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Lecture 1

Course Overview

Welcome to CS/INFO 5/4152

- Course is **completely full**
  - Had 120 applications for 72 (8x9) spots
  - Even more than last year (which had 100).
  - Increased groups to 10 meet demand

- Still a few possibilities if you are waiting
  - Not everyone has responded to an invite
  - Need to shore up skills in some teams

- If not in the class, talk to me afterwards

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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

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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

- **CUGL Tutorial**: Must create a tutorial
  - Demonstrates understanding of significant topic
  - Hopefully of use to future classes
  - Get two drafts, with grade on second draft

Overview

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CS/INFO 5152: Master's Version

- **Game Labs**: Similar to introductory course
  - Done outside of class for first three weeks
  - Special l...
  - Complete...
  - Only INFO has a choice; CS is programming only

> 4152 students do also; but work is not graded

- **CUGL Tutorial**: Must create a tutorial
  - Demonstrates unde... ...cant topic
  - Hopefull...
  - Get two ... ...on second draft

> 4152 students not required to do this

Overview

Game Development

- Uses the familiar **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

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Course Structure

- Most things happen during the "lecture" section
  - Meets three days a week (M,W,F) 9:05-9:55
  - 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

Overview

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  - Advanced game development topics ~~~~~~~~~ course (this is not ~~~~~~~
  - **Design** ~~~~~~~~~~~~~~~~~~~~ testing
  - **Technical** ~~~~~. mobile platforms, memory management

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

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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**

Overview

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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 12:20-1:10 in **Gates 114**
  - Groups 6-9 meet Wednesday 2:30-3:20 in **Hollister 406**

- **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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  - Extra cre..................g
  - This is *re*...........

ENGRC does not apply to grad students in 5152

Overview

Game Requirements

- Should be **mobile game** on iOS or Android
  - Develop cross-platform, but graded only on one
  - But **an exception** coming on the next page…

- 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 an App Store

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What is the Exception?

Overview

What is the Exception?

Do **not** just want a PC game.
Must leverage its unique features.

Overview

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
  - Mobile devices are about $200; used are cheaper
  - Cheapest Steam Deck is about $400
  - Just need one device for your whole group

- Either 2D or 3D is acceptable

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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

Overview

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But Conversely

- You **must** develop Steam Deck on x86 Linux
  - Means a computer with an Intel or AMD chip
  - Possible if you have a really old Mac (unlikely)
  - More likely a partition on a Windows Machine

- **Any distribution** is acceptable
  - We have tested it on **Ubuntu**
  - Steam suggests **Manjaro** (closest to Steam Deck)
  - Need GCC, CMake, and Flatpak installed

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Working in C++

- Best option for cross-platform development
  - **iOS**: Obj-C and **C++**; **Android**: Java and **C++**
  - Important to understand if move to Unreal
  - 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

Overview

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

Overview

Working With CUGL: Good News

OpenGL for Each Hardware Generation

- Supports modern(ish) C++
  - Full C++17 support
  - Heavy use of smart pointers

- Build is very light-weight
  - Engine has ~40 MB footprint

- Advanced input features
  - Built-in pinch and rotation
  - Orientation detection
  - Arbitrary text input

- Modern OpenGL support
  - OpenGLES 3.1 on mobile

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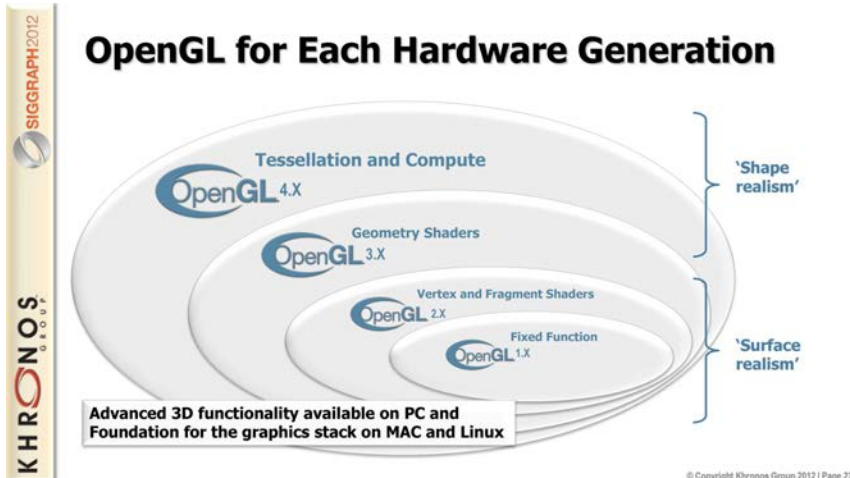
CUGL Continues to Evolve

New Features for 2024

- Networking/multiplayer
  - Last year's test went well
  - Now part of official release

- Improved audio library
  - Algorithmic reverb is official
  - Simple filters (lowpass etc.)

- Figma Support
  - Can design UIs with no code

- And the Steam Deck

Did Not Quite Make It

- Javascript support on hold
  - Intended to help UX designers
  - API needs to be refactored

- Still no Vulkan support
  - Bad performance on iOS
  - Android fails to compiled

- SVG support still not there
  - Vulkan work delayed it

- Still missing some UI elements

CUGL Continues to Evolve

New Features for 2024

- Networking/multiplayer
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- Game controller support
  - Including rumble feedback

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Is this good enough?

Why not use Unity?

Overview

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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)

Overview

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Three years later…
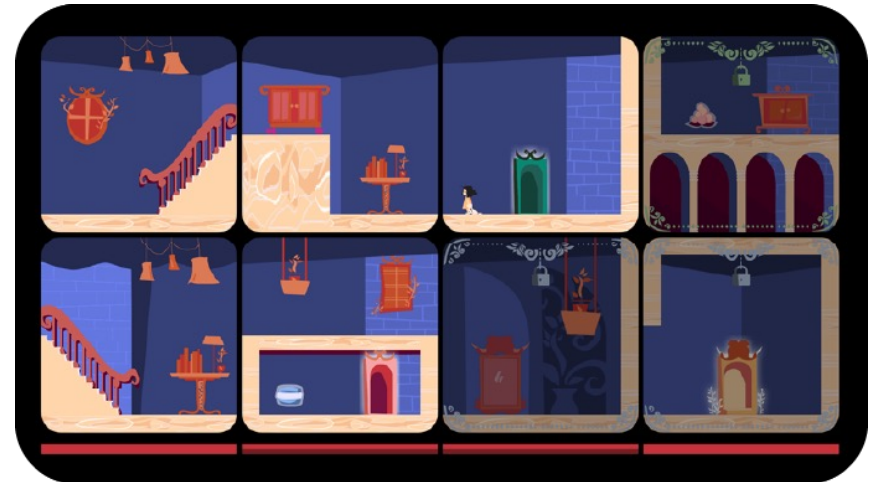
Overview

2016: CUGL 1.0 Released
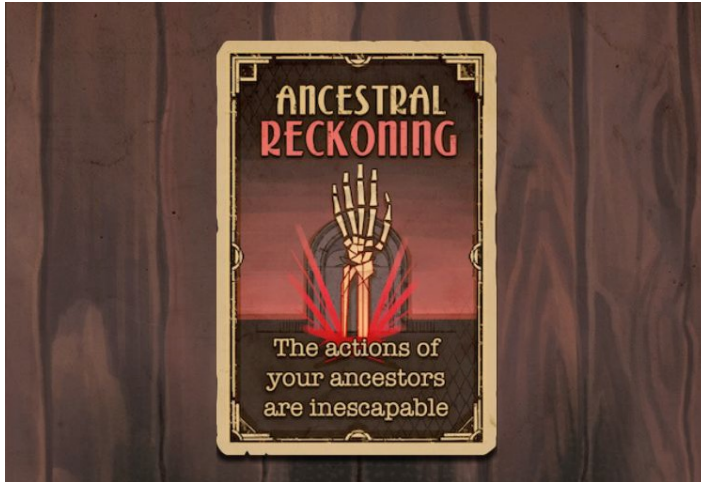
Underhand

- 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
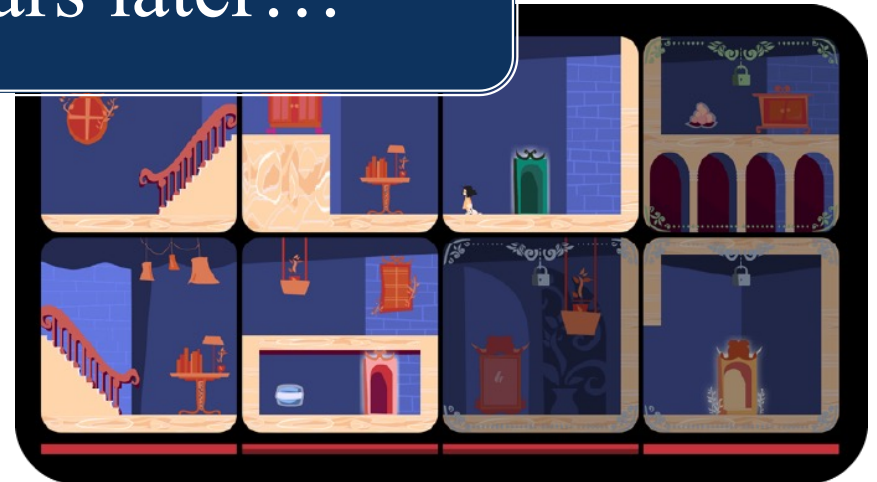- Beats MIT Media Lab!

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Manic Mov...

- Real time puzzler
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- **Best Student Game** at BFIG
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Three years later…

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**

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2019: *Family Style*

- Multiplayer Coop game

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Overview

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

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Rogue-Lites are Okay!

Overview

Deck-Building Games Are NOT

Overview

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

Overview

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Semester Schedule

Week 1	Team Workflow	1/27	
Week 2	Initial Proposal	2/3	Pre-Production
Week 3	Concept Document (**Project Kickoff**)	2/10	
Week 4	**Nondigital Prototype** Milestone Proposals	2/14 2/17	
Week 5	Gameplay Specification	2/24	
	February Break		
Week 6	**Gameplay Prototype**	2/28	
Week 7	Detailed Specifications	3/9	Development
Week 8	**Technical Prototype**	3/11	
Week 9	Document Revisions	3/23	

Introduction

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Semester Schedule

Week 10	**Alpha Release**	3/25	Development
	Spring Break		
Week 10	Code Walkthroughs App Store Page	4/8 4/13	
Week 11	**Closed Beta Release (Feature Complete)**	4/15	
Week 12	Document Revisions	4/27	
Week 13	**Open Beta Release (Open Playtesting)**	4/29	Release
Week 14	Postmortems Final Portfolio	5/6 5/8	
Week 15	GDIAC Showcase	5/18	

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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

Overview

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

Overview

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%
CUGL Tutorial	0%*	15%

Overview

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Mastery

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Game Grade	25%	
Participation	20%	
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CUGL Tutorial	0%*	

Participation

Game Grade

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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

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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

http://www.catme.org

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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

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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