<Draw it or Lose it>

CS 230 Project Software Design Template

Version 1.0

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Document Revision History

Version	Date	Author	Comments
1.0	01/21/2023	Zachary DeLong	Completed Executive Summary and Domain Model

Instructions

Fill in all bracketed information on page one (the cover page), in the Document Revision History table, and below each header. Under each header, remove the bracketed prompt and write your own paragraph response covering the indicated information.

Executive Summary

Our client *The Gaming Room* needs our firm's help with streamlining the development of their web-based gaming app supported across platforms. The client has explicitly stated four software requirements: A game must contain one or more teams; every team will have multiple players; game and team identifiers must be unique; memory must always contain no more than one game instance. We can begin development once we have agreed on the design of this application and set the hardware/software requirements.

Requirements

Technical Requirements include a web-based app with support across multiple platforms, a game must contain one or more teams, every team will have multiple players, game and team identifiers must be unique, and only one game instance can be stored in memory.

Design Constraints

Technical Constraint #1: The gaming app must be web-based with multiple platform support.
Technical Constraint #2: The game must contain one or more teams.
Technical Constraint #3: Every team will have multiple players.
Technical Constraint #4: Game and team identifiers must be unique.
Technical Constraint #5: Only one game instance can be available in memory at any given time.

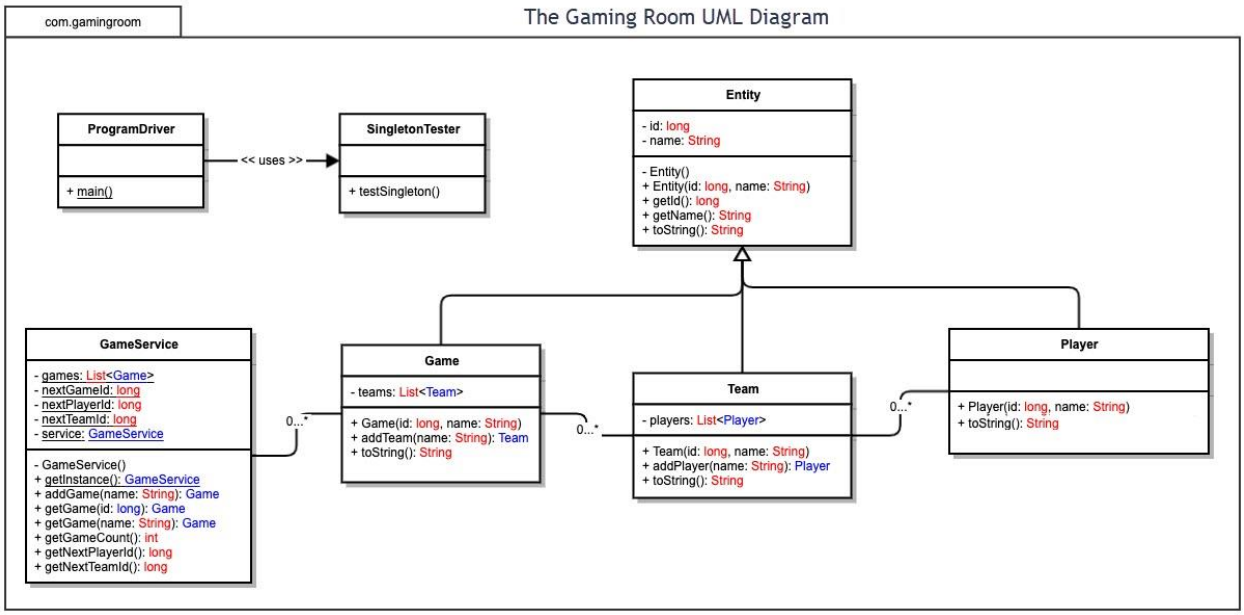
I choose the first constraint because it's important to understand that our app must be developed in web format and what operating systems it should be supported on. I chose the next four design constraints because they are software requirements explicitly stated by our client that must be implemented in our code and are non-negotiable.

System Architecture View

Please note: There is nothing required here for these projects, but this section serves as a reminder that describing the system and subsystem architecture present in the application, including physical components or tiers, may be required for other projects. A logical topology of the communication and storage aspects is also necessary to understand the overall architecture and should be provided.

Domain Model

This diagram shows inheritance from base class *Entity* to subclasses: *Game, Team, Player.* The four classes on the bottom row show association with a cardinality of zero or more. *ProgramDriver* depends on the *testSingleton()* method of the *SingletonTester* class. A singleton pattern is implemented in the *GameService* class to always maintain game objects in memory down to one. Iterative patterns are implemented for checking lists and updating unique identifiers for games, teams, and players. The package *com.gamingroom* contains all classes.



END OF PROJECT ONE

Evaluation

Development Requirements	**Mac**	**Linux**	**Windows**	**Mobile Devices**
Server Side	Expensive to host and hardware is not cheap Average Security Stable Servers Accessible (GUI)	Open-Source Free / Cheapest Less Accessibility (Need to learn command line for starters) Hosting not compatible with windows applications Stable Servers	Closed-Source Pay to Use High Accessibility (GUI) High Volume Traffic High Maintenace Servers Exclusively compatible with ASP, .NET, Microsoft Access, or MSSQL databases.	Android – Open-Source IOS – Mostly Closed Source Free / Cheap Poor IDE selection Inefficient

Client Side	Development should consider hosting on Mac if they have the budget to pay for a server and the hardware itself. Developers who are not familiar with Linux may find this operating system more accessible to suit their usage.	Development should consider hosting on Linux if they are on a limited budget. Developers will need to be willing to learn or already have the technical knowledge of the command line / tools available to them. Clients with a Windows application cannot natively join a Linux server	Development should consider hosting on Windows if they have the resources to pay for a license and the appropriate pc hardware. Development may want to consider other options for hosting a stable server that can hold thousands of players.	There does not seem to be any benefits to hosting on a mobile device over traditional operating systems. Development may want to consider hosting on a mobile device as a last resort.
Development Tools	Xamarin – Open-Source development tool that can deploy to platforms: IOS, Android, Mac, and Windows. Build with C#	PyCharm Community – Open-Source and Cross-platform IDE. Python IDE that can handle web development	May use ASP, .NET, Microsoft Access, or MSSQL databases. Windows Server Environment ($1069 - Standard; $6155 – Datacenter) Xamarin – Open-Source development tool that can deploy to platforms: IOS, Android, Mac, and Windows. Build with C#	IOS – Python, iSH Shell (Free) Xcode – Supports many languages such as C, C++, Swift, Java, and others. Only deploys apps on Apple Devices (Free)

END OF PROJECT TWO

Recommendations

Analyze the characteristics of and techniques specific to various systems architectures and make a recommendation to The Gaming Room. Specifically, address the following:

1. **Operating Platform**:

I recommend Linux OS for its customizable cloud hosting capabilities that will scale the gaming room to multiple platforms.

2. **Operating Systems Architectures**:

Linux Cloud Hosting comes with benefits such as being open-source/free, high security, and database support for MySQL and PostgreSQL. Supports web server platforms such as Apache and NGINX in addition to a free Linux-based GUI tool called cPanel that is an accessible way to manage your web servers.

3. **Storage Management**:

Magnetic Disk Memory is an affordable way to store large amounts of data that can be accessed directly at random for companies on a budget. I'd recommend electronic disk memory over magnetic for its faster access speeds and reliability if the gaming room has the budget for a more expensive storage management system.

4. **Memory Management**:

For the Draw it or Lose it software, Linux uses paging which is a memory management technique that allows for non-contiguous memory allocation by taking processes located in the secondary storage (i.e., hard drive) and moving them into the main memory (RAM & ROM) in "page" form. (GeeksforGeeks, 2023). The paging technique is implemented by MMU which divides both the physical address space and logical address space into equal parts called frames and pages respectively (GeeksforGeeks, 2023).

5. **Distributed Systems and Networks**:

Distributed Systems are made up of multiple devices with their own processors and data storage converging to share resources and complete tasks with no device acting as the "central hub". (GeeksforGeeks, 2023). Distributed Systems facilitate communication between the various platforms through different approaches such as Cloud Computing, Peer-to-Peer Networks, and Distributed Architecture (GeeksforGeeks, 2023). Cloud Computing sends computing resources (power, storage, networking) through the internet by request; Peer-to-Peer Networks share computing resources and files between users (GeeksforGeeks, 2023). Cloud systems are easier to scale to demand and tend to have much higher security than peer-to-peer networks.

6. **Security**:

Operating systems will prevent unauthorized access by following the "principle of least privileged" which is the practice of providing just enough privilege to any programs, users, and systems

so that they may complete their services. This principle is a worthwhile security feature as it minimizes potential system damage if it were to be compromised (Silberschatz, 2018).

Multifactor authentication is a secure way to handle user protection because it requires the user to provide multiple means of identification before they access a website or app. An encrypted authentication session that requires a one-time use password, personal pin, and fingerprint scan would be a secure means of authorization (DeLong, 2023).

Security policy aims to improve security by providing statements or requirements that an organization must follow that should promote security for the clients. For example, A company may hold a policy of acceptable use that can limit how clients use their network and resources to help mitigate the risk of a data breach (DeLong, 2023).

References

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