Software Requirements Specification

for

Embedded Devices Management

Version v4.28 approved

Prepared by:

Group 5

09/01/2017

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Information Document and Author

Group 5:

Project's Name on RRC Package: quanlynhung_nhom5

Github soure code link: https://github.com/ngthuc/ptycpm_htql_thietbinhung

Website link: https://demo.ngthuc.com/project/ptycpm/login

Default Account: 2709 Pass : 123123

Additional documentation:
https://drive.google.com/drive/folders/0BwvTggymLfLOampveGZPOVUyU2M

List of Members:

Serial	Full name	Student code
1	Nguyen Quoc Khanh	B1400696
2	Duong Van Lang	B1400700
3	Le Minh Luan	B1400704
4	Nguyen Thien Minh	B1400706
5	Doan Minh Nhut	B1400713
6	Huynh Hoang Tho	B1400729
7	Le Nguyen Thuc	B1400731
8	Huynh Bao Toan	B1400734
9	Trac Man Tiep	B1400797

Tracking of Document Version

Name	Date	Change Reason	Version
Software Requirements 1501	15/01/2017	First Document	1.15
Software Requirements 2002	20/02/2017	Update Function & Description First	2.20
Software Requirements 1604	16/04/2017	Update Function & Description Second	4.16
Software Requirements 2804	28/04/2017	Update Function & Description the Last Time, Project Accomplish	4.28

1. Introduction

1.1 Purpose

Successfully built the payment system for embedded devices worked on Web-based. The new system responsed demand:

- Manage for the payment for embedded devices, members, projects, labs, information partners provice used devices work on resreach, study have used embedded devices. Make sure to provide functionality same as the previous crafting management process.
- Contribute to increased convenience, cost savings with the help of technology, overcoming disadvantages of the old process, ensure strict management through decentralization of membership.
- Ensure information consistency, storage work and query by storing it on a database

1.2 Document Conventions

Document Structure: Titles are marked according to numbered list(example, 1, 2, d3, v.v ...), smaller titles are marked according to numbered subsections(example: 1.1, 1.2, 1.3, v.v ...).)

Document Convention:

- Font: Time New Roman.
- Font size: 13 .(except content and data table in Appendix B).
- Font color text: Black.
- Font color title: Blue.
- Margin-left: 3.5 cm.
- Margin-right: 2 cm.
- Margin-top: 3 cm.
- Margin-bottom: 3 cm.
- Line spacing: 1.2 pt.
- The title is bold and larger than the content 2pt. Each title will increase 2pt if the title is larger than the previous title.

- Color Text: Black (Topic and someone Table on Appendix B: Blue or Orgrane).

1.3 Intended Audience and Reading Suggestions

Read Object included: Members, group belong to Software Developer manage embedded devices

Document included

- Introduce included: Purpose, The intended audience and suggested reading, Product range, referance documents.
- Overall description included: viewpoint product; product function; user layer & feature, Operating environment;product function; User Guide; assumption & dependent
- Requires an external interface included: user interface;hardware interface software interface,communication interface

System punction.

- Other non-functional requirements include: performance,safety; security requirements; Software Quality Attributes; Business rules
- Other requirements.
- Appendix A: Glossary.
- Appendix B: Analytical Models.
- To Be Determined List.

1.4 Product Scope

- Product area:

  - Application of information technology in management.
  - Strict application of products in the field of information technology.
- Time work : 4 moth (After begin day project: 09/01).
- The scope: Deployed on company, organi in the whole territory of Vietnam is want Embedded Devices Management a online with network Internet.
- Object serving of this software:Manager embedded device, all member want to borrow device .
- Object using document: Group building and pronounciation software K40, Analysis document for Embedded Devices Management CT241, person is manager and testing this software (Teacher).
- Basic Content: Analysis apply for archivers - Analysis apply for management.

1.5 Terms and Abbreviate

Serial	Terms/abbreviate	Define/ Explain
1	IDE	Integrated Development Environment
2	JS	JavaScript
3	Manager	Orther speaking of Embedded Devices System Manager.
4	System manager	
5	Embedded Devices Manager	
6	Basic User	Accounts decentralization default
7	IT	Information Technology
8	Basic	All account isn't manager account.

1.6 References

[1] Requirement analysis in software engineering – Can Tho University.
[2] Software requirements specification by https://hienngong.files.wordpress.com/2012/09/mau-bm-qtpm-cnpm-dac-ta-yeu-cau-phan-memsrs-v2-0.doc
[3] IEEE Recommended Practice for Software Requirements Specifications – Michigan State University
[4] Software Requirements Specification Amazing Lunch Indicator - http://www.cse.chalmers.se/~feldt/courses/reqeng/examples/srs_example_2010_group2.pdf.
[5] Software Requirements Specification for nTravel https://cs.gmu.edu/~dfleck/classes/cs421/spring08/SampleProject/FINAL%20SRS.pdf
[6] Software requirements specification guide: https://www.wattpad.com/4972601-3-1-phân-tích-and-đặc-tả-yêu-cầu-phần-mềm-đặc-tả

2. Overall Description

2.1 Product Perspective

In the period of industrialization and modernization of the country, the application of science and technology to work and life is very necessary, and information technology has become an effective tool for the work for us, The management of general equipment and embedded devices in particular in the school, it is a waste of time when managed on the papers. With problem of embedded device management, borrowers find it hard to have information about equipment that can be borrowed, repayment period, How to borrow, How to make relevant documents, Managers often have difficulty in updating information, having problems with large amounts of documents, documents can damage the loss during storage.

Therefore, embedded device management system, to ensure data security, automatic and saving more time. In this section we propose to build a "Embedded Device Management System"on web-base, that supports users and managers, who can access to it anytime, anywhere. Base on web technology is storge database, that helps to solve process and borrows by algorithms, ensure storge using the database structure. This solution helps quick statistics, high accuracy. The comfortable geographical of access,cost saving, time, easy to manage in the future.

2.2 Product Functions

This system has functions:

- Manage members:
  - Add member.
  - Change personal information.
  - Delete member.
- Manage device:
  - Update device information.
    - Add device.
    - Change device information.
    - Delete device.
  - Allow borrow device.
  - Confirmed extension of borrow.
- Display information
  - Display device information.
  - Display project information.
  - Display lab room information..
  - Display member information.
    - Display personal information.
    - Display device borrow information.
- Login.
- Logout.
- Change password.
- Decentralization member.
- Manage Project:
  - Add Project.
  - Change project information.
  - Delete project.
- Manager producer (Partner supplies equipment).
  - Add producert.
  - Update producer information.
  - Delete producer.
- Manage lab room.

- Add lab.
- Update lab.
- Delete lab.

– Find
- Find device.
- Find member.
- Find device.
- Find project.

– Borrow device.
- Adjourn borrow return time.
- Register borrow device:
  - Register borrow of project.
  - Register borrow of personal.

2.3 User Classes and Characteristics

Serial	User	Feature	Functions	Role & level of importance	Requirement
1	Embedded Device Manager	Manage information & data of the whole system & authorized to set permission for other user	Authorized functions mentioned in section 2.2.Except 2 function in registered item to borrow device: • Adjourn borrow return time. • Borrow register device : ▪ Register borrow of Project. ▪ Register borrow of personal	Role: the Highest administrator Level: very important	Understanding knowledge about IT field The knowledge of data control and information Knowledge and experience in managing embedded devices
2	Member	Allowed to use the system functions. However, limited functionality to changes the database (only for	– Display information – Login. – Logout. – Change password – Find – Register borrow device	Role: basic user Level:very improtant	Understanding knowledge about IT field Knowledge about rule for borrow embedded device

		administrators)			
NOTE: this is basic permission usage, accounts can have function depend on the administrator's authority					

2.4 Operating Environment

Hardware:

System requirement	Minimum	Recommended
CPU	- Intel(R) Core(TM) 2 CPU E4600 @ 2.40GHz or higher . - Pentium(R) Dual-Core CPU E2210 @ 2.20 GHz or higher.	- Intel(R) Core(TM) i3-2100 CPU @ 3.10 GHz or higher.
RAM	1 GB.	2 GB or higher.
Graphics	Not required	512 Mb or higher.
Storge	0.5GB available space	1GB available space

Software:

Requirement	Minimum	Recommended
Adobe Flash Player	Version for 2010 to now	New version now.
Browser	All version browser to 2010 for now	Opera, Mozilla Firefox, Chrome, CocCoc, Yandex, Microsoft Edge, Safari (All version now)
System Operating	WindowsVista/Windows7/Windows XP/ Windows 8 /Windows 2003 Server/All version Linux for 2000 to now/ all version Mac OS for 2000 to now.	Windows 7 (64/32 bit)/ Windows 8 (64/32 bit)/ Windows 10/Ubuntu 14.04/Ubuntu 16.04, Mac OSX.

2.5 Design and Implementation Constraints

- Constraints Implement:
  - The interface is easy to use with the user, all functions easy to see, easy to implement .
  - Devices that want to use the software must connect to the Internet to the application's web site with a web browser .

  - Users who want to use the product must have an account and password to login
- Design contraint
  - Program language: Web Programing with:
    - Front-end: HTML/CSS + Bootstrap, JS (Ajax, jQuery, JSON)
    - Back-end: PHP, Java Script
  - Database design language: MySQL.
  - Interface Langguage: Vietnamese.
  - IDE: Atom, USBWebServer.
  - Graph Drawing Tools: Start UML, Edraw Max
  - Documentation and Presentation: Microsoft Ofice 2013, Libre Office.

2.6 User Document

2.7 Assumptions & Dependences

- Website hacked.
- Hardware device malfunction abruptly.
- Unstable power supply or lack of solution for backup power supply.
- Wifi malfunction disconnects
- Handing over the product is not timely
- Sudden changes in the project document.

3. External Interface Requirements

3.1 User Interfaces

- Font: sans-serif.
- Button: Background color and text color depending on the context, monochrome.
- Menu: Placed at the top of the site.
- The message display as the target (header above) or as text in the layout
- The confirmation dialog box used Dialog.
- Program interface: Type of website interface, included pages:
    - Index
    - Admin
    - Contact
    - Device
    - Footer
    - General
    - Header
    - Labs

- Login
- Members
- Menu
- Profile
- Project
- Search

Pages can be organized horizontally in the top left of the screen. At the top right of the screen is the login interface, that allows users to use the account to log in, located in the top of same frame as the search box ... The bottom is the contact information, product introduction.

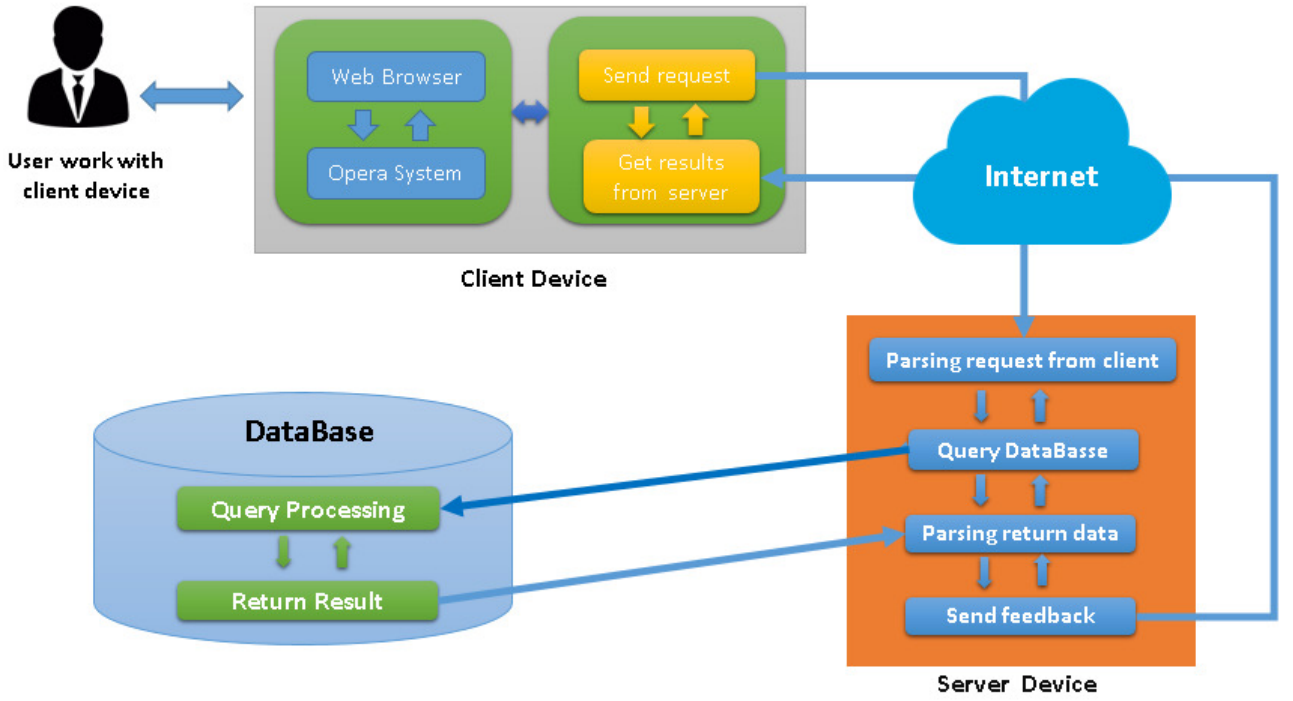
3.2 Hardware Interfaces

Hardware support requirements used in the project include:

- Computer: A Computer for Manager Used to manage devices and related to Member with website Manage Embedded Device.
- Database: Capable of holding large data, Allows quick connection, Supports multiple retrieval at the same time. Availability on The expansion of the databse was developed earlier.
- Interactive software with user by mouse, display and keyboard.
- Connection: Need support for connection Internet for device by network wired or wireless network.
- Server HTTPs, server Databasse specific application so as not to affect the existing system.
- User send requirement from system and system will return results to requirement, if have.

3.5 Software Interfaces

In the system, the communication components are as follows:



Communication database MySQL: A application program to server will send requirement to system operating and import manager (I/O) to query to the database of MySQL. After processing the request MySQL will asked this requirement. If false, this will return error, if true then the result will be buffered MySQL, then put into the program buffer, Eventually the data is processed and sent back to the client. The client receives the data as a web page and displayed in the browser.

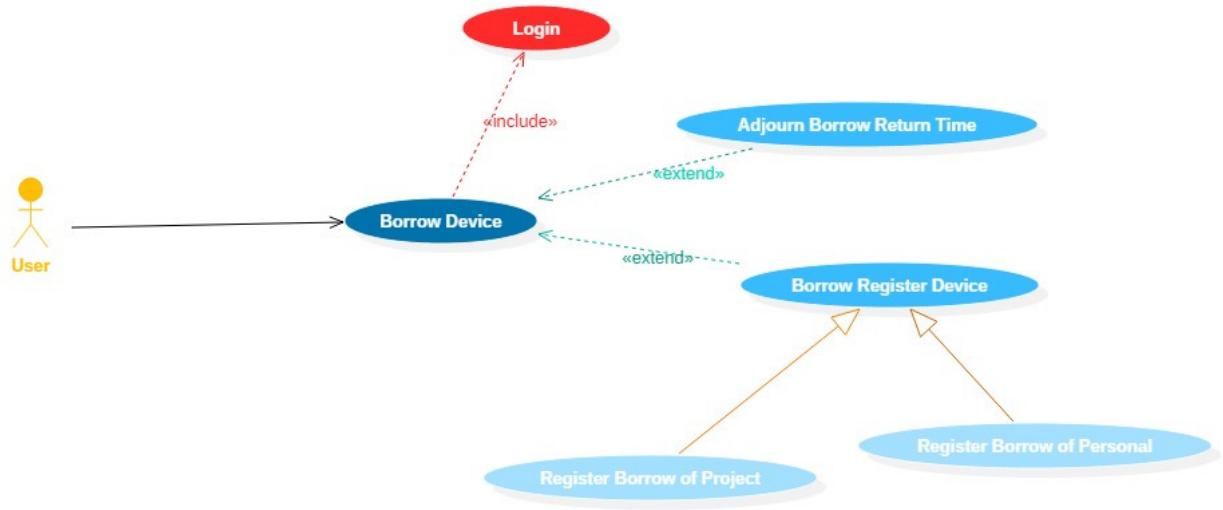
3.4 Communications Interfaces

Websites allow users to contact management via mail and site feedback. The system can run on most browsers today commonly used web programs like firefox, opera, googlechorme, ... To ensure a secure communication network, can't using HTTPS (Hypertext Transfer Protocol Secure - This is a combination of protocols HTTP and security protocol SSL (Secure Socket Layer) or TLS (Transport layer security) Allow secure information exchange over the Internet). Incident can occur in asynchronous systems with different devices on multiple operating systems.

4. System Features

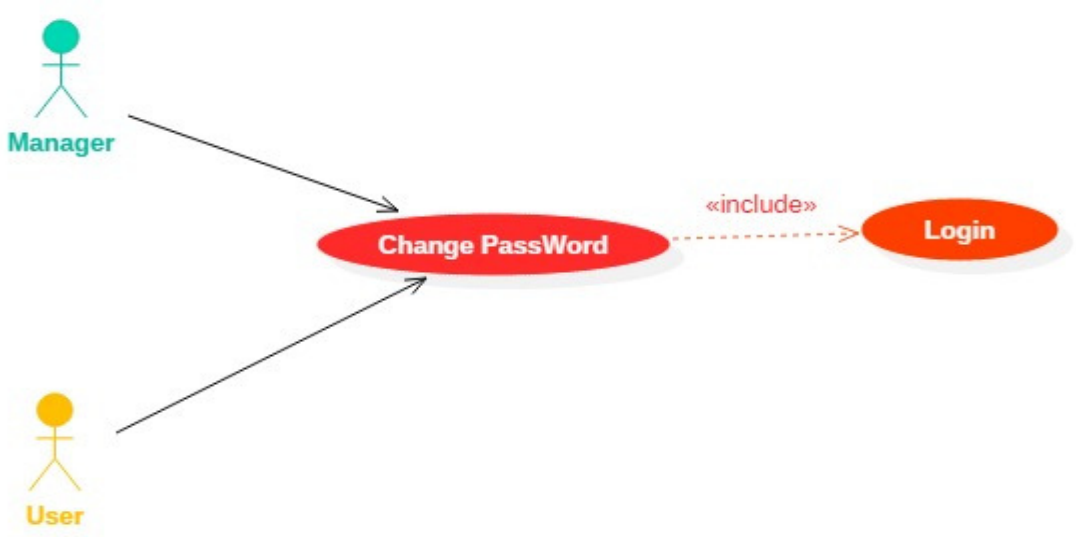
ID	Use Case Name	Note
UC_001	Borrow Device	
UC_002	Change Password	
UC_003	Decentralization Member	
UC_004	Display Information	
UC_005	Find	
UC_006	Logout	
UC_007	Manage Member	
UC_008	Manage Project	
UC_009	Manage LabRoom	
UC_010	Manage Producer	
UC_011	Manage Device	
UC_012	Change Personal Information	
UC_013	Setting	

4.1 UC_001 – Borrow Device



Use case: UC_001_ Borrow Device		
Purpose	**Borrow Device**	
Describe:	User want to borrow device	Extent necessary: High
		Classify: High
Target users	User	
Ingredients and concerns	User want to borrow device.	
Relationships	+Association :User +Include: Login +Extend: Borrow Register Device, Adjour Borrow Return Time +Generalization: Register Borrow of Project, Register Borrow of Personal	
Previous condition	User must login the system before borrow device.	
Basic flows	1. User Login 2. Users select 1 of 3 functions: Sub 1: If choose Borrow Register Device: Sub 1.1: Optional Register Borrow of Project Sub 1.2: Optional Register Borrow of Personal Stop Event. Sub 2: If choose Adjour Borrow Return Time 3. Stop Event	
Alternative Flows	Users perform interchange Sub, Sub 2 before returning software interface	
Result After	Successfully borrowed device.	

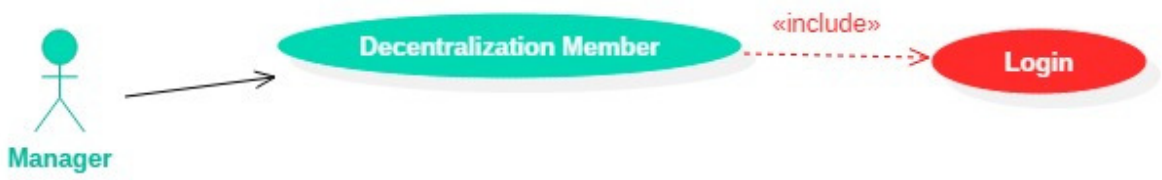
4.2 UC_002 – Change Password



Use case: UC_002_ Change Password		
Purpose	**Allow change password for Account**	
Describe:	Users or managers want to change password	Extent necessary: High
		Classify: High
Target users	Users,managers	
Ingredients and concerns	User or managers want to change password	
Relationships	+Association: User, Admin +Include: Login +Extend: +Generalization:	
Previous condition	User must login the system before change password.	
Basic flows	1. User/manager select the button Logout 2. Users fill in information to change:	

	Fill in the old password Fill in the new password Retype the new pasword 3. System check registration information Sub 1: If information is correct → a message will appear to inform the new more successful, go to 4. Sub 2: If information is incorrect → show error register a message will appear requesting to enter the correct information, go to 5 4. Display form login,next to step 6 5. Show registration form, request to re-enter registration information 6. Stop Event.
Alternative Flows	User must login the system before change pasword
Result After	Password was successfully changed.

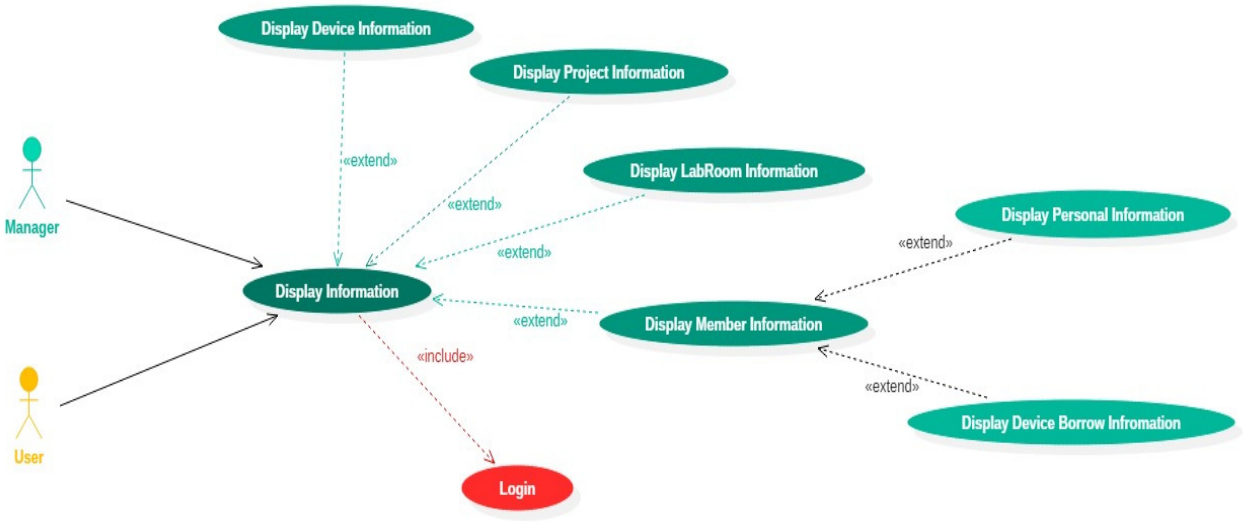
4.3 UC_003 - Decentralization Member



Use case: UC_003_ Decentralization Member		
Purpose	**Allow Decentralization Member for the system**	
Describe:		Extent necessary: Medium

	Manager can authorized for users	Classify: Medium
Target users	Manager	
Ingredients and concerns	Manager can authorized access to users in the system	
Relationships	+Association: Manager +Include: Login +Extend: +Generalization:	
Previous condition	In status login	
Basic flows	1. Manager choose authority user access 2. Page authority appear Sub 1: Manager select member(user) want to authorized. Sub 2: Manager confirm authorized for users 3. Stop Event	
Alternative Flows	Manager must login the system before Decentralization Member	
Result After	Successfully Decentralization Member.	

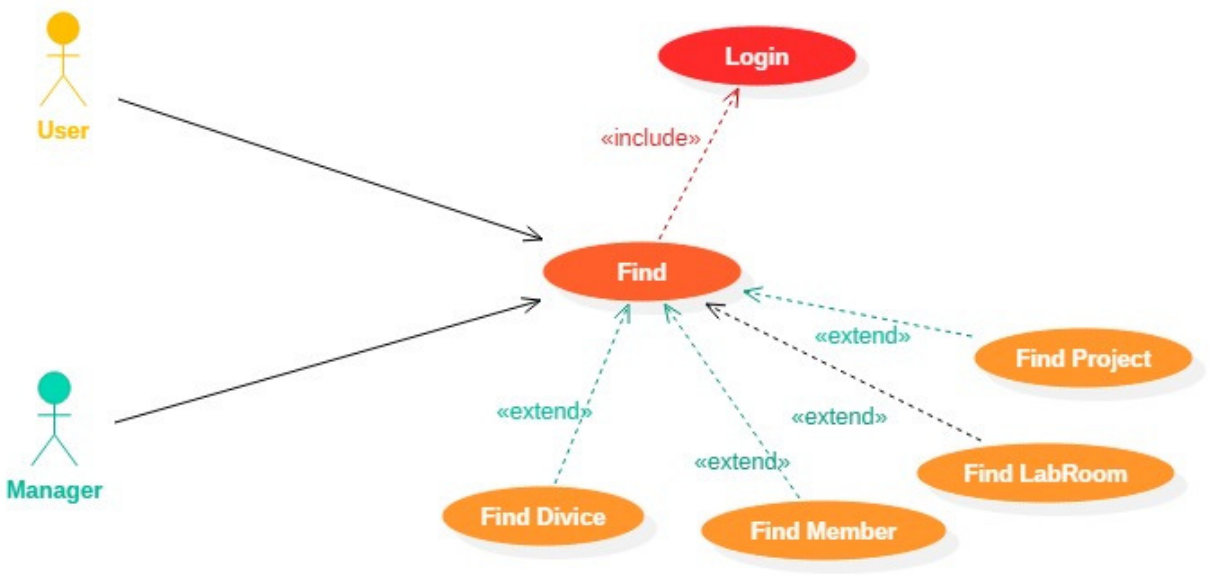
4.4 UC_004 – Display Information



Use case: UC_004_ Display Information		
Purpose	**Display Information**	
Describe:	Manager &user want to display information	Extent necessary: High
		Classify: High
Target users	Manager, user	
Ingredients and concerns	Manager &user want to display information	
Relationships	+Association: Manager, User +Include: Login +Extend:Display Device Information, Display Project Information, Display Labroom Information, Display Member Information +Generalization:	
Previous condition	User, Manager must login the system before display information.	
Basic flows	1. User login	

	2. Users select 1 of 3 functions) Sub 1: choose Display Device Information Sub 2: choose Display Project Information Sub 3: choose Display Labroom Information Sub 4: choose Display Member Information • Select 1 of 3 functions + choose Display Personal Information + choose Display Device Borrow Information
Alternative Flows	Manager perform interchange Sub1,sub 2 before returning software interface
Result After	Successfully Display Information to choose (1,2,3 or 4).

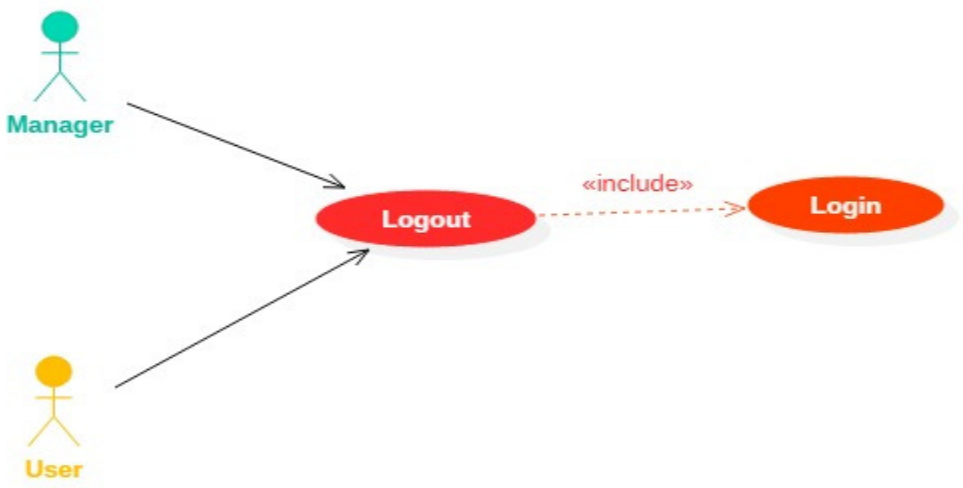
4.5 UC_005 – Find



Use case: UC_005_Find		
Purpose	**Allow Find**	
Describe:	User or manager can find all of information in the system	Extent necessary: Medium
		Classify: Medium
Target users	Basic User, Manager	
Ingredients and concerns	User, manager want to search all of information through: Search Device, Member, Project, Labs	
Relationships	+Association: User, Admin +Include: Login +Extend: Find Device, Find Member, Find Project, Find LabRoom +Generalization:	
Previous condition	Manager must login the system before find information.	

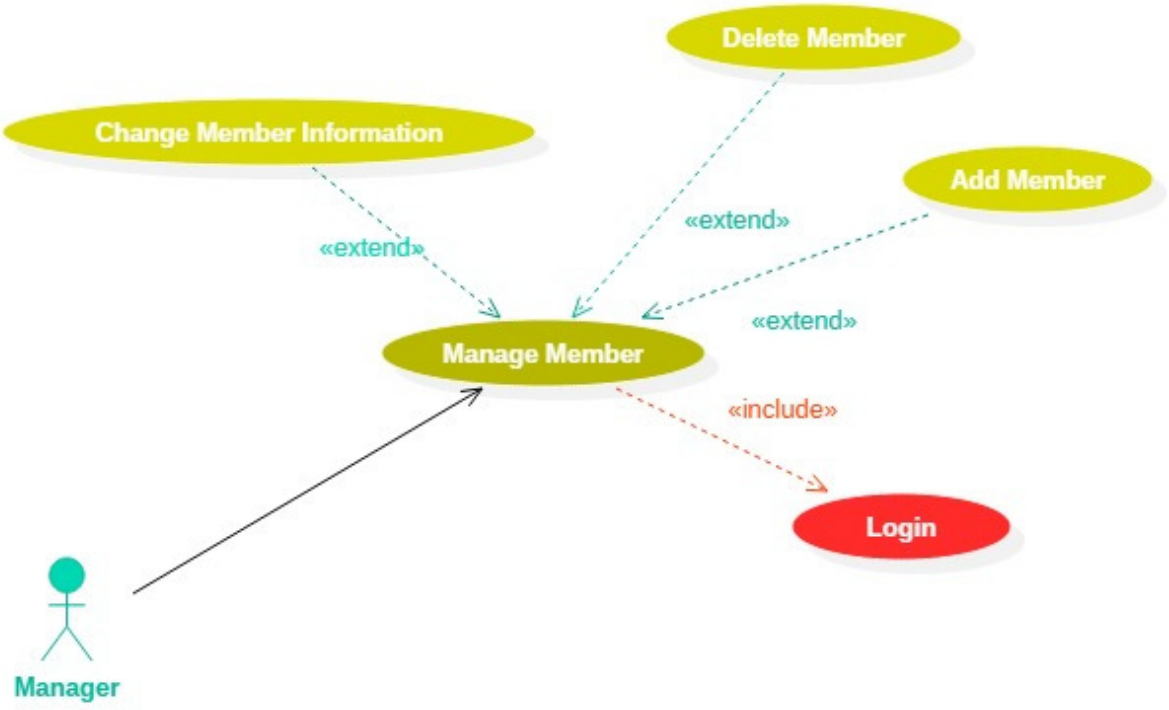
Basic flows	1. User/manager select Find function 2. User/manager enter information to find Sub 1: If enter device name→ press the button search → next to step 3 Sub 2: If enter member name→ press the button search → next to step 3 Sub 3: If enter project name → press the button search→next to step 3 Sub 4: If enter labRoom name→press the button search→next to step 3 3. Display search result (If exist) 4. Stop Event
Alternative Flows	The system access database to find informations necessary.
Result After	Successfully Find Sub is select (1,2,3 or 4).

4.6 UC_006 - Logout



Use case: UC_006_Logout		
Purpose	**Allow logout from the system**	
Describe:	User or manager want to log out from the system	Extent necessary: Low
		Classify: Low
Target users	Basic User, Manager	
Ingredients and concerns	User, Manager want to log out from the system after shutdown using.	
Relationships	+Association: User, Admin +Include: Login +Extend: +Generalization:	
Previous condition	User muts login	
Basic flows	1. User/manager select the button Logout 2. Form Homepage appear. 3. Stop Event	
Alternative Flows	Manager must login the system before logout	
Result After	Successfully log out	

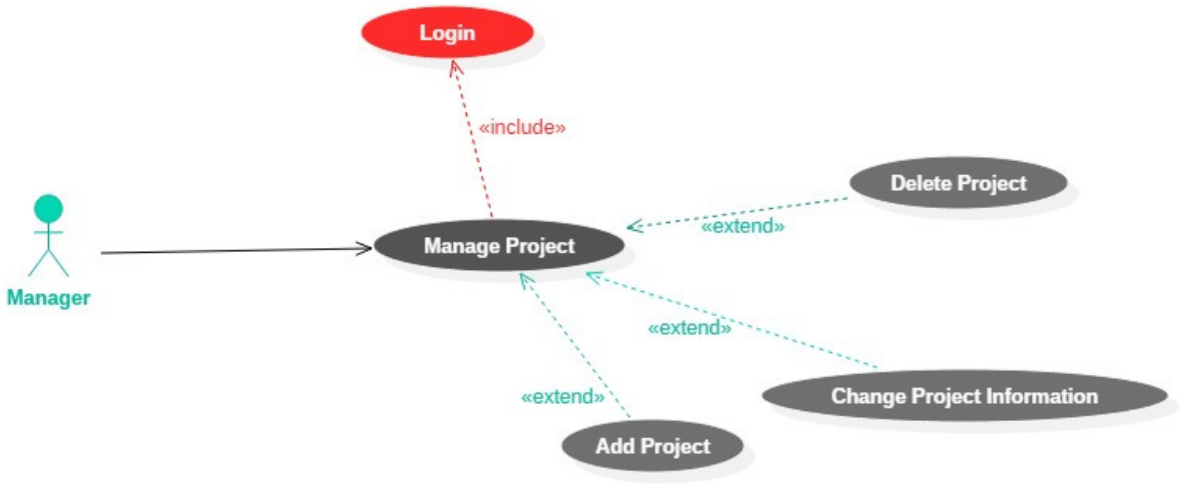
4.7 UC_007 – Manage Member



Use case: UC_007_Manage Member		
Purpose	**Manage Member**	
Describe:	Manager perform Activities related to manage member	Extent necessary: High
		Classify: High
Target users	Manager	
Ingredients and concerns	Manager want to add new member,remove & change information member.	
Relationships	+Association: Admin +Include: Login +Extend: Add Members, Delete Member, Change Information Member. +Generalization:	

Previous condition	Manager must login the system before managing information project.
Basic flows	1. Manager must login the system before managing information member. 2. Manger select 1 of 3 functions Sub 1: If select Add Member Sub 2: If select Delete Member Sub 3: If select Change Information Member 4. Perform correspondence function Sub 1, Sub 2 or Sub 3 5. Return to software interface 6. Stop Event
Alternative Flows	Manager perform interchange Sub1,sub 2 before returning software interface.
Result After	Successfully Sub to choose (1,2 or 3).

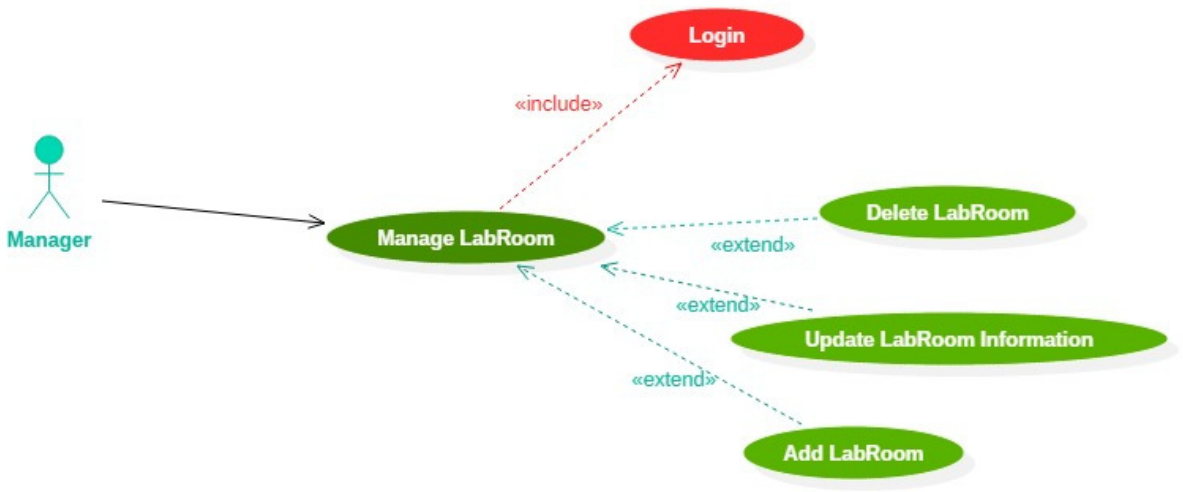
4.8 UC_008 – Manage Project



Use case: UC_008_Manage Project

Purpose	**Project Manager**	
Describe:	Manager perform Activities related to manage project	Extent necessary: High
		Classify: High
Target users	Manager	
Ingredients and concerns	Manager want to add new project,remove &change information project	
Relationships	+Association: Admin +Include: Login +Extend: Add Project, Delete Project, Change Information Project. +Generalization:	
Previous condition	Manager must login the system before managing information member	
Basic flows	1. Manager login the system before perform manage project 2. Manager select 1 of 3 functions Sub 1: If select Add Project Sub 2: If select Delete Project Sub 3: If select Change Information Project 4. Perform correspondence functions Sub 1, Sub 2 or Sub 3 5. Return to software interface 6. Stop Event	
Alternative Flows	Manager perform interchange Sub1,sub 2 before returning software interface.	
Result After	Successfully Sub to choose (1,2 or 3).	

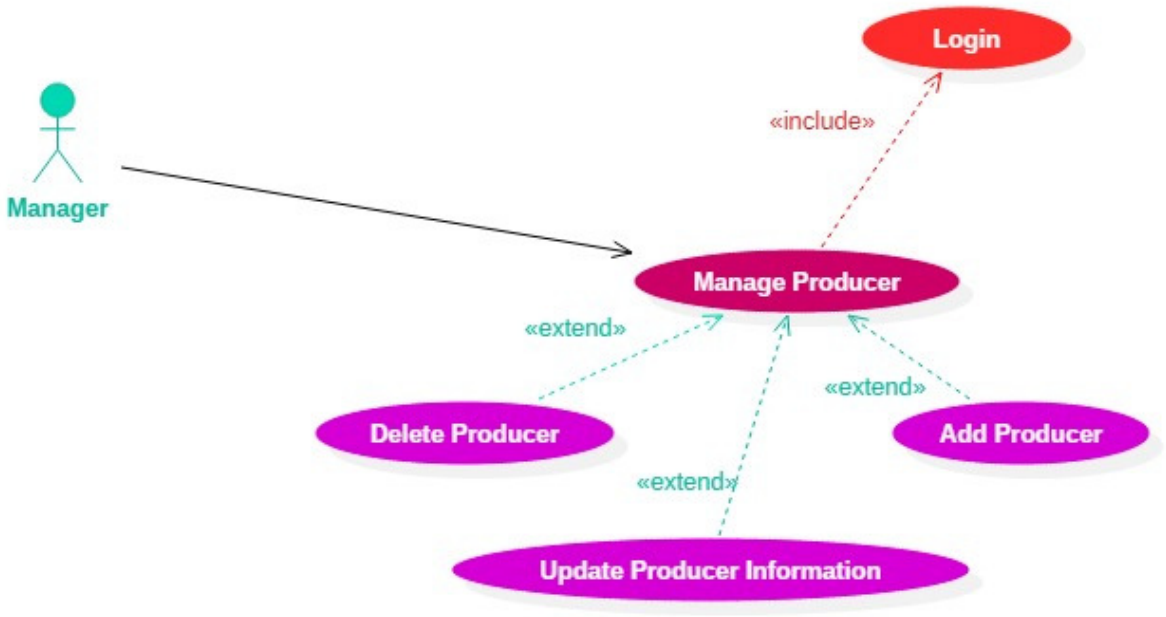
4.9 UC_009 – Manage LabRoom



Use case: UC_009_Manage LabRoom		
Purpose	**Manage Lab**	
Describe:	Manager perform Activities related to manage labroom	Extent necessary: High
		Classify: High
Target users	Manager	
Ingredients and concerns	Manager want to add new lab,remove &change information lab.	
Relationships	+Association: Admin +Include: Login +Extend: Add LabRoom, Delete LabRoom, Update LabRoom Information. +Generalization:	
Previous condition	Manager must login the system before managing information lab	
Basic flows	1. Manager must login the system before managing information lab 2. Manager select 1 of 3 functions	

	Sub 1: If select Add LabRoom Sub 2: If select Delete LabRoom Sub 3: If select Change Information LabRoom 4. Perform correspondence function Sub 1, Sub 2 or Sub 3 5. Return to software interface 6. Stop Event
Alternative Flows	Manager perform interchange Sub1,sub 2 before returning software interface.
Result After	Successfully Sub to choose (1,2 or 3).

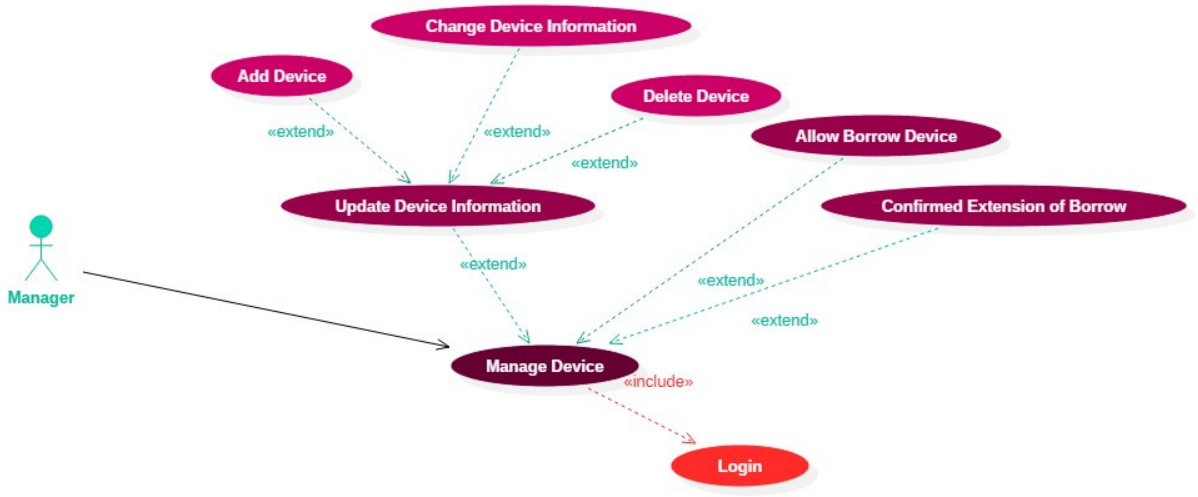
4.10 UC_010 – Manage Producer



Use case: UC_010_Manage Producer		
Purpose	**Manage Producer**	
Describe:		Extent necessary: High

	Manager perform Activities related to manage producer	Classify: High
Target users	Manager	
Ingredients and concerns	Manager want to add new lab,remove &change information producer	
Relationships	+Association: Admin +Include: Login +Extend: Add Producer, Delete Producer, Update Producer Information. +Generalization:	
Previous condition	Manager must login the system before managing information producer.	
Basic flows	1. Manager login the system before perform manage producer 2. Manager select 1 of 3 functions Sub 1: If select Add Producer Sub 2: If select Delete Producer Sub 3: If select Update Producer Information. 4. Perform correspondence function Sub 1, Sub 2 or Sub 3 5. Return to software interface 6. Stop Event	
Alternative Flows	Manager perform interchange Sub, Sub 2, Sub 3 before returning software interface	
Result After	Successfully Sub to choose (1,2 or 3).	

4.11 UC_011 – Manage Device



Use case: UC_011_ Manage Device		
Purpose	**Manage Device**	
Describe:	Manager perform Activities related to manage device	Extent necessary: High
		Classify: High
Target users	Manager	
Ingredients and concerns	Manager want to add: Update Device Information, Allow Borrow Device, Confirm Extension of Borrow	
Relationships	+Association: Admin +Include: Login +Extend: Update Device Information, Allow borrow device, Confirm Extension of Borrow. +Generalization:	
Previous condition	Manager must login the system before managing information Device.	
Basic flows	1. Manager login the system before perform manage Devvice 2. Manager select 1 of 3 functions	

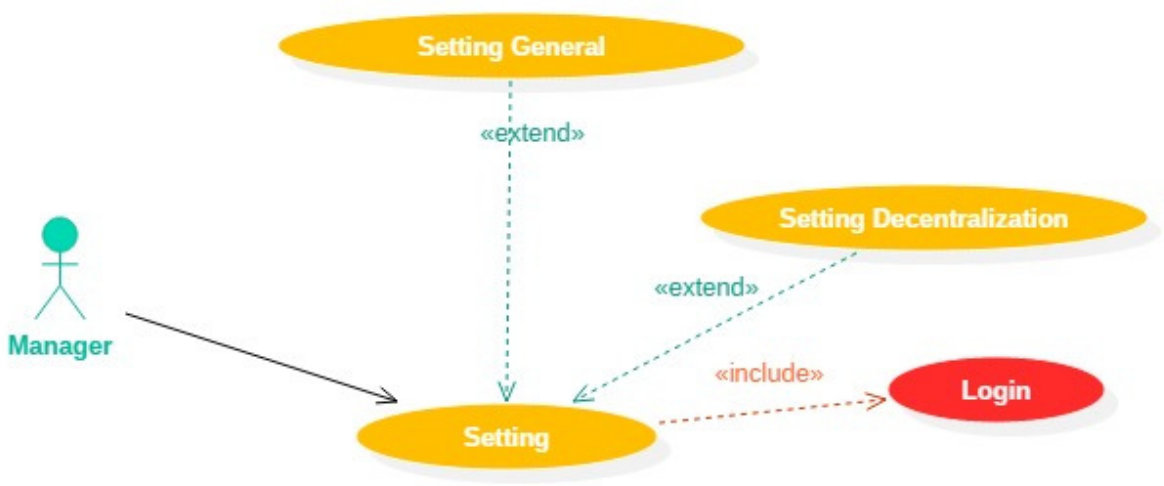
	Sub 1: If select Update Device Information: Sub 1.1: Optional Add Device Sub 1.2: Optional Delete Device Sub 1.3: Optional Change Device Information Stop Optional Event. Sub 2: If select Allow Borrow Device Sub 3: If select Confirm Extension of Borrow 3. Stop Event
Alternative Flows	Manager perform interchange Sub1,sub 2 before returning software interface.
Result After	Successfully Sub to choose (1,2 or 3).

4.12 UC_012 – Change Personal Information

Use case: UC_012_ Change Personal Information		
Purpose	**Change Personal Information**	
Describe:	User want to change Personal Information.	Extent necessary: Medium
		Classify: Medium
Target users	User	
Ingredients and concerns	User want to change personal information.	
Relationships	+Association: User +Include: Login	

	+Extend: +Generalization:
Previous condition	User must login the system before change personal information.
Basic flows	1. User select the button allow perform change personal information 2. User full in information to change: Update -First and last name Update - date of birth Update - Gender Update - Address 3. Information check system has updated Sub 1: If information is correct → successfully update information,next to step 4 Sub 2: If information is incorrec → a message will appear requesting to enter the correct information,next to step 5. 4. Display form homepage,next to step 6. 5. Display form change information, Require to re-enter personal information to update. 6. Stop Event
Alternative Flows	The system check personal information has just been updated from the form. Change information to avoid entering letters or symbols, the number is not allowed when updating user information.
Result After	Successfully change personal information .

4.13 UC_013 – Setting



Use case: UC_013_Setting		
Purpose	**System setting**	
Describe:	Manager perform Activities related to Setting	Extent necessary: High
		Classify: High
Target users	Manager	
Ingredients and concerns	Manager want to perform setting,or setting up authorized user	
Relationships	+Association: Admin +Include: Login +Extend: Setting General, Setting Decentralization +Generalization:	
Previous condition	Manager must login the system before managing information producer.	
Basic flows	1. Manager login the system before perform manage setting 2. Manager select 1 in 2 fuction Sub 1: If select Setting General Sub 2: If select Setting Decentralization 4. Perform correspondence function Sub 1 or Sub 2.	

	5. Return to software interface 6. Stop Event
Alternative Flows	Manager must login the system before system setting
Result After	Successfully change setting system to choose (Sub 1 or Sub 2)

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Serial	Minimum Requirement
NR_001	Allows multi-threaded access.
NR_002	The computer acting as the server must operate continuously during the operation of the system..
NR_003	Always online while using this system

5.2 Exporting Requirements

Serial	Minimum Requirement
NR_003	Minimum network connection download / upload speed 4 Mbps / 512 Kbps..
NR_004	Quick response system is less than 1 second per operatio
NR_005	Ability to adapt to many different devices and operating systems
NR_006	Works well with multiple devices
NR_007	Ensure storage capacity if required to store large amounts of data.

5.3 Security Requirements

Serial	Minimum Requirement

NR_008	The system needs to be protected by an advanced and regularly updated data encryption system.
NR_009	Build a password security mechanism to manage access numbers
NR_010	Lets prevent and deny some invalid access

5.4 Software Quality Attributes

- **Product activity:**
  - **Accuracy**:

Standard	Description
Output tasks	This list includes information such as the borrower, date of the loan, date of return, borrowed equipment, condition of the equipment. Information can be statistic by time, device ID, member and project
Accuracy can be achieved	The possibility of false information to the storage limit of less than 1%, the information must be the exact output according to the information stored in the system.
Full information output information	The probability of losing data when archiving or reporting is less than 1%.
Get the earliest information	Members can view the latest information about the device as soon as the manager updates it
Availability of information	Average response time when query execution is less than 1 second, access time to generate report required less than 10 seconds
Standards and guidelines needed	Software and documentation must comply as a document provided to the customer.

  - **Reliability:** The frequency by which equipment status as damage has been borrowed, ... has not been updated promptly resulting in errors in equipment returning less than 1 case per month. The probability of wrong information stored on the return device does not occur..

- **Effectiveness:** The actual parameters are calculated as follows: Number of current devices, number of members and frequency of use of equipment are borrowed. It then determines the optimal storage, memory, and processing flow for the servers..
- **Integrity:** Only authorized users of the system can register for a facility loan within the framework allowed for use in the projects in which they participate. Members who are not involved or who are not members of the system will not be able to view information as well as borrow equipment..
- **Usability:** The system is mainly used for engineers, programmers are those who specialize in information systems. Therefore, when designing the system does not need too much detail, just full of necessary functions so that users can use immediately to start participating in the system.

- **Product update:**
  - **Maintenance:** Programming, system design must comply with the set quality standards. Code, filename, class name, ... to write the correct syntax, agreed standards. Need to arrange the package model to facilitate later upgrades, it is best to use the MVC model..
  - **Flexibility:** Managers can easily add content to the report as well as select the time and duration of the request statistics. Allows the administrator to delegate permissions to other users for management support..
  - **Checking ability:** The lend - return device, change the information of the device, the member must be exported into the system log file to easily check the error in the operation , storage. Do not accept duplication of data in new creation..
- **Product conversion:**
  - **Ability to move**: Can be used in different browsers or on different operating systems. Not only that, the system needs to be compatible with different devices.
  - **Reusability:** The components of the system are individually designed and have specific specific functions. Ready to change or use for another system.
  - **Interoperability:** Information stored in the system can be displayed as storage files such as SQL, Microsoft Excel, Microsoft Word, ...

5.5 Software Quality Attributes

- Members only use functions within the decentralization framework that the manager rules for each account.
- The administrator has full control of the features mentioned in section 2.2. Except for the two functions in the loan register:
    - Adjourn of the borow period:
    - Register borrowing equipment
        - Borrow equipment for the project.
        - Borrow equipment for individuals
- The system always has from one account: Do not allow to delete all accounts in the system..

6. Other Requirements

On next design document for this:
Must describe clearly principle of decentralization which is manager using to decentralization for orther user. There are decentralization:

- Owner
- Admin
- Manager
- Member
- Basic User

One decentralization level can change functions on decentralization setting.

Appendix A: Glossary table

This document does not use many terminology, which are presented in Section 1.5

Appendix B: Analysis Models

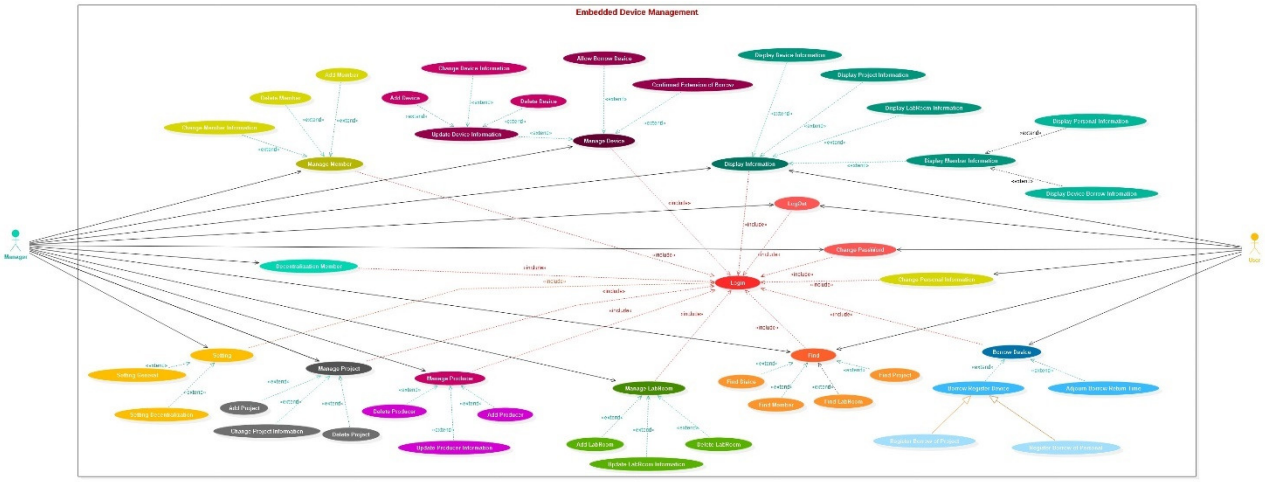
1. UC_Login

Use case: UC_Login		
Purpose	**Allow log on system**	
Describe:		Extent necessary: High

	User or Manager want to login on system	Classify: High
Target users	Basic User, Manager	
Ingredients and concerns	User or Manager login on system when want to using all function.	
Relationships	+Association: User, Admin +Include: Login +Extend: +Generalization:	
Previous condition	None	
Basic flows	1. User /Manager click Login 2. Form Login show Sub 1: User /Manager inter username and password Sub 2: System testing login information . Return login true or false, if true, go to Homepage, else re-login. 3. Stop Event	
Purpose	None	
Describe:	Return login true or false	

2. Use Case Diagram: Full size:

drive.google.com/drive/folders/0BwvTggymLfLOampveGZPOVUyU2M?usp=sharing



3. Class Diagram: full size:

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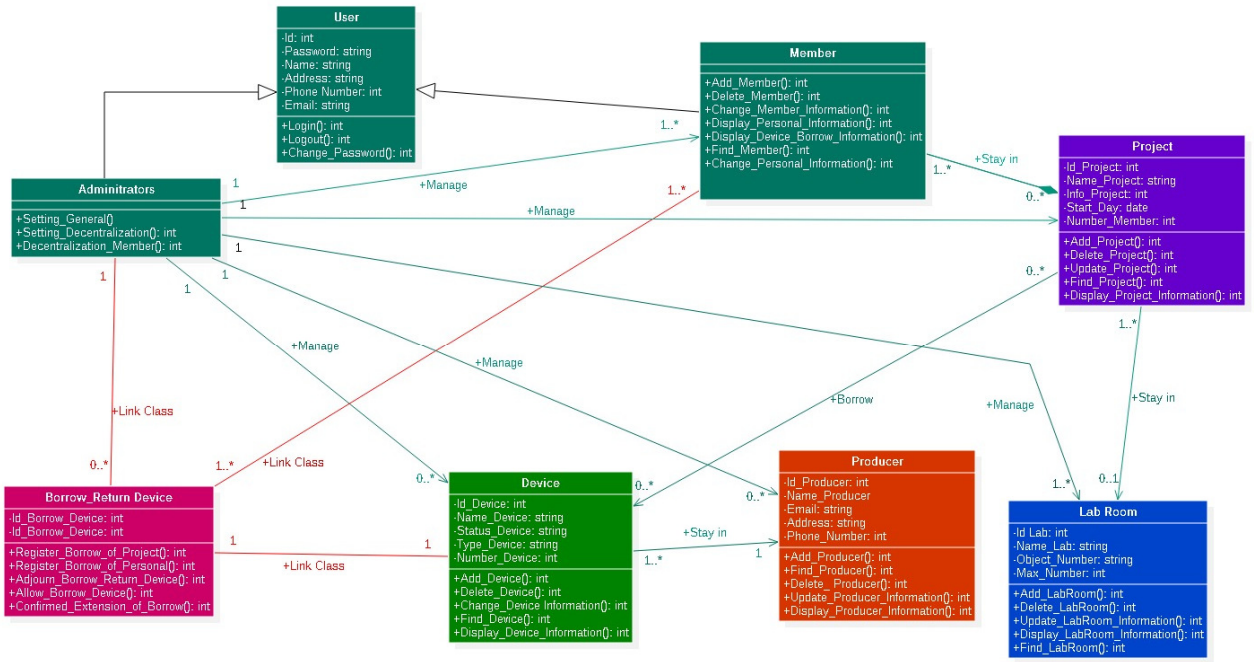

4. Entity-Relationship Model: full size:

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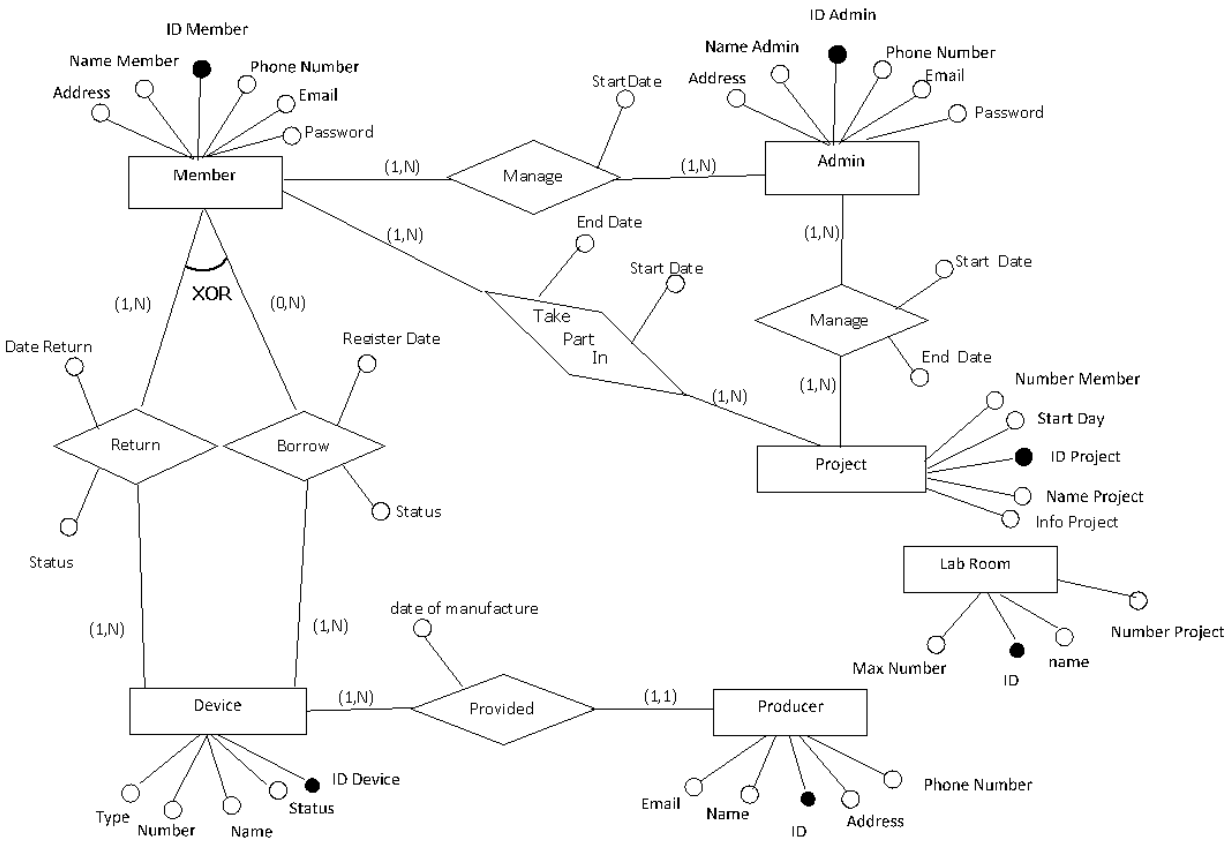
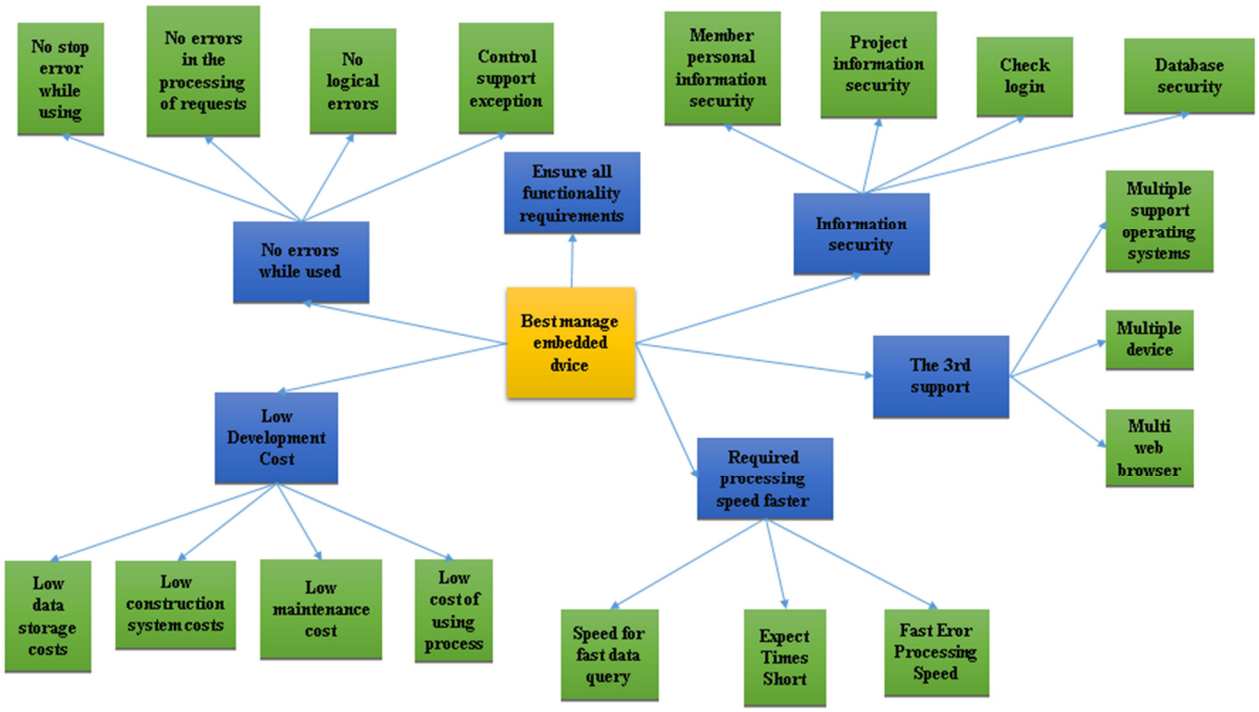


5. Sequence diagram

There are too many sequence diagrams so we can not include this document:
Please you can see all sequence diagrams in this link:
https://drive.google.com/drive/folders/0BwvTggymLfLOYWhlQmZCQ2thSUk?usp=sharing

6. Goal tree: full size:

drive.google.com/drive/folders/0BwvTggymLfLOampveGZPOVUyU2M?usp=sharing



7. Goal analysis diagram: Full size:

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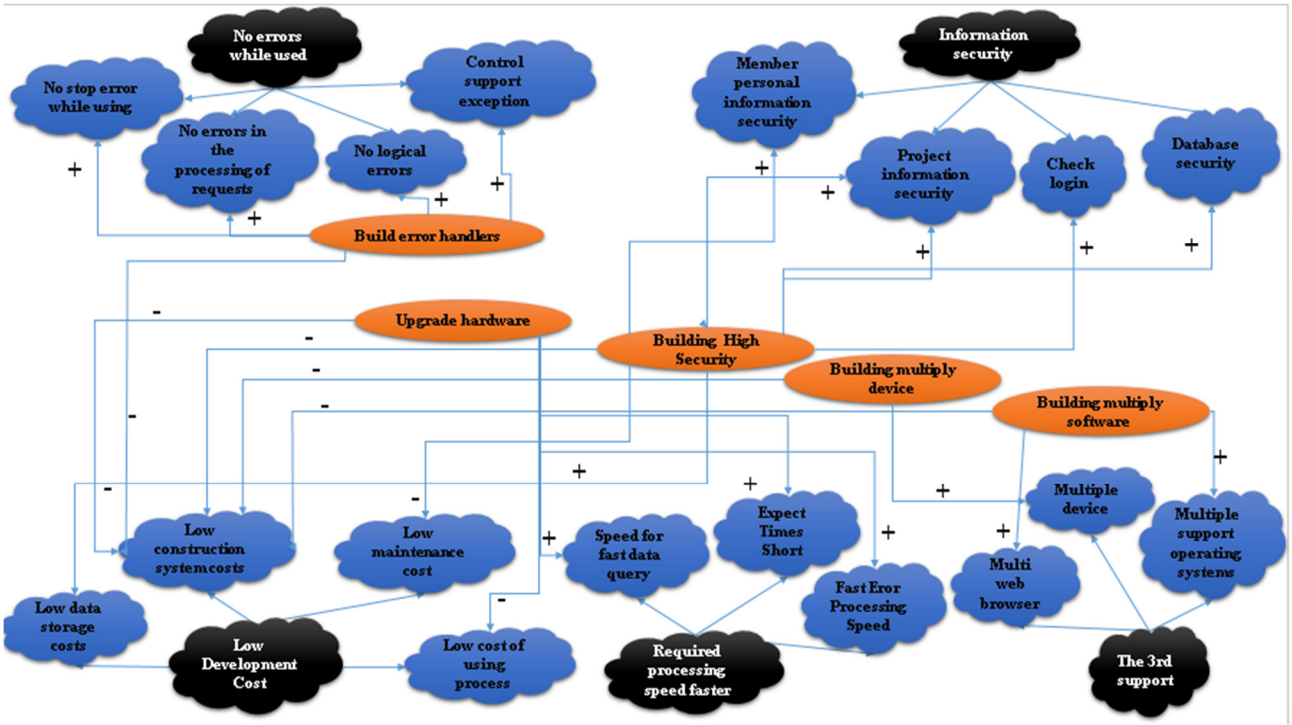

8. Analyzing costs - Penefits : This file in:

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Table salary for engineer								
						Basic salary		3320000
Ware	Coefficient	Salary	Allowance 1 (12% salary)	Allowance 2 (4% salary)	Insurrance (34.8% salary)	Total salary Reality	Salary/date	Salary/hour (H)
1	2.34	7768800	932256	310752	2703542.4	11715350	585767.52	73220.94
2	2.67	8864400	1063728	354576	3084811.2	13367515	668375.76	83546.97
3	3	9960000	1195200	398400	3466080	15019680	750984	93873
4	3.33	11055600	1326672	442224	3847348.8	16671845	833592.24	104199.03
5	3.66	12151200	1458144	486048	4228617.6	18324010	916200.48	114525.06
6	3.99	13246800	1589616	529872	4609886.4	19976174	998808.72	124851.09

7	4.32	14342400	1721088	573696	4991155.2	21628339	1081416.96	135177.12
8	4.65	15438000	1852560	617520	5372424	23280504	1164025.2	145503.15
9	4.98	16533600	1984032	661344	5753692.8	24932669	1246633.44	155829.18

Table calculation software value

Software Name: Embedded Device Management Website

TT	Categories	Electrolyte	Value	Note
I	**Calculate the use case score (Use Case)**			
1	Actor Points (TAW)		2	
2	Use-case Points (TBF)		25	
3	Calculate Points UUCP	UUCP = TAW +TBF	27	
4	Coefficient of complexity about Technical-Technological TCF)	TCF = 0,6 + (0,01 x TFW)	1.01	
5	Coefficient of complexity about environment (EF)	EF = 1,4 + (-0,03 x EFW)	0.755	
6	Calculate Points AUCP	AUCP = UUCP x TCF x EF	20.58885	
II	**Interpolation labor time (P)**	P : people/hour/AUCP	20	
III	**Actual effort value (E)**	E = 10/6 x AUCP	34.31475	
IV	**Average wage (H)**	H: people/hour	73,220.94	vnd
V	**Internal Software Value (G)**	G = 1,4 x E x P x H	70,351,631.02	vnd

Table software cost synthesis

Number	Expense item	Calculation	Value	Symbol
1	Software Value	1,4 x E x P x H	70,351,631.02	G
2	General expenses	G x tỷ lệ	45,728,560.17	C
3	Income taxable Pre-calculated	(G+C) x tỷ lệ	6,964,811.47	TL
4	Software costs	G + C + TL	123,045,002.66	G_{PM}
	Total	G_{PM}	123,045,003	

Cash Flow description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development cost:	($123,045,003)					
Operation & maintenance Cost:		($)400000	($)450000	($)500000	($)550000	($)600000
Discount factors for 12%:	1	0.893	0.797	0.712	0.636	0.567
Time-adjusted Costs (adjusted to present):	($123,045,003)	($357,200)	($358,650)	($356,000)	($349,800)	($340,200)
Cumulative time-Adjusted cost over	($123,045,003)	($123,402,203)	($123,760,853)	($124,116,853)	($124,466,653)	($124,806,853)
Benefils derived from Operation of new	$0	$25,000,000	$30,000,000	$35,000,000	$40,000,000	$45,000,000
Discount factors for 12%:	$1	$0.89	$0.80	$0.71	$0.64	$0.57
Time-adjusted Benefils (current of present)	$0	$22,325,000	$23,910,000	$24,920,000	$25,440,000	$25,515,000
Cumulative time-Adjusted bennefits over	$0	$22,325,000	$46,235,000	$71,155,000	$96,595,000	$122,110,000
	0	1	2	3	4	5
Cumulative lifetime time-adjusted costs+	($123,045,003)	($101,077,203)	($77,525,853)	($52,961,853)	($27,871,653)	($2,696,853)

Cash Flow description	Year 6	Year 7	Year 8	Year 9	Year 10
Development cost:					
Operation & maintenance Cost:	($)650000	($)700000	($)750000	($)800000	($)850000
Discount factors for 12%:	0.507	0.452	0.404	0.361	0.322
Time-adjusted Costs (adjusted to present):	($329,550)	($316,400)	($303,000)	($288,800)	($273,700)

Cumulative time-Adjusted cost over	($125,136,403)	($125,452,803)	($125,755,803)	($126,044,603)	($126,318,303)
Benefils derived from Operation of new	$50,000,000	$55,000,000	$60,000,000	$65,000,000	$70,000,000
Discount factors for 12%:	$0.51	$0.45	$0.40	$0.36	$0.32
Time-adjusted Benefils (current of present)	$25,350,000	$24,860,000	$24,240,000	$23,465,000	$22,540,000
Cumulative time-Adjusted bennefits over	$147,460,000	$172,320,000	$196,560,000	$220,025,000	$242,565,000
	6	7	8	9	10
Cumulative lifetime time-adjusted costs+	$22,323,597	$46,867,197	$70,804,197	$93,980,397	$116,246,697

9. Q & A:

STT	Question	How to reply	Fields	Who are asked
1	What happens when a device has been borrowed and has more subscribers borrowing it ?	Fill in the text answer	Manage Device	Manager
2	Should you search for the device by which attribute ?	Select 1 of 3 answer: - Find device code - Device name - Producer	Manage Device	Manager and Member
3	How is show a list of devices ?	Select 1 of 3 answer: - By the line - By the column - By the table	Manage Device	Manager and Member

4	How is arrange device ?	Select 1 of 4 answer: - Order by device code - By the alphabetical device name - By the order of the new device - By the Number of borrowings	Manage Device	Manager and Member
5	How many max device can you borrow ?	Enter the number	Manage Device	Manager
6	What kind of information device can you manage ?	Fill in the list of information to manage	Manage Device	Manager
7	How long can you borrow device?	Fill in dates	Manage Device	Manager
8	How long and how much can you borrow at a time ?	Fill in the text answer	Manage Device	Manager
10	When Member forgot password, how will solve ?	Fill in the text answer	Manage User	Manager
11	Should search the Member under Any of their attributes ?	Select 1 of 3 answer: - By the member code - By the member name - By the project manager name	Manage User	Manager and Member
12	How is show a list of member ?	Select 1 of 3 answer: - By the line - By the column - By the table	Manage User	Manager and Member
13	How is sort a list of member ?	Select 1 of 3 answers: - By the member code - By the letter of member name - By the order of the new member	Manage User	Manager and Member
14	How many max project can a member take part in ?	Fill in the number	Manage Member	Manager
15	Need to manage the information of Member ?	Fill in the list of information to manage	Manager Member	Manager
16	Should look for projects under any attribute of it	Select 1 of 3 answers: - By the project name - By the project - By the project manager name	Manage Project	Manager and Member

17	How is show a list of member ?	Select 1 of 3 answers: - By the line - By the column - By the table	Manage Project	Manager and Member
18	How is sort a list of project ?	Select 1 of 3 answers: - By the order of project code - By the letter of project name - By the order of the new member	Manage Project	Manager and Member
19	How many max member are there in the project ?	Fill in the number	Manage Project	Manager
20	What information does the project need to manage ?	Fill in the list of information to manage	Manage Project	Manager
21	What attribute should manufacturers search for ?	Select 1 of 3 answers: - By the producer code - By the producer - By the product	Manage Producer	Manager
22	How is show a list of producer ?	Select 1 of 3 answers: - By the line - By the column - By the table	Manage Producer	Manager and Member
23	How is sort a list of producer ?	Select 1 of 3 answers: - By the order of the producer - By the letter of producer name	Manage Producer	Manager and Member
24	What information does the manufacturer need to manage ?	Fill in the list of information to manage	Manage Producer	Manager
25	Decentralized to do several types of accounts ?	Fill in the number and list the items	Manage Decentralization	Manager
26	In the general settings for the system, what items to install ?	Fill in the list of items to install in general	Manage Decentralization	Manager
27	How many functions need to permitted are there in the install permission ?	Fill in the function to authorized	Manage Decentralization	Manager
28	Resolve the case of registered members to borrow but not to receive equipment ?	Fill in the solution in the form of a text answer	Manage Borrow and Return	Manager

29	Resolve a case where members register to borrow but do not return the device upon expiration ?	Fill in the text answer	Manage Borrow and Return	Manager
30	Has the system limited login ?	Yes or No	Manager Login	Manager
31	How many items are there in the homepage interface design ?	Select items (You can select more than 1 item): Member Device Project General notification LabRoom Find button	Design interface	Manager
32	How many items are there in the user interface design?	Select items (You can select more than 1 item): Member Device Project General notification LabRoom Find button Homepage button Logout button Swicth account button Display Infromation button	Design interface	
33	How many items are there in the manager interface design ?	Select items (You can select more than 1 item): Manger Member Manager Device Manager Project General notification Manager LabRoom Information Find button Homepage button Logout button Swtich account button Personal Information button General Setting button Install Decentralization button Borrow and Return Device button	Design interface	

34	Which the title bar and the user menu are designed, horizontal or vertical ?	Optional: Design by horizontal, above Design by horizontal, below Design by the right vertical Design by the left vertical	Design interface	Manager
35	Which the title bar and the manager menu are designed, horizontal or vertical ?	Optional: Design by horizontal, above Design by horizontal, below Design by the right vertical Design by the left vertical	Design interface	Manager

10. Matrix requirements: This file in:

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	UC_001	UC_002	UC_003	UC_004	UC_005	UC_006	UC_007	UC_008	UC_009	UC_010	UC_011	UC_012	UC_013
UC_001	1	9	3	5	7	9	1	1	3	5	3	9	7
UC_002	1/9	1	1/5	1/7	1/5	1	1/9	1/9	1/7	1/7	1/9	1	1/5
UC_003	1/3	5	1	3	5	7	1/3	1/3	1	1	1/7	1	1
UC_004	1/5	7	1/3	1	3	1	1/7	1/7	1/3	1/3	1/7	1	1
UC_005	1/7	5	1/5	1/3	1	3	1/7	1/7	1/5	1/5	1/7	3	1
UC_006	1/9	1	1/7	1	1/3	1	1/9	1/9	1/7	1/7	1/9	1/5	1/7
UC_007	1	9	3	7	7	9	1	1	3	3	1	5	5
UC_008	1	9	3	7	7	9	1	1	3	3	1	5	5
UC_009	1/3	7	1	3	5	7	1/3	1/3	1	1	1/3	3	3
UC_010	1/5	7	1	3	5	7	1/3	1/3	1	1	1/3	3	3
UC_011	1/3	9	7	7	7	9	1	1	3	3	1	7	7
UC_012	1/9	1	1	1	1/3	5	1/5	1/5	1/3	1/3	1/7	1	1
UC_013	1/7	5	1	1	1	7	1/5	1/5	1/3	1/3	1/7	1	1
SUM	5.02	75	21.88	39.48	48.87	75	5.91	5.91	16.49	18.49	7.60	40.20	35.34

	UC_001	UC_002	UC_003	UC_004	UC_005	UC_006	UC_007	UC_008	UC_009	UC_010	UC_011	UC_012	UC_013	Sum	Sum/13
UC_001	0.199	0.120	0.137	0.127	0.143	0.120	0.169	0.169	0.182	0.270	0.395	0.224	0.198	2.454	0.189
UC_002	0.022	0.013	0.009	0.004	0.004	0.013	0.019	0.019	0.009	0.008	0.015	0.025	0.006	0.165	0.013
UC_003	0.066	0.067	0.046	0.076	0.102	0.093	0.056	0.056	0.061	0.054	0.019	0.025	0.028	0.750	0.058
UC_004	0.040	0.093	0.015	0.025	0.061	0.013	0.024	0.024	0.020	0.018	0.019	0.025	0.028	0.407	0.031
UC_005	0.028	0.067	0.009	0.008	0.020	0.040	0.024	0.024	0.012	0.011	0.019	0.075	0.028	0.366	0.028
UC_006	0.022	0.013	0.007	0.025	0.007	0.013	0.019	0.019	0.009	0.008	0.015	0.005	0.004	0.165	0.013
UC_007	0.199	0.120	0.137	0.177	0.143	0.120	0.169	0.169	0.182	0.162	0.132	0.124	0.141	1.977	0.152
UC_008	0.199	0.120	0.137	0.177	0.143	0.120	0.169	0.169	0.182	0.162	0.132	0.124	0.141	1.977	0.152
UC_009	0.066	0.093	0.046	0.076	0.102	0.093	0.056	0.056	0.061	0.054	0.044	0.075	0.085	0.908	0.070
UC_010	0.040	0.093	0.046	0.076	0.102	0.093	0.056	0.056	0.061	0.054	0.044	0.075	0.085	0.881	0.068
UC_011	0.066	0.120	0.320	0.177	0.143	0.120	0.169	0.169	0.182	0.162	0.132	0.174	0.198	2.133	0.164
UC_012	0.022	0.013	0.046	0.025	0.007	0.067	0.034	0.034	0.020	0.018	0.019	0.025	0.028	0.358	0.028
UC_013	0.028	0.067	0.046	0.025	0.020	0.093	0.034	0.034	0.020	0.018	0.019	0.025	0.028	0.458	0.035

ID	Name	Ratio
UC_001	Borrow Device	18.875%
UC_002	Change Password	1.268%
UC_003	Decentralization Member	5.769%
UC_004	Display Information	3.131%
UC_005	Find	2.817%
UC_006	Logout	1.270%
UC_007	Manage Member	15.209%
UC_008	Manage Project	15.209%
UC_009	Manage LabRoom	6.985%
UC_010	Manage Producer	6.781%
UC_011	Manage Device	16.411%
UC_012	Change Personal Information	2.753%
UC_013	Setting	3.522%

Appendix C: To Be Determined List (Null)

The end