
CMPE 450

SOFTWARE ENGINEERING

REQUIREMENT ANALYSIS

DESIGN DOCUMENT

Version 1.0

Project Name: Stock Follow Up
System Project

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Introduction

1.1 Purpose of the System

The stock follow up system has two main purposes that aim to different user groups. One of these purposes is storing the merchandise information in a single database with an organized and easy way, which will lead to a more accessible and more reliable data storage method.

The other purpose of the system is providing restricted access to the database to examine the merchandise information with a filtered listing option. This way, the authorized users will be able to reach to any needed information easily, efficiently and securely.

1.2 Scope of the System

The stock follow up system is mainly going to be used in the purchasing department of Bogazici University. The data insertion to the system will be performed by the employees after signing into the system.

The data examination part of the program will be used by the rector, the employees of the purchasing department, and all managers of departments which are allocated a budget. However, it is planned to be an online system, so if necessary new users can be added. After signing into the system, the users will be able to observe and group the information according to their criteria, simply by using the program interface, without any specific knowledge of database.

1.3 Objectives and Success Criteria of the Project

The most important criteria in designing the stock follow up system can be defined as accuracy, simplicity and efficiency. Since the database will include a big amount of data with a variety of fields, accuracy has an important role in this project. The system will be used by many users at the same time, and each user can perform different actions. All these situations increase the complexity of the program, so the system should provide a good error handling mechanism and a simple GUI, without losing its efficiency.

Security is also an important criteria for the design of this system and the reliability of the data. Authorization mechanism should be implemented carefully, and the database should be well protected against not permitted access attempts.

CURRENT SYSTEM

Currently, a system like the stock follow up system is being used in the purchasing department to store the merchandise information, which takes part in a chain of processes.

When a department needs an item, they send a request form to the purchasing department. The only authorized employee stores the information of all requested items in a simple spreadsheet, and then the purchasing of that item is being appointed to an employee. After the item is ordered and purchased, it is being stored in the university warehouse until it is going to be used. When the item is needed, the purchasing department sends an approval form to the property department to get the item from the warehouse. If the request gets approved, the property department adds the information of that item into a database and sends the approval form back to the purchasing department to end the process.

The problem with the current system is that the merchandise information is not being stored in an organized and associated way. The property department has only the list of the approved items, so the spreadsheet which is stored in the purchasing department is the only source to reach to the total list of purchased items. However, this spreadsheet can only be modified by a single user and it is stored in the computer of this user, which makes it insecure, inefficient and time consuming to modify.

The current system also does not consist of an observation part. When an information or a documentation is required about the merchandise, the data should be gathered manually either from the spreadsheet of the purchasing department, or from the property department database.

PROPOSED SYSTEM

3.1 Functional Requirements

The stock follow up system is going to be used for two main purposes which are inserting and observing data, but the system will consist of a single module including various interfaces.

First of all, there will be a sign in page with a registration part. If the users were registered before, they will be able to sign into the system by entering their username and password. Otherwise, they will choose the registration option which can only be approved by the system administrator.

Once the users connect to the system, they will encounter with two different options, which are inserting data and examining data. However, they will not be able to choose both of them if they do not have permission.

The data insertion part of the system will have a simple interface in which the users can add merchandise information into the database by filling the fields such as item description, item price, item amount, order-purchase-approval date, etc. There will also be a field called "approval" which is going to be used to see if the item was approved by the property department and got out of the warehouse. The default selection of that field will be "not approved", and the users will be able to change its status in the future when needed.

The data examination part of the system will be more comprehensive compared to the data insertion part. In this part, the users will be able to

observe a specific part of the database with a filtering option. The items in the database which they are allowed to view will be determined by their authority. They will have the option to create a specific list by filtering the data according to different fields and ranges of values that the fields can take, such as defining a range on the amounts field or adding an interval on the date field. This mechanism will allow the users to filter the data without requiring any database knowledge.

3.2 Nonfunctional Requirements

3.2.1 User Interface and Human Factors

There will basically be four groups of users who will interact with the program. The first group involves the staff of the Purchasing Department, the second one consists of managers of Departments, the third one is the Rector and the fourth is the administrator. All users except the administrator will have intermediate computer knowledge. Therefore, with the help of an intuitive user-interface the end-users can easily start working with our program after reading a short tutorial.

The staff of Purchasing Department can add new transactions, approve previous transactions and view all previous transactions.

Each department manager has permission to access only the transactions that involve his/her department in one of three ways. Either the transaction will be made to purchase a good to that department or that transaction will be financed by that department's budget. It is also possible that the transaction will be made to purchase a good to that department and the transaction will be financed by the same department.

The Rector and the Manager of Purchasing Departments will be allowed to view all transactions in the system but they will not be able to add or remove any transactions.

It is needed that the input information must be supervised to be absolutely correct. To achieve this control, the above-mentioned forms should pass through a detailed check for input errors. Although it is a tedious task to overcome, it is absolutely necessary for the database integrity and pattern consistency.

The administrator achieves this task by modifying the allowable field values of all forms. The input will be checked against these allowable values. The administrator also has the authority to approve new users to register.

3.2.2 Documentation

There will be no need for printed documentation for the three user groups. Since the user interface will be designed as simple as possible, an extra printed technical documentation for users is not required. Each user will be able to access a Frequently Asked Questions. There should also be a help section which details every operation accomplished by the system.

The documents that will be prepared during the design phase of the Stock Follow Up System include RAD including System Models, SDD and ODD.

3.2.3 Hardware Consideration

There are two aspects for hardware configuration: clients and server. The server should be capable of handling connections simultaneously of the complete staff of the Purchasing Department (15 people) plus at least a few managers. There are approximately 50 departments who have separate budgets and there will be approximately 2 people per department who can be registered as managers. According to our discussions with managers, we have estimated that not more than 10 percent of the managers will be accessing to the system at the same time. So in conclusion the system should at least support 25 connections. In case the number of connections exceeds the maximum number for the system, the system should notify the users of the abnormal condition.

The server should have necessary disk space for its related data. The size of primary and secondary storage should be proportional to the size of the transaction data and the number of users. Also an additional server may be preferred to keep the database separately according to the size of the database and number of data processing on the database. This separation would enhance the performance of the overall system by transferring the burden of excessive data processing to the Data Server.

Finally, in terms of their physical location, there are two user groups. The Purchasing Department Staff, and others (including the rector, managers, administrator) who are located in various places on campus. The intranet

connection has to be able to support the high number of connections from the Purchasing Department and the connections from the other places on campus.

3.2.4 Performance Characteristics

The information retrieval should be as fast as possible for user satisfaction and performance. To ensure this, the system must give response to the operations quickly and the users also should be able to access the system easily.

Error Handling:

Data Consistency is achieved with the help of the administrator who manages the allowable values in the database. For example, if a new department is created, the name of that department is added to the table containing the allowable values for department names. So with the help of the administrator, we will be able to check input for consistency.

Any input entered by the user will be checked according to data consistency. For instance, a department name field must contain only valid department names. Some fields will be required fields when a transaction record is entered to the system. If the user can not fill these entries, he/she must be prompt to enter the required fields. After all data entered by the user is checked, it must be written to the database.

Any other error that will occur after the test phase of the program may be corrected later on. Connecting to server, scripting, database and server errors will be taken care of separately by the developers of the program and handled properly to ensure system integrity.

Extreme Situations:

It must be ensured that the Staff of the Purchasing Department can access the system at all times. Priority will be given to their operations in case of extreme conditions.

3.2.5 Quality Issues

The most important dimension of quality that concerns this Stock Follow

Up System module is reliability and usability. The program should be kept user-friendly. The program must handle all errors and control the data flow between user inputs and database. The data consistency in the database is an important criterion for the quality of the program.

3.2.6 System Modifications

A Reporting System may be added to the program. The current design includes generic filters on the forms which will be used to sort the data according to chosen fields. The generic filters can be customized to cover the specific needs of the departments. For example, a yearly budget report can be created as a predefined filter which is a simple filter choosing purchases over a specific date interval of a specific department.

3.2.7 Physical Environment

The server can be located anywhere that provides normal room temperature and pressure.

It will most possibly be located at the Purchasing Department because it will be accessed most frequently from there. This will also provide advantage in a case of network failure, because the server itself would be easily reachable.

3.2.8 Security Issues

As mentioned at 3.3.1, there are four user groups and each user group has different privileges for accessing the different parts of system and performing different tasks. It must be insured that non-users of the system have no means of accessing or modifying the database or the program.

It must also be ensured that department managers who are not managing Purchasing Department do not have any access to the transactions that do not involve their department in any way.

3.2.9 Resource Issues

The database must be backed up periodically. The backup operation should be handled when last user connected to the system and least query is being

executed on the database. For example a job can take the backup of the database every midnight.

3.3 SYSTEM MODELS

3.3.1 Scenarios

A new employee is hired to one of the departments that will use the program. The new employee is a new user of the program. He uses the registration form to become authorized to store data in the database using the other parts of the program. The new employee chooses a username and password to register the system. After the new employee submits the form, the form is checked for errors. If any error is found, the new employee is prompted to fill the form again. The administrator has the authority to approve the new registration. After the registration is approved, the new employee has the authority to use the program.

An employee of one of the departments that uses the program has right to store data to the database. After the employee logs in using his username and password, he can view a form to store new data to the database. The data can include the list of the goods that are bought, the seller of the goods, the name of the department whose budget pays for the goods, the name of the department that uses the goods, the unit and total prices of the goods, the date of order, the date of buying, the date of approval and the number or amount of the goods. After the purchase is approved by the Property Department, the employee responsible for the purchase in the Purchasing Department registers the approval in the database.

All of the Purchasing Department employees have the authority to view data that is stored in the database and to add new purchasing information. They login the system using their usernames and passwords.

All of the managers have the authority to view the purchases funded or received by their department.

The rector and the manager of the purchasing department can view all purchases.

The search in the database can be performed in groups. The grouping can be performed according to the seller of the goods, whether the buying of the

goods is approved or not, according to the type of the goods (using a code), the name of the department whose budget pays for the goods, the name of the department that uses the goods, the date of order, the date of buying, the date of approval and the prices of the goods.

When a new department is formed, a new manager is hired or a new kind of goods is bought, the administrator adds the new department and its code to the database.

3.3.2 Use Case Model

Actors

The actors of the system are the administrator, the employees of the Purchasing Department, managers of the departments and the rector. Each of the users has different authorities and use different forms of the program to perform their tasks.

Use Cases

The use cases of the system are the registration of the new users, storing new data to the database, viewing the data that is stored to the database either in general mode or in grouping and changing the allowable input values in the database.

The use case diagram below shows the relation between the actors and the use cases. In the system, a new employee can register to the system; the registration can be approved by the manager; new data about new goods can be stored to the database, the data can be viewed by the actors of the system according to their authority and allowable input values can be modified by the administrator.

3.3.3 Object Model

Data Dictionary

A The system has different kinds of users. These users are the administrator, employees, managers of the departments that use the system and the rector. These users are identified by their username and passwords are used for authentication purposes.

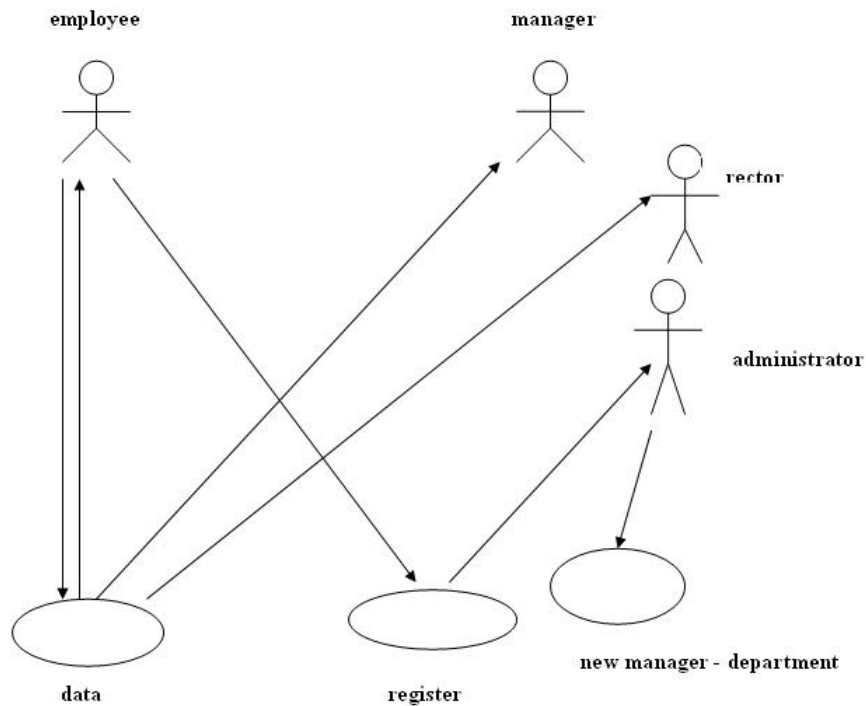


Figure 3.1: use_case_diagram_of_the_system

B The information about the goods includes the seller of the goods, the name of the department whose budget pays for the goods, the name of the department that uses the goods, the prices of the goods, the unit prices of the goods, the date of order, the date of buying, the date of approval, the number or amount of the goods.

3.3.4 Dynamic Models

Sequence Diagrams

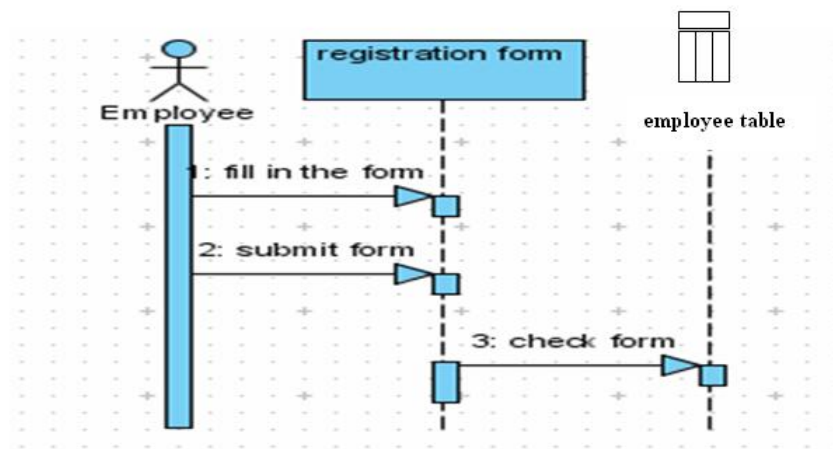


Figure 3.2: sequence_diagram_for_registration

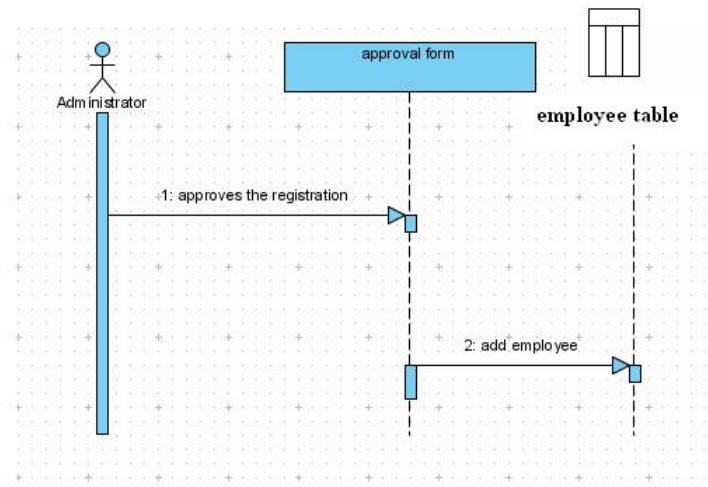


Figure 3.3: sequence_diagram_for_approval_of_registration

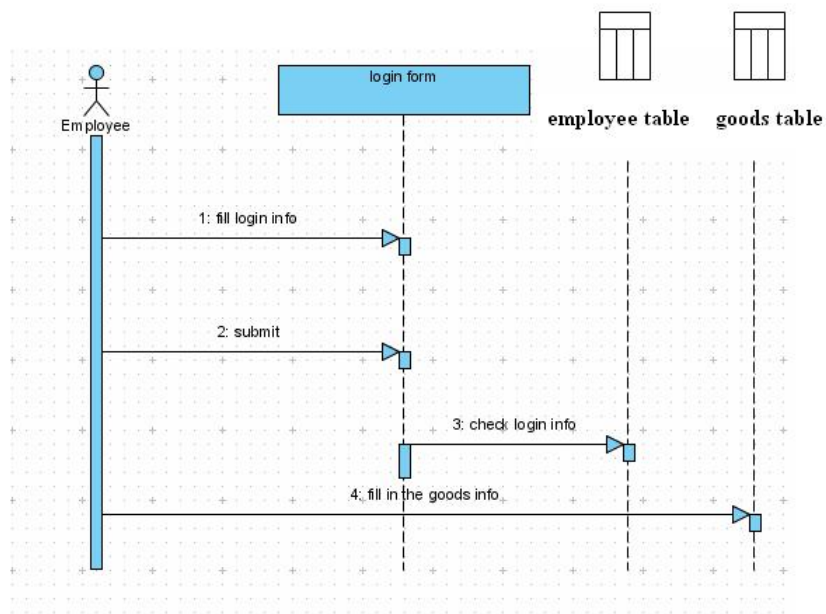


Figure 3.4: sequence_diagram_for_storing_data

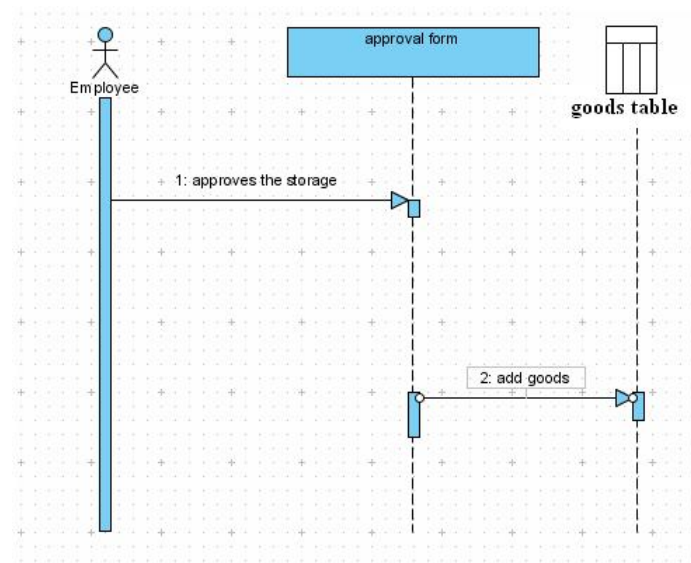


Figure 3.5: sequence_diagram_for_approval_of_the_purchase

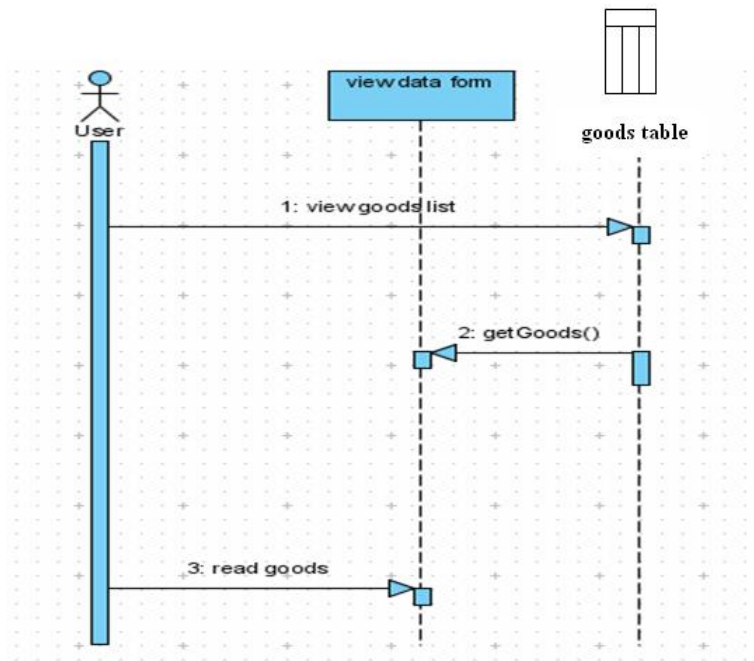


Figure 3.6: sequence_diagram_for_viewing_data

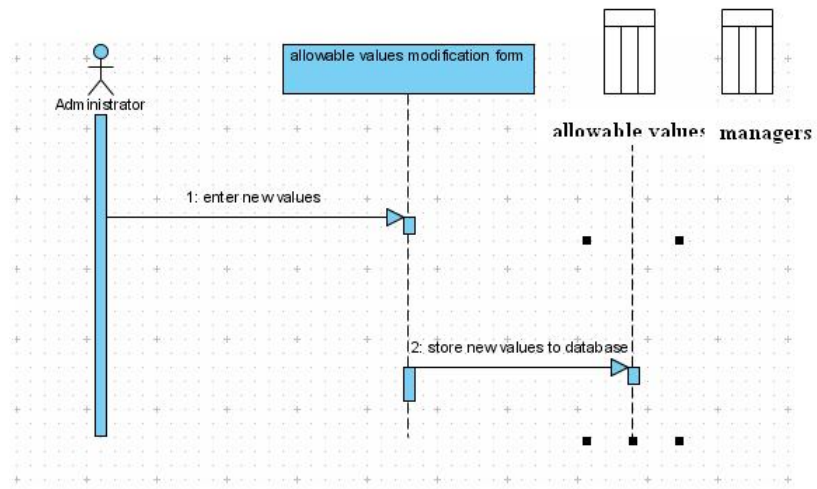


Figure 3.7: sequence_diagram_for_entering_new_goods_and_managers

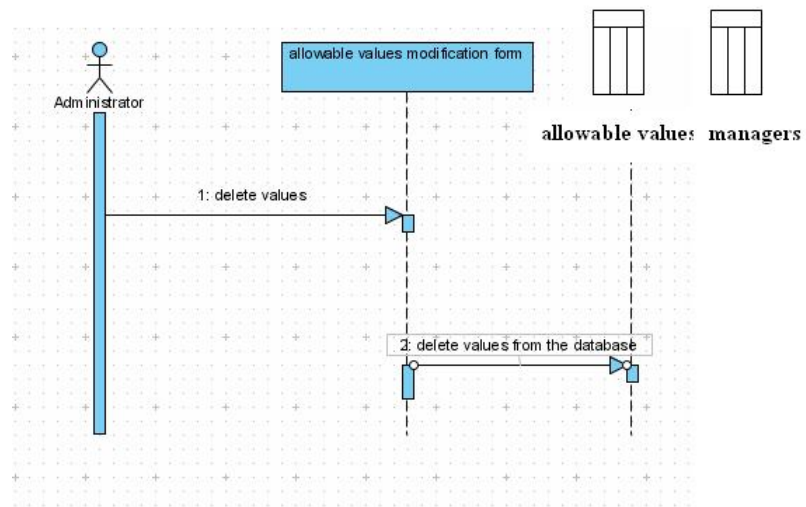


Figure 3.8: sequence_diagram_for_deleting_goods_and_managers

3.3.5 User Interface - Navigational Paths

Navigational Paths

Different users have different navigational paths in the system. The rector can view data; the administrator can enter new goods and managers and also delete them; the employees can enter data to the database and view data; the administrator can approve a registration or view data.

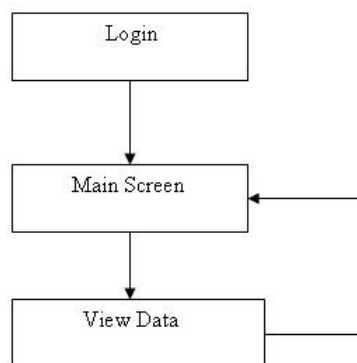


Figure 3.9: navigational_path_rector_case

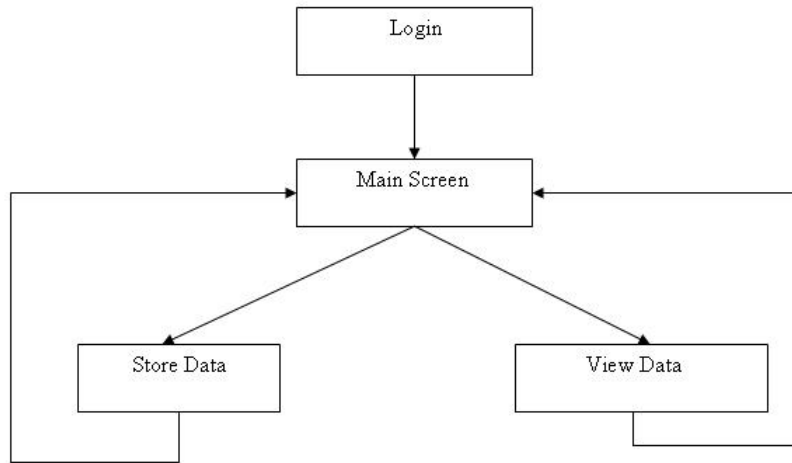


Figure 3.10: navigational_path_employee_case

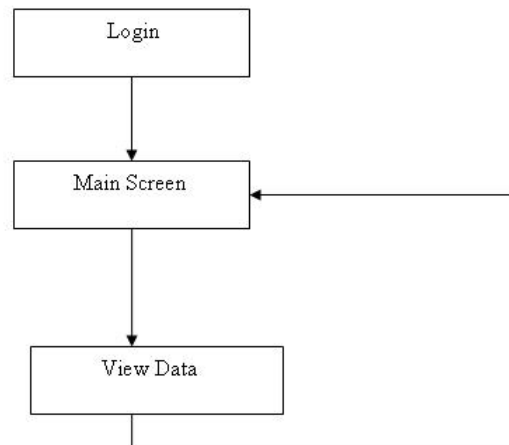


Figure 3.11: navigational_path_manager_case

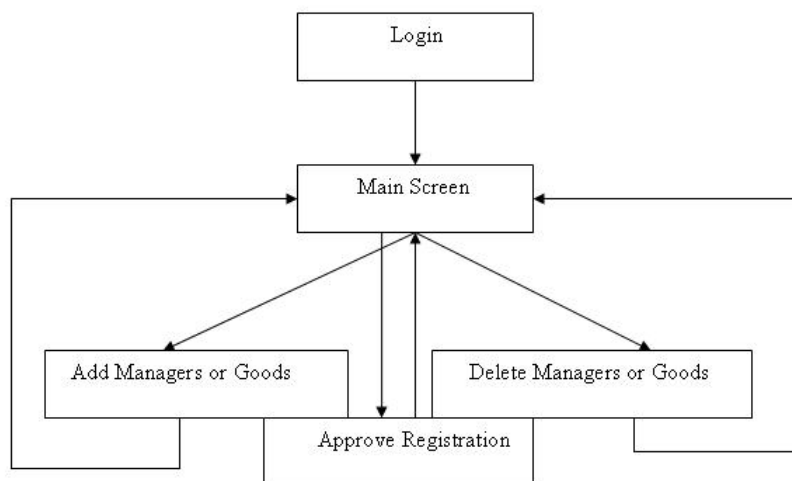


Figure 3.12: navigational_path_administrator_case

Definitions, Acronyms and Abbreviations

- CmpE: Computer Engineering
- RAD: Requirements Analysis Document
- email: Electronic Mail
- ID: Identification
- SDD : System Design Document
- ODD : Object Design Document
- GUI : Graphical User Interface

References

- “An introduction to Database Systems”, C.J. Date, Addison-Wesley Publishing
- Normalized Database Design Document v2.0, 2003
- PostgreSQL Official Documentation
- This year’s RADs
- Organization of Data Normal Form Definitions & Examples From Codd & Date, http://defiant.yk.psu.edu/~lxn/IST_210/normal_form_definitions.html
- Latex Tutorials

Glossary

Actor : External entity that needs to exchange information with the system. An actor can represent either a user role or another system.

Authorization : The process of associating a person with access rights.

Class diagram : UML notation representing the structure of the system in terms of objects, classes, attributes, operations, and associations. Class diagrams are used to represent object models during development.

Criterion : A measure of goodness used when evaluating alternatives for an issue.

Functional Requirement : An area of functionality the system must support. The functional requirements describe the interactions between actors and the system independent of the realization of the system.

Goods : Anything that can be purchased by a department

GUI : Graphical User Interface

Login : procedure used to get access to an operating system, or application, usually in a remote computer.

Manager : He is responsible for managing a department.

Nonfunctional requirement : A user visible constraint on the system. Non-functional requirements describe user visible aspects of the system that are not directly related with the functionality of the system.

Property Department : the Bosphorus University Department which manages the delivery of goods for all other departments.

Pseudo requirement : A constraint on the implementation of the system imposed by the client.

Purchase : buying of a good to a department

Purchasing Department : the Bosphorus University Department which manages purchase of goods for all departments.

Object Design Document (ODD) : A document describing the object design model. The object design model is often generated from comments embedded in the source code.

ODD : See Object Design Document.

Scalability : the ability of a computer application or product (hardware or software) to continue to function correctly and efficiently as it (or its context) is changed in size or volume in order to meet a user need.

Scenario : Instance of a use case. A scenario represents a concrete sequence of interactions between one or more actors and the system.

SDD : See System Design Document.

Security : Property of a system indicating its ability to protect the resources against unauthorized use.

Sequence diagram : UML notation representing the behavior of the system as a series of interactions among a group of objects. Each object is depicted as a column in the diagram. Each interaction is depicted as an arrow between two columns. Sequence diagrams are used during analysis to identify missing objects, attributes, or relationships. Sequence diagrams are used during object design to refine the specification of classes.

System Design Document : A document describing the system design model.

Transaction : See purchase

User : A role representing the persons who interact directly with the system when accomplishing their work.

Use case : A general series of interactions between one or more actors and

the system. See also scenario.

Use case diagram : UML notation used during requirements elicitation and analysis to represent the functionality of the system. A use case describes a function of the system in terms of a sequence of interactions between an actor and the system. A use case also includes entry conditions that need to be true before executing the use case and the exit conditions that are true at the completion of the use case.

