

Draw it or Lose it

# **CS 230 Project Software Design**

Version 2.0

## Table of Contents

[**CS 230 Project Software Design** 1](#_Toc111975699)

[Table of Contents 2](#_Toc111975700)

[Document Revision History 2](#_Toc111975701)

[Executive Summary 3](#_Toc111975702)

[1. Introduction 4](#_Toc111975703)

[2. Design Constraints 4](#_Toc111975704)

[3. Recommendations 5](#_Toc111975705)

[4. Conclusion 10](#_Toc111975706)

[5. References 12](#_Toc111975707)

## [Document Revision History](#_grjogdjh5fi8)

| Version | Date | Author | Comments |
| --- | --- | --- | --- |
| 1.0 | 07/16/2022 | Wyatt Vickers | Completed Everything |
| 2.0 | 08/12/2022 | Wyatt Vickers | Final Design done and documented |
| 3.0 | 08/30/2022 | Wyatt Vickers | Project 3 Parts are seperated |

## [Executive Summary](#_sbfa50wo7nsh)

We (The Gaming Room) want to develop a web-based game that is compatible with multiple platforms. This game is called “Draw it or Lose it”, and consists of one or multiple teams of multiple people and four rounds timed at one minute/round. A picture is shown from an available library and one team attempts to guess the image until the time expires. If the team can not correctly guess the image, each other team is allowed 15 seconds to answer for points. The game is currently only available on Android. The design constraints are studied. A lot of recommendations like what operating systems should be used, the architectures of those operating systems, Storage management, memory management, distributed systems and networks, and security are done for upgrading the game to a multi-user game.

## Introduction

The project’s main objective revolves around the process of offering the developers a chance to develop rich and diverse systems that are associated with the following aspects:

* The process of utilizing constructs of the objects to properly assess the theoretical framework of a particular kind of program.
* The process of programming, establishing, and assessing components like data types that are equipped with the ability to mutate.
* The act of assessing the program's framework with the help of a specific kind of diagram will help offer guidance to programmers.
* The process of obtaining an adequate amount of experience in designing different kinds of systems (*◾ welcome to designing the user experience of Game Development Tools* 2015).

In addition to the mentioned aspects, one will also be capable of obtaining an adequate level of understanding concerning the concepts that are fundamentally observed in the frameworks of various kinds of web servers.

## [Design Constraints](#_2et92p0)

The development of a unique MUD that can be utilized as an interactive web app, followed by the implementation of the same, is one of the major expectations of the given project. In this case, the mentioned application will be utilized by gamers with the help of the browsers they utilize regularly. So, the system that needs to be developed should be able to consider the aspects, like the interface that will be observed and utilized by the customers, and the back-end system that complements and supports the functions of the front-end in every way. Moreover, the use of graphical elements is also observed in the given project. The establishment of the regions that are located close to the MUD game will often be utilized in the MUD to present a known circumstance. But, the developers are not expected to completely duplicate the characteristic features that are observed in the mentioned regions to develop the environment for the MUD. Moreover, the different kinds of MUDs will be geographically linked to one another, so it is essential to develop the common aspects that are correctly found in the environments.

## Recommendations

We analyzed the characteristics of and techniques specific to various systems architectures and make a recommendation to The Gaming Room. Specifically, addressed the following (Geig, 2021) (Harbour, 2012):

* 1. **Operating Systems**

Windows would be the best operating system to use for The Gaming Room as it supports most types of software with various environments to work in. There are efficient ways to communicate and share information within Windows.

The environment that is used for the game server (He, 2019) is:

* Linux 2.6.32-358.18.1.el6.x86\_64 running CentOS release 6.4 (Final).
* This OS has many features that inspired me to choose this OS to run the game server. It is more useful in the future for further expansion of the server and easy to host in it. This OS can able to run DBMS (Riak).

Local environment and software tools (He, 2019) (Scolastici, 2013) used for development:

* Windows 7 Home Premium 6.1.7601 (Service Pack 1 build 7601) and Linux 2.6.32-358.18.1.el6.x86\_64 running CentOS release 6.4 (Final)
* Before the configuration is done on the client-server, a Linux server is used for hosting the game. This server can able to access the Riak. To increase the efficiency of the system dual OS is used (Asif & Krogstie, 2013).
  1. **Operating Systems Architectures**

Windows is very useful because most of its user-end software has a GUI to access information and resources. These GUI’s are the foundation for graphics, web services, media, and texts. Depending on what the program is will determine if a user account can access it or if it’s made for server/elevated access. Using an ARM application isn’t very strong, even compared to an x86 system. This limits its capabilities. Using an x86 platform would be a great way to develop a game using more complex software. The following software will be more useful for multi-user games (Sutopo, 2017). This software does various functions in multi-user games.

**C# 4.5.**

For the dual OS, the language used for programming is Java and C#. This language is mainly selected because it has numerous features in it. One of the languages is platform independent which is java. Both the programming languages are object-oriented (Smith et al., 2020).

**corrugated iron 1.4.2 C# library**

To transfer the data from the client side to the server and retrieve the necessary data JSON is used. This reduces the need for customization. In the early days, the C# is the only way to connect the Riak. The (find, write, retain) are done by the Riak.

**QuickGraph 3.6.61119.7 C# library.**

It is a library that is used to develop graphs. It is the most common way to create the graph in C# and is easy to use. In this, the client has requested to develop a hexagon map. For that case, the Quick Graph is used to develop the required map.

**Microsoft .NET 4.5.**

By using Mono, .NET can able to run on other platforms (Scolastici, 2013). At first, it is developed to perform inter-operability for the OS. It can be run through the C# language.

**Mono 3.4.0**

To program on cross-platform websites mono is used. The Mono is one of the free platforms. NET. The game server should be able to run on Linux and Windows devices. For that Mono is used to achieve this requirement.

**MonoDevelop 4.2.2 and Xamarin Studio 4.2.5 (build 0).**

It is one of the free integrated development environments. To create a website or application that run on various platform Xamarin Studio and MonoDevelop is used. The MonoDevelop is used to create a new application or website and find the bugs in the website developed.

**Microsoft Visual Studio 2010 10.0.40219.1 SP1**

Microsoft Visual Studio is one of the most prominent integrated development environments that is used for the creation or development of .NET websites. It is an open-source platform, so most of them prefer this due to its features (Carman, 2018).

**Git 1.9.0.msysgit.0 (Windows), Git 1.7.1 (Linux), and GitHub.**

It combines with GitHub (one of the most preferable online websites for programming projects). It has many features such as a suggestion for correction of code and made separate branches for the development of projects. Git can be easily accessible a can support multiple platforms. In this, we can able to change the code that fits us (Thakkar, 2020).

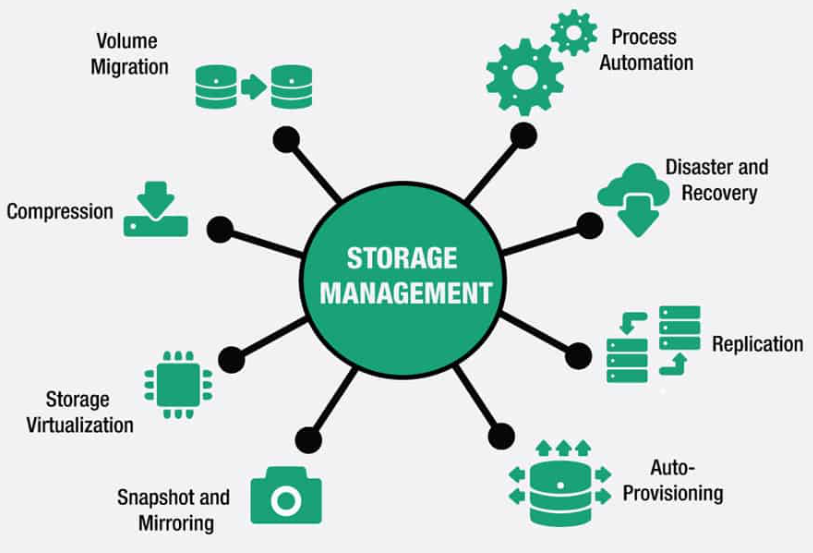
**UMLet 13.1.**

To create a Unified Modeling Language drawing UMLet is used. It is free software for constructing UML pictures. From this, we can able to get the numerical form of the drawing. It has a collection of recently used templates.

**WinSCP 5.1.4 (Build 3020) and PuTTY 0.63.**

It is used at Heriot-Watt University for remote access by the user. It has a combination of telnet/Secure Shell (PuTTY) and File Transfer Protocol (WinSCP). It is also free software.

* 1. **Storage Management**

Cloud is the most modern way to share and save files to access anywhere you have system network access. Windows also use storage sense to help manage and clean files on the drive while providing clear information about the storage a program takes up. Using cloud networks allows all the data to be saved on formatted hard drives on a local server which can be useful for backups and creating high storage capacities (He, 2019). Stem cloud is a new technology that can be used for storing game data. Game settings, saving games, user-specific settings, and profile statistics can be with this technology. The following storage management activities can be performed very effectively in the stem cloud. 

Effective storage management improved the game's performance, availability, capacity, and recoverability. The following activities need to be done very effectively for better storage management. Volume migration, auto-provisioning, process automation, disaster and recovery, snapshot and mirroring, and storage virtualization. SAN (Storage Area Network) can be used for huge storage management in multi-user games. SRM (Storage Resource Management) is a software solution used in SAN. NAS (network area storage) also can be used. DAS (directly attached storage) is a simple technology used in multi-user games.

SDS (Software-defined storage) is a new technology that can virtualize the SAN, NAS, and DAS hardware. This technology also can be used in multi-user games.

* 1. **Memory Management:**

The game will need a library of images. Images take up space and with memory allocation, we can choose where this media is saved and can be referred to. Along with other attachments, these pieces of media and other files can be grouped on a separate drive or folder to help secure information and keep information readily accessible, especially during larger projects in the IDE. For multi-user games, the following techniques can be used for better memory management.

**Techniques to having an efficient use of memory system**

The following are the six efficient techniques for achieving this:

* Making the Partitioning fixed,
* Making the Partitioning Dynamic,
* Straightforward Paging,
* Straightforward Segmentation,
* Using the Paging style for the Virtual Memory
* Segmenting the Virtual Memory.

**Making the Partitioning fixed,**

This is the most established and least complex strategy used to place more than one cycle in the principal memory. In this parceling, the quantity of allotments (non-covering) in RAM is fixed however the size of each segment might be something very similar. As it is a touching portion, consequently no spreading over is permitted.

**Making the Partitioning Dynamic,**

Dynamic parts are a user space dividing framework. Utilizing this dividing framework, you can make, resize, or annihilate parts during over-the-air (OTA) refreshes. With dynamic allotments, merchants never again need to stress over the singular sizes of parts like framework, seller, and item

**Straightforward Paging**

Basic Paging is an expert Barix answer for executing a total paging framework into your undertaking. The engineering, crossed over utilizing Simple Paging Firmware, upholds an expert slave model with a drawn-out point of interaction to show and deal with every single associated gadget, gatherings, and zones.

**Basic Segmentation**

A table stores the data of pretty much all such portions and is called Segment Table. Portion Table - It maps two-layered Logical locations into one-layered Physical locations. It's each table passage has Base Address: It contains the beginning actual location where the sections dwell in memory.

**Virtual-Memory Paging**

Memory paging is a memory of the executives’ procedure for controlling how a PC or virtual machine's (VM's) memory assets are shared. A PC can address memory past the sum truly introduced in the framework.

**Virtual-Memory Segmentation**

Virtual Memory Segmentation partitions the cycles into n number of fragments. Every one of the portions is not isolated at a time. Virtual Memory Segmentation could happen at the run season of a program.

**Conveyed frameworks**

A dispersed framework is a figuring climate wherein different parts are spread across various PCs (or other registering gadgets) in an organization. These gadgets split up the work, organizing their endeavors to finish the task more productively than if a solitary gadget had been liable for the errand.

* 1. **Distributed Systems and Networks**

The problem we are trying to solve is having multiple interactions and systems communicate with each other, however, they aren’t all in the same language. Maybe we could create a server where all this information is sorted and translated into. Cross-platform game creation? Using web servers and languages compatible with web-based applications can allow mobile devices and PC devices to “cross-play” and connect wirelessly with each other. Latency becomes an issue because we have to rely on the client and server-side bandwidth, especially if we have a large player base and enough power for these servers and cooling systems to work effectively and efficiently. Various kinds of Distributed Systems are used in multi-user games (He, 2019).

**Disseminated Computing System**

A dispersed PC framework comprises different programming parts that are on various PCs, yet run as a solitary framework. The PCs that are in a conveyed framework can be genuinely near one another and associated by a neighborhood organization, or they can be geologically far off and associated by a wide region organization.

**Disseminated Information System:**

Disseminated data frameworks address an inexorably significant pattern for PC clients. Conveyed handling is a strategy for executing a solitary sensible arrangement of handling capabilities across various actual gadgets so that each plays out some piece of the all-out handling required.

**Disseminated Pervasive System:**

The Distributed and Pervasive Systems (DPS) Group conducts state-of-the-art research that spotlights difficulties encompassing the improvement of frameworks for dispersed systems administration and inescapable detecting. Specifically noteworthy is the plan, advancement, and double-dealing of these frameworks for logical examinations.

* 1. **Security**

Windows has built-in security features and live virus detection features. But because of the popularity of windows, many viruses can easily penetrate these systems, therefore having other types of malware and threat protection is essential. Mac has amazing antimalware software, making it less susceptible to cyberattacks, however, this is at the cost of less software availability and flexibility with software compatibility. Mobile devices are prone to attacks, especially on the web. Most antimalware and security are already built into the phone and provide live detection and active monitoring. Linux doesn’t have much threat protection, however, it’s more transparent with its files and contents, making it easier to see exactly what’s going on with the operating system. DDoS solutions need to be implemented in multi-user games. Information theft and cheating are major security threats in multi-user games. Stronger authentication, encryption, and user activity monitoring can enhance the security in multi-user gaming.

## Conclusion

A single-user game needs to be upgraded to a multi-user game. The design constraints of the game are studied initially. The domain model for the single-user game is studied. The single-user game is evaluated. The server-side technologies, the client-side technologies, and the design tools that can be used for the multi-user game environment are studied. Technical recommendations are done for the multi-user game up gradation. The analysis of the system structure of the game has been approached in many variations including:

Balancing the game load.

The efficiency of the system is an important thing that shows how it logically works and tackles the problems. This describes how this system structure balances when the game load increases. Based on the relation, the player has distributed; for interactively balancing between players, use P2P framework; On core machines, the reusability of function reduces the load; In the connected area, split the world of a game into clear-cut. These are the solutions suggested in this research.

Minimizing web traffics.

It is also important to reduce the traffics in the network. The suggested solutions are, the use of recognition messages, Inspect the quality of networking executions, logical use of pattern of publish-subscribe, and based on communication around the AOI of participants.

Storing data.

Database Management Systems are used to store the game data. The usage of

-P2P structure,

- Distributed and Non-Distributed systems and

-relational and Non-relational Database management system

Are sharing and storing the data.

Given both game layout and system structure:

Initially, the reduction of the functionality of the game engine leads to play with historical perfection.

Then, the study of suitable NoSQL database for addressing issues and storing data of the game. After that, with the view of upcoming projects, it tries to guarantee the standard and reveal game information to work with the upcoming presentation of contented writing.

Game Engine

The game engine should come with the following features:

Allowing players to:

Register their accounts and permit them to join in games.

Interact with other players, by either bulletin or chat center.

Delete their account and pieces of information.

It should allow players to notice the game's progress and also permit them to join.

The User Interface (UI) should be minimalistic allowing players to:

Commune with objects in the game.

See their location, progress, and ranking of the game.

Also look over their finances, armies, and holdings.

Also, see their current location on the hexagon map, But as optional.

Allow players to alter or establish the new content of a game to ease the functionality of this game. Most of the reports and articles propose strategies that the Extensible functions to make core game machines run efficiently. In 2013, the multi-server structure was recommended by Dieckmann with the different modules like Patch server, Proxy server, Synchronization server, Database, World server, Login server, and Game server

Fundamental to the entire system, is the allocated database, which verifies the continuity. And also, in the case of any failure in the system, it delivers the source code absolute.

The patch server allows the renewing the users before sign-in. This patch also permits a possibly high load cycle to be completed in lined up with other game capabilities.

The securing of the user’s pieces of information is a very important thing. Here the Login server permits the system for making the login process well-organized. The upgraded security measures were executed to preserve the participant’s data. The Game server is to supply expandable and execute the core game engine while working equally. The Proxy server manages all the communications between server and client and it also carried out three major functionalities. They are, initially, separate the requirement of the game server to compress/Decompress data and Encrypt/Decrypt data. Then, disconnecting the client and game server for filtering the dangerous traffic and increases the security. After that, enhance the system by enabling latest proxy server.

## References

Asif, M., & Krogstie, J. (2013). Mobile client-side personalization. *2013 International Conference on Privacy and Security in Mobile Systems (PRISMS)*. https://doi.org/10.1109/prisms.2013.6927183

Carman, C. (2018). *Visual design concepts for mobile games*. Taylor & Francis, a CRC title, part of the Taylor & Francis imprint, a member of the Taylor & Francis Group, the academic division of T&F Informa, plc.

Geig, M. (2021). *Sams Teach yourself unity game development in 24 Hours*. Pearson Education, Inc.

Harbour, J. S. (2012). *Sams Teach yourself Android game programming in 24 Hours*. Sams.

He, A. (2019). Client-side and server-side programming in SIREPO framework. https://doi.org/10.2172/1573466

Scolastici, C. (2013). *Mobile game design*. Packt Publishing Limited.

Smith, K., Shen, Y., & Dean, A. (2020). Software design considerations for mathematics in Mobile Games. *Game Design and Intelligent Interaction*. https://doi.org/10.5772/intechopen.88177

Sutopo, H. (2017). Mobile game developing: Math Mobile Game Learning Model. *International Journal of Information and Electronics Engineering*, *7*(2), 62–67. https://doi.org/10.18178/ijiee.2017.7.2.662

Thakkar, M. (2020). Deploying your app to a server. *Building React Apps with Server-Side Rendering*, 175–188. https://doi.org/10.1007/978-1-4842-5869-9\_6

◾ welcome to designing the user experience of Game Development Tools. (2015). *Designing the User Experience of Game Development Tools*, 28–41. https://doi.org/10.1201/b18051-6