System and Software Architecture Description (SSAD)

E-Lock Box

Team 08

<Team members and roles>

Jian Lei:	Project Manager / Builder
Mu Bai:	Requirements Engineer / Builder
Hanadi Mardah:	Life Cycle Planner / UML modeler
Xiaochen Wang:	Operational Concept Engineer / Builder
Da Lu:	Prototyper / Software Architect
Cheng Cheng:	Feasibility Analyst / Tester
Garret Catron:	IIV&V / Quality Focal Point

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Version History

Date	Author	Version	Changes made	Rationale
10/09/14	Mu Bai Jian Lei	1.0	• Add session 1 & 2	• Initial SSAD for Foundation Commitment Package on E-Lock Box
10/18/14	Jian Lei	2.0	• Add session 3	• Initial SSAD for Development Commitment Package on E-Lock Box
10/19/14	Mu Bai	2.1	• Add session 4.1.3&5	• Initial SSAD for Development Commitment Package on E-Lock Box
10/20/14	Da Lu	2.2	• Add session 4.1.1&4.1.2	• Initial SSAD for Development Commitment Package on E-Lock Box
11/26/14	Mu Bai	2.3	• Modify session 2, 3 & 4	• SSAD for TRR Package on E-Lock Box
11/26/14	Hanadi Mardah	2.4	• Modify E-R Diagram, Design Class Diagram	• SSAD for draft TRR Package on E-Lock Box
12/08/14	Hanadi Mardah	2.5	• Modifiy E-R Diagram, Design Class Diagram	• SSAD for TRR Package

Table of Contents

Table of Tables

Table of Figures

1. Introduction

1.1 Purpose of the SSAD

The purpose of this SSAD is to record the architecture of E-Lock Box system including a detailed diagram of system organization and operations according to the requirements and operational concepts. Our programmers and developers will use this SSAD as a reference to the system architecture while building on the project.

1.2 Status of the SSAD

This SSAD is version 2.5, which is completely finish all sessions based on the previous teams' work (SSAD_FCP_F13a_T05_V1.2.doc), the requirements on win book and our new system design.

2. System Analysis

2.1 System Analysis Overview

The primary purpose of the Living Advantage's website is to store youths' vital documents and personal information such as birth certificate, social security card, and driver's license safely so the youths can access to documents as they want. There are case managers who will create accounts for youths and help them to upload these documents. They keep track of all information of what they have done on youth like storing personal information and phone calls. They can also generate a report from system and send emails to notify the youths. Administrator who has the highest authority can manage all users with documents, profiles and activities in the system.

2.1.1 System Context
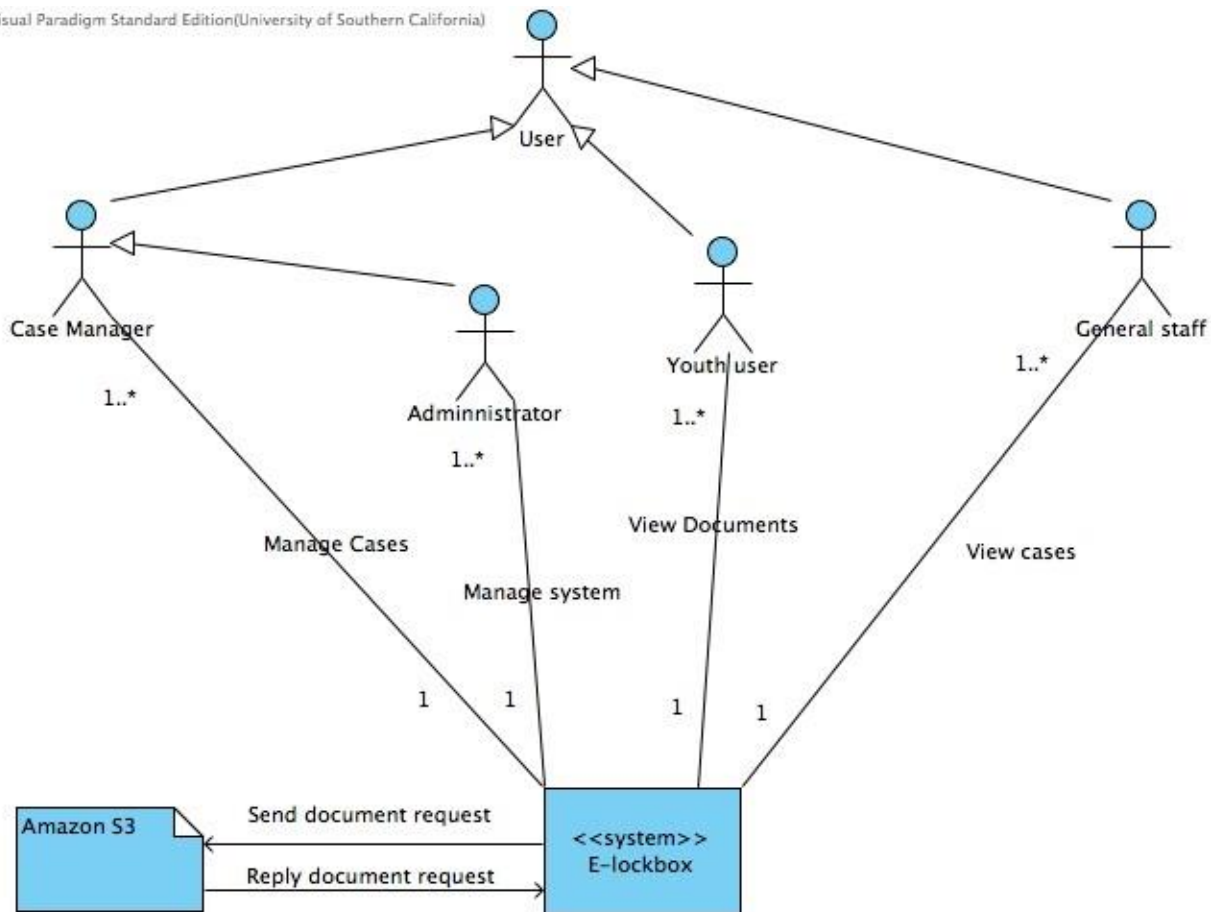
Figure 1: System Context Diagram

Table 1 Actors Summary

Actor	Description	Responsibilities
Administrator	Users who manage the whole system	Manage all users, documents and cases
Case Manager	Users who is mainly responsible for youth users	Help youths with documents, activities Keep track of responsible youth users, read and manage cases
Youth user	Users who can only access to their own documents	View their own documents Set password and security questions
General staff	Users who has limited authority to the system	View case information for youth users Assist case manager and administrator to record the activities

2.1.2 Artifacts & Information

Table 2 Artifacts and Information Summary

Artifact	Purpose
Missing document	It shows total amount of social security card, birth certificates, CA IDs and immunizations are missing
Processing document	It shows total amount of social security card, birth certificates, CA IDs and immunizations are in foster youth's possession.
Contact information	It contains what a case manager has done in certain period time such as how long the case manager contacted with foster youth.
Age	It calculates age for data report and reports total number of each age.
Usage of System	It is a report that shows monthly and Bi-Annual usage of the system.
Time	It shows the actual time provided by the system clock.

Placement	This report will contain how many placement youth have had.
Ethnicity	It contains total number of foster youth for each ethnicity and the report must be ordered as highest number of foster youth to lowers.
Zip code	It will show the all zip codes that are in the database and display in a chart about zip code and the number of foster youth who lives in the zip code.
Demographic data	It will show the number of youth user in certain area.
Youth user basic information	It will shows the basic information of a youth not just including the zip code, age, placement, grade level etc., also has the name, contact, email, address and so on.
Case information	Each case will represent a youth. In the case information, it shows the foster youth basic information, activity history, vital document record, report record and so other information.
Activity History	It shows the contact between a case manager and a foster youth. Activity so far includes email and phone contact. Each activity will have a time stamp.
Report	It shows the data from system. The report will be generated automatically from the system and the content of the report will be chose by who generate the report.
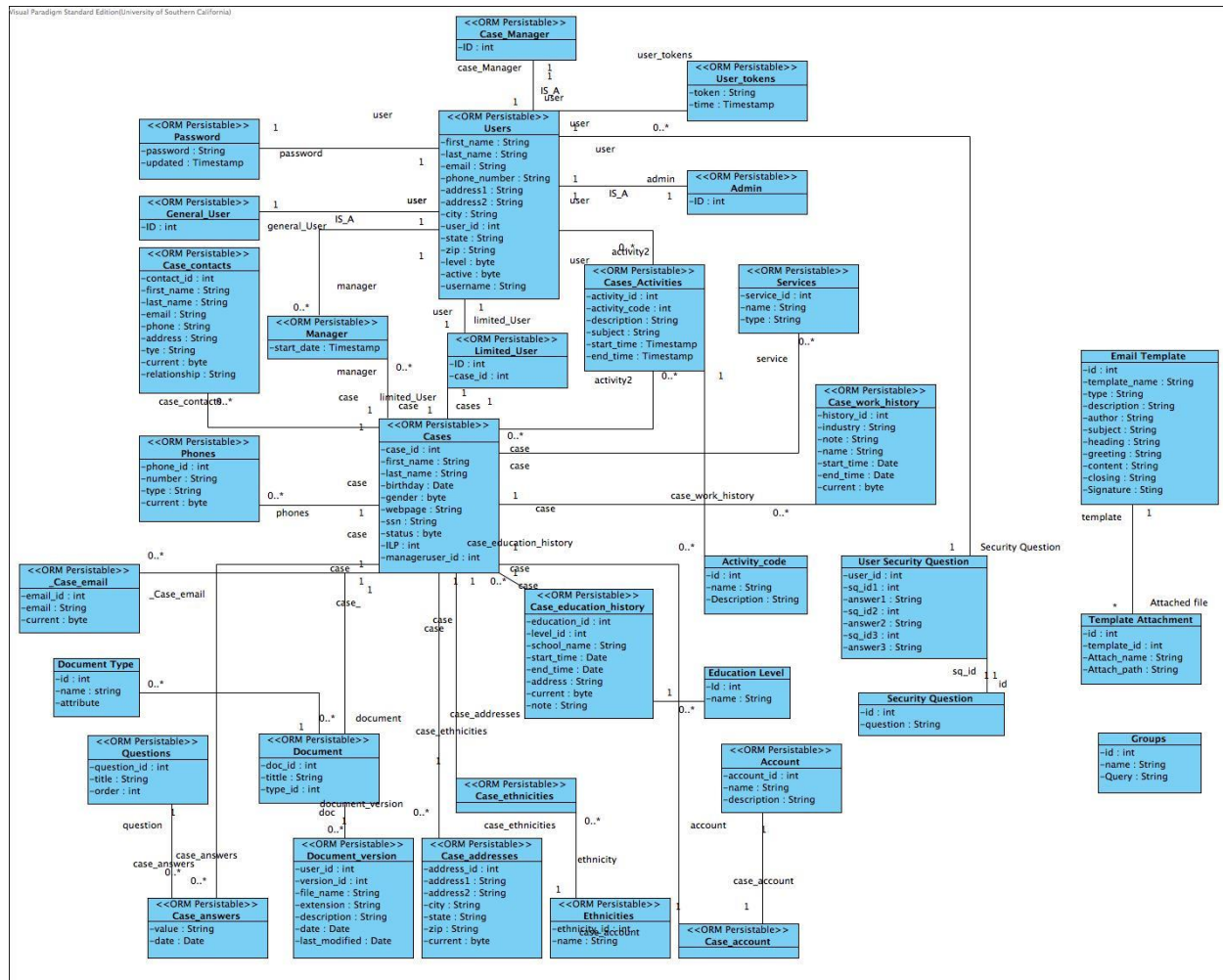
Figure 1 ER Diagram

2.1.3 Behavior
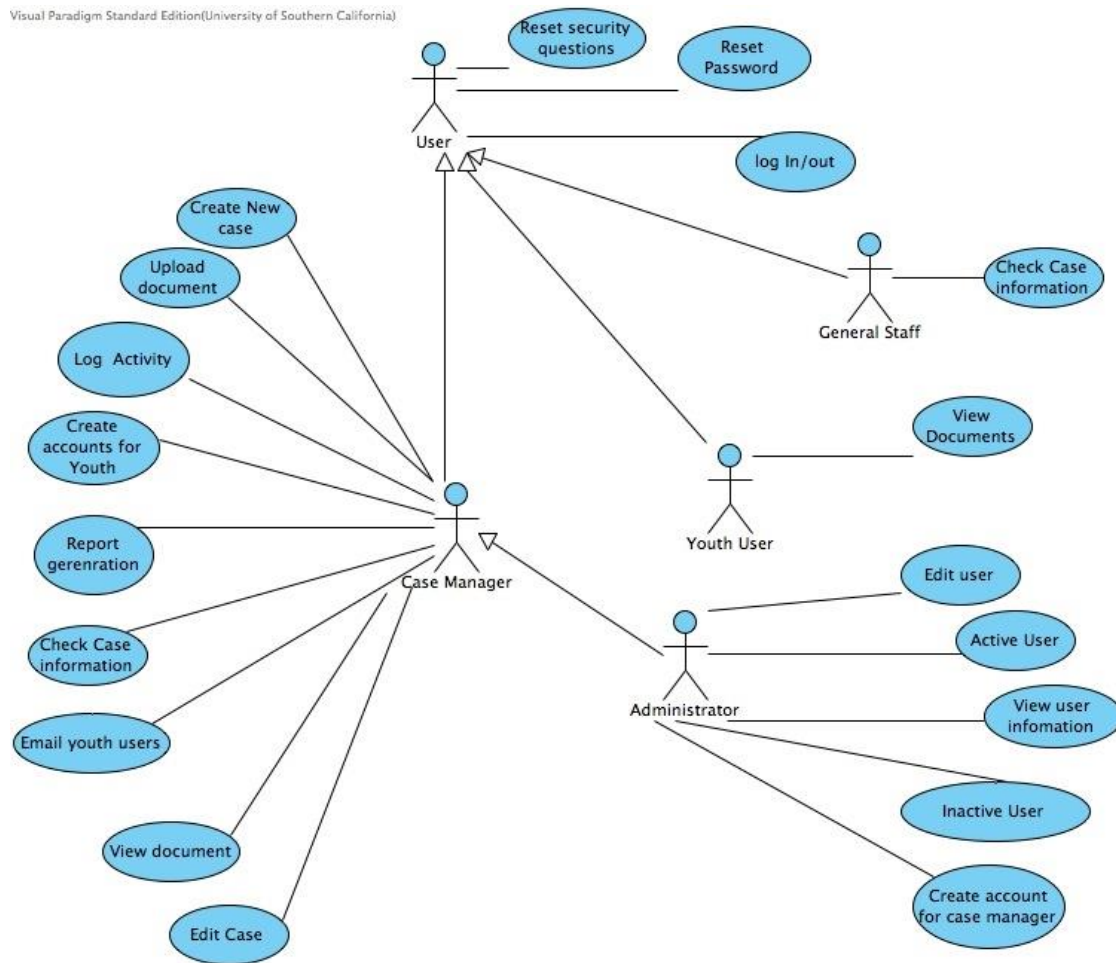
Figure 2 Process Diagram

2.1.3.1   Document Management

2.1.3.1.1   USE CASE 1:

Table 3 UC-1 Process Description: Upload document

Identifier	UC-1: Upload document
Purpose	Administrator or case manager can upload documents for a foster youth in the system

Requirements	
Development Risks	None
Pre-conditions	1. Only administrator and case manager can upload document 2. Administrator or case manager has logged into the system 3. Upload document function only in case information page 4. The paper edition of document has been scanned into the local machine as electric edition
Post-conditions	A new vital document will be uploaded into the system and a record of new uploaded document will appear in the case information

Table 4 UC-1 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator and case manager] Click "Add new"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, return document upload page
5	Choose document and type in the description of the document and click "Submit"	
6		Validate the information of description
7		If validate failed, return invalid description message
8		If validate succeed, insert document into document database

9		Update the case information page with new uploaded document record

2.1.3.1.2 USE CASE 2:

Table 5 UC-2 Process Description: View document

Identifier	UC-2: View document
Purpose	Administrator, case manager and youth user can see the vital document in the system
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator, youth user and the case manager can view 2. Administrator or case manager or youth user has logged into the system
Post-conditions	Users can see the information of the vital document

Table 6 UC-2 Typical Course of Action

Seq #	Actor's Action	System's Response
1	Click a specific document record	
2		Validate the role of users
3		If validate failed, return unauthorized information
4		If validate succeed, send doc request to document database
5		Database return document and generate a preview of document
6	Click "Download" or "Print"	

7		Validate the role of users
8		If validate failed, return unauthorized information
9		If validate succeed, send request corresponding controller

2.1.3.2   Case Management

2.1.3.2.1   USE CASE 3:

Table 7 UC-3 Process Description: Create a new case

Identifier	UC-3: Create a new case
Purpose	Create a new case for a new youth user in the system. The new case will include the basic information about this youth.
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator and case manager can create a new case 2. Administrator or case manager has logged into the system
Post-conditions	A new case will be created into the database

Table 8 UC-3 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator or case manager] Click "Create new case"	
2		Validate the role of user
3		If validate failed, return unauthorized action information

4		If validate succeed, return a case information page
5	Type in the information and click "Submit"	
6		Validate the information from case information page
7		If validate failed, return invalid information message
8		If validate succeed, insert case into case database return succeed message

2.1.3.2.2   USE CASE 4:

Table 9 UC-4 Process Description: Check case information

Identifier	UC-4: Check case information
Purpose	Administrator, case manager and general staff can see the information of a case
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator, case manager and general staff can check case information 2. Administrator, case manager or general staff has logged into the system
Post-conditions	System will return the page of case information and each authorized user can see the information even go into the detail

Table 10 UC-4 Typical Course of Action

Seq #	Actor's Action	System's Response

1	[Administrator, case manager or general staff] Click the case information link	
2		Verify the user if he/she is an administrator, case manager or a general staff
3		If verify success, return the page of case information
4		If verify fail, return a message of " Unauthorized access"

2.1.3.2.3 USE CASE 5:

Table 11 UC-5 Process Description: Edit Case

Identifier	UC-5: Edit case
Purpose	If some information of a youth has changed, administrator and case manager can edit the case information of the youth
Requirements	
Development Risks	None
Pre-conditions	1. Case should exist in the system 2. Administrator and case manager should login to the system
Post-conditions	New case information will be refreshed into the database

Table 12 UC-5 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator and case manager] Choose a specific case	
2		Send request to case database and receive the case information

3		Return a case information page
4	Click "Edit"	
5		Validate the role of user
6		If validate failed, return unauthorized action information
7		If validate succeed, return a case information page for editing
8	Type in the new case information and click "Submit"	
9		Validate the information from case information page
10		If validate failed, return invalid information message
11		If validate succeed, refresh the new information into database
12		Return a new case information page

2.1.3.2.4 USE CASE 6:

Table 13 UC-6 Process Description: Log an activity

Identifier	UC-6: Log an activity
Purpose	Administrator or case manager can log activities related to a foster youth.
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator and case manager can log an activity 2. Administrator or case manager has logged into the system 3. Log an activity can only be done in the case information page
Post-conditions	A new record of activity will appear in the case information

Table 14 UC-6 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator, case manager and general staff] Click "Add new"	
2		Return activity description page
3	Type in the information and click "Save"	
4		Validate the description of activity
5		If description is blank, return "Description should not be blank" message
6		If validate succeed, insert activity into case
7		Update new activity record in case information page

2.1.3.3   Report Generation

2.1.3.3.1   USE CASE 7:

Table 15 UC-7 Process Description: Report generation

Identifier	UC-7: Report generation
Purpose	Administrator or case manager can generate different many kinds of report to get information from system
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator and case manager can generate a report 2. Administrator or case manager has logged into the system

Post-conditions	A new report will be generated from the system automatically and can be print and download

Table 16 UC-7 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator and case manager] Click "Report"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, return report generation page
5	Choose the kind of report want to generate and type in necessary information	
6		Validate the choice of report
7		If choice is blank, return "Report cannot be blank" message
8		If validate succeed, then validate the information from report page
9		If validate failed, return invalid information message
10		If validate succeed, send request to case database, document database and user database
11		Receive information and generate a preview of report
12	Click "Print"	
13		Send request to corresponding controller

2.1.3.4   User Management

2.1.3.4.1   USE CASE 8:

Table 17 UC-8 Process Description: User login

Identifier	UC-8: User login
Purpose	Users can login to the system using their username and password
Requirements	
Development Risks	None
Pre-conditions	1. User should be exist in the system 2. User who login failed once should recognize the verification code in the picture
Post-conditions	None

Table 18 UC-8 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[All users] Type in username and password, click "Send Email Verification Code"	
2		Validate username to get user's email address. Generate a verification code randomly and send to user by email
3	Type in the verification code received, and click "Login".	

4		Validate password
3		If validate failed, return home page with verification code in the picture
4		If validate succeed, return main page

2.1.3.4.2 USE CASE 9:

Table 19 UC-9 Process Description: Create high-level user

Identifier	UC-9: Create high-level user
Purpose	Only administrator can create another administrator as well as a case manager and general staff.
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator can create high-level user 2. Administrator has logged into the system 3. Create high-level user can only happen in the user management system
Post-conditions	A new user will be created in the system and database will get the record of this user's username, password and some basic information such as name, email, phone and address

Table 20 UC-9 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator] Click "Use Management"	
2		Validate the role of user
3		If validate failed, return unauthorized action information

4		If validate succeed return user management page
5	Click "Create user"	
6		Return a user information page
7	Type in the information and click "Submit"	
8		Validate the information from user information page
9		If validate failed, return invalid information message
10		If validate succeed, insert the user into user database

2.1.3.4.3 USE CASE 10:

Table 21 UC-10 Process Description: Create a youth user

Identifier	UC-10: Create a youth user
Purpose	Administrator or case manager can create a youth user so that a foster youth will have an username and password to log into the system
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator and case manager can log an activity 2. Administrator or case manager has logged into the system 3. Create a youth user can only be done in the case information page
Post-conditions	A new user will be generated and the username and password will be recorded into the database. The username and password will send to the foster youth through email.

Table 22 UC-10 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator or case manager] Click "Create user"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, generate a random password related to the username, which is the email address in the case
5		Insert the new username and password in the user database and send request to case database
6		Connect case with a youth user and return generate succeed message

2.1.3.4.4 USE CASE 11:

Table 23 UC-11 Process Description: Edit user

Identifier	UC-11: Edit user
Purpose	If some information of high level user has changed, administrator can change the information of high level user
Requirements	
Development Risks	None
Pre-conditions	1. User should exist in the system 2. Administrator should login the system
Post-conditions	New user information will be refreshed into the database

Table 24 UC-11 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator] Click "User Management"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, return user management page
5	Click a specific user	
6		Send request to user database and return the user information page
7	Click "Edit"	
8		Return a user information page for editing
9	Type in new information and click "Submit"	
10		Validate the information from user information page
11		If validate failed, return invalid information message
12		If validate succeed, refresh new information into database
13		Return a new user information page

2.1.3.4.5 USE CASE 12:

Table 25 UC-12 Process Description: Activate user

Identifier	UC-12: Activate user
Purpose	If some off-system users want to come back system, administrator can activate corresponding user
Requirements	
Development Risks	None
Pre-conditions	1. User should exist in the system 2. User should be inactivated 3. Administrator has logged into the system
Post-conditions	A user will be successful activated in the system

Table 26 UC-12 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator] Click "User management"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, return user management page
5	Select a specific user and click "Activate"	
6		Check the status of user
7		If the status is activated, return wrong action message

8		If the status is inactivated, activate the user and change the status of user in the database

2.1.3.4.6 USE CASE 13:

Table 27 UC-13 Process Description: Inactivate user

Identifier	UC-13: Inactivate user
Purpose	If a user is no longer in the system, administrator can inactivate the user
Requirements	
Development Risks	None
Pre-conditions	1. User should exist in the system 2. Administrator has logged into the system 3. User should be activated
Post-conditions	A limited user and the related case will be inactivate in the system, only administrator can see inactivate case and then activate it.

Table 28 UC-13 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator] Click "User management"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, return user management page
5	Select a specific user and click "Inactivate"	

6		Check the status of user
7		If the status is inactivated, then return wrong action message
8		If the status is activated, then inactivate the user and change the status of user in database

2.1.3.4.7   USE CASE 14:

Table 29 UC-14 Process Description: Reset Password

Identifier	UC-14: Reset Password
Purpose	Administrator, case manager, general staff and youth user can change their own password after validating their answer to their security question
Requirements	
Development Risks	None
Pre-conditions	1. The user should login to the system. 2. The user should answer their security question
Post-conditions	New password will be refreshed into the database and return reset succeed message

Table 30 UC-14 Typical Course of Action

Seq #	Actor's Action	**System's Response**
1	[Administration and case manager] Click "Reset password"	
2		Validate the role of user
3		If validate failed, return unauthorized action information

4		If validate succeed, return password reset page
5	Type in the answer of security question	
6		Validate the information from password reset page
7		If validate failed, return invalid information message
8		If validate succeed, continue to set new password
9	Type in the new password and confirm it, click "Submit"	
10		Validate the information from password reset page
11		If validate failed, return invalid information message
12		If validate succeed, refresh the new password into the database and return reset succeed message
13		Return to case management page

2.1.3.4.8 USE CASE 15:

Table 31 UC-15 Process Description: Reset Security Questions

Identifier	UC-15: Reset Security Question
Purpose	Administrator and case manager can change their security questions or help the user whom they are responsible for to change the security questions
Requirements	
Development Risks	None

Pre-conditions	1. The user should exist in the system.
	2. Administrator and case manager should login to the system
Post-conditions	New security questions will be refreshed into the database and return reset succeed message

Table 32 UC-15 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administration and case manager] Click "Reset security questions"	
2		Validate the role of user
3		If validate failed, return unauthorized action information
4		If validate succeed, return security questions reset page
5	Type in the previous answers of security questions, select new security questions and type in new answers and click "Submit"	
6		Validate the information from security questions reset page
7		If validate failed, return invalid information message
8		If validate succeed, refresh the new security questions and answers into the database and return reset succeed message
9		Return to case management page

2.1.3.5   Mass Email

2.1.3.5.1   USE CASE 16:

Table 33 UC-16 Process Description: Mass Email

Identifier	UC-16: Mass Email
Purpose	Administrator, the case manager and general staffs can send email to notify youth users
Requirements	
Development Risks	None
Pre-conditions	1. Only administrator, the case manager and general staffs can send Email through the system 2. The Email can only be sent to specified youth users 3. Administrator, case manager or general staff has logged into the system
Post-conditions	Email will be sent to specified youth users and added to the database

Table 34 UC-16 Typical Course of Action

Seq #	Actor's Action	System's Response
1	[Administrator, case manager and general staff] Choose a group of users and click button "Next"	
2		Verify the user if he/she is an administrator, case manager or a general staff
3a.1		If verify success, find Email addresses for selected youth users in the database

3a.2	Choose an email template and click "Send Email"	
3a.3		Sent the Email and add activities for each case to the database
3b		If verify fail, then return a message of "Unauthorized access"

2.1.4 Modes of Operation

The E-Lockbox will operate in only one mode, so nothing further need to be said of modes of operation.

2.2 System Analysis Rationale

1. Based on how users will interact with system, we want to give the basic description of four different levels of users are available in the E-Lockbox system:
(1) Youth users: This user will be the youth responsible by Living Advantage. User can view their vital files in the system and contact case manager offline when it's necessary.

(2) Case managers: This user can upload vital files for foster youth and view foster youth's files. Also, the case managers can help foster youth when they need help, and track history, generate report.
(3) Administrators: This user is the highest level of authority in the system. User will be responsible to manage other users, files and cases in the system including activate and deactivate files, cases and users etc.
(4) General staff: This user will be able to view case information, which not include the information of vital files of foster youths.

2. According to the system context diagram and user case diagram, we want to make following explanation:
(1) Each manipulation of each role according to system context diagram may correspond to many user cases listed from 2.1.3.1, which the user cases start from 2.1.3.1 will not be the whole of this system. We will update more user cases based on new version of operational concept, requirements and prototype.

3. Technology-Independent Model

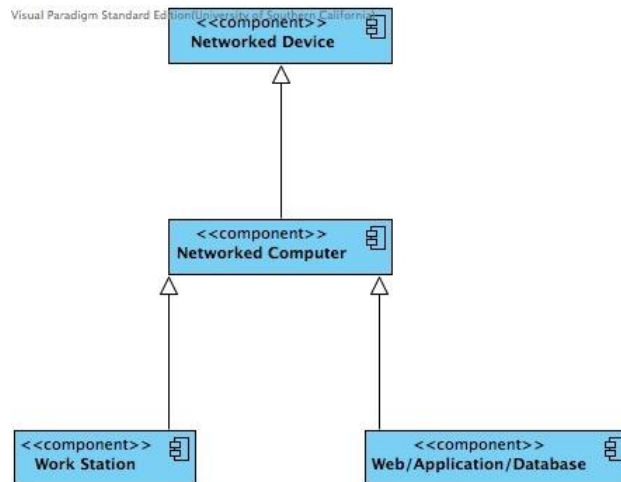## 3.1 Design Overview

3.1.1 System Structure
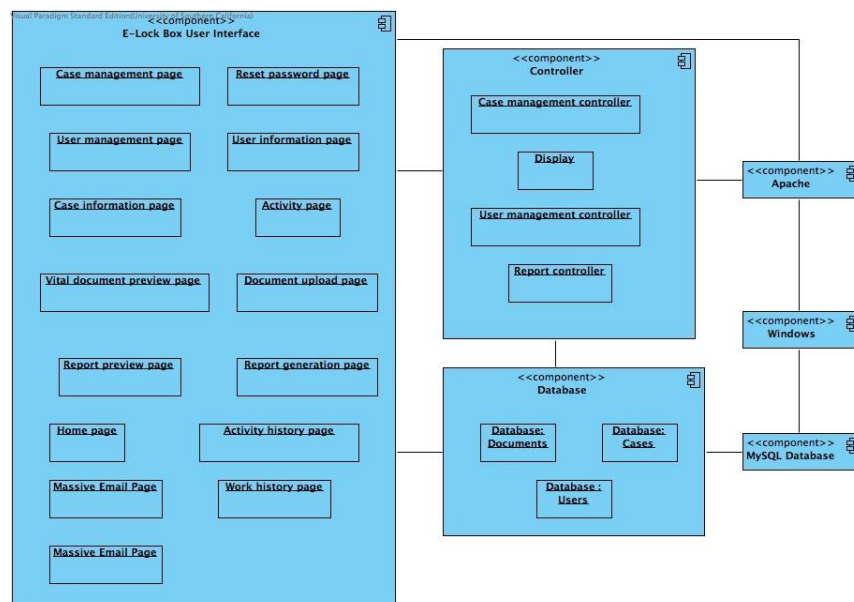

Figure 3 Hardware Component Class Diagram
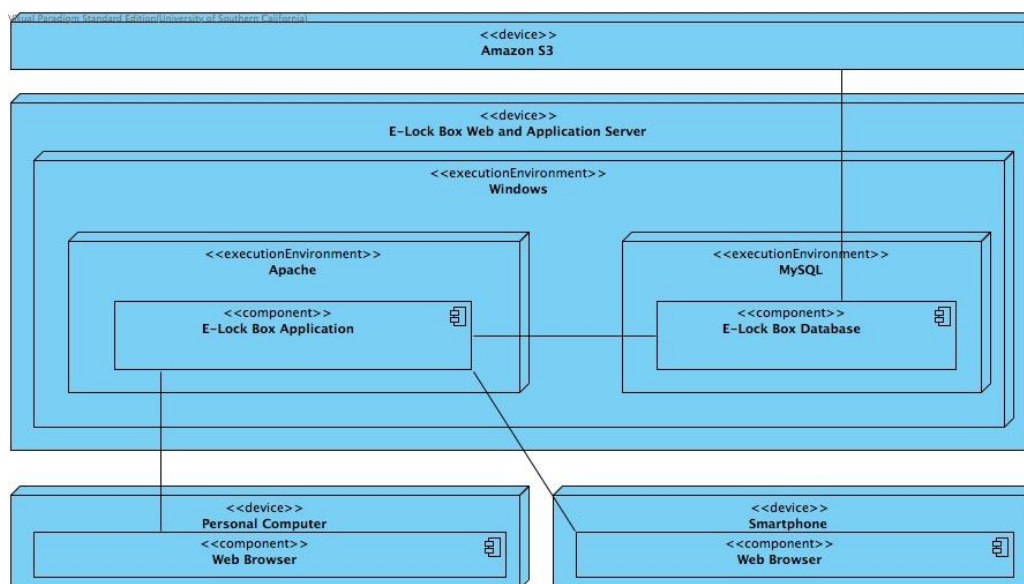

Figure 4 Software Component Class Diagram

Figure 5 Deployment Diagram

Table 35 Hardware Component Description

Hardware Component	Description
Networked Computer	It is a server that receive requests from Client and response the request
Work Station	Workstation is a station that a client runs. It request to the server. It includes google chrome.
Web/application/database	

Table 36 Software Component Description

Software Component	Description
Login Page	User can Login through this page
View Case Information Page	It contains the information about the case of the chosen limited user.
Case Manager Basic Information Page	It contains the information about the case manager who controls a case
View Cases Page	It contains list of the cases that can be clicked to view detail
Account Information Page	It contains the logged in user's information and the user can update and change their password

| Case Page	It contains all information for a foster youth including contact information, education and work history and vital document records
Activity Item Page	It contains all activity information
Edit Case Page	Case Manager and Administrator can edit the case page
Create New Case Page	Through this page, selected user can create new case.
Create New Activity Page	It can create new activity.
Generate User Page	It can create new user
Generate Report Page	Selected users can create report about the limited users' demographic, etc.
Case Manager Information Page	It contains a selected case manager's information.
Personnel Management Page	It contains all users' information. Through this page, administrator can activate, or deactivate user accounts
Massive Email Page	Case Manager and Admin can selected youth users from goups

3.1.2 Design Classes

3.1.2.1   <Classes n>
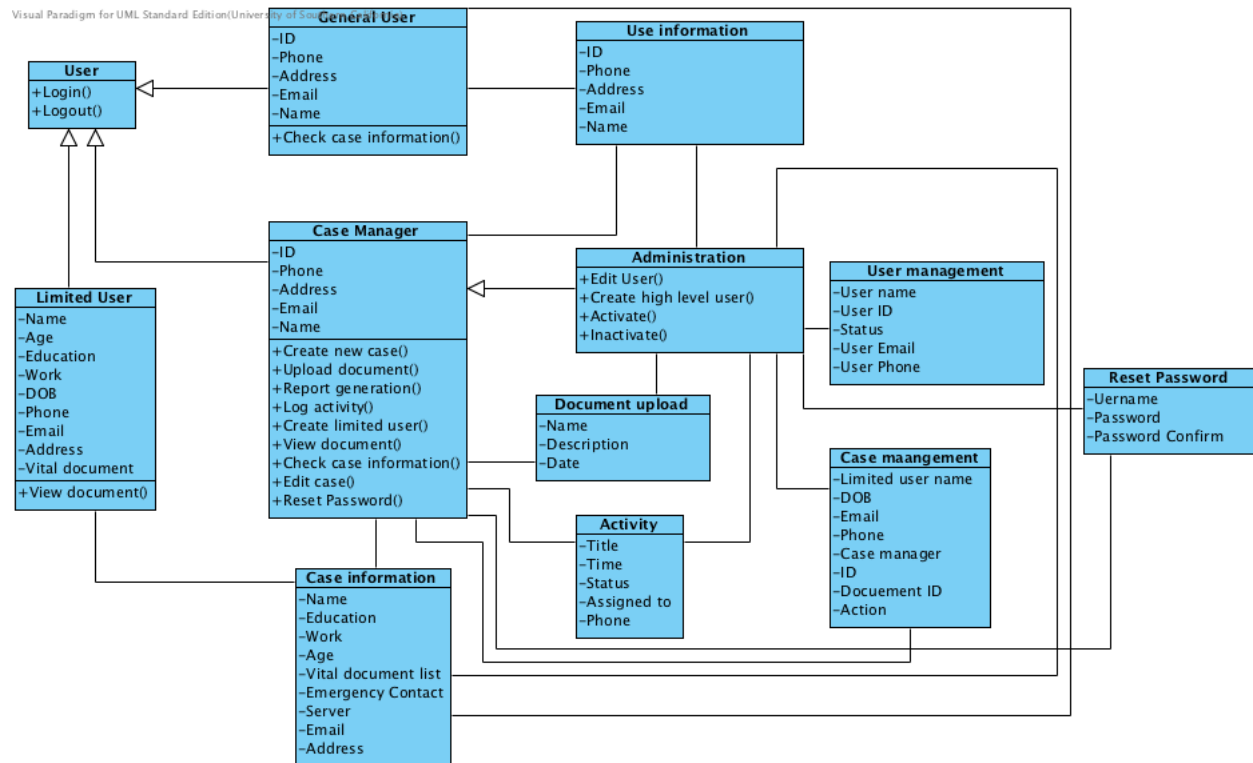
Figure 6 Design Class Diagram

Table 37 Design Class Description

Class	Type	Description
User		Any user can login and logout of the system
Limited User		Limited user will have his basic information and he only can view document.
General User		General user has his basic information and he has limited access to the system
Case manager		Case manager will has his basic information and some authorized access to the system
Case information		This class will help limited user class to record all necessary information of him.

User information		This class will help general user, case manager and administrator to record necessary information.
Administrator		Administrator inherit from case manager with adding more access to the system.
Document upload		This class will help to record necessary information when uploading a document.
Activity		This class will log information of an activity.
User management		This class will be used in user management.
Case management		This class will be used in case management.
Reset password		This class will be used to reset password.

3.2 Design Rationale

We designed the system according to different level of access to the system of different kinds of users. Each user will have its information, while youth user is the reason we building this system so they will have more specific information in the system. Other classes or pages are used to implement the different level of access and different kind of function of the system according to the requirement from clients.
We deploy the system according to the fact that clients may not be able to supply device to store real data in the system, so we will store the real data in the Amazon and the database we have are mainly contain the index of each kind of data.

We describe software and hardware in high-level abstraction, so we don't go into the detail of each part. For design class diagram, we just include some basic class in the system, which will be mainly used, and the whole system may be more complicated.

4. Technology-Specific System Design
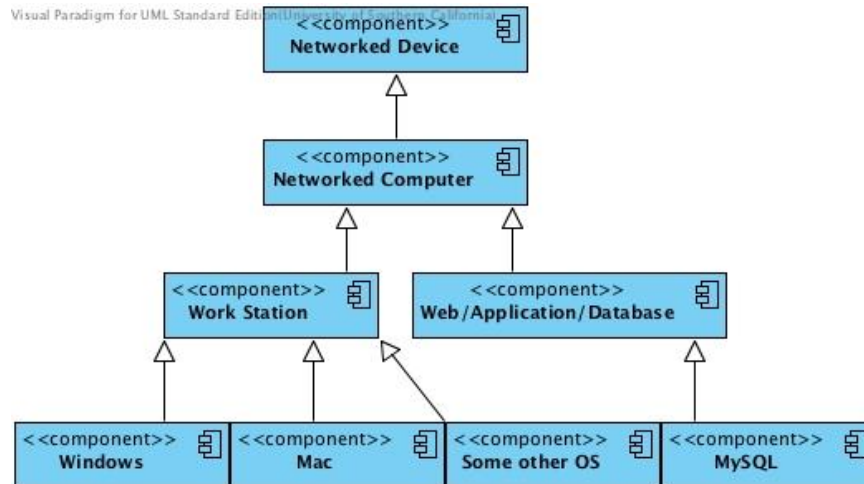
4.1 Design Overview

4.1.1 System Structure

Figure 7 Hardware Component Class Diagram

Table 38 Hardware Component Description

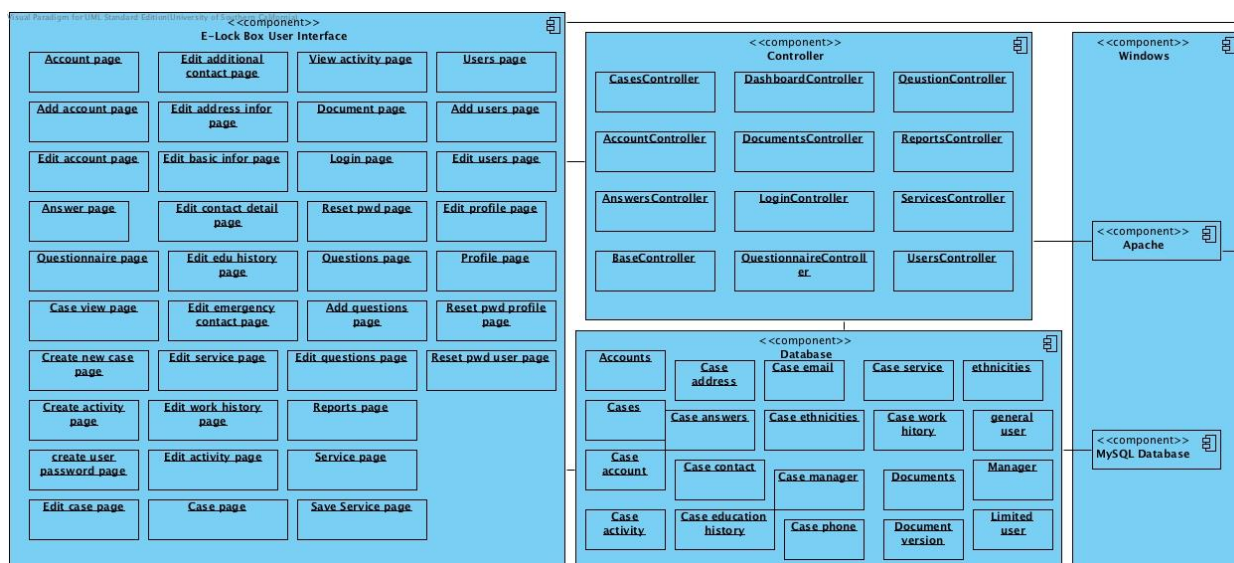| Hardware Component	Description
Networked Computer	It is a server that receive requests from Client and response the request
Work Station	Workstation is a station that a client runs. It request to the server. It includes multiple kind of operating system with different kind of browsers like Google chrome.
Web/application/database	

Figure 8: Software Component Class Diagram

Table 39: Software Component Description

Software Component	Description
Case management page	It contains a list of cases that a case manager is responsible for and also it's the main page when a case manage or administrator or general user login the system.
User management page	It contains a list of users in the system, including their users' id and status and so on. Only administrator can access it.
Case information page	It contains all necessary information the system need to use for a foster youth, including name, email, phone, address, and education history and so on.
Vital document preview page	It contains screenshot of vital document.
Report preview page	It contains screenshot of generated report.
Home page	It used to login the system by any users.
Search result page	It contains the result of a search.
Reset password page	It contains the necessary information for resetting password, including username, new password and password confirm etc.
User information page	It contains necessary information for a high-level user, which means administrator, case manager and general user, including name, phone, and email and so on.
Activity page	It contains the necessary information you need to type in to build a legal activity record.
Document upload page	It contains necessary description for uploaded document and some functions for choosing the document you want to upload.
Report generation page	It contains the type of report you want to generate.
Activity history page	It contains the history of the activities for a foster youth.

| Work history page	It contains the history of education of a foster youth.
Case management controller	It used to control all case related workflow in the system. Any message that related to the case needs to deliver to it first.
Display	It used to display different kind of message or information.
User management controller	It used to control all user related workflow, which user only means high-level users.
Report controller	It used to generate report and interact with different kind of database.
Database: Documents	It contains all vital document index
Database: Cases	It contains all cases index
Database: Users	It contains all user index
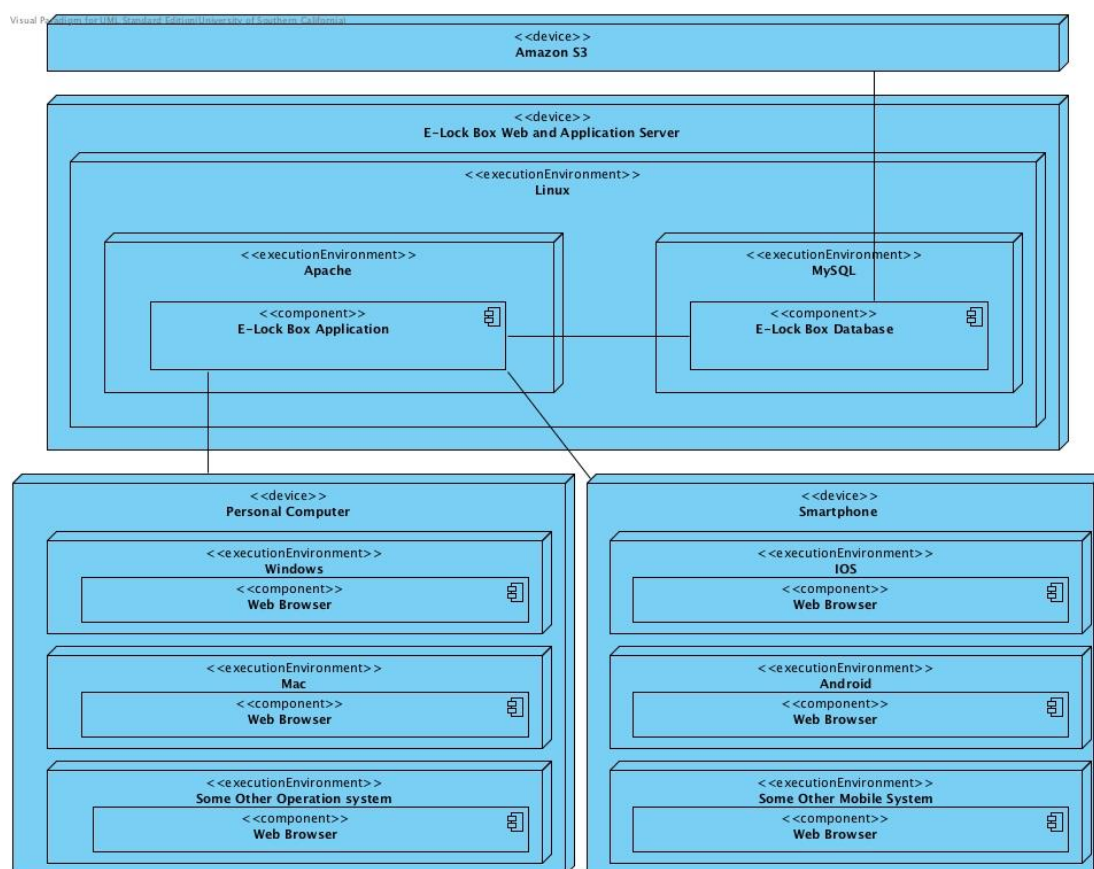
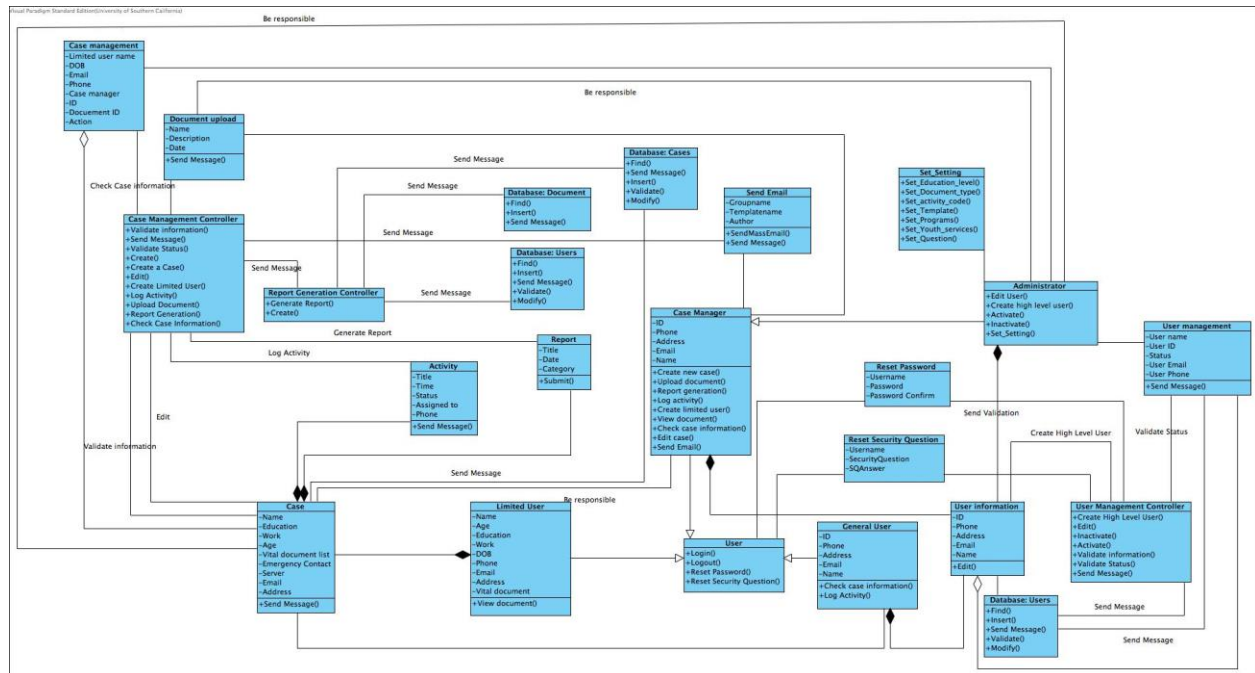**Figure 9: Deployment Diagram**

4.1.2 Design Classes

4.1.2.1   <Classes n>

Figure 10 Design Class Diagram

Table 40 Design Class Description

Class	Type	Description
User		Any user can login and logout of the system
Limited User		Limited user will have his basic information and he only can view document.
General User		General user has his basic information and he has limited access to the system
Case manager		Case manager will has his basic information and some authorized access to the system
Case information		This class will help limited user class to record all necessary information of him.
User information		This class will help general user, case manager and administrator to record necessary information.
Administrator		Administrator inherits from case manager with adding more access to the system.

Document upload		This class will help to record necessary information when uploading a document.
Activity		This class will log information of an activity.
User management		This class will be used in user management.
Case management		This class will be used in case management.
Reset password		This class will be used to reset password.
User management controller		This is used for dealing with all user related issue.
Case management controller		This is used for dealing with all case related issue
Report		This class will be used to generate report.
Report controller		This is used for generating report related issue
Database: Users		This is used to store user entity.
Database: Documents		This is used to store vital document entity.
Database: Cases		This is used to store case entity.
Send Email		This is used to send email.
Reset Security Question		This is used to reset security question.
Set Setting		This is used to set some features

4.1.3 Process Realization

The process diagram will show some sequence diagram for most risky or important use cases in the system.

4.1.3.1 Reset Password

This is a significant use case for security of the system. All users can change their passwords if their answer to the security question is correct and the password.
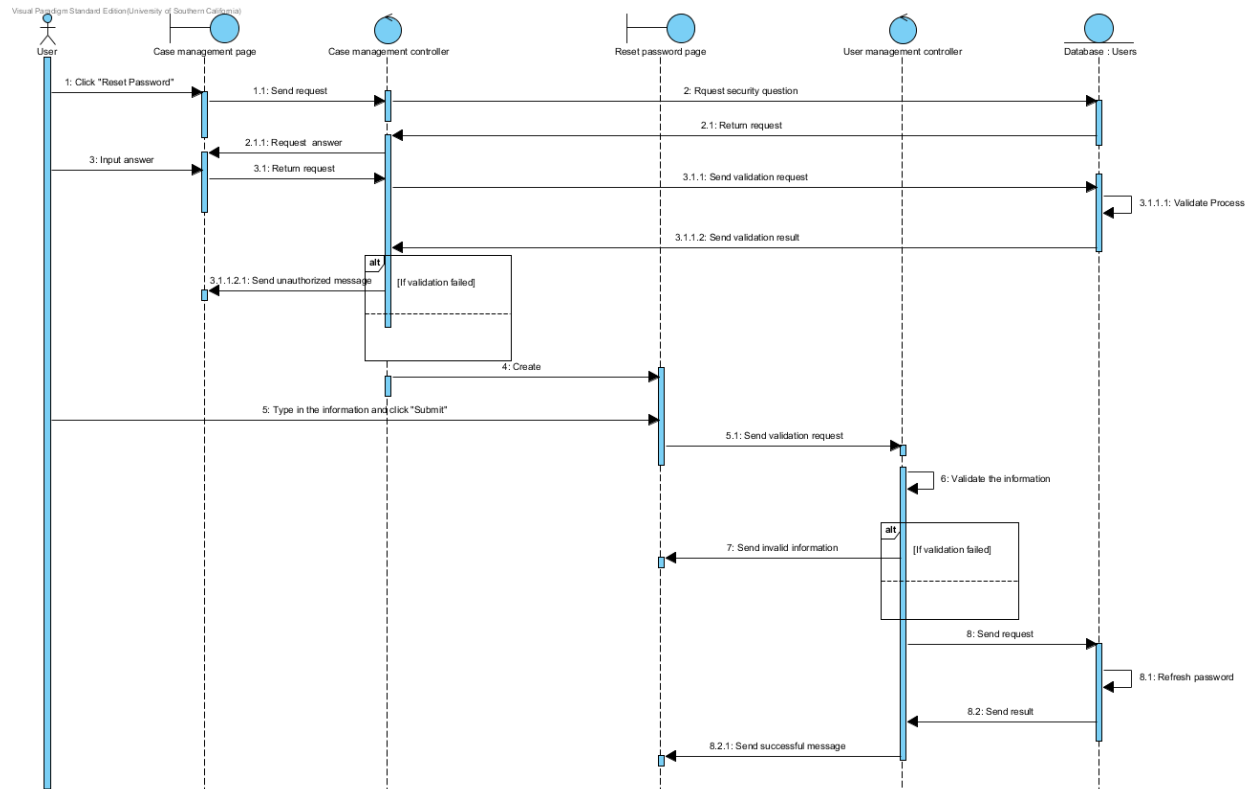
Figure 11 Process Realization Diagram: Reset Password

4.1.3.2 View Document

Youth users can easily access to their life vital documents. While the youth users want to print or download documents, they are required to input the verification code which has been sent to their email. Otherwise, the operation is invalid.

Figure 12 Process Realization Diagram: View Document

4.1.3.3 Upload Document

This is one of most important use case in the system. If we want to store vital document from foster youth secure, we need this function to upload the document into a safe database.
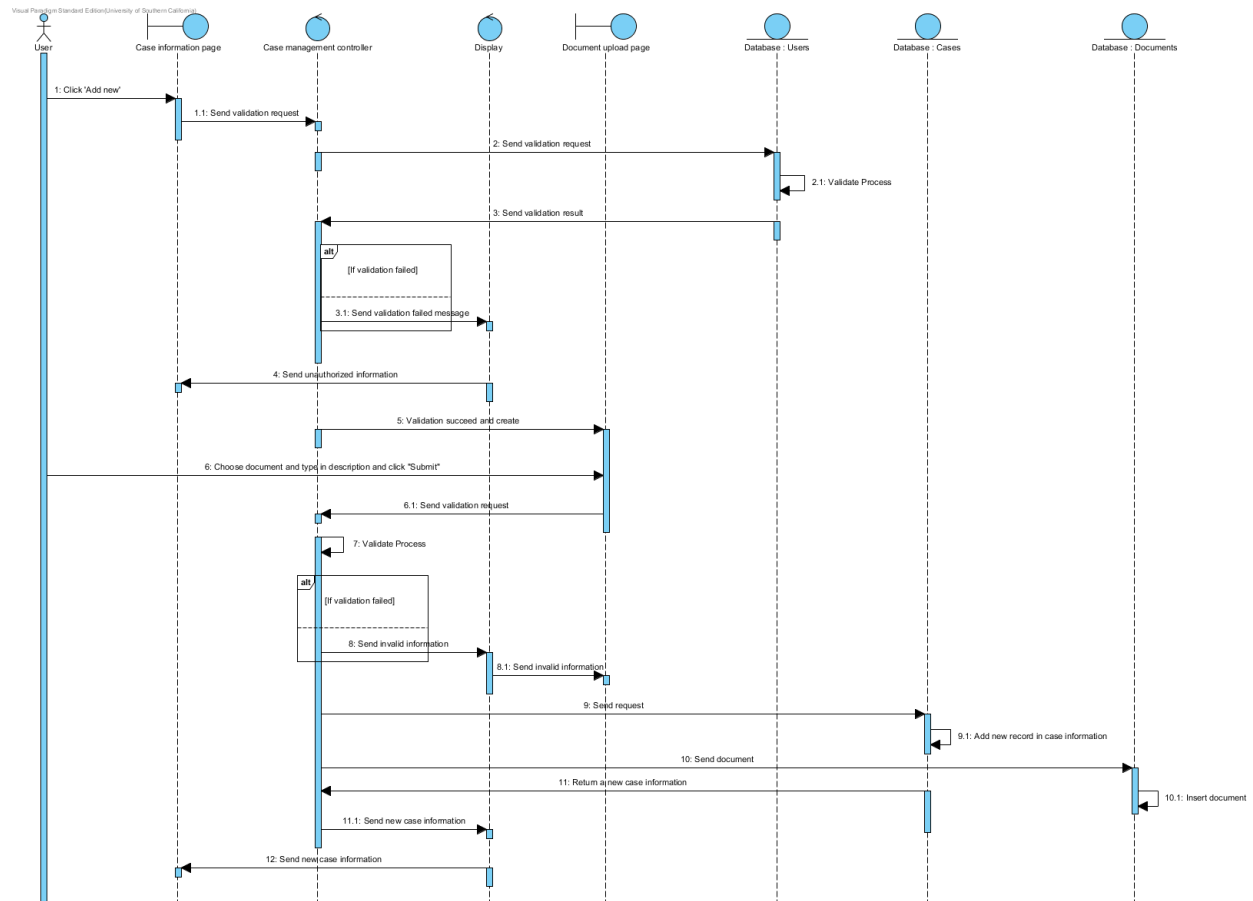

Figure 13 Process Realization Diagram: Upload Document

4.1.3.4 Create new case

For this use case, it's one of the highest priorities in the system. When we want to help any foster youth, we need to create a case for him or her and then track case information. We can have a case without create a related user, which means the related foster youth may not be a limited user in the system but once they become a limited user in the system, they will be connected to a exist case.
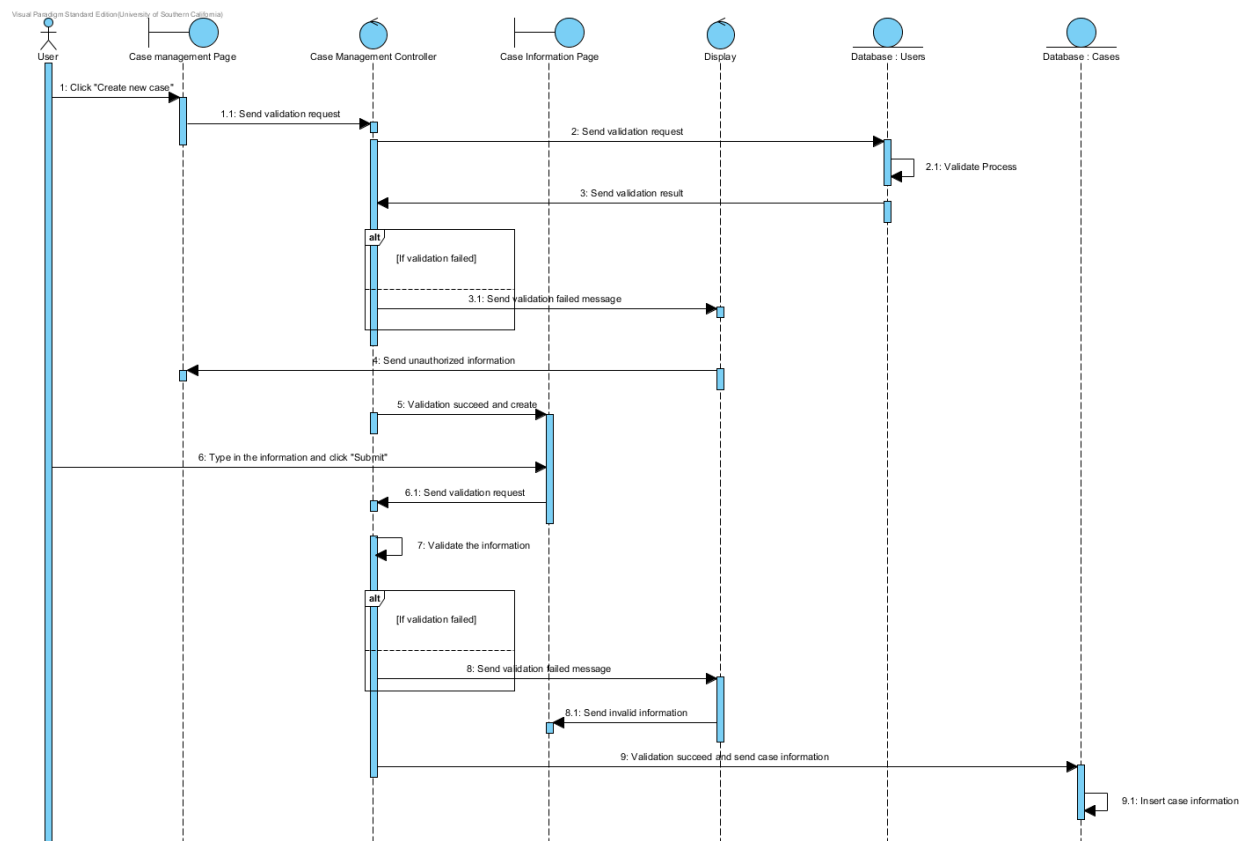

Figure 14 Process Realization Diagram: Create new case

4.1.3.5 Create high-level user

Create a high level user just like create a case for foster youth, this is the only way to add more people to help foster youth. Also, it's one of the most priority functions.
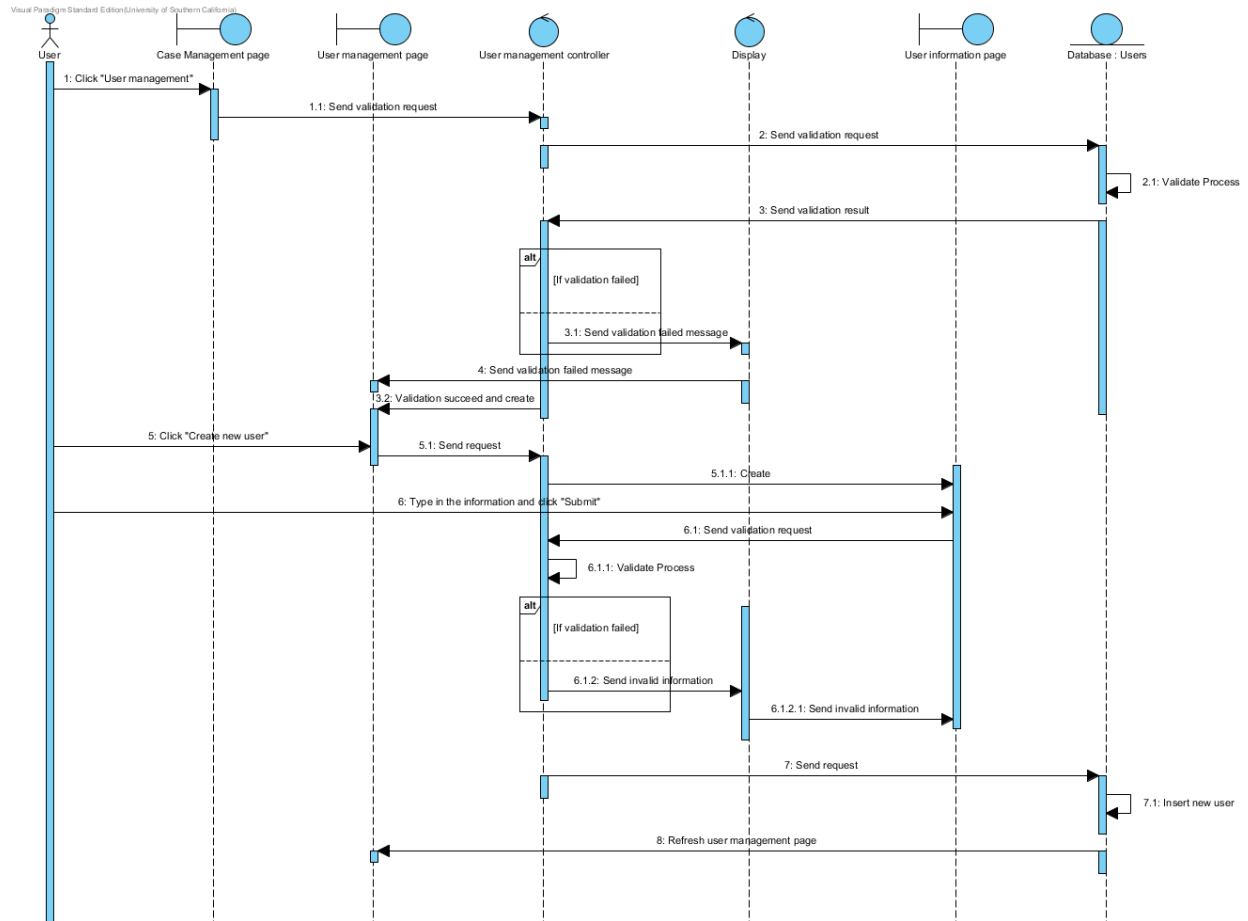

Figure 15 Process Realization Diagram: Create high-level user

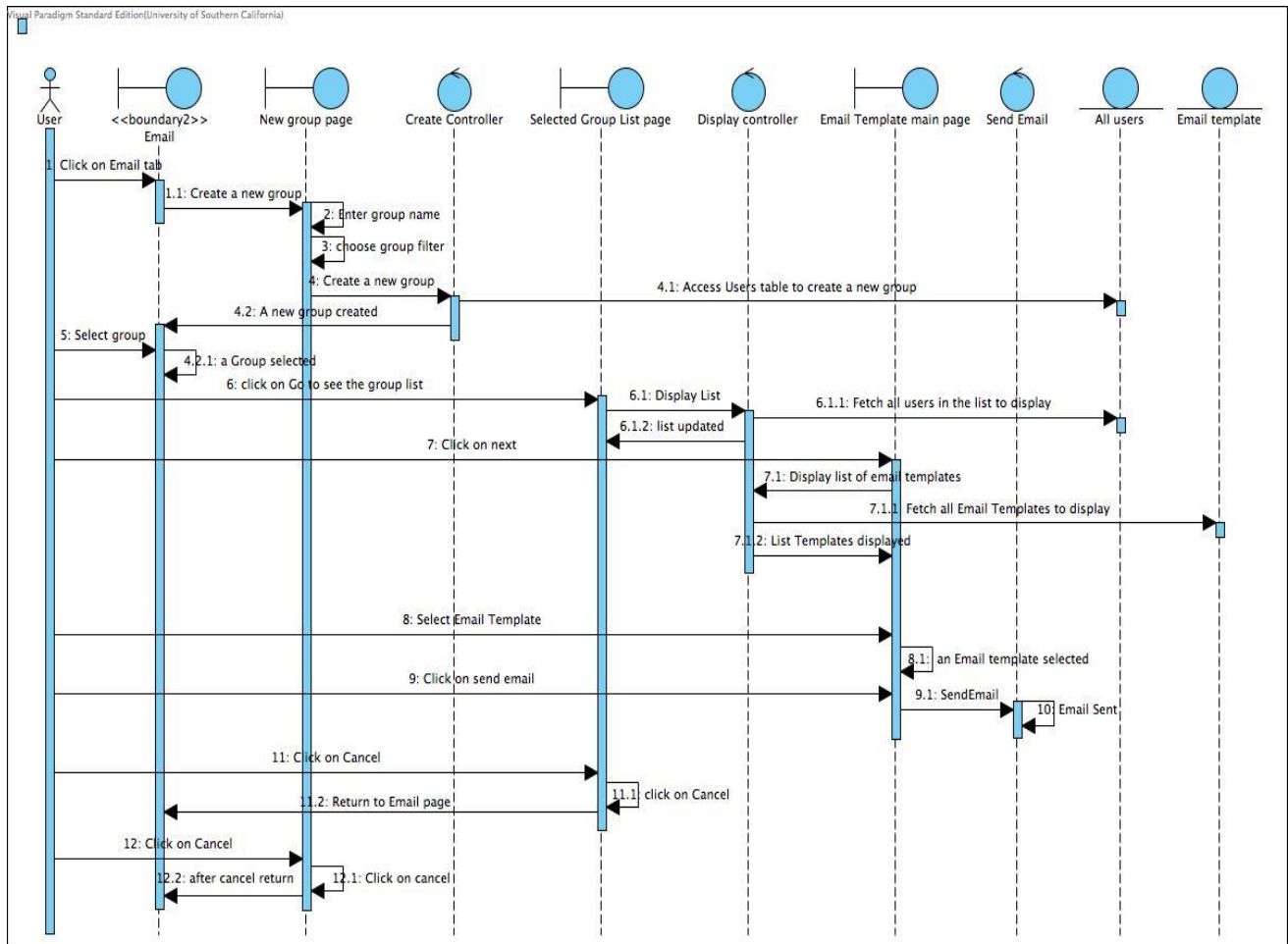## 4.1.3.6 Mass email and Create email Template

Figure 16 Process Realization Diagram: Create new group and send mass email

4.2 Design Rationale

We designed the system according to different level of access to the system of different kind of user. Each user will have its information, while limited user is the reason we building this system so they will have more specific information in the system. Other classes or pages are used to implement the different level of access and different kind of function of the system according to the requirement from clients.
We deploy the system according to the fact that clients may not be able to supply device to store real data in the system, so we will store the real data in the Amazon and the database we have are mainly contain the index of each kind of data.

We descript software and hardware in high-level abstraction, so we don't go into the detail of each part. For design class diagram, we just include some basic class in the system, which will be mainly used, and the whole system may be more complicated.

5.   Architectural Styles, Patterns and Frameworks

Table 41 Architectural Styles, Patterns, and Frameworks

Name	Description	Benefits, Costs, and Limitations
MVC Architecture	Model–view–controller (MVC) is a software architecture pattern, which separates the representation of information from the user's interaction with it. It include model, view and controller in this architecture, following are the descriptions of each: **Controller:** A controller can send commands to the model to update the model's state. It can also send commands to its associated view to change the view's presentation of the model. **Model:** A model notifies its associated views and controllers when there has been a change in its state. This notification allows the views to produce updated output, and the controllers to change the available set of commands. A passive implementation of MVC omits these notifications, because the application does not require them or the software platform does not support them. **View:** View requests information from the model that it needs for generating an output representation to the user.	**Benefits:** 1. Separation of concerns: The separation the three components, allows the re-use of the business logic across applications. Multiple User Interfaces can be developed without concerning the code base. 2. Developer specialization and focus: The developers of UI can focus exclusively on the UI screens without bogged down with business logic. **Costs:** There is no specific cost required to use MVC architecture. **Limitations:** 1. Because of the decoupling of MVC, it may increase complexity of the system. 2. MVC need multiple programmer and knowledge of multiple programming. 3. Inefficiency of data access in view.