AN ONLINE SYSTEM TO ADD, DELETE AND MODIFY NETWORK RELATED EQUIPMENT

by

Sandeep Reddy Endapally
Bachelor of Computer Science, JNTU, 2003

A Project

Submitted to the Graduate Faculty

of the

University of North Dakota

in the partial fulfillment of the requirements

for the degree of

Master of Science

Grand Forks, North Dakota
December
2007
This project document, submitted by Sandeep Reddy Endapally in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

(Faculty Advisor)

This project document meets the standards for appearance, conforms to the style and format requirements of the Computer Science Department of the University of North Dakota, and is hereby approved.

Graduate Director

7/2/07

Date
PERMISSION

Title: An Online System to Add, Delete and Modify Network Related Equipment

Department: Department of Computer Science

Degree: Master of Computer Science

In presenting this report in partial fulfillment of the requirement for a graduate degree from the University of North Dakota, I agree that the Department of Computer Science shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my work or, in his absence, by the Chairperson of the Department.

Signature

Date 06/18/2007
# TABLE OF CONTENTS

LIST OF FIGURES ........................................................................................................... vi

LIST OF TABLES ............................................................................................................. ix

ACKNOWLEDGEMENTS ................................................................................................. x

ABSTRACT ....................................................................................................................... xi

## CHAPTER

I. INTRODUCTION ...........................................................................................................1

1.1 Project Outline .......................................................................................................3

1.2 Report Organization .............................................................................................3

II. REQUIREMENTS AND SPECIFICATION ..........................................................4

2.1 Requirements .........................................................................................................4

2.2 Specifications .........................................................................................................6

III. SOFTWARE DESIGN ...........................................................................................25

3.1 Use Case Diagram ...............................................................................................25

3.2 Activity Diagrams .................................................................................................27

3.3 Deployment Diagram ............................................................................................33

3.4 Entity-Relationship Diagram ...............................................................................34

3.5 Database Tables ....................................................................................................37

IV. IMPLEMENTATION .............................................................................................41

4.1 Client Side Modules ............................................................................................41

4.2 Server Side Modules ............................................................................................44
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Interface of ITSS template and login form</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Interface of main menu</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>Interface of add menu</td>
<td>7</td>
</tr>
<tr>
<td>4.</td>
<td>Interface to add new building, if the required building does not exist</td>
<td>8</td>
</tr>
<tr>
<td>5.</td>
<td>Interface of form after entering equipment information with error check button</td>
<td>9</td>
</tr>
<tr>
<td>6.</td>
<td>Interface of form with submit button</td>
<td>9</td>
</tr>
<tr>
<td>7.</td>
<td>Interface of form to enter port information</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>Interface to add new building</td>
<td>11</td>
</tr>
<tr>
<td>9.</td>
<td>Interface of modify menu</td>
<td>11</td>
</tr>
<tr>
<td>10.</td>
<td>Interface of drop down list to modify equipment by serial number</td>
<td>12</td>
</tr>
<tr>
<td>11.</td>
<td>Interface of drop down list to modify equipment by UND Tag ID</td>
<td>12</td>
</tr>
<tr>
<td>12.</td>
<td>Interface of form to modify after choosing a serial number</td>
<td>13</td>
</tr>
<tr>
<td>13.</td>
<td>Interface to add or delete modules</td>
<td>14</td>
</tr>
<tr>
<td>14.</td>
<td>Interface to add ports</td>
<td>14</td>
</tr>
<tr>
<td>15.</td>
<td>Interface showing update functionality</td>
<td>14</td>
</tr>
<tr>
<td>16.</td>
<td>Interface to rearrange modules</td>
<td>15</td>
</tr>
<tr>
<td>17.</td>
<td>Interface showing number of modules to transfer</td>
<td>15</td>
</tr>
<tr>
<td>18.</td>
<td>Interface to transfer modules from equipment to equipment</td>
<td>16</td>
</tr>
<tr>
<td>19.</td>
<td>Interface showing empty modules to transfer</td>
<td>16</td>
</tr>
</tbody>
</table>
20. Interface to edit building............................................................................................17
21. Interface of drop down list to delete equipment by serial number .......................17
22. Interface of drop down list to delete equipment by a building ...............................18
23. Interface to search equipment and active outlets ......................................................18
24. Interface to search equipment by serial number .......................................................19
25. Interface to search equipment by UND Tag ID .........................................................19
26. Interface to search equipment by location ...............................................................20
27. Interface to search equipment by building room ......................................................20
28. Interface to search equipment by room ....................................................................21
29. Interface to search active outlets .............................................................................21
30. Interface of report menu...........................................................................................22
31. Interface to view communication reports by building ...............................................22
32. Interface to view communication reports by individual room ..................................23
33. Interface to view network report................................................................................23
34. Interface to view equipment report ..........................................................................23
35. Interface to view personal information ....................................................................24
36. Use Case diagram .....................................................................................................26
37. Activity diagram for add process .............................................................................28
38. Activity diagram for modify process .........................................................................29
39. Activity diagram for modify process using serial number and UND tag ID .............30
40. Activity diagram for search process ..........................................................................31
41. Activity diagram for report process .........................................................................32
42. Deployment diagram..................................................................................................33
43. Entity-Relationship diagram .......................................................... 35
44. Interface of user login ................................................................. 60
45. Interface of main menu .............................................................. 61
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>36</td>
</tr>
<tr>
<td>2.</td>
<td>36</td>
</tr>
<tr>
<td>3.</td>
<td>36</td>
</tr>
<tr>
<td>4.</td>
<td>37</td>
</tr>
<tr>
<td>5.</td>
<td>38</td>
</tr>
<tr>
<td>6.</td>
<td>38</td>
</tr>
<tr>
<td>7.</td>
<td>39</td>
</tr>
<tr>
<td>8.</td>
<td>40</td>
</tr>
</tbody>
</table>

1. Structure of Building table..................................................................................................36
2. Structure of Network table..................................................................................................36
3. Structure of Equipment Type table .....................................................................................36
4. Structure of Equipment table .............................................................................................37
5. Structure of Module table ..................................................................................................38
6. Structure of Room table .....................................................................................................38
7. Structure of Port table .......................................................................................................39
8. Structure of users table ......................................................................................................40
ACKNOWLEDGMENTS

I would like to thank people who have contributed to the completion of this study. I would like to thank my advisor, Dr. Hassan Reza for his guidance and advice throughout the duration of this work. I would also like to thank my supervisor, Todd Barrett in ITSS department (UND) for his guidance and advice. Special thanks to my family for their constant love and understanding, without which would have made this work impossible.
ABSTRACT

Network software is an online system used by Information Technology Systems and Services (ITSS) department at the University of North Dakota to add, modify, delete and view equipment data. Equipment is defined as a set of modules. Each module of equipment is defined as a set of ports. These ports are connected to outlets in rooms of a building where the equipment resides. The equipment is used for networking purposes which consists of switches, hubs, and bridges along with routers. The earlier system has lot of drawbacks. For example, the interfaces are not user friendly and the database is not normalized and indexed. So the ITSS department has decided to change the entire outlook of the website and also to design a new database table structure. So, the final system will be implemented using Linux, Apache server, MySQL 5.0, PHP (LAMP) environment and new database structure will be designed which is normalized, indexed and modular. The new structure will have the ability to add tables to the database without complications. Additionally, the final system will have the ability to add, delete and modify buildings, network type and equipment type which are associated with the equipment. There is a large amount of data about equipment in the earlier system which will be transferred to the new system with 95% accuracy.
CHAPTER I
INTRODUCTION

Network software deals with network related equipment. Equipment consists of modules. A module, which is not empty, is defined as a set of ports. The ports of a module of equipment are connected to outlets in rooms of a building where the equipment resides. The equipment is used for networking purposes which consists of switches, hubs, and bridges along with routers. The equipment is identified by serial numbers. The data associated with equipment is as follows:

1. Building
2. Equipment type
3. Network type
4. UND Tag ID
5. Room number
6. IP Address
7. Modules
8. Ports to which outlets are connected

The equipment is moved from the room of one building to the room of another building, or from one room to another room in the same building. The modules of equipment can be transferred to empty modules of other equipment. The modules of equipment can be rearranged. The earlier program has a number of drawbacks which are as follows:
1. The update functionality for equipment is not working correctly.
2. The transfer functionality for modules from equipment to other equipment is not working correctly.
3. The search functionality is not giving correct results.

ITSS department came up with the proposal to change the entire outlook of the website and to design a new database structure which will give fast results.

The main objectives of this system are:

1. To design web pages that looks professional.
2. To design a database structure that can give fast and correct results.
3. To make add functionality for equipment, building, network type and equipment type easier.
4. To implement update and search process which can be easily understood by the user.

The database is used as a backend in this project. So, the database plays an important role in this project. The earlier database system structure is not normalized and indexed. It was difficult to add new tables to earlier table structure. So, ITSS wants a database structure with the following features:

1. The database table structure shall be normalized.
2. The database table structure shall be indexed.
3. A user shall have the ability to add new tables at any time with out any complications.
1.1 Project Outline

The project involves steps in software engineering process. Requirement analysis and specification is the first step in this process. Requirements are given by the user, ITSS department and specifications are prepared depending on the requirements. The second step is the design process. IBM Rational Rose and Microsoft Visio are used for the design process. The third step is to implement the software system. PHP, JavaScript, AJAX, and HTML are used as a front end and MYSQL is used as a back end. The fourth step is verification and validation. Verification and validation is performed to check whether the software conforms to the user requirements. Unit testing, integration testing and black box testing are the testing techniques used in this project.

1.2 Report Organization

Chapter II describes requirement analysis and specification. Chapter III describes the design process using IBM rational rose and Microsoft Visio. Chapter IV describes the implementation process. Chapter V describes verification and validation. Chapter VI describes the conclusion part.
CHAPTER II

REQUIREMENTS AND SPECIFICATIONS

Requirements are the functions, services and constraints the system should provide. The software requirements document should be precise. It provides information to the software developer of what the system should do. It is a contract between the software developer and the buyer. The requirements are provided by the client, ITSS department. Specifications are the precise written description of the project.

2.1 Requirements

ITSS has decided to implement the program in Linux, Apache server, MySQL and PHP (LAMP) environment. Some of the requirements are that the project interfaces will be written in PHP, data should be stored in MySQL 5.0 and the final requirement is that the data has to be migrated from Oracle to MySQL with at least 95% accuracy.

Some of the basic interfaces that will be needed are:

1. Add equipment
   a. Add new building locations dynamically
      i. Being able to add buildings while adding equipment.
      ii. Being able to change building locations while in the add equipment interface.
   b. Add new equipment
i. Need to be able to add all the information about the equipment.

ii. Need to be able to add ports for equipment dynamically.

2. Modify equipment
   a. Names of equipment
   b. Location of equipment
   c. Modify equipment ID

3. Search for equipment by:
   *note: the search function needs to be dynamic, it should allow the user to select via dropdown list or allow the user to start typing the number or name and provide those results in the dropdown list.
   a. Serial number
   b. UND tag ID
   c. Name
   d. Location
   e. Building
      i. Room
      ii. Outlet ID

4. Report
   a. Building
      i. By room
   b. Location
   c. Network report
      i. Sort by equipment type
ii. Sort by UND Tag ID

iii. Sort by building

d. Equipment type report

i. Sort by Serial Number

ii. Sort by building

iii. Sort by UND Tag ID

All these interfaces need to have the ability to be modularized; basically they should be able to be plugged into something later if the need arises.

2.2 Specifications

According to requirements, specifications are as follows.

**Specification 1:** The system shall have ITSS template and a user login which is limited only to registered users from ITSS department.

![Network Systems Login Form]

Figure 1: Interface of ITSS template and login form.
**Specification 2:** The index page shall have links “Add Menu”, “Modify Menu”, “Search Menu”, “Report Section”, “My Info” and “Logout”.

![Main Menu](image1.png)

**Figure 2:** Interface of main menu.

**Specification 3:** The link “Add Menu” mentioned in specification 2 shall invoke a page which has links “Add New Equipment”, “Add New Building”, “Add New Network Type” and “Add New Equipment Type”. The page shall also have a button “Main Menu” to the left side of the page which takes you to the index page and “LogOut” to the right side of the page.

![Add Menu](image2.png)

**Figure 3:** Interface of add menu.

**Specification 4:** The link “Add New Equipment” mentioned in specification 3 shall invoke a form which has drop down list for building, network type and equipment type. There shall be buttons beside each drop down list to add new building, network type and equipment type if required building, network type and equipment type does not exist.
Figure 4: Interface to add new building, if the required building does not exist.

**Specification 5:** The form mentioned in specification 4 shall also have text box for serial number, serial number comment, equipment ID comment, IP Address, room number and drop down for number of modules for the equipment and a text box for each module to enter number of ports. The page shall also have a 500 limit character text box to enter comment regarding equipment. Serial number and UND Tag ID shall be unique. UND Tag ID can be empty, but serial number and room number shall not be empty. The page has an error check button at last.
Figure 5: Interface of form after entering equipment information with error check button.

**Specification 6:** The error check button mentioned in specification 5 shall invoke same page with button changed to submit. The purpose of doing this is to encounter errors.

Figure 6: Interface of form with submit button.
**Specification 7**: The “Submit” button in specification 6 shall invoke a page where port information shall be entered for each module. A text boxes for port, outlet, room to which outlet is connected, comment corresponding to each port shall be available. If the equipment already exists in the data base, an error message shall be displayed that the equipment already exists.

![Form to enter port information](image)

**Figure 7**: Interface of form to enter port information.

**Specification 8**: The links “Add New Building” or “Add New Network Type” or “Add New Equipment Type” mentioned in specification 3 shall invoke a page to add new building or new network type or new equipment type. The links “Add New Building”, “Add New Network Type” and “Add New Equipment Type” shall also be available in the page.
Figure 8: Interface to add new building.

**Specification 9:** The web page to modify shall contain two sections.

1. Administrative section

2. Equipment section
   
   - Administration section: Administrative section shall contain links “Edit Building Name”, “Edit Equipment Type Names”, “Edit Network Type Names” and links “Delete Building Names”, “Delete Equipment type Names” and “Delete Network Type Names”.
   
   - Equipment section: Equipment section shall contain links “Modify by Serial Number”, “Modify by UndTag” and links “Delete Equipment by Serial Number”, “Delete all Equipment in a Building”.

Figure 9: Interface of modify menu.
**Specification 10:** The link “Modify by Serial Number” mentioned in specification 9 shall invoke a page which has a drop down list to select a serial number.

![Drop down list to modify equipment by serial number](image)

Figure 10: Interface of drop down list to modify equipment by serial number.

**Specification 11:** The link “Modify by UNDTag” mentioned in specification 9 shall invoke a page which has a drop down list to select a UND Tag ID.

![Drop down list to modify equipment by UND Tag ID](image)

Figure 11: Interface of drop down list to modify equipment by UND Tag ID.

**Specification 12:** After selecting a serial number mentioned in specification 10 and clicking submit button, a page with information regarding the equipment shall be displayed. The page shall allow the users to modify any part of the information except serial number. Serial number cannot be modified. The page shall have “Modify Equipment by S/N Tags”, “Add/Delete Modules”, “Rearrange Modules” and “Transfer Modules” buttons to the left side of the page.
Figure 12: Interface of form to modify after choosing serial number.
**Specification 13:** The button “Add/Delete Modules” shall invoke a page which allows the users to add or delete modules.

![Interface to add or delete modules.](image1)

Figure 13: Interface to add or delete modules.

**Specification 14:** The “Submit” button mentioned in specification 13 shall invoke a page where number of ports is entered.

![Interface to add ports.](image2)

Figure 14: Interface to add ports.

**Specification 15:** The “Submit” button mentioned in specification 14 shall invoke a page stating that module information is updated with button “Ok”. “Ok” button shall invoke page mentioned in specification 12.

![Interface showing update functionality.](image3)

Figure 15: Interface showing update functionality.
Specification 16: The “Rearrange Modules” button mentioned in specification 12 shall allow the users to rearrange modules. There shall be at least two modules to rearrange. So if there is only one module for the equipment and if the user click the submit button, an error shall be displayed stating that there should be at least two modules to rearrange.

Figure 16: Interface to rearrange modules.

Specification 17: The “Transfer Modules” button mentioned in specification 12 shall allow the user to transfer modules from equipment to equipment. When button “Transfer Modules” is clicked, a page to enter number of modules to be transferred shall be invoked.

Figure 17: Interface showing number of modules to transfer.
**Specification 18:** The “Submit” button mentioned in specification 17 shall invoke a page with text boxes for module numbers and a drop down list of serial numbers to which the modules shall be transferred.

![Interface to transfer modules from equipment to equipment.](image)

**Figure 18:** Interface to transfer modules from equipment to equipment.

**Specification 19:** After entering number of modules and choosing a serial number and clicking the “Submit” button mentioned in specification 18, if the number of modules entered are more than empty modules for a serial number an error shall be displayed stating that there are not enough empty modules to transfer.

![Interface showing empty modules to transfer.](image)

**Figure 19:** Interface showing empty modules to transfer.

**Specification 20:** Links “Edit Building Name”, “Edit Network Type Names”, “Edit Equipment Type Names” shall be invoke the same page to edit.
Figure 20: Interface to edit building.

**Specification 21:** The link “Delete Equipment by Serial Number” mentioned in specification 9 shall invoke a page which has drop down list to select a serial number. When a serial number or building is selected, the contents corresponding to the serial number shall be deleted.

Figure 21: Interface of drop down list to delete equipment by a serial number.
**Specification 22:** The link “Delete All Equipment in a Building” mentioned in specification 9 shall invoke a page which has drop down list to select a building. When a building is selected, the contents corresponding to the building shall be deleted.

![Delete Equipment by Building](image)

Figure 22: Interface of drop down list to delete equipment by a building.

**Specification 23:** The search page shall contain buttons “search by Serial Number”, “Search by UNDTagID”, “Location”, “Search by Building Room” and “Search Active outlet”.

![Search Equipment and Active Outlets](image)

Figure 23: Interface to search equipment and active outlets.
Specification 24: The button “Search by Serial Number” mentioned in specification 22 shall invoke a page which has drop down list to select a serial number and a “Submit” button. The “Submit” button shall allow the users to view the results.

Figure 24: Interface to search equipment by serial number.

Specification 25: The button “Search by UNDTagID” mentioned in specification 22 shall invoke a page which has drop down list to select a UND Tag ID and a “Submit” button. The “Submit” button shall allow the users to view the results.

Figure 25: Interface to search equipment by UND Tag ID.

Specification 26: The button “Location” mentioned in specification 22 shall invoke a page which has drop down list to select a building and a “Submit” button. The “Submit” button shall allow the users to view the results.
Figure 26: Interface to search equipment by location.

**Specification 27:** The button “Search by Building Room” mentioned in specification 22 shall invoke a page which has drop down list to select a building and a “Submit” button.

Figure 27: Interface to search equipment by building room.

**Specification 28:** The button “Submit” mentioned in specification 26 shall invoke a page which has drop down list to select room of a building and a “Submit” button. The “Submit” button shall allow the users to view the results.
Specification 29: The button “Search Active outlet” mentioned in specification 22 shall invoke a page which has drop down list to select a building, text box for entering room number and “Submit” button. The “Submit” button shall allow the users to view the active outlets.

Specification 30: The report menu should contain two sections. “Administrative Reports” and “Standard Reports”. Administrative reports should contain links “List all
Current Building”, “List all Current Equipment Types” and “List all Network Types”. Standard reports should contain links “All Equipment in a Building”, “Equipment listing – by Building Room”, “Network report” and “Equipment Type”.

Figure 30: Interface of report menu.

**Specification 31:** The link “All Equipment in a Building” mentioned in specification 29 shall invoke a page which has drop down list to select a building. When a building is selected, user shall be able to view the results.

Figure 31: Interface to view communication reports by building.

**Specification 32:** The link “Equipment listing-by Building Room” mentioned in specification 29 shall invoke a page which has drop down list to select a building. When a building is selected, user shall be able to view the drop down list for selecting room in building. When the room is selected user shall be able to view the results.
Figure 32: Interface to view communication reports by individual room.

**Specification 33:** The link “Network Report” mentioned in specification 29 shall invoke a page which has drop down list to select network type. Users shall be able to view the results after selecting UND Tag ID or equipment type or building from drop down list.

Figure 33: Interface to view network report.

**Specification 34:** The link “Equipment Type” mentioned in specification 29 shall invoke a page which has drop down list to select equipment type. Users shall be able to view the results after selecting UND Tag ID or serial number or building from drop down list.

Figure 34: Interface to view equipment report.
Specification 35: The link “My Info” on index page shall invoke a page where user can view personal information, change password and edit personal information.

Figure 35: Interface to view personal information.
CHAPTER III

SOFTWARE DESIGN

I used Unified Modeling Language (UML) of IBM Rational Software Modeler and Microsoft Visio based on the requirements. Modeling is the most essential part for any software system. It plays vital role in any development process. The UML is a language to specify, visualize, construct and document software systems. It is also used for non software systems. The UML uses notations to express software systems. UML has thirteen types of diagrams to express software system in a convenient way.

3.1 Use Case Diagram

Use Case diagrams is used to describe system functionality. A Use Case diagram has actors, associations, use cases. Use case is depicted in the form horizontal eclipse and provides something measurable value to an actor. The actor is drawn in the form of stick figures. An actor may be person, organization who interacts with the system. Associations between actors and use cases in use case diagrams are represented in the form of solid lines.
Figure 26: Use Case diagram.
3.2 Activity Diagrams

Activity diagrams are used to specify flow of control and data in a system. Activity diagrams are same as flow charts because they show how data flows. Activity diagrams can also show parallel and concurrent flows. In activity diagrams, we use activity nodes and edges to depict flow. Activity diagrams are used before implementing a project to model the flows. During analysis and design activity diagrams are used to show behavior of operations.

I used five activity diagrams to show the data flow in the system. The first activity diagram shows data flow in the add process. The second diagram and third diagrams shows data flow in the modify process. The fourth diagram shows data flow in the search process. The fifth diagram shows data flow in the report process.
Add Menu

User enters

Add Building
Click Add Building

Add Network Type
Click Network Type

Add Equipment Type
Click Equipment Type

Add Equipment

If Serial Number or UND Tag ID exists

Error process

If Serial Number and UND Tag ID does not exist

Enter Port information

Add Process

Figure 27: Activity diagram for add process.
Figure 28: Activity diagram for modify process.
Figure 29: Activity diagram for modify process using serial number and UND tag ID.
Figure 30: Activity diagram for search process.
Figure 31: Activity diagram for report process.
3.3 Deployment Diagram

Deployment diagrams are used to show relationship between software and hardware components in the system. Deployment diagrams are used during implementation phase to show physical arrangement of the nodes in the system, the artifacts that are stored in each node. Nodes represent hardware devices. Nodes can also be used to represent application server.

I used deployment diagram with three nodes. Node 1 represents web browser. Node 2 represents database server. Node 3 represents web server.

![Deployment Diagram](image-url)

Figure 32: Deployment diagram.
3.4 Entity-Relationship Diagram

The Entity relationship diagram is used to view the real world in the form of entities and relation between them. An entity represents a real world object. It is almost similar to a table in relational model. A relationship is defined as an association between two or more entities. Entities are represented in the form of labeled rectangle. Relationships are represented in the form of solid lines. There are three types of relationships.

1. One-to-one relationship: In this form of relationship, the direction is from independent entity to dependent entity. One instance of an entity is related to one instance of other entity.

2. One-to-many relationship: In this form of relationship, one instance of entity is associated with zero or many instances of other entity.

3. Many-to-many relationship: In this form of relationship, zero or many instances of a relationship is associated with zero or many instances of other entity.
Figure 33: Entity-Relationship diagram.
3.5 Database Tables

Table 1 gives description about the table building. It has two fields. BuildingID is an auto increment field and Location is the field for name of the building in UND.

Table 1: Structure of Building table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>BuildingID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>Location</td>
<td>Varchar(100)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 gives description about the table network type. It has two fields. NetworkID is an auto increment field and NetworkType is the field for the network type in UND.

Table 2: Structure of Network table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>NetworkID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>NetworkType</td>
<td>Varchar(100)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 gives description about the table equipment type. It has two fields. EquipmentTypeID is an auto increment field and EquipType is the field for the equipment type in UND.

Table 3: Structure of Equipment Type table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>EquipmentTypeID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>EquipType</td>
<td>Varchar(100)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4 gives description about table equipment. It has 11 fields. EquipmentID is an auto increment field. SerialNumber is the unique key. No two equipments can have similar serial number’s. SNComment and EquipmentIDComment are serial number comment and equipment type comment. UNDTagID can be empty, but two equipments should not have similar UNDTagID. BuildingID, NetworkID, EquipmentTypeID are foreign key’s to identify location, network type and equipment type respectively. RoomNo is the roomnumber in which the equipment is available. It should not be empty. Ipaddress and Comment can be empty.

Table 4: Structure of Equipment table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>EquipmentID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>SerialNumber</td>
<td>Varchar(50)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SNComment</td>
<td>Varchar(100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EquipIDComment</td>
<td>Varchar(100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNDTagID</td>
<td>Varchar(36)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BuildingID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td>Foreign key</td>
</tr>
<tr>
<td>NetworkID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td>Foreign key</td>
</tr>
<tr>
<td>EquipmentTypeID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td>Foreign key</td>
</tr>
<tr>
<td>RoomNo</td>
<td>Varchar(25)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IpAddress</td>
<td>Varchar(36)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comment</td>
<td>LONGTEXT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5 gives description about the table module. ModuleID is an auto increment field. EquipmentID is a foreign key which is related to equipment. ModuleNumber is the number of module of equipment. NumberofPorts refers to number of ports each module of equipment has.

Table 5: Structure of Module table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>ModuleID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>EquipmentID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td>Foreign key</td>
</tr>
<tr>
<td>ModuleNumber</td>
<td>Int(11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NumberofPorts</td>
<td>Int(11)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6 gives description about the table room. RoomID is an auto increment field. BuildingID is a foreign key which is related to table Building. RoomNo is the number of the room in which equipment is available. EquipmentID is the ID of the equipment. It is related to EquipmentID in the table Equipment.

Table 6: Structure of Room table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>RoomID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>BuildingID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td>Foreign key</td>
</tr>
<tr>
<td>RoomNo</td>
<td>Varchar(25)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EquipmentID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7 gives description about the table port. PortID is an auto increment field. PortNo is the number of port corresponding to each module. Data for Portspot is stored in the database in the form of ModuleNumber-PortNo. OutletID field consists of outlets in room. RoomNo is the number of the room to which equipment is connected through outlet. RoomID corresponds to RoomID in the table Room. ModuleNo corresponds to ModuleNo in the table Module.

Table 7: Structure of Port table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>PortID</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>PortNo</td>
<td>Int(11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portspot</td>
<td>Varchar(25)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OutletID</td>
<td>Varchar(36)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RoomNo</td>
<td>Varchar(25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PortCmt</td>
<td>Varchar(100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RoomID</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ModuleNo</td>
<td>Int(4)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 gives description about the table users. Userid is an auto increment field. Firstname, Lastname represents name of the user. User and password are the fields which are used for login.
Table 8: Structure of users table

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Null</th>
<th>Increment</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Userid</td>
<td>Int(4)</td>
<td>Not null</td>
<td>Auto</td>
<td>Primary key</td>
</tr>
<tr>
<td>Firstname</td>
<td>Varchar(50)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lastname</td>
<td>Varchar(50)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>user</td>
<td>Varchar(50)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>Varchar(16)</td>
<td>Not null</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER IV
IMPLEMENTATION

HTML, JAVA SCRIPT, AJAX, PHP and MYSQL are used for implementation. The implementation section is divided into two parts.

1. Client side modules
2. Server side modules

4.1 Client Side Modules

To implement client side modules HTML, JAVA SCRIPT AND AJAX are used. JAVA SCRIPT is used to validate data and AJAX is used to dynamically generate text boxes and results in the same page. The below JAVA SCRIPT sample code is used to validate drop down lists for building, network type and equipment type and text boxes for serial number and room number.

function validate_form(fill)
{
    if (document.forms.fill.locate.selectedIndex==0)
    {
        alert("Building name missing, fields with * are required");
        document.forms.fill.locate.focus();
        return false;
    }
    if (document.forms.fill.Equip_Typ.selectedIndex==0)
    {
        alert("Equipment Type missing, fields with * are required");
        document.forms.fill.Equip_Typ.focus();
        return false;
    }
    if (document.forms.fill.Net_Typ.selectedIndex==0)
    {
        alert("Network Type missing, fields with * are required");
        document.forms.fill.Net_Typ.focus();
        return false;
    }
if((document.forms.fill.Serial_Num.value==""))
{  
   alert("Serial Number should not be empty, fields with * are required");  
   document.forms.fill.Serial_Num.focus();  
   return false;  
}

if((document.forms.fill.Room_No.value==""))
{  
   alert("RoomNo should not be empty, fields with * are required");  
   document.forms.fill.Room_No.focus();  
   return false;
}

return true;

JAVA SCRIPT and AJAX plays an important role in generation dynamic information.

The below sample code is used to dynamically generate text boxes to add new building, network type and equipment type when clicked on the button.

function addnewbldg(array_var , sname , loc)
{
    var stemp = ";
    if(sname == "locate")
    {  stemp = "Enter the New Building Name";
    }

    if(sname == "Equip_Typ")
    {  stemp = "Enter the New Equipment Type Name";
    }

    if(sname == "Net_Typ")
    {  stemp = "Enter the New Network Type Name";
    }

    var newbldg = prompt(stemp);
    var temp="";

    if ( (newbldg == '') || (newbldg == ' ') || (newbldg == null) )
    {
    }
    else
    {
        var bcheck = "true";

        for (i = 0; i < array_var.length; i++)
        {
            if(newbldg.toUpperCase() ==
               array_var[i].toUpperCase())
            {
                bcheck = "false";
            }
        }
    }  
}
The below AJAX sample code is used for transferring data between a client script and server script. AJAX stands for Asynchronous JavaScript and XML.

**XMLHttpRequest object:** This object is used to send and receive HTTP requests and responses. The main advantage of XMLHttpRequest object is that it does not require the page to post<form> element.

```javascript
var http_request = false;
function makePOSTRequest(url, parameters) {
    http_request = false;
    if (window.XMLHttpRequest) { // Mozilla, Safari,...
        http_request = new XMLHttpRequest();
        if (http_request.overrideMimeType) {
            // set type accordingly to anticipated content type
            http_request.overrideMimeType('text/xml');
            http_request.overrideMimeType('text/html');
        }
    } else if (window.ActiveXObject) { // IE
        try {
            http_request = new ActiveXObject("Msxml2.XMLHTTP");
        } catch (e) {
            try {
                http_request = new ActiveXObject("Microsoft.XMLHTTP");
            } catch (e) {
            }
        }
    }
    if (!http_request) {
        alert('Cannot create XMLHTTP instance');
        return false;
    }
    http_request.onreadystatechange = alertContents;
    http_request.open('POST', url, true);
    http_request.setRequestHeader("Content-type", "application/x-www-form-urlencoded");
    http_request.send(parameters);
}
```
http_request.setRequestHeader("Content-length", parameters.length);
http_request.setRequestHeader("Connection", "close");
http_request.send(parameters);

function alertContents() {
    if (http_request.readyState == 4) {
        if (http_request.status == 200) {
            //alert(http_request.responseText);
            result = http_request.responseText;
            document.getElementById('playerinfo').innerHTML = result;
        } else {
            alert('There was a problem with the request.\');
        }
    }
}

The below sample JAVASCRIPT function code is used to print a document.

function Clickheretoprint() {
    var disp_setting="toolbar=yes,location=no,directories=yes,menubar=yes,"
    disp_setting+="scrollbars=yes,width=875, height=615, left=100, top=25";
    var content_vlue =
document.getElementById("print_content").innerHTML;

    var docprint=window.open("","",disp_setting);
    docprint.document.open();
    docprint.document.write('<html><head><title>Network Services</title>');
    docprint.document.write('</head><body onLoad="self.print()"></center>');
    docprint.document.write(content_vlue);
    docprint.document.write('</center></body></html>');
    docprint.document.close();
    docprint.focus();
}

4.2 Server Side Modules

Server side modules are implemented using PHP. PHP stands for Hypertext Preprocessor. PHP is a server side scripting language. The files for add menu, modify menu, search process and report are implemented using PHP. PHP can be used to make website secure. Sessions are used to make a webpage secure. If a illegal user tries to enter a web page, he will be directed to the login page using sessions.
The below sample PHP code makes a page secure.

```php
<?php
session_start();
if (!isset($_SESSION['authorized-networkuser']))
{
    header("Location:index.php",true);
}
else
{
    if ( $_SESSION['authorized-networkuser'] != "true")
    {
        header("Location:index.php", true);
        exit();
    }
}
?>
```

PHP allows database connection by using the following sample code.

```php
<?php
global $con;
$db_host="localhost";
$db_user="username";
$db_password="password";
$db_dbname="databasename";
$con=mysql_connect($db_host,$db_user,$db_password) or die("Connection to database failed: " .mysql_error());
mysql_select_db($db_dbname) or die("Could not select database $db_dbname");
?>
```

The different types of PHP files used in this project are as follows:

- **index.php**: This file is used for the login purpose.
- **validate.php**: This file is used to validate the user name and password.
- **submitpage.php**: This file is used to display index page.
- **Add.php**: This file is used to display links for add new equipment, add new network type, add new equipment type.
- **AddEquipinfo.php**: This file is used to add new equipment.
- **EquipAddSuccess**: This file is used to check whether equipment already exists, if not displays port information. If there is no module for equipment the adding process ends with this file.
- **EquipAddSucessProcess.php**: When equipment has modules associated with it, then adding process ends with this file.

- **Modify.php**: This file displays links to modify equipment, delete equipment, modify building, network type and equipment type.

- **ModifyEquipment.php**: This file displays the serial numbers in the form of a drop down list.

- **ModifyEquipmentinfor.php**: This file retrieves all information about chosen equipment and displays it making it ready to modify.

- **TransferMod.php**: This file displays the tag ID’S in the form of a drop down list.

- **ModifyEquipmentTagID.php**: This file retrieves all information about chosen equipment and displays it making it ready to modify.

- **ModifyEquipinfo.php**: This file retrieves all information about chosen equipment and displays it making it ready to modify.

- **AddModules.php**: This file handles adding and deleting modules.

- **AddPorts.php**: This file handles port information.

- **PortstoOutlet.php**: This file handles module and port update.

- **InsertPort.php**: This file handles module and port update.

- **DeleteEquipment.php**: This file displays drop down list of serial numbers to delete equipment.

- **DeleteBuildEquip.php**: This file displays drop down list of building names to delete equipment by building.
- **AddBuildinginfo.php**: This file displays drop down list of building names to delete buildings.

- **AddNetworkType.php**: This file displays drop down list of network type names to delete network type.

- **AddEquipmentType.php**: This file displays drop down list of equipment type names to delete equipment type.

- **Search.php**: This file displays buttons for search process.

- **SearchbySerial.php**: This file displays serial numbers in drop down list for the purpose of searching equipment by serial number.

- **SearchEquipment.php**: This file is used to display equipment information.

- **SearchbyUNDTagID.php**: This file displays tag ID’s in drop down list for the purpose of searching equipment by tag ID.

- **SearchbyLocation.php**: This file displays buildings in drop down list for the purpose of searching equipment by building.

- **SearchLocation.php**: This file is used to display equipment information.

- **SearchbyRoom.php**: This file displays buildings in drop down list for the purpose of finding rooms in a building to search equipment in a particular room.

- **SearchRoom.php**: This file displays building rooms in drop down list.

- **DisplaybyRoom.php**: This file is used to display equipment information.

- **SearchbyOutletID.php**: This file displays buildings in drop down list for the purpose of searching active outlet by room.

- **SearchOutletID.php**: This file displays active outlets in a room of a building.
- **Report.php**: This file displays links to generate reports regarding building, network type, equipment type, equipment by buildings, equipment by rooms of a building, network type sorted by UND tag ID, Equipment type, building and equipment type sorted by serial number, UND tag ID, building.

- **allequipmentinbldg.php**: This file displays equipment by building.

- **commroomlisting.php**: This file displays equipment by room of a building.

- **NetworkReport.php**: This file displays network report sorted by UND tag ID, Equipment type, and building.

- **EquipmentReport.php**: This file displays equipment type report sorted by serial number, UND tag ID, building.

- **myinfo.php**: This file displays user information.
CHAPTER V
SOFTWARE VERIFICATION AND VALIDATION

During and after implementation, it is very much necessary to ensure that the system being built meets specifications and delivers functionality expected by the end user who pays for software. Verification definition goes in this way: Are we building the right product? Validation definition goes in this way: Are we building the product right? Verification and validation are used to find any defects existent in the system. The following testing methods are used for this project.

1. Unit testing
2. Integration testing
3. Black box testing

5.1 Unit Testing

Unit testing is performed on pages individually, instead of testing them as a whole. This testing is done to encounter any errors associated with a particular page. Unit testing is done by software developer. Unit testing for a webpage is performed by testing links, buttons and drop down lists. Data validation is also performed for pages individually. All PHP files are tested for links, buttons and drop down lists. JAVA SCRIPT files are tested for each page to test whether page validation is working properly. Security issues are also tested for each page which is implemented using sessions. Overall, all PHP files are tested individually to check whether web pages conform to specifications.
5.2 Integration Testing

The process of integration arises building a system from its components and testing the system for errors that arise as a result of component interactions. In this project the integration testing is done which starts at index page, index.php. When the username and password are entered, submitpage.php shall be invoked. In submitpage.php there are links for “Add Menu”, “Modify Menu”, “Search Menu”, “Report Section”, “My Info” and “Logout”. When “Add Menu” is clicked, section for adding equipments, adding buildings, adding equipment type and adding network type shall be invoked. When “Modify Menu” is clicked, section for modifying and deleting building names, equipment names, network names, equipments shall be invoked. When “Search Menu” is clicked, section for searching equipment by serial numbers, tag ID’s, building, building room and active outlets in a room of building shall be invoked. When “Report Section” is clicked, section for viewing reports regarding building, equipment type, network type, sorted equipment type report, sorted network report and equipment in building shall be invoked. In each page the buttons to go to previous page, main menu are tested. Many errors are fixed which are encountered during integration testing.

5.3 Black Box Testing

Black box testing is the process where a system is considered as a function where set of inputs match set of outputs. A series of black box tests are performed for the following which are stated below.

1. Add Menu.
2. Modify Menu.
4. Report Section.

5. My Info.

5.3.1 Black box testing for Add Menu

1. Click “Add Menu”.

2. Click “Add New Equipment”.

3. Enter equipment information.

4. Check the database to see whether the information is successfully inserted.

5. Enter equipment information with same serial number as the previous one to make sure that same equipment is not inserted twice.

6. Click “Previous Page”.

7. Click “Add New Building”.

8. Enter building name.

9. Check the database to see whether the building information is successfully inserted.

10. Enter same building name as the previous one to make sure that building is not inserted twice.

11. Click “Add New Equipment Type”.

12. Enter equipment type name.

13. Check the database to see whether the equipment type information is successfully inserted.

14. Enter same equipment type name as the previous one to make sure that same equipment type is not inserted twice.

15. Click “Add New Network Type”.

51
16. Enter network type name.

17. Check the data base to see whether the network type information is successfully inserted.

18. Enter same network type name as the previous one to make sure that same network type is not inserted twice.

**5.3.2 Black box testing for Modify Menu**

1. Click “Edit Building Name”.

2. Select a building name from drop down list and enter a new name to modify.

3. Check the database whether changes are made.

4. Select a building name and enter other existing building name to check the changes are not made.

5. Click “Edit Equipment Type Names”.

6. Select an equipment type name from drop down list and enter a new name to modify.

7. Check the database whether changes are made.

8. Select an equipment type name and enter other existing equipment type name to check the changes are not made.

9. Click “Edit Network Type Names”.

10. Select a network type name from drop down list and enter a new name to modify.

11. Check the database whether changes are made.

12. Select a network type name and enter other existing network type name to check the changes are not made.

13. Click “Delete Building Name”.
14. Check to see building is not deleted if equipment is associated with it, else it should be deleted.

15. Click “Delete Equipment Type Names”.

16. Check to see equipment type is not deleted if equipment is associated with it, else it should be deleted.

17. Click “Delete Network Type Names”.

18. Check to see network type is not deleted if equipment is associated with it, else it should be deleted.

19. Click “Modify by Serial Number”.

20. Select a serial number from drop down list and click submit.

21. Click “Add/Delete Modules” and check modify equipment section by adding more module and deducting modules.

22. Click Transfer Modules and enter number of modules to be transferred.

23. enter module numbers and select a serial number from drop down list and check whether the transfer is successful after clicking submit.

24. Click “Rearrange Modules” and enter rearranged module numbers.

25. Check to see whether the rearrangement is successful.

26. Go to modify section and perform the same thing for UND tag ID as we did for serial number.

27. Go to modify section and click “Delete Equipment by Serial Number”.

28. Select a serial number from the drop down list and click delete.

29. Check the database to see whether the equipment information is deleted successfully.
30. Go to modify section and click “Delete All Equipment in a Building”.

31. Select a building from drop down list and click delete.

32. Check the database to see whether the equipment related to building is deleted successfully.

5.3.3 Black box testing for Search menu

1. Click “Search by Serial Number”.

2. Select a serial number from drop down list and click submit.

3. Check the results from the database whether the output is matching equipment information in database.

4. Click “Search by UNDTagID”.

5. Select a tag ID from drop down list and click submit.

6. Check the results from the database whether the output is matching equipment information in database.

7. Click “Location”.

8. Select a building from drop down list and click submit.

9. Check the results from the database whether the output is matching equipment information in database.

10. Click “Search by Building Room”.

11. Select a building from drop down list and click submit.

12. Select a room from drop down list and click submit.

13. Check the results from the database whether the output is matching equipment information in database.

14. Click “Search Active outlet”.

54
15. Select a building from drop down, enter a room number and click submit.

16. Check the results from the database whether the output is matching outlet information in database.

5.3.4 Black box testing for Report Section

1. Click “List all Current Building”.

2. Check database whether all buildings are displayed correctly.

3. Click “List all Current Equipment types”.

4. Check database whether all equipment type is displayed correctly.

5. Click “List all Network Type”.

6. Check database whether all network type is displayed correctly.

7. Click “All Equipment in a Building”.

8. Select a building from drop down list and click submit.

9. Check the results from the database whether the output is matching equipment information in database.

10. Click “Equipment listing - by Building/Room”.

11. Select a building from drop down list and click submit.

12. Select a room from drop down list and click submit.

13. Check the results from the database whether the output is matching equipment information in database.

14. Click “Equipment Type “.

15. Select equipment type from drop down list and select a sort type.

16. Check the results with the database.

17. Click “Network Type”.
18. Select network type from drop down list and select a sort type.

19. Check the results with the database.

5.3.5 Black box testing for My Info

1. Click on the “My Info” link and check whether your name and email is correct.

2. Change password and personal information.

3. Check whether information update is successful.
CHAPTER VI

CONCLUSION

This project meets all requirements and specifications stated by ITSS department. This project also follows all steps in the software engineering process. Overall this project is an online system which helps the ITSS department deal with equipment storage, equipment update, transfer of equipment modules and the rearrangement of equipment modules.

6.1 Future Consideration

1. The deletion part for equipment, building, equipment type and network type are implemented in such a way that they become permanently deleted. In the future, a flag (active/inactive) field may be added to the database for table’s equipment, building, network type and equipment type. The purpose of doing this is to recover any equipment, building, equipment type and network type which may be deleted by mistake. When ever equipment, building, network type and equipment type are deleted, the flag is set to inactive mode. The initial mode will be active mode.

2. The data transformation from one data base to the other database is then done successfully, but in the future, data has to be corrected because there is lot of incorrect data in the database. The outlet, room number and equipment information is incorrect.
REFERENCES


[2] PHP

http://www.php.net/

Retrieved on December 1, 2006

[3] AJAX

http://www.devx.com/webdev/Article/33024/

Retrieved on December 2, 2006

[4] IBM Rational Software Modeler


Retrieved on December 9, 2006


http://www.uml.org

Retrieved on December 15, 2006


Retrieved on January 3, 2007

[7] Entity Relationship Diagram

http://www.utexas.edu/its/windows/database/datamodeling

Retrieved on January 15, 2007
[8] ITSS Department, University of North Dakota

http://www.und.edu/dept/itss/

Retrieved on January 17, 2007
APENDIX I

USER MANUAL

This system is an online system to deal with equipment in each room, modules associated with each equipment, port associated with each module of an equipment and active outlets in each room of building. The first interface will be a login form which is only restricted to ITSS users.

Figure 34: Interface of user login.

The second interface will be main menu to add, modify, search and report.
Add Menu functionality

1. Click “Add Menu”.
2. To add equipment click “Add New Equipment”.
3. Enter equipment information and click “Error Check”.
4. Check if there is any error and click “Submit”.
5. Enter port information if there are any modules for equipment and click “Submit”.
6. To add new building click “Add New Building”.
7. Enter building name in the text box and click “Submit”.
8. To add new network type click “Add New Network Type”.
9. Enter network name in the text box and click “Submit”.
10. To add new equipment type click “Add New Equipment Type”.
11. Enter equipment type name in the text box and click “Submit”.

Modify Menu functionality

1. To modify building name click “Edit Building Name”.
2. Select a building name from drop down list and enter new name in the text box and click “Submit”.
3. To modify network type name click “Edit Network Type Names”.

Figure 35: Interface of main menu.
4. Select a network type name from drop down list and enter new name in the text box and click “Submit”.

5. To modify equipment type name click “Edit Equipment Type Names”.

6. Select an equipment type name from drop down list and enter new name in the text box and click “Submit”.

7. To delete a building click “Delete Building Name” and select a building name from drop down list and click “Delete”.

8. To delete a network type click “Delete Network Type Names” and select a network name from drop down list and click “Delete”.

9. To delete an equipment type click “Delete Equipment Type Names” and select a equipment type name from drop down list and click “Delete”.

10. To modify an equipment click “Modify by Serial Number”.

11. Select a serial number from drop down list and click “Submit”.

12. Change the data and click “Modify”.

13. To add or delete modules click “Add/Delete Modules” and add or reduce module number depending on requirement and click “Submit”.

14. Enter port information if modules are added or enter module numbers if modules are deducted and click “Submit”.

15. Click “Ok”.

16. To rearrange modules click “Rearrange Modules” enter module number positions to rearrange.

17. To transfer modules click “Transfer Modules”.

18. Enter number of modules to transfer in the text box and click “Submit”.

62
19. Enter the module numbers and select serial number from drop down list and click “Submit”.

20. Enter corresponding module numbers to be transferred and click “Submit”.

21. Click “Ok”.

22. To delete equipment by serial number click “Delete Equipment by Serial Number”.

23. Select a serial number from drop down list and click “Delete”.

24. To delete all equipment in a building click “Delete All Equipment in a Building”.

25. Select a building name from drop down list and click “Delete”.

**Search Menu functionality**

1. Click “Search Menu”.

2. To search equipment by serial number click “Search by Serial Number”.

3. Select serial number from drop down list and click “Submit”.

4. To search equipment by UND Tag ID click “Search by UNDTagID”.

5. Select UND Tag ID from drop down list and click “Submit”.

6. To search equipment by location click “Location”.

7. Select a location from drop down list and click “Submit”.

8. To search equipment by room of a building click “Search by Building Room”.

9. Select a location from drop down list and click “Submit”.

10. Select a room from drop down list and click “Submit”.

11. To search active outlets click “Search Active outlet”.

12. Select a location from drop down list and enter room number in the text box and click “Submit”.

63
Report Section functionality

1. Click “Report Section”.
2. To view all building click “List all Current Building”.
3. To view all equipment types click “List all Current Equipment Types”.
4. To view all network types click “List all Current Network Types”.
5. To view all equipment in a building click “All Equipment in a Building”.
6. Select a building from drop down list.
7. To view all equipment in a room of a building click “Equipment listing – by Building/Room”.
8. Select a building from drop down list and select a room from drop down list.
9. To view network report click “Network Report”.
10. Select a network type from drop down list and select “Equipment Type” or “Building” or “UNDTag”.
11. To view equipment type report click “Equipment Report”.
12. Select an equipment type from drop down list and select “Serial Number” or “Building” or “UNDTag”.

My Info functionality

1. Click “My Info”.
2. To change password click “Change Password”.
3. Enter new password, confirm password and click “Submit”.
4. To edit information click “Edit Personal Information”.
5. Enter first name, last name, email address and click “Submit”.

64
APENDIX II

Please contact Todd Barrett (tmbarrett@gra.midco.net) at Information Technology Systems and Services department (ITSS), UND for source code.