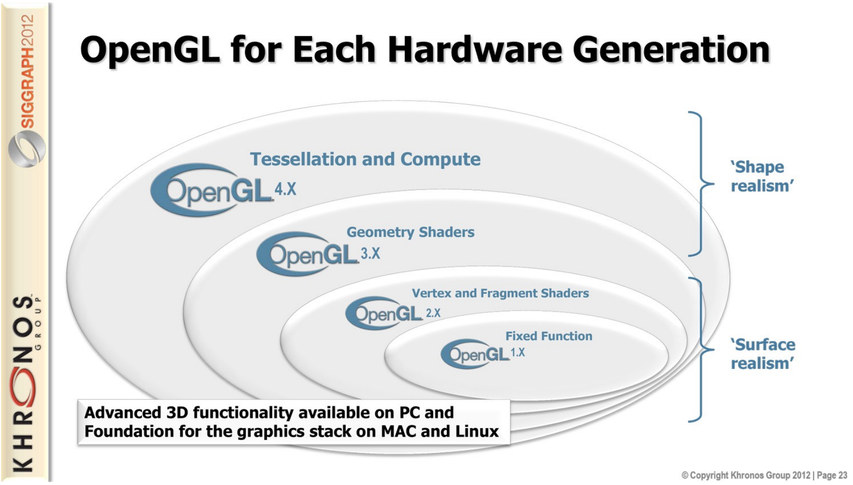
Working in C++

- Best option for cross-platform development
  - **iOS**: Obj-C and **C++**; **Android**: Java and **C++**
  - Game developers should learn it anyway
  - See the online lectures to learn more
- You should use a **professional IDE**
  - This means XCode or Visual Studio
  - Tools for analyzing memory performance
  - Android Studio is ***not*** a professional C++ IDE

Cornell University Game Library

- Custom game engine "written from scratch"
  - Core set of 170 C++ classes (70k lines of code)
  - Supports input, graphics, and audio
- Layered on top of some useful libraries
  - **SDL**: SimpleDirectMedia Layer
  - **Box2D**: The definitive 2D physics library
- Compatible with any C++ library out there
  - **Example**: Bullet for 3D physics

Working With CUGL: Good News


KHRONOS GROUP

SIGGRAPH2012

OpenGL for Each Hardware Generation

Advanced 3D functionality available on PC and Foundation for the graphics stack on MAC and Linux

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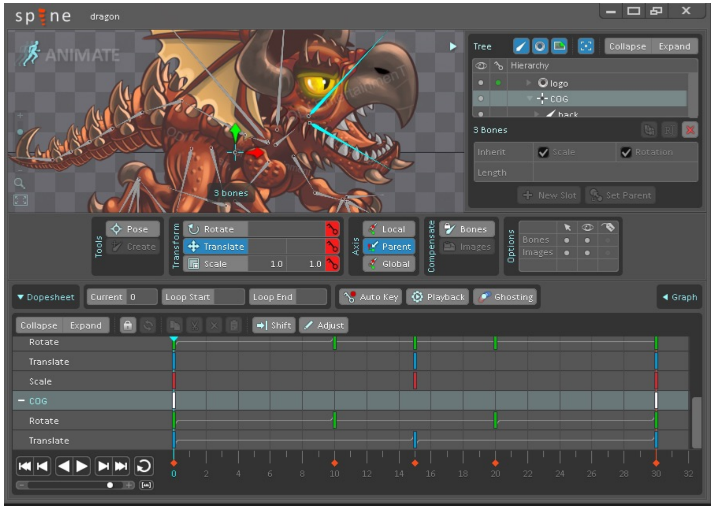
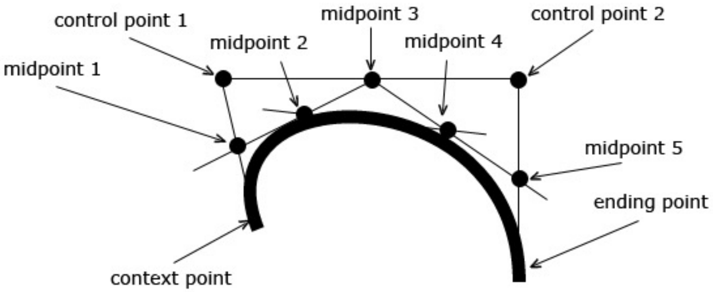
- Supports modern(ish) C++
  - Full C++17 support
  - Heavy use of smart pointers
- Build is very light-weight
  - Engine has 200 MB footprint
- Advanced input features
  - Built-in pinch and rotation
  - Orientation detection
  - Arbitrary text input
- Modern OpenGL support
  - OpenGLES 3.1 on mobile

Working With CUGL: The Bad News





- Engine is very spartan
    - Box2D is only 3d-party library
    - No support for external editors
    - No support for rigging
- Windows is *PC only*
    - No UWP development
    - Means no Surface support
- SVG support not *quite* ready
    - Full support for **commands**
    - But did not integrate it yet
- **Networking code removed**

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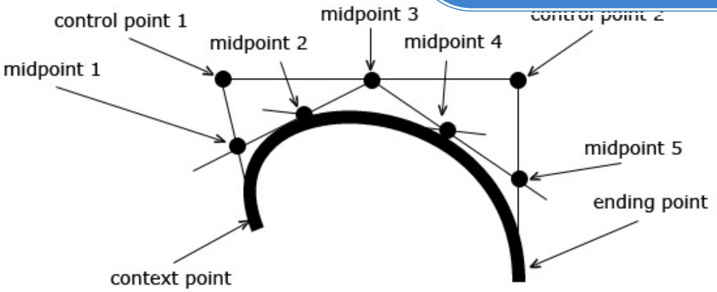
Is this good enough?

Why not use Unity?



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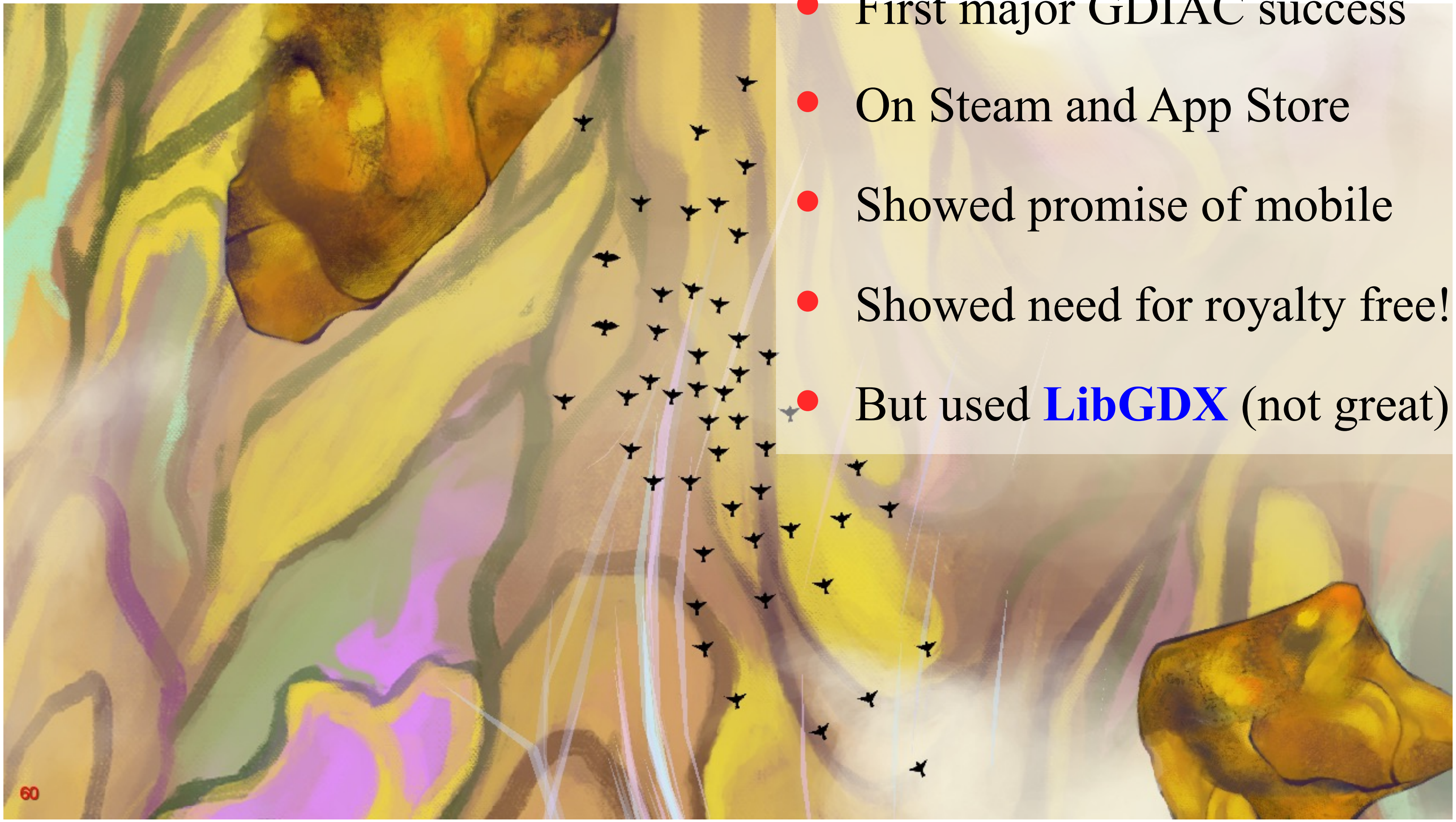
  - Full support for **commands**
  - But did not integrate it yet
- **Networking code removed**

2013: *Gathering Sky*



- First major GDIAC success
- On Steam and App Store
- Showed promise of mobile
- Showed need for royalty free!
- But used **LibGDX** (not great)

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Three years later…

2016: CUGL 1.0 Released

Underhand

- Strategic card game
- Inspired by *Reigns*
- Went viral on Reddit
- **1 mill Android downloads**

Manic Moving Mansion

- Real time puzzler
- Reorder rooms to guide player
- **Best Student Game** at BFIG
- Beats MIT Media Lab!

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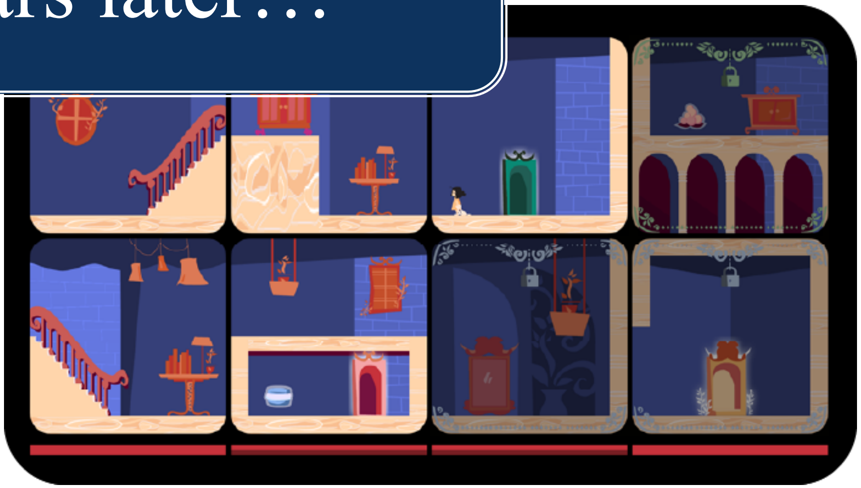
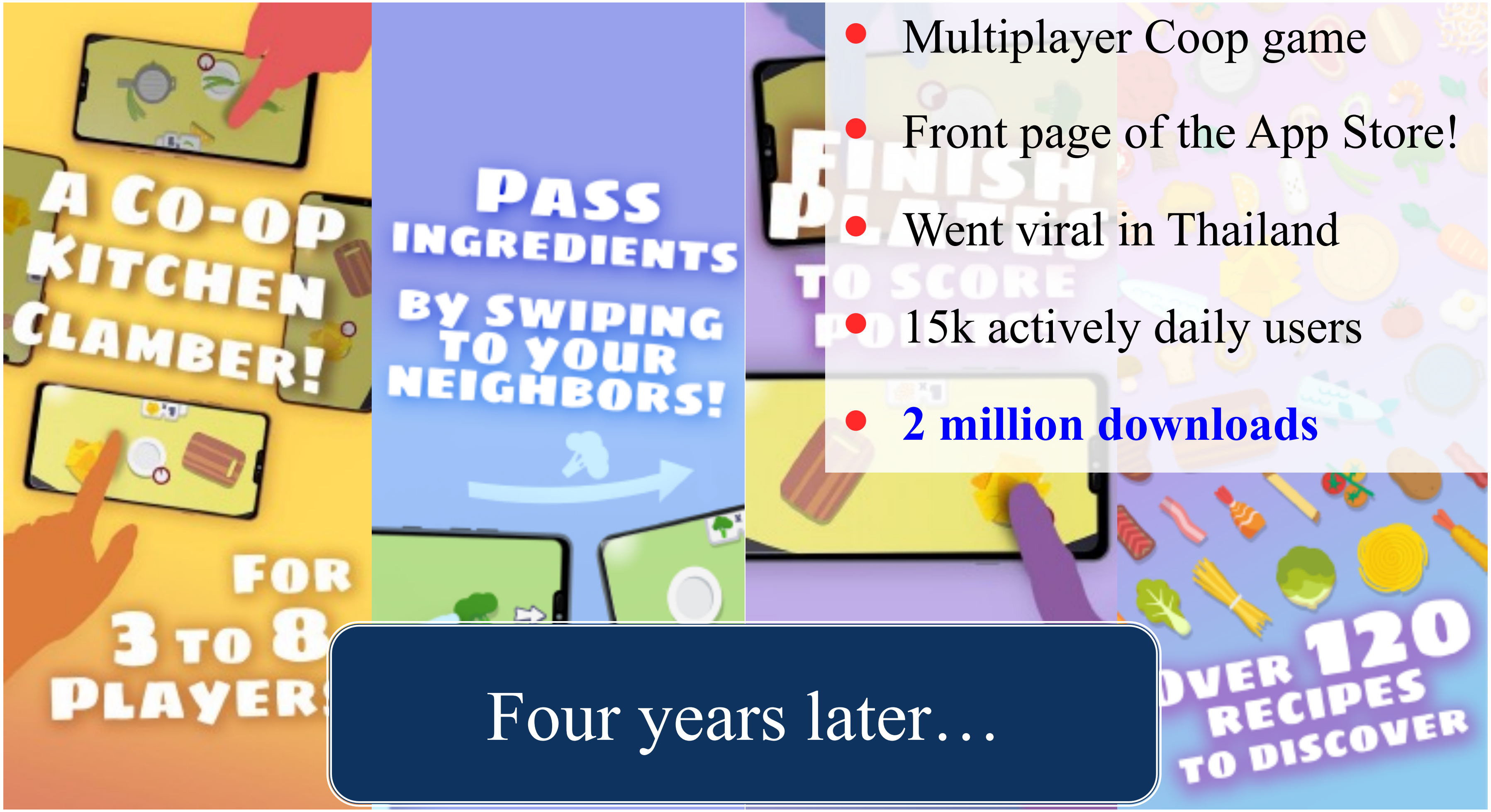


2019: *Family Style*

A co-op kitchen clamber!
For 3 to 8 players
Pass ingredients by swiping to your neighbors!
Finish plates to score points
Over 120 recipes to discover

- Multiplayer Coop game
- Front page of the App Store!
- Went viral in Thailand
- 15k actively daily users
- **2 million downloads**

2019: *Family Style*


A CO-OP KITCHEN CLAMBER!
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FINISH PLATES TO SCORE POINTS
OVER 120 RECIPES TO DISCOVER

- Multiplayer Coop game
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Four years later…

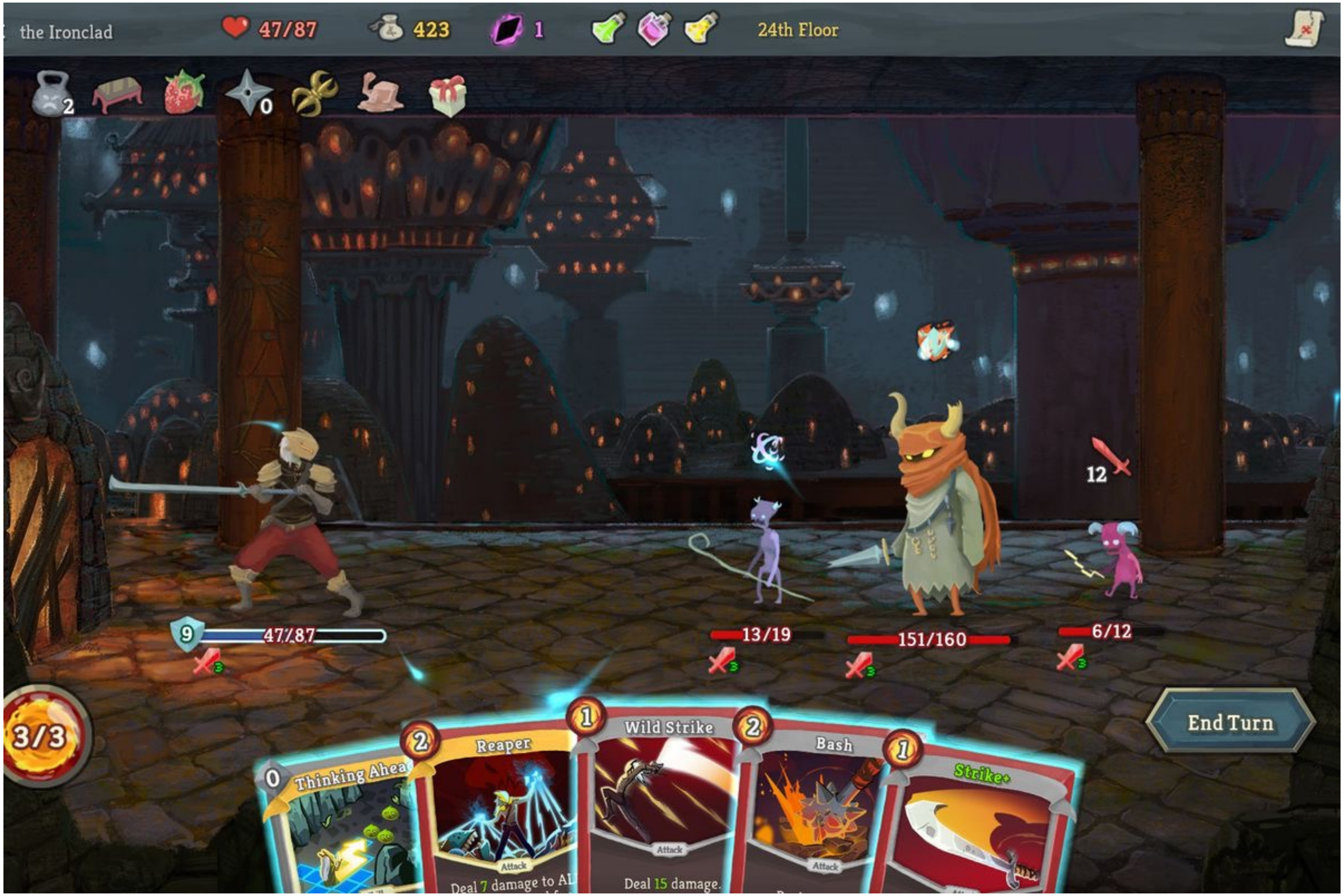
2023: This Semester

What Should You Make?

- This course is not just CS 3152 Part 2
  - Want your games to be different in some way
  - Mobile enforces this to some degree
- We have removed (almost all) restrictions
  - Can make a narrative-heavy game
  - Not limited to single-player games
- But it still must be **feasible**!
  - 3152 alums have the experience here

Rogue-Lites are Okay!

Deck-Building Games Are NOT



What About Multiplayer?

A Co-op Kitchen Clamber!
For 3 to 8 Players
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- CUGL **had** networking
  - Built on an unsupported lib
  - Issues with Cornell WiFi
  - Actively **banned** by Apple
- So we had to **remove** it
  - Not in current release

What About Multiplayer?

A CO-OP KITCHEN CLAMBER!
FOR 3 TO 8 PLAYERS
PASS INGREDIENTS BY SWIPING TO YOUR NEIGHBORS!
FINISH PLATES TO SCORE POINTS!
OVER 120 RECIPES TO DISCOVER

- But found a **replacement**!
  - Web RTC: new technology
  - Supported by Google/Apple
  - Still integrating into CUGL
- CUGL release in 3 weeks?
  - Use at **your own risk**!

Intellectual Property

- Your **group** retains all ownership
  - You can commercialize it later
  - You can make derivative works
  - Individual ownership is your responsibility
- But Cornell gets a non-exclusive license
  - Non-commercial use of final version submitted
  - We can post this version on our website
  - We claim no other rights to your game

Semester Schedule

Week 1	Team Workflow	1/28	Pre-Production
Week 2	Initial Proposal	2/4	
Week 3	Concept Document **(Project Kickoff)**	2/11	
Week 4	**Nondigital Prototype** Milestone Proposals	2/15 2/18	
Week 5	Gameplay Specification	2/25	
	February Break		
Week 6	**Gameplay Prototype**	3/1	Development
Week 7	Detailed Specifications	3/11	
Week 8	**Technical Prototype**	3/13	
Week 9	Document Revisions	3/25	

Semester Schedule

Week 10	**Alpha Release**	3/27
Spring Break		
Week 10	Code Walkthroughs App Store Page	4/10 4/15
Week 11	**Closed Beta Release (Feature Complete)**	4/17
Week 12	Document Revisions	4/29
Week 13	**Open Beta Release (Open Playtesting)**	5/1
Week 14	Postmortems Final Portfolio	5/8 5/10
Week 15	GDIAC Showcase	5/20

Development

Release

Group Management

- Every group has a **project leader**
  - Final say in all *group management decisions*
  - Coordinates designers and programmers
- Every group has a **lead programmer**
  - Responsible for the *code architecture*
  - Delegates coding tasks to others
- Every group has a **lead designer**
  - Responsible for the *visual style and interface*
  - Ensures other designers conform to style

Group Management

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- E

- **Optional**: **lead user specialist**
  - Get the game in the hands of players
  - Record and *analyze all playtesting results*

- Every group has a **lead designer**
  - Responsible for the *visual style and interface*
  - Ensures other designers conform to style

Grading: 4152 vs 5152

Group Grades	4152	5152
Group Game Grade	25%	25%
Course Documents	25%	15%
Presentations	5%	0%*

Individual Grades	4152	5152
Game Grade	25%	20%
Participation	20%	10%
Activities/Labs	0%*	15%
Mastery Topic	0%*	15%

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Mastery

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Game Grade	25%	[illegible]
Participation	20%	[illegible]
Activities/Labs	0%*	15%
Mastery Topic	0%*	[illegible]

Participation

Game Grade

Game Grade

- Group grade reflects the game quality

Grade	Criteria
A	Bug-free, Fun-to-play
B	Complete and playable
C	Complete but unplayable
D/F	Serious delinquencies

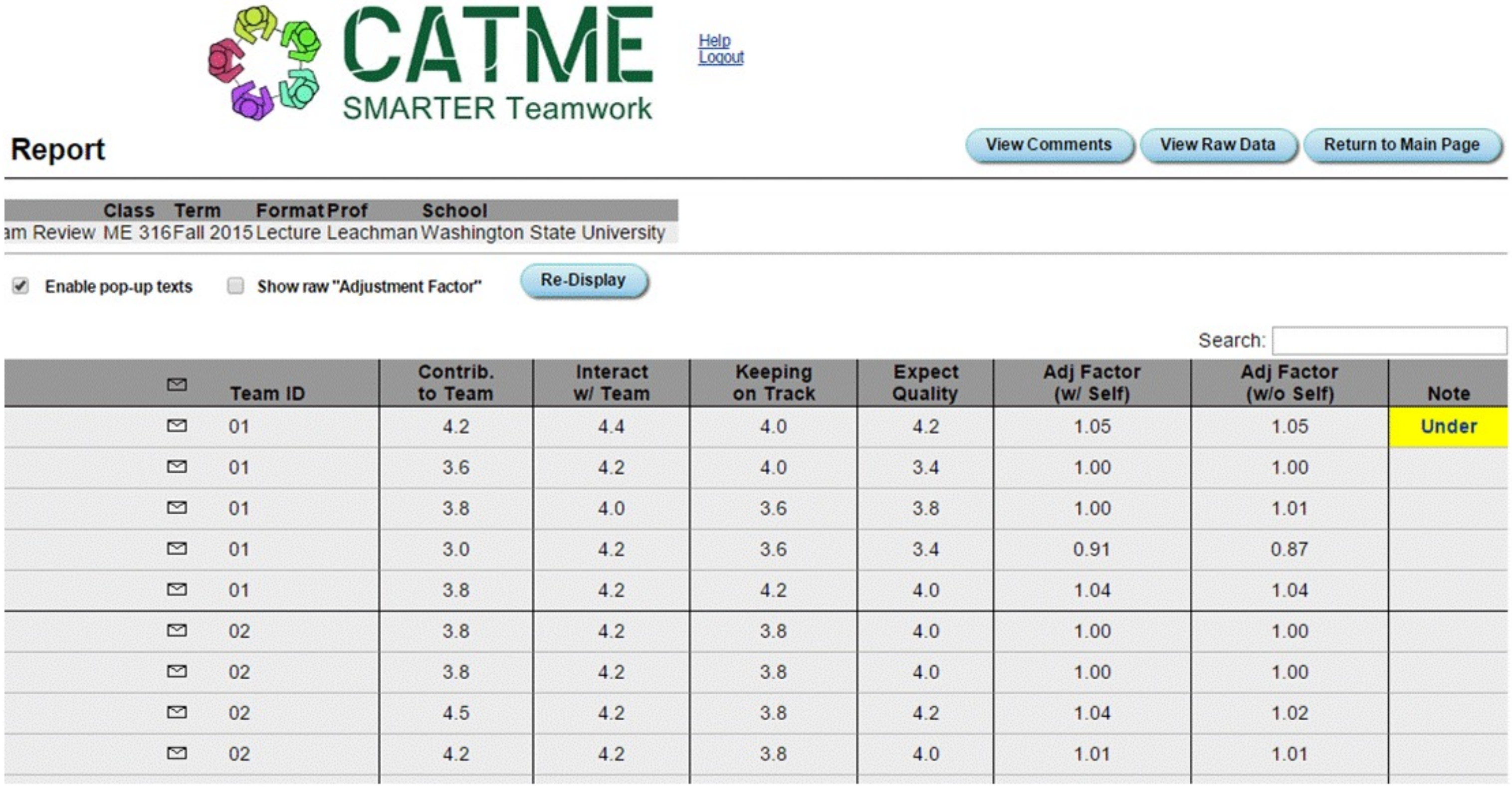
- Individual grade represents contribution

Grade	Criteria
> Group	Visionary, group MVP
= Group	Good attitude, hard worker
< Group	Produce negative work
D/F	Abandon the group

ENGRC Grading

- ENGRC section also has a grade
  - No extra work; just time for testing/documents
  - New requirement by school of engineering
- All grades except the game grade
  - Workflow & Group Reports (13%)
  - Course Documents (77%)
  - Attendance & Presentations (10%)
- Typically higher than course grade

Using CATME for Reports



Report

	Class	Term	Format	Prof	School
am Review	ME 316	Fall 2015	Lecture	Leachman	Washington State University

☑ Enable pop-up texts ☐ Show raw "Adjustment Factor"

✉	Team ID	Contrib. to Team	Interact w/ Team	Keeping on Track	Expect Quality	Adj Factor (w/ Self)	Adj Factor (w/o Self)	Note
✉	01	4.2	4.4	4.0	4.2	1.05	1.05	Under
✉	01	3.6	4.2	4.0	3.4	1.00	1.00	
✉	01	3.8	4.0	3.6	3.8	1.00	1.01	
✉	01	3.0	4.2	3.6	3.4	0.91	0.87	
✉	01	3.8	4.2	4.2	4.0	1.04	1.04	
✉	02	3.8	4.2	3.8	4.0	1.00	1.00	
✉	02	3.8	4.2	3.8	4.0	1.00	1.00	
✉	02	4.5	4.2	3.8	4.2	1.04	1.02	
✉	02	4.2	4.2	3.8	4.0	1.01	1.01	

http://www.catme.org

This Week

- **Team Workflow** due at end of the week
  - Want rules of how you interact with each other
- Lectures on **game mechanics**
  - Reviewing what you forgot from CS/INFO 3152
  - Augmented with mobile mechanics on Friday
- Set up your **CUGL** build environment
  - Download sample project and set it up
  - Programmers start the first game lab

Next Week

- **Pitch Session** next Wednesday, Friday
  - 5-10 minute “elevator pitch” for your game
  - Practice with short, concise description
  - Provide some feedback for Concept Document
- Turn pitch into an **initial write-up**
  - Respond to feedback from pitch session
  - Chance to get even more feedback on idea
- **Concept Document** due in two weeks
  - Slightly different format from Intro course