

# Intro Class

**2D Games: Bridgewater State University**

# Admin

- Lets go over the syllabus
- Then reverse roll call.

# Welcome

- Welcome to 2D Game Design
  - Its been 2 years since I did this course
    - So lots of it is different
    - You see the topics I'm planning on the syllabus.
    - If there is anything else you are dying for let me know now. I'll try to fit it in.

# Welcome II

- Usually two types of people take this class

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  - I love games

# Welcome II

- Usually two types of people take this class
  - I love games
  - I don't really care about games but...
    - I heard you can learn some good programming here
    - It fit my schedule
  - I'm going to use this starting lecture to (try to) motivate the class for both groups

# Why Games I

- Why study games 1: Money

- The data collection methods have changed but the trend is clear
- Except for the 2020 bl

Year	Movie Box office (source: Box Office Mojo)	Electronic game revenue
1995	\$5.4 Billion	\$3.2 Billion
2008	\$9.6 Billion	\$9.5 Billion (ESA)
2013	\$10.3 Billion	\$15.4 Billion(NPD)
2018	\$11.8 Billion	\$43.8 Billion (ESA and NPD)
2020 (kinda cheating c.f. covid)	Just not relevant – foreign was decent but US covid reduced	\$139 Billion (SuperData)
2022	\$7.32 billion (domestic)	\$56.6 Billion (ESA)
2024	\$8.56 billion (domestic) [Forbes]	\$58.7 (ESA)

# Why Games II

- Why Games II: Technology
  - Games are also worth studying because they use the same technology as other more business oriented apps
    - Multi-player games:
      - Secure servers, networked communication etc
    - Single player games:
      - Game AI: many similar algorithms used in other AI apps (though many traditional AIs are not 'trying to win')
    - Games in general
      - Performance considerations
      - User interface concerns, usable software.



# Why 2D? Part 1

- 3D games get most of the press, so why 2D?
  - First technically simpler to implement
    - Can focus on gameplay and server technologies
      - Not lighting, physics and 3d math.
      - Most use a 3d engine to hide some of this complexity.
        - Unity/Unreal/Godot/etc.
    - Most game design lessons transfer 2d->3d

# Why 2d? Part II

- 2D games make a lot of money even today.
  - Most 3d games start to look old/dated after a few years
    - 2d can look ok for **far** longer
  - Major money in 2d recently:
    - Angry birds, fruit ninja and plants v. zombies (**really** old but still selling)
    - Terreria<sup>†</sup>/Rimworld/Factorio /Stardew Valley / the binding of Isaac/Don't Starve(together)/ 鬼谷八荒 Tale of Immortal/2025 summer splashes Bongo Cat and Banana (selling millions of copies each)
    - <https://games-stats.com/steam/?tag=2d&page=1>
    -

<sup>†</sup>Terreria is just ridiculous, 12 years, 58.7 million copies, \$170+ million, still a top selling 2D game on steam – Stardew Valley might be about to eclipse it – top rated game









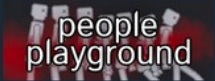





























# 2D On Steam













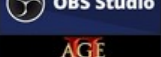


Trailers

Movement, rank, title, date, platforms, tag and price

Score

platform filters

-  1. **Stardew Valley** Feb 2016    Farming Sim Top 250 #1 **8.87** 98% 901,901 votes \$14.99
-  2. **Terraria** May 2011    Open World Survival Craft Top 250 #3 **8.82** 97% 1,420,868 votes \$9.99
-  3. **People Playground** Jul 2019  Sandbox Top 250 #4 \$9.99 **8.81** 99% 285,230 votes
-  4. **Vampire Survivors** Oct 2022   Action Roguelike Top 250 #6 \$4.99 **8.79** 98% 251,409 votes
-  5. **RimWorld** Oct 2018    Colony Sim Top 250 #12 -20% **8.74** 98% 213,600 votes \$27.99
-  6. **Balatro** Feb 2024   Card Game Top 250 #16 \$14.99 **8.73** 98% 160,685 votes
-  7. **The Binding of Isaac: Rebirth** Nov 2014    Action Roguelike Top 250 #19 \$14.99 **8.72** 97% 348,005 votes
-  8. **Bloons TD 6** Dec 2018   Tower Defense Top 250 #20 \$13.99 **8.72** 97% 359,009 votes
-  9. **Hollow Knight** Feb 2017    Metroidvania Top 250 #25 \$14.99 **8.71** 97% 423,189 votes
-  10. **DELTARUNE** Jun 2025   Story Rich Top 250 #31 \$24.99 **8.70** 99% 56,162 votes
-  11. **MiSide** Dec 2024  Psychological Horror Top 250 #32 \$14.99 **8.70** 98% 113,842 votes
-  12. **HoloCure - Save the Fans!** Aug 2023  Pixel Graphics Top 250 #33 FREE 38,266 votes

Most played 2D games					
100 entries per page. Hold Shift to sort by multiple columns.					
Search...					
Rank	SteamDB.info	Name ↓↑	Current ↓↑	24h Peak ↓↑	All-Time Peak
1.		Bongo Cat	156,656	162,134	194,508
2.		Stardew Valley	121,918	149,986	236,614
3.		Banana	99,350	112,430	917,272
4.		RimWorld	65,668	65,668	65,668
5.		Football Manager 2024	60,335	63,564	89,478
6.		Don't Starve Together	42,867	56,795	115,925
7.		Terraria	38,910	43,598	489,886
8.		Geometry Dash	37,336	41,606	88,346
9.		tModLoader	34,303	40,319	56,583
10.		Project Zomboid	26,847	27,132	65,505
11.		Limbus Company	23,610	30,609	80,901
12.		The Binding of Isaac: Rebirth	23,405	24,859	70,701
13.		OBS Studio	20,851	22,786	27,334
14.		Age of Empires II: Definitive Edition	20,482	21,083	38,725
15.		Yu-Gi-Oh! Master Duel	20,009	24,716	262,689



# 2D on Steam II






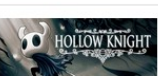

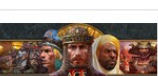


## 2 things

- That is a lot of money
- Tell me about project zomboid
- Stardew #25
- Terraria #27 in revenue all time
- And they cost a **lot** less to make

### Results

Found 47947 games. It's 34.0% of all Steam games

Export to Excel

#	Title	Release	Price	Tags	Followers	Reviews	Score	Net Revenue US\$
1	 <b>Stardew Valley</b> Steam <a href="#">↗</a> Publisher: ConcernedApe Developer: ConcernedApe	Feb 26, 2016 9 years, 4 months ago	\$14.99	2D Agriculture Building Casual Crafting Cute Dating Sim Farming Sim Fishing Great Soundtrack Indie Life Sim Multiplayer Open World	956,584	771,035	10/10	~\$220 million
2	 <b>Terraria</b> Steam <a href="#">↗</a> Publisher: Re-Logic Developer: Re-Logic	May 16, 2011 14 years, 1 month ago	\$9.99	2D Action Adventure Atmospheric Building Co-op Crafting Exploration Indie Multiplayer Online Co-Op Open World Open World Survival Craft	888,052	1,131,634	10/10	~\$220 million
3	 <b>RimWorld</b> Steam <a href="#">↗</a> Publisher: Ludeon Studios Developer: Ludeon Studios	Oct 17, 2018 6 years, 8 months ago	<del>\$34.99</del> \$27.99 -20%	2D Atmospheric Base Building Building City Builder Colony Sim Indie Management Moddable Open World Procedural Generation	599,317	180,819	10/10	~\$120 million
4	 <b>Factorio</b> Steam <a href="#">↗</a> Publisher: Wube Software LTD. Developer: Wube Software LTD.	Aug 14, 2020 4 years, 11 months ago	\$35.00	2D Automation Base Building Building City Builder Co-op Crafting Indie Management Moddable Multiplayer Open World Pixel Graphics	395,676	172,988	10/10	~\$120 million
5	 <b>Project Zomboid</b> Steam <a href="#">↗</a> Publisher: The Indie Stone Developer: The Indie Stone	Nov 8, 2013 11 years, 8 months ago Early Access	<del>\$19.99</del> \$13.39 -33%	2D Adventure Building Co-op Crafting Early Access Indie Isometric Multiplayer Open World Open World Survival Craft	537,554	291,996	9/10	~\$110 million
6	 <b>Hollow Knight</b> Steam <a href="#">↗</a> Publisher: Team Cherry Developer: Team Cherry	Feb 24, 2017 8 years, 4 months ago	\$14.99	2D Action Adventure Atmospheric Controller Cute Dark Fantasy Difficult Exploration Great Soundtrack Hand-drawn Indie Metroidvania	399,316	377,020	10/10	~\$110 million
7	 <b>Don't Starve Together</b> Steam <a href="#">↗</a> Publisher: Klei Entertainment Developer: Klei Entertainment	Apr 21, 2016 9 years, 2 months ago	\$14.99	2D Action Adventure Atmospheric Co-op Crafting Difficult Funny Horror Indie Multiplayer Online Co-Op Open World	717,477	345,340	10/10	~\$99 million
8	 <b>Age of Empires II: Definitive Edition</b> Steam <a href="#">↗</a> Publisher: Xbox Game Studios Developers: CaptureAge, Forgotten Empires, Tantalus Media, Wicked Witch, World's Edge	Nov 14, 2019 5 years, 7 months ago	\$34.99	2D Action Adventure Base Building City Builder Classic Co-op Great Soundtrack Historical Isometric Medieval Multiplayer RTS Real-Time	263,150	143,385	9/10	~\$96 million
9	 <b>The Binding of Isaac: Rebirth</b> Steam <a href="#">↗</a> Publisher: Nicalis, Inc. Developers: Edmund McMillen, Nicalis, Inc.	Nov 4, 2014 10 years, 8 months ago	\$14.99	2D Action Action Roguelike Atmospheric Co-op Dark Difficult Dungeon Crawler Gore Great Soundtrack Horror Indie Local Co-Op	356,085	315,082	10/10	~\$91 million
10	 <b>Bloons TD 6</b> Steam <a href="#">↗</a> Publisher: Ninja Kiwi Developer: Ninja Kiwi	Dec 17, 2018 6 years, 6 months ago	\$13.99	2D 3D Action Addictive Cartoony Casual Co-op Cute Difficult Family Friendly Funny Great Soundtrack Multiplayer Online Co-Op	90,774	317,185	10/10	~\$85 million

- And of course the top money making games that are 2d:
  - Which are?

# Why 2d? Part II

- Lots and lots of Money
  - Especially in freemium games
    - (pay for copy nearly always makes less)
  - And of course of the top money making games half are 2d:
    - Highest grossing Mobile games of all time
      - Honor of Kings/Arena of Valor \$18.6 billion
      - Genshin Impact \$6.25 billion
      - PUBG Mobile \$11 billion
      - Candy Crush Saga \$12.00 billion
      - Monster Strike: \$11 billion
      - Puzzle and Dragons \$8 billion
      - Clash of Clans \$10.2 billion
      - Pokemon Go \$9.3 billion
      - Fate/Grand Order \$7 billion
        - Source: [https://vgsales.fandom.com/wiki/List\\_of\\_highest-grossing\\_mobile\\_games](https://vgsales.fandom.com/wiki/List_of_highest-grossing_mobile_games)
  - Mix of western and eastern games
  - Unhighlighted are 3D, highlighted are 2D

# Why 2d Part III

- Whenever a new platform comes out
  - 2d comes first then perhaps a move to 3d
  - Mobile still lots of 2d
  - The io game phenomenon from years ago
    - I've so far seen mostly 2d (web assembly might change that)
    - Agar.io/surviv.io still played right
      - Pronunciation poll

# Who is your market?

- If you have software you need to know your market
  - Who will pay money for you to make software?
  - So who are your customers for games?



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    - Who else?

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    - Sometimes parents/relatives of players
      - Givers of gifts
    - Anyone else?

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  - So who are your customers for games?
    - Often your players (we'll talk about them in a moment)
    - Sometimes parents/relatives of players
      - Givers of gifts
    - Often educators
      - Edutainment games
    - Computer Systems OEMs
      - Who buy and preinstall your software.
  - Know your customer, and make them happy.

# Who are your players?

- Who are the video game players of today?

# Who are your players?

- Who are the video game players of today? (US)
  - All sorts
    - 70% of Adults play games in the US.
    - Median age of gamer is 36 and has been playing for 18 years.
    - 47% of gamers are women/ 52% are men.(US)
      - Reverses for older gamers:
        - 52% of Boomer women play video games, compared to 46% of Boomer men.
    - The over-25 crowd is the fastest growing revenue market for game companies.
      - Teen and early 20s demo has been gamers for a while.
    - Estimated 190.6 Million Americans play video games
  - <https://www.cepro.com/news/esa-essential-facts-about-u-s-video-game-industry-report-finds-60-of-adults-are-gamers/618975/>

# Players World Wide

Here's a closer look at the regional breakdown:

Region	Number of Gamers
Asia	1.48 billion
Europe	715 million
Latin America	420 million
North America	285 million
MENA	168 million
Sub-Saharan African	144 million
Oceania	32 million

- World wide
  - If we look at the highest grossing games
    - Lots of them were developed in Asia for a primarily non-western audience.
    - 3.32 billion gamers world wide
  - Can lead to extra issues to consider (GDPR – government regulation etc)
- Lets look at <https://explodingtopics.com/blog/number-of-gamers>

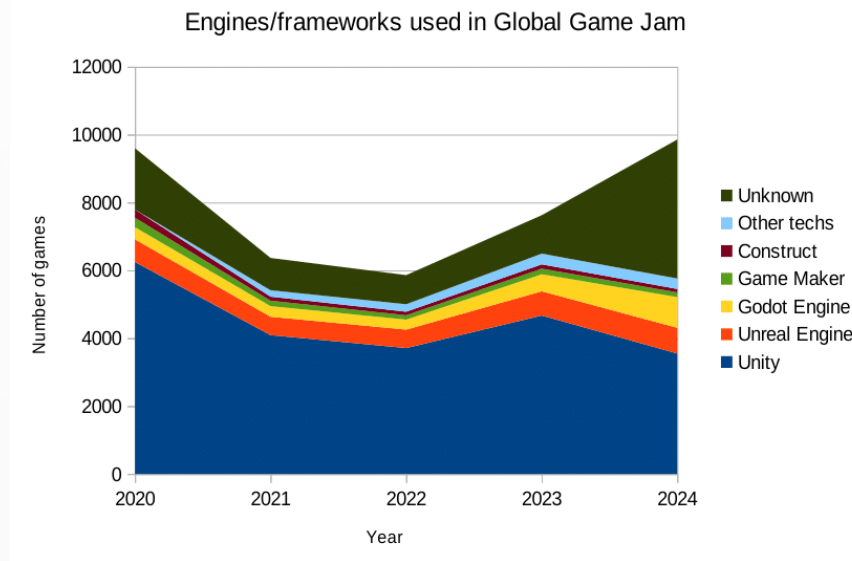


# Structure of this class.

- We will look at three things
  - general game design
  - common implementation techniques for common game functionality
  - implementing our games with programming and supporting game libraries.
- We'll interleave the first topic with the other two.

# Programming and Libraries

- In this class we will learn game development techniques
  - Rather than just use the pre implemented techniques through an engine.
    - Though once we master those simple tech we will add more engine like libraries for some of that.
  - Important to learn the fundamentals
  - Other colleagues use Unity
  - Unreal great, but C++ learning curve.



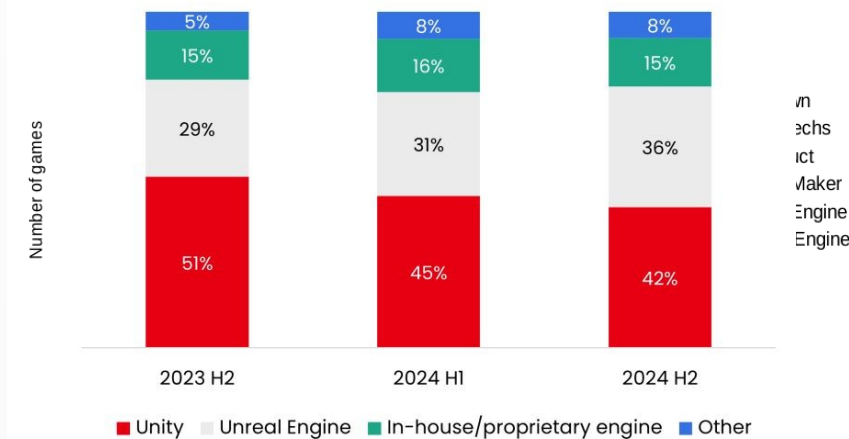


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**Unity has steadily lost market share over the past year, with Unreal Engine the main beneficiary**

**Which game engine does your current project use?**



OMDIA

Game  
Developer  
Collective

# Technology

- In this class we will use
  - Go
  - Why ?
    - Compiled
      - You can build an actual running game and give it to people
      - Or compile it to web assembly and put it on the web
      - Without the issues with C++
      - Or C#/java massive runtime
    - Not a top 5 language, but it is a top 10 language
      - IEEE:
        - <https://spectrum.ieee.org/top-programming-languages-2024>
        - <https://www.tiobe.com/tiobe-index/>

# Libraries

- There are several good 2d game libraries for go:
  - <https://github.com/avelino/awesome-go#game-development>
  - But Ebitengine is my choice
  - Best for this class because
    - Pure go, can compile to WebAssembly
    - Can compile for any target that go compiles to. (with static binary)
    - Supports Switch and Steam
      - [https://ebitengine.org/en/blog/nintendo\\_switch.html](https://ebitengine.org/en/blog/nintendo_switch.html)
      - <https://ebitengine.org/en/blog/steam.html>

# Coming up

- We will first have a power intro to go for upper level students (assuming no prior go experience), but at least three semesters in other languages
- Then begin our tour of game techniques and ebitengine
- While covering the larger game design decisions as well.

# Assignment

- Make sure you have go 1.24 or above installed
  - 1.25 is expected to be out in August, but these slides were written earlier in the summer
- Renew your academic license with JetBrains and install GoLand Professional.
  - See resources page of website.
- Install git on your machine
  - Be prepared to write code from next time.
- If you don't have one, register for a free GitHub.com account and send me your ID via email.
  - This will count as a quiz grade
- Or in case of night class, when we come back from our short break.

