AKDENİZ UNIVERSITY

FACULTY OF ENGINEERING
COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

CSE 491
SENIOR DESIGN PROJECT
INTERMEDIATE REPORT

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1 Group Members and Roles

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2 Introduction

We are two students and independent game developers who studying computer science and engineering at Akdeniz University. For the Senior Design Project course, we will develop a computer game. This game is going to be a survival game based on a story. This game type is very improvable and liked by people. First of all, we need to determine what kind of game we want in our minds. We need to decide how the game will look (First Person, Third Person, Side, Top Down, etc.), what the story of the game will be and which game engine we will use. In addition, we need to know the language used by the engine. Besides the game engine, we will also need other programs to design models. Such as Autodesk 3dsmax, Blender, and Adobe programs.

2.1 What is the Independent Game Development?

Independent game development refers to a game development process made by one person or a small team, especially one without financial support from a publisher. Independent game developers are without any restrictions in terms of creativity, mostly in a home environment or in small offices, with their own means and ideas. The income of these small communities depends on the supporters they have, the advertising promotions they can do as their budget allows, and of course the quality of the games they make. There are indie games, which are short for independent games that have very high incomes and even crushed the sales figures of the games of some of the big companies. These are:

Minecraft – Mojang

Terraria – Re-Logic

Braid – Jonathan Blow

Super Meat Boy – Team Meat

Spelunky – Derek Yu, Mossmouth LLC

Starbound – Chucklefish Ltd

Shovel Knight – Yacht Club Games

Undertale - Toby Fox

Stardew Valley - ConcernedApe

Below, there are two figures that show the advantages and disadvantages of indie game development. [2] (Figure 1) and (Figure 2)

Figure 1: Advantages of Indie Game Design

Figure 2: Disadvantages of Indie Game Design

3 Problem

The problem is the "Proper Game Engine". The game engine is the framework and ready-made skeleton used to create a game. Developers with the help of game engines; can easily create much faster and more advanced games for computers, consoles, and mobile devices. Also, we can describe the game engine as the heart of a game. In fact, we can summarize the game as the decorations made on this engine, the added story, sound, music, map, and overlays. The sine qua non of a game engine includes displaying the game map, models, and other graphic elements to the player, (collision detection: did you shoot someone, did you hit someone, where did you hit, how much health did you hit, etc.), things like playing audio and music files at the right time can be counted.

3.1 Definition of the Problem

The problem definition is "Why we don't build a game engine and how do we choose a proper game engine?". Building a game engine from scratch means hours of professional work, which must be done by teams and highly advanced people in software languages. Even the biggest game developers of today are aware of this situation, so instead of building their own game engines, they are taking the most important part of the workload off their shoulders by using the game engines that are already in place.

3.2 Difficulties

Difficulties of building a game engine:

1 - Rendering
2 - Math Calculations
3 - Input Taking
4 - Frame Timing Control
5 - System Initialization
6 - Takes Too Much Time

Difficulties of choosing a proper game engine:

1 - Does the game engine to be used charge a fee?
2 - What is the cross-platform support level for the platform(s) where the game will be released?
3 - Is the content of the documentation sufficient in terms of information?
4 - Which programming language is used for the game engine will use?
5 - What scripting language support is used if any?
6 - Is the interface of the game engine easy to use?
7 - How is the community support that the developer will interact with in terms of activity?

Difficulties of indie game development:

Graphics/Sound/Playability, including 2D and 3D, will vary depending on the size of the Indie Studio, the type of play it wants to do, and its budget. Since most indie studios have a limited budget, they try to do these things with the support of funding.

In one-man studios things are more difficult, the developer has to either make or buy the Graphics, Programming, Music, and Sound Effects itself. Stress and work tempo are very high when the developer does it himself/herself.

4 Comprehensive Survey

4.1 Survey About the Problem

Game engines are the heart of a game because you build the game on the story and characters you design and jump, run, and fly; It is the software that blends the data required for the game such as the light and shadow adjustment of the scenes, which allows physical movements such as explosions, collisions, gravity to be displayed on the screen, the sound of sounds, the editing of commands with codes, the use of AI (artificial intelligence) modules. The game engines actually provide the necessary optimization for the background game, and in some game types, creating a feeling for the player as if the character and object in the scene reflect this feeling to the player.

There are two game engines in competition among many game engines in the market. These are Unity and Unreal Engine.

4.1.1 Unity

Figure 3: Unity

It has a multi-platform capability and was created in Denmark by Unity Technologies. It produces 3D games and simulations more effectively than the available game engines. It is possible to create 2D games as well, although the quality is inferior to that of 3D game development. Only C# is used by Unity. The 2020 version now supports the Bolt plugin and does away with the Boo and UnityScript languages. Objects have pre-coded attributes that can be enabled by dragging and dropping them. You can purchase or download a variety of tools from Unity's huge asset store, including 2D and 3D model animation, scene, particle, lighting, shadow, ground, tree, rock, terrain, and sky-compatible add-ons. For the creation and development of games across several platforms, the Unity game engine may be preferred (PC, console, mobile device). Mobile platforms and VR (Virtual Reality) technology see the most success with it. The in-depth and instructive tutorials and courses can help you learn how to use the game engine in greater detail. Because of its simplicity compared to Unity's capability, it is preferred by software developers and is not difficult to use. Students who sign up for Pro accounts from Unity receive them for free. In the free version, there are no limitations and only the Unity game engine's logo is visible when the game is opened. Purchasing the Pro version is required if the yearly revenue is more than $200,000.[1] In terms of utilization, it is the game engine with the greatest community. When an issue arises, a solution is found promptly and without difficulty. Compared to other game engines, the documentation has more content. In comparison to Unreal Engine, Unity's graphics are inferior and it is unable to produce realistic-looking effects. Unlike previous game engines, this one integrates graphics and code, speeding up development and offering the developer a flexible workspace. There is a business license available. Small projects

and the creation of mobile games are better suited for their use. It is not appropriate for the kind of massive projects we refer to as AAA games. The Unity game engine has an advantage over Unreal Engine when it comes to recruitment processes compared to Turkey.

4.1.2 Unreal Engine

Figure 4: Unreal Engine

It is the engine that Epic Games created. Because it has also been employed in the film business, Unreal Engine is no longer merely a game engine. As a result, artists use it as an engine that is friendly to them. The language utilized is C++, and the drag-and-drop visual programming interface, which we refer to as Blueprint, is employed. Visual scripting can be used to create some games, however the Unreal Engine foundation is quite sophisticated and challenging to understand. Unreal Engine is slower and more challenging to use for game development than Unity. First-person shooters and third-person shooters are the game genres with which it has found success, and it is appropriate for creating 2D and 3D games. Compared to other game engines, it has the best graphics, making it possible to create AAA games, or what we refer to as massive and complicated games. As opposed to Unity, it has a smaller community. It supports multiple platforms. The license type is a commercial license. Unreal Engine 5 was unveiled in May 2020 and is anticipated to be released near the end of 2021. Currently there are 4 versions. As infrastructure, it supports VR (Virtual Reality) games like Unity. In accordance with Unity, it is the greatest engine that has succeeded in realistic visualization and has strong materials

and animation features that can produce landscape and vegetation. It does not have as extensive documentation as Unity. Normally it's free, but if the fee earned exceeds 1,000,000 USD, a 5% royalty fee will be charged by Epic Games.

4.2 Common Approaches

Unity comes as a completely free and open-source game engine, but there are also paid and premium versions to choose from.

The games are for playing on various devices like iOS, Android, PC, and so on. Therefore, game development companies are required to develop various versions that users of any device can play without any glitches. The Unity 3D game engine allows game developers to make different versions for different platforms, while also being useful in quickly advertising the game title.

Unity has the ability to minimize the efforts of game developers, allowing them to develop Mobile game apps that can target both iOS and Android platforms with cross-platform capabilities.

Unity is loved by mobile game development and console-based game development companies for its excellent support for different formats and platforms.
So with these common approaches, in this project, Unity will be our game engine.

4.3 What Other People Have Done?

4.3.1 Valheim

Figure 5: Valheim

Inspired by Viking culture, the survival game Valheim, which is still in early access, broke the record for the number of simultaneous players, despite being just announced, and became the second most played game in the world.

The Swedish developer Iron Gate Studio and publisher Coffee Stain Studios are teaming up to create the next survival and sandbox video game Valheim. For Linux and Windows, it was made available in early access on February 2, 2021, and it will be made available for Xbox One and Xbox Series X/S in 2023. A five-person team built on Richard Svensson's development work from a side project he worked on in his free time to create the game. It is made in Unity Game Engine.

Figure 6: Valheim in Unity
[3]

4.3.2 Rust

Rust is a digitally distributed survival video game from Steam, developed by Facepunch Studios. It was released to Mac, Linux, and Microsoft Windows on December 11, 2013, and was in early access. It was back in early access on June 14, 2014. The game is made using the Unity 5 game engine.[4]

Figure 7: Rust
[5]

Figure 8: Rust
[6]

5 REFERENCES

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