

Draw-it or Lose-It

# **CS 230 Project Software Design**

Version 1.0

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## [Document Revision History](#_grjogdjh5fi8)

| Version | Date | Author | Comments |
| --- | --- | --- | --- |
| 1.0 | 21-Jan-2025 | Dan Loranger | Initial Revision |

## [Executive Summary](#_sbfa50wo7nsh)

Creative Technology Solutions (“CTS”) has been engaged by “The Game Room”, a new client, to develop a web-based game as highlighted in the following brief.

*Draw It or Lose It is loosely similar to the 1980s television game Win, Lose or Draw, where teams compete to guess what is being drawn. Rather than a player drawing images on an easel to help team members guess the puzzle (a phrase, title, or thing), the application will render images from a large library of stock drawings as clues. A game consists of four rounds of play lasting one minute each. Drawings are rendered at a steady rate and are fully complete at the 30-second mark. If the team does not guess the puzzle before time expires, the remaining teams have an opportunity to offer one guess each to solve the puzzle with a 15-second time limit.*

## Requirements

* Game play consists of 4 rounds
* Each round lasts 30 seconds
* Opposing team opportunity lasts 15 seconds after each round
* Images render linearly across the 30-second round interval (presumed as scan lines)
* A game will have the ability to have one or more teams involved.
* Each team will have multiple players assigned to it.
* Game and team names must be unique to allow users to check whether a name is in use when choosing a team name.
* Only one instance of the game can exist in memory at any given time. This can be accomplished by creating unique identifiers for each instance of a game, team, or player.

## [Design Constraints](#_2et92p0)

- UI will be web-based

- UI must support modern browsers, typical PC and mobile platforms. This may require separate UI per platform.

- Game server must be centralized to prevent multiple instances concurrently and allow teams / games to form dynamically.

- Given the design already exists in an Android app, existing code should be reviewed and leveraged as much as possible for re-use. Given that the existing Android APP utilizes JAVA, this will be the programming language used on the Android APP as well as the server-side code.

## [System Architecture View](#_ilbxbyevv6b6)

Not Required at this time.

<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)

Provided here is the existing game UML diagram as previously generated by the customer.

**"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.**

Behaviorally, the entry point is the *ProgamDriver* which implements the *main()*. This main uses the *SingletonTester* class to ensure only a single instance is active on the server.

The *Entity* class is the parent class to the classes of *Game*/*Team*/*Player* with each child class inheriting the parents attributes, but also implementing a specific *toString()* function respectively.

The *GameService* class is responsible for adding games via *addGame(String Name),* and provides and interface for locating existing games by ID and Name, along with identifying/assigning player and Team numerical IDs via *getNext…Id().*

Once a game is added, the *Game* class manages a list of existing teams, and allows adding teams by name *addTeam(string name).* Once a team is formed, the *Team* class manages a list of players, with the ability to *addplayers(String name).* The *Player* class is a single object with a public instantiator that requires an ID (long type) and name (string type).

Architectural Question – It is observed that in the Team Class, it might be useful to include the option to remove a player (disconnected or similar). This will need reviewed with the customer.

Architectural Question – It is observed that in the *Game* Class, it might be useful to include the option to remove a team (disconnected or similar). This will need reviewed with the customer.

Architectural Question – It is stated the game will use a predefined library of images, but it is unclear from the architecture if the game will be rendered locally or on the server. This decision will directly affect the software architecture and also the performance of the game play. A local rendering on the user’s device will require either higher data streaming rates (higher ongoing server bandwidth costs) for transferring images or alternatively a significantly larger installation package on the user’s device. This will need reviewed with the customer.

* If operating locally on the user’s device, either multiple resolutions of images will be required to be downloaded, or resizing prior to display will be required for proper screen fit.
* If rendered on the server, this resizing could be either 1 time with stored images (higher storage capacity), or resized dynamically during game play (higher CPU performance costs for repeated redundant operations)

## [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** | <Evaluate Mac for its characteristics, advantages, and weaknesses for hosting a web-based software application.> | <Evaluate Linux for its characteristics, advantages, and weaknesses for hosting a web-based software application.> | <Evaluate Windows for its characteristics, advantages, and weaknesses for hosting a web-based software application.> | <Evaluate Mobile Devices for their characteristics, advantages, and weaknesses for hosting a web-based software application.> |
| **Client Side** | <Determine the software development considerations (cost, time, expertise) that are necessary for supporting multiple types of clients as they pertain to Mac.> | <Determine the software development considerations (cost, time, expertise) that are necessary for supporting multiple types of clients as they pertain to Linux.> | <Determine the software development considerations (cost, time, expertise) that are necessary for supporting multiple types of clients as they pertain to Windows.> | <Determine the software development considerations (cost, time, expertise) that are necessary for supporting multiple types of clients as they pertain to Mobile Devices.> |
| **Development Tools** | <Identify the relevant programming languages and tools (IDEs and other tools) that are used to build this type of software for deploying on Mac.> | <Identify the relevant programming languages and tools (IDEs and other tools) that are used to build this type of software for deploying on Linux.> | <Identify the relevant programming languages and tools (IDEs and other tools) that are used to build this type of software for deploying on Windows.> | <Identify the relevant programming languages and tools (IDEs and other tools) that are used to build this type of software for deploying on Mobile Devices.> |

## 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**: <Recommend an appropriate operating platform that will allow The Gaming Room to expand Draw It or Lose It to other computing environments.>
2. **Operating Systems Architectures**: <Describe the details of the chosen operating platform architectures.>
3. **Storage Management**: <Identify an appropriate storage management system to be used with the recommended operating platform.>
4. **Memory Management**: <Explain how the recommended operating platform uses memory management techniques for the Draw It or Lose It software.>
5. **Distributed Systems and Networks**: <Knowing that the client would like Draw It or Lose It to communicate between various platforms, explain how this may be accomplished with distributed software and the network that connects the devices. Consider the dependencies between the components within the distributed systems and networks (connectivity, outages, and so on).>
6. **Security**: <Security is a must-have for the client. Explain how to protect user information on and between various platforms. Consider the user protection and security capabilities of the recommended operating platform.>