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Date: 06/17/2024

CS230

The Gaming Room's Software Design Document

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1. Introduction.

   The Gaming Room plans to expand its popular game, Draw It or Lose It, to run on a variety of computing platforms. This document contains a detailed analysis and recommendations for the system architecture required to accomplish this goal.

2. Project Overview

The goal is to improve the game Draw It or Lose It so that it runs smoothly across multiple platforms. This includes proposing an operating system, comprehending its design, assuring effective storage and memory management, utilizing distributed systems, and protecting user data.

3. Requirements

Expand Draw It or Lose It to multiple platforms.

Ensure efficient data storage and retrieval.

Implement robust memory management.

Utilize distributed systems for communication across platforms.

Ensure high-level security for user data and game interactions.

4. System Architecture.

The system architecture describes the fundamental components needed to support the game's expansion. This comprises selecting an operating platform, its architecture, storage solutions, memory management strategies, distributed system design, and security measures.

5. Suggestions

Operating Platform: Ubuntu Server (Linux-based)

Ubuntu Server is a robust, open-source platform renowned for its reliability, security, and speed. It supports a diverse set of hardware and software, making it perfect for scalable game

production.

Operating System Architectures

Linux Operating System Architecture

The kernel is the central component that manages the CPU, memory, and peripheral devices.

System libraries are essential for application compatibility and system functionality.

System Utilities are basic commands and functions that help to maintain the system.

User Interface: Typically, servers have a command-line interface (CLI), although a GUI can be added if necessary.

Storage Management

Recommended Storage Management System: Network Attached Storage (NAS) with RAID configuration.

Rationale: NAS provides centralized storage that is accessible via a network, guaranteeing that data is available across all platforms. Using RAID (Redundant Array of Independent Disks) provides data redundancy and improves performance.

Features:

Scalability: Easily increase storage capacity.

Redundancy: RAID ensures that data is not lost in the event of disk failure.

Improved read/write performance with the right RAID level (e.g., RAID 5 or 6).

Memory Management

Memory Management Techniques for Linux

Virtual Memory: Extends physical memory to disk storage, creating the illusion of more memory space.

Paging divides memory into fixed-size pages, which reduces fragmentation and improves memory allocation.

Swapping involves moving inactive pages to swap space in order to free up physical memory.

Caching and buffering: Improves performance by temporarily storing frequently used data in RAM.

Distributed Systems and Networks.

Distributed System Implementation

Middleware: To handle communication between platforms, use middleware such as Apache Kafka or RabbitMQ.

Microservices Architecture: Divide the game into microservices, each with a specific function (e.g., user authentication, game logic, scoring).

RESTful APIs: Allow communication between various services using HTTP/HTTPS.

Networking Considerations:

Connectivity: Maintain a strong network infrastructure to ensure ongoing communication.

Outages: Set up redundancy and failover measures to withstand network outages.

Security

Security Measures

Data Encryption: Use SSL/TLS for data in transit and AES for data at rest.

Authentication and Authorization: Implement OAuth 2.0 for secure user authentication and role-based access control (RBAC) for authorization.

Regular Updates and Patching: Keep the operating system and all software components up-to-date with the latest security patches.

Firewalls and Intrusion Detection Systems (IDS): Protect the server from unauthorized access and detect any potential security breaches.

Backup and Disaster Recovery: Regularly back up data and have a disaster recovery plan in place to restore data in case of any failures.

6. Conclusion.

Following the guidelines in this document, The Gaming Room can successfully expand Draw It or Lose It to multiple computing environments. This involves deploying a Linux-based server platform, employing efficient storage and memory management techniques, leveraging distributed systems for seamless communication, and implementing strong security measures to safeguard user data.