

The Gaming Room

# **CS 230 Project 1 Software Design**

Version 1.0

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| Version | Date | Author | Comments |
| --- | --- | --- | --- |
| 1.0 | 1/27/2024 | Armon Wilson | Initial Release |

**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](#_sbfa50wo7nsh)

The Gaming Room has envisioned a web-based version of their game, "Draw It or Lose It," and has sought Creative Technology Solutions (CTS) to facilitate the development. This game, inspired by the TV show Win, Lose or Draw, involves teams guessing what is being drawn. This software design document proposes a solution to meet the client's requirements for this web-based game application.

## Requirements

Business Requirements:

* The application shall be designed and implemented using a web-based distributed architecture, considering aspects such as client-server communication, security, and scalability.
* The game shall support one or more teams, fostering collaborative gameplay where participants work together to guess drawings.
* Each team shall have the capability to include multiple players, engaging experience.
* The system shall enforce the uniqueness of both game and team names, preventing ambiguity and facilitating easy identification.

Technical Requirements:

* A game shall have the ability to have one or more teams involved.
* Each team shall have the capability for multiple players assigned to it.
* Game and team names shall be unique to allow users to check whether a name is in use when choosing a team name.
* Only one instance of the game shall exist in memory at any given time. This can be accomplished by creating unique identifiers for each instance of a game, team, or player.

Requirements Summary:

The application, designed for a web-based distributed architecture, emphasizes collaborative gameplay with multiple teams and players. To ensure clarity and ease of identification, unique names for games and teams shall be enforced. Additionally, only one instance of the game is permitted in memory at any given time, achieved through the implementation of unique identifiers for games, teams, and players.

## [Design Constraints](#_2et92p0)

Web-based Architecture:

The application needs to be designed for a distributed environment, considering factors like client-server communication, security, and scalability.

Software Implications:

Designing the application for a distributed environment involves optimizing client-server communication, implementing robust security measures, and ensuring scalability through cloud services.

Unique Identifiers:

Each game, team, and player must have unique identifiers to distinguish instances. This constraint influences the design of classes and the usage of identifiers within the application.

Software Implications:

Requiring unique identifiers for each game, team, and player influences the application's design by necessitating the implementation of mechanisms to generate and manage distinct identifiers, impacting class structures.

## [System Architecture View](#_ilbxbyevv6b6)

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](#_8h2ehzxfam4o)

This UML visualizes the class structure of the application. The Game, Team, & Player classes all inherit their id and name variables from the Entity class. The GameService class manages the instantiation of each game instance for the Game class with a “zero to many” relationship. The Game class instantiates a team for the Team class with a “zero to many” relationship. The Team class instantiates a player for the Player class with a “zero to many” relationship. The Singleton design pattern is used for each case of instantiation. Each class houses a list for their respective relationships and utilizes the Iterator design pattern to for each attempt to construct a new entity to ensure only one instance of instantiation occurs for any given object.

The ProgramDriver class contains the main() method, creating an instance of the GameService and multiple Entity objects, and then calls the SingletonTester class to verify the singleton pattern is functioning as intended.

**"The Gaming Room UML diagram. The top of the diagram is labeled as com dot gamingroom. Test boxes are placed in two layers. The first layer has three text boxes and the second layer has four of them. In the first layer, the 'ProgramDriver' textbox points to 'SingletonTester' textbox. The 'ProgramDriver' textbox contains the text 'asterisk main round brackets.' The 'SingletonTester' textbox contains the text 'asterisk testSingleton round brackets.' The arrow between these two text boxes are labeled 'open two angle brackets uses close two angle brackets'. In the second layer, there are 'GameService', 'Game', 'Team', and 'Player' text boxes. The 'GameService' textbox has texts arranged in two layers. The first layer contains games colon List open angle bracket Game close angle bracket, nextGamesId colon long, nextPlayer Id colon long, nextTeamId colon long, and service colon GameService. The second layer contains GameService round brackets, getinstance round brackets colon GameService, addGame open parenthesis name colon String close parenthesis colon Game, getGame open parenthesis id colon long close open parenthesis colon Game, getGame open open parenthesis name colon String close open parenthesis colon Game, getGameCount round brackets colon int, getNextPlayerID round brackets colon long, and getNextTeamId round brackets colon long. The 'GameService' box is connected with the 'Game' textbox with a line labeled 'zero dot dt dot asterisk'.  The 'Game' textbox also contains text in two layers. The first layers contains the text teams colon List open angle bracket Team close angle bracket. The second layer has Game open round bracket id colon long comma name colon String close parenthesis, addTeam open parenthesis name colon String close parenthesis Team, toString round brackets colon String. The 'Game' textbox is connected with the 'Team' textbox with a line labeled 'zero dot dt dot asterisk'. The 'Team' textbox also contains text in two layers. The first layers contains the text players colon List open angle bracket Player close angle bracket. The second layer has Team open parenthesis id colon long comma name colon String close parenthesis, addPlayer open parenthesis name colon String close parenthesis colon Player, and toString round brackets colon String. The 'Team' textbox is connected with the 'Player' textbox with a line labeled 'zero dot dt dot asterisk'. It contains the text Player open parenthesis id colon long comma name colon String close parenthesis and toString round brackets colon String. The 'Game', the 'Team, and the 'Player' boxes point to the 'Entity' textbox in first layer. The 'Entity' textbox contains text in two layers. The first layer has the text id colon long and name colon String. The second layer has Entity round brackets, Entity open parenthesis id colon long comma name colon String close parenthesis, getId round brackets colon long, getName round brackets colon String, toString round brackets colon String.**

## [Evaluation](#_2o15spng8stw)

Using your experience to evaluate the characteristics, advantages, and weaknesses of each operating platform (Linux, Mac, and Windows) as well as mobile devices, consider the requirements outlined below and articulate your findings for each. As you complete the table, keep in mind your client’s requirements and look at the situation holistically, as it all has to work together.

In each cell, remove the bracketed prompt and write your own paragraph response covering the indicated information.

| **Development Requirements** | **Mac** | **Linux** | **Windows** | **Mobile Devices** |
| --- | --- | --- | --- | --- |
| **Server Side** | Mac servers are reliable and secure, best suited for environments requiring seamless integration with Apple technologies. | Linux servers offer high customization and security but will be more complicated to implement. | Windows servers provide a user-friendly environment but may involve licensing fees. | Mobile devices offer a vast user base and app store distribution but face challenges due to OS and device fragmentation. |
| **Client Side** | Considerations include expertise in macOS technologies and varying costs based on application complexity and licensing fees. | Considerations involve compatibility across distributions and the need for expertise in Linux-specific APIs. | Considerations include compatibility with different versions and potential variations in user experience across diverse devices. | Considerations involve platform-specific languages, such as Swift for iOS and Java for Android, and thorough testing on diverse devices. |
| **Development Tools** | Relevant tools for Mac development include Xcode as the IDE and Swift as the programming language. | Linux development tools include IDEs like Visual Studio Code and programming languages such as C, C++, Python, and Java. | Windows development tools encompass Visual Studio and Visual Studio Code, supporting languages like C#, C++, and Python. | Mobile development tools include Xcode for iOS (Swift) and Android Studio for Android (Java), with cross-platform options like React Native or Flutter for efficiency. |

## 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**: To make Draw It or Lose It available on various devices, consider using frameworks like React Native or Flutter. These allow you to write code once and deploy it on multiple platforms, saving time and ensuring a consistent experience across different devices.
2. **Operating Systems Architectures**: For a cross-platform application using frameworks like React Native or Flutter, the chosen operating platform architectures would involve a combination of iOS and Android architectures. These frameworks leverage native components, ensuring compatibility with both iOS and Android operating systems.
3. **Storage Management**: For cross-platform applications, utilizing cloud-based storage could be suitable. These platforms offer scalable storage management, providing efficient data handling for applications deployed on various operating systems.
4. **Memory Management**: The recommended operating platform, whether it's cloud-based or server-based, should employ effective memory management techniques, such as dynamic memory allocation and garbage collection, to optimize the performance and resource utilization.
5. **Distributed Systems and Networks**: Distributed systems architecture can be implemented, utilizing network protocols and technologies. This involves designing the software to enable interaction between devices, considering factors such as connectivity and potential outages.
6. **Security**: User information can be protected through encryption and secure communication protocols. Implementing user authentication and authorization features, along with leveraging the security capabilities of the chosen operating platform, will help safeguard user data on various platforms.