Management Tool for Processing Network Element Information

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Abstract: The Network Element Information Processing Management Tool provides an interface for Network Element information maintenance. Every network element's information is still managed manually by the user, and there can be hundreds of them, which is time-consuming. The proposed system solves the problem by automating the information gathering and information processing related to Network Elements. All network elements must be known, maintained, monitored, and allocated using the management tool, which will aid in automating the process of allocation, software version, fetching IPs, availability and reachability. The management tool shows correct and up-to-date information.

Index Terms – Network Element Information, Normal user, Admin user, Super user, Database.

I. Introduction

The design and implementation of the system is to provide service in organisation. The system is to provide comprehensive network element information system. The Network Element Information Management Tool is required to know, maintain, track, and allocate all network elements in a single location when on the move. The network element IPs, credentials, allocation time, availability, reachability, hardware information, software details, and locations can all be fetched by user.

Node.JS and Express.JS are used to build the application. Before any record changes are made, all data is carefully checked and tested on the server. All data is safely stored on MySQL servers that are maintained by the administrator, ensuring the highest level of security.

The proposed application makes it easier for all the users to adopt it. This is implemented by authentication, which makes it reasonably secure. There are three users i.e., normal, admin and super users who can access the application. The normal users can view only the specific information of network elements. The admin and super user can easily manage details for every network element in the tool. This application also has the feature for user feedback, which will enable us to further enhance the functionality of the platform and add many more features to it.

As a result, From Network Element owners, testing Development Units to the Lab owners, everyone shall reap the benefits of the operability of this platform, saving us a huge amount of time from all the mundane activities of manual intervention. Rather than going through all the hectic processes to maintain Network Element details manually, the user can search Network Element details in seconds. Lab users can allocate the Network Elements to DU within seconds.
II. Proposed System

Manual maintenance of information of network elements is a tedious process and the goal is to create an application that provides a solution by automating the process of information gathering and information processing related to network elements and contains up-to-date network element information. This should make network element management more effective.

A. OBJECTIVES

- Creation of authorized users to monitor, maintain and allocate the network elements.
- Automate the process of allocating network elements.
- Automated retrieval of the most recent software version of each network element
- To analyse the connectivity of network elements under each Direct Access Coordinator
- Every 12 hours check the availability of network elements.
- Adding network feature information in bulk via an excel file
- Data plugins are used to search for network element information globally and individually in a matter of seconds.

III. System Architecture

This section covers the data flow diagram, comprehensive flow graph, requirement analysis, and the front and back end design processes for the network element information management system.

A. DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a graphical representation of a Network Element Information System flow. Data Processing can also be visualised using a data flow diagram. DFD depicts the system's contact with external entities. This context-level DFD is then "exploded" to reveal more depth of the modelled structure. A data flow diagram (DFD) depicts how data flows through a system. During the problem-solving process, data flow diagrams are often used. It considers a system to be a function that converts given input into desired output.

The Data Flow Diagram in Figure 1 depicts the movement of data through the various transformations or processes in the system.
This paper primarily focuses on the management of network element knowledge, which is maintained by the admin and super user across different levels of control, with regular users only being able to access the required details of network elements. In the flow graph, the work of each individual entity will be clarified in detail.
The home page displays the specific information of network element to the normal users. Registered Admin and Super Users are requested to login to the application by entering their credentials. The credentials of admin user and super user are stored as encrypted form in database.

**Network Element Resource:** Network element name, class, identity, hardware type, location, physical location and IP is accessed by users. These details may be added/edited/deleted by admin user and super user. The normal user can only view the specified information. Pinging the assigned IP address of each network element for every 12 hours to check whether the network element is alive or dead.

**Software Version:** To fetch latest software version, connect remotely to the server via SSH2 or Telnet using the IP address of each network element and execute the command based on the network element class type to obtain the software version.

**Allocation Period:** The allocation information is provided by super user that includes jira, direct access coordinators, and start and end dates, and the expiry of the allocation can be tracked using the moment process.

**Network Element IP Database Manager:** Allows the user to obtain IP addresses that have not been allocated. The user must provide information about the cloud, IP type and vlan, IP in each vlan. This is to automate the user request by processing the search into a database and providing the users with requested information.
B. FUNCTIONAL REQUIREMENTS

The key role of the Network Element information management system is to monitor and preserve information to increase performance. The system's admin user and super user are two important functional requirements. Other users would have less power (enable/disable/update) than the Administrator. It will be assured that the data entered is formatted correctly. Names, for example, cannot be replicated. If the user enters incorrect information, the user will be prompted to re-enter the information.

C. NON-FUNCTIONAL REQUIREMENTS

a. Performance Requirements:

The proposed framework, which we will create, will be used as the primary performance system, assisting the organisation in handling the entire database of network elements enrolled in the organisation. As a result, it is assumed that the database will meet all of the criteria in terms of functionality.

b. Safety Requirements:

The database could crash at any time due to a virus or a failure of the operating system. As a result, taking a database backup is needed.

c. Security Requirements:

We'll be building a stable database. Admin User and Super User are two groups of people who will be seeing all or parts of the information.

IV. Technologies Used

NodeJS

Node.js is a server environment that is free to use. Node.js is capable of creating dynamic page content. On the server, Node.js will build, open, read, write, delete, and close files. Node.js has the ability to obtain data from forms. Tasks are stored in Node.js files and are executed when such events occur.

Express.JS

A single-page, multi-page, and hybrid web application server platform written in Node.JS. It is the standard framework for Node.JS.

MySQL

The acronym SQL stands for Structured Query Language. SQL is a programming language that allows one to access and manipulate databases. The American National Standards Institute (ANSI) has developed SQL as a standard. SQL can run queries against a database, retrieve data from a database, insert records in a database, update records in a database, remove records from a database, build new
databases, tables, stored procedures, and views, and set permissions on tables, procedures, and views.

HTML
Stands for hypertext markup language, and it is the foundation of every website. Without an understanding of HTML, no website can be structured. To make a web page more effective, we use different frameworks such as CSS. As a result, we're using this vocabulary to improve the effectiveness and efficiency of our web pages. We also use JavaScript to render our web pages interactive.

V. Results

![Network Element Information System](image)

**Fig 3: Normal User View**

![Admin Login](image)

**Fig 4: Admin User Login Form**
Fig 5: Super User Login Form

![Super User Login Form]

Fig 6: Admin User View

![Admin User View]

Fig 7: Super User View

![Super User View]

Fig 8: Network Element IP Database Manager

![Network Element IP Database Manager]
VI. Conclusion

The proposed system's main goal is to simplify the use of Network Elements Information, which will help minimise operating costs and enable users to retrieve information in a single window interface. The application brings in quality improvements, time & cost savings, reduces human intervention leading lower human errors & creates a new way of working. Owners of Network Element Tool management would benefit from the platform's functionality, which will save them a significant amount of time by eliminating all manual intervention activities. It always provides correct details. The information collected over the years can be saved and accessed at any time. The information contained in the repository enables management in making informed decisions. As a result, a Web-based Network Element Information Management system is preferable. Both users and organisation will get the details they need right away.

References


