



Video Game Development Introduction



SJU ACM
Student Chapter

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THE BASICS OF GAME DEVELOPMENT



Video Games Start as an Idea

- Like every project, video games start as an idea
 - It could be the creation of a singular individual or dedicated teams assigned to come up with ideas for games
- Developers are likely to consider how expansive the original concept could get
 - Typically based on the market and expertise of the developers

How do we come up with hit game idea?

So, you program video game?
Is it hard to write all of that code?



No, I said I design games.



Oh, so you draw the characters?
That must be fun.



No. I don't draw them.
That's what an artist does.



I don't det it.
If you don't code the games or draw the games what do you do?



Apparently nothing.



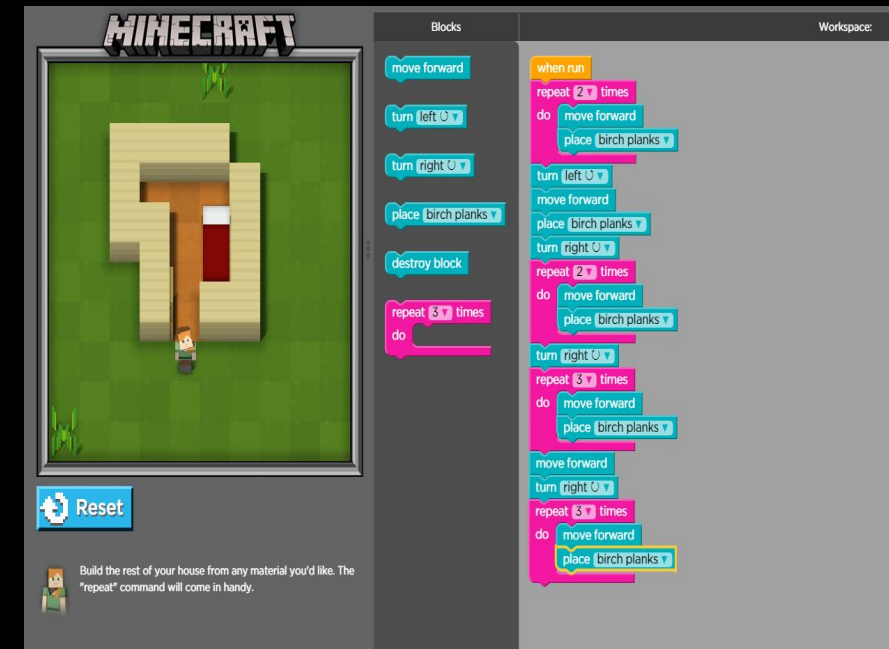
The POV of the Consumer

- Developers must consider the POV of the consumers by outlining:
 - Rules
 - Flow and feel
 - Player controls
 - Story, theming, and actions
- Decisions made during this stage may determine the success of the game



● Programming and Engineering

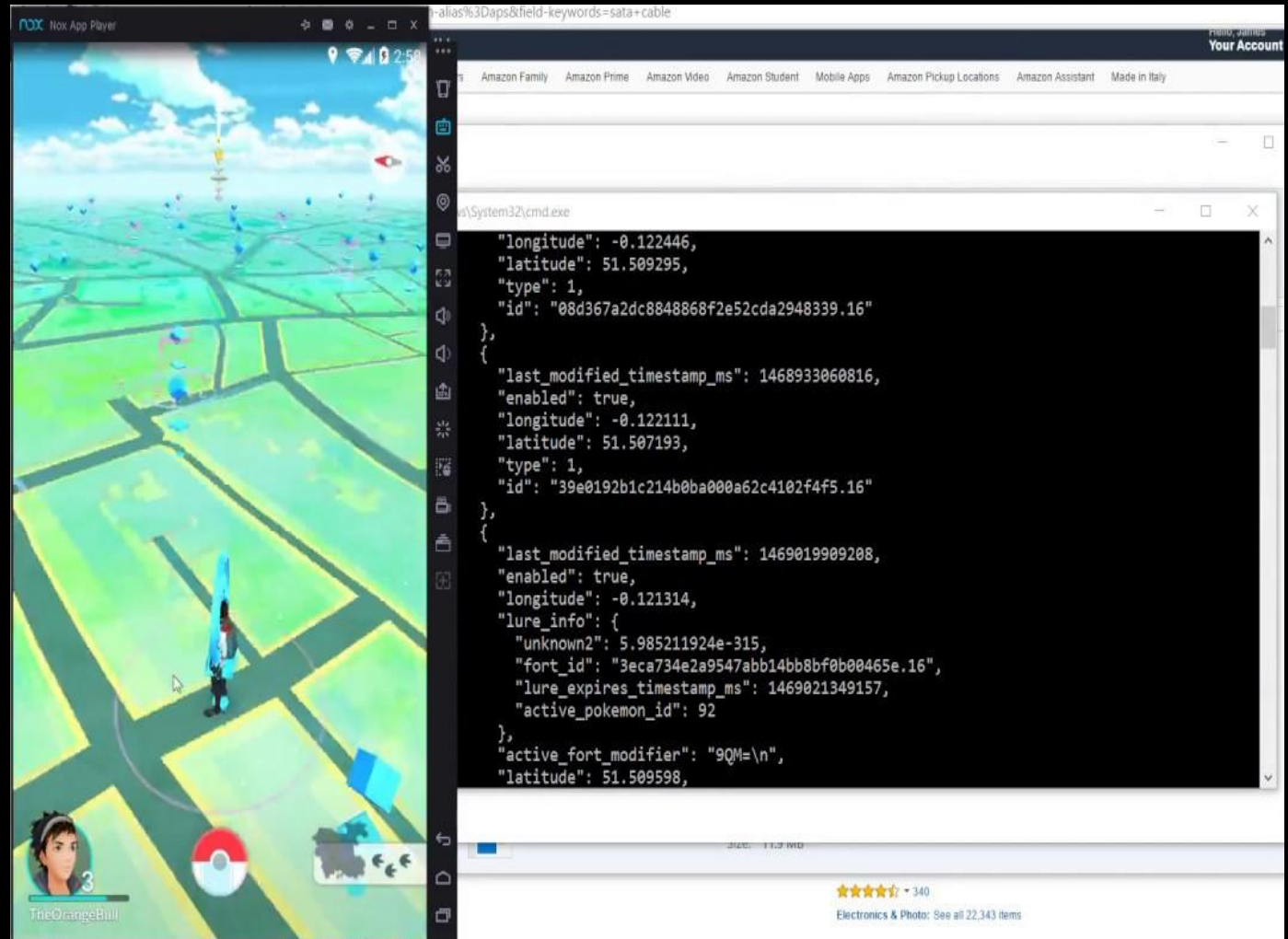
- Resembles the leap from conceptual to playable
- Requires the application of STEM-based developers, utilizing programming languages and engines/platforms
- The language used is based on console (Online, PC, Xbox/PS) and the type of game being developed
- Game engines refer to the basic architecture that is used to run games, allowing for the configuration of in-game physics, renderings, collision detections, and AI





Programming Languages

- C++ - high abstraction level, allowing for better control of hardware
 - Counter-Strike, Starcraft
- Java - ease of use
 - Minecraft, FIFA 11
- JavaScript - Works well with HTML and CSS
 - Hangman, Angry Birds
- HTML5 - works with multiple platforms and browsers
 - Cookie Clicker
- C# - flexible and powerful, compatible with a wide variety of platforms
 - Pokemon Go, Super Mario Run
- Python - PyGame
 - Battlefield 2



● Gaming Engines



- Gaming engines' purpose is to render 2D/3D graphics, in-game physics, sound, AI, networking, VR tools, input controls, lighting, textures, etc.
- The two main gaming engines are Unity and Unreal Engine
 - Unity is written in C++
 - Unreal Engine is written in C#
- Both provide support for PC, consoles, and mobile games on all operating systems



● Unity vs Unreal

Games Developed with Unity

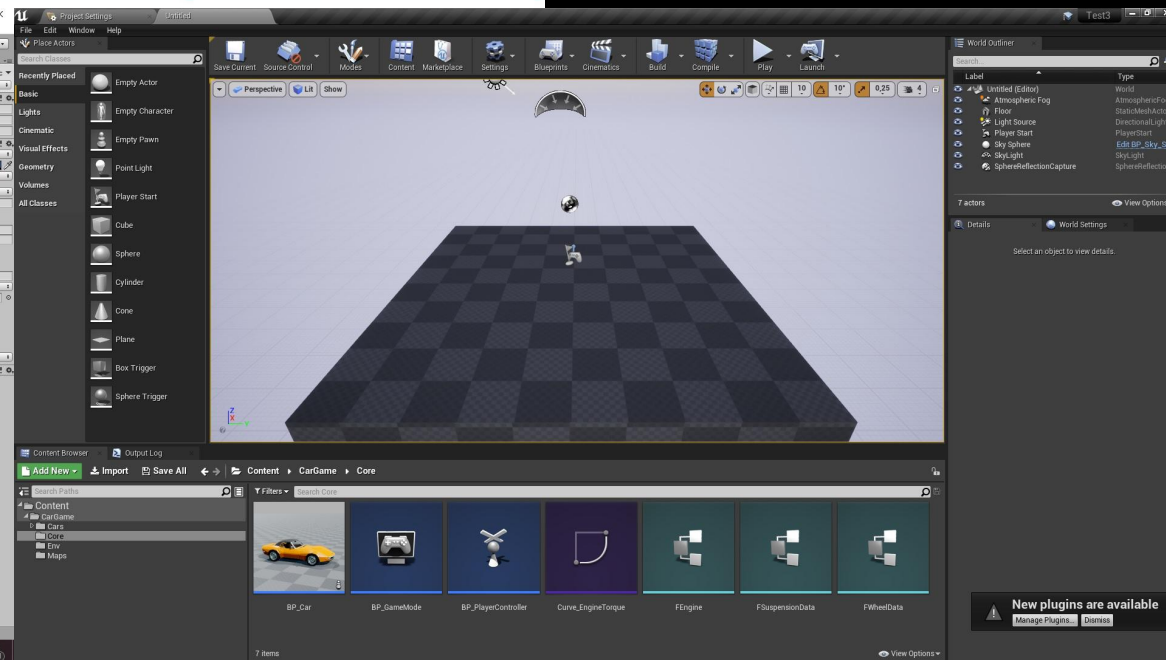
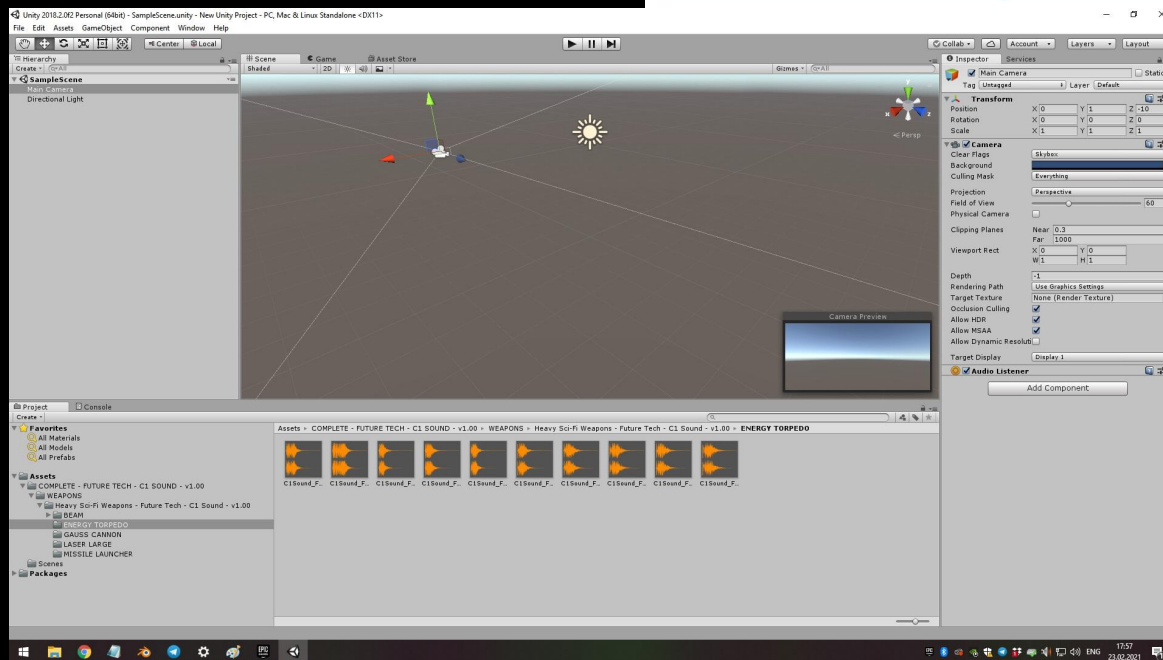
- Escape from Tarkov
- Hollow Knight
- Cuphead
- Fall Guys: Ultimate Knockout
- Call of Duty: Mobile

Games Developed with Unreal

- Kingdom Hearts 3
- Fortnite
- Ark: Survival Evolved
- Sea of Thieves
- Street Fighter 5



	Unity	Unreal
Graphics	Physically-Based Rendering, Global Illumination, Volumetric lights after a plugin installed, Post Processing	Physically-Based Rendering, Global Illumination, Volumetric lights out of the box, Post Processing, Material Editor
Unique Features	Rich 2D support	AI, Network Support
Target Audience	Mostly indies, coders	AAA-game studios, indies, artists
Coding	C#, Prefab, Bolt	C++, Blueprints
Community	More than 200k members on the official subreddit	About 100k members on the official subreddit
Performance	Does not scale well, unlike Unreal Engine	Has support for distributed execution (Incredibuild)



● Unreal Engine 5

- Launched on April 5th, 2022, with support for current gen, and PS5 and Xbox Series X/S
- Nanite - allows for high-detailed photographed content to be brought into video games
- Lumen - reacts to scene and light changes



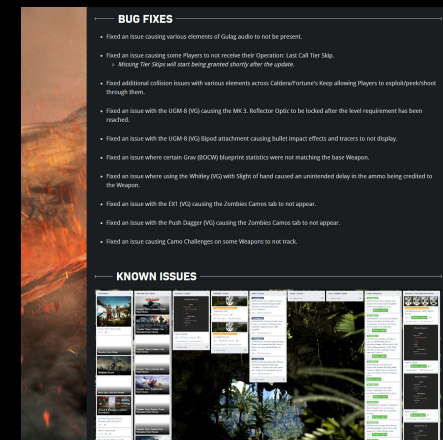
[The Matrix Awakens PS5 Gameplay](#)





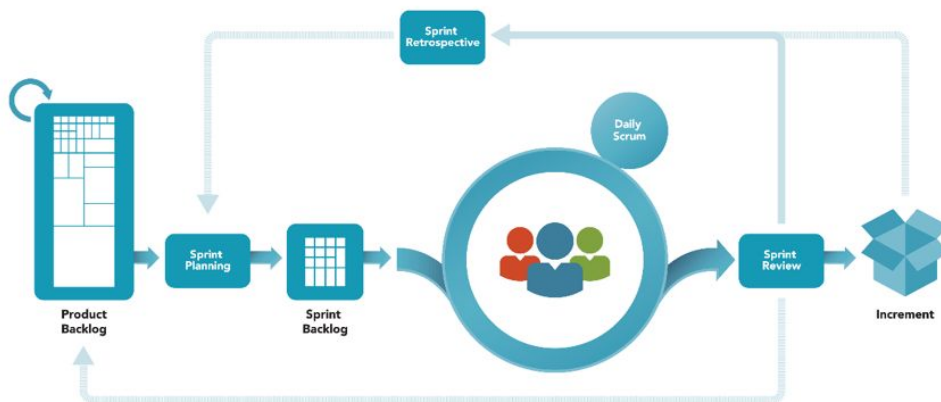
Post-Production

- After the development and release of a video game, it is essential developers implement a maintenance phase
- Encompasses feedback from users to supply the game with bug fixes and additional features/content



Project Management

- To produce a successful video game, every phase of production requires good project management
- Agile - seeks client satisfaction through continuous delivery of value-adding software and communication between client and team members
- Scrum - utilizes sprints, which are stages of developments



● The Video Game Industry

- The value of the Video Game Market in the U.S. is \$95.45 billion
- In 2021, US gamers spent \$60.4 billion on games, representing a \$2.7 billion increase
- 83% of video game sales are digital
- Cyberpunk 2077 reached a total cost of \$316 million (development and marketing)





Cybersecurity and Video Game Development

Cybersecurity in the Gaming Industry

- PC and mobile games are more vulnerable than console games
- Cheats - provided as a product that enables unfair game advantages by inserting malicious payloads to game files
- Account takeovers - stealing virtual items tied to another player's account (items, operators, weapons)
- Distributed denial of service (DDoS) - use botnets to send mass traffic to servers hosting online games
- Social engineering - targeting less knowledgeable player bases for financial benefit
- Credential stuffing - acquiring stolen passwords



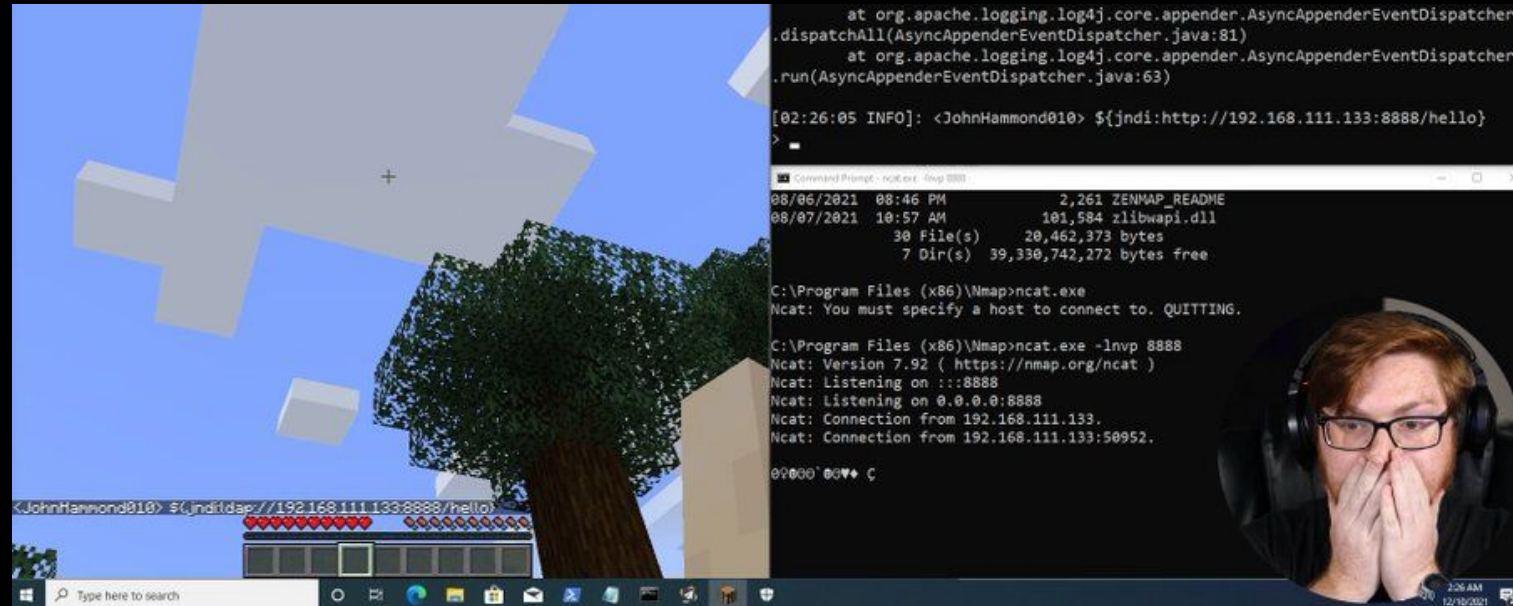
● GTA 6 Leaks

- Hacker leaked 3 GB of data containing dozens of clips
 - Considered one of the largest video game data breaches of all time
- Alleged hacker was a 17-year old from Oxfordshire, England
 - Associates with the hacker group “Lapsus\$”
- Gained access to Rockstar Games’ Slack server to carry out the breach
- GTA 6 budget: over \$2 billion!



● Log4j in Minecraft

- Log4j is a common Java library used for logging
- Zero-day exploit, known as Log4Shell, was discovered which allowed attackers to breach systems
- Some versions of Minecraft utilized a vulnerable version of Log4j, making Minecraft a possible attack vector
- Remote code execution could be gained via Minecraft's in-game chat
 - [John Hammond Demo](#)





Showcase of Projects: Brought to you by SJU GET

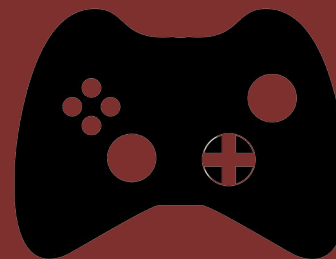
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Video Game Development



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● HTML/JS - Viscor By Paul Fung

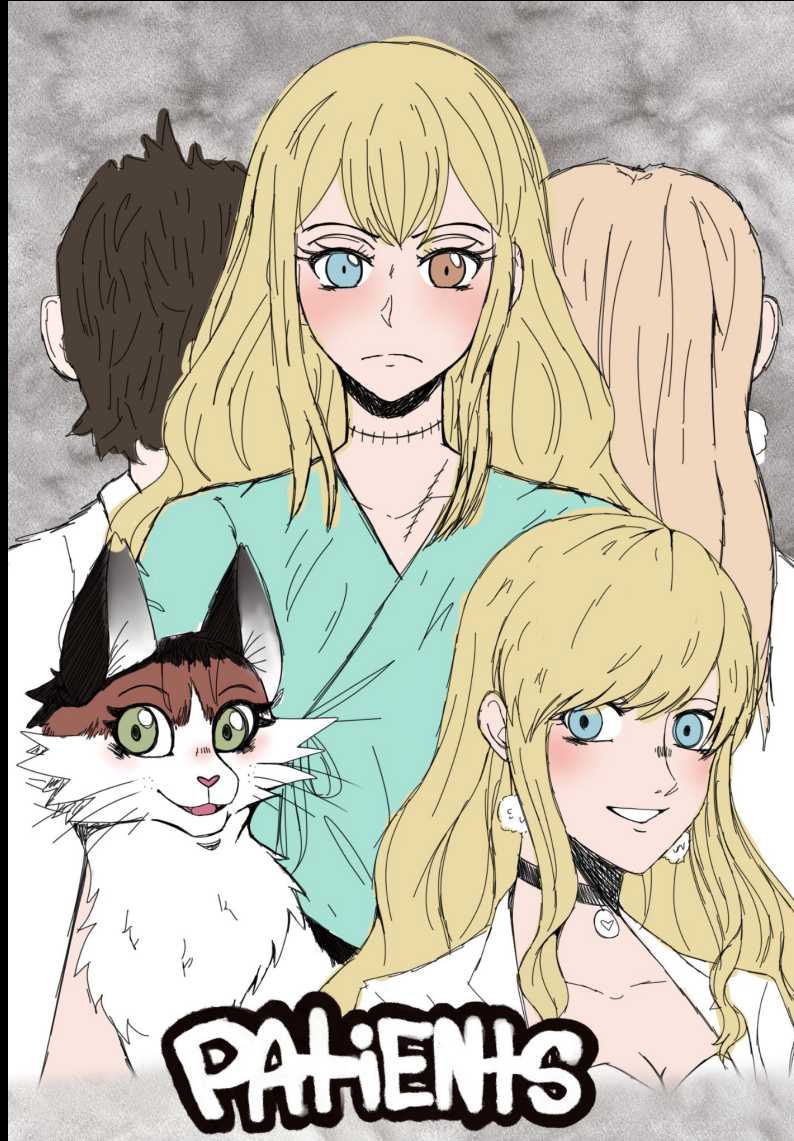
Welcome to the World of Viscor



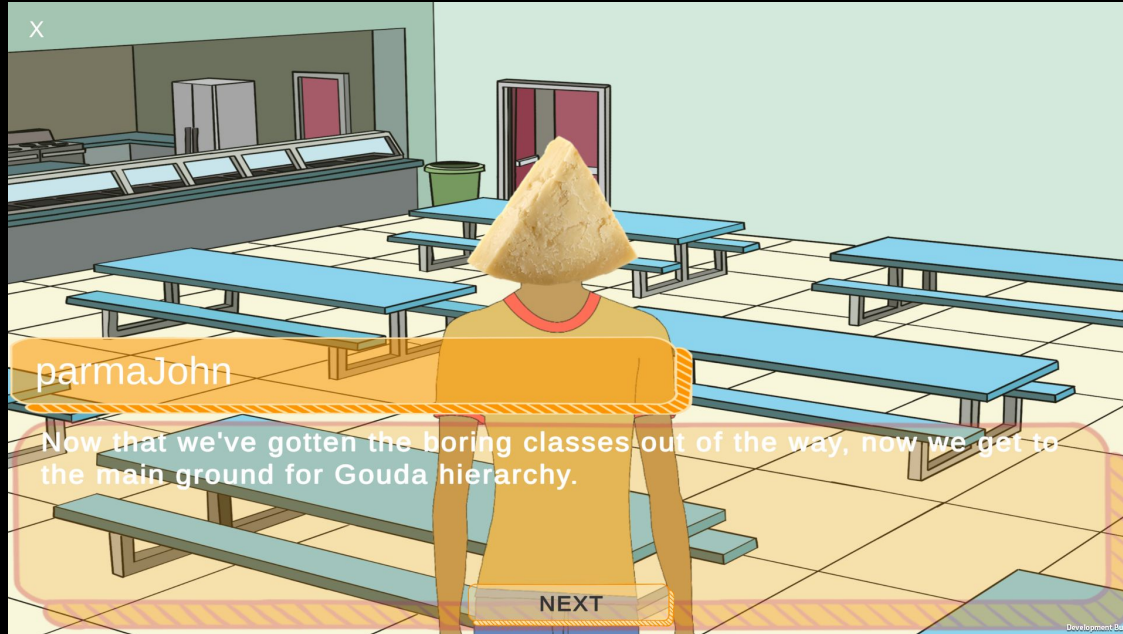
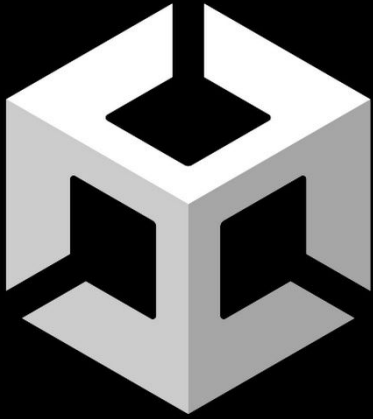
Begin



- RPG MAKER MV - Patients by Caitlin



Unity Projects



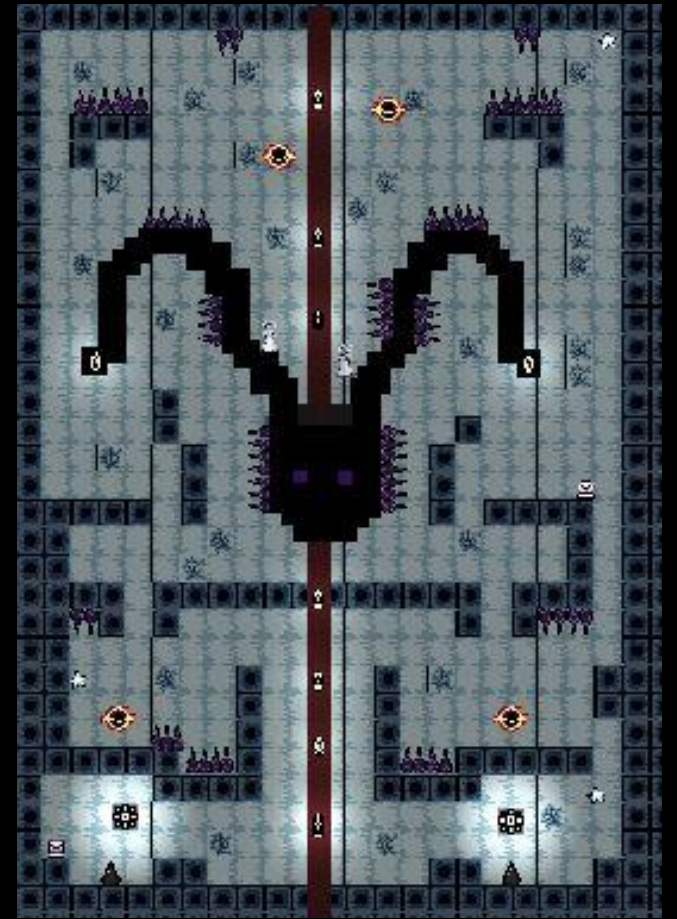
Lactose and Lovers



Trash Job



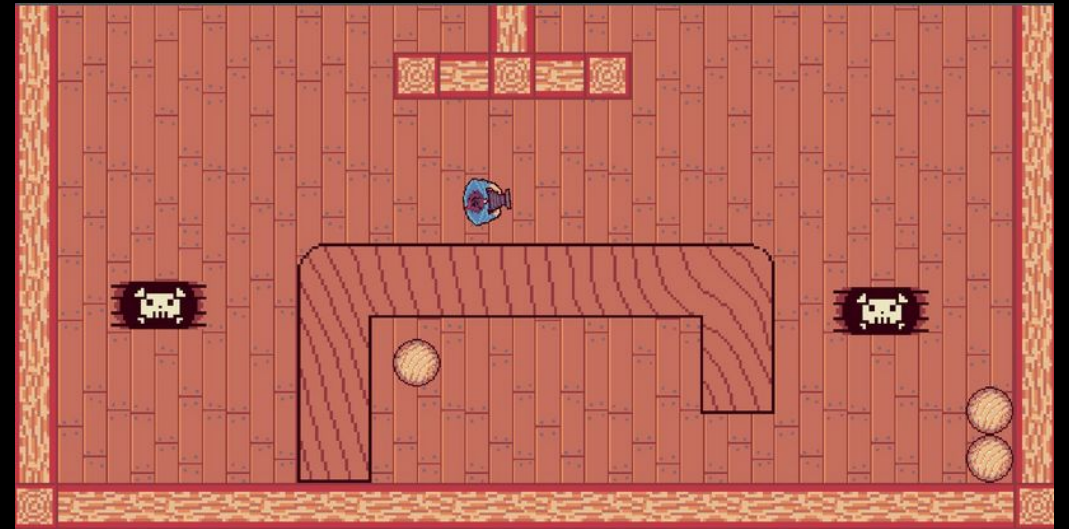
- Unity - I Need Space - Omega7



[I Need Space](#)



● Unity - Wallbang



You are your worst enemy. This is why your bullets bounce off walls and deal double damage to you. Fend off a wave of pirates along with the very cannonballs you shoot them with.

How to play: Aim with your mouse and click to shoot the enemy.

Programmer - Sajid2001

Level Designer - Logan

Art - Calcym, ZeroToaster

SFX - themasterdragon2

Music - Calcym



[Wall Bang](#)



- Unreal Engine Project - Kai and Cedric



Pygame - Space Invader



```
#Enemy Movement
for i in range(Enemy_Num):
    #GameOver
    if EnemyY[i] > 440:
        for j in range(Enemy_Num): #For loop in for loop = nested loop
            EnemyY[j] = 2000
        GameOverText()
        if HighScore < score:
            HighScore = score
        font = pygame.font.SysFont("PressStart2P",64)
        time.sleep(3)
        window.blit(background,(0,0))
        font_text = font.render("HighScore: "+str(HighScore),True,"red")
        window.blit(font_text,(width/3,height/2))
        pygame.display.update()
        restart()
    #running = False
    #break #Takes us out of loop
    EnemyX[i] += EnemyX_Change[i]
    if EnemyX[i] <= 0: #Left side of the screen
        EnemyX_Change[i] = 4
        EnemyY[i] += EnemyY_Change[i]
    elif EnemyX[i] >= 736: #Right side of screen
        EnemyX_Change[i] = -4
        EnemyY[i] += EnemyY_Change[i]

#Collision
collision = isCollision(EnemyX[i],EnemyY[i],bulletX, bulletY)#Returns
True or False
if collision: #If Collision is true
    explosionSound = mixer.Sound("explosion.wav")
    explosionSound.play()
    bulletY = 480
    bullet_State = "ready"
    score += 1
    EnemyX[i] = random.randint(0,736)
```

Space Invaders



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