Version History

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Version | Description | Authors |
| Dec. 10, 2008 | 1.0 | Test Plan | Erik Gerber  James T. Perry  Mousa Al-Hulaimi |

**Table of Contents**

1 Test Guidelines……………………………………………………………….3

1.1 Component Module Level………………………………………….3

1.2 Integration Level……………………………………………………3

1.3 Validation Level……………………………………………………3

1.4 System Level……………………………………………………….3

2 Integration Strategy…………………………………………………………..3

3 Overall Performance Testing…………………………………………………3

4 Document Overview………………………………………………………….4

4.1 Purpose…………………………………………………………..…4

4.2 Requirements Validated…………………………………………….5

5 Requirements Validation……………………………………………………..5

5.1 Validation Tables…………………………………………………..5

5.2 Testing Methods…………………………………………………...7

6 State Transition Diagram Validation……………………………………….11

6.1 STD Validation: Search Equipment Scenario……………………11

6.2 STD Validation: Search Parts Scenario…………………………..11

6.3 STD Validation: Search Software Scenario………………………12

6.4 STD Validation: Search Networks Scenario……………………..12

6.5 STD Validation: Search Maintenance Scenario………………….13

6.6 STD Validation: Search Users Scenario………………………….14

6.7 STD Validation: Login Scenario…………………………………14

6.8 STD Validation: Log off Scenario………………………………..15

6.9 STD Validation: Backup Scenario………………………………..15

7 Data Flow Diagram Validation……………………………………………..15

7.1 DFD Validation: Login Operation…………………………..……15

7.2 DFD Validation: Search Equipment Operation……………..……15

7.3 DFD Validation: Search Parts Operation…………………………16

7.4 DFD Validation: Search Software Operation……………………..16

7.5 DFD Validation: Search Networks Operation……………………17

7.6 DFD Validation: Search Users Operation………………………..17

7.7 DFD Validation: Search Maintenance Operation………………...18

**Table of Figures**

Table 2.1 Validation Table for SRS01………………………………………..5

Table 2.2 Validation Table for SRS02…………………………………….….5

Table 2.3 Validation Table for SRS03………………………………….…….6

Table 2.4 Validation Table for SRS04…………………………………….….6

Table 2.5 Validation Table for SRS05………………………………….…….6

Table 2.6 Validation Table for SRS06……………………………………..…6

Table 2.7 Validation Table for SRS07……………………………………..…6

Table 2.8 Validation Table for SRS08………………………………………..7

Table 2.9 Validation Table for SRS09…………………………………….….7

Table 2.10 Validation Table for SRS10……………………………………....7

1. **Test Guidelines**

The EMU System shall be tested at four levels, as indicated, in order to minimize the number of errors, and to meet our customer needs.

**1.1 Component Module Level**

Once the interfaces for the major system component modules have been specified, the programmer takes responsibility for the design, development, and testing of each module.

**1.2 Integration Level**

The testing of components at an integration level will test each integrated module with the help of the development team, according to the EMU System Requirements Specification.

**1.3 Validation Level**

Testing at the validation level will be accomplished using the System Requirements Specification, ensuring all functional behavior and performance meets requirements.

**1.4 System Level**

Testing of the EMU system at the system level will ensure that the EMU system performs adequately according to eh System Requirements Specification.

1. **Integration Strategy**

The strategy for integration testing will involve a top-down and bottom-up approach for integrating interface modules.

On the top-down approach, the Login Screen will integrate with the Welcome Screen so that once the user logs on, the Welcome Screen will them be shown. Then, the Equipment, Parts, Network, Software, Maintenance, Users, Registration, and Backup Screens will be integrated with the Welcome Screen so that the window will change to one of the eight screens when a button is pressed on the Welcome Screen.

After the top-down approach has been integrated and performs correctly, each of the eight interface screens will then be integrated separately to the Welcome Screen using an iterative approach. Each interface will be integrated so that each interface screen will return to the Welcome Screen when the user clicks the “Main Menu” button.

After the eight interface screens have been integrated, the Welcome Screen will be integrated to the Login Screen so that the user can log off the system.

1. **Overall Performance Testing**

Once we have a completed EMU system, we need to test the overall performance of it. All team members will log in to the system using different accounts to simulate an actual working environment. Team members shall test functions designated for different levels of users: administrators, students, and faculty/staff, and the integrity of the data stored in the databases.

All bugs and defects in the system will be fixed immediately.

**4. Document Overview**

**4.1 Purpose**

    The purpose of the requirements validation document is to validate the results of the EMU system's requirements specification our team and validated and tested each requirement. The following checklist questions are used to validate each requirement of the EMU system.

|  |  |
| --- | --- |
| **Checklist Questions** | **Quality Attribute** |
| Is each requirement uniquely identified? | Traceability and Standard conformance |
| Are specialized terms defined in the glossary? | Understandability |
| Does a requirement stand by itself or would it be expected to examine other requirements to comprehend what the specified requirement meant? | Understandability and Completeness |
| Does any requirement use the similar terms in a different way? | Ambiguity |
| If similar services are requested by different requirements? If any possible contradictions due to slight variation is identified? | Consistency and Redundancy |
| If any requirement refers to other services provided by other requirements, has it been identified and documented? | Completeness and understandability |
| If related requirements are grouped together? If not, do they refer each other? | Traceability, organization, and cohesiveness |
| Are all security and safety considerations properly specified? | Completeness and consistency |
| Do the requirements provide an adequate basis for design? | Organization and completeness |
| Are al requirements written at a consistent and appropriate level of detail? | Organization and completeness |
| Can all of the requirements be implemented within known constraints? | Correctness |
| Is each requirement verifiable by testing, demonstration, review, or analysis? | Correctness |

**4.2 Requirements Validated**

These validated requirements provide the functional services offered by the EMU system, which helps validate all services provided by the EMU system. This would be the main subsystem of the EMU system known as the activation and operation monitor. The following table lists all the requirements validated in this document.

|  |  |
| --- | --- |
| Requirement | SRS ID |
| Software shall validate user login | SRS01 |
| Software shall access information on equipment items | SRS02 |
| Software shall access information on parts. | SRS03 |
| Software shall access information on networks. | SRS04 |
| Software shall access information on software. | SRS05 |
| Software shall access information on maintenance records. | SRS06 |
| Software shall access information on users. | SRS07 |
| Memory of backup should be able to take all information. | SRS08 |
| Software should enable printer functions | SRS09 |
| Software should enable digital signature pad. | SRS10 |

**5. Requirements Validation**

**5.1 Validation Table**

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Correctness | Validation of username and password | Specify methods for correct login |

Table 2.1 Validation Table for SRS01

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Ambiguity | Can any user alter equipment data? | Clearly state possibilities and restrictions |
| Correctness | Are all necessary data entries being shown? | Specify which entries are to be shown. |

Table 2.2 Validation Table for SRS02

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Ambiguity | Can any user alter parts data? | Clearly state possibilities and restrictions |
| Correctness | Are all necessary data entries being shown? | Specify which entries are to be shown. |

Table 2.3 Validation Table for SRS03 

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Ambiguity | Can any user alter network data? | Clearly state possibilities and restrictions |
| Correctness | Are all necessary data entries being shown? | Specify which entries are to be shown. |

Table 2.4 Validation Table for SRS04

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Ambiguity | Can any user alter software data? | Clearly state possibilities and restrictions |
| Correctness | Are all necessary data entries being shown? | Specify which entries are to be shown. |

Table 2.5 Validation Table for SRS05

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Ambiguity | Can any user alter maintenance record data? | Clearly state possibilities and restrictions |
| Correctness | Are all necessary data entries being shown? | Specify which entries are to be shown. |

Table 2.6 Validation Table for SRS06

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Ambiguity | Can any user alter user data? | Clearly state possibilities and restrictions |
| Correctness | Are all necessary data entries being shown? | Specify which entries are to be shown. |

Table 2.7 Validation Table for SRS07

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Correctness | Are the data entries saved correctly? | Specify how to save information. |

Table 2.8 Validation Table for SRS08

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Correctness | Is the printer doing its task correctly? | Clearly state printer functions. |
| Organization | Are all information printed in an organized way? | Specify formats for papers. |

Table 2.9 Validation Table for SRS09

|  |  |  |
| --- | --- | --- |
| Problem Types | Identified Problem | Recommendation |
| Correctness | Is the digital signature pad doing its task correctly? | Clearly state pad functions. |
| Correctness | Is the signature of an individual correct? | Specify guidelines for accepting signatures. |

Table 2.10 Validation Table for SRS10

**5.2 Testing Methods**

The following states the specific testing methods used for our requirement subset.

**Requirement tested:** Log on Button

**Related Requirements:** SRS01

**Test applied:** In the prototype, a “Log on” button is confirmed to exist.

The username and password is assumed to be filled in for the user to log into the system. The “Log on” button is pressed, and the username and password is then tested for validation, and lets the user enter the system if the username and password are correct.

**Requirement problems:** What if the username and password are incorrect?

**Recommendations:** Display an alert about error.

**Requirement tested:** Find Button

**Related Requirements:** SRS02, SRS03, SRS04, SRS05, SRS06, SRS07

**Test applied:** In the prototype, a “Find” button is confirmed to exist.

The user enters an identification number for the equipment item, part, software, network, maintenance record, or user. The “Find” button is pressed, and all information about the equipment item, part, software, network, maintenance record, or user under the specified number is shown.

**Requirement problems:** What if the user enters either an invalid number?

**Recommendations:** If the invalid number is negative, there should be an alert telling the user not to enter a negative number. If it is a positive number outside the boundary, there should be an alert specifying the error.

**Requirement tested:** Main Menu Button

**Related Requirements:** SRS02, SRS03, SRS04, SRS05, SRS06, SRS07

**Test applied:** In the prototype, a “Main Menu” button is confirmed to exist.

The “Main Menu” button is pressed on any screen that is not the Login Screen or the Main Menu itself. Once the button is pressed, the user will be sent to the Main Menu.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory

**Requirement tested:** Log off Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Log off” button is confirmed to exist.

The “Log off” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Login Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Search Equipment Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Search Equipment” button is confirmed to exist.

The “Search Equipment” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Equipment Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Search Parts Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Search Parts” button is confirmed to exist.

The “Search Parts” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Parts Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Search Software Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Search Software” button is confirmed to exist.

The “Search Software” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Software Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Search Networks Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Search Networks” button is confirmed to exist.

The “Search Software” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Software Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Search Users Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Search Users” button is confirmed to exist.

The “Search Users” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Users Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Search Maintenance Button

**Related Requirements:** None

**Test applied:** In the prototype, a “Search Maintenance” button is confirmed to exist.

The “Search Maintenance” button can only be pressed on Main Menu screen. Once the button is pressed, the user will be sent to the Maintenance Screen.

**Requirement problems:** None

**Recommendations:** Current requirement is satisfactory.

**Requirement tested:** Back up System Button

**Related Requirements:** SRS08

**Test applied:** In the prototype, a “Back up System” button is confirmed to exist.

The “Back up System” button can only be pressed on Main Menu screen. Once the button is pressed, database information is then saved.

**Requirement problems:** Which databases are to be backed up?

**Recommendations:** Specify that all databases of the system are backed up.

**6. State Transition Diagram Validation**

**6.1 STD Validation: Search Equipment Scenario**

**User Action:** Find

Data Stored: None

Previous state: none

Next state: Information on equipment items shown

Transition operation: Finds information and shows on screen.

**User Action:** Enter new equipment

Data Stored: New equipment information

Previous state: none

Next state: none

Transition operation: Stores information on database.

**User Action:** Go to main menu

Data Stored: None

Previous state: Equipment Screen

Next state: Main Menu

Transition operation: Checks to see if main menu is accessible and displays it.

**6.2 STD Validation: Search Parts Scenario**

**User Action:** Find

Data Stored: None

Previous state: none

Next state: Information on part items shown

Transition operation: Finds information and shows on screen.

**User Action:** Enter new parts

Data Stored: New part information

Previous state: none

Next state: none

Transition operation: Stores information on database.

**User Action:** Go to main menu

Data Stored: None

Previous state: Parts Screen

Next state: Main Menu

Transition operation: Checks to see if main menu is accessible and displays it.

**6.3 STD Validation: Search Software Scenario**

**User Action:** Find

Data Stored: None

Previous state: none

Next state: Information on software items shown

Transition operation: Finds information and shows on screen.

**User Action:** Enter new software

Data Stored: New software information

Previous state: none

Next state: none

Transition operation: Stores information on database.

**User Action:** Go to main menu

Data Stored: None

Previous state: Software Screen

Next state: Main Menu

Transition operation: Checks to see if main menu is accessible and displays it.

**6.4 STD Validation: Search Networks Scenario**

**User Action:** Find

Data Stored: None

Previous state: none

Next state: Information on networks shown

Transition operation: Finds information and shows on screen.

**User Action:** Enter new networks

Data Stored: New network information

Previous state: none

Next state: none

Transition operation: Stores information on database.

**User Action:** Go to main menu

Data Stored: None

Previous state: Network Screen

Next state: Main Menu

Transition operation: Checks to see if main menu is accessible and displays it.

**6.5 STD Validation: Search Maintenance Scenario**

**User Action:** Find

Data Stored: None

Previous state: none

Next state: Information on maintenance record items shown

Transition operation: Finds information and shows on screen.

**User Action:** Enter new maintenance records

Data Stored: New maintenance record information

Previous state: none

Next state: none

Transition operation: Stores information on database.

**User Action:** Go to main menu

Data Stored: None

Previous state: Maintenance Screen

Next state: Main Menu

Transition operation: Checks to see if main menu is accessible and displays it.

**6.6 STD Validation: Search Users Scenario**

**User Action:** Find

Data Stored: None

Previous state: none

Next state: Information on users shown

Transition operation: Finds information and shows on screen.

**User Action:** Enter new users

Data Stored: New user information

Previous state: none

Next state: none

Transition operation: Stores information on database.

**User Action:** Go to main menu

Data Stored: None

Previous state: User Screen

Next state: Main Menu

Transition operation: Checks to see if main menu is accessible and displays it.

**6.7 STD Validation: Login Scenario**

**User Action:** Login

Data Stored: None

Previous state: Login Screen

Next state: Main Menu

Transition operation: Validates username and password and displays Main Menu if correct.

**6.8 STD Validation: Log off Scenario**

**User Action:** Log off

Data Stored: None

Previous state: Main Menu

Next state: Login Screen

Transition operation: Checks to see if Login Screen is accessible and displays it.

**6.9 STD Validation: Backup Scenario**

**User Action:** Backup system

Data Stored: Data from all databases

Previous state: Main Menu

Next state: Main Menu

Transition operation: Saves all database information and returns to the Main Menu.

**7. Data Flow Diagram Validation**

**7.1 DFD Validation: Login Operation**

|  |  |
| --- | --- |
| User action: logging in |  |
| Inputs and Sources | User inputs username and password |
| Transformation Function | Compares username and password to valid users. |
| Transformation Outputs | Display Main Menu |
| Control Information | Control of buttons accessible to user, depending on user’s status. |

**7.2 DFD Validation: Search Equipment Operation**

|  |  |
| --- | --- |
| User action: searching equipment |  |
| Inputs and Sources | User inputs equipment ID number |
| Transformation Function | Compares ID to all valid equipment items. |
| Transformation Outputs | Display information relating to ID |
| Control Information | None |

|  |  |
| --- | --- |
| User action: entering new equipment items |  |
| Inputs and Sources | User enters new equipment information. |
| Transformation Function | System provides functions to add new information. |
| Transformation Outputs | Return to Equipment Screen |
| Control Information | Operation not accessible if current user is a student. |

|  |  |
| --- | --- |
| User action: returning to Main Menu |  |
| Inputs and Sources | User presses button to return to the Main Menu |
| Transformation Function | System provides function to exit Equipment Screen and displays Main Menu |
| Transformation Outputs | Display the Main Menu |
| Control Information | None |

**7.3 DFD Validation: Search Parts Operation**

|  |  |
| --- | --- |
| User action: searching parts |  |
| Inputs and Sources | User inputs part ID number |
| Transformation Function | Compares ID to all valid part items. |
| Transformation Outputs | Display information relating to ID |
| Control Information | None |

|  |  |
| --- | --- |
| User action: entering new part items |  |
| Inputs and Sources | User enters new part information. |
| Transformation Function | System provides functions to add new information. |
| Transformation Outputs | Return to Parts Screen |
| Control Information | Operation not accessible if current user is a student. |

|  |  |
| --- | --- |
| User action: returning to Main Menu |  |
| Inputs and Sources | User presses button to return to the Main Menu |
| Transformation Function | System provides function to exit Parts Screen and displays Main Menu |
| Transformation Outputs | Display the Main Menu |
| Control Information | None |

**7.4 DFD Validation: Search Software Operation**

|  |  |
| --- | --- |
| User action: searching software |  |
| Inputs and Sources | User inputs software ID number |
| Transformation Function | Compares ID to all valid software items. |
| Transformation Outputs | Display information relating to ID |
| Control Information | None |

|  |  |
| --- | --- |
| User action: entering new software |  |
| Inputs and Sources | User enters new software information. |
| Transformation Function | System provides functions to add new information. |
| Transformation Outputs | Return to Software Screen |
| Control Information | Operation not accessible if current user is a student. |

|  |  |
| --- | --- |
| User action: returning to Main Menu |  |
| Inputs and Sources | User presses button to return to the Main Menu |
| Transformation Function | System provides function to exit Software Screen and displays Main Menu |
| Transformation Outputs | Display the Main Menu |
| Control Information | None |

**7.5 DFD Validation: Search Networks Operation**

|  |  |
| --- | --- |
| User action: searching networks |  |
| Inputs and Sources | User inputs network ID number |
| Transformation Function | Compares ID to all valid networks. |
| Transformation Outputs | Display information relating to ID |
| Control Information | None |

|  |  |
| --- | --- |
| User action: entering new networks |  |
| Inputs and Sources | User enters new network information. |
| Transformation Function | System provides functions to add new information. |
| Transformation Outputs | Return to Networks Screen |
| Control Information | Operation not accessible if current user is a student. |

|  |  |
| --- | --- |
| User action: returning to Main Menu |  |
| Inputs and Sources | User presses button to return to the Main Menu |
| Transformation Function | System provides function to exit Network Screen and displays Main Menu |
| Transformation Outputs | Display the Main Menu |
| Control Information | None |

**7.6 DFD Validation: Search Users Operation**

|  |  |
| --- | --- |
| User action: searching users |  |
| Inputs and Sources | User inputs a user ID number |
| Transformation Function | Compares ID to all valid users in the system. |
| Transformation Outputs | Display information relating to ID |
| Control Information | Operation not valid if the current user is a student. |

|  |  |
| --- | --- |
| User action: entering new users |  |
| Inputs and Sources | User enters new user information. |
| Transformation Function | System provides functions to add new information. |
| Transformation Outputs | Return to Users Screen |
| Control Information | Operation not accessible if current user is a faculty or student. |

|  |  |
| --- | --- |
| User action: returning to Main Menu |  |
| Inputs and Sources | User presses button to return to the Main Menu |
| Transformation Function | System provides function to exit Users Screen and displays Main Menu |
| Transformation Outputs | Display the Main Menu |
| Control Information | Operation not accessible if current user is a student. |

**7.7 DFD Validation: Search Maintenance Operation**

|  |  |
| --- | --- |
| User action: searching maintenance records |  |
| Inputs and Sources | User inputs maintenance ID number |
| Transformation Function | Compares ID to all valid maintenance items. |
| Transformation Outputs | Display information relating to ID |
| Control Information | Operation not accessible if current user is a faculty or student. |

|  |  |
| --- | --- |
| User action: entering new maintenance records |  |
| Inputs and Sources | User enters new maintenance information. |
| Transformation Function | System provides functions to add new information. |
| Transformation Outputs | Return to Maintenance Screen |
| Control Information | Operation not accessible if current user is a faculty or student. |

|  |  |
| --- | --- |
| User action: returning to Main Menu |  |
| Inputs and Sources | User presses button to return to the Main Menu |
| Transformation Function | System provides function to exit Maintenance Screen and displays Main Menu |
| Transformation Outputs | Display the Main Menu |
| Control Information | Operation not accessible if current user is a faculty or student. |