

Online DVD Rental System -RentIT

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Project Goal

In this project, we plan to design and implement a web based system named RentIT. Customers could rent movies online and this system could manage the whole process of the business. Also this system should solve some main issues with error tolerance and extendibility. The source code can be checked out from <http://rentdvd.googlecode.com/svn/trunk>.

Introduction to the DVD Rental Service

Online video rental services allow a person to rent DVDs. These DVDs are delivered to the customers by mail. Basically, all the transactions that happen between customers and rental companies are conducted online by the rental service websites. Most companies operate on the following model [1]:

- The customer creates an account on the website of the rental company and adds films that they want to watch to the wish list.
- Movie discs having the titles from the list are mailed to customers.
- After customers finish using the films, they return the DVDs to the nearest branches of the rental company.

The company will let customers keep the films for a definite period depending on the type of plan the customer has opted for. The number of the movies that one customer can hold is also dependent on the type of the plan. Usually, once a disc is returned, next one will be mailed to the customer. Most of the companies have a limit on the total number of discs that one customer can rent in a month. But there is a flexibility to upgrade into premium plans to have better period and limit on DVDs. There are couples of such kind of companies, for example, Blockbuster, Netflix, eHit and LOVEFiLM. The companies offer different plans to the customers. And usually the plans are more or less like the following:

Unlimited-"These plans have no maximum of the number of movies a user can rent per certain period of time, although there is a limit on the number one may have out at any one time. As a result, the higher the limit is, the higher the monthly charge is." [1]

Limited-"This kind of plan has a limit on the number of discs one customer could have at one time and also there is a maximum total of discs that one customer could rent within each billing period(usually monthly). This sort of plan is cheaper than the 'unlimited' plan." [1]

[1] Pay as You go-"This plan allows individual rentals for a fixed fee without any monthly fee. [1]
Package-The most significant difference between this plan and the others is that there are a certain number of discs contained in the package. So the customers can rent a bunch of DVDs at one time." [1]

Requirement and Function Design

To meet users' requirement, the role should be defined ahead. There are two roles in our system: the customer and the administrator. For example, the customer needs to add the DVDs to the queue and later the DVDs will be delivered in the order of the queue. The other role is the administrator who manages the business through this system. There are different types of customers regarding the services that the provider could offer. For example, in our system there are three service plans: 'Unlimited', 'Limited' and 'Pay as You Go'. So they should be distinct from each other. Also, there are two types of administrators too. One is the primary administrator or clerk who is in charge of adding movies, deleting movies. The other is the super administrator who can access the confidential information of the system like user accounts, popular DVDs and income. Figure 1 shows the system role.

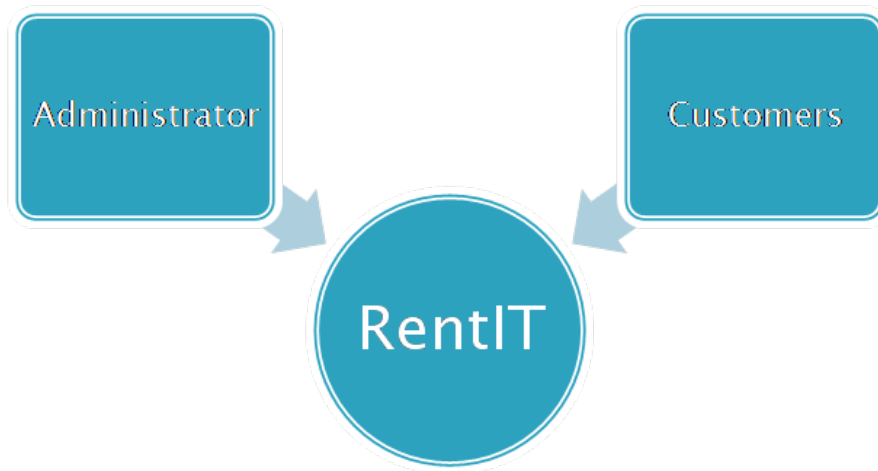


Figure 1 Role in the RentIT system

The customer's requirement is as Table 1.

Requirement	Description
Account management	<ul style="list-style-type: none">• Register an account online.• Edit personal information: date of birth, residential address, E-mail address and phone number.• Change service: plans, payment methods, suspend plans, reactivate plans and close accounts.
Search for movies	<ul style="list-style-type: none">• Search for movies by titles, authors, directors, years, genres, actors and rating.
Browse movies	<ul style="list-style-type: none">• Browse movies by categories.• View the latest movies.• View 'Top 10 list', 'Award list' and so on
Manage queue of watch list	<ul style="list-style-type: none">• Edit movie list from the queue.• Change the order of a DVD: the customer could adjust the priority of the movies to be delivered.
Review movies	<ul style="list-style-type: none">• Add comments to a movie• Read comments from other customers• Delete own comments• Update comments
Keep track of DVDs	<ul style="list-style-type: none">• View DVDs that at the customer's hand.• View DVDs that are unavailable currently.• View DVDs that have not been delivered.

Extended functions	Description
Friends management	<ul style="list-style-type: none"> • Add a friend to the friend list. • View a friend's queue or history. • Privacy settings.
Search history control	<ul style="list-style-type: none"> • Customers can choose to save the recent search results: after user search for movies, the results could be saved with a name give by the customer. • Delete search history: user can delete previous search results.

Table 1 Customer Requirement List

The administrator's requirement is as Table 2.

Requirement	Description
Customer account management	<ul style="list-style-type: none"> • View a customer's account detail. • List all the customers with their status. • View a customer's renting history including what DVDs and when they rent.
Movies management	<ul style="list-style-type: none"> • Add new movies. • Add/Edit movies' information: titles, years, category, length, actors and directors. • List all the movies and their status. For example, the number of a certain DVD. • Automatically set the ratings of movies by the number of the requests.
Extended functions	Description
System report	<ul style="list-style-type: none"> • View the list of most popular DVDs.
Profile management	<ul style="list-style-type: none"> • Edit administrator password.

Employee management	<ul style="list-style-type: none">Specify the administrators into more detail: clerk and manager. And they have particular authorization to access the information of the system.
Income review	<ul style="list-style-type: none">Get revenue information within a period of time like a month

Table 2 Administrator Requirement List

Project Organization

This project contains series of tasks that need to be accomplished to guarantee the correctness and robustness of the system in order to fully meet the ultimate goal – what users truly want. Here there is a syntactic confusion with the term users. It means both administrator and customers regarding to the notification inside of the system. As to the software engineering, users means all the objects will utilize the system to satisfy their needs. [2]

- Requirement

1. Eliciting requirements: We are going to communicate with users or customers to determine what their requirements are.
2. Analyzing requirements: Eliminate those unclear statements from users including incomplete, ambiguous or conflicting issues.
3. Recording requirements: Oral statement will be translated to the documents such as use cases, user stories or process specification.

- Function Design

1. Based on the requirement documents generated in the first task, a plan needs to be developed for a solution.
2. Painting out the system architecture, we may take abstraction, refinement or modularity methods to portrait the system from different facades.
3. Several points need to be considered: Extensibility, fault-tolerance, reliability, robustness and usability. Especially the usability needs to be paid more attention so that the interface must be intuitive enough to the target users.

- Implementation

1. Our team will accomplish this system based on web pages. PHP and MySQL is the main technology we are going to use in this project.
2. We will work out the actual pages and function according to the function design specification from last phase.
3. Dealing with database, we will design and create schemas in the database to store the information needed as backend utilizing the knowledge we will learn from the class.
4. Design web pages that make interaction between the users and the system more intuitive and joyful.

To specify the steps, we have:

- Customer function implementation
- Administrator function implementation

- Testing & Evaluation

1. After finishing all the implementation tasks we will have unit test, integrated test and system test.
2. Also we should verify if the system has fully meet users' requirement and also conforms to the design specification.

- Deployment

- To get a clear view of the time line, please see Figure 2.

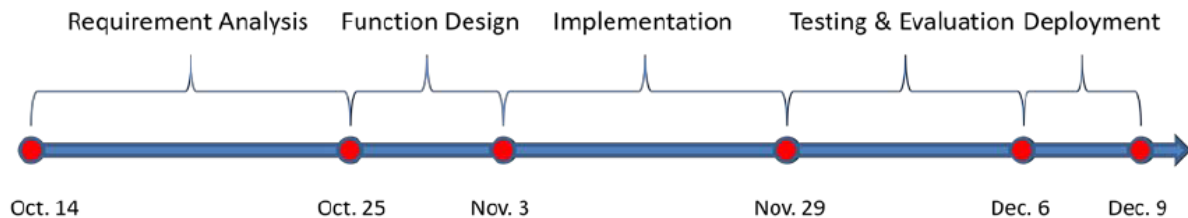


Figure 2 Project Timeline

Role

Table 3 shows the organization of our group.

Name	Requirement Analysis	Function Design	Implementation	Testing	Deployment
Aaron	<input checked="" type="checkbox"/>	Web Design	DB & Web Development	DB testing	<input checked="" type="checkbox"/>
Devarshi	<input checked="" type="checkbox"/>	Web & DB Design	DB Implementation MySQL	Web Testing	<input checked="" type="checkbox"/>
Ilhan	<input checked="" type="checkbox"/>	Web Design	DB & Web Development	DB testing	<input checked="" type="checkbox"/>
Snehal	<input checked="" type="checkbox"/>	DB & Web Design	DB & Web Development	DB testing	<input checked="" type="checkbox"/>
Vinod	<input checked="" type="checkbox"/>	DB Design	DB Implementation MySQL	Web Testing	<input checked="" type="checkbox"/>

Table 3 Project Organization

E-R Model

Figure 3 shows the ER model of RentIT system.

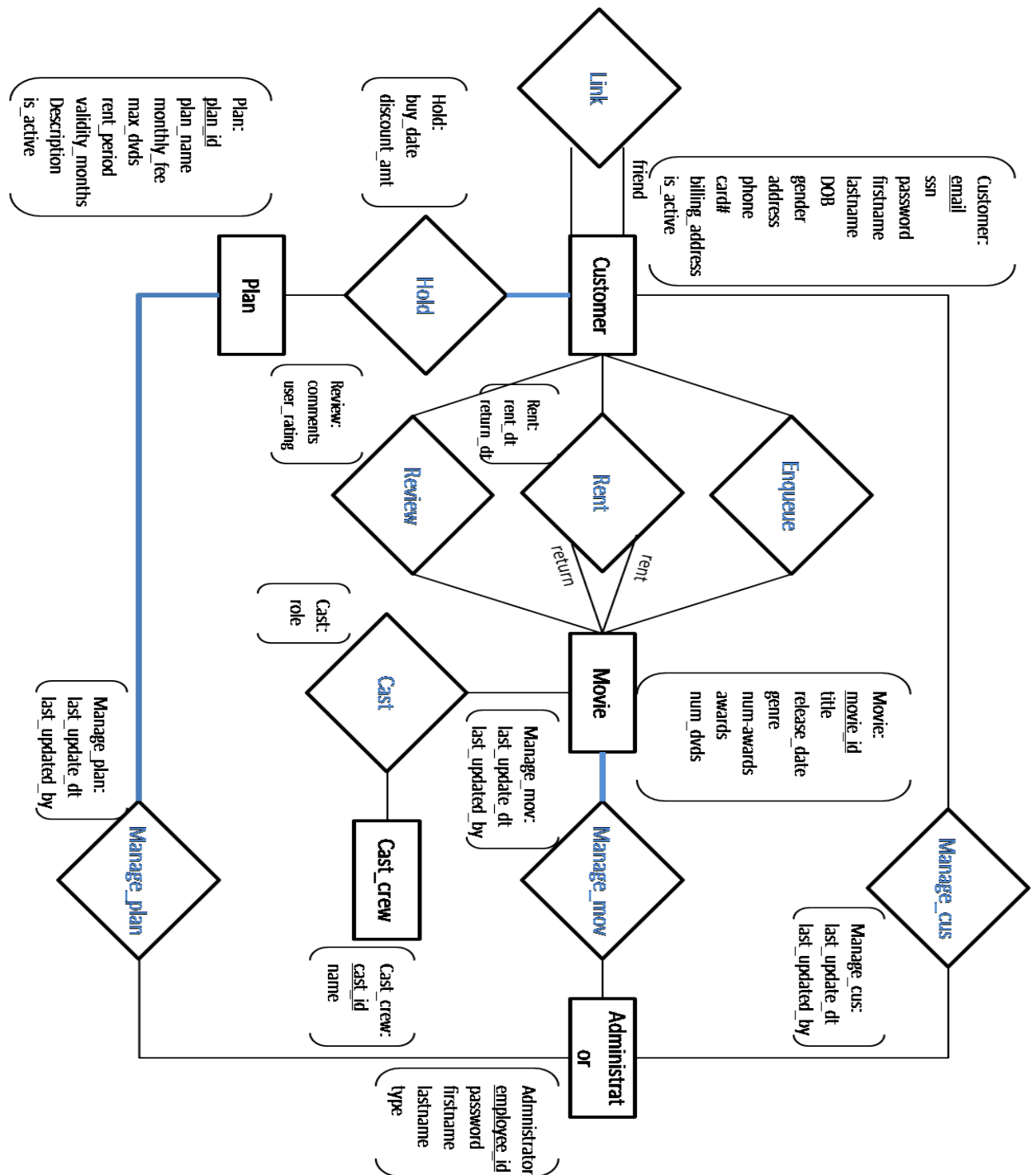


Figure 3 ER Model of RentIT system

Customer Entity:

The details on the customer such as name, email-id, date of birth and more are maintained.

Movie:

The details on the movies such as movie name, id, genre, actors and more are being Managed.

Rental Service

The Rental service entity holds the details on the plan of the rental that a customer can choose.

Cast Crew:

The Cast and crew of a movie is maintained in this entity which is being maintained by the Movie entity.

Administrator:

The administrator maintains and manages the information on the Customer, Movie, Rental Service and cast crew.

Customer-Movie Relation:

The Customer access the movie through 3 types of relations as:

- Customer Rents Movie

Customer can search for a movie and rent the movie's that are present the movie database.

- Customer Enqueue's Movie

Customer can prioritize the order of the movie that he wish to rent.

- Customer Review's Movie

The customer can enter his comments/review on the movie that he wish

Movie-Cast Crew Relation:

The Movie entity gets the information on the cast and crew through the cast crew entity

Administrator-Customer Relation:

The administrator controls the information over the customer. The identity of the customer is being maintained by the administrator. The general details about the customer such as address,phone

number, card number and the details regarding the rental plans and the movies rented everything is maintained by the customer.

Administrator-Movie Relation:

The details on movie, the updating, deleting of the movies, cast, crew are maintained by the administrator. The administrator primarily decides on what movie should be there and the details on these movies will be added by administrator.

Administrator – Rental service Relation:

The administrator maintains the type of plan that is available for the customer. He has a constant check on the details about the customer's plans and their history through the rental service relation.

Relational Model

CustomerInfo(email:string,ssn:integer,password:string,firstname:string,lastname:string,date_of_birth:date,gender:char,street:string,apt:integer,city:string,state:string,zipcode:integer,country:string,phone:integer,card_number:integer,billing_street:string,billing_apt:integer,billing_city:string,billing_state:string,billing_zip:integer,billing_country:string,is_active:char)

Movies(movie_id:integer,title:string,release_dt:date,genre:string, num_awards:integer ,awards:strings, num_dvds:integer,rating:real)

CastCrew(cast_id:integer, name:string)

Casting(cast_id:integer,movie_id:integer,role:string)

Plan(plan_id:integer,plan_name:string,plan_amt:real,max_dvds:integer,rent_period:integer,validity_months:integer,description:string,is_active:char)

Hold(email:string,plan_name:string,buy_dt:date,discount_amt:real)

CustomerReview (reviewer: string, movie_id: integer, user_rating: real, comments: string)

CustomerQueue (email:string,movie_id:integer,priority:integer)
[priority should be UNIQUE for each email]

MovieRent (email:string,movie_id:integer,rent_dt:date,expected_return_dt:date)

MovieRentHistory (email:string,movie_id:integer,rent_dt:date,return_dt:date)

AdminInfo(employee_id:integer, password:string,firstname:string,lastname:string,type:string)

MovieMgmt(movie_id:integer,last_updated_by:string,last_update_dt:date)

[last_updated_by: FK to AdminInfo(employee_id)]

CustomerMgmt(customer_email: string, last_updated_by:string, last_update_dt:date)

[last_updated_by: FK to AdminInfo(employee_id)]

PlanMgmt(plan_id:integer, last_updated_by:string, last_update_dt:date)

[last_updated_by: FK to AdminInfo(employee_id)]

FriendList (email:string, friend_email:string)

Data flow

Below are the level-0 and level-1 data flow diagram for DVD rental system. This diagram shows graphical representation of "flow" of data through DVD rental system. This also helps to visualize data processing (structured design) of DVD rental system.

Level-0 DFD:

Level-0 diagram shows abstract view of the system information flow. Paramount functionality of the system is that customer should be able to rent the movie DVD. Customer request for the DVD and system checks the availability of the DVD and if DVD is in library then it will get delivered to the customer or system responds to customer that movie is not available. Figure 4 shows the level-0 DFD.

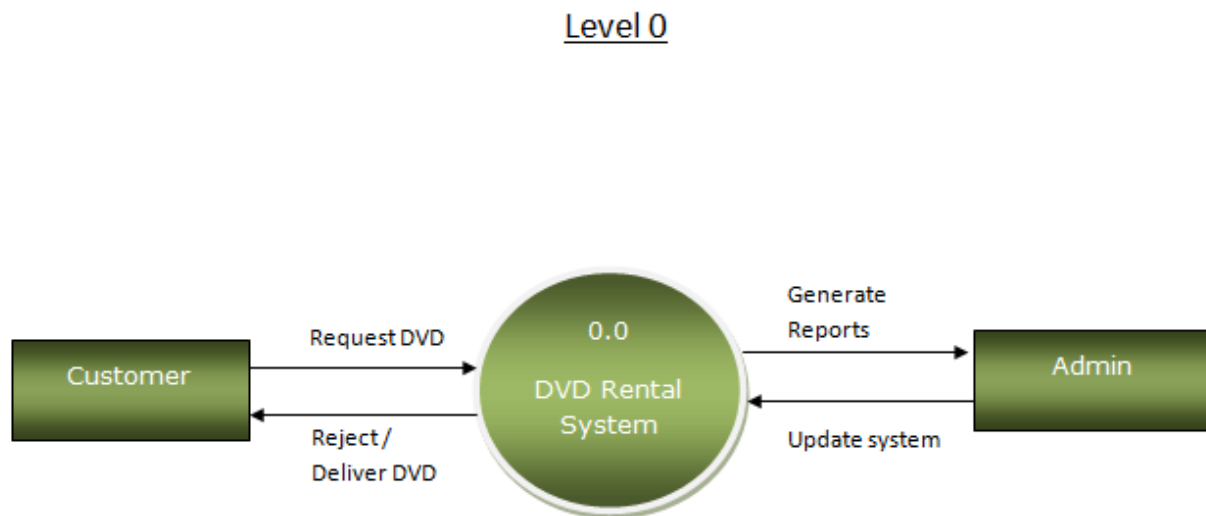


Figure 4 Level 0

Level-1 DFD:

Level-1 diagram elaborates on the data flow and functionality of DVD rental system. It describes following processes: Figure 5 shows level 1.

Rental Plan: Customer will review all the plans available in our system. After reviewing all the plans, he/she can decide on the plan the best plan suitable for them.

Registration: Customer will enroll in the system by providing his details like email id, name, billing and shipping address etc. System responds back by approving his request.

Check Availability of DVD: Customer will browse through the collection of DVDs in the system and will check for its availability. If DVD is available then it will get added to the customer's queue and will be delivered to the customer and if DVD is not available then system will respond with the message that DVD is not available currently in the system.

Queue Movie: while browsing the movies customer can add movie to his / her queue and change the priorities of the movies in the queue.

Reviews: Customer can browse all the reviews of movies and then can select the movie to watch. He/she may add reviews to the movies.

Return DVD: Customer has to return the DVD which he has rented to the DVD rental system by post. After admin receives it, he/she will update the return date of the DVD marking DVD has been returned.

Update data in system: Admin has whole control of the system. He/she can update customer/movie/casting data in the system.

Generate Reports: Admin will generate reports like user details and the plan he has enrolled, Rent history of the user.

Online DVD Rental System- RentIT

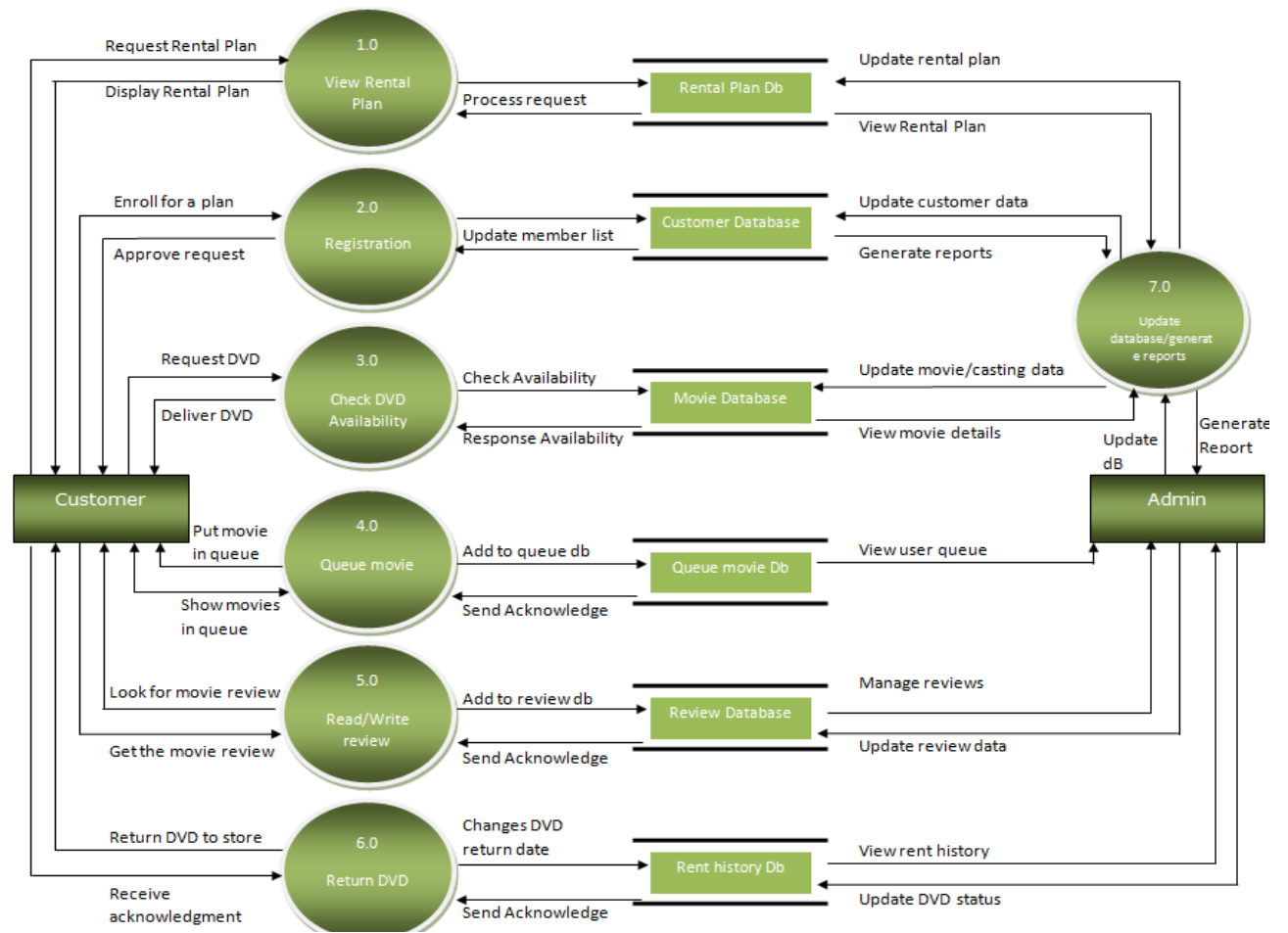


Figure 5 level 1

User interface

The main page is "Login Page". Users and the administrators will login to system by using this page. User (administrator or customer) can create an account by using "Customer Registration" page. After registering "Login Page" will convey the people to the "Admin Menu" page or "Browse" page depend on their account type.

If the user is an administrator the next page will be "Admin Menu" page. In this page the admin will have three options.

1. Movie management
 - a. Manage Movies: Takes the admin to "Movie Pages". In "Movie Pages" admin can add information about the movie and casting for a movie.
 - b. Manage Casting: Takes the admin to "Casting Page". In this page the admin can search, add, update and delete the casting information.
2. User management
 - a. Manage Customers: Takes the admin to "List Users" page. In this page admin can search a specific user by using "Name" or "e-mail" criteria. After searching with criteria, admin can change several information of the customer such as service plans and status of customers (active or inactive). Also this page provides admin with rent details by taking the admin to the "Rent History" page.
3. System settings
 - a. Manage Service Plans: Takes the admin to "Service Plan" page. In this page admin can create a new plan or update the existing plans.
 - b. Manage Rent History: Takes the admin to "List Customers" page. In this page admin can search a specific user by using "Name" or "e-mail" criteria. After searching with criteria admin can change several information of the customer such as service plans and status (active or inactive). Also this page provides admin with rent details by taking the admin to the "Rent History" page. In this page admin can update return date of a DVD.

If the user is a customer then the next page after the "Login Page" will be "Browse" page. The user can see the movies in categories, his/her account, and his/her movie queue. Customers can see the movie description and the reviews of others. The customer also has option to add a review and edit priority of movies in his/her queue. Customer has a screen for managing his/her account.

User registration:

User Registration

Last Name:	<input type="text"/>	e-mail:	<input type="text"/>
First Name:	<input type="text"/>	Gender:	<input type="text"/> V
Date of Birth:	<input type="text"/>	Service Plan:	<input type="text"/> V
Phone Number:	<input type="text"/>		
<u>Billing Address</u>		<u>Shipping Address</u>	
Street:	<input type="text"/>	Street:	<input type="text"/>
Apartment:	<input type="text"/>	Apartment:	<input type="text"/>
City:	<input type="text"/>	City:	<input type="text"/>
Country:	<input type="text"/>	Country:	<input type="text"/>
State:	<input type="text"/>	State:	<input type="text"/>
Zip Code:	<input type="text"/>	Zip Code:	<input type="text"/>
<input type="checkbox"/> Shipping Address is same as billing address.			
Terms of Use: <input type="checkbox"/> Agree <input type="checkbox"/> Disagree			
<input type="button" value="Submit"/>		<input type="button" value="Reset"/>	<input type="button" value="Cancel"/>

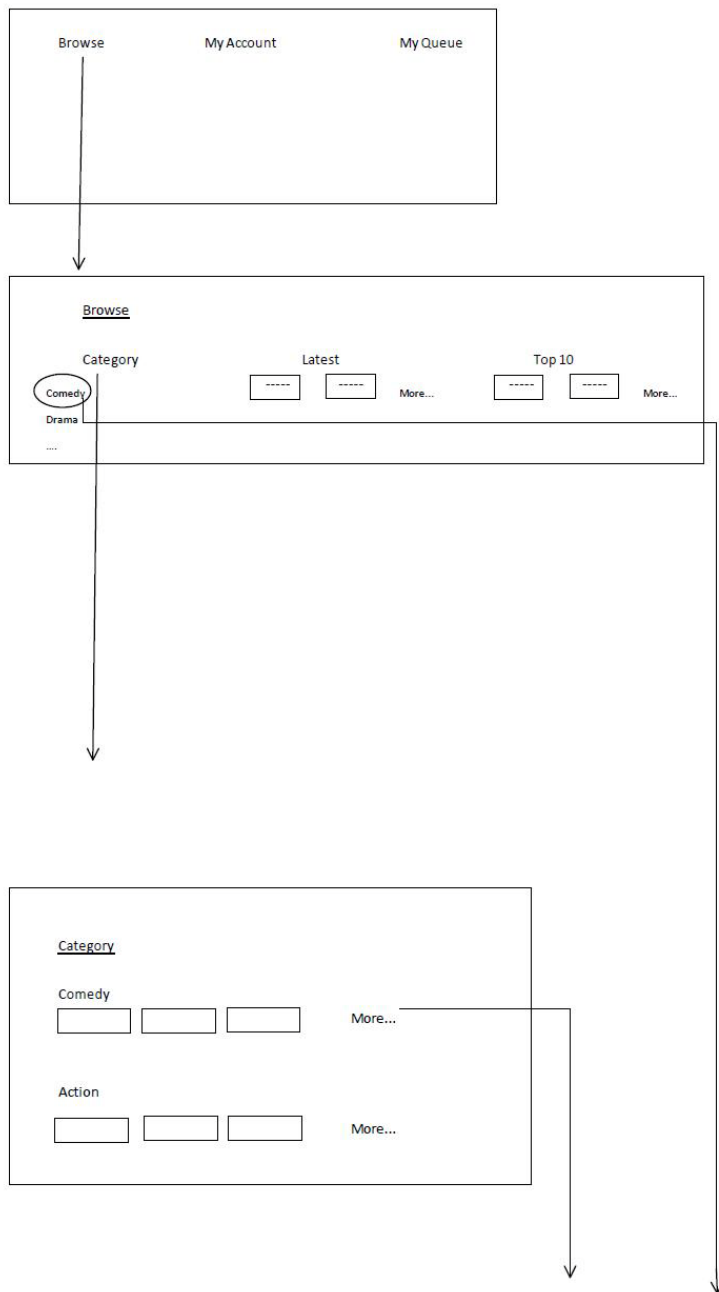
Login page:

Login Page

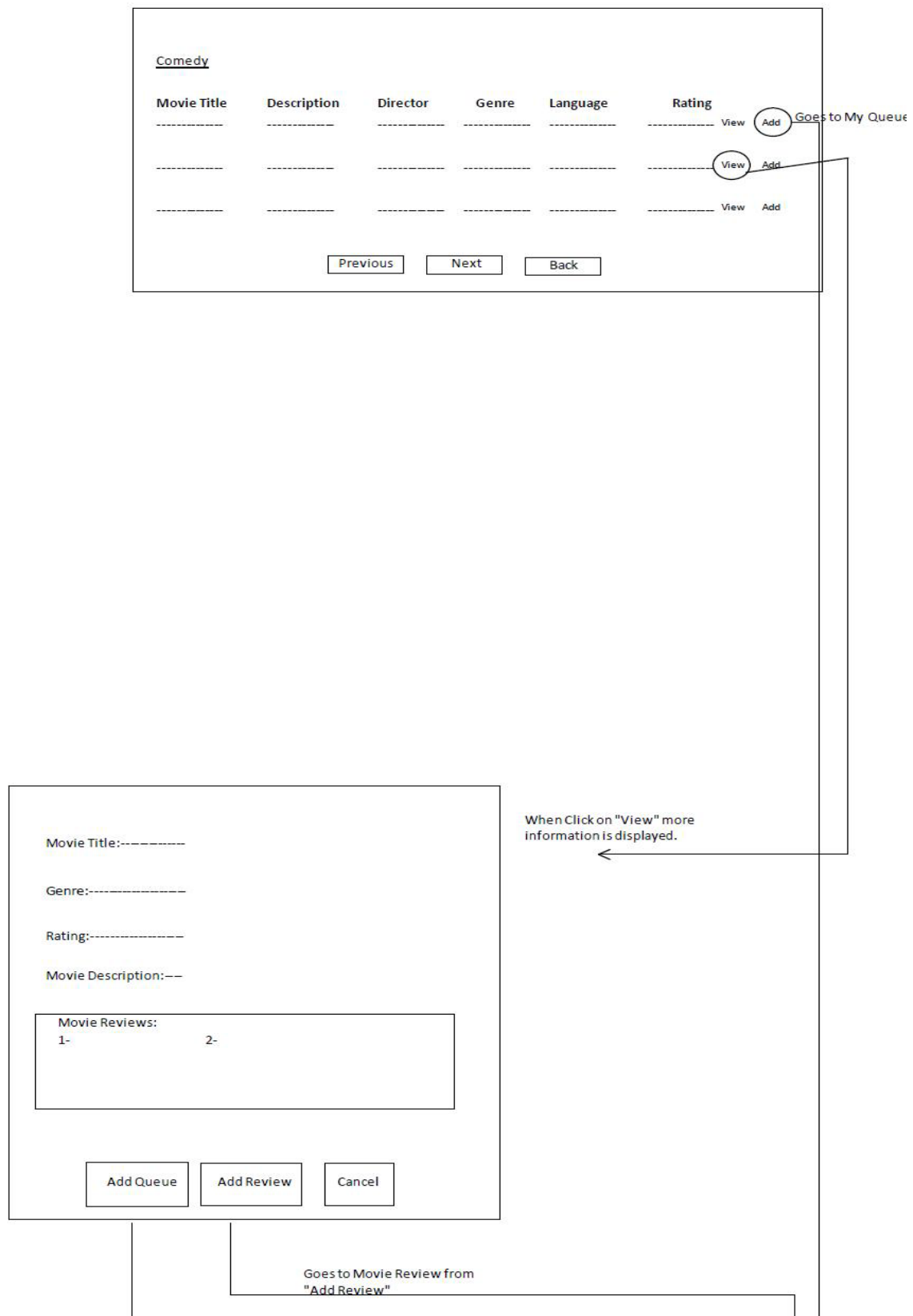
Username:	<input type="text"/>
Password:	<input type="password"/>
<input type="button" value="Submit"/>	<input type="button" value="Cancel"/>

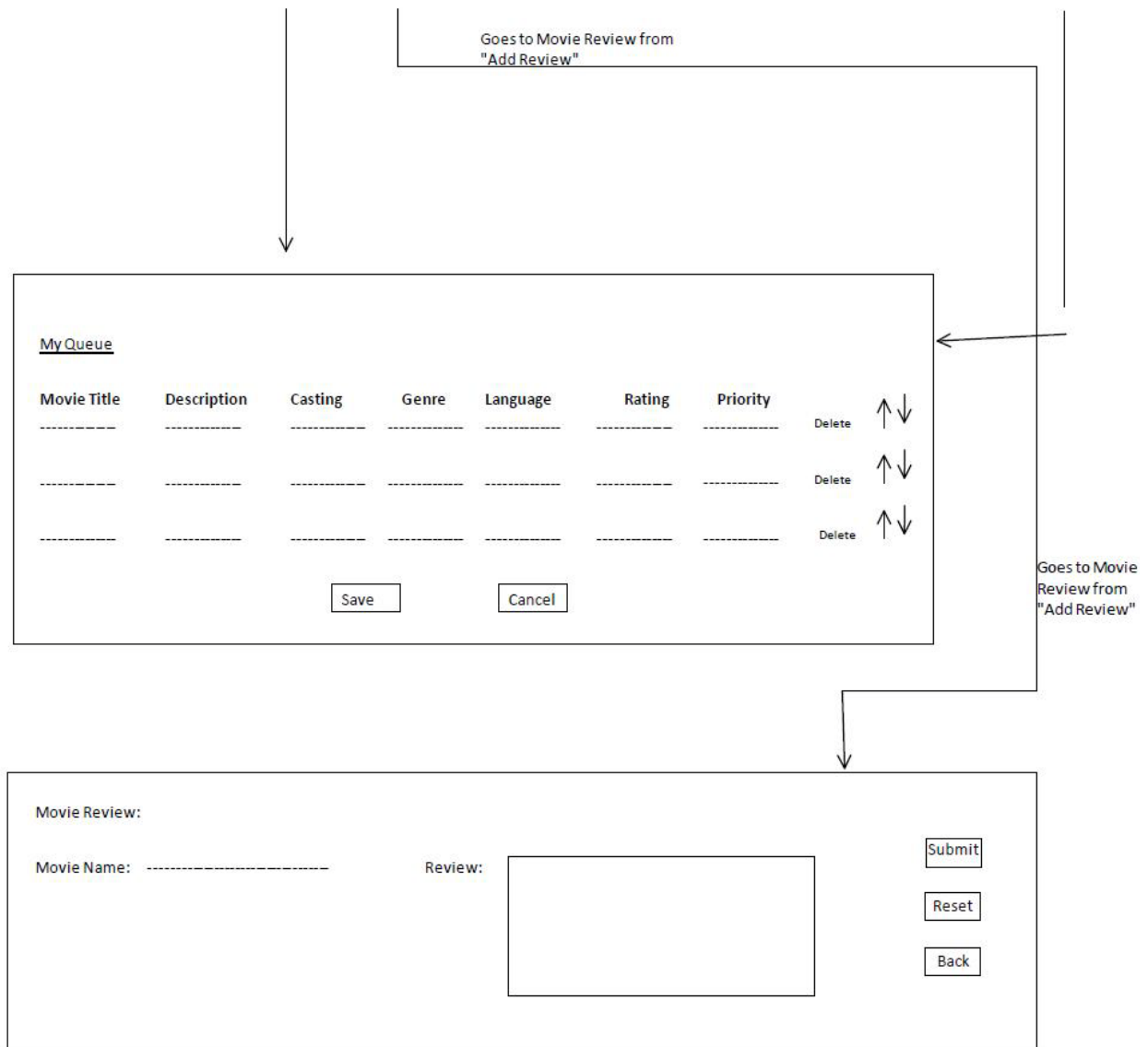
Customer page:

User Browse



Online DVD Rental System- RentIT





My Account:

My account

Change Password Change Account Details

e-mail: Phone Number:

Service Plan: V

Billing Address Shipping Address

Street: Street:

Apartment: Apartment:

City: City:

Country: Country:

State: State:

Zip Code: Zip Code:

☐ Shipping Address is same as billing address.

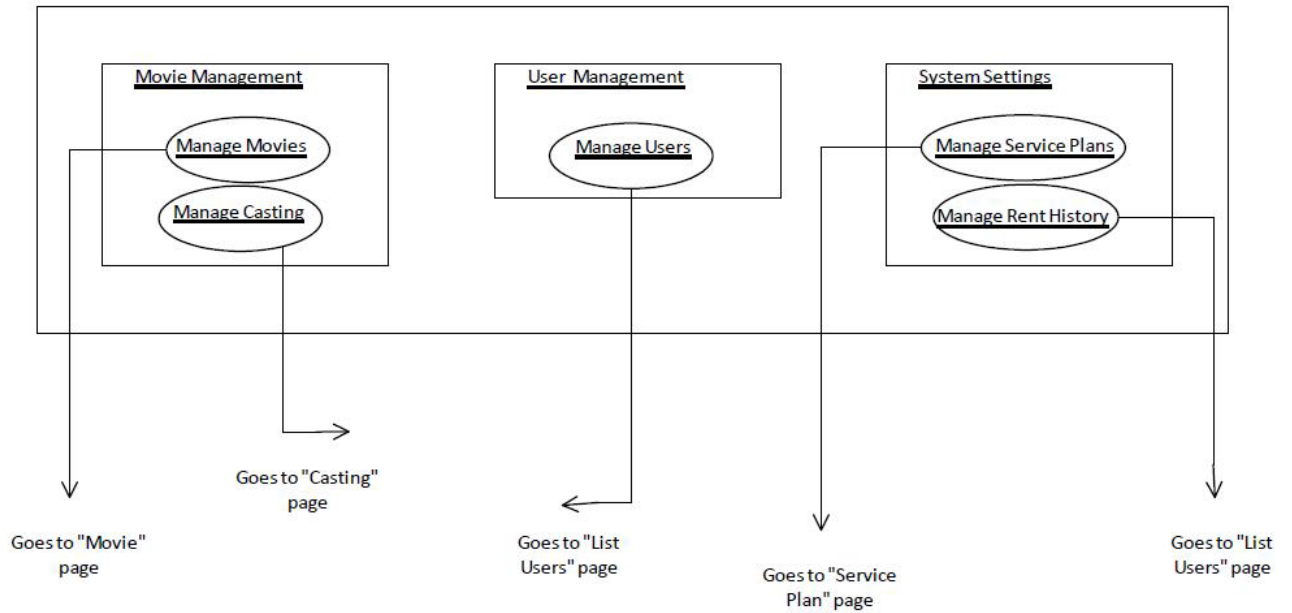
Change Password:

Password:

Confirm Password:

Admin page:

Admin Menu



Movie Management:

1. Manage movies

Movie Pages

Movie ID:

Movie Title:

Release date:

Genre:

Rating:

Number of DVDs:

Number of awards:

Awards:

Casting:

Cast	Actor
<input type="text"/>	<input type="text"/>

Search

Add

Delete

Update

Cancel

Casting

Cast Name

V

Role

V

Submit

Cast Name	Role	Action
-----	-----	Update/Delete
-----	-----	Update/Delete
-----	-----	Update/Delete

Submit

Cancel

2. Manage casting

Casting Page

Cast ID:	<input type="text"/>			
Cast Name:	<input type="text"/>			
<input type="button" value="Search"/>	<input type="button" value="ADD"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>	<input type="button" value="Cancel"/>

Customer management:

1. Manage users

List Users

Name:

e-mail:

Sr. Number	Name	e-mail	Phone Number	Address	Service Plan	Action	Active
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>

Rent History

Movie Name	Date Of Rent	Date of Return	Action
-----	-----	-----	Update/Delete
-----	-----	-----	Update/Delete
-----	-----	-----	Update/Delete

If Click Rent Details

System settings:

1. Manage service plans

Service Plan

Plan ID:	<input type="text"/>
Plan Name:	<input type="text"/>
Monthly Fee:	<input type="text"/>
Max dvd:	<input type="text"/>
Rent Period	<input type="text"/> V
Validity month:	<input type="text"/>
Status	<input type="text"/> V
Description:	<input type="text"/>
<div><input type="button" value="Search"/> <input type="button" value="Add"/> <input type="button" value="Update"/> <input type="button" value="Delete"/> <input type="button" value="Cancel"/></div>	

2. Manage rent history

List Users

Name:

e-mail:

Sr. Number	Name	e-mail	Phone Number	Address	Service Plan	Action	Active
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>
-----	-----	-----	-----	-----	-----	Rent Details	<input type="checkbox"/>

Rent History

Movie Name	Date Of Rent	Date of Return	Action
-----	-----	-----	Update /Delete
-----	-----	-----	Update /Delete
-----	-----	-----	Update /Delete

If Click Rent Details

Reference

[1] Online Video Rental: http://en.wikipedia.org/wiki/Online_video_rental

[2] Requirement Analysis: http://en.wikipedia.org/wiki/Requirements_analysis