

Ladies and gentlemen,  
Start your engines!

The GAM 200 survival guide  
The CSD2400 survival guide

# About me



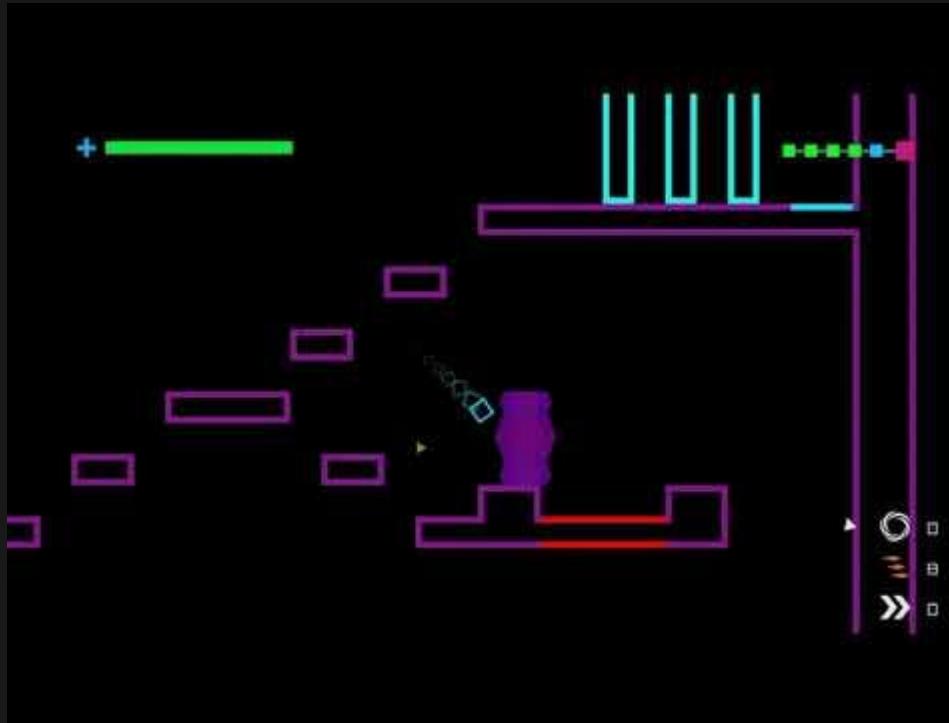
**Jamie:**

- SP Game Dev alumni
- Probably will graduate
- Current Year 3 RTIS
- Specialized in Graphics
- Worked on OpenGL for GAM 150 and 200

# What is this talk

# GAM250 Project Example (no BFA)

## CSD2450



# GAM250 Project Example (with BFA)

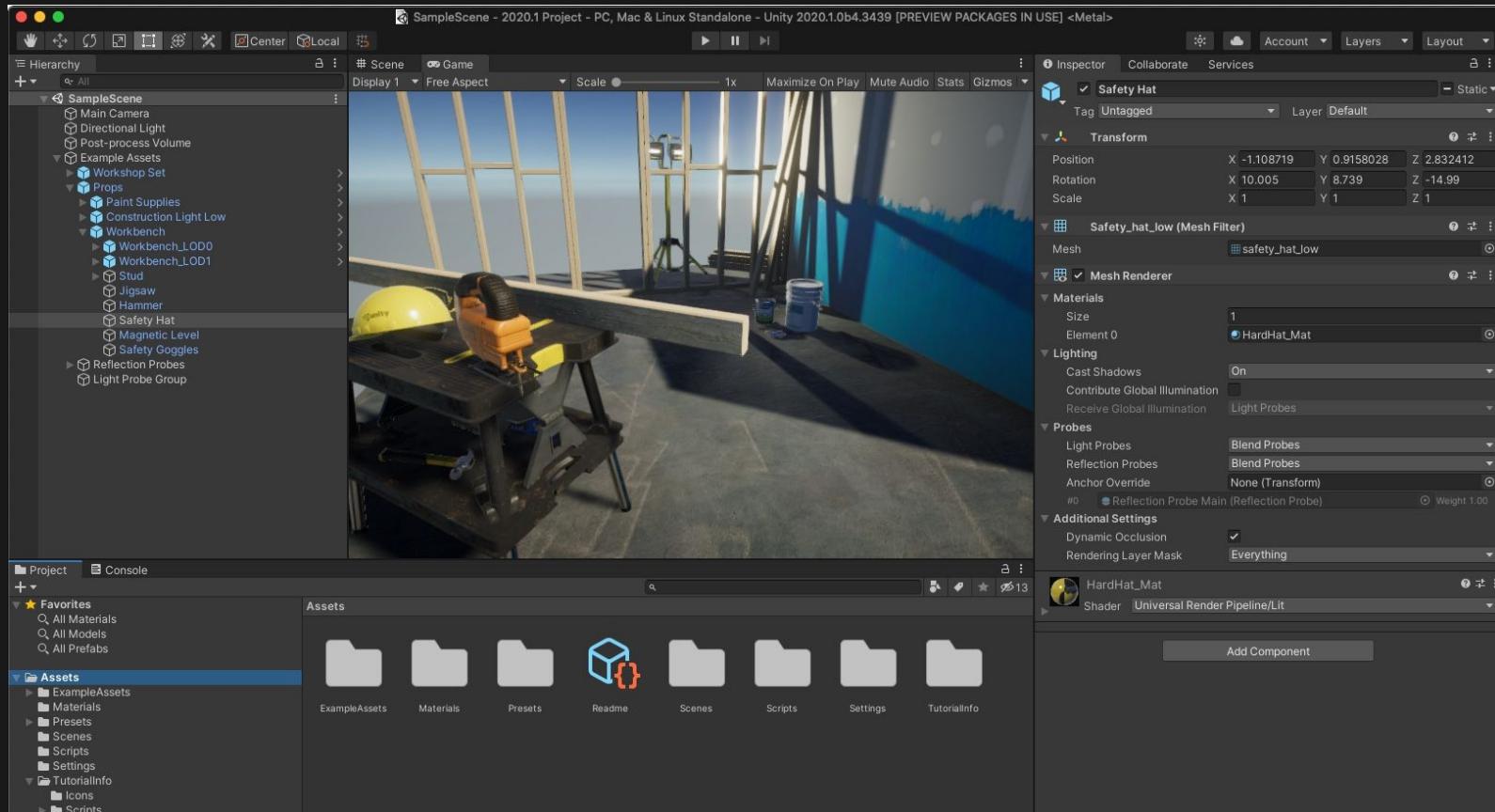
CSD2450



# Expectations

# What is a game engine anyway?

# Unity



# Unreal



# Cprocessing / AEngine

```
void shapesdemo_draw_triangle()
{
    // set the fill color to red
    CP_Settings_Fill(CP_Color_Create(255, 0, 0, 255));

    // draw a triangle with three points
    CP_Graphics_DrawTriangle(100.0f, 100.0f, // point 1
        200.0f, 100.0f, // point 2
        200.0f, 200.0f); // point 3

    // set the fill color to dark blue
    CP_Settings_Fill(CP_Color_Create(0, 0, 160, 255));

    // draw a triangle with three points
    CP_Graphics_DrawTriangle(0.0f, 0.0f, // point 1
        CP_Input_GetMouseX(), CP_Input_GetMouseY(), // point 2
        CP_Input_GetMousePreviousX(), CP_Input_GetMousePreviousY()); // point 3
}
```

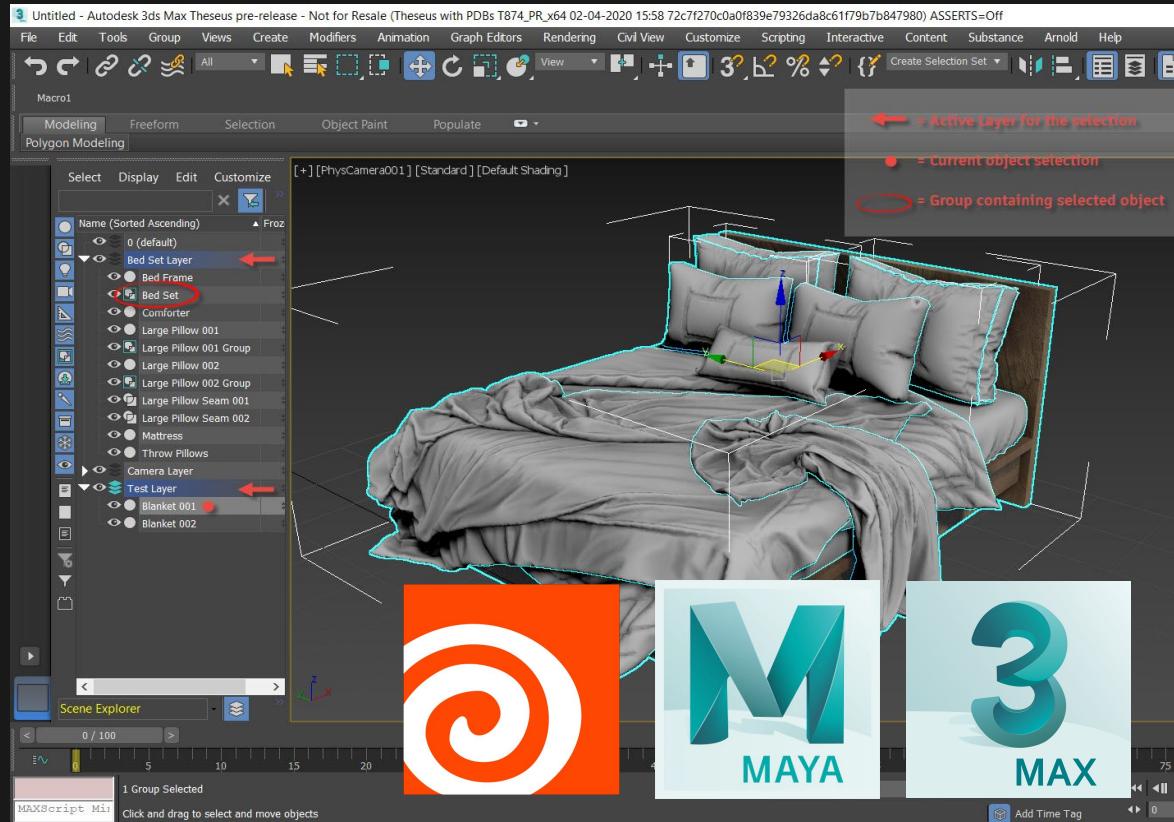
```
// =====
// create the bullet shape
// =====

GameObj* pBulletReference;
pBulletReference = sGameObjList + sVertexNum++;
pBulletReference->type = TYPE_BULLET;

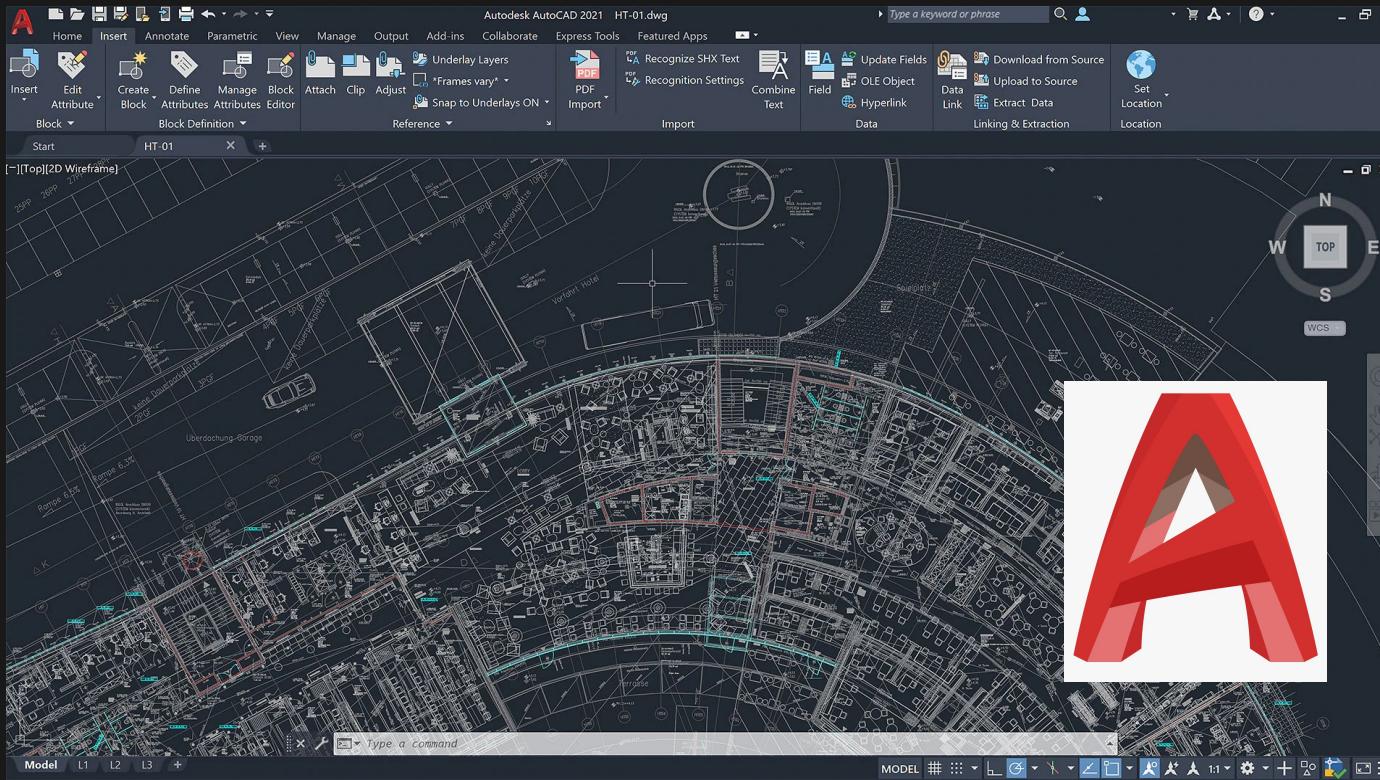
AEGfxMeshStart();
AEGfxTriAdd(
    0.5f, 0.5f, 0xFF00C9FB, 0.0f, 0.0f,
    -0.5f, 0.5f, 0xFF00C9FB, 0.0f, 0.0f,
    -0.5f, -0.5f, 0xFF00C9FB, 0.0f, 0.0f
);
AEGfxTriAdd(
    0.5f, -0.5f, 0xFF00C9FB, 0.0f, 0.0f,
    0.5f, 0.5f, 0xFF00C9FB, 0.0f, 0.0f,
    -0.5f, -0.5f, 0xFF00C9FB, 0.0f, 0.0f
);
pBulletReference->pMesh = AEGfxMeshEnd();
AE_ASSERT_MESG(pBulletReference->pMesh, "fail to create bullet object!!");
```

# Why game engines?

# Sort of like game engines



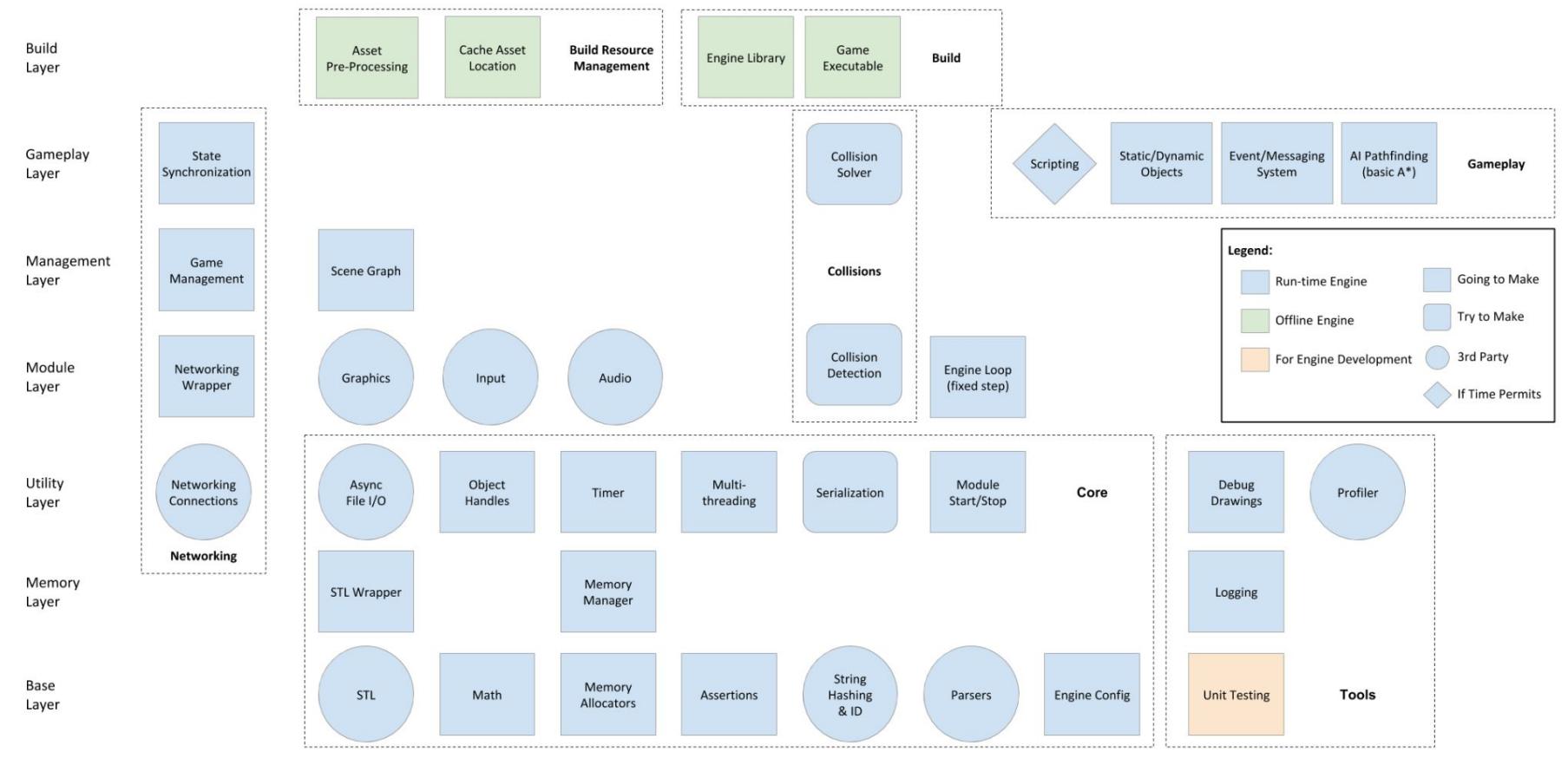
# Sort of like game engines



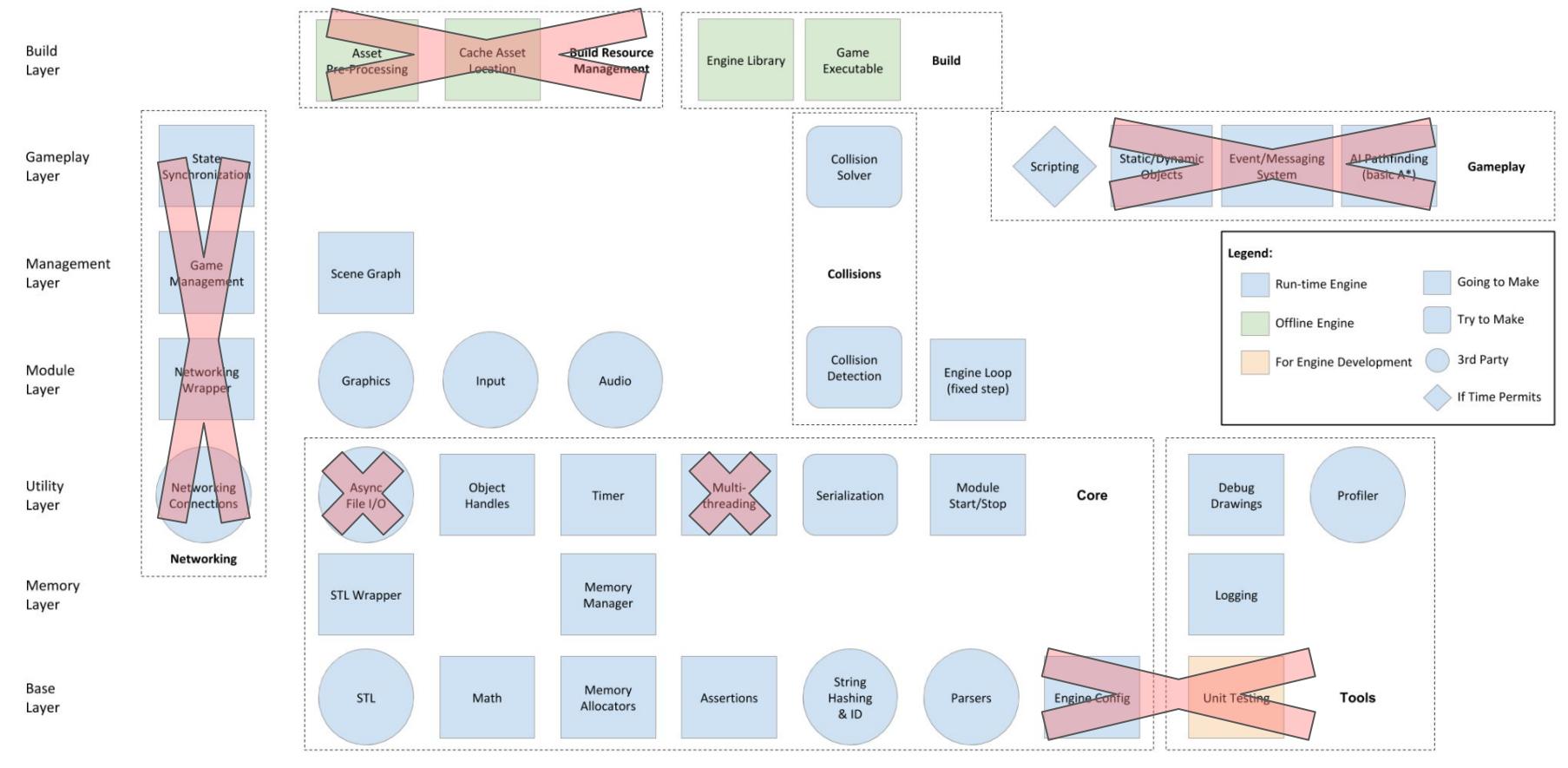
# Sort of like game engines



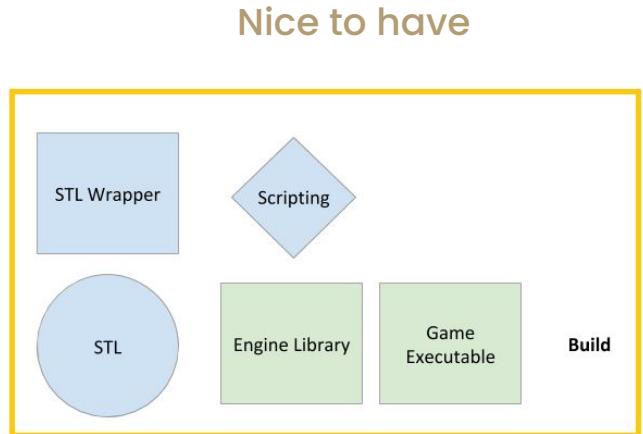
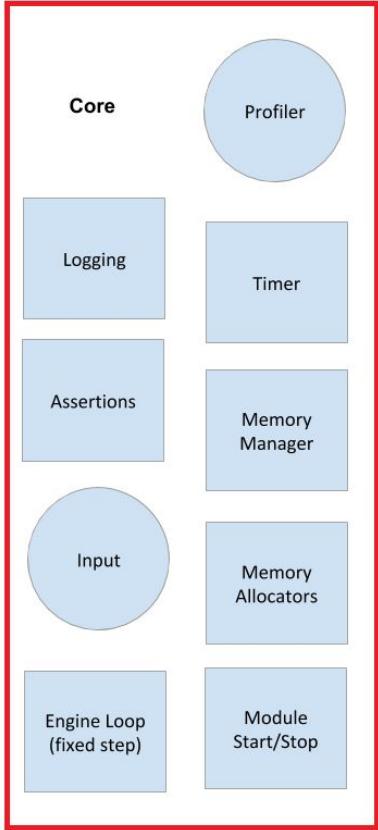
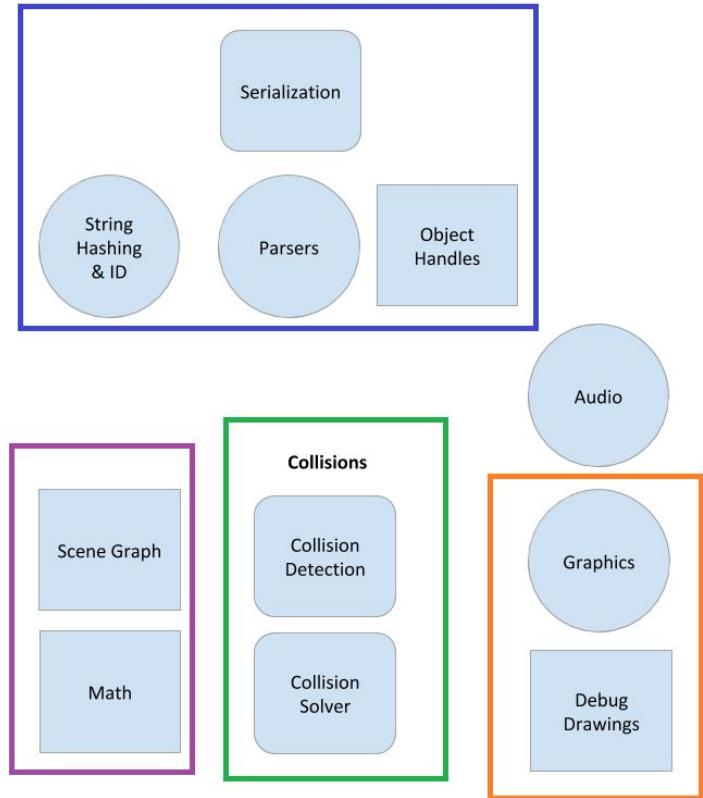
So, What is a game engine?



Source: <https://isetta.io/blogs/engine-architecture/>

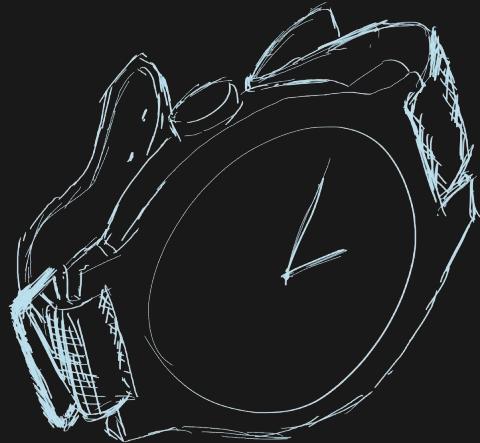


Source: <https://isetta.io/blogs/engine-architecture/>



# What is our resource?

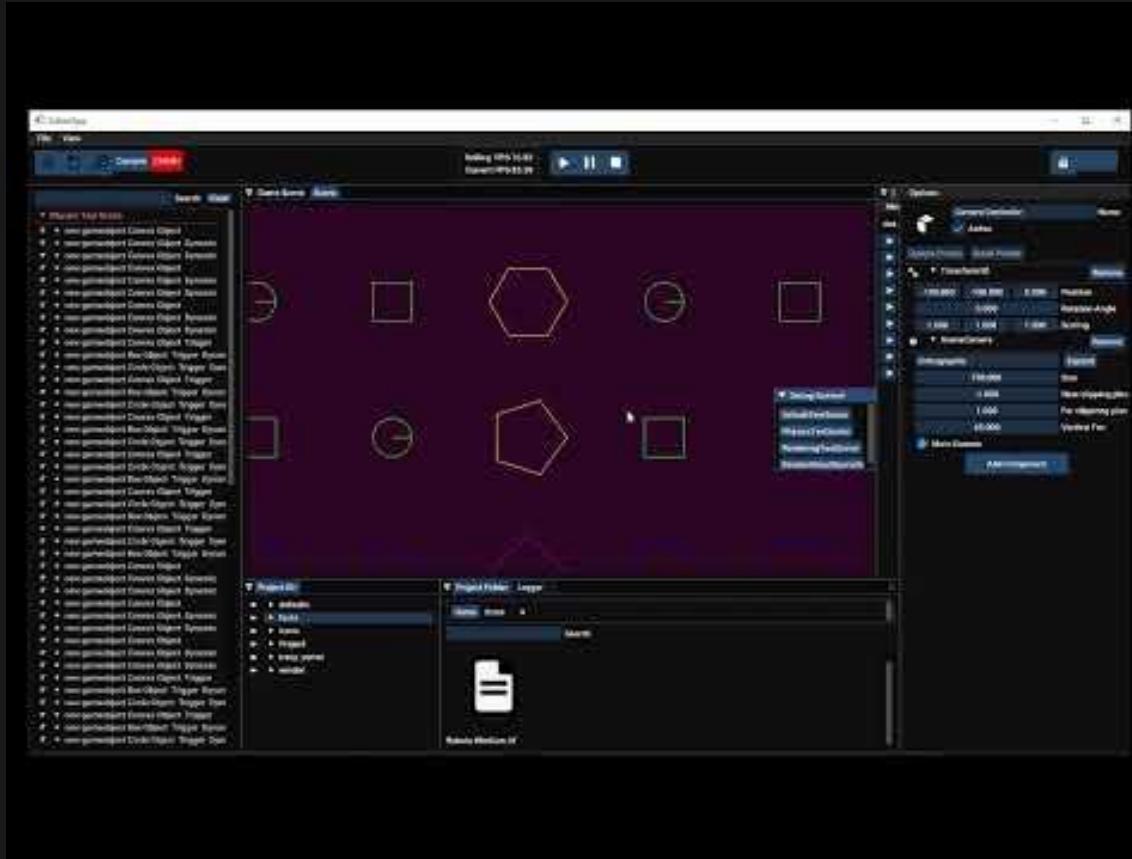
# What is our resource?



What a GAM200 engine should look like

# Post GAM200 engine

## CSD2400



# Final<sub>(ish)</sub> engine



# Example GAM200 schedule

CSD2400

# Example GAM200 schedule

CSD2400

## Engine proof milestone

- Basic engine functionality
- Graphics, Physics
- Unity prototype

# Example GAM200 schedule

## CSD2400

### Engine proof milestone

- Basic engine functionality
- Graphics, Physics
- Unity prototype

### Segment milestone

- One mechanic in engine
- More engine features

# Example GAM200 schedule

## CSD2400

### Engine proof milestone

- Basic engine functionality
- Graphics, Physics
- Unity prototype

### Segment milestone

- One mechanic in engine
- More engine features

### Episode milestone

- Playable level in game engine

# Example GAM200 schedule

## CSD2400

### Engine proof milestone

- Basic engine functionality
- Graphics, Physics
- Unity prototype

### Alpha

- Full level in engine

### Segment milestone

- One mechanic in engine
- More engine features

### Episode milestone

- Playable level in game engine

# Example GAM200 schedule

## CSD2400

### Engine proof milestone

- Basic engine functionality
- Graphics, Physics
- Unity prototype

### Alpha

- Full level in engine

### Segment milestone

- One mechanic in engine
- More engine features

### Beta

- Full game in engine

### Episode milestone

- Playable level in game engine

# Example GAM200 schedule

## CSD2400

### Engine proof milestone

- Basic engine functionality
- Graphics, Physics
- Unity prototype

### Alpha

- Full level in engine

### Segment milestone

- One mechanic in engine
- More engine features

### Beta

- Full game in engine

### Episode milestone

- Playable level in game engine

### Gold

- Game is polished and ready for release

Observations from past experience  
helping GAM 200 groups  
CSD2400

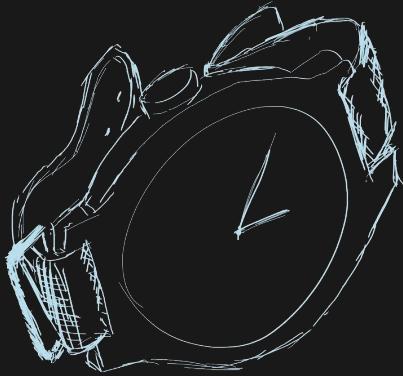
# Team Conflicts and Communication Issues



# Working with UXs and BFAs



# Project and Time Management



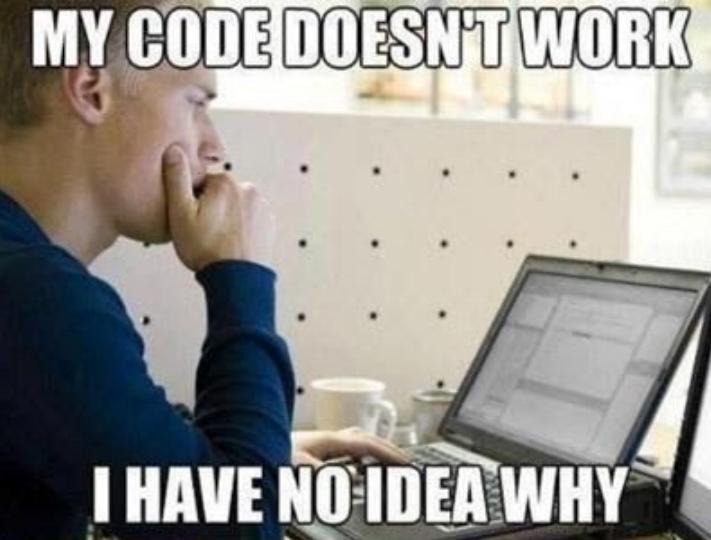
# What is a Stand-up?

A short meeting where each team member will update the team on their task



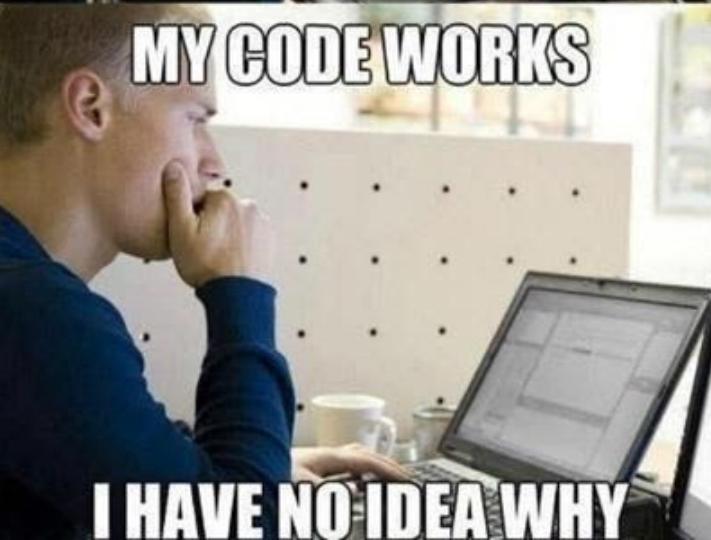
# Why are Stand-ups important?

**MY CODE DOESN'T WORK**



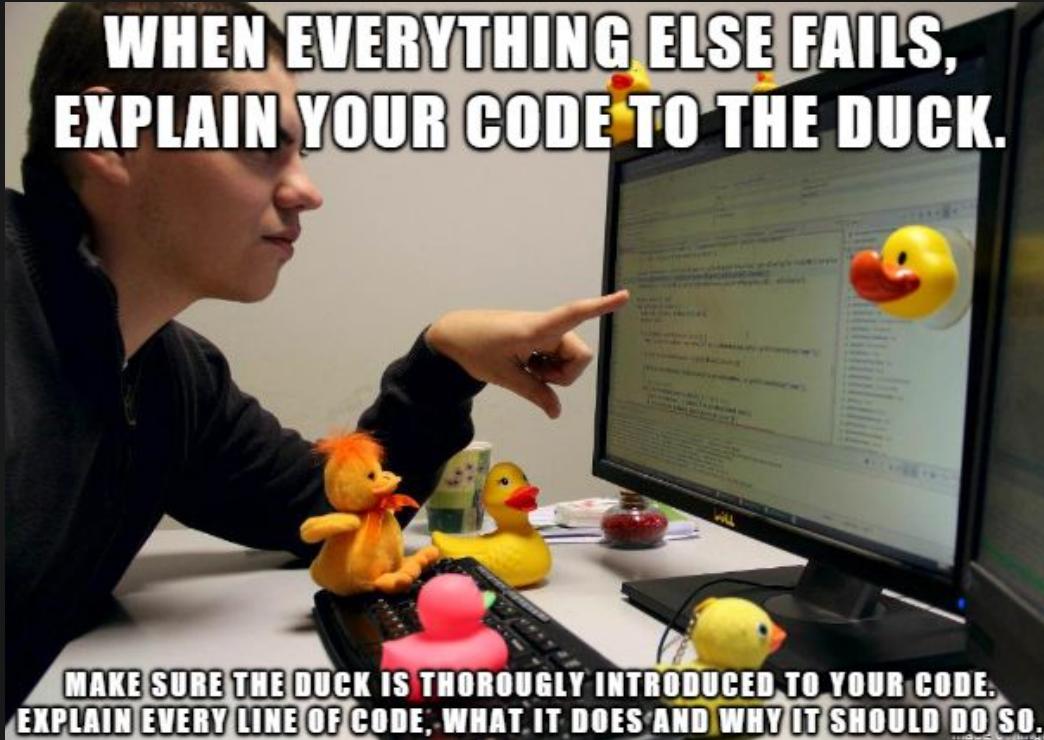
**I HAVE NO IDEA WHY**

**MY CODE WORKS**



**I HAVE NO IDEA WHY**

# Rubber Duck Debugging

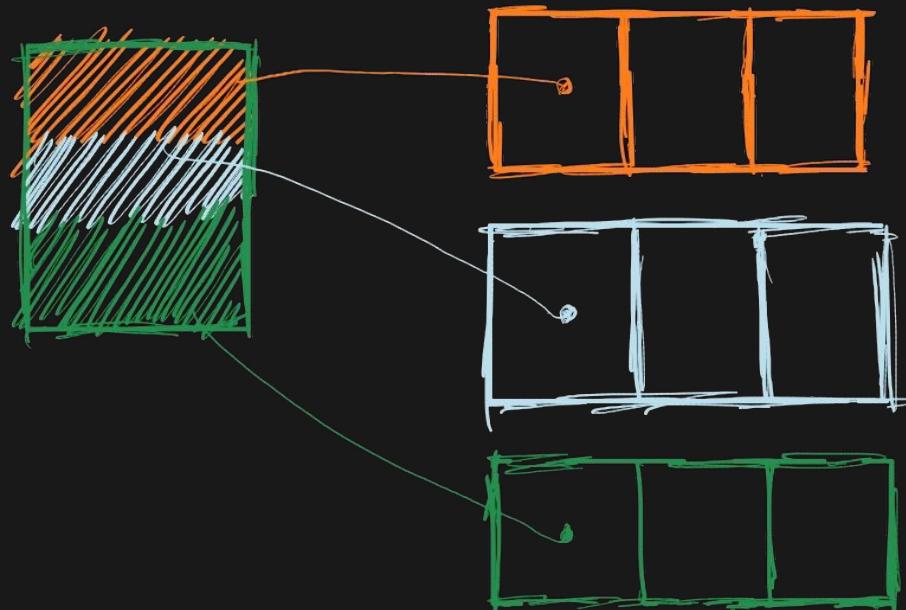


# Ticketing System

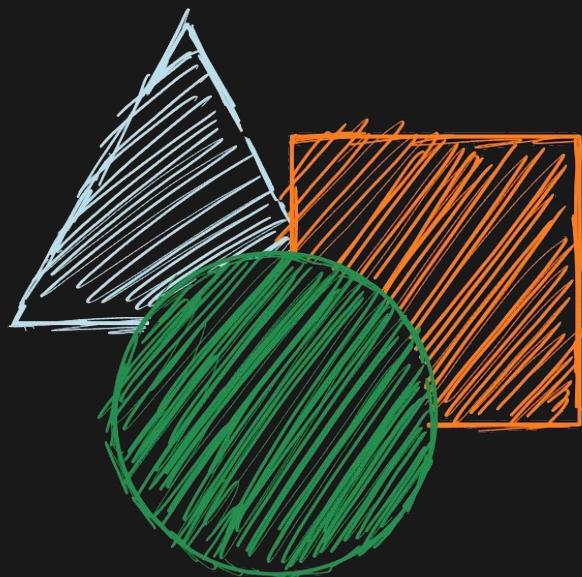


# Game Engine Features Overview

# Engine Architecture / ECS



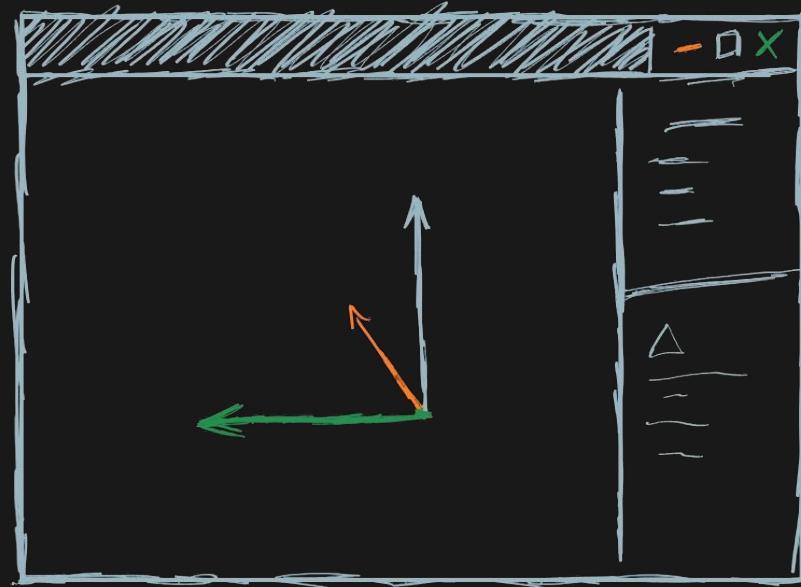
# Graphics



# Physics



# Editor



# Gameplay Scripting



# Gameplay Scripting



**WAITING FOR CODE TO COMPILE**



**STILL WAITING**

# Artificial intelligence

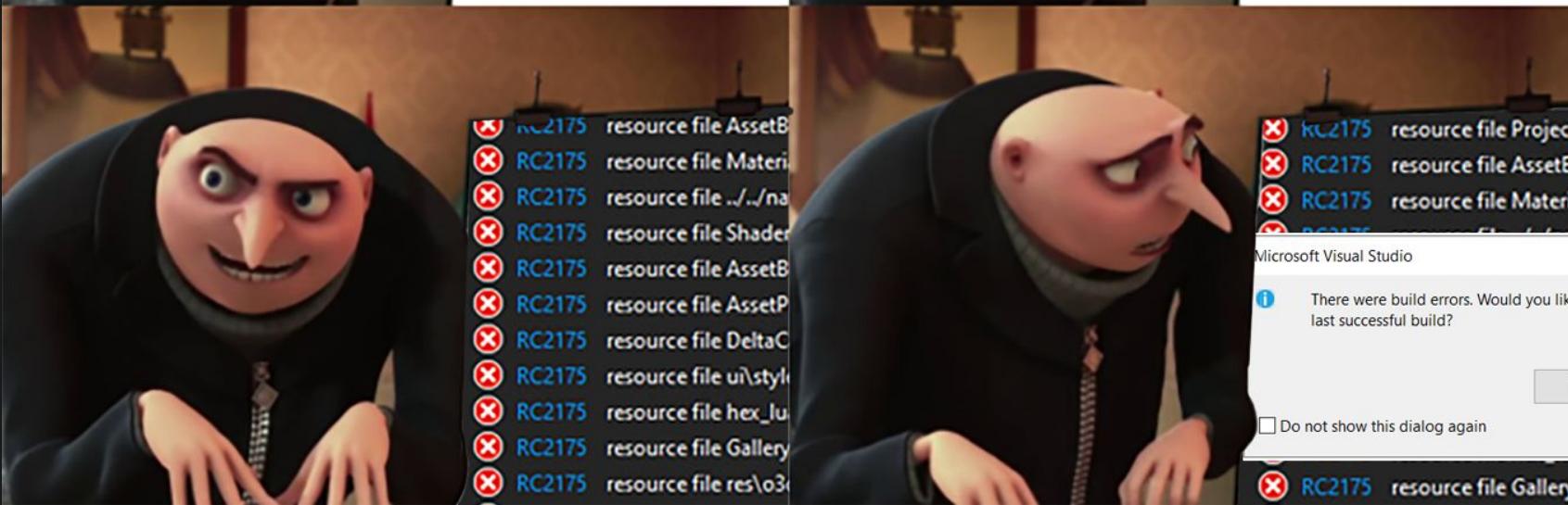


# Audio



# Tips on starting your GAM 200 Engine

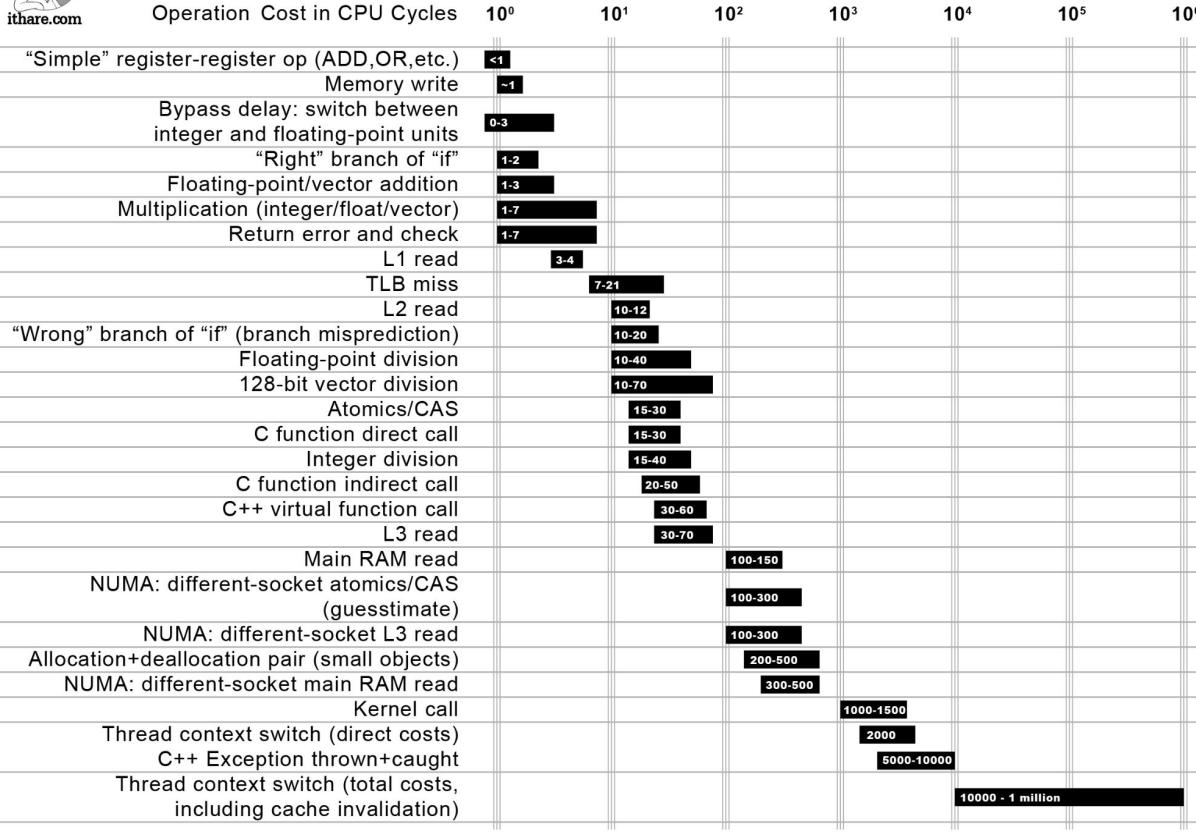
CSD2400



# What happens when you call “new”



Not all CPU operations are created equal



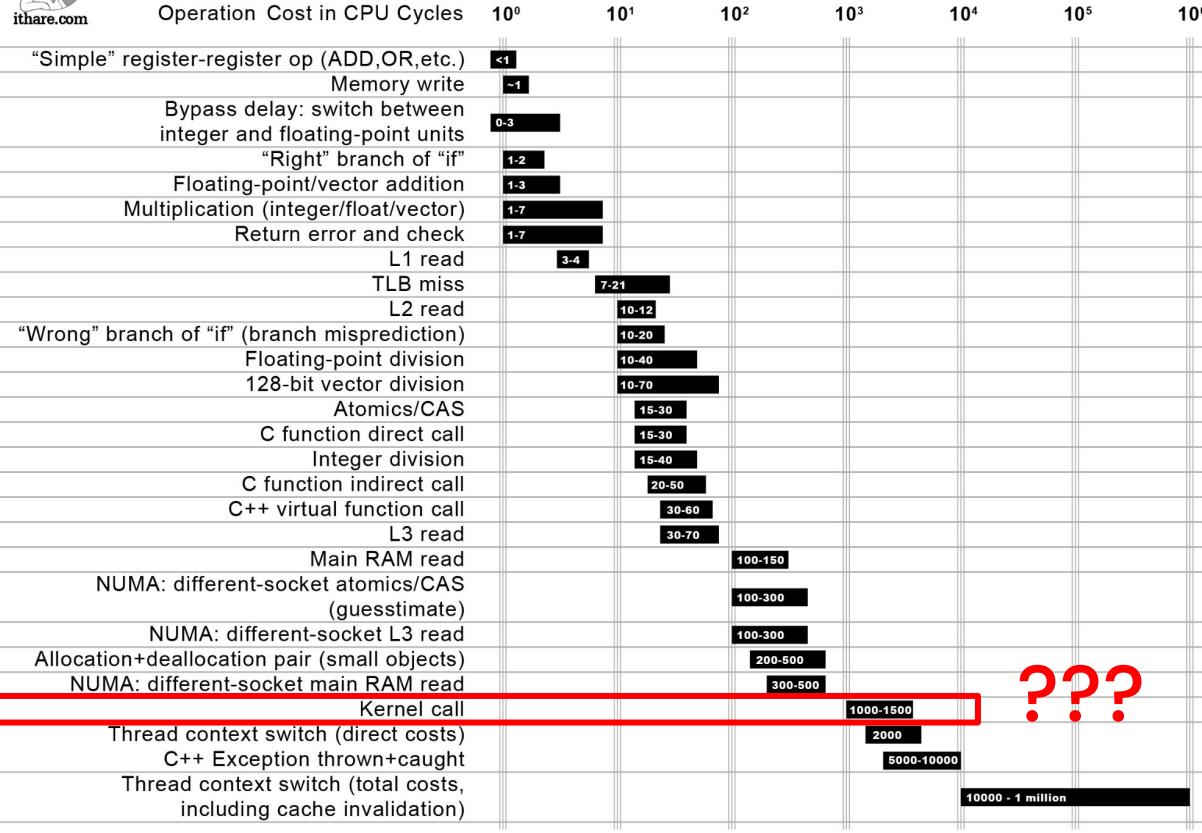
Distance which light travels while the operation is performed



# What happens when you call “new”



Not all CPU operations are created equal



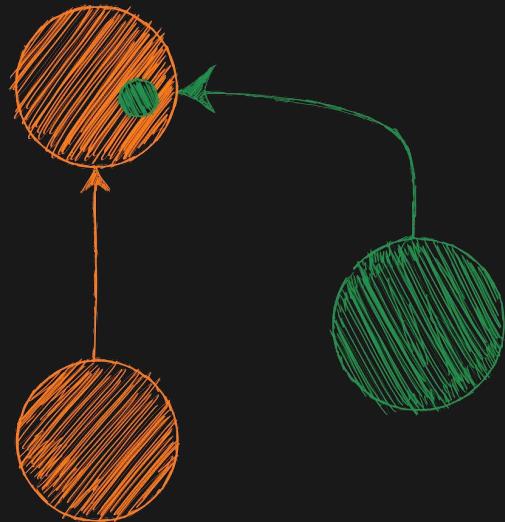
Distance which light travels while the operation is performed



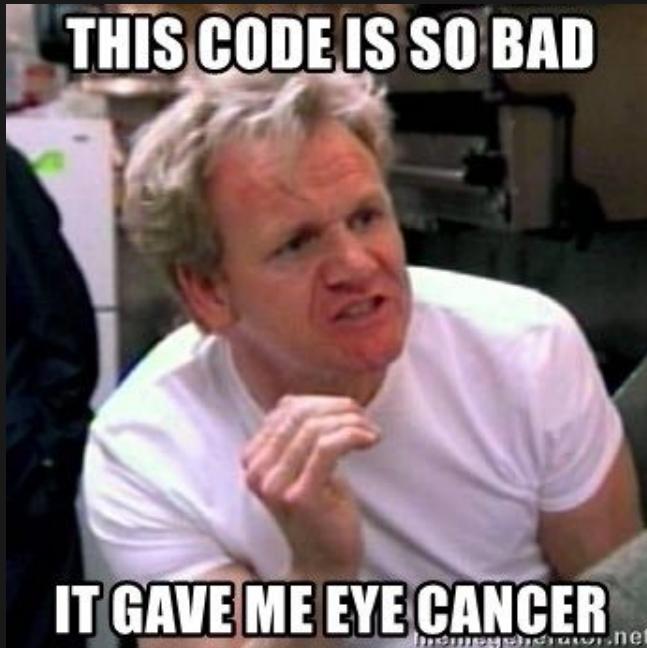
# Roles and Responsibilities

# Setting Priorities and Deadlines

# Version Control



# Good Coding Practices



Ministry Of Dev, PhD  
@UdellGames

[+ Folgen](#)

Use whatever brace style you prefer.

But not this.

Don't do this.

Seek help instead of this.

```
public class Permuter
{
    private static void permute(int n, char[] a)
    {
        if (n == 0)
            System.out.println(String.valueOf(a));
        else
            for (int i = 0; i <= n; i++)
                permute(n-1, a);
                swap(a, n % 2 == 0 ? i : 0, n);
    }
    private static void swap(char[] a, int i, int j) {
        char saved = a[i];
        a[i] = a[j];
        a[j] = saved;
    }
}
```

# Ninecraft

## Lessons from my team

- Hierarchical team structure considered harmful
- Vision issues
- Work smarter not harder



# Hierarchical structure considered harmful

-  GAM 200 visions
-  GAM200 NineCraft
-  GAM200 TECH

- Separate rooms, separate teams
- Communication barrier/conflict
- Different levels of commitment

# Vision issues



- Game's Design not "Digipen friendly"
- Differing Final Product Vision
- Over Accommodation

# Work smarter not harder



- Tech team stayed strong
- Frequently discussed problems
- Pair programming

What should you hope to achieve as a  
student in GAM 200?  
CSD2400

# Don't be afraid to ask around for help

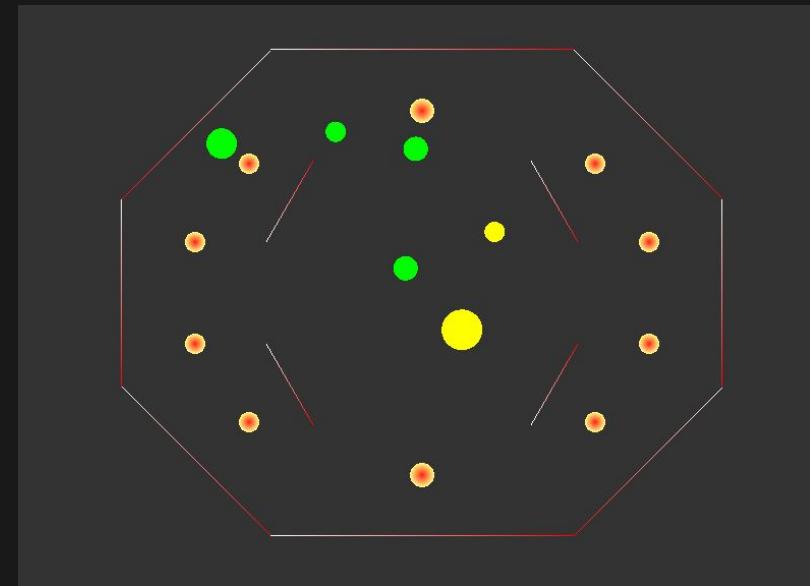
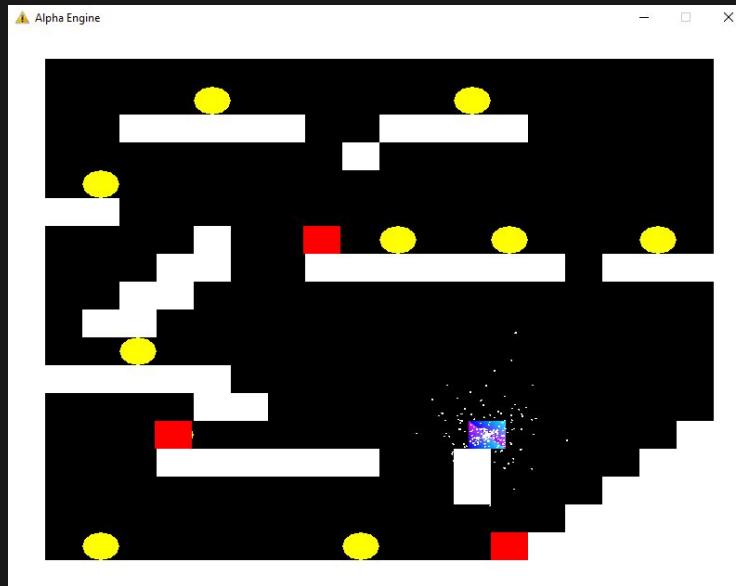
- BUT, ask questions the right way
- Try to find an answer:
  - Forum
  - Web
  - manual
  - FAQ
  - Experimentation
  - Ask a skilled friend
  - Reading source code

<http://www.catb.org/~esr/faqs/smart-questions.html#before>

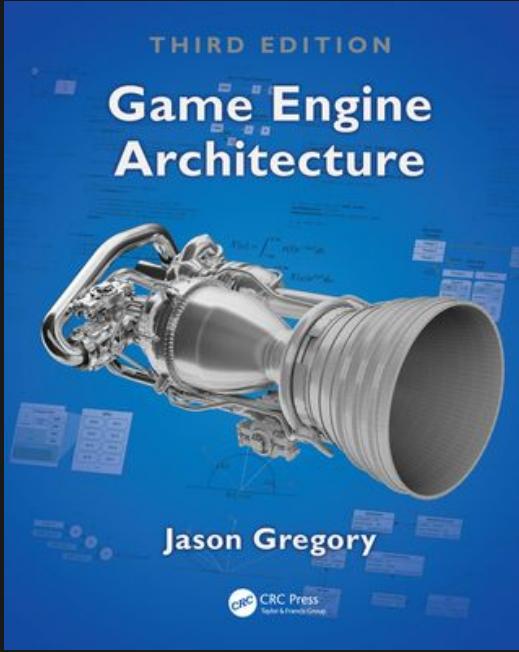
# Good resources

# Physics and collision

CSD1130 - Game Implementation techniques



# Jason Gregory



Physical: \$140  
O'Reilly student : FREE

- High level overview
- Use it as a reference
- We don't have time for books

<https://www.oreilly.com/library-access/>

# Yan Chernikov

A circular portrait of a young man with short brown hair and a light beard, smiling slightly. He is wearing a dark t-shirt. The background is a blurred outdoor scene with greenery.

**Yan Chernikov**  
@TheCherno

Youtuber : [youtube.com  
/c/TheChernoProject](https://youtube.com/c/TheChernoProject)

- Digestible content
- Understanding concepts
- Code structure
- He may not be showing you a perfect answer

# General stuff

Git - source control	<ul style="list-style-type: none"><li>• <a href="https://www.atlassian.com/git/tutorials/setting-up-a-repository">https://www.atlassian.com/git/tutorials/setting-up-a-repository</a></li><li>• <a href="https://desktop.github.com/">https://desktop.github.com/</a></li><li>• <a href="http://gitextensions.github.io/">http://gitextensions.github.io/</a></li></ul>
Graphics	<ul style="list-style-type: none"><li>• <a href="https://learnopengl.com/">https://learnopengl.com/</a></li><li>• <a href="https://docs.gli/">https://docs.gli/</a></li><li>• <a href="https://www.khronos.org/opengl/wiki/">https://www.khronos.org/opengl/wiki/</a></li></ul>
Physics	<ul style="list-style-type: none"><li>• <a href="https://gamedevelopment.tutsplus.com/tutorials/how-to-create-a-cu_stom-2d-physics-engine-the-basics-and-impulse-resolution--game-dev-6331">https://gamedevelopment.tutsplus.com/tutorials/how-to-create-a-cu_stom-2d-physics-engine-the-basics-and-impulse-resolution--game-dev-6331</a></li></ul>
Physics timestep	<ul style="list-style-type: none"><li>• <a href="https://www.gafferongames.com/post/fix_your_timestep/">https://www.gafferongames.com/post/fix_your_timestep/</a></li></ul>
Scripting	<ul style="list-style-type: none"><li>• <a href="http://docs.go-mono.com/?link=xhtml%3adeploy%2fmono-api-metad ata.html">http://docs.go-mono.com/?link=xhtml%3adeploy%2fmono-api-metad ata.html</a></li><li>• <a href="https://github.com/mono/mono">https://github.com/mono/mono</a></li></ul>

# General stuff

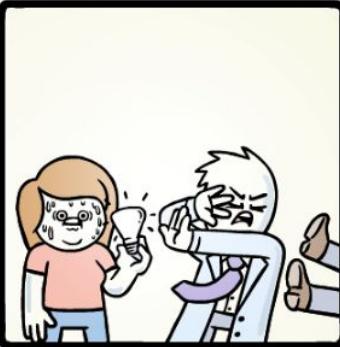
Editor	
ImGui	
ImGuiUI	
ImGuizmo	<ul style="list-style-type: none"><li>• <a href="https://github.com/ocornut/imgui">https://github.com/ocornut/imgui</a></li><li>• <a href="https://github.com/CedricGuillemet/ImGuizmo">https://github.com/CedricGuillemet/ImGuizmo</a></li></ul>
Serialization	<ul style="list-style-type: none"><li>• <a href="https://www.rttr.org/">https://www.rttr.org/</a></li><li>• <a href="https://rapidjson.org/">https://rapidjson.org/</a></li></ul>
Audio - FMOD	<ul style="list-style-type: none"><li>• <a href="https://www.fmod.com/">https://www.fmod.com/</a></li></ul>
ECS	<ul style="list-style-type: none"><li>• <a href="https://www.david-colson.com/2020/02/09/making-a-simple-ecs.html">https://www.david-colson.com/2020/02/09/making-a-simple-ecs.html</a></li></ul>

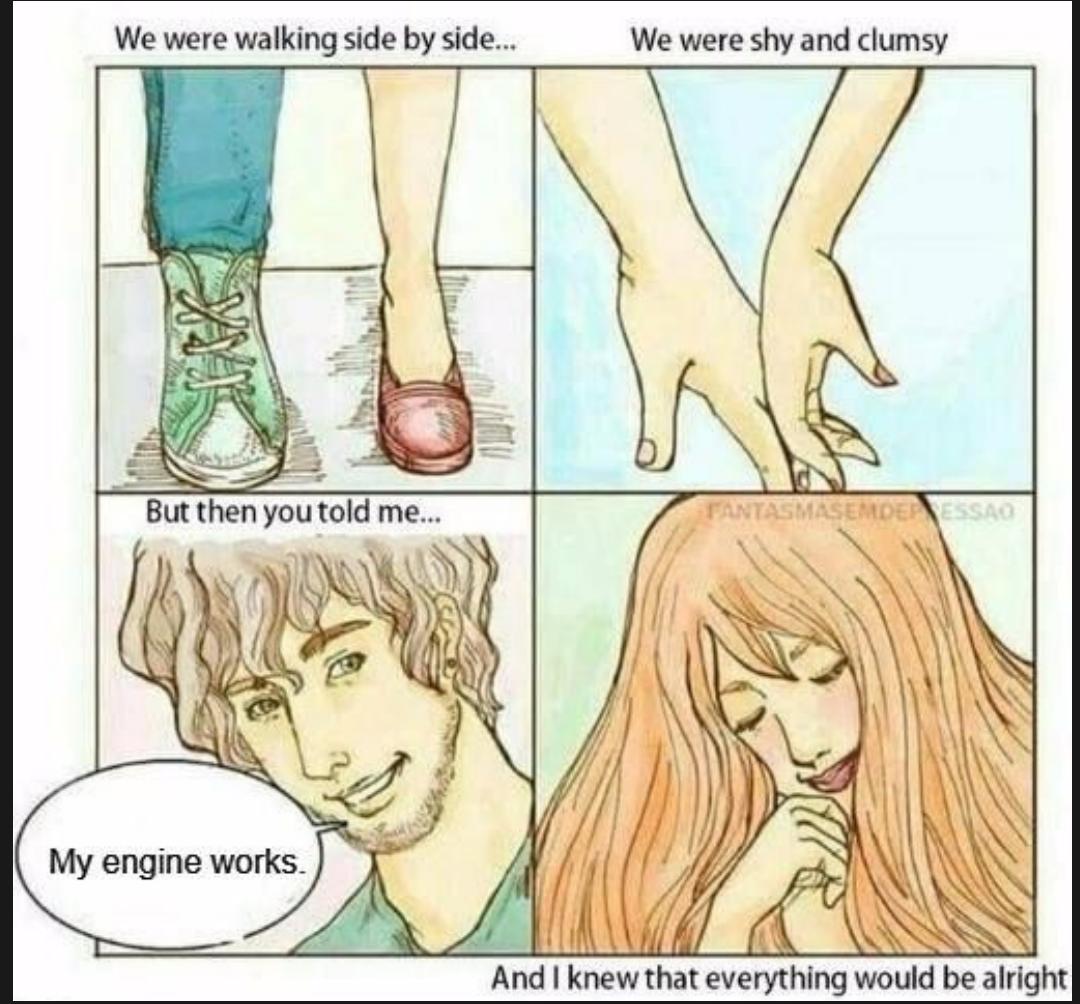
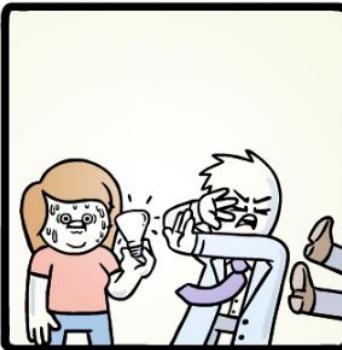
# Remember to stay healthy

- Burnout is real
- Exercise & eat well
- Sometimes a problem is easier after a break

If you forget everything  
Remember this

Game engines are hard





# Join our ASC Engine Club Discord Server



<https://discord.gg/cCRW4xxtJb>

<https://tinyurl.com/asc-engine>