Development of web portal for centralized management of network resources

by

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A project submitted
In
partial fulfillment of the requirements
for the degree
of
BACHELOR OF TECHNOLOGY
In
Computer Engineering

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April 2023

CERTIFICATE

This is to certify that the project work titled

Development of web portal for centralized management of network resources

Is the bonafide work of

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Project Guide	:	Mr. Arvind Mohan Singh (Guide)
Project Duration	:	06/12/2022 to 07/04/2023
Project Remarks	:	Satisfactorily Completed

07/04/23

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Theoretical knowledge is of no importance if one doesn't know the way of its implementation. We are thankful to our University and IPR that provided us an opportunity to apply our theoretical knowledge through the project. We feel obliged in submitting this project as a part of our internship.

We would like to take an opportunity to express our humble gratitude to our external project guide **Mr. Arvind Mohan Singh** and internal guide **Dr. Malay S. Bhatt**, under whom we undertook our project. We would also like to thank **Mr. Sharad Jash** and **Mr. Vijay Patel** for their valuable guidance in the completion of our project**.** Their constant guidance and willingness to share their vast knowledge made us enhance our knowledge and helped us to complete the assigned tasks to perfection. Without their effort, support and astonishing testing ability this project may not have succeeded.

With Sincere Regards,

Luv Patel

Harsh Patel

ABSTRACT

For any Organization, managing the record of their employee's devices and instruments which requires internet access for their operation is a very difficult job. Also, keeping track of User data as well as assigning a particular network to every user is a tedious job. IP addresses are typically an extremely important part of a network, and managing them can become pretty difficult as the number of IP addresses used on a network are scaling up in a daily basis.

Thus, to ensuring that each and every User in the organization gets the access as per their usage as well as per their geographic location in the organization, we must have a robust system. IP Address Management (IPAM) is a way in which we can track and manage the IP address space on our network. The project aims to improve the efficiency and effectiveness of network management, allowing organizations to better leverage their network resources to achieve their goals.

Overall, the development of a web portal for centralized management of network resources is a critical project that will help organizations to streamline their network resource management processes and improve overall network performance.

CHAPTER I
INTRODUCTION

Due to advancement in the technology and requirement for constant communication with various things like communication over the internet, with each other or within an organization is a must. Therefore, nowadays for every organization network is first and foremost requirement.

This project involves the development of a web portal for centralized management of network resources. The portal will provide an intuitive and user-friendly interface for managing network devices, configuring network settings, and monitoring network performance. The system will enable network administrators to manage network resources from a single location, reducing the complexity and time required for network management. The portal will be developed using modern web technologies and will be designed to be scalable, secure, and reliable. The project aims to improve the efficiency and effectiveness of network management, allowing organizations to better leverage their network resources to achieve their goals.

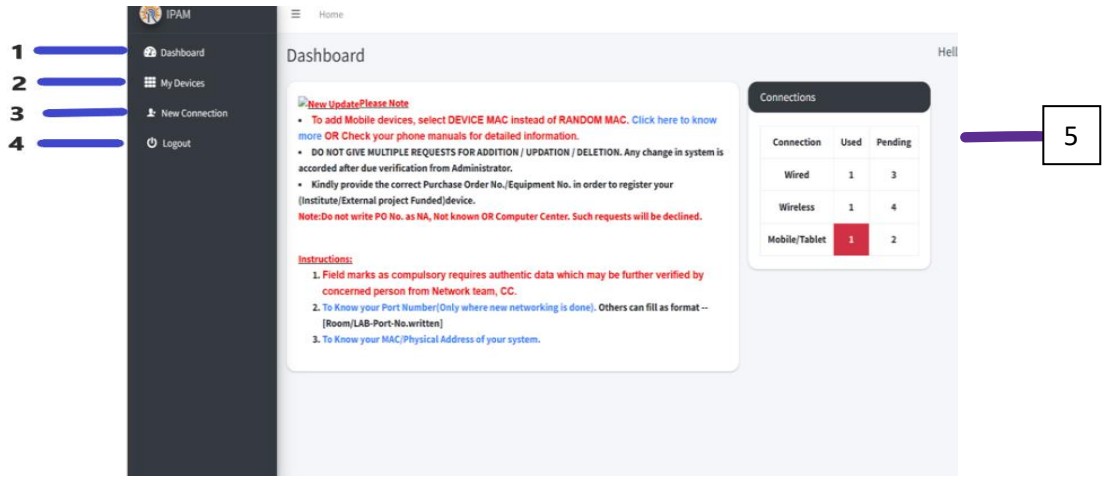


Fig 1.1 User Dashbaord

We have developed and implemented various functionalities.

The functionalities on the user side include :-

1). **Dashboard** :

It is the first page where the User will land upon login. Here, the use can see a navigation panel on the left, public announcements if any.

2). **New Connection Request** : Here, using this functionality the user can request for a new Internet connection. There are three types of connection request namely wired, wireless and mobile/tablet. Users fill out the form by providing the details based on the type of connection required.

3). **My Connections :**

Using this feature, the user can see the details of their all connections established so far as well as if they think that a particular connection is no longer required, then they can make a delete connection request. Also, if any modification needs to be done, then user can use the edit button beside record they wish to edit. Similarly, they can see pending request or if they wish then they can delete a previously made pending request.

4). **Connections Table :**

This table is present on the user dashboard, which gives a overview of devices which are in use as well as pending for approval for each category of connection i.e. wired, wireless and mobile/tablet.

5). **Logout :**

When the user has completed performing actions on his dashboard, then he/she can logout of the system using this button in navigation panel.

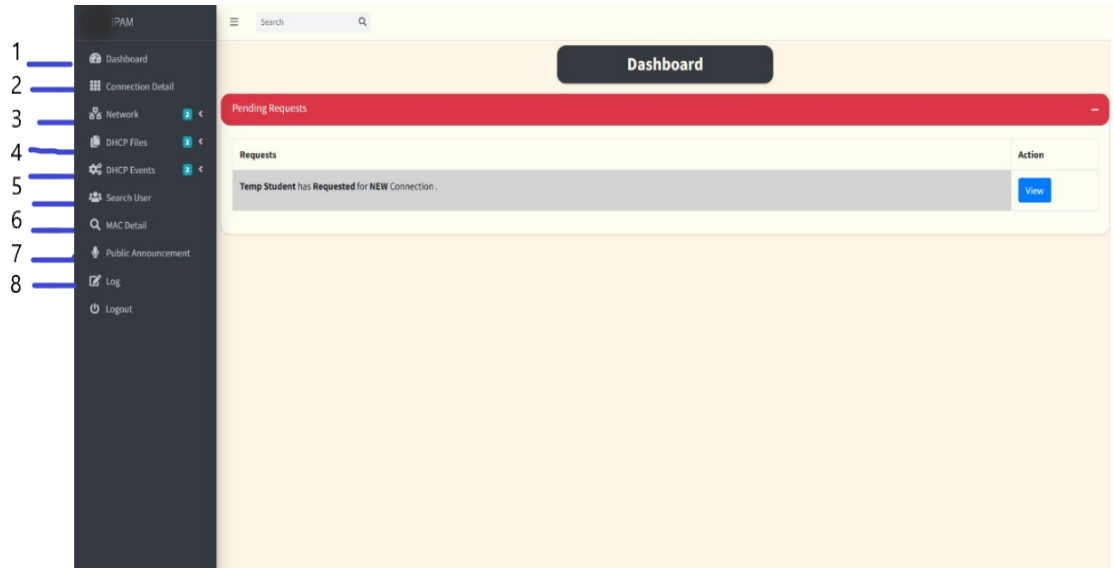


Fig 1.2 Admin Dashboard

Coming to the Admin Side, the functionalities include :

- Dashboard
- Connection Details
- Network

- Subnets
- Vlan Charts

- DHCP Events
  - DHCP Logs
  - DHCP Servies
- Search User
- MAC Detail
- Public Announcements
- Logs
- Logout

1). **Dashboard :** Here, the admin has a navigation panel on the left and on the dashboard, admin gets all the requests the users has sent for new connection.

2). **Connection Details :** Here, the admin can view all the connections of the organization. The details are segregated such that admin can switch between the connection types by using the tabs provided.

3). **Network** : Here, there are two subparts. In the subnet section, the admin can create a new subnet as well as can view the existing subnets. Also, if necessary can view details of a particular subnet and if he wish can edit the subnet details or can delete it. Second, the vlan charts provide a graphical view of a particular Vlan by displaying a list of IP addresses and the allocated users.

4).**DHCP Events :** Here, the Logs related to DHCP can be viewed which gives the admin a better look at the service. Furthermore, the DHCP service can also be started or stopped by using the activate or deactivate button.

6). **Search User :** If the admin wants to view or edit or delete a particular user or a connection of a user, then the admin can do so by searching the user either by their name, payroll no., or by their email.

7). **Public Announcements :** If the admin wants to pass some important message or instructions to all the users of the system, then he can use this functionality to create a new announcement and then click on the activate button to push this on user dashboard.

8). **Logs** : Any activity that takes place on the portal is lodged in the log file of the system. Thus, this way if any mishap happens then using this log file record, the correct activity can be traced.

8). **Logout** : When the admin finishes his work, he can then logout using this button.

1.1 Program Flow :

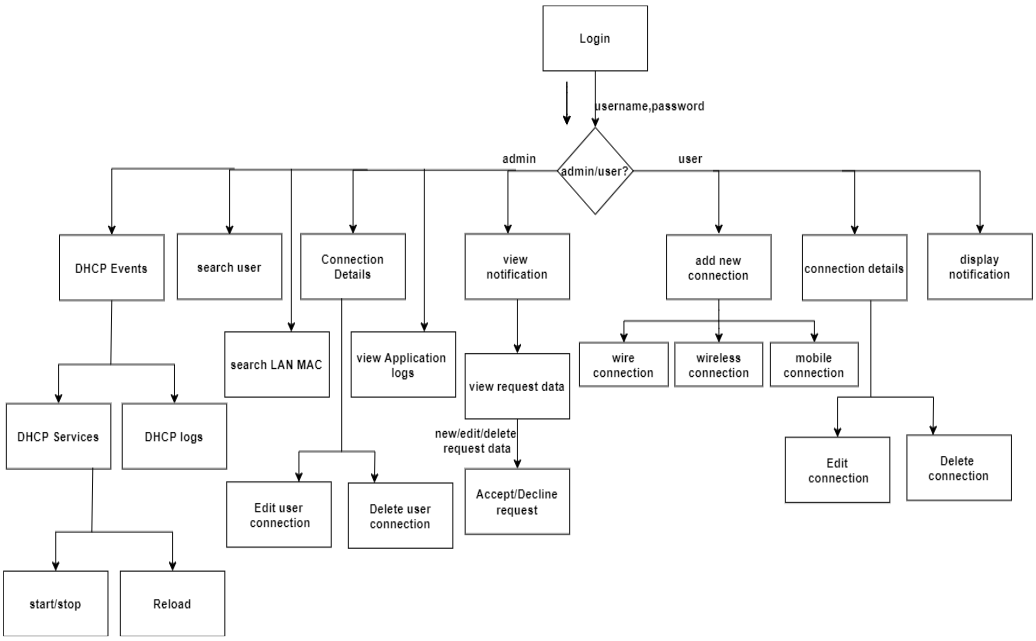


Fig 1.3 Program Flow

1.2 PROJECT DETAILS

Designing of Web Portal with the help of which a new or an existing user can send a new, edit or delete request for Wired, Wireless and/or Mobile/Tablet Connections. Based on the actions of user, Admin can Accept/Decline the requests. In Case of Wired Connection, IP Address is assigned by the administrator to the user device through portal. The entries in the different configuration files based on VLANs are made automatically in a specific format which consist of Hardware Ethernet, fixed address, hostname and a unique key associated with each user. For Wireless and Mobile/Tablet Connections, IP Addresses are assigned dynamically by DHCP server.

Additional UI Functionalities for Admin:

- Public Announcements to users.
- Monitor Application Logs.
- Search for a LAN MAC address.
- Start/Stop/Reload DHCP service.
- Search for all connections detail associated with a user.
- Edit/Delete any connection.

1.3 PURPOSE

The purpose of the project is to simplify Administrator's work through UI Portal which is done manually.

1.4 SCOPE

• Manage free IP address space in a subnet from a UI portal.

• Configuring subnets in use and its expandability.

• Static and dynamic IP and name resolution.

• The hostname associated with each IP address.

• The specific hardware associated with each IP address.

• Migration of existing user and its data.

• Managing and configuring high-availability of Linux based DHCP and DNS processthrough UI portal.

1.5 OBJECTIVE

• To automate administrator's work i.e. changes in the configuration files when user requests for new/edit/delete wired connection based on VLAN.

- Moreover, user can request (new/edit/delete) for Wireless and Mobile/Tablet Connections.

• Monitoring the Activity Logs.

• Addition of New Network by Admin through Interface.

• IP Address Management (Reserved, Used and Free) through UI.

1.6 TECHNOLOGY AND LITERATURE REVIEW

1. Model, View and Controller

The Model-View-Controller (MVC) framework is an architectural pattern that separates an application into three main logical components Model, View, and Controller. Hence the abbreviation MVC. Each architecture component is built to handle specific development aspect of an

application. MVC separates the business logic and presentation layer from each other. It was traditionally used for desktop graphical user interfaces (GUIs). Nowadays, MVC architecture has become popular for designing web applications as well as mobile apps.

2. **Dynamic Host Configuration Protocol (DHCP)**

A DHCP Server is a network server that automatically provides and assigns IP addresses, default gateways and other network parameters to client devices. It relies on the standard protocol known as Dynamic Host Configuration Protocol or DHCP to respond to broadcast queries by clients.

A DHCP server automatically sends the required network parameters for clients to properly communicate on the network. Without it, the network administrator has to manually set up every client that joins the network, which can be cumbersome, especially in large networks. DHCP servers usually assign each client with a unique dynamic IP address, which changes when the client's lease for that IP address has expired.

3. **Domain Name System (DNS)**

DNS is a host name to IP address translation service. DNS is a distributed database implemented in a hierarchy of name servers. It is an application layer protocol for message exchange between clients and servers.

Every host is identified by the IP address but remembering numbers is very difficult for the people and also the IP addresses are not static therefore a mapping is required to change the domain name to IP address. So DNS is used to convert the domain name of the websites to their numerical IP address.

4. LARAVEL Framework

Laravel is an open-source PHP framework, which is robust and easy to understand. It follows a model-view-controller design pattern. Laravel reuses the existing components of different frameworks which helps in creating a web

application. The web application thus designed is more structured and pragmatic.

Laravel offers a rich set of functionalities which incorporates the basic features of PHP frameworks like CodeIgniter, Yii and other programming languages like Ruby on Rails. Laravel has a very rich set of features which will boost the speed of web development.

If you are familiar with Core PHP and Advanced PHP, Laravel will make your task easier. It saves a lot time if you are planning to develop a website from scratch. Moreover, a website built in Laravel is secure and prevents several web attacks.

Advantages of Laravel:

Laravel offers the following advantages, when we are designing a web application based on it –

- The web application becomes more scalable, owing to the Laravel framework.
- Considerable time is saved in designing the web application, since Laravel reuses the components from other framework in developing web application.
- It includes namespaces and interfaces, thus helps to organize and manage resources.

CHAPTER II

ABOUT THE SYSTEM

2.1 STUDY OF CURRENT SYSTEM

With the help of User Webpage, user can request for new connection for his/her device to admin. Admin views the user's request and makes entries in database and files manually.

2.2 PROBLEMS AND WEAKNESSES OF CURRENT SYSTEM

The problems and weakness of the current system are:

• It becomes time consuming and tedious task for admin to make entries manually.

• If any connection is not accepted by admin then user is unknown about the status of request he has made. Because of this, a bad impression is created in user's mind about the administrative department as there is no update to his/her connection request. Thus, the user will keep wandering around the admin's office only to find out that their request has been declined. This also consumes the admin's time as he has to go through the record again to find whether that person has been declined request.

2.3 USER CHARACTERISTICS

1. Admin: Admin has access to the Admin Dashboard. Admin can access all the users data and can also alter it. Admin accepts or declines the Connection requests made by Users.

2. User: User has access to the User Dashboard. User can request admin to add, edit or delete its own connection data.

2.4 System Requirements (SRS)

1. Introduction

Designing of Web Portal with the help of which a new or an existing user can send a new, edit or delete request for Wired, Wireless and/or Mobile/Tablet Connections. Based on the actions of user, Admin can Accept/Decline the requests. In Case of Wired Connection, IP Address is assigned by the administrator to the user device through portal. The entries in the different configuration files based on VLANs are made automatically in a specific format which consist of Hardware Ethernet, fixed address, hostname and a unique key associated with each user. For Wireless and Mobile/Tablet Connections, IP Addresses are assigned dynamically by DHCP server.

2. Objective and Goal

- To automate administrator's work i.e. changes in the configuration files when user requests for new/edit/delete wired connection based on VLAN.
- Moreover, user can request (new/edit/delete) for Wireless and Mobile/Tablet Connections.
- Monitoring the Activity Logs.
- Addition of New Network by Admin through Interface.
- IP Address Management (Reserved, Used and Free) through UI.

3. Functional Requirements

R1: Login (Admin and User)

Input: username, password

Output: access to Dashboard

Description: If admin logs in then redirect to Admin Dashboard and User gets redirected to User Dashboard.

R2: Add New Connection (User)

R2.1: Select Connection Type

Input: Click on New Connection and select Connection type- Wire, Wireless or Mobile/Tablet

Output: Form based on the type of connection selected

Description: The User can add three types of Connections i.e. Wire, Wireless or Mobile/Tablet Connection. So, User needs to select the type before making a new request.

R2.2: Fill the Connection form

Input: Enter the Connection Details and submit the form

Output: Data is stored in tables in Database. User gets notified with New Connection Request Status – Pending. Admin gets notified with the New Connection Request from User.

Description: User enters form details of the Wire, Wireless or Mobile/Tablet Connection and submits the form. The User is notified with request status as Pending and Admin is notified with the new Connection Request. The form values are stored in temporary tables.

R3: Edit/Delete Connection (User)

Input: Click on Connection Details

Output: Three tabs- Wire, Wireless and Mobile/Tablet with Connection Details of User

Description: On clicking Connection Details, User's data for all three Connections is displayed separately.

R3.1: Edit Connection

Input: Click on edit Button and update data.

Output: Data updated in temporary tables in Database. User gets notified with Edit Connection Request Status – Pending. Admin gets notified with the Edit Connection Request from User.

Description: Edit form is displayed with old values and user can modify and submit it. The User is notified with request status as Pending and Admin is notified with the edit Connection Request. The form values are stored in temporary tables.

R3.2: Delete Connection

Input: Click on Delete Button of the Connection

Output: User gets notified with Delete Connection Request Status-Pending. Admin gets notified of Delete Connection Request from User.

Description: On click of delete button, the user is alerted. The User is notified with request status as Pending and Admin is notified with the delete Connection Request.

R4: View Connection Details (Admin)

Input: Click on Connection Details

Output: Connection details wired, wireless and mobile of all users with edit/delete functionality

Description: On clicking Connection Details, all Users data for all three Connections is displayed.

R4.1: Edit User Connection

Input: click on edit button, Modify the data and submit

Output: User data is changed and updated in database

Description: Admin can edit any User's any Connection Data. Modified User is notified about the change. Database is updated.

R4.2: Delete User Connection

Input: click on delete button of user

Output: User Connection deleted and Database is updated

Description: Admin can delete any User's any Connection. User of Deleted Connection is notified. Database is updated.

R5: Public Announcement (Admin)

Input: write message to announce

Output: Announcement displayed to all users

Description: Admin can publish a public message to all the users.

R6: Application Logs (Admin)

Input: Click on Application Logs

Output: List of all users logging information

Description: Activity log of all user is maintained and Admin can view all the actions taken by user.

R7: DHCP Service (Admin)

R7.1: DHCP service start/stop

Input: click button start/stop

Output: DHCP service starts/stops

Description: Admin can stop the DHCP service if it's already running and vice versa.

R7.2: DHCP service reload

Input: click on reload button

Output: DHCP service gets reloaded

Description: Admin can reload DHCP Service.

R8: DHCP Logs Search (Admin)

Input: enter the keyword to search.

Output: list of all the logs matching the keyword from dhcp log file.

Description: When the entered keyword is searched, list of all the logs matching that keyword is displayed from the DHCP log file.

R9: Search LAN MAC (Admin)

Input: enter the MAC Address and click search button

Output: Display User name and assigned IP Address corresponding to that MAC

Description: When MAC is searched, the user name and IP assigned to that MAC is displayed.

R10: Network Chart (Admin)

Input: enter the network subnet.

Output: chart showing which IP address are Reserved, Free and Used.

Description: Admin can view the free, reserved

R11: View DHCP Configuration files (Admin)

Input: Click on the file to view.

Output: Configuration file detail

Description: Admin can view the configuration file details.

R12: Search user (Admin)

Input: enter user ID, name or email and click search Button.

Output: All Connection Details of the User

Description: Admin can search any user with id, name or email and that user details are displayed.

R13: View User Request Notification (Admin)

Input: click of view Button.

Output: Form with Data of New, Edit or Delete Request and Accept and Decline Buttons

Description: The new, edit or delete request data by user is displayed to Admin.

R13.1: Accept Request

Input: If new Connection then assign IP address and Click Accept Button.

Output: User notified with New, Edit or Delete Connection Request is Approved Status. Changes are made in the Database

Description: Admin reviews the request data and accepts the request. User get notified with New, Edit or Delete Connection Request is Approved Status. Changes are made in the Database accordingly.

R13.2: Decline Request

Input: Click Decline Button

Output: User notified with New, Edit or Delete Connection Request is Declined Status. Changes are made in the Database

Description: Admin reviews the request data and declines the request. User get notified with New, Edit or Delete Connection Request is Declined Status. Changes are made in the Database accordingly.

R14: Logout (Admin and User)

Input: Click on Logout.

Output: Admin or User gets logged out.

Description: Admin or User gets logged out.

4. Non-Functional Requirements

- **N1: Usability**

The system must be easy to use by users such that they do not need to read an extensive amount of manuals.

- The system must be quickly accessible by business people.
- The system must be intuitive and simple in the way it displays all relevant data and relationships.
- Thus to achieve this goal, we have made an easily navigable interface by implementing properly named buttons and a dashboard with helpful links through which the user can get answer to most of there questions like how to find MAC address, what commands to run on terminal, etc.

- **N2: Reliability**

The System must give accurate status to the user continuously. Any inaccuracies are taken care by the regular confirming of the actual levels with the levels displayed in the system.

• The system must provide a password enabled login to the user to avoid any foreign entity changing the data in the system.

• The system should provide the user updates on completion of requested processes and if the requested processes fail, it should provide the user the reason for the failure.

• Thus, to achieve this goal, we have developed the system in such a way that it uses Active Directory for the user authentication. Without authentication and authorization, nobody can change anything in the system. As far as failures are concerned, we have used exception handling methods and alert system to make sure the use is notified of any error in real time along with proper reason.

- **N3: Performance**

The system must not lag, because the workers using it don't have down-time to wait for it to complete an action.

• The system must complete updating the databases options successfully every time the user requests such a process.

• All the functions of the system must be available to the user and admin every time the system is turned on.

• Thus, to achieve this goal, we had made sure that all the operations to be performed are taking place immediately after the user request so that there is no delay so no need to maintain record of delay. Also, whereever possible, we have tried to fetch data from UI only, thus reducing the need to run queries again and again.

- **N4: Supportability**

The software is designed such that it works even on systems having the minimum configuration.

• The system is adaptable even if additional plugins or modules are added at a later point.

• The data can be exported to the upper staff so as to make the system more portable.

- As well as it is porting friendly and the code is easy to understand.
- Thus, to achieve this goal, we have used frameworks as well as dependencies in such a way that if in future, more plugins or dependencies are required to be incorporated, then it can be done without any major change in the overall structure. This makes it more available to extend this in future.

2.5 HARDWARE AND SOFTWARE REQUIREMENTS

Hardware Requirements:

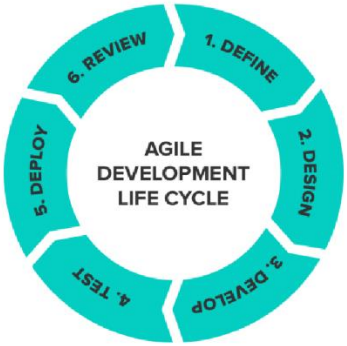
- 64- bit Linux OS
- RAM- 4GB or above
- Processor- 1.6GHz

Software Requirements:

- LDAP Server
- ISC DHCP
- LARAVEL Packages
- MYSQL Database

2.6 PROJECT PLANNING

Project Development Approach



- The Agile model's primary goal is to speed up project completion. Agility is necessary for this assignment to be completed. By adapting the process to the project and eliminating processes that might not be necessary for that project, agility is accomplished. Additionally, time and effort wasters are prevented.

- Actually, Agile model refers to a group of development processes. These processes share some basic characteristics but do have certain subtle differences among themselves.

- Agile Methods break the product into small incremental builds. These builds are provided in iterations.

- Every iteration involves team working simultaneously on various areas like –
  - Planning
  - Analysis
  - Design

- Coding
- Testing

Advantages:

- Working through Pair programming produce well written compact programs which has fewer errors as compared to programmers working alone.
- It reduces total development time of the whole project.
- Customer representative get the idea of updated software products after each iteration. So, it is easy for him to change any requirement if needed.

Disadvantages:

- Due to lack of formal documents, it creates confusion and important decisions taken during different phases can be misinterpreted at any time by different team members.

2.7 ASSUMPTIONS AND DEPENDENCIES

Assumptions:

• User friendly interface on server side so that any user can easily navigate through the system with or without logging in.

• Server used for data storing is always secured.

• User should have a basic knowledge of navigating in a website.

• The backend events (in phpMyAdmin) will always be turned on.

• Internet Connection required.

Dependencies:

• Application is depended on LDAP server for login of admin as well as user.

CHAPTER III

SYSTEM ANALYSIS

3.1.1 Use-Case Diagram

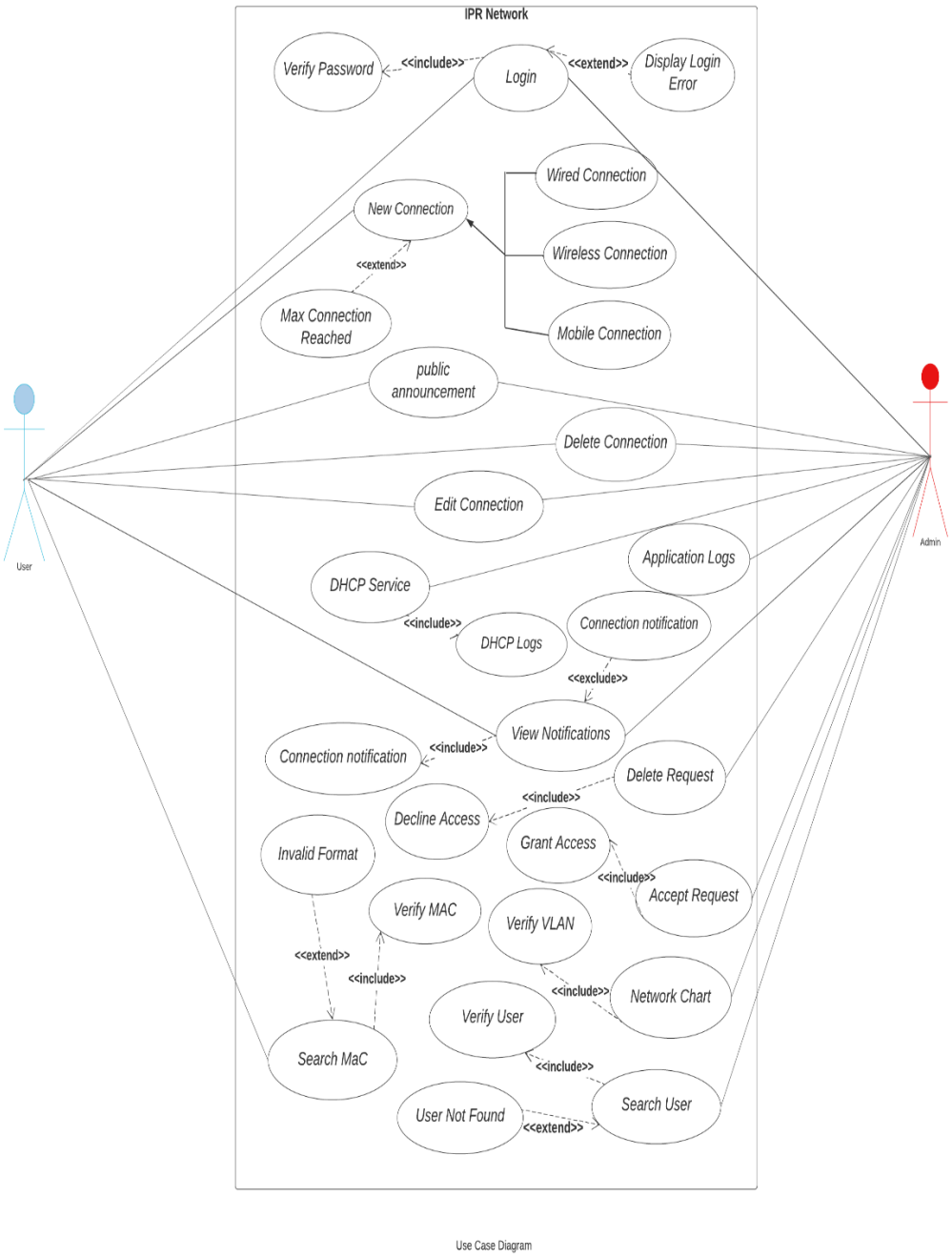
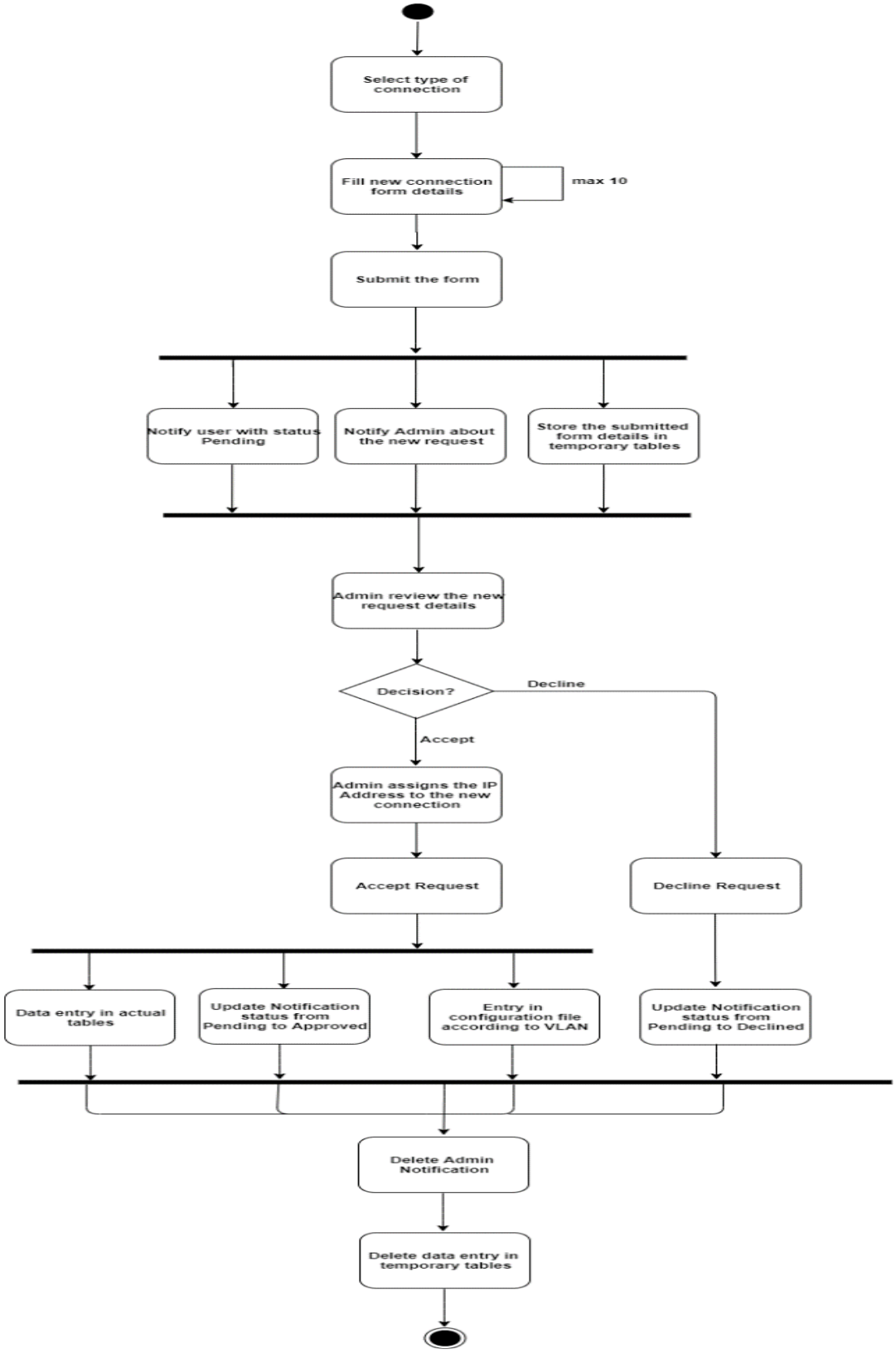


Fig : 3.1.1.1 Use Case Diagram

3.2 SYSTEM ACTIVITY



Activity Diagram(New Connection Request)

3.3 DATA MODELING – ER DIAGRAM

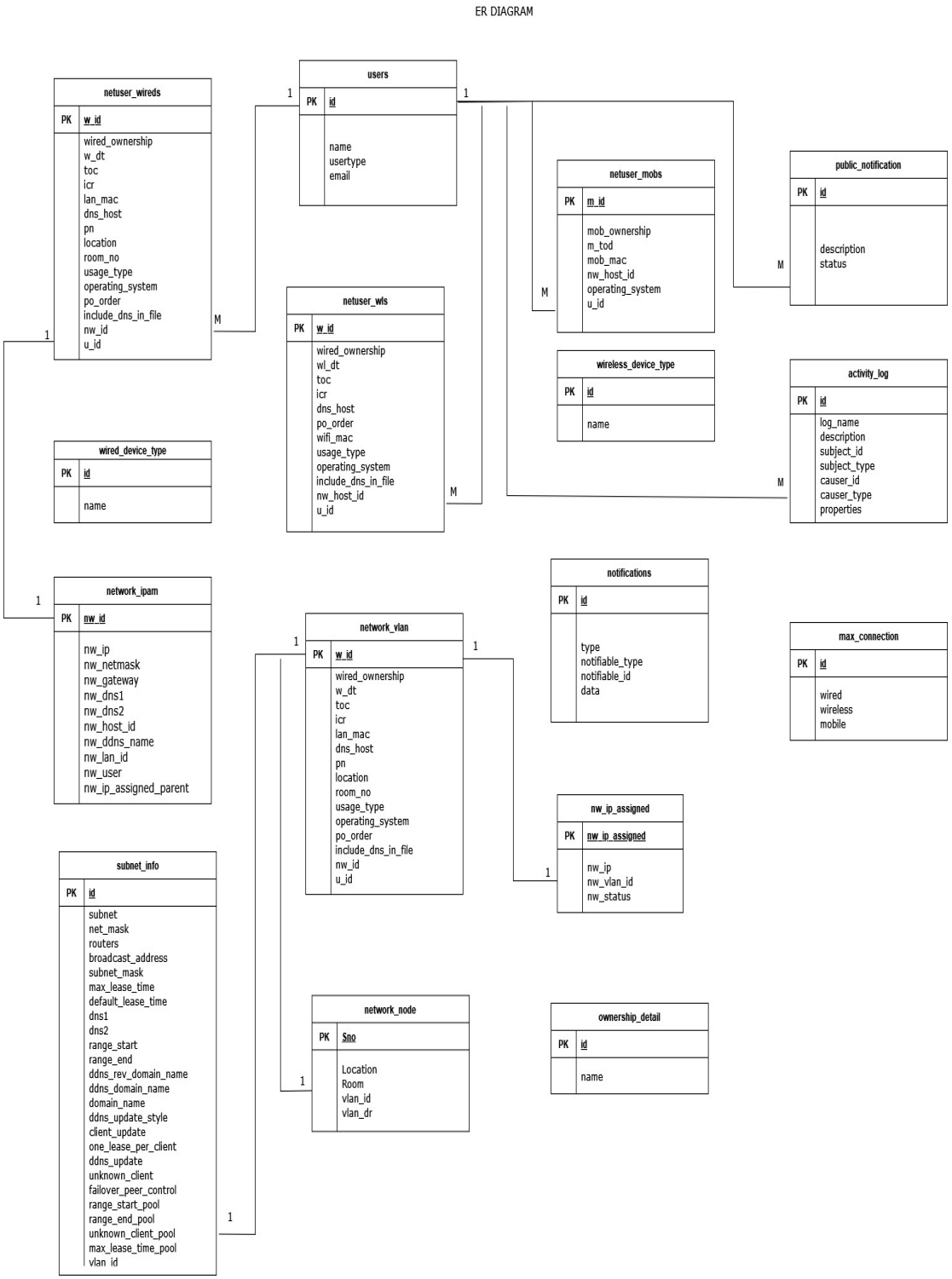


Fig : 3.3.1 **Entity – Relation Diagram**

3.4 Sequence Diagram

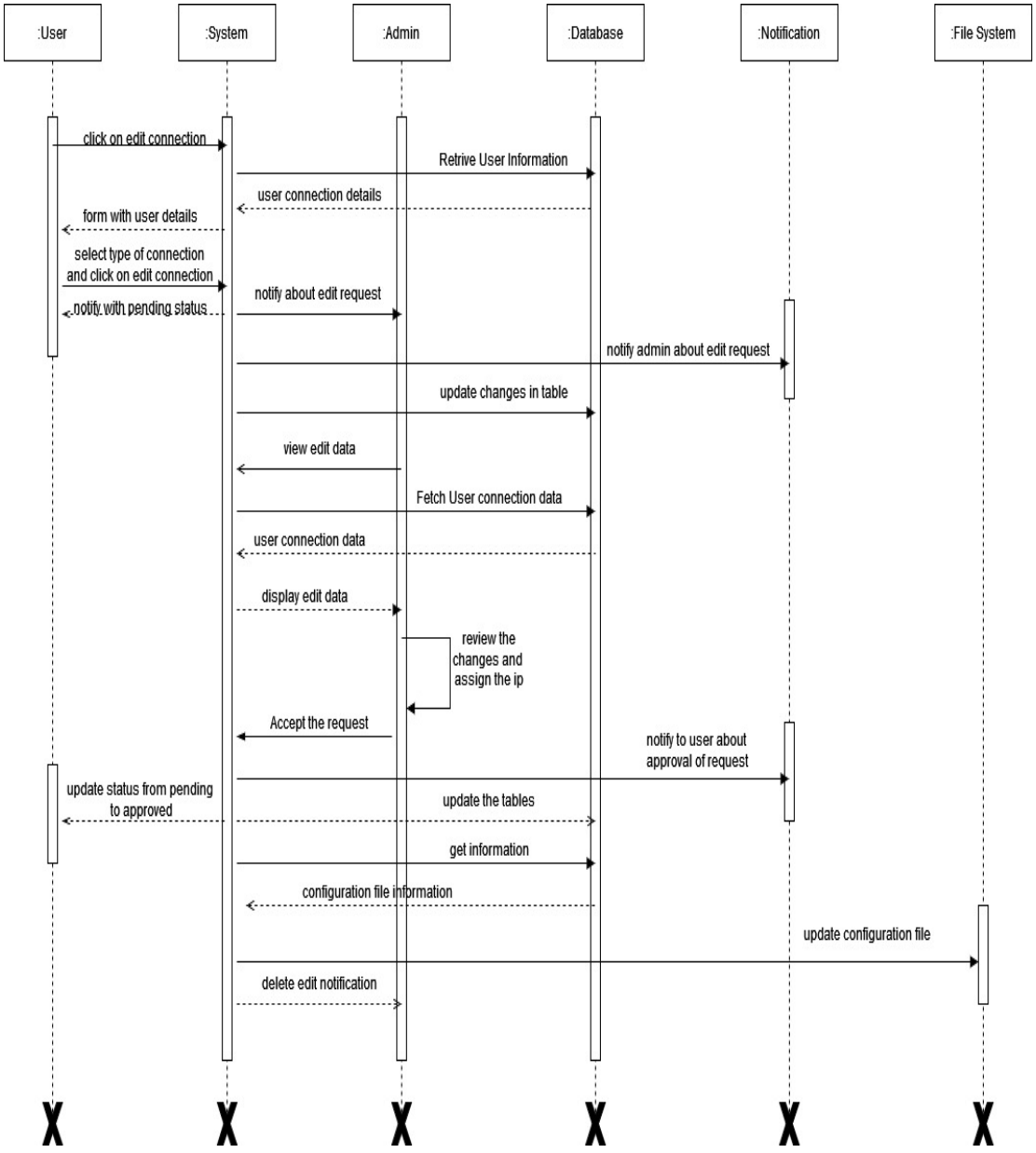


Fig : 3.4.1 **Sequence Diagram (Edit Connection Request)**

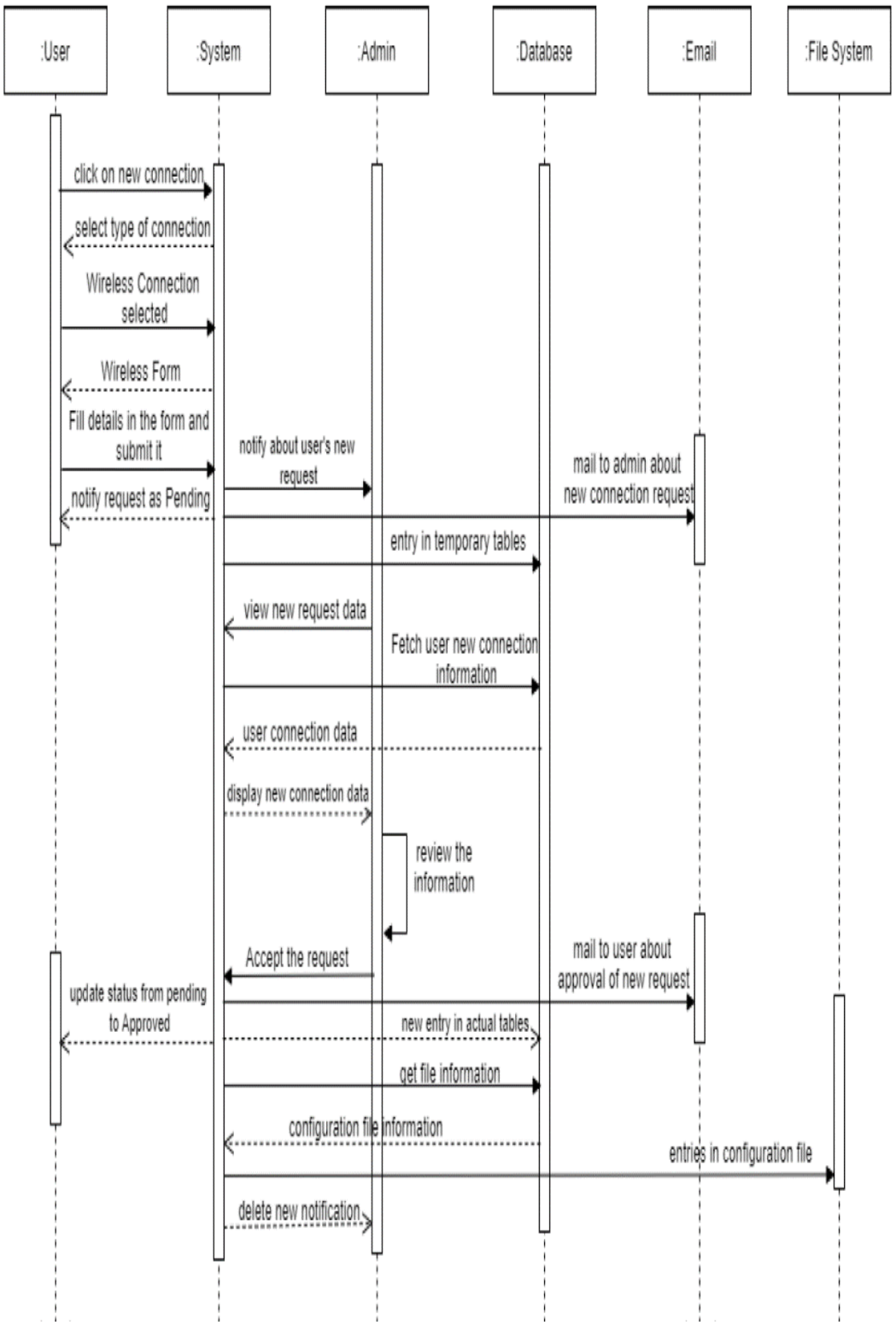


Fig : 3.4.2 **Sequence Diagram (New Connection Request)**

3.5. Class Diagram

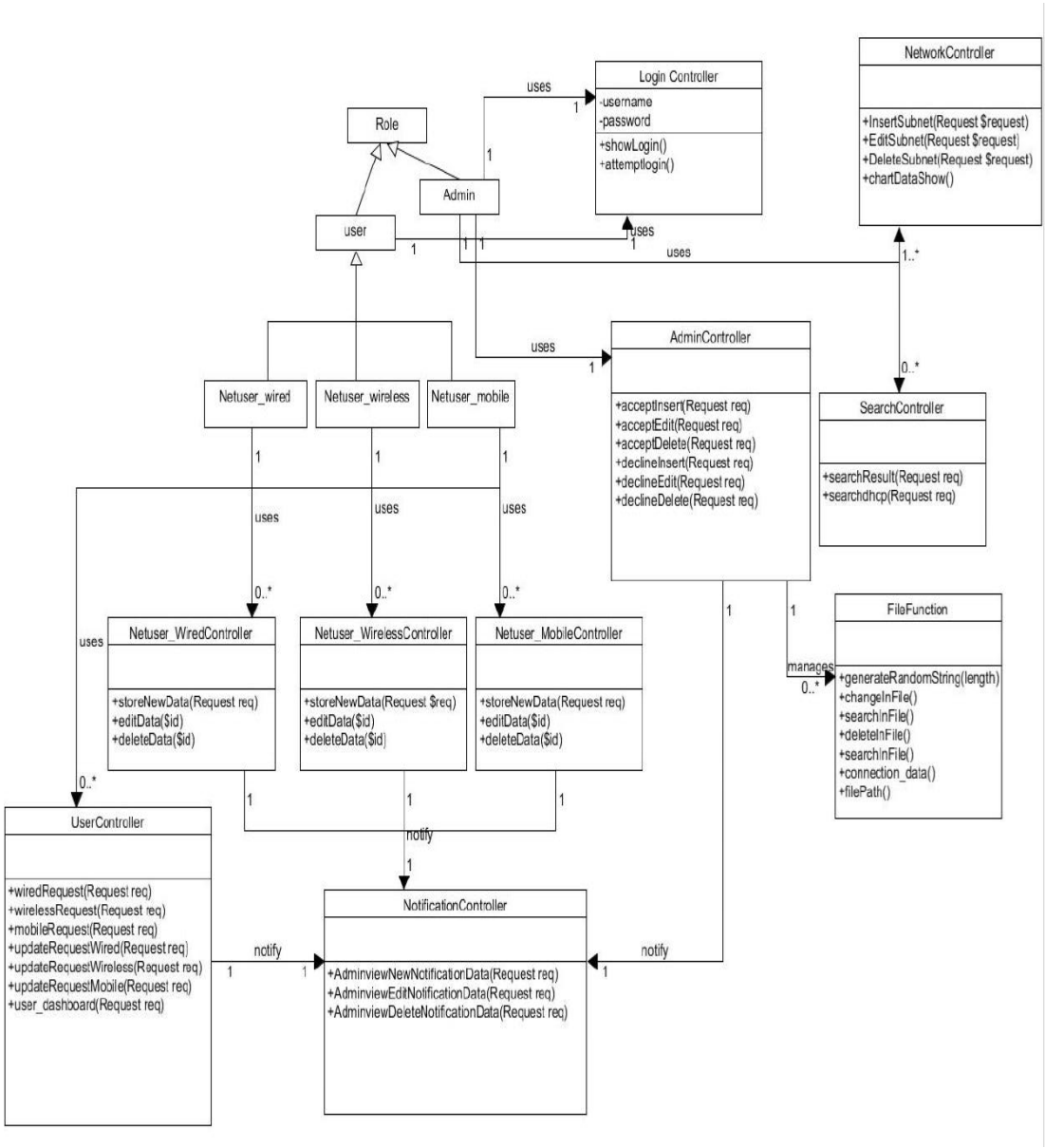


Fig : 3.5.1 Class Diagram

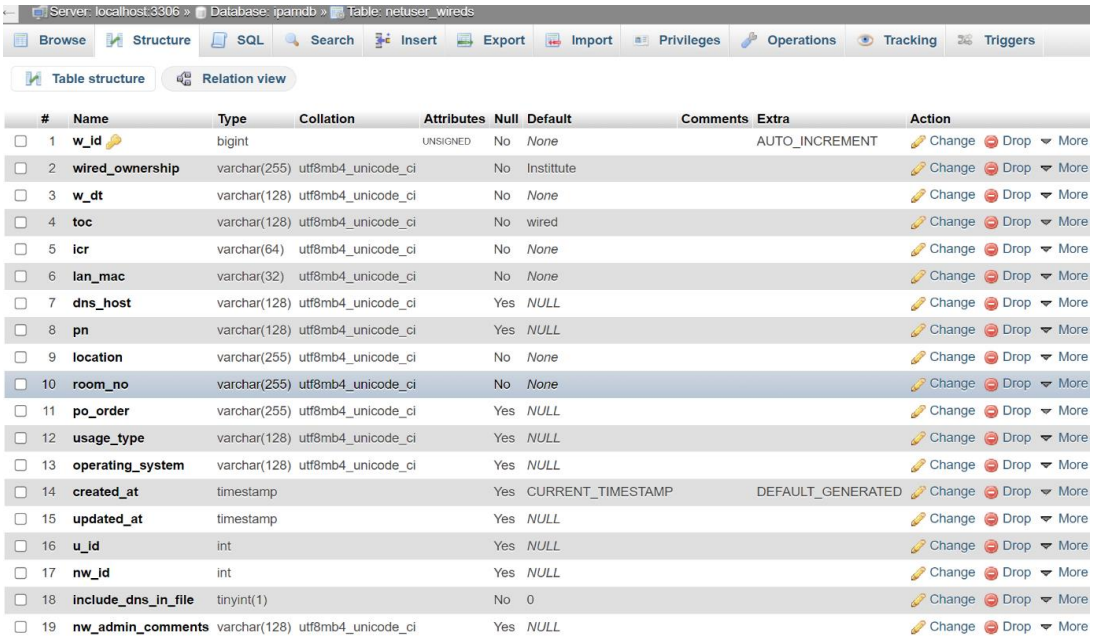
CHAPTER IV

SYSTEM DESIGN

4.1 Database Design

4.1.1 Data Dictionary

Table 4.1.1.1 netuser_wireds



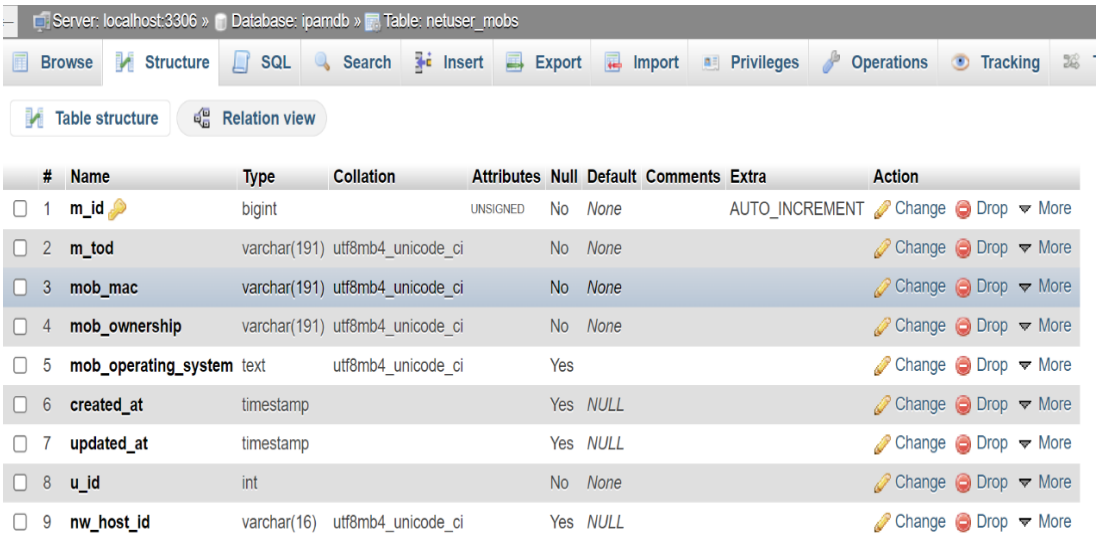
Server: localhost:3306 » Database: ipamdb » Table: netuser_wireds

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Tracking | Triggers

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	w_id	bigint		UNSIGNED	No	None		AUTO_INCREMENT	Change Drop More
2	wired_ownership	varchar(255)	utf8mb4_unicode_ci		No	Instittute			Change Drop More
3	w_dt	varchar(128)	utf8mb4_unicode_ci		No	None			Change Drop More
4	toc	varchar(128)	utf8mb4_unicode_ci		No	wired			Change Drop More
5	icr	varchar(64)	utf8mb4_unicode_ci		No	None			Change Drop More
6	lan_mac	varchar(32)	utf8mb4_unicode_ci		No	None			Change Drop More
7	dns_host	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
8	pn	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
9	location	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
10	room_no	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
11	po_order	varchar(255)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
12	usage_type	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
13	operating_system	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
14	created_at	timestamp			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More
15	updated_at	timestamp			Yes	NULL			Change Drop More
16	u_id	int			Yes	NULL			Change Drop More
17	nw_id	int			Yes	NULL			Change Drop More
18	include_dns_in_file	tinyint(1)			No	0			Change Drop More
19	nw_admin_comments	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More

Table 4.1.1.2 netuser mobs



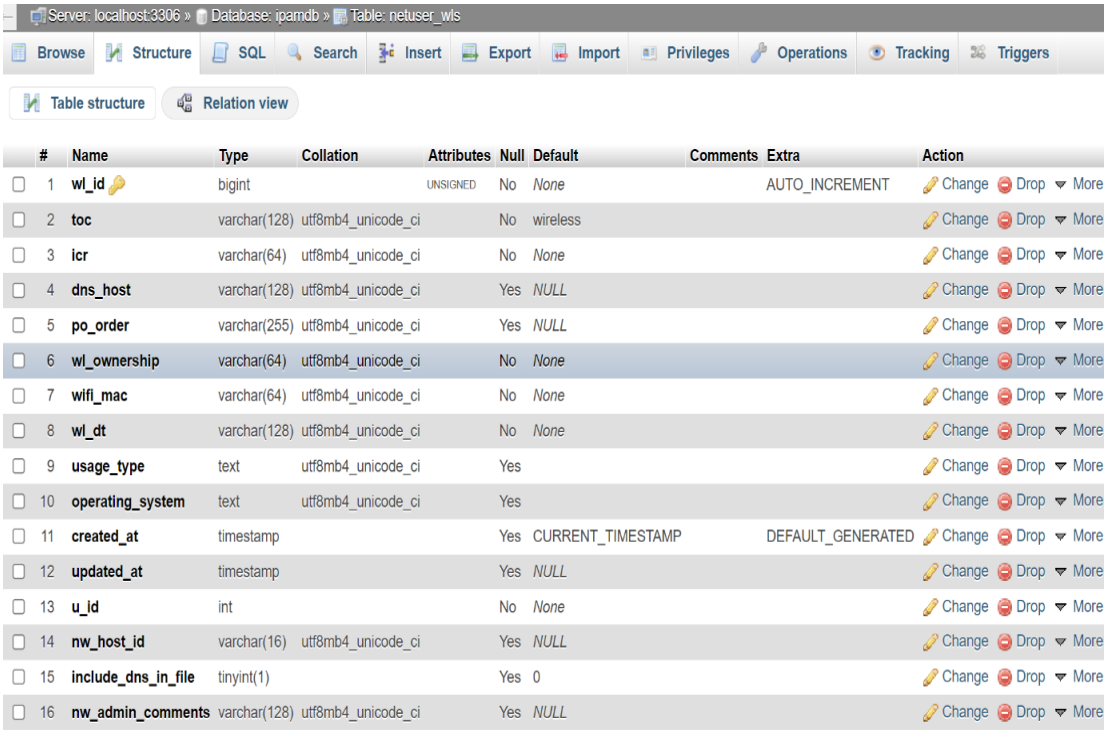
Server: localhost:3306 » Database: ipamdb » Table: netuser_mobs

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Tracking

Table structure | Relation view

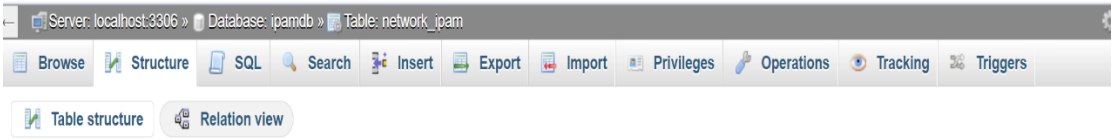
#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	m_id	bigint		UNSIGNED	No	None		AUTO_INCREMENT	Change Drop More
2	m_tod	varchar(191)	utf8mb4_unicode_ci		No	None			Change Drop More
3	mob_mac	varchar(191)	utf8mb4_unicode_ci		No	None			Change Drop More
4	mob_ownership	varchar(191)	utf8mb4_unicode_ci		No	None			Change Drop More
5	mob_operating_system	text	utf8mb4_unicode_ci		Yes				Change Drop More
6	created_at	timestamp			Yes	NULL			Change Drop More
7	updated_at	timestamp			Yes	NULL			Change Drop More
8	u_id	int			No	None			Change Drop More
9	nw_host_id	varchar(16)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More

Table 4.1.1.3 netuser wls



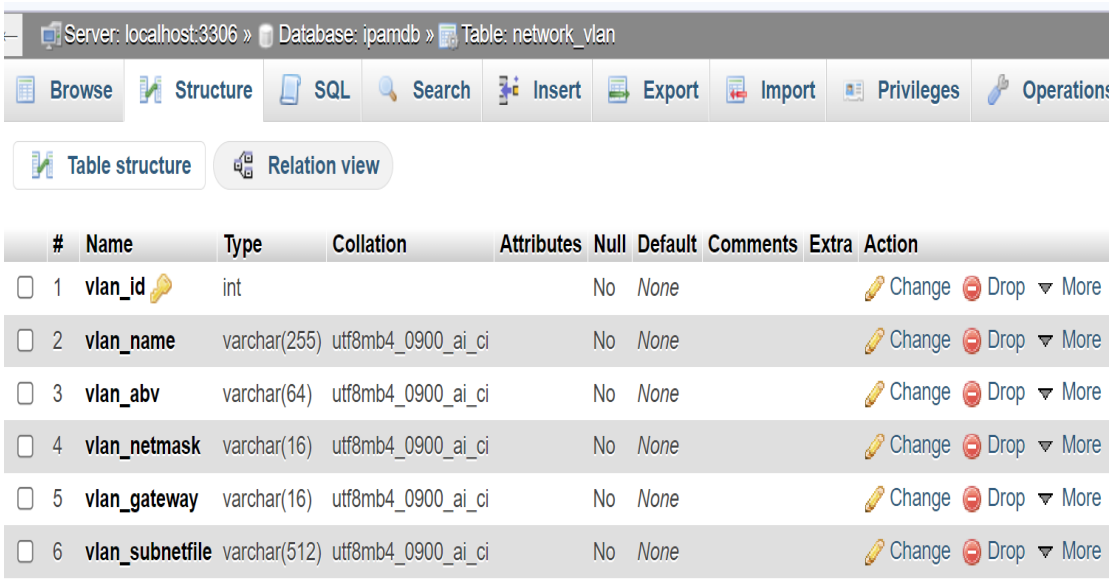
#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	wl_id	bigint		UNSIGNED	No	None		AUTO_INCREMENT	Change Drop More
2	toc	varchar(128)	utf8mb4_unicode_ci		No	wireless			Change Drop More
3	icr	varchar(64)	utf8mb4_unicode_ci		No	None			Change Drop More
4	dns_host	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
5	po_order	varchar(255)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
6	wl_ownership	varchar(64)	utf8mb4_unicode_ci		No	None			Change Drop More
7	wifi_mac	varchar(64)	utf8mb4_unicode_ci		No	None			Change Drop More
8	wl_dt	varchar(128)	utf8mb4_unicode_ci		No	None			Change Drop More
9	usage_type	text	utf8mb4_unicode_ci		Yes				Change Drop More
10	operating_system	text	utf8mb4_unicode_ci		Yes				Change Drop More
11	created_at	timestamp			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More
12	updated_at	timestamp			Yes	NULL			Change Drop More
13	u_id	int			No	None			Change Drop More
14	nw_host_id	varchar(16)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
15	include_dns_in_file	tinyint(1)			Yes	0			Change Drop More
16	nw_admin_comments	varchar(128)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More

Table 4.1.1.4 network_ipam



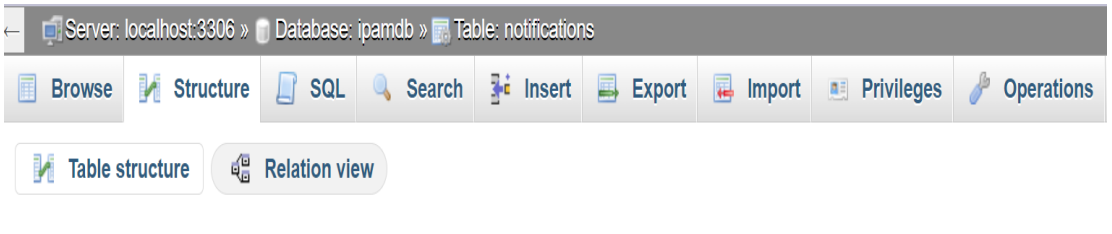
#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	nw_id	int			No	None		AUTO_INCREMENT	Change Drop More
2	nw_ip	varchar(16)	utf8mb4_unicode_ci		No	None			Change Drop More
3	nw_netmask	varchar(16)	utf8mb4_unicode_ci		No	None			Change Drop More
4	nw_gateway	varchar(16)	utf8mb4_unicode_ci		No	None			Change Drop More
5	nw_dns1	varchar(16)	utf8mb4_unicode_ci		No	10.20.4.5			Change Drop More
6	nw_dns2	varchar(16)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
7	nw_host_id	varchar(256)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
8	nw_ddns_name	varchar(256)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
9	nw_vlan_id	int			Yes	NULL			Change Drop More
10	nw_user	varchar(255)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
11	nw_ip_assigned_parent	int			Yes	NULL			Change Drop More
12	created_on	datetime			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More
13	updated_on	datetime			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More

Table 4.1.1.5 network_vlan



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	vlan_id	int			No	None			Change Drop More
2	vlan_name	varchar(255)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	vlan_abv	varchar(64)	utf8mb4_0900_ai_ci		No	None			Change Drop More
4	vlan_netmask	varchar(16)	utf8mb4_0900_ai_ci		No	None			Change Drop More
5	vlan_gateway	varchar(16)	utf8mb4_0900_ai_ci		No	None			Change Drop More
6	vlan_subnetfile	varchar(512)	utf8mb4_0900_ai_ci		No	None			Change Drop More

Table 4.1.1.6 notifications



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	char(36)	utf8mb4_unicode_ci		No	None			Change Drop More
2	type	varchar(191)	utf8mb4_unicode_ci		No	None			Change Drop More
3	notifiable_type	varchar(191)	utf8mb4_unicode_ci		No	None			Change Drop More
4	notifiable_id	bigint		UNSIGNED	No	None			Change Drop More
5	data	text	utf8mb4_unicode_ci		No				Change Drop More
6	read_at	timestamp			Yes	NULL			Change Drop More
7	created_at	timestamp			Yes	NULL			Change Drop More
8	updated_at	timestamp			Yes	NULL			Change Drop More

Table 4.1.1.7 subnet_info

Server: localhost:3306 » Database: ipamdb » Table: subnet_info

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations | Tracking

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int			No	None		AUTO_INCREMENT	Change Drop More
2	subnet	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
3	net_mask	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
4	routers	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
5	broadcast_address	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
6	subnet_mask	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
7	max_lease_time	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
8	default_lease_time	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
9	dns1	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
10	dns2	varchar(20)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
11	range_start	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
12	range_end	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
13	ddns_rev_domain_name	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
14	ddns_domain_name	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
15	domain_name	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
16	ddns_update_style	varchar(20)	utf8mb4_0900_ai_ci		No	None			Change Drop More
17	client_update	int			No	None			Change Drop More
18	one_lease_per_client	int			No	None			Change Drop More
19	ddns_update	int			No	None			Change Drop More
20	unknown_client	varchar(8)	utf8mb4_0900_ai_ci		No	None			Change Drop More
21	failover_peer_pool	varchar(20)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
22	range_start_pool	varchar(20)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
23	range_end_pool	varchar(20)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
24	unknown_client_pool	int			Yes	NULL			Change Drop More
25	max_lease_time_pool	varchar(20)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
26	vlan_id	int			No	None			Change Drop More

Check all | With selected: Browse | Change | Drop | Primary | Unique | Index | Fulltext | Add to central columns

Table 4.1.1.8 network_node

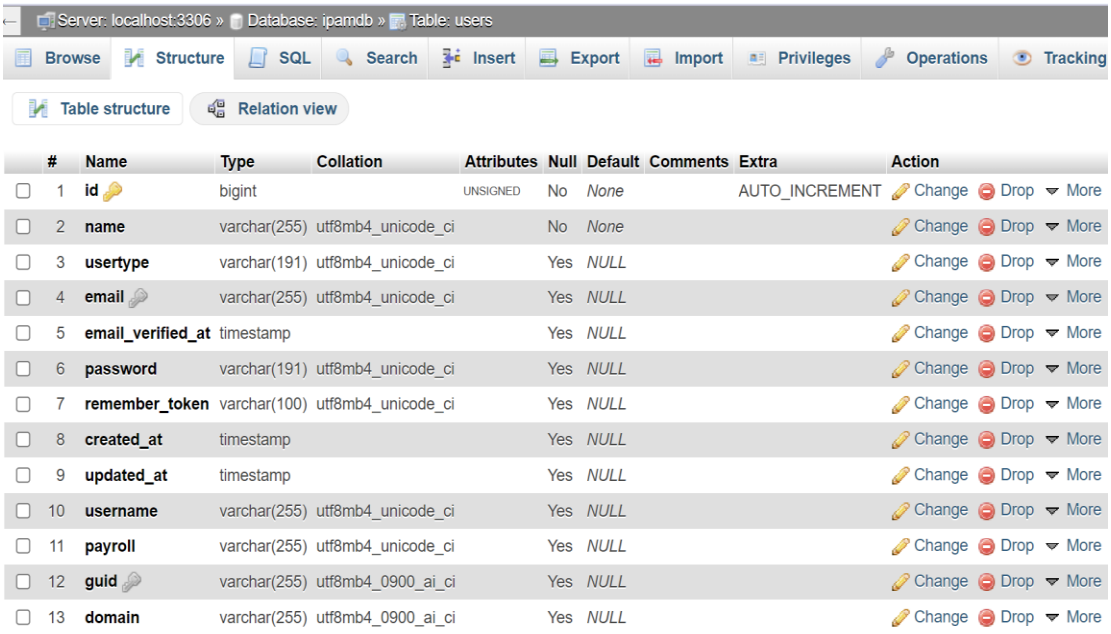
Server: localhost:3306 » Database: ipamdb » Table: network_node

Browse | Structure | SQL | Search | Insert | Export | Import | Privileges | Operations

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	Sno	int			No	None		AUTO_INCREMENT	Change Drop More
2	Location	text	utf8mb3_unicode_ci		Yes				Change Drop More
3	Room	text	utf8mb3_unicode_ci		Yes				Change Drop More
4	vlan_id	int			No	None			Change Drop More
5	vlan_dr	varchar(255)	utf8mb3_unicode_ci		No	None			Change Drop More

Table 4.1.1.9 Users

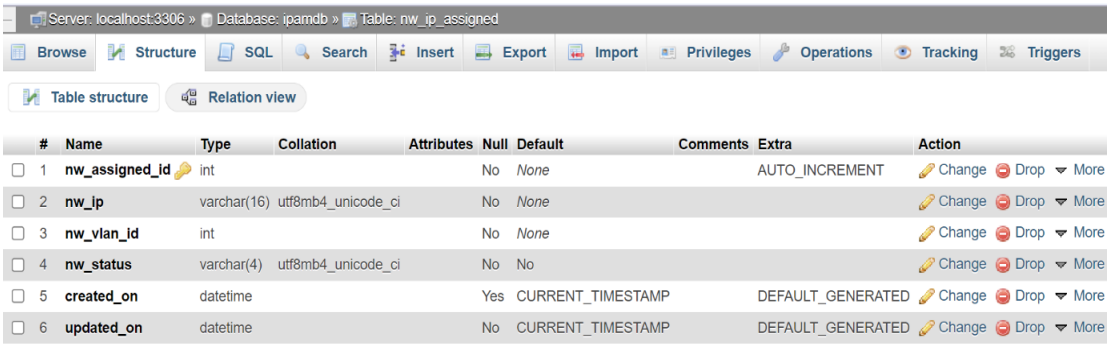


#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	bigint		UNSIGNED	No	None		AUTO_INCREMENT	Change Drop More
2	name	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
3	usertype	varchar(191)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
4	email	varchar(255)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
5	email_verified_at	timestamp			Yes	NULL			Change Drop More
6	password	varchar(191)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
7	remember_token	varchar(100)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
8	created_at	timestamp			Yes	NULL			Change Drop More
9	updated_at	timestamp			Yes	NULL			Change Drop More
10	username	varchar(255)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
11	payroll	varchar(255)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
12	guid	varchar(255)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More
13	domain	varchar(255)	utf8mb4_0900_ai_ci		Yes	NULL			Change Drop More

Table 4.1.10 activity_log

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	bigint		UNSIGNED	No	None		AUTO_INCREMENT	Change Drop More
2	log_name	varchar(191)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
3	description	text	utf8mb4_unicode_ci		No				Change Drop More
4	subject_id	bigint		UNSIGNED	Yes	NULL			Change Drop More
5	subject_type	varchar(191)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
6	causer_id	bigint		UNSIGNED	Yes	NULL			Change Drop More
7	causer_type	varchar(191)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
8	properties	longtext	utf8mb4_bin		Yes				Change Drop More
9	created_at	timestamp			Yes	NULL			Change Drop More
10	updated_at	timestamp			Yes	NULL			Change Drop More

Table 4.1.11 nw_ip_assigned



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	nw_assigned_id	int			No	None		AUTO_INCREMENT	Change Drop More
2	nw_ip	varchar(16)	utf8mb4_unicode_ci		No	None			Change Drop More
3	nw_vlan_id	int			No	None			Change Drop More
4	nw_status	varchar(4)	utf8mb4_unicode_ci		No	No			Change Drop More
5	created_on	datetime			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More
6	updated_on	datetime			No	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change Drop More

4.2 Front- end Interface

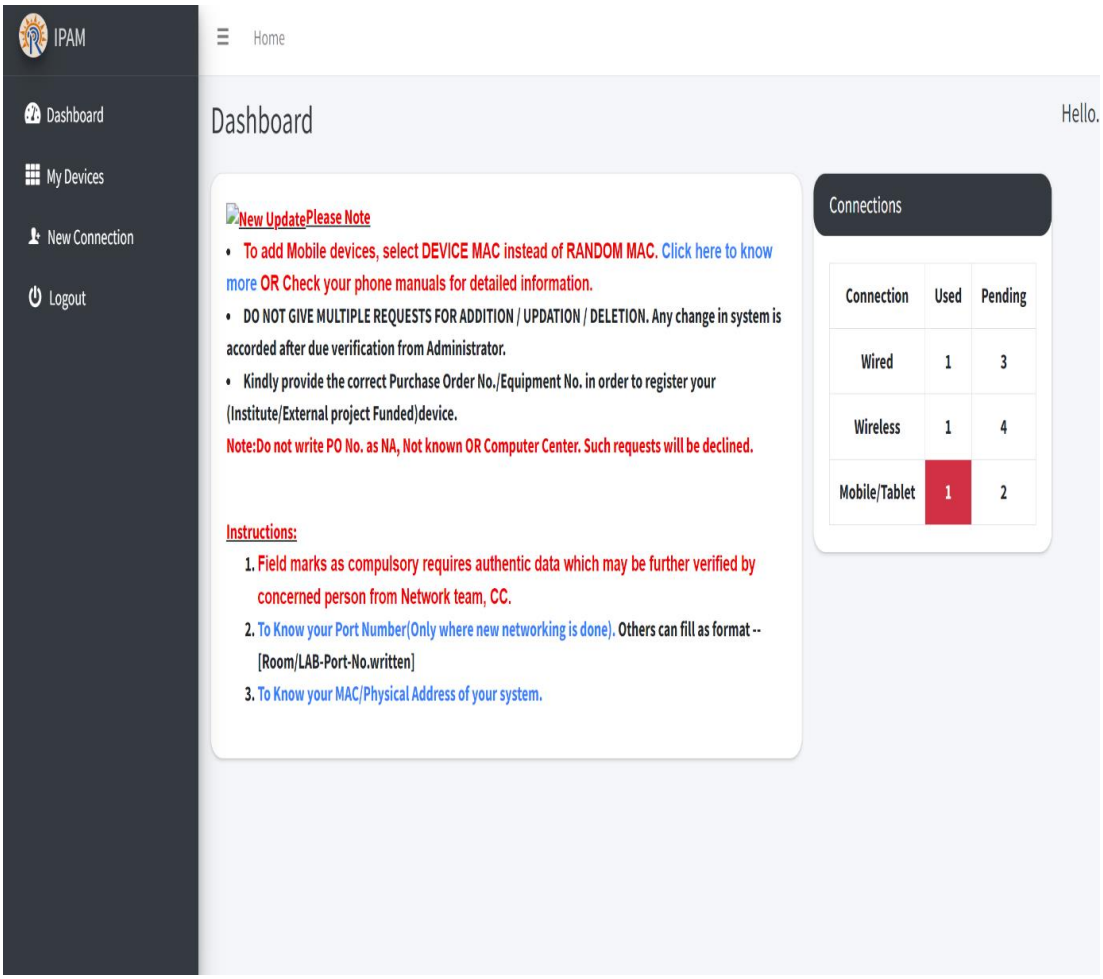


Fig 4.2.1 User Homepage

4.2.2 If a user does not how to find the MAC address required for connection, then the user can click on the “Know your MAC address tab”.

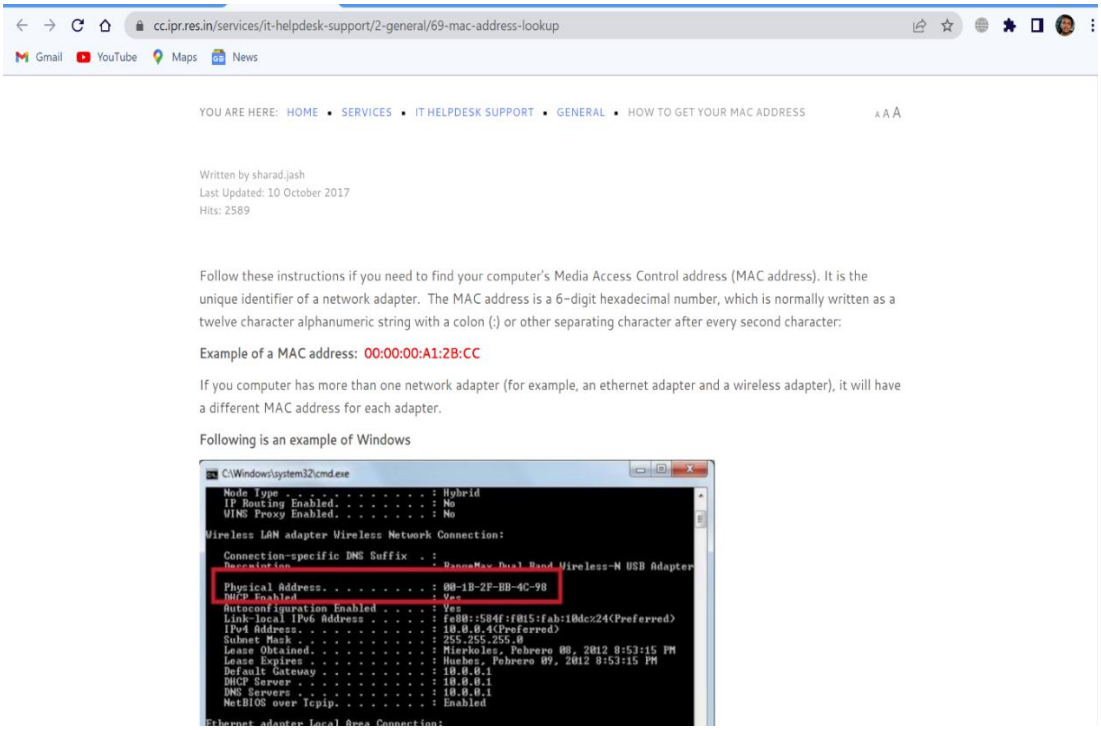


Fig 4.2.2 Page Instructing how to find a MAC Address

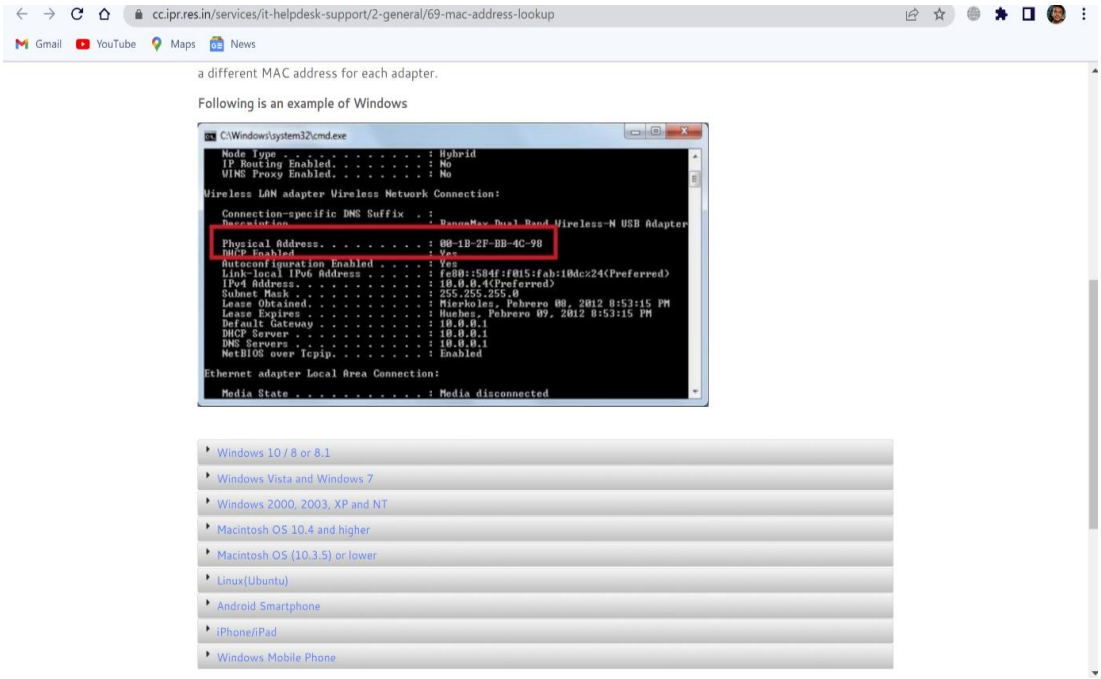


Fig 4.2.2.1 Links for finding MAC address as per the operating system

4.2.3 There are three types of New connection requests. Wired, Wireless and Mobile/Tablet that can be made by the user.

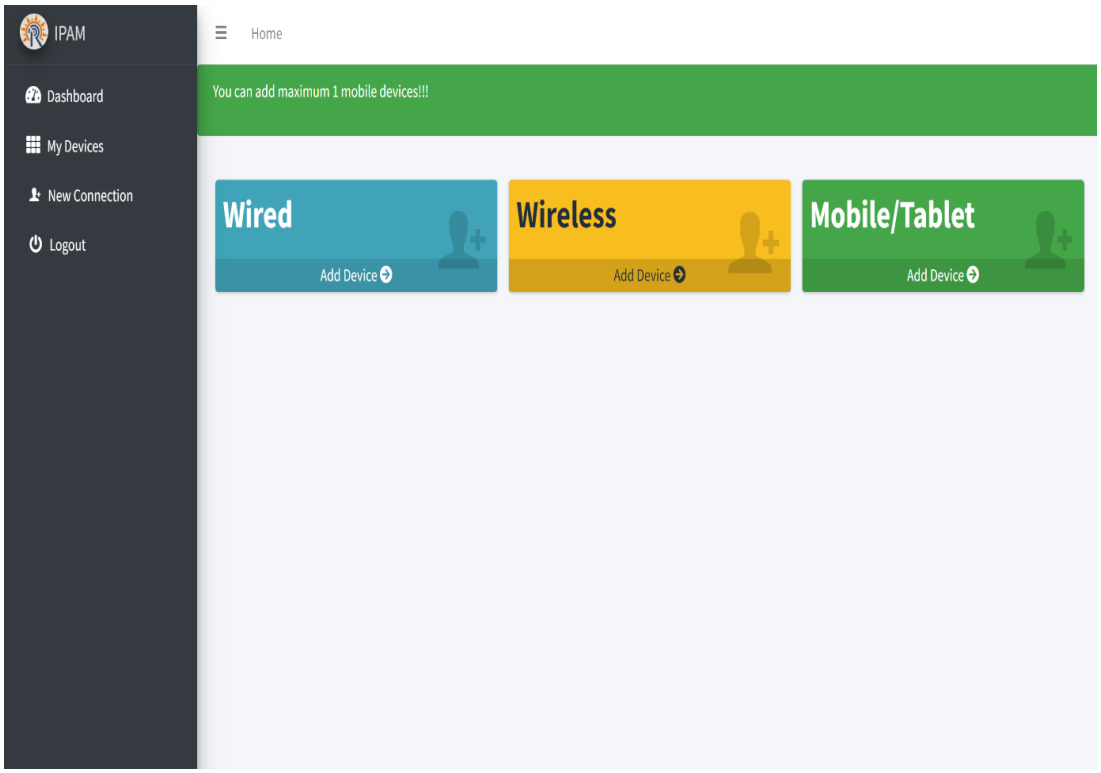


Fig 4.2.3 New Connection Tab

4.2.4 Below is the form for Wired Connection Request

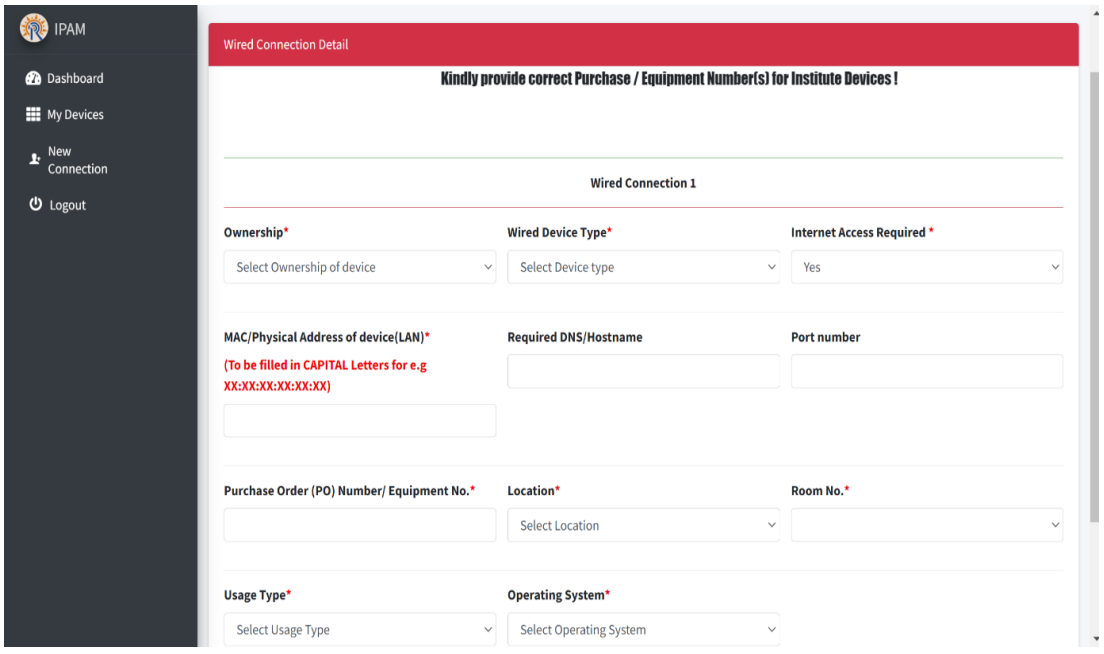


Fig 4.2.4 Wired Connection Request Form

4.2.5 Below is the form for Wireless Connection Request

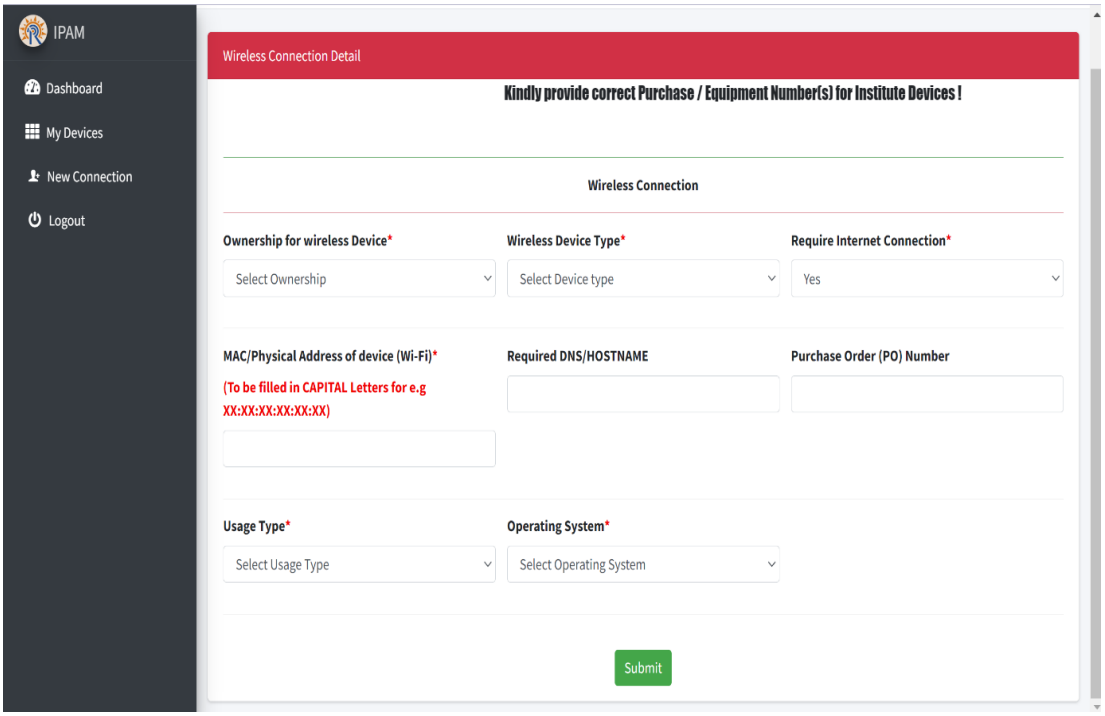


Fig 4.2.5 Wireless Request Form

4.2.6 Below is the form for Mobile Connection Request

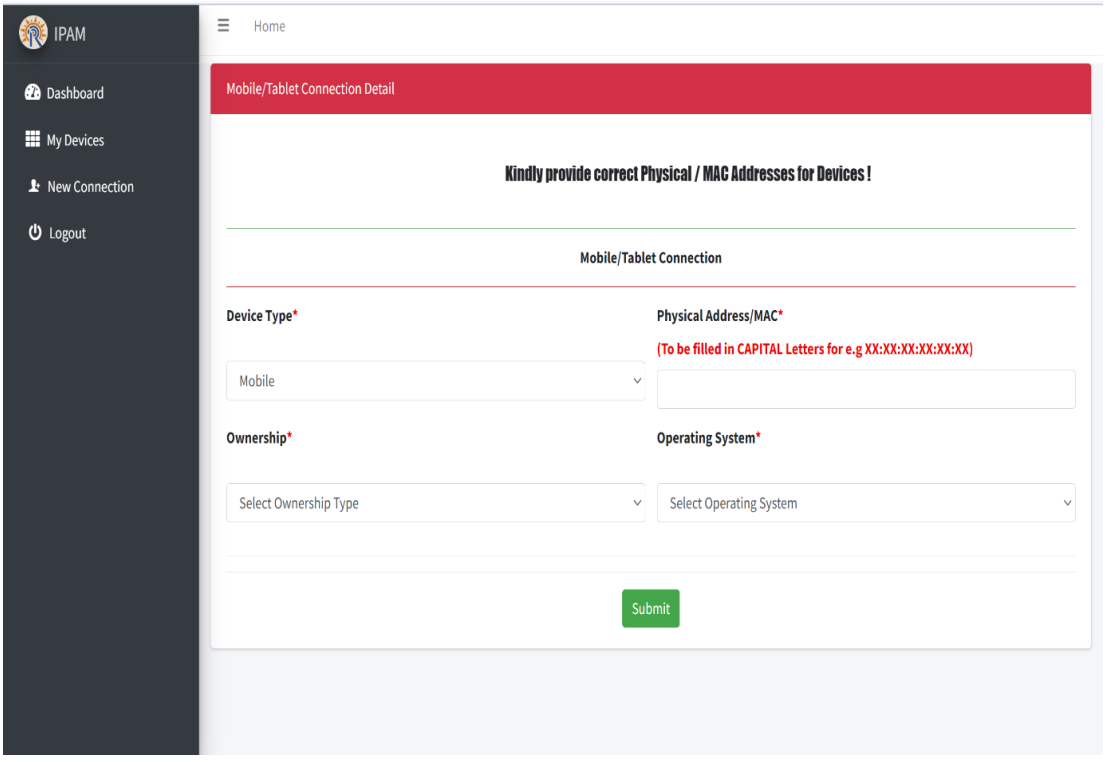
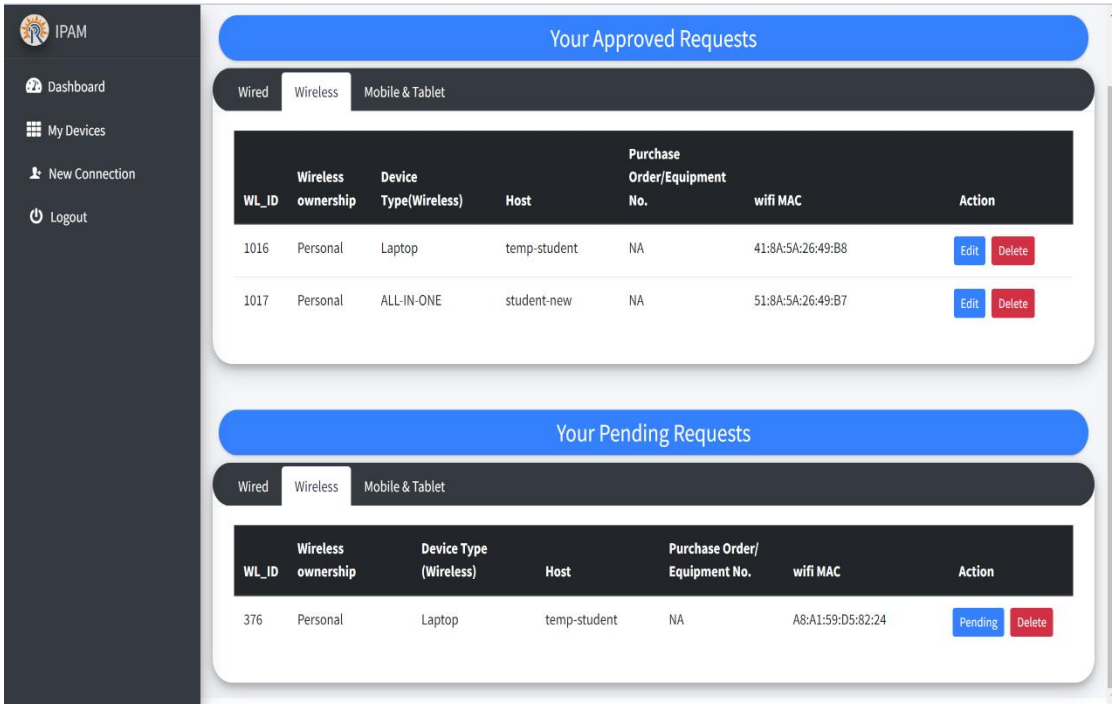
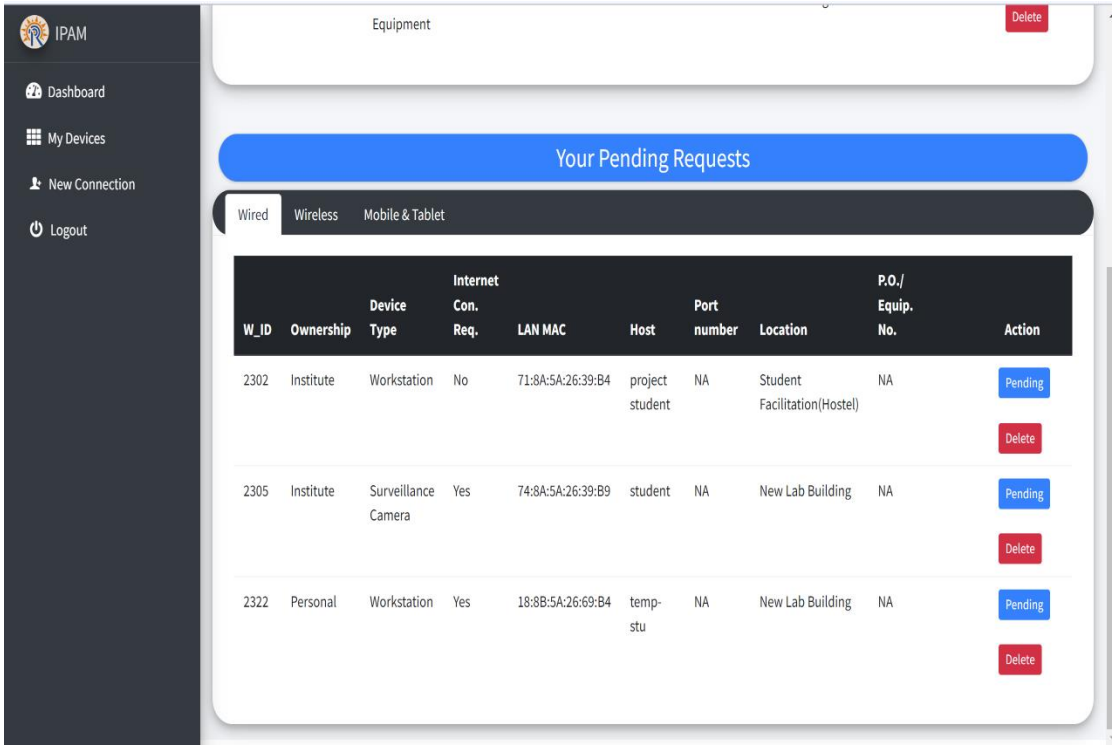


Fig 4.2.6 Mobile Request Form

4.2.7 My Device connections of a user where he can performs actions like edit, delete or can get a general overview of their connections.



4.2.7 Approved and Pending Requests.



4.2.7 Pending requests wired.

4.2.8 Connection Detail tab where the admin can see all the connected devices and can see all the details of the connection like mac , location, ownership type, etc.

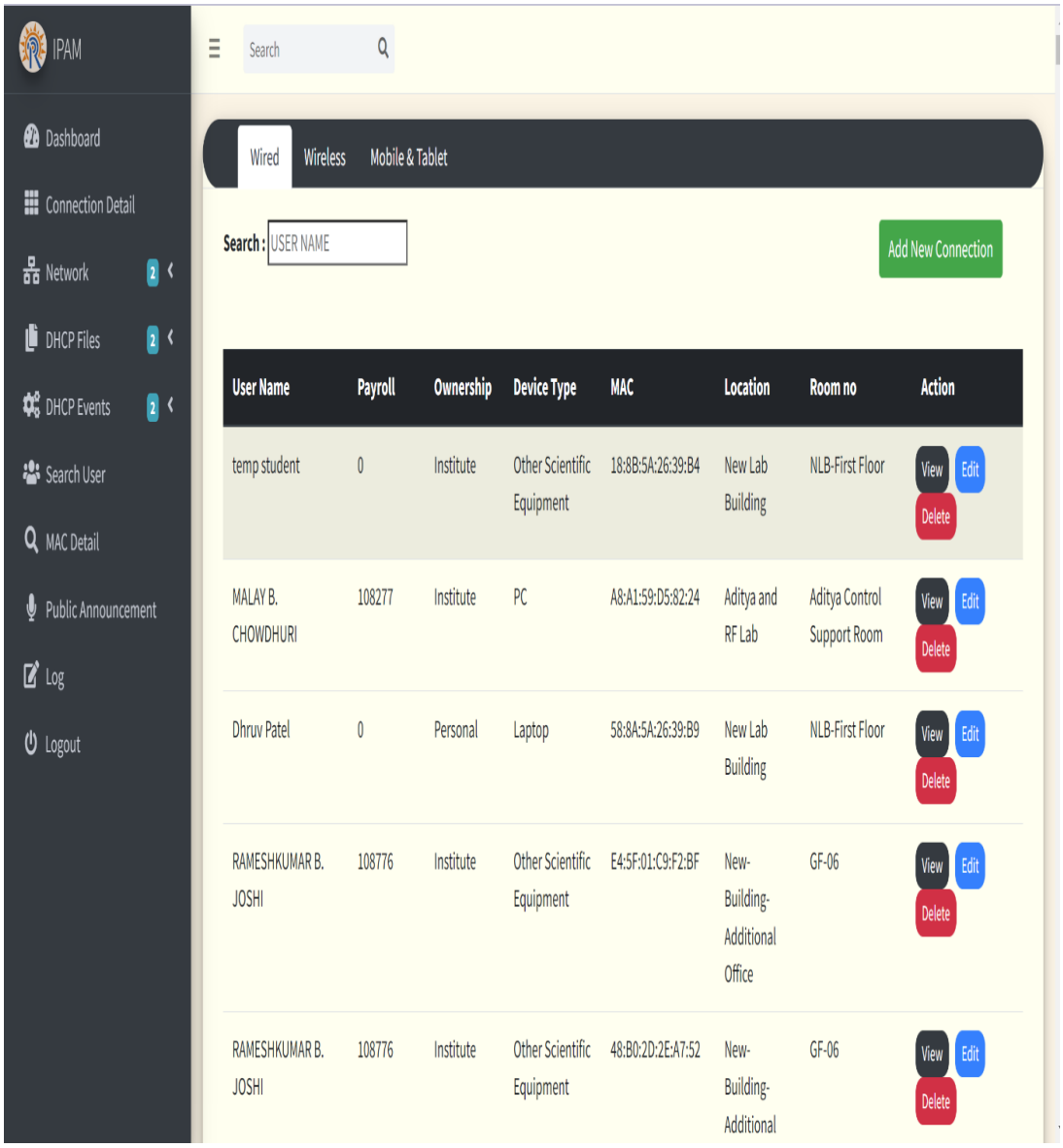


Fig 4.2.8 Connection Detail Tab

4.2.9 Admin can manage the subnets from the network's tab. Here there are twp options New Subnet and Existing subnets.

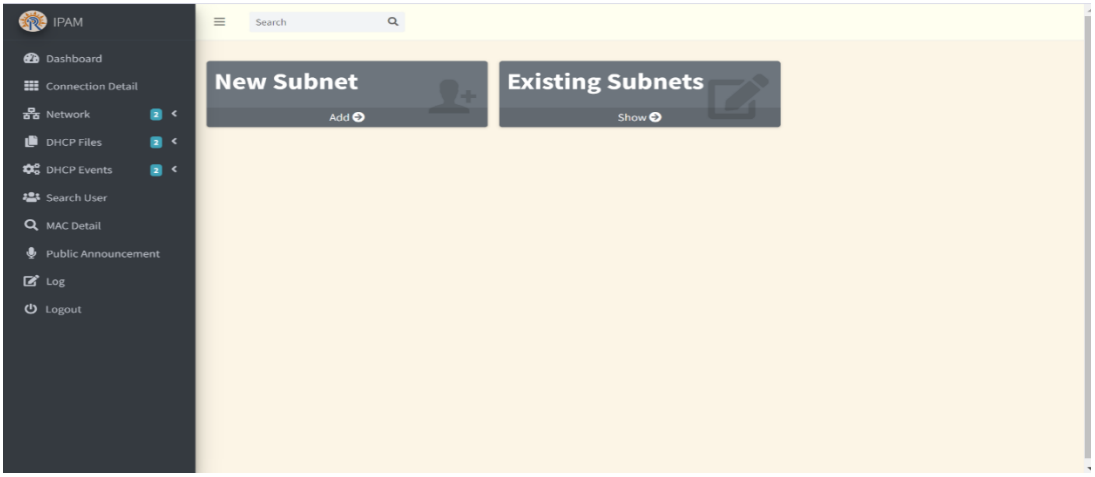


Fig 4.2.9 Subnet's Section

4.2.10 Upon clicking the existing subnets button, the admin can see the list of available subnets in the network as shown below.

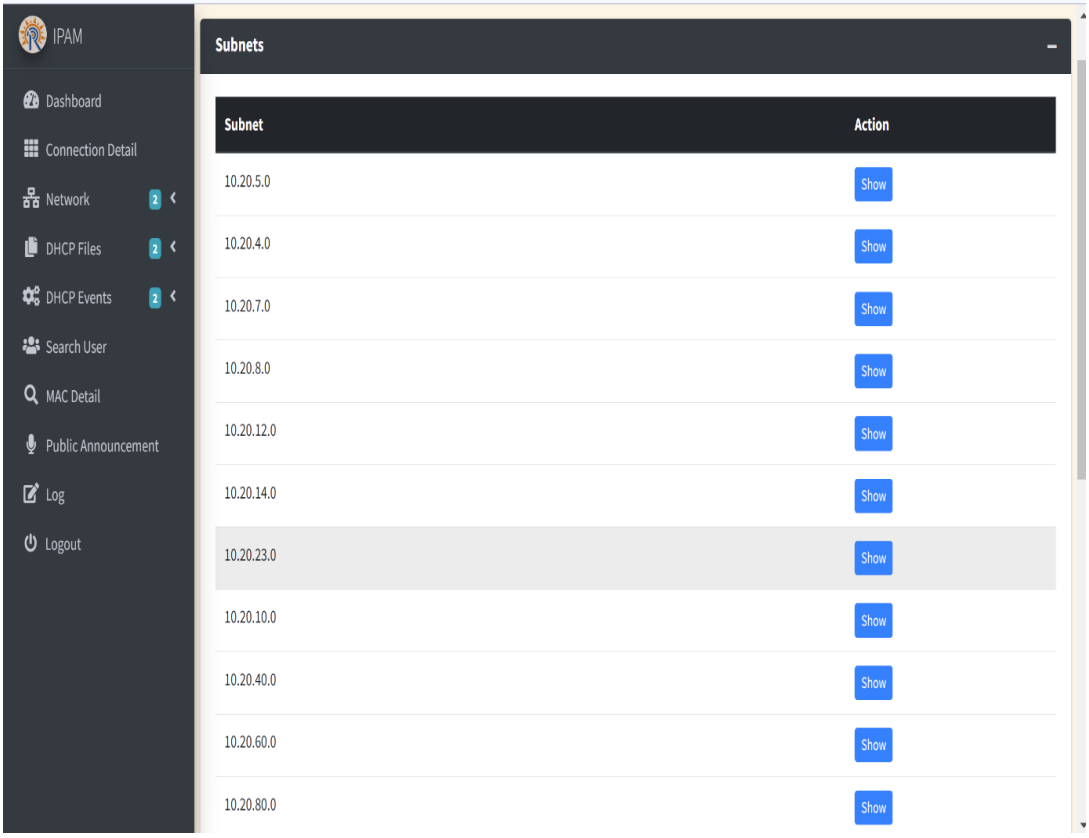


Fig 4.2.10 Existing Subnets

4.2.11 To view the details of a particular subnet, click on the show buttom next to the subnet which need to be viewed.

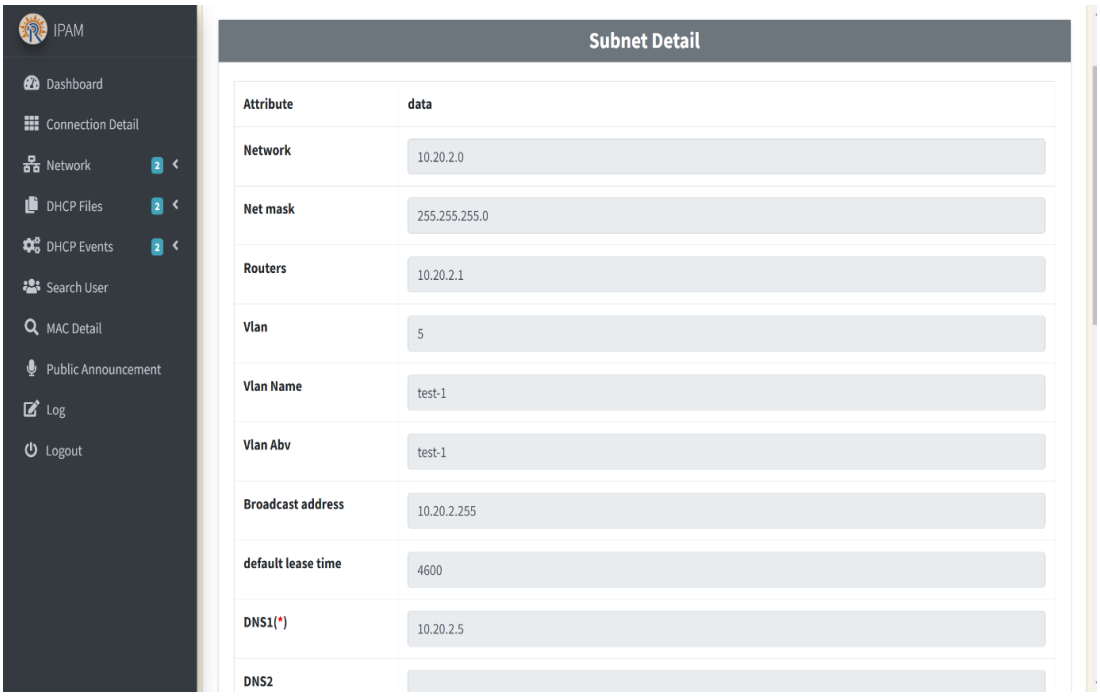


Fig 4.2.11 Subnet Details

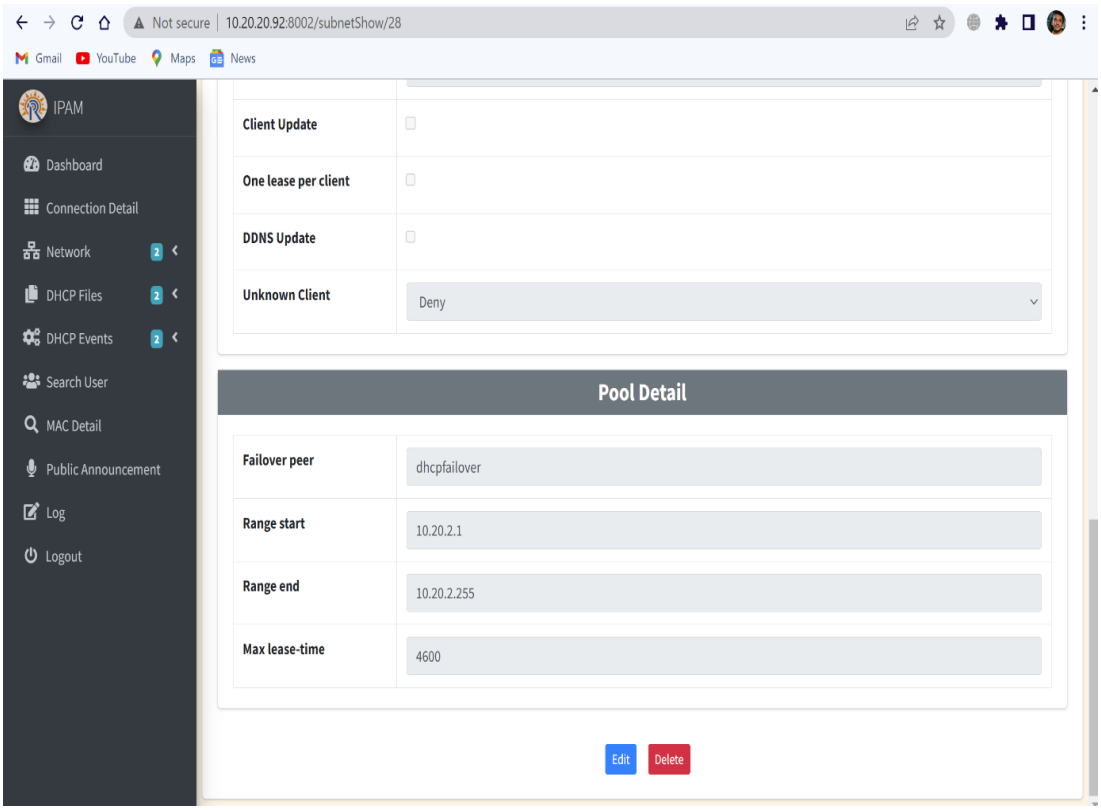


Fig 4.2.11 Subnet Details

4.2.12 Next in the network is the vlan charts, where the admin can select a particular value from the dropdown.

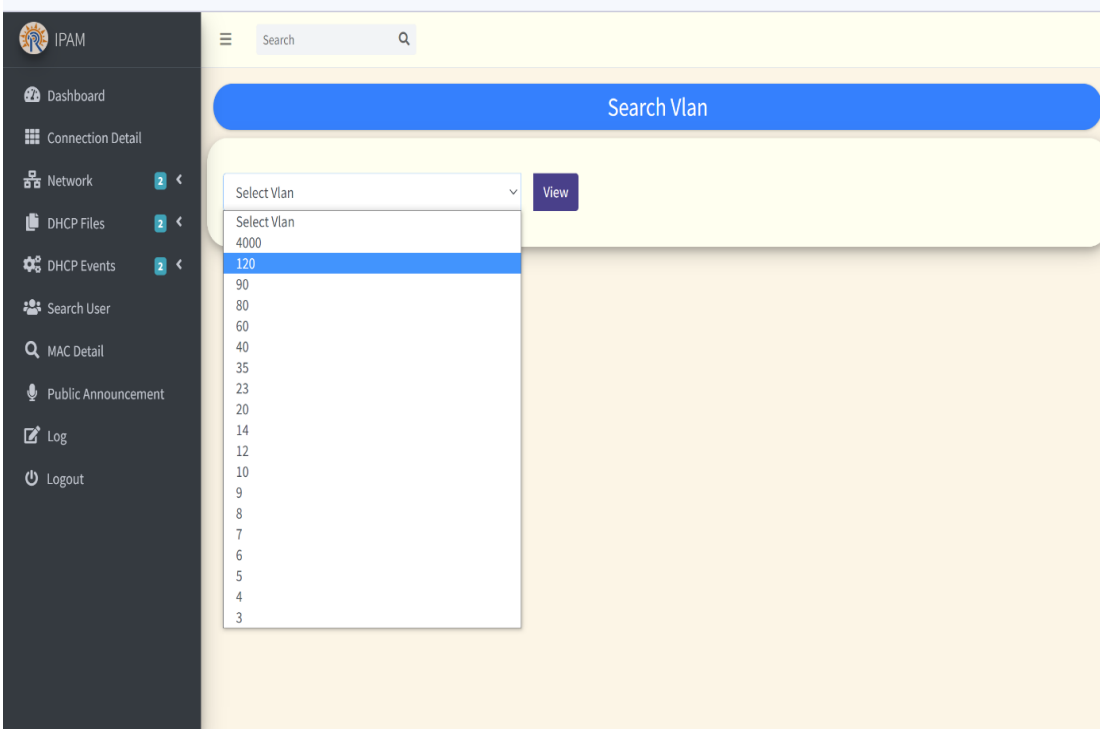


Fig. 4.2.12 Search Vlan

4.2.13 Upon selecting appropriate value, the admin can now see the graphical view as shown below.

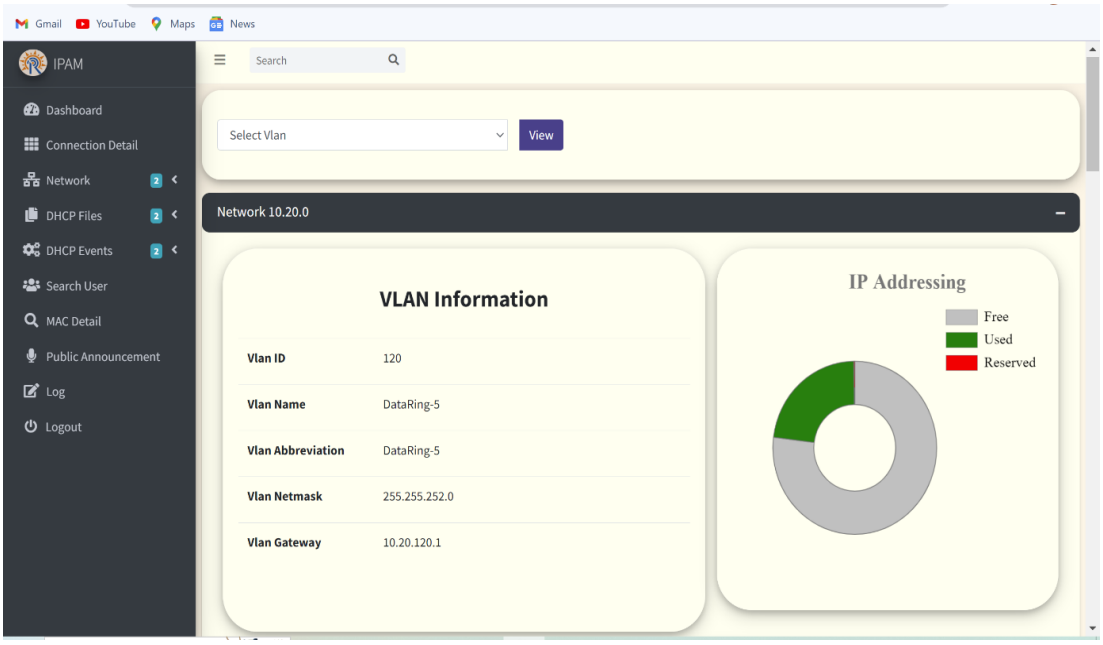


Fig 4.2.13.1 Vlan Result

The red colored Pill are reserved, the green colored pill are the ones which are allocated and grey are not yet allocated. Upon hovering on a particular pill, the admin can have a quick glance as to whom this IP is assigned.

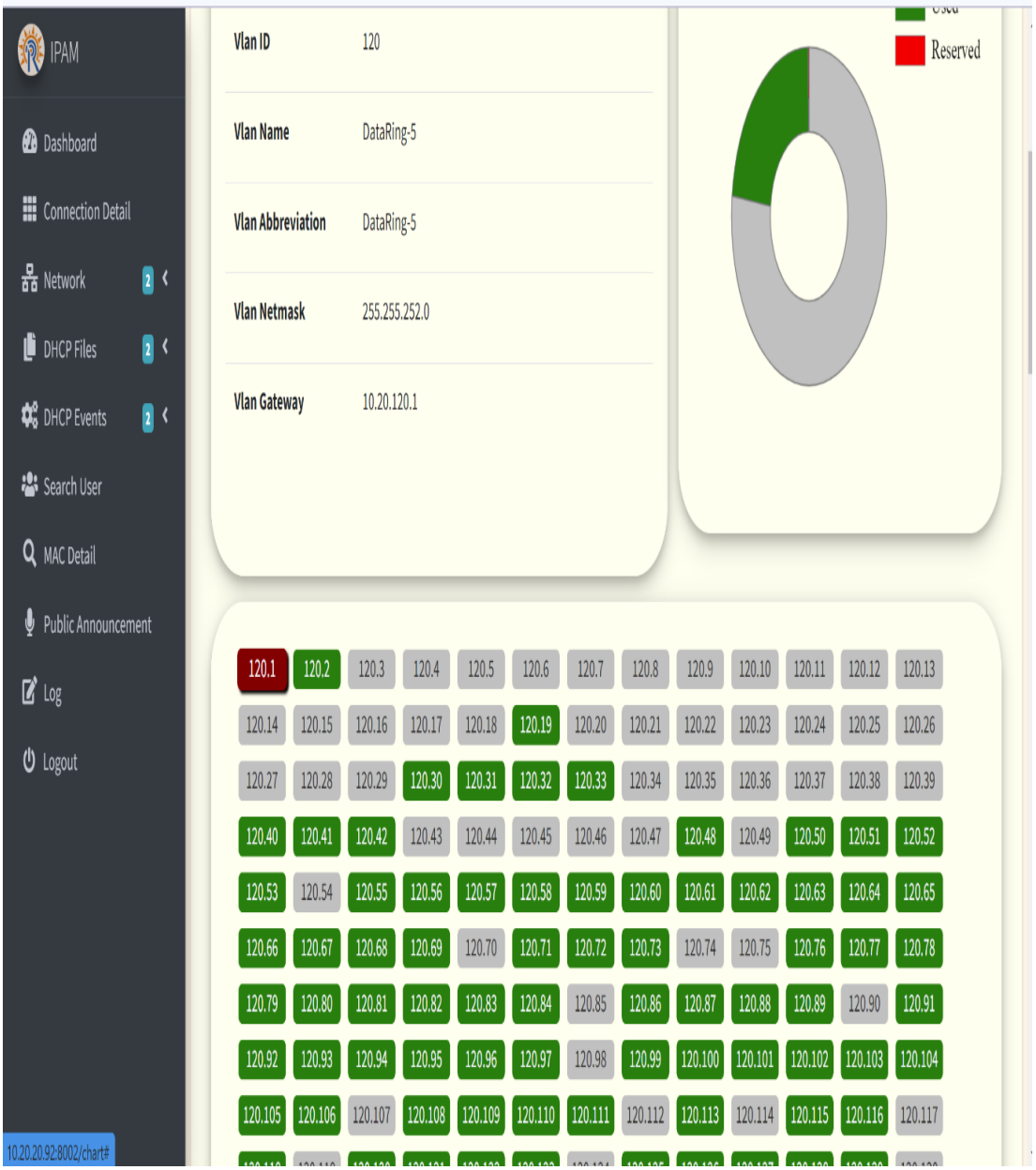


Fig 4.2.13.2 Vlan chart

4.2.14 Next is the Dhcp Files, which is also a important part of the network where all the record related to Dhcp are stored.

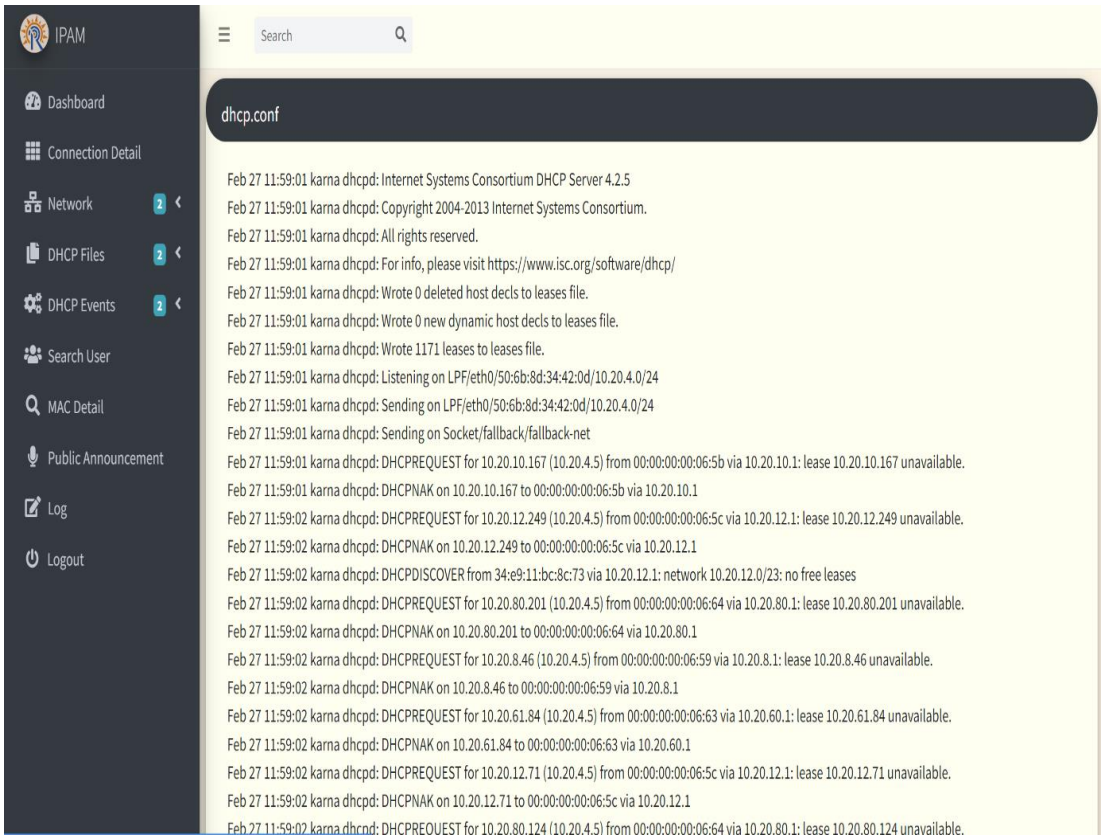
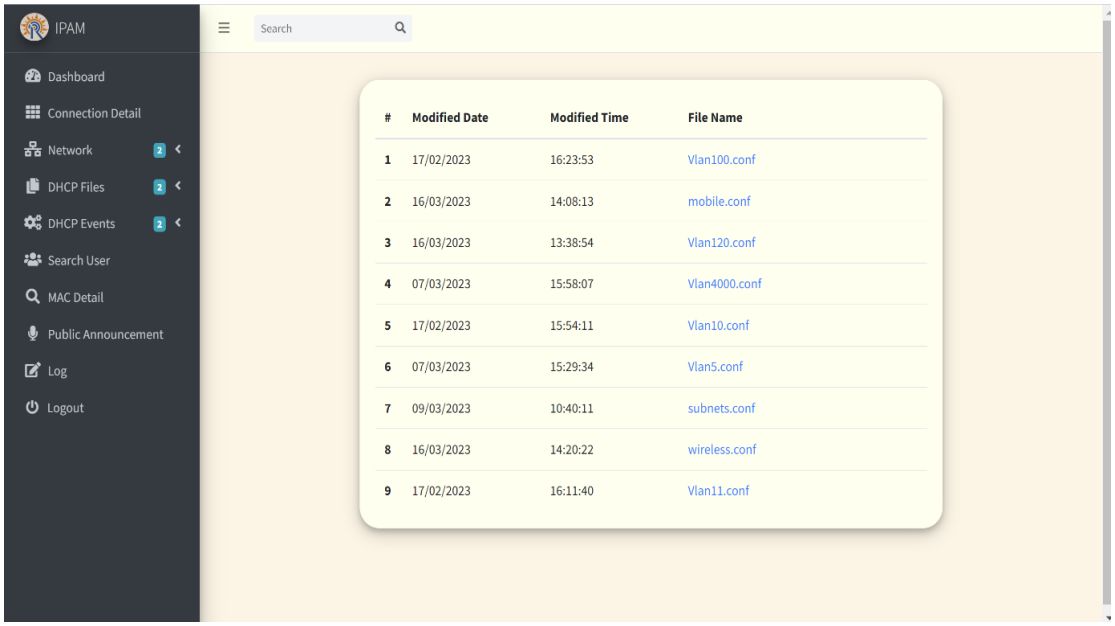


Fig 4.2.14 Dhcp log file

4.2.15 Below is the tab for config files. Each config files store the data for each type of connection as well as for the Vlan.



4.2.16 Upon clicking a particular file, the details of the same can be seen. Below are the details of the Vlan60.conf file.

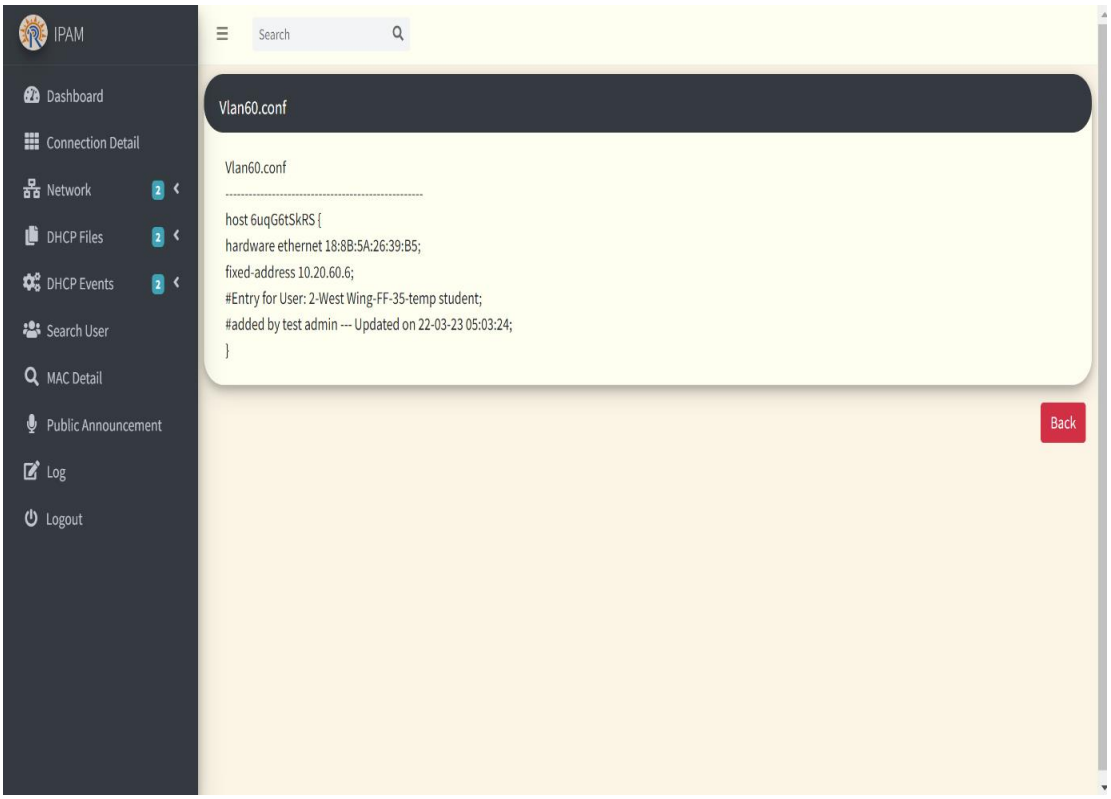


Fig 4.2.16 Config file content

4.2.17 The admin can search for a particular user as well as all its connection.

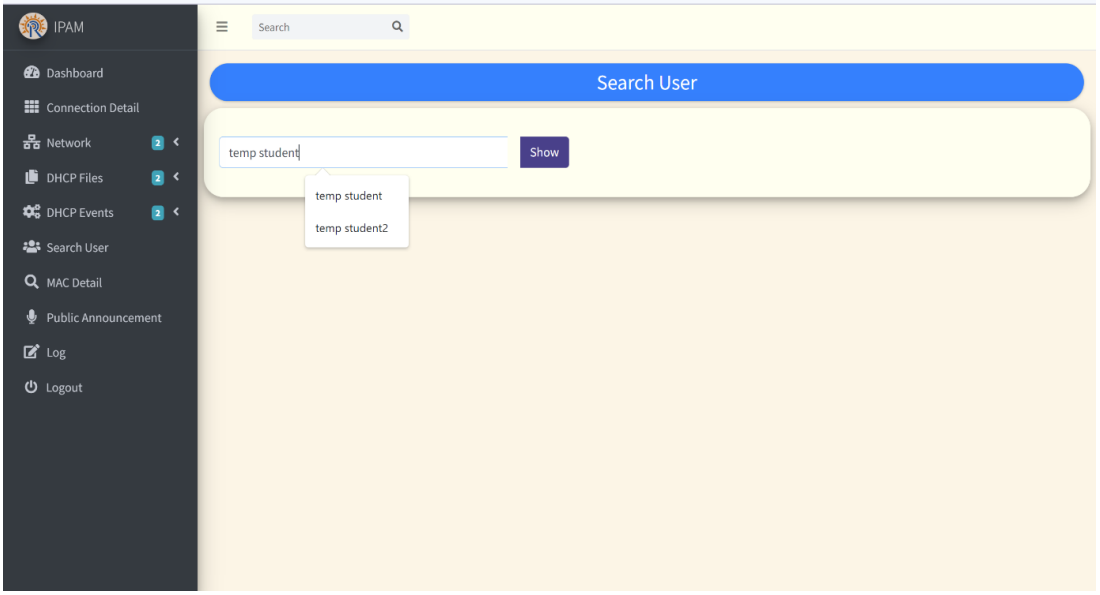


Fig 4.2.17 Search User

4.2.18 Admin can announce important information to all its user using this functionality.

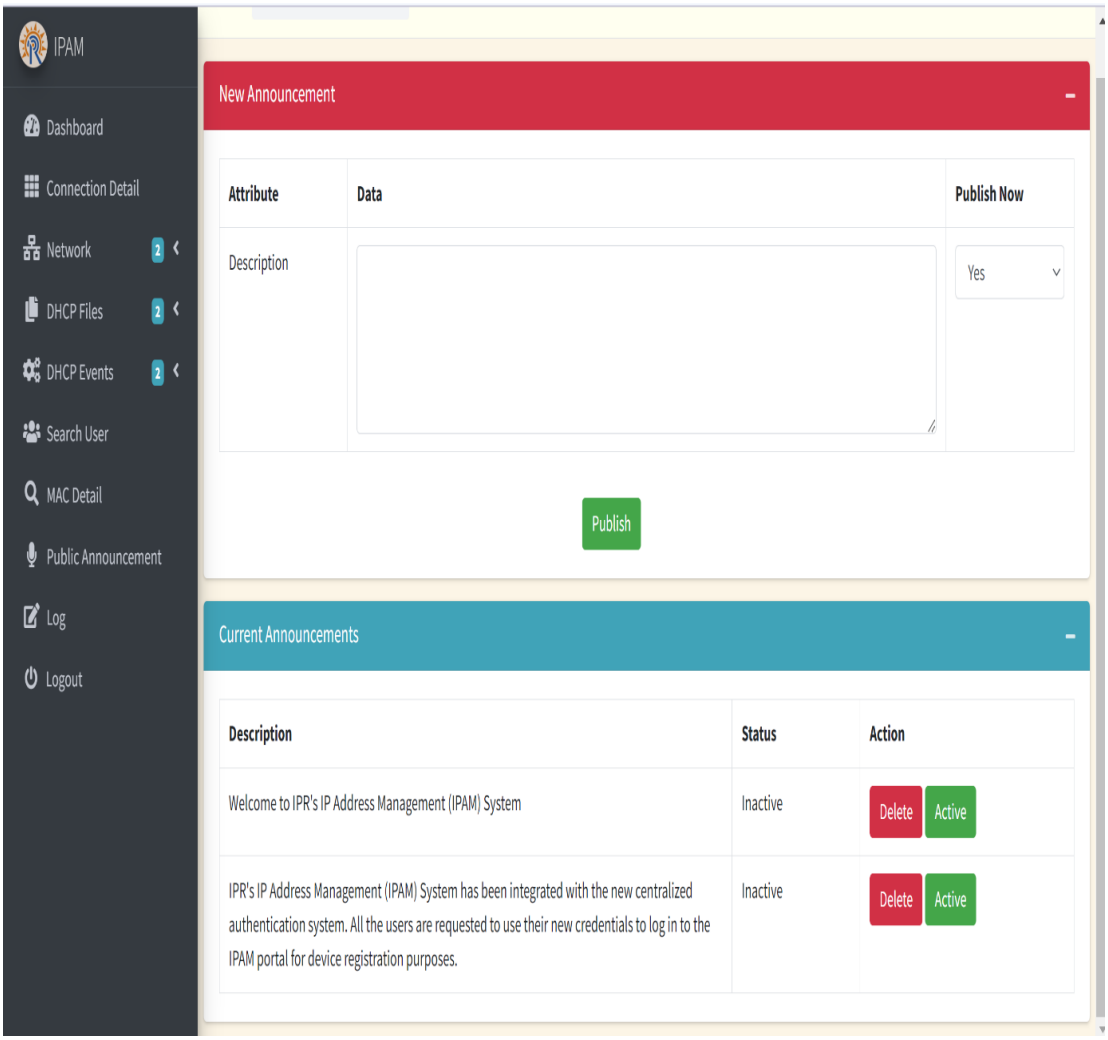


Fig. 4.2.18 Public Announcements

CHAPTER V

IMPLEMENTATION

USER:

- In User module, network connection registration is the prime feature through which user can request for internet access as per their requirements.
- Users will land on a webpage of registration where they need to enter the necessary details inorder to register themselves.
- After registering a request is sent to admin stating that a particular user is asking for internet access and if admin accepts the request then and only then that particular user is allowed to access internet.
- Initially, a temporary username and password is provided to user on their respective email id through which they can login for the very first time.
- In addition to it users are requested to change their password for security purposes.
- Moreover, a user can request for new connection apart from existing connection.
- On User dashboard one can notice the number of connections for all three categories i.e. Wired, Wireless, Mobile.
- After successfully requesting for a network connection one can check their request in the pending section and if a user made a request by mistake then it can be deleted.
- On completion of desired actions a user can logout from his/her account.

ADMIN:

- Admin can directly login to the dashboard without any prior registration as their record will be already present in the AD.
- After admin login as we redirect to admin dashboard, firstly we can observe that there a notification panel which depicts all the user request for network connection.
- Admin can modify as well as delete an existing user's record.

- The admin also has the privilege of adding a new connection for themselves or for any user if the user has any difficulty to register by himself.
- Another one is the Network functionality where we can create new subnets as well can view all the existing subnets and their detail per subnet. Over the period of time, if there is a change in the subnet, then the admin can use the edit button to edit the configuration or if no longer required, then he can delete the subnet as well.
- Another useful thing for admin is the Vlan Charts. Here, if the admin wants to see the overall usage of a particular vlan, then he can select it from dropdown and a chart will be shown indicating the percentage of reserved, unused and used space. Below that, all the ip associated to that subnet will be displayed and each pill will expand to give a quick glance as to whom this IP is assigned.
- As the logs of the activity taking place over the whole system are recorded, there is a separate page for viewing those log files. Here, the list of config files of wired, wireless and mobile as well as config files of subnets are also displayed as a list. From there, the admin can select any one config file to see the information particularly for that activity. Similar functionality is there for the DHCP log file where details regarding to the dhcp event can be viewed.
- Next in line, is the Search User functionality, it has been implemented in such a way that the search action can take payroll no, firstname or lastname as an input to perform search. This input will then be used for running the Query in database to fetch that record. IF found, then the result will be displayed on the screen with separate section for all types of connections where the admin can have a look on number of devices a particular user has. Also, if the admin wishes, can make changes to the data or can delete the record. Similar functionality is present for the admin to Search for existing MAC address in the system. Here, the input will be passed to controller and using Eloquent query, the result is searched and passed onto the view page.
- Instead of passing the announcement to users manually, we have implemented a public announcement tab, where the admin need to create a new announcement and when he clicks on publish the message, then this message will be displayed to the users on their dashboard. Finally the admin can then logout once the task is completed.

CHAPTER VI

TEST CASE DESIGN

6.1 Testing

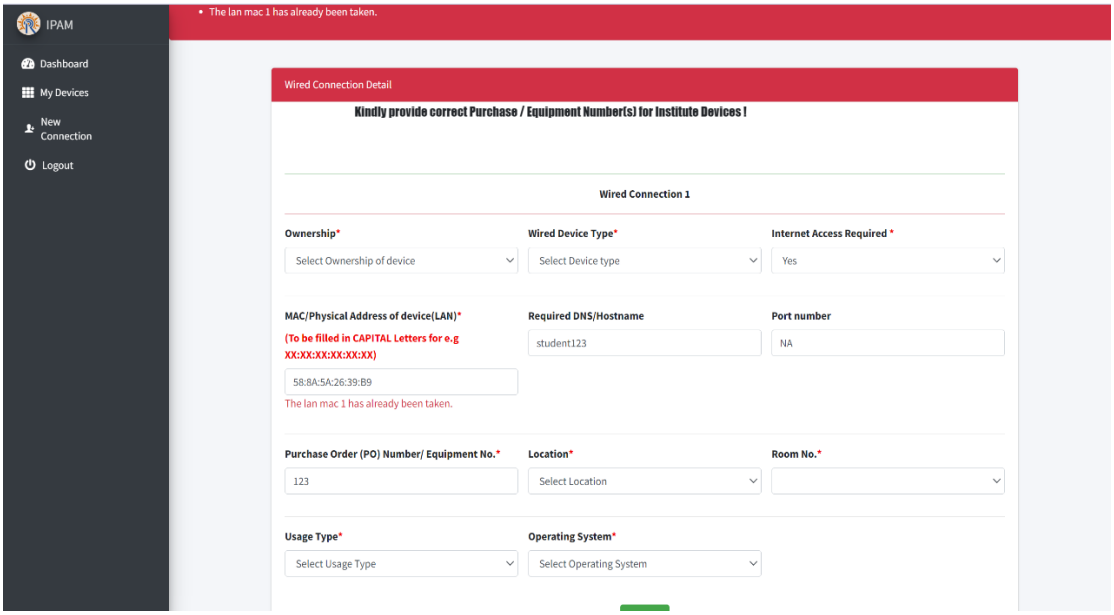
- **Testing Method :** Manual Testing

Sr	Action	Output	Expected Output	Result
1	Register for mobile internet connection.	Only if it is first device	Only if it is first device	Success
2	Invalid Mac format	Error (Format Invalid)	Error (Format Invalid)	Success
3	Duplicate Mac Address insert	Error (Mac already Taken)	Error (Mac already Taken)	Success
4	Select Location from the dropdown menu	Room dropdown gets activated	Room dropdown gets activated	Success
5	View total connection	Table indicating total connection of each type	Table indicating total connection of each type	Success
6	View My Devices	Page displaying your all connection details	Page displaying your all connection details	Success
7	Search User	All details regarding the user are displayed	All details regarding the user are displayed	Success
8	Get Mac Detail	Information related to user like IP address is assigned, location, etc is displayed	Information related to user like IP address assigned, location, etc is displayed	Success
9	Public Announcement Created	Announcement appears on the user side	Announcement appears on the user side	Success
10	Create New Subnet	Upon submitting the form, new subnet is created	Upon submitting the form, new subnet is created	Success
11	View Existing Subnets	List of Existing subnet is displayed	List of Existing subnet is displayed	Success
12	Vlan Charts	Dropdown menu containing Vlan	Dropdown menu containing Vlan	Success

		values to be displayed	values to be displayed	
13	Analyse particular Vlan Chart	Vlan information containing graphical view as well as each IP pill displaying whether it is assigned, reserved or not assigned.	Vlan information containing graphical view as well as each IP pill displaying whether it is assigned, reserved or not assigned.	Success
14	View Config Files	Opens a config file containing information particular to that .conf file	Opens a config file containing information particular to that .conf file	Success
15	Config File for Vlan	Keeps record with details of user assigned that vlan and IP.	Keeps record with details of user assigned that vlan and IP.	Success
16	Log file on admin Side	Displays and keeps track of all the activity on the portal	Displays and keeps track of all the activity on the portal	Success

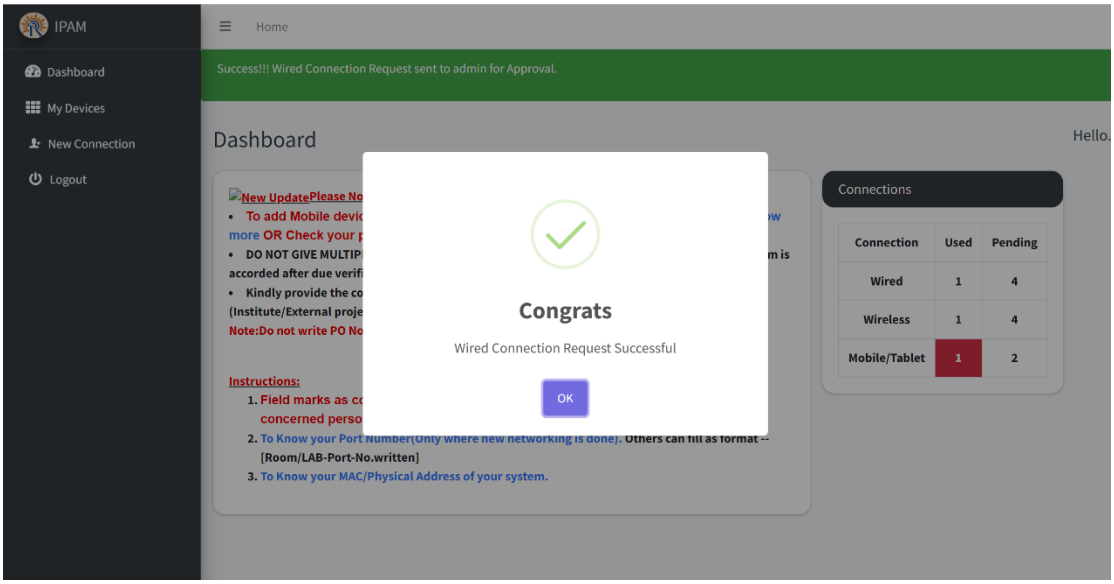
6.2 Testing Snapshots

6.2.1 If MAC address is already registered



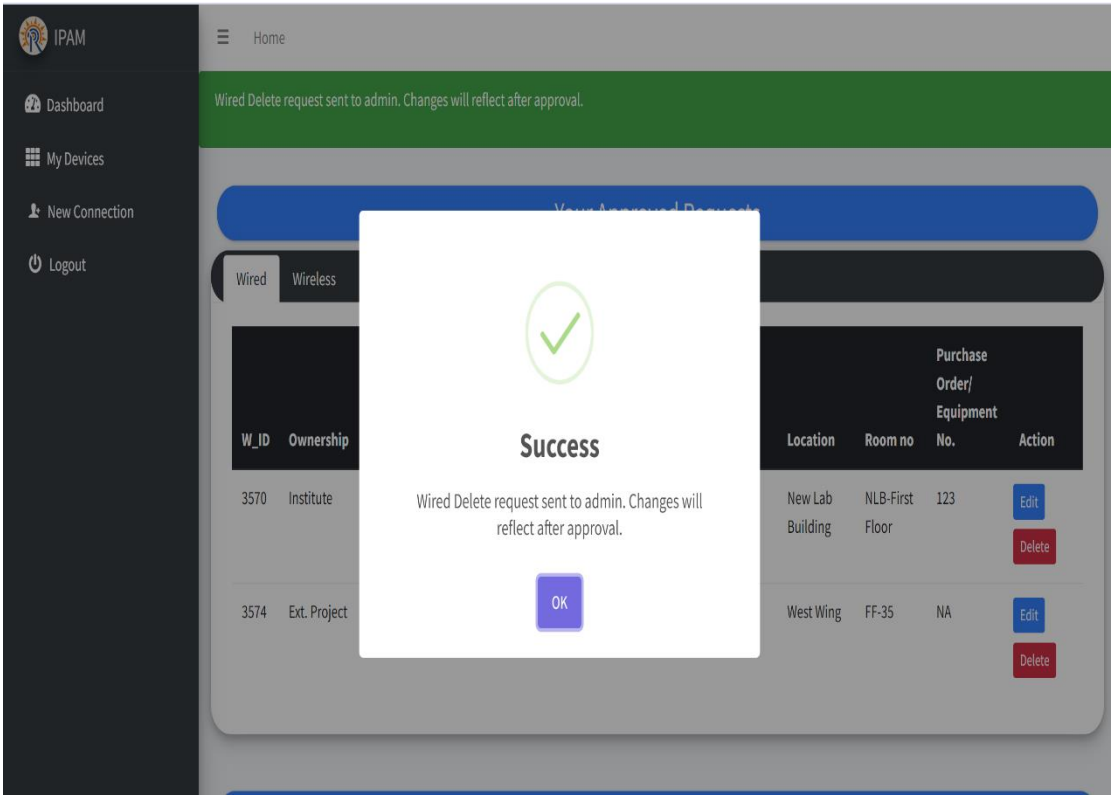
6.2.1 Lan MAC Already Taken

6.2.2 Confirmation upon successful request submission



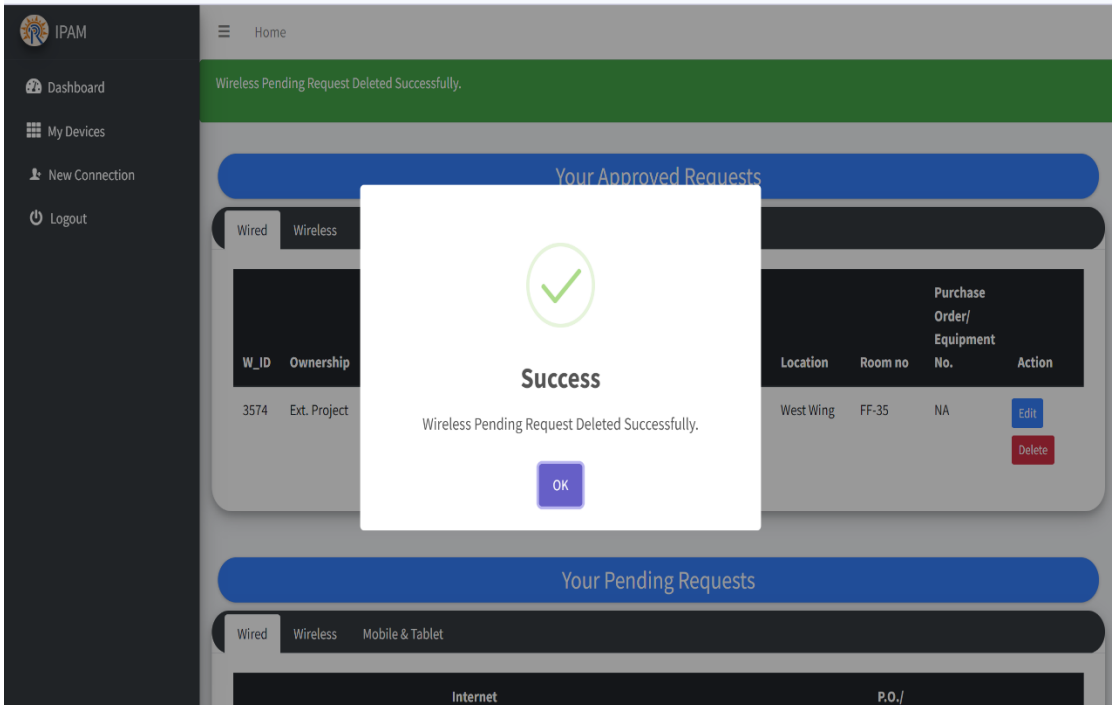
6.2.2 Request successful confirmation

6.2.3 Delete action taken by the User for a *Approved* connection



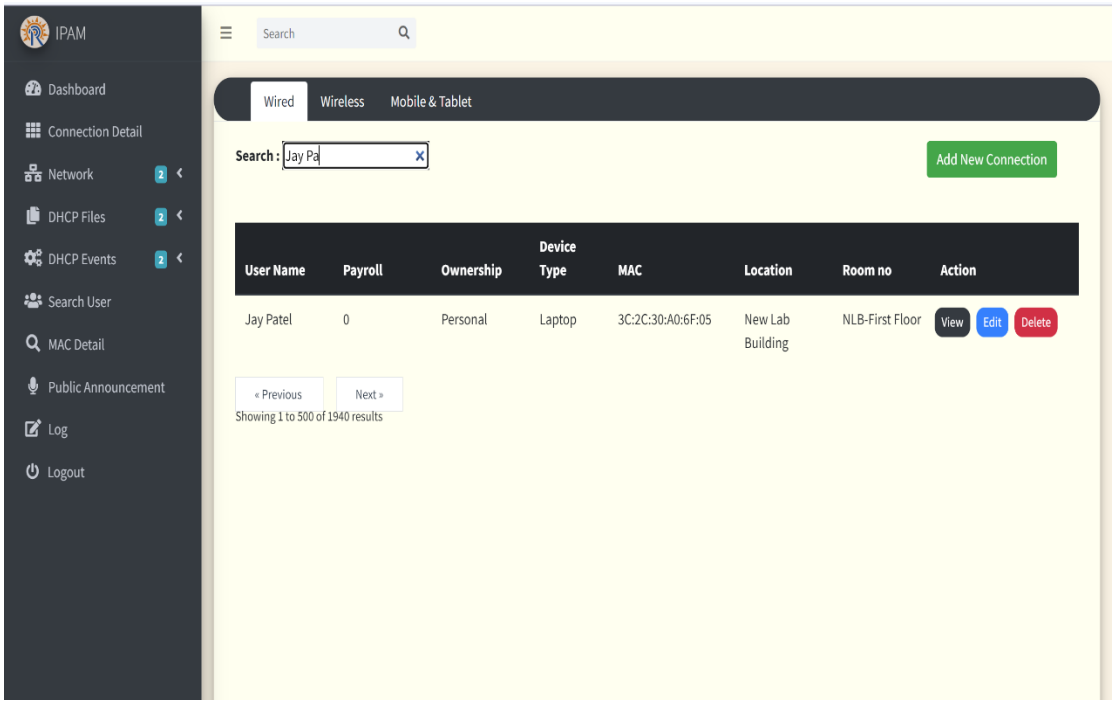
6.2.3 Delete Request sent to admin for approval

6.2.4 Delete Action taken by user for *Pending* connection request



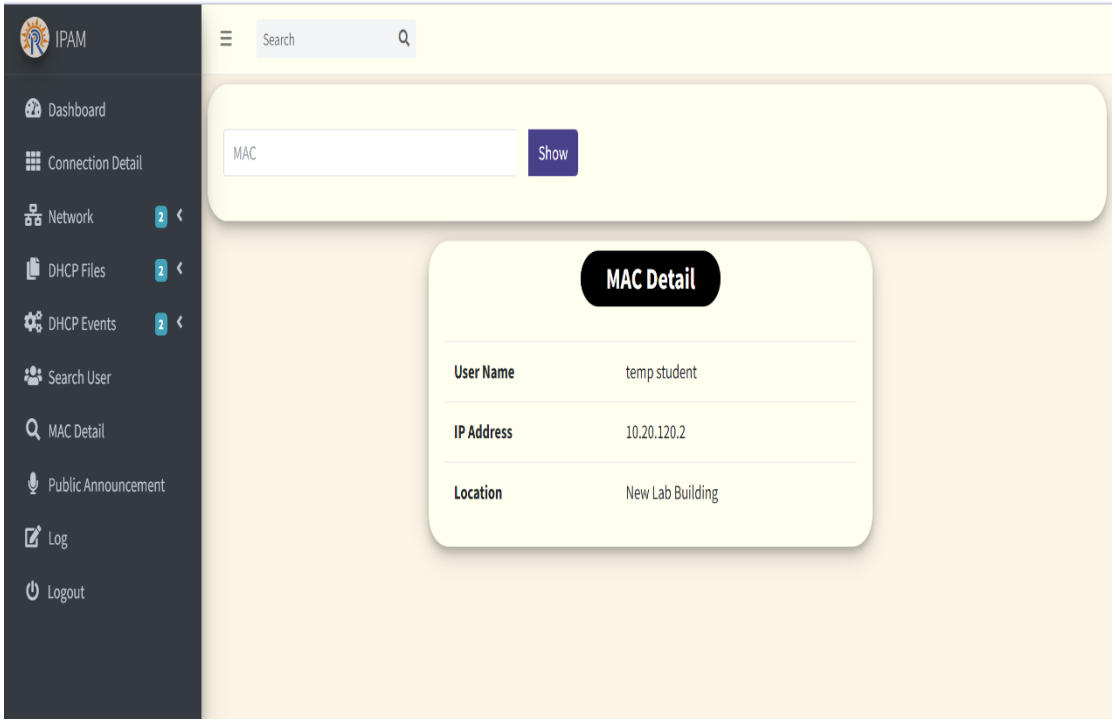
6.2.4 Delete action for pending connection request

6.2.5 Search User by name



6.2.5 Search User by name

6.2.6 Search User detail by MAC address.



6.2.6 Search User by Mac Address

CHAPTER VII

CONCLUSION

The IPAM portal is equipped with variety of functionalities, after getting a thorough knowledge of the modules to be implemented for better implementation.

Many important functionalities are successfully implemented in the IPAM portal namely the internet connection request for all three types like wired, wireless and mobile/tablet. Lists of approved as well as pending requests by the user, along with a table indicating the total number of connections in each category, notification to the admin about the new connection, edit connection details, delete request by the user as well as assigning the IP addresses to the user connection in case of wired connection, and most importantly storing each and every record of the user in the database for better tracking. This collectively will form a portal which will help the admin for centralized management of network resources.

This web portal will work as a optimized way for the user to get access to the internet just by filling in his/her connection details and sending it for approval to the network admins. More than users, this system will help the admins to have a centralized control over the network which will help them reduce the manual paperwork of distributing the forms for internet connection, collecting the forms in-person or from the collection dropboxes as well as going through the papers one by one and keeping file of those forms. Instead, this storage of forms in physical format is replaced by the database, where each record is stored in a well-formatted manner for better analysis by the admins.

Also, non-major functionalities like deleting pending request on user side, sending the mails to the admin about a connection request be it new connection, edit or delete action by the user, as well as updating the status of the connection request to the users via mail with appropriate links in the mail to monitor their status, dynamically filling the “room no” dropdown based on the location selected, makes the whole user experience fluid as well as gives it a personalized touch.

7.2 Limitations :-

- Only the user, who are on IPR's network can access the portal.
- Connectivity to LDAP is essential.
- No functionality to receive crash report from the user side.

7.3 Future Extensions :-

- Separate Functionality to add Location and Room Directly from the UI instead of manual entry to the Database.
- Optimize the Admin Dashboard such that all the admins can have synced data on their respective dashboard
- Expand to create functionality where the command line instructions can be executed from a click of a button.

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