

Draw It or Lose It

# **CS 230 Project Software Design Template**

Version 1.2

## Table of Contents

[**CS 230 Project Software Design Template**](#_l6ti7uoag22u)1

[**Table of Contents**](#_30j0zll)2

[**Document Revision History**](#_grjogdjh5fi8)2

[**Executive Summary**](#_sbfa50wo7nsh)3

[**Design Constraints**](#_2et92p0)3

[**System Architecture View**](#_ilbxbyevv6b6)3

[**Domain Model**](#_8h2ehzxfam4o)3

[**Evaluation**](#_2o15spng8stw)3

[**Recommendations**](#_m8aleynsvzvc)5

## [Document Revision History](#_grjogdjh5fi8)

| Version | Date | Author | Comments |
| --- | --- | --- | --- |
| 1.0 | 07 /16/2022 | Allison Doyle | Entries of executive summary, design constrains and domain model. |
| 1.1 | 07/31/2022 | Allison Doyle | Entry for evaluation in server, client, and development tools |
| 1.2 | 08/14/2022 | Allison Doyle | Entries for recommendations: operating platform, operating system architecture, storage management, memory management, distributed systems and networks, and security |

## [Executive Summary](#_sbfa50wo7nsh)

The game “Draw It or Lose It” is played by having the members of each team will try to guess the image. The application will use a library of stock drawings to render a photo to completion in 30 seconds. The players are then to make their guesses of what the image is displaying until their time is up. The current game is only available as an android app, but the client wishes to develop a web-based game that is available across platforms. Making a multi-platform application will take significant time and money, as different software must be produced to accommodate the various platforms.

## [Design Constraints](#_2et92p0)

Web browser

Web applications are dependent on web browser rendering. How the web application works on a mobile browser compared to a desktop browser must be considered. The developer must test the web application to ensure that popular browsers support the web application.

Reliance on internet connection

The web application depends on the individual's connection to the internet and cannot be used offline. Potential low connectivity will affect the web application's performance and should be considered.

Performance

Making a web application based on an existing mobile app will come with challenges in the differences in functionality between the native app and web apps. A web app will run slower and less smoothly as hardware, and operating system optimization is impossible as the application will only communicate with the browser.

## [System Architecture View](#_ilbxbyevv6b6)

## [Domain Model](#_8h2ehzxfam4o)

The classes Game, Team, and Player all inherit the properties of the Entity class. The parent class, Entity, has methods used in all child classes, such as getName(), getId(), and the default constructor. The classes GameService and Game are associated with a cardinality of zero to many as GameServices contains a method that adds games to an array list of games. Classes Game and Team are associated with a cardinality of zero to many because Game possesses a method that adds teams to an array list of teams. Team and Player classes have an association with a cardinality of zero to many because the Team class contains the method that adds new players to an array list of players. The ProgramDriver class uses the SingletonTester class as it includes the method to test the existence of a single instance.

**"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)

| **Development Requirements** | **Mac** | **Linux** | **Windows** | **Mobile Devices** |
| --- | --- | --- | --- | --- |
| **Server Side** | Apple’s proprietary operating system is macOS.  One advantage of using a macOS operating system server for hosting a web application is that it is more secure, user-friendly, and stable. macOS is more secure than some other operating systems on the market because it is Unix-based and more difficult for malicious actors to exploit. macOS is also regarded as one of the most simple and intuitive servers for administrators to operate and maintain. The stability of macOS servers is an advantage because the server can run for long periods without needing to be restarted.  The disadvantages of using macOS servers are the licensing and price. macOS is less popular than operating systems such as windows which causes the price of using their servers to be more expensive. Also, since macOS is a proprietary operative system, the is a higher cost because of licensing. | Linux is a free, open-source, multitasking, portable, multi-user operating system.  The advantages of using the Linux operating system for server hosting are security, price, and reliability. Linux is considered one of the most secure operating systems because of the many customizable security features offered to Linux users. As an open-source operating system, Linux servers do not charge for licensing, and the cost of using Linux servers is lower in general. Linux has many features that allow it to be reliable and stable, such as the scarce need to restart the system. Linux servers can stay running for years without needing to be rebooted. Also, because Linux is the most used server OS, compatibility is seldom an issue.  The disadvantage of using Linux is the difficulty of using the operating system. Some regard Linux as one of the most complex operating systems to learn because of the lack of setting automation. | Windows is a graphics-based operating system owned by Microsoft.  Windows's advantages are the graphical interface, supported software, and storage management. The graphical user interface (GUI) is an advantage for Windows because it makes operating more accessible and intuitive. Windows is a popular operating system and has a lot of support software that can be used on the operating system. Lastly, Windows allows administrators to manage storage in the server collectively rather than individually, which simplifies storage management.  The disadvantages of Windows operating system servers are licensing costs and decreased stability. Windows requires rebooting and downtime when enabling updates so that the server will be less reliable. | Mobile devices can host web servers with the help of web containers such as i-jetty. I-jetty serves java-based web content. Some benefit of using mobile device servers is its ability to facilitate the developer to create an app with scalability in mind and cost efficiency.  A downside to mobile device servers is the security needs and setting customization. The security needs of mobile device servers are heightened because of the vulnerability of mobile operating systems. The customization needs require many of the settings to be changed for the specific needs of the server, which can be time-consuming and less efficient. |
| **Client Side** | The advantages of macOS on the client side are its intuitive design, which increases the system's ease of use. macOS integrates various Apple products to optimize the performance of the operating system. The operating system has a wealth of supported software for the operating system, which is approved by Apple's standards.  A disadvantage is that macOS is only available on Apple hardware which is limiting. | The advantages of Linux are its highly customizable settings and features that assist in storage, memory management, and security. Linux also provides a great deal of freedom to the administrator.  The downside is that Linux is not as user-friendly as other operating systems. | Windows is a prevalent operating system with abundant free, supported software. Windows are created to have a user-friendly interface many people are familiar. The user does not have any technical expertise to operate the Windows system.  Disadvantages are that Windows is more susceptible to security attacks. Windows price ranges between Linux, free, and macOS, more expensive. | Mobile devices help developers create mobile apps using small memory footprints, which is needed in a mobile device's limited processing. The downside is that these apps take longer to develop, and testing them in other environments will be challenging. |
| **Development Tools** | Java, C, C++, Javascript, and Python are some languages that can be used to build software to deploy on macOS.  Visual Studio, Eclipse, IntelliJ IDEA, PyCharm, or Atom are excellent resources for creating these programs.  There are licensing fees for all of the IDE’s mentioned, which should be taken into consideration. | Python, Javascript, C/C++, Java, and Shell are the best coding languages to create Linux deployed software. PyCharm, Atom, Visual Studio, and Eclipse are all great IDE’s to assist in developing software for Linux.  PyCharm, Atom, Visual Studio, and Eclipse are all proprietary software that have licensing fees. | Ruby, Java, Python, or Node are excellent choices for scripting for web development. Microsoft Visual Studios is a great IDE to use in windows.  Visual Studios is owned by Microsoft and has licensing fees for its use. | Javascript is the most popular choice when creating cross-platform software for mobile devices. Atom is a great idea tool to assist. |

## Recommendations

1. **Operating Platform**:

Linux is recommended as the operating platform for the Draw It or Lose It web application. Linux is reliable, secure, versatile, and multitasking, which are a few reasons it is the preferred platform for the app. Linux has increased reliability because of the built-in features that prevent it from needing to be rebooted after updates are made to the system. Versatility and security are bonuses of Linux as the customization and settings of Linux allow the administrator to have a tremendous amount of control over the aspects of the system.

1. **Operating Systems Architectures**:

The Linux operating system's architecture comprises the kernel, the shell, and the applications. The inner layer, the kernel, is essentially the heart of the operating system. The kernel is responsible for the actions of the operating system by communicating with the underlying hardware and carrying out activities. The shell is the connection between the kernel and the user. The shell is in two categories: the graphical line shells and the command line shells. The graphical line shell assists the graphical user interface (GUI), and the command line shell the command line interface. Both shells receive commands from the user and implement those commands as operations in the system. The shell then runs functions of the kernel.

1. **Storage Management**:

Draw It or Lose It will benefit from a cloud-based storage management system. Cloud storage will allow the files needed for the web application to be accessed and used by the application anywhere and at any time. Companies can purchase cloud storage from a third-party vendor that will assist in automation, security, scalability, and cost efficiency. Using cloud store as a management system will decrease the cost and time of maintenance on the system by employees; instead, the service will be maintained by the third-party cloud storage vendor. Keeping sensitive information in cloud storage will also increase the system's security, as even if one server fails, the data is still safely kept in the cloud-based storage. Lastly, the benefit of scalability is seen as the company will pay for its needs and usage. As the users grow, there will always be room to increase the storage used in the cloud. The only potential downside to this form of storage management is that the data will not be able to be accessed if there is no connection to the server.

1. **Memory Management**:

Draw It or Lose It needs to include storing images, user data, and software that can be accessed cross-platform for a web-based gaming application. Cloud-based storage that can be accessed using an API (Application Programming Interface) is undoubtedly the best option to meet the needs of Draw It or Lose It. The benefits of cloud-based storage are reliability, security, and scalability. Utilizing cloud-based storage increases the reliability of the data and the software because it is far less susceptible to outages and cyber-attacks. Keeping sensitive user information and game data in cloud-based storage is more secure than storing it in local storage. There is less reason for bad actors to attack a device if no information is stored locally. Lastly, the flexibility of storage is a bonus in cloud-based storage because as the application size grows, the developer has the freedom to increase the amount of cloud storage. The app data can be accessed using an API to retrieve, add, edit and delete data stored in the cloud, which will also increase the security of the data.

1. **Distributed Systems and Networks**:

Draw It or Lose It will communicate with the server and retrieve data between several different devices and platforms; therefore, the application must utilize an API. The client, Draw It or Lose It, will access data from the server through requests carried out by the API. To increase the flexibility and compatibility of the API, making it REST (Representational State Transfer) will allow it to work efficiently and diversly. RESTful APIs are stateless and therefore require no data to be saved from the client for sessions and identification. Instead, the client is responsible for keeping the session and data request history. REST APIs use the standard HTTP (Hypertext Transfer Protocol) methods such as DELETE, GET, PUT and POST to delete, add and modify data in the database. This will allow the mobile app and web app to communicate with the server and any other future platforms.

1. **Security**:

Linux has various security features for administrators to increase the system's security. User management is a vital and fundamental part of system security, where a user can be an individual, web server, or file owner. The user management in Linux examines users to determine the systems and executable programs to which they have access. Linux uses PAM (Pluggable Authentication Modules) uses libraries that include system-wide user authentication in which the Linux system administrator can choose how the application will authenticate the user. Linux uses standards to monitor and block malicious HTTPS traffic to the web application through a WAF (Web Application Firewall) and will stop unauthorized data from leaving the application. Lastly, an essential process for securing data is encryption. Encrypt communication between client and server can be accomplished with Linux's open-source software library OpenSSL. OpenSSL is used to generate private keys and implement the SSL (Secure Socket Layer) and TLS (Transport Layer Security) protocols. Encryption will help defend the system against cyber-attacks and protect the confidentiality of the user data.