Software Design Document
For
MAIN CC PORTAL

Prepared By

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Introduction

Problem Statement

The current system for computer servers and campus Wi-Fi authentication at NIT Calicut is inefficient and unreliable, causing significant disruptions for students, faculty, and researchers. Key pain points include:

1. **Server Management Issues:**
    - **Lack of Transparency:** No visibility into server maintenance schedules, leading to unexpected downtimes.
    - **Access Management:** No centralized system to view server access details (IP addresses, credentials).
    - **Communication Issues:** Reliance on emails for requests (server access, VPN, issue reporting), resulting in delays.
    - **Data Loss:** Difficulty reporting server downtimes/data loss, risking academic/research work.
2. **Campus Wi-Fi Authentication Issues:**
    - **Single Device Limitation:** Users can only log in on one device; manual logouts are cumbersome.
    - **Automatic Disconnections:** Frequent Wi-Fi drop-offs requiring reauthentication.
    - **Inefficient Resolution:** Users must call CNC for help, causing delays.

Primary Users

1. Students

- **Role:** End-users who require access to servers, VPNs, and Wi-Fi for academic purposes (e.g., coursework, research, projects).
- **Needs:**
    - **Quick and easy access:** Submit server/VPN requests and receive approvals promptly.
    - **Transparency:** Track the status of their requests in real-time.
    - **Issue resolution:** Report Wi-Fi or server-related issues and receive timely support.
- **System Features for Students:**

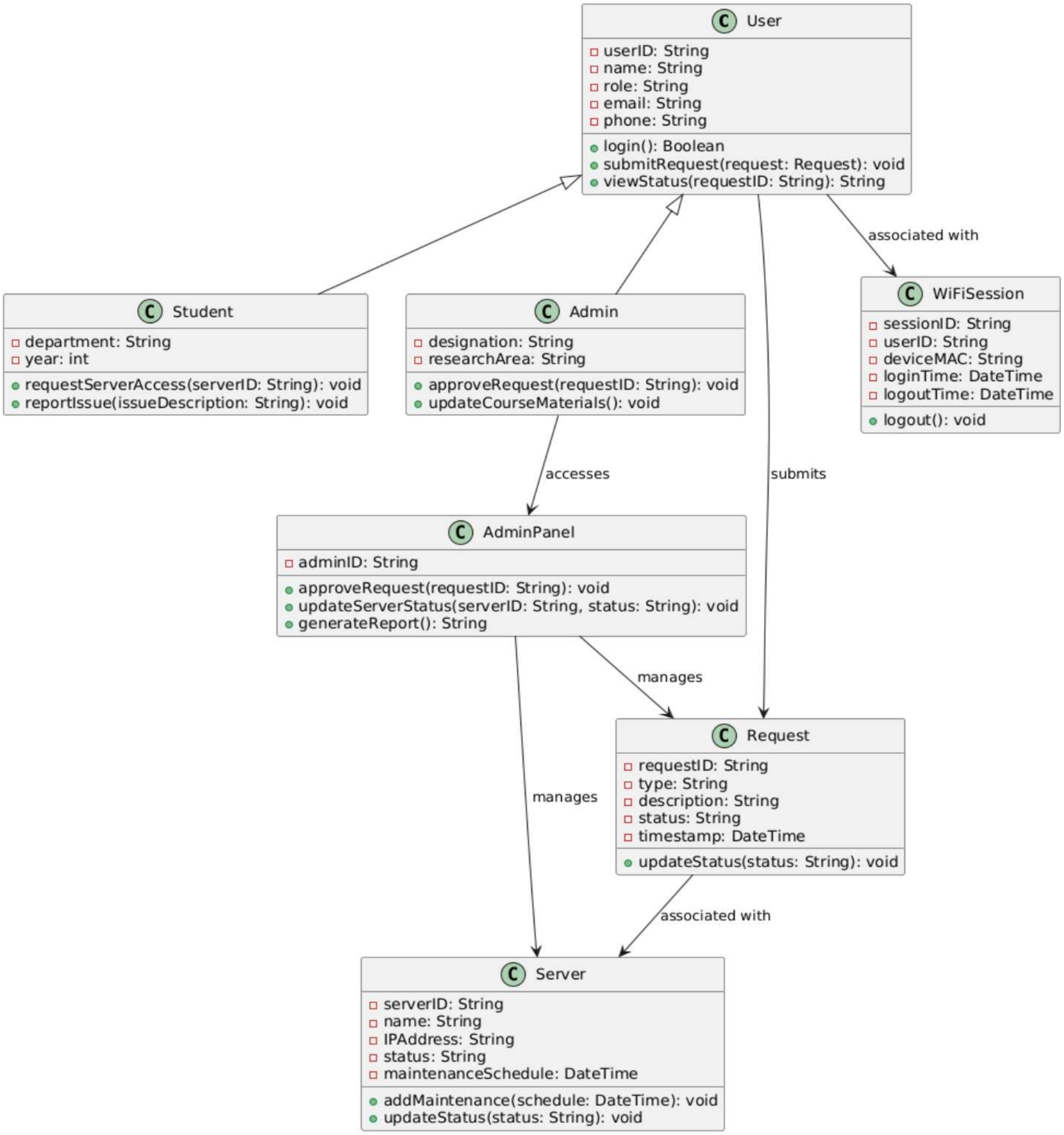
    - Intuitive UI for submitting requests and checking statuses.
    - Automated notifications for request approvals or rejections.
    - Issue reporting tool with tracking capabilities.

2. Admins (Faculty/Department Heads)

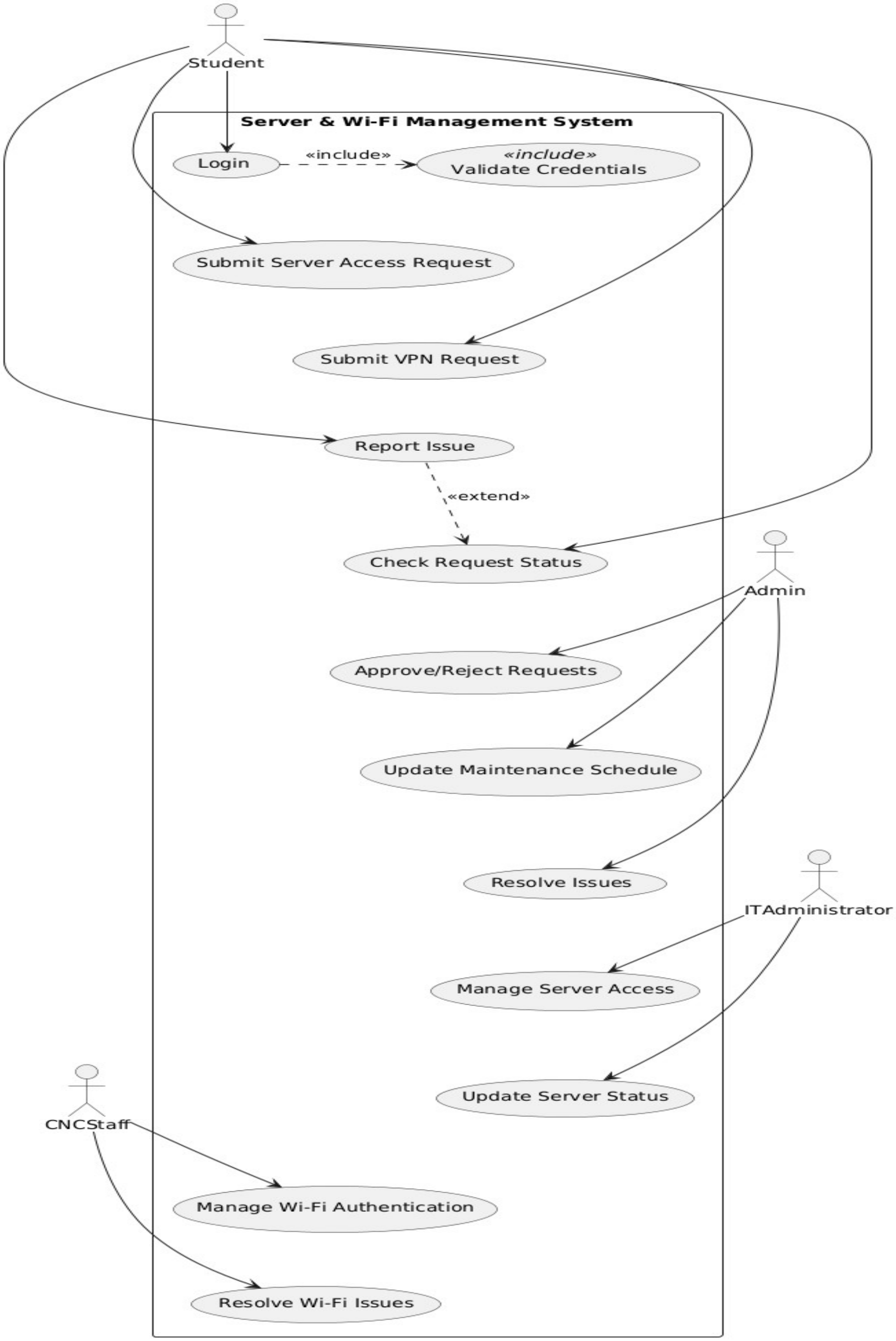
- **Role:** Approve or reject server/VPN access requests, manage user permissions, and oversee server statuses.
- **Needs:**
    - **Efficient workflow**: Streamlined process for reviewing and approving requests.
    - **Control**: Ability to manage server access and monitor usage.
    - **Insights**: Access to reports and analytics on server usage and request trends.
- **System Features for Admins**:
    - Admin Panel for managing requests, updating server statuses, and scheduling maintenance.
    - Role-based access control to ensure secure and appropriate permissions.
    - Reporting tools for generating usage and request analytics.

Diagrams

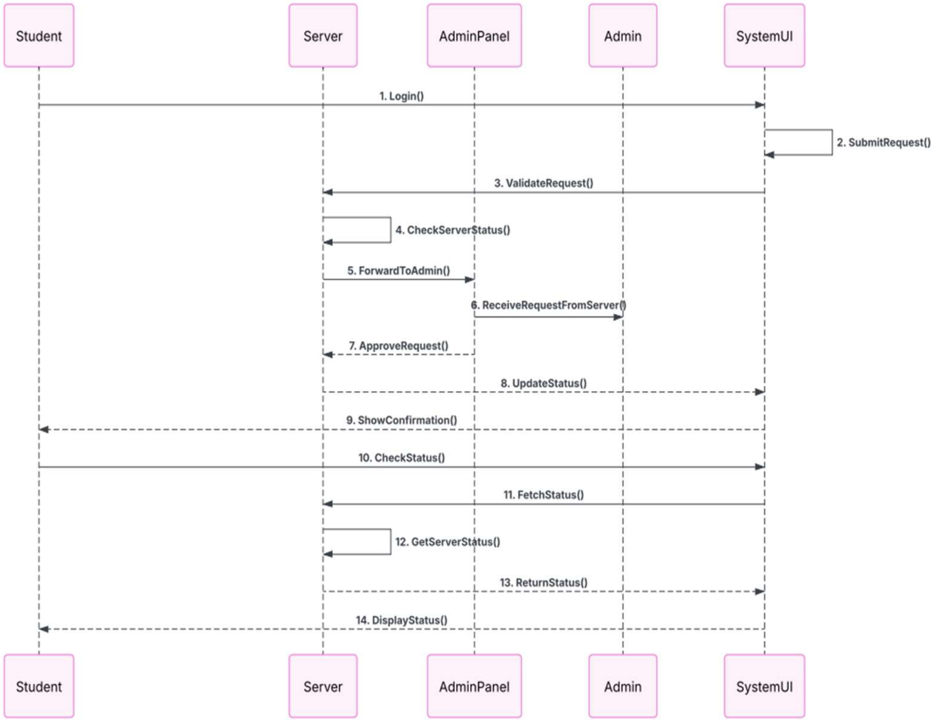
Class Diagram



Use Case Diagram

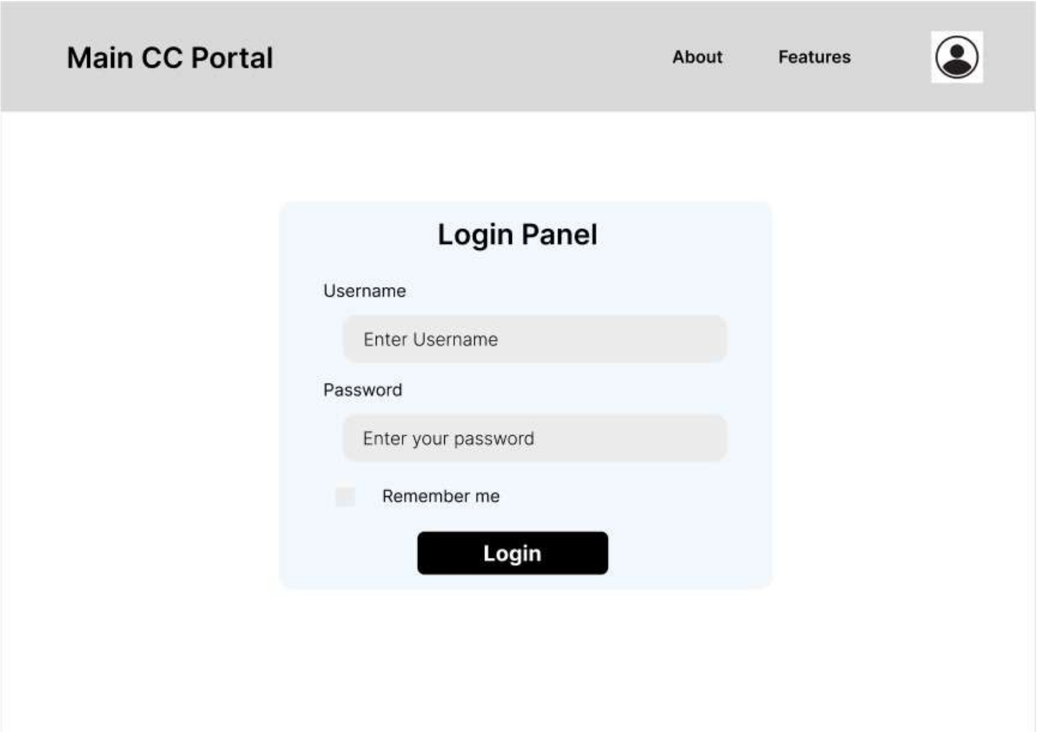


Sequence Diagram



System UI

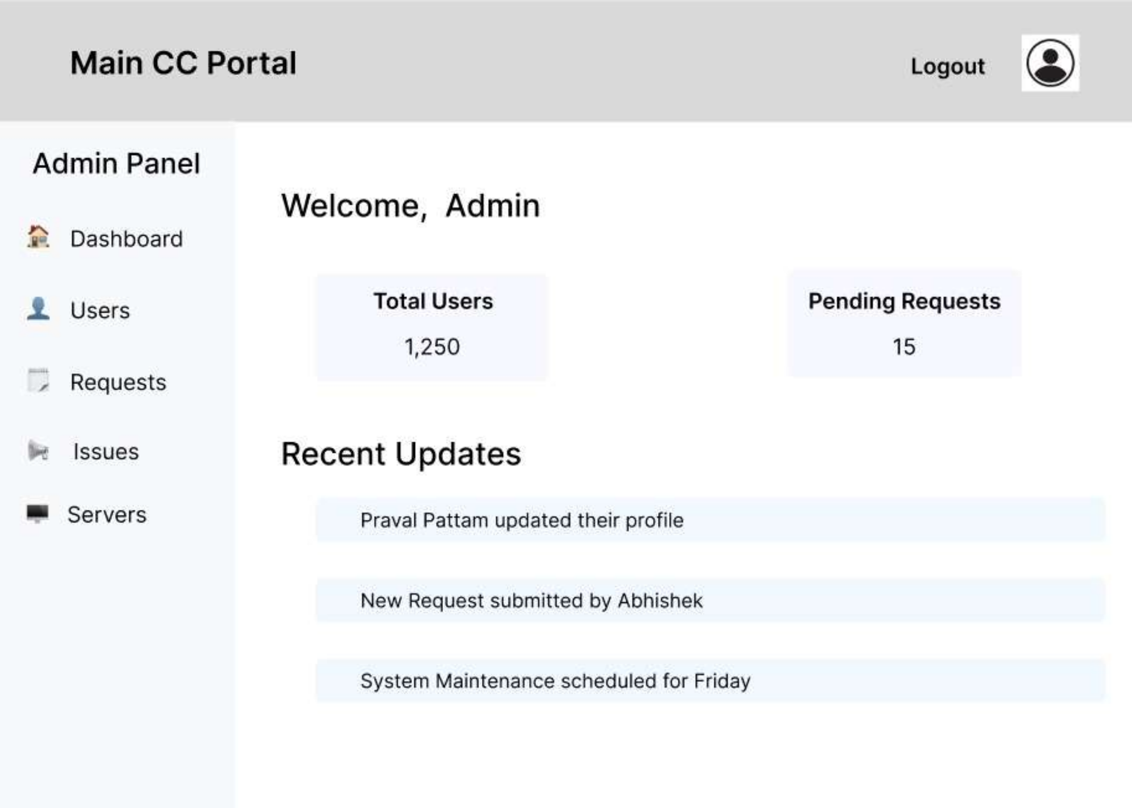
Login Panel



- **Header:** Contains the portal name on the left and an "About" button and a “Features” button with a user profile icon on the right.
- **Main Content Area:** Two fields “Username” and “Password”, a “Remember me” button and a “Login” button that enables users to login to their user panel dashboard and use the features of the website.

Admin Panel

1. Dashboard



Welcome, Admin

Total Users	Pending Requests
1,250	15

Recent Updates

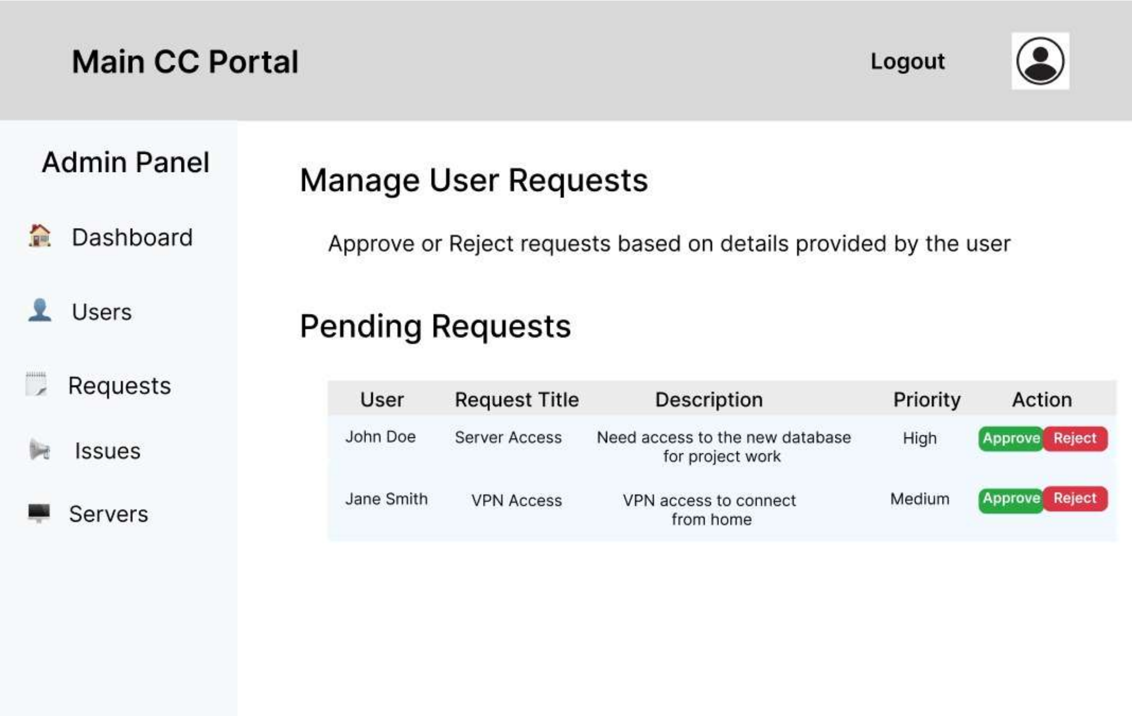
Praval Pattam updated their profile

New Request submitted by Abhishek

System Maintenance scheduled for Friday

- **Header:** Contains the portal name on the left and a "Logout" button with a user profile icon on the right.
- **Sidebar (Admin Panel):** Includes navigation options such as Dashboard, Users, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **welcome message** addressed to the admin.
  - **Statistics section:** Displays the total number of users (1,250) and the count of pending requests (15).
  - **Recent Updates section:** Lists recent activities, including a user updating their profile, a new request submission, and scheduled system maintenance.

2. Requests Panel



Manage User Requests

Approve or Reject requests based on details provided by the user

Pending Requests

User	Request Title	Description	Priority	Action
John Doe	Server Access	Need access to the new database for project work	High	Approve Reject
Jane Smith	VPN Access	VPN access to connect from home	Medium	Approve Reject

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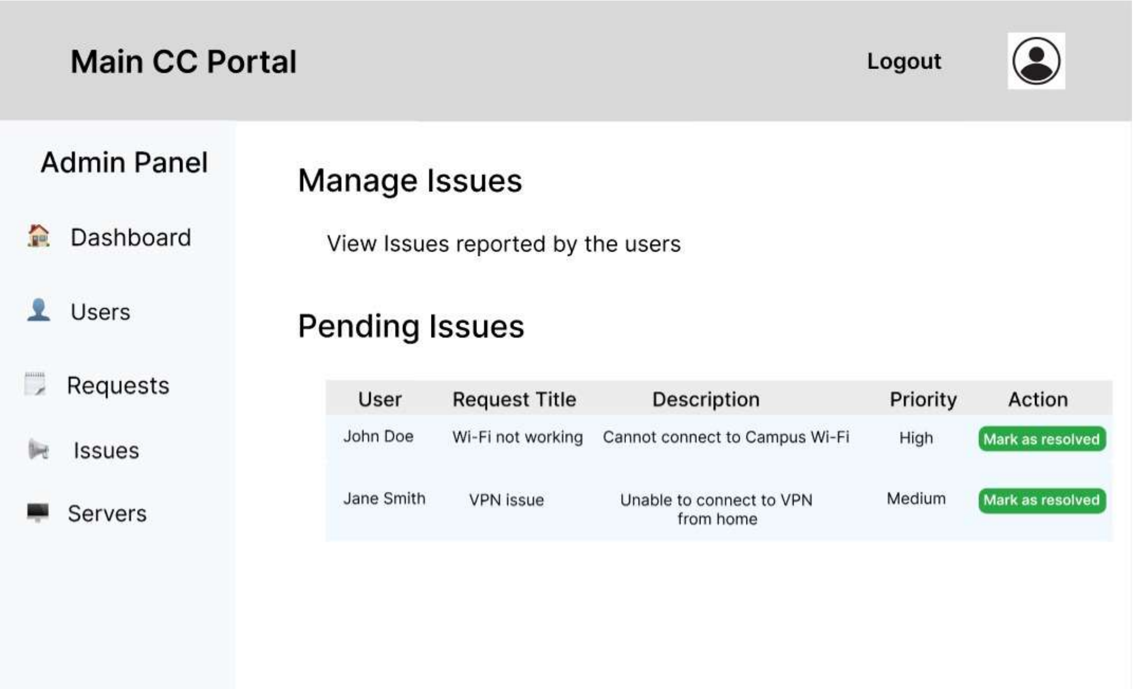
- **Sidebar (Admin Panel):** Includes navigation options such as Dashboard, Users, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
    - A **Pending Requests section** displaying a table with columns for **User, Request Title, Description, Priority, and Action**.
    - Each request has **Approve** and **Reject** buttons for quick action.

3. Issues



Manage Issues

View Issues reported by the users

Pending Issues

User	Request Title	Description	Priority	Action
John Doe	Wi-Fi not working	Cannot connect to Campus Wi-Fi	High	Mark as resolved
Jane Smith	VPN issue	Unable to connect to VPN from home	Medium	Mark as resolved

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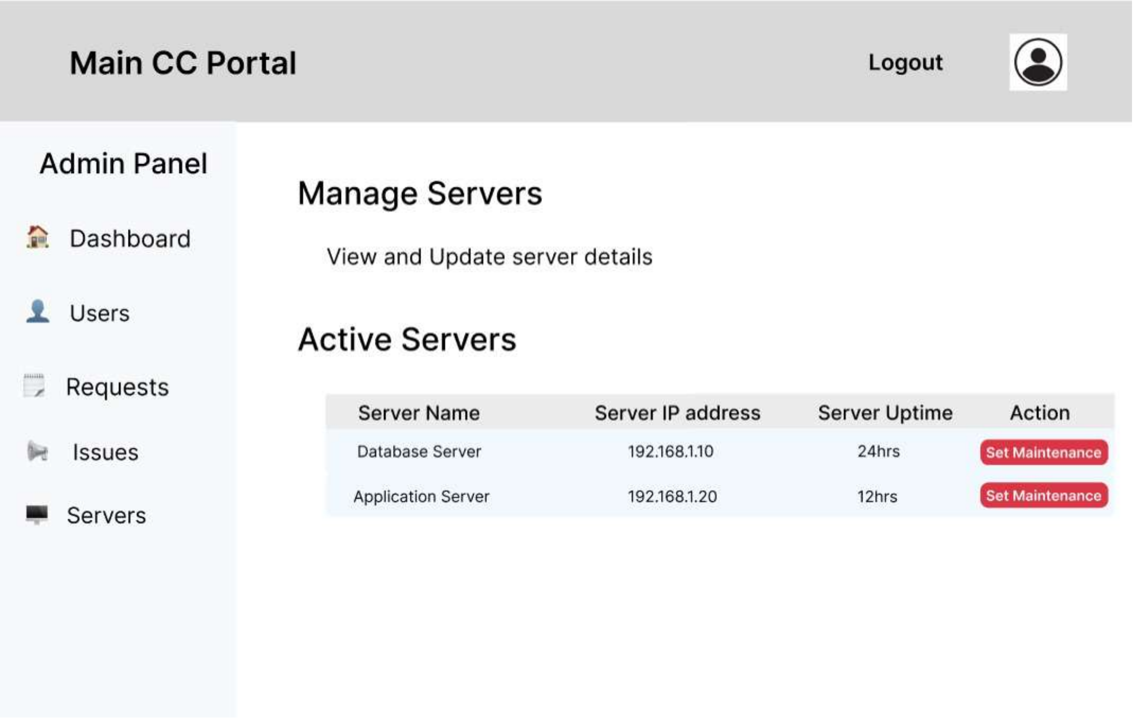
- **Sidebar (Admin Panel):** Contains navigation options such as Dashboard, Users, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **Manage Issues** area informing the admin about viewing and managing user-reported issues.
  - A **Pending Issues section** displaying a table with columns for **User, Request Title, Description, Priority, and Action**.
  - Each issue has a **Mark as Resolved** button for quick action.

4. Servers



Manage Servers

View and Update server details

Active Servers

Server Name	Server IP address	Server Uptime	Action
Database Server	192.168.1.10	24hrs	Set Maintenance
Application Server	192.168.1.20	12hrs	Set Maintenance

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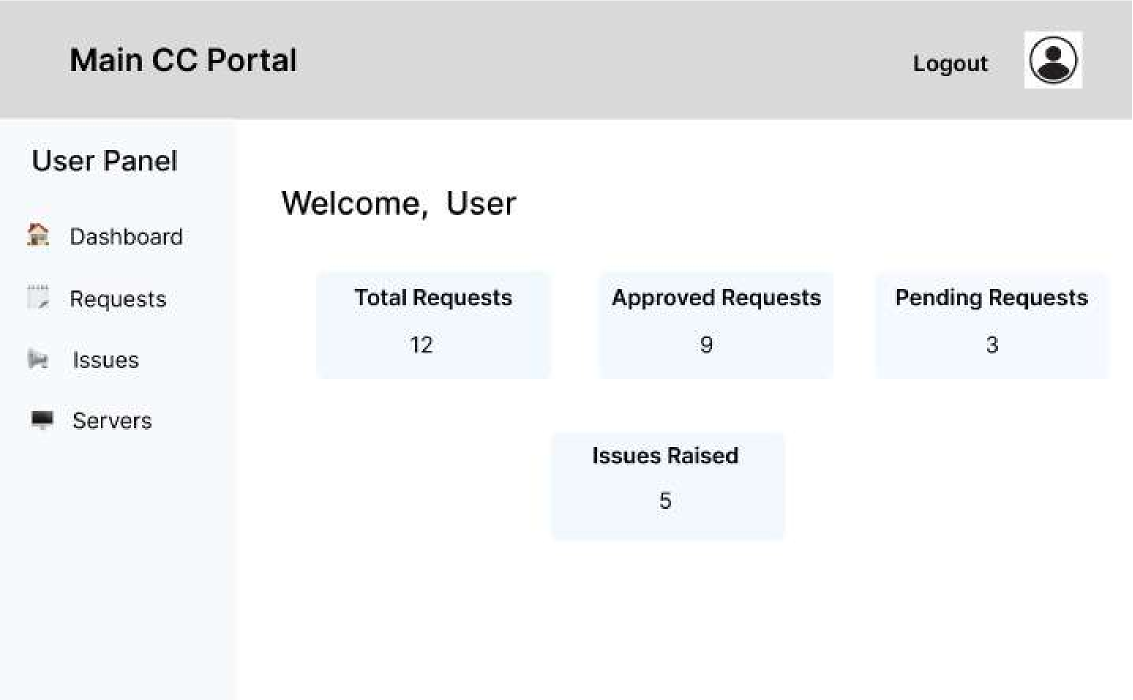
- **Sidebar (Admin Panel):** Contains navigation options such as Dashboard, Users, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **Manage Servers** area informing the admin about viewing and updating server details.
  - An **Active Servers section** displaying a table with columns for **Server Name, Server IP Address, Server Uptime, and Action**.
  - Each server has a **Set Maintenance** button for performing maintenance tasks.

User Panel

1. Dashboard



Welcome, User

Total Requests 12

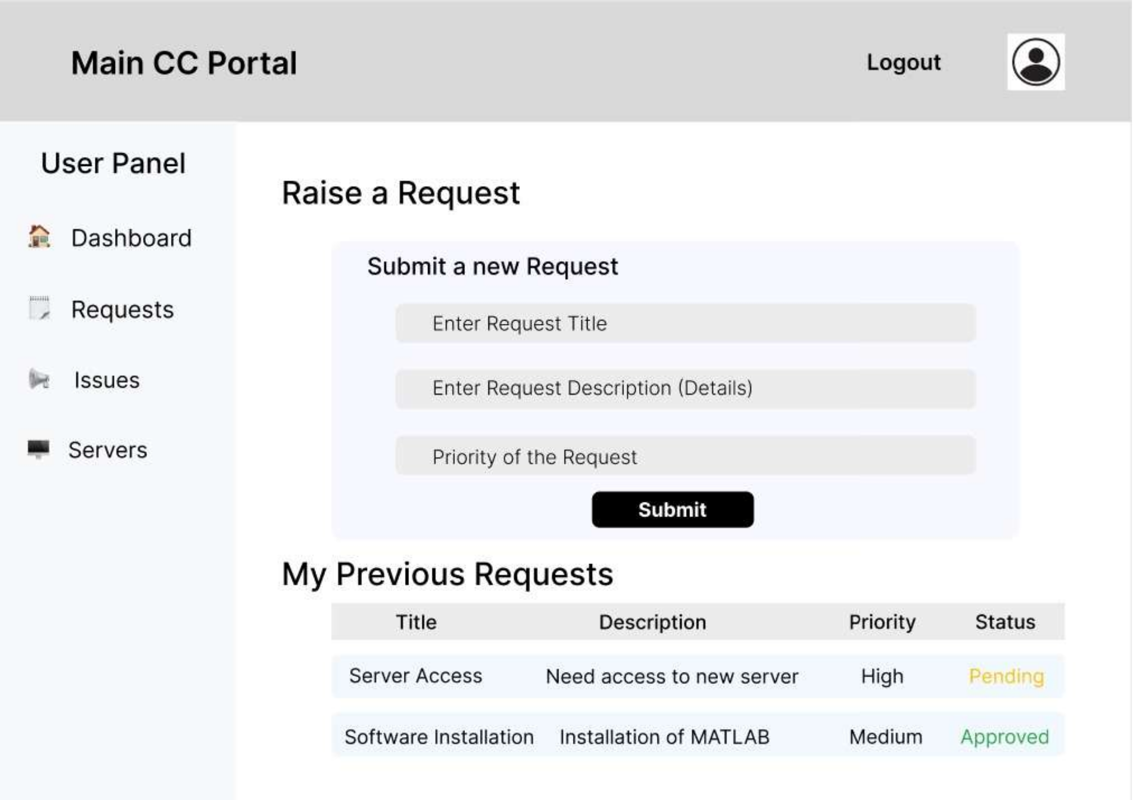
Approved Requests 9

Pending Requests 3

Issues Raised 5

- **Header:** Shows the portal name on the left and a "Logout" button with a user profile icon on the right.
- **Sidebar (User Panel):** Contains navigation options such as Dashboard, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **welcome message** addressing the user.
  - Four summary cards displaying key statistics:
    - Number of Total requests.
    - Number of Approved Requests.
    - Number of Pending Requests.
    - Number of Issues Raised.

2. Requests



My Previous Requests

Title	Description	Priority	Status
Server Access	Need access to new server	High	Pending
Software Installation	Installation of MATLAB	Medium	Approved

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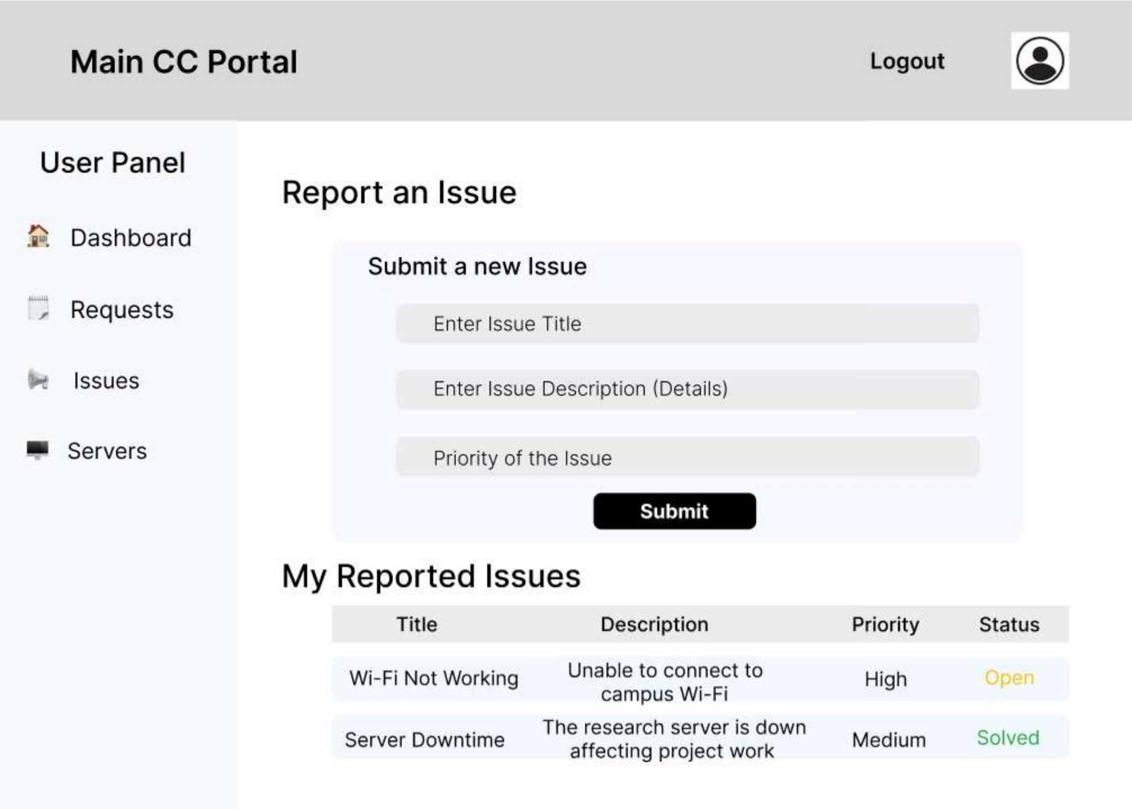
- **Sidebar (User Panel):** Contains navigation options such as Dashboard, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **"Raise a Request"** section with a form containing fields for **Request Title, Description, and Priority**, along with a **Submit** button.
  - A **"My Previous Requests"** section displaying a table with past requests, including columns for **Title, Description, Priority, and Status**.
    - Example requests include **Server Access** (High Priority, Pending) and **Software Installation** (Medium Priority, Approved).

3. Issues



Report an Issue

Submit a new Issue

My Reported Issues

Title	Description	Priority	Status
Wi-Fi Not Working	Unable to connect to campus Wi-Fi	High	Open
Server Downtime	The research server is down affecting project work	Medium	Solved

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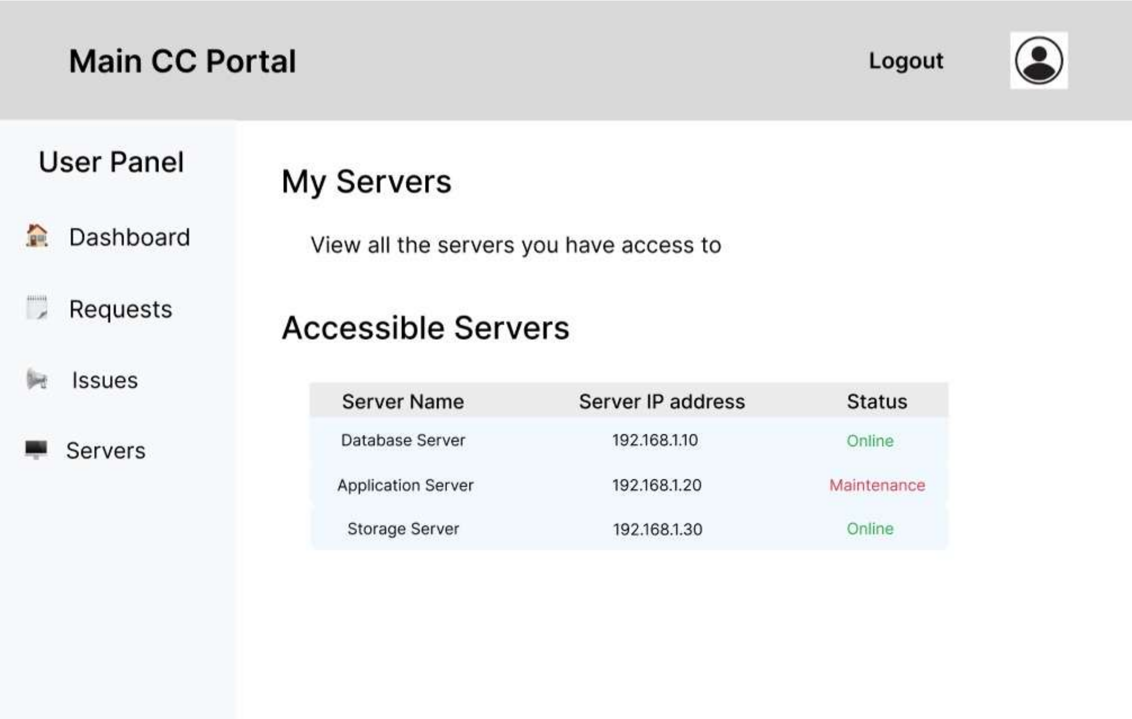
- **Sidebar (User Panel):** Contains navigation options such as Dashboard, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **"Report an Issue"** section with a form containing fields for **Issue Title, Description, and Priority**, along with a **Submit** button.
  - A **"My Reported Issues"** section displaying a table with past issues, including columns for **Title, Description, Priority, and Status**.
    - Example issues include **Wi-Fi Not Working** (High Priority, Open) and **Server Downtime** (Medium Priority, Solved).

4. Servers



My Servers

View all the servers you have access to

Accessible Servers

Server Name	Server IP address	Status
Database Server	192.168.1.10	Online
Application Server	192.168.1.20	Maintenance
Storage Server	192.168.1.30	Online

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- **Sidebar (User Panel):** Contains navigation options such as Dashboard, Requests, Issues, and Servers, each represented by an icon.
- **Main Content Area:**
  - A **"My Servers"** section with a list of the servers the user has access to.
  - An **"Accessible Servers"** section displaying a table with **Server Name, IP Address, and Status**.
    - Example servers include **Database Server (192.168.1.10, Online)**, **Application Server (192.168.1.20, Maintenance)**, and **Storage Server (192.168.1.30, Online)**.

Design Alternatives

The following are the alternative architectural designs:

1. Monolithic Architecture

- **Approach:** Build the entire system as a single application where all components (UI, backend, database, and business logic) are tightly integrated.
- **Pros:** Easier to develop, deploy, and maintain for small-scale applications.
- **Cons:** Scalability and flexibility become challenging as the system grows.

2. Microservices Architecture

- **Approach:** Break the system into multiple independent services (e.g., User Management, Server Monitoring, Issue Tracking) that communicate via APIs.
- **Pros:** Scalable, modular, and fault-tolerant.
- **Cons:** More complex to manage, requires API gateways and service discovery.

3. Serverless Architecture

- **Approach:** Utilize cloud-based serverless computing (e.g., AWS Lambda, Azure Functions) where backend logic is executed as functions triggered by events.
- **Pros:** Reduced infrastructure management, cost-efficient for intermittent workloads.
- **Cons:** Vendor lock-in, cold start latency.

4. Containerized Deployment with Kubernetes

- **Approach:** Deploy services as **Docker containers** orchestrated by **Kubernetes** for scalability and automation.
- **Pros:** Portable, scalable, and supports automated deployments.
- **Cons:** Steeper learning curve, requires container orchestration expertise.

Why Monolithic Architecture is the Best Choice for Our Needs?

1. Simple & Easy to Maintain

- A single codebase makes development, testing, and debugging straightforward.

2. Cost-Effective

- Requires minimal infrastructure, reducing operational costs.

3. Fast Deployment

- One-step deployment without complex service management.

4. Ideal for Small-Scale Applications

- Well-suited for an institute with a limited number of users.

5. Future Flexibility

- Can be modularized later if expansion is needed.

Conclusion:

Monolithic architecture is the best fit due to its simplicity, lower cost, and fast development, making it ideal for our institute’s server inventory tool.

Evaluation of other similar Server Inventory Tools

1. https://www.centrel-solutions.com/xiaconfiguration/capabilities.aspx?capability=windows-server-inventory-tool

2. https://www.network-inventory-advisor.com/best-hardware-inventory-software.html

The tools listed above do not have features like user-raised issues and user requests to the admin, which are essential for our system. These features enhance communication, streamline issue resolution, and improve overall system management by allowing users to actively engage with administrators.