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Lecture 1

Course Overview

Welcome to CS/INFO 5/4152

- Course is **mostly full**
  - Had 90 applications for 72 (8x9) spots
  - 4152 has *never* filled before
  - Increased groups to 9 people meet demand

- Still a few possibilities if you are waiting
  - Character designers for section 202 needed
  - May need another solid (C++) programmer

- 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 Meng (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

Overview

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

- **Leadership**: Must take major role on team
  - See workflow for possible roles
  - Can be shared if necessary
  - Other roles require permission

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

- **Leadership**: Must take major role on team
  - See workflow for...
  - Can be s...
  - Other rol...

  4152 can take these roles if necessary

Overview

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**
  - We **WILL** be in person (even if under a tent)
  - We **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) 9:05-10:00
  - 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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Course Structure

- Most things happen during the "lecture" section
  - Meets three days a week (M,W,F) 11:15-12:05
  - 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 ~~~~~~ course (this is not ~~~~)
  - **Design** ~~~~~~~~~~~~~~~~~ testing
  - **Technical** ~~~~. 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**

Overview

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 **Phillips 203**
  - Groups 6-9 meet Wednesday 2:30-3:20 in **Phillips 203**

- **Catch**: You must enroll in ENGRC 4152/5152
  - Extra credit hour for work you are already doing
  - This is *required*; it is not optional

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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

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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

Overview

Choosing a Platform

- You **must** develop iOS apps on a Macintosh
  - Only XCode can load the app on to a device
  - No longer 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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Choosing a Platform

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  - Only XCode can ~~load~~ ~~ce~~
  - No l~~o~~ ~~ship~~
  - But n~~e~~ ~~p~~ ($100) to put on store

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

- You can develop Android on either platform
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  - But it is not good enough for your main IDE
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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
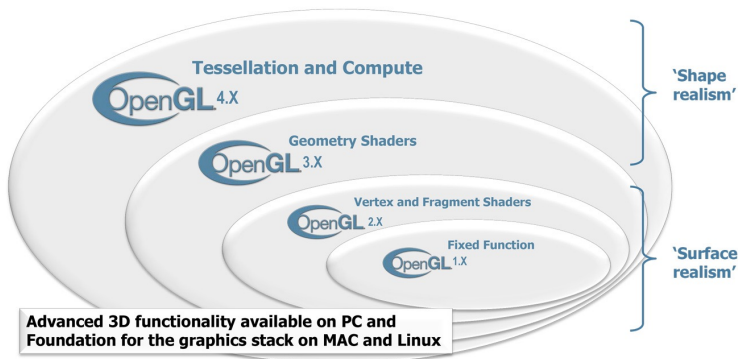
Cornell University Game Library

- 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
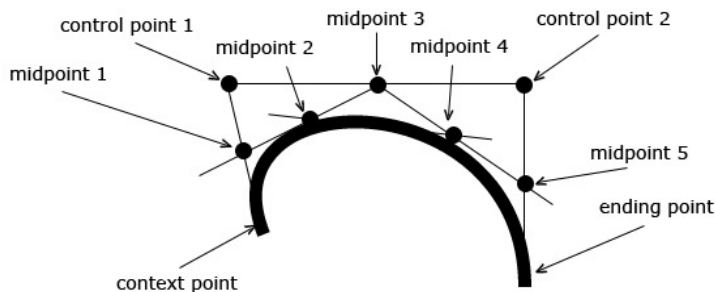 - **Example**: Bullet for 3D physics

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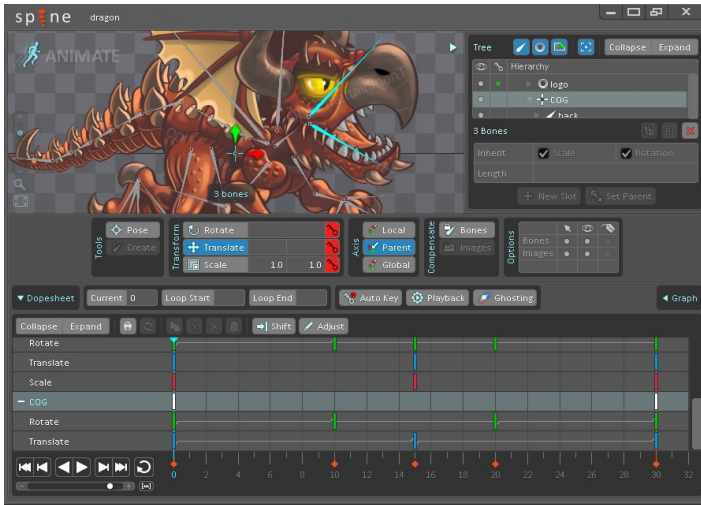at cornell university

Working With CUGL: Good News

OpenGL for Each Hardware Generation

Tessellation and Compute

OpenGL 4.X

Geometry Shaders

OpenGL 3.X

'Shape realism'

Vertex and Fragment Shaders

OpenGL 2.X

Fixed Function

OpenGL 1.X

'Surface realism'

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

© Copyright Khronos Group 2012 | Page 23

- 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

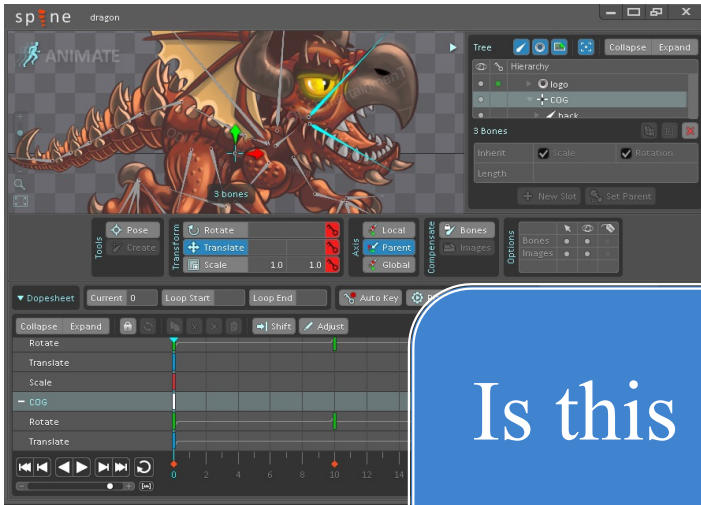the game**design**initiative
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Working With CUGL: The Bad News

- 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 parser is unfinished
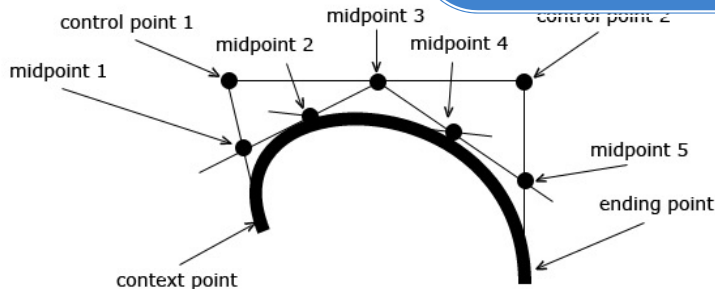
- Dollar gestures still missing

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  PC only

  ...evelopment

  ...urface support

- SVG support not *quite* ready
  - Full support for **commands**
  - But parser is unfinished

- Dollar gestures still missing

Is this good enough?

Why not use Unity?

control point 1
midpoint 3
control point 2
midpoint 2
midpoint 4
midpoint 1
midpoint 5
ending point
context point

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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)

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Three years later…
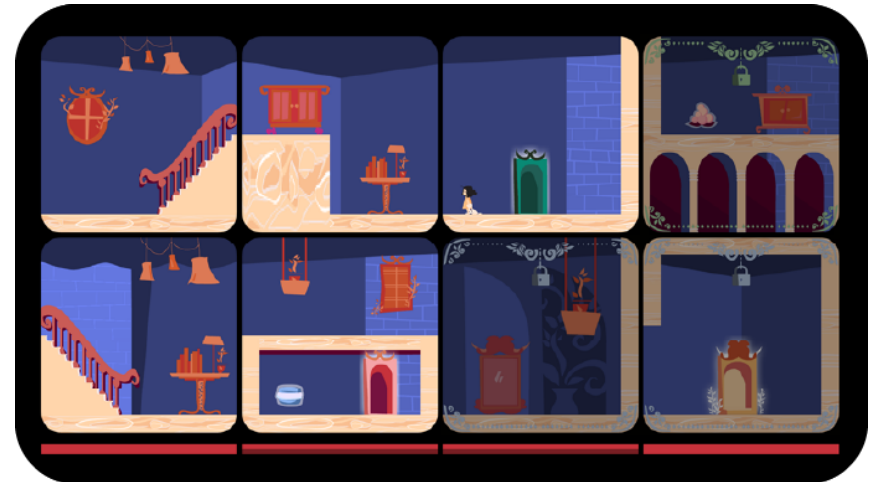
Overview

2016: CUGL 1.0 Released

Underhand

- Strategic card game

- Inspired by *Reigns*

- Goes 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!

2016: CUGL 1.0 Released

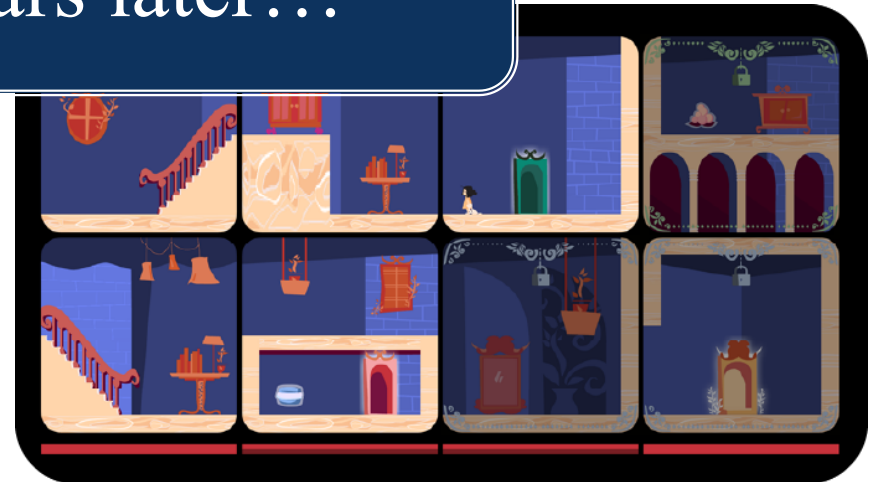
Underhand

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- Inspired by *Reigns*
- Goes viral on Reddit
- ...ownloads

Manic Mov...

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

Three years later…

2019: *Family Style*

- 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

- Front page of the App Store!

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Three years later…

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2022: This Semester

Overview

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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

Semester Schedule

Week 1	Team Workflow	1/29	
Week 2	Initial Proposal	2/5	
Week 3	Concept Document (**Project Kickoff**)	2/12	Pre-Production
Week 4	**Nondigital Prototype** Milestone Proposals	2/16 2/19	
Week 5	Gameplay Specification	2/26	
	February Break		
Week 6	**Gameplay Prototype**	3/2	
Week 7	Detailed Specifications	3/12	Development
Week 8	**Technical Prototype**	3/14	
Week 9	Document Revisions	3/26	

Introduction

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Semester Schedule

Week 10	**Alpha Release**	3/28
	Spring Break	
Week 10	Code Walkthroughs Promotional Video	4/11 4/16
Week 11	**Closed Beta Release (Feature Complete)**	4/18
Week 12	App Store Page	4/30
Week 13	**Open Beta Release (Open Playtesting)**	5/2
Week 14	Postmortems Final Portfolio	5/9 5/11
Week 15	GDIAC Showcase	5/21

Development

Release

Introduction

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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

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Group Management

- Every group has a **project leader**
  - Final say in all *group management decisions*
  - Coordinates designers and programmers

- E⦁ New this year: **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%	20%
Presentations	5%	0%*

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

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Leadership

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Leadership	0%*	

Participation

Game Grade

Overview

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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

Overview

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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

Overview

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  - Download sample
  - Prog

When ready on Wednesday

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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

Overview