

Draw It or Lose It

# **CS 230 Project Software Design Document**

Version 1.0

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## [Document Revision History](#_grjogdjh5fi8)

| Version | Date | Author | Comments |
| --- | --- | --- | --- |
| 1.0 | 11/14/21 | Joseph Iadarola | Begun filling out design information using starter template |
| 2.0 | 12/5/21 | Joseph Iadarola | Refined Evaluation section for Project Two |

**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)

Draw It or Lose It is currently an Android only app and must be redesigned to be a web-based game. This means that the new game must feel and function the same as the existing app but will be played through web browsers.

## [Design Constraints](#_2et92p0)

The new web-based Draw It or Lose It must have a Singleton design so that only one instance of the game exists in memory. The game should also be designed so that multiple teams can play the game with multiple players on each team. These teams and games must be designed so that each has a unique name.

## [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)

The ProgramDriver class runs the game through the main method and currently uses the SingletonTester class at this stage of development.

The GameService class uses a Singleton design so there will only be one instance of a GameService object in memory. The GameService instance in memory contains a list of Game type objects called games and has helper methods to add a new Game to the games list, get a Game from the games list and generate long type Id’s for Game, Team, and Player objects.

Each Game, Team, and Player type object is an Entity type object and inherits from the Entity class.

Each Game contains a list of Team objects called teams and each Team contains a list of Player objects called players. Both Game and Team classes have similar methods to add a new Team or Player, respectively, to their contained list.

**"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** | Macs use an operating system called MacOS that comes with purchased Mac computers and can only be legally used on Apple made Macs. They have an advantage of having various web server hosting tools included in the OS and there is reliable and convenient customer support through Apple. A weakness for running a server using a Mac is that there is a steep initial monetary cost because buying a Mac is not cheap. Another weakness is that initially the Mac hardware is not optimized to host a server which may hinder application performance. | Linux distributions are open source and can have no cost to set up a server based on information from linux.com. Some distributions offer paid versions of their open-source OS that come with features like advanced server management tools and technical support. An advantage of Linux is there is a wide community of open-source server software along with how-to guides. A weakness for Linux is that customer support comes at a price if it is available at all. | Windows is a Microsoft owned operating system that is generally considered the default operating system by the American public. A server version of Windows for servers is available called Windows Server. An advantage is that there is easy access to direct customer support and other helpful tools for Windows through Microsoft and online communities. Another advantage is that server licenses can be purchased without buying separate hardware meaning that the server can be hosted in the cloud unlike MacOS. There is a monetary cost to running a server using Microsoft purchased software and services can be seen as a weakness. | Mobile Devices can host web-based software applications through downloaded apps. Much like MacOS, when using iOS as a server, you can't transfer the operating system license to newer hardware when the current hardware becomes obsolete. A disadvantage for Android is that devices only receive security updates for at most four years, shorter than the lifespan of the average server.  Based on web articles, server hosting applications are limited by the hardware of the mobile device, making the type of device significant. There is an advantage that some Android mobile devices, that can act as web servers have a low initial cost compared to other hardware like laptops and desktops. |
| **Client Side** | When developing on MacOS there is an initial cost for development on a Mac because the Mac hardware and OS are required. The time needed for web development on a Mac is no more significant than any other platform. Mac hardware is needed to test web applications through Safari because Safari only runs on MacOS. There is no additional expertise needed for developing on MacOS other than how to use a Mac. | There is no cost to develop on Linux. Some expertise might be needed to navigate the OS depending on which platform is being used. The development time on Linux is fast and flexible. If time does not permit testing across all platforms, Linux can be the lowest priority platform for testing because all major browsers available on Linux are available on other platforms and should have been tested on those platforms. | Windows is generally found to be easy to use and navigate. The cost associated with developing on Windows comes from the OS license cost. The time requirement for development on Windows is similar to other platforms. | There is a cost for developing web applications that will work in Safari because a Mac is needed for debugging mobile Safari. The Android operating system can be emulated on all major desktop platforms through first party software. There is an initial time requirement for emulator instillation and expertise to use said emulators. |
| **Development Tools** | Languages include but are not limited to JavaScript, CSS and HTML and supporting libraries. For web development IDEs that can be used include Visual Studio for Mac, Visual Studio Code and WebStorm. Visual Studio for Mac and WebStorm have some licensing costs associated. Mac development tools include Git, and Selenium. The server-side languages support includes PHP, pearl, Rust, C#, Python, etc. | Languages include but are not limited to JavaScript, CSS and HTML and supporting libraries. Linux IDEs include Eclipse, Visual Studio Code and WebStorm, which cost money. Linux development tools include Git, Selenium and other online development tools. The server-side languages support includes PHP, pearl, Rust, C#, Python, etc. | Languages include but are not limited to JavaScript, CSS and HTML and supporting libraries. For web development IDEs that can be used include Visual Studio, Visual Studio Code, and WebStorm. Visual Studio and WebStorm have some licensing costs associated. Windows development tools include Git, and Selenium. The server-side languages support includes PHP, pearl, Rust, C#, Python, etc. | Languages include but are not limited to JavaScript, CSS and HTML and supporting libraries. JavaScript, PHP, Ruby, and Python IDEs can be used. Mobile development tools include Git, Selenium and other online development tools. There is a website called vscode.dev that is a browser-based IDE based on Visual Studio Code that can be used for basic web development and debugging of certain applications. |

## 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 would recommend using Linux as the server platform to expand Draw It or Lose It to other computing platforms. I base this recommendation on the fact that Linux has the lowest initial cost and provides ample support for future maintenance. MacOS is not a suitable server platform because of licensing restrictions and mobile devices are severely limited by their hardware. Windows is a viable server platform option, but the variety of server software and web frameworks available on Linux make it a better choice.
2. **Operating Systems Architectures**: A Linux based OS uses the monolithic Linux kernel as its operating system architecture. Rather than hybrid kernels in Windows and MacOS, the monolithic kernel uses system calls from the computer programs to run the entirety of the OS.
3. **Storage Management**: I would recommend using Amazon Web Services (AWS) for data storage. The data can be managed using the Amazon S3 REST API or AWS SDK. AWS allows for both hosting and storage on the cloud, and is highly reliable.
4. **Memory Management**: Software packages for fine control of memory management are available for free download on more Linus distributions, but the exact options available will vary by distribution. These packages are actively maintained by professional and community members alike with timely security updates and performance enhancements.
5. **Distributed Systems and Networks**: I would recommend Kubernetes (K8s), an open-source container management program, to manage the containerized application across multiple nodes in the network. Containers managed by K8s automatically restarted if any of them are determined to be in an “unhealthy” state. Health tests for containers can be customized to the developer’s needs.
6. **Security**: Critical steps in making a secure web-based application include getting an SSL certificate for the website that hosts the game. An SSL certificate ensures that communications between the client and server are properly encrypted. To secure the application itself, it can be run through a Docker container which isolates the application from the rest of the platform. This isolation means that if the application is compromised, the rest of the system is safe.