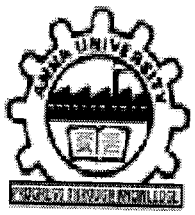

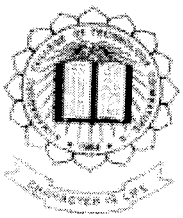

ISSUE TRACKING SYSTEM

By

C.D. RAJAGANAPATHY

Reg. No 71204621027

of

KUMARAGURU COLLEGE OF TECHNOLOGY

Coimbatore

(Affiliated to Anna University)

A PROJECT REPORT

Submitted to the

FACULTY OF INFORMATION AND COMMUNICATION ENGINEERING

In partial fulfillment of the requirements
for the award of the degree

of

MASTER OF COMPUTER APPLICATIONS

June - 2007

Kumaraguru College of Technology

Coimbatore – 641006

Department of Computer Applications

Bonafide Certificate

Certified that this project report titled **ISSUE TRACKING SYSTEM** is the bonafide work of **C.D.RAJAGANAPATHY (Reg No. 71204621027)** who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

HEAD OF THE DEPARTMENT

GUIDE

Submitted for the University Examination Held on 2/7/07

INTERNAL EXAMINER

EXTERNAL EXAMINER

June 8th, 2007

To whomsoever it May Concern

This is to inform you that **C.D.RAJAGANAPATHY** has successfully completed his project assignment titled **ISSUE TRACKING SYSTEM** as a part of **MCA** curriculum.

As a Project Trainee, he started this project on **December 18, 2006** and completed it on **June 8, 2007**

Please note, as per the company's policies and practices, the company retains ownership of the intellectual property rights concerning work undertaken during projects and disclosure of the source code and any other relevant information or data out of the organization is strictly prohibited.

C.D.RAJAGANAPATHY designated, as project trainee will not be delivering the respective source code pertaining to his project.

For Caritor (India) Pvt Ltd,

Mary Mitra Mazumdar

MARY MITRA MAZUMDAR
ASSISTANT MANAGER – HUMAN RESOURCES

ACKNOWLEDGEMENT

It's my pleasure to thank all the great people for their help towards making me complete this project successfully. First of all, I would like to thank our Principal **Dr.V.Joseph Thanikkal Ph.D.,** principal, for providing me with lot of facilities to complete the project successfully.

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ABSTRACT

A number of projects will be developed in an organization and there will be issue(s) raised now and then by different persons at different periods of time. Thus managing these raised issues and tracking them to resolution can be a cumbersome job and that's where an Issue Tracking System gains its importance.

Issue Tracking System is simple web based tool to manage the issue(s) and track them to resolution through the different stages in the Software Development Life Cycle (SDLC). It will provide detailed information on the status of the issues associated with the project or a phase. As a result the project will gain better performance.

This simple web based tool is developed using ASP.NET. Each and every issue is tracked right form the time of its creation till closure. The status of the issue will be notified to the respective person at stages where the status of the issue changes from one to another. This tool provides easy access to any information by updating the information system whenever any modification takes place.

Issue Tracking System can display, edit, update, and print the issue(s) details by the click of a button, thus enabling the user to communicate with the system in user-friendly manner. Hence this web based tool enables to speed up all the transactions that take place and as a result the retrieval of required information is sooner, giving the system a good performance.

The front end for this simple web based tool has been developed using ASP.NET 2005 and SQL Server 2005 as the back end. The tool also makes use of a new technique called AJAX (Asynchronous JavaScript and XML).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDIX – 1

APPENDIX – 2

CHAPTER 1

1. INTRODUCTION

1.1 PROJECT OVERVIEW

A Number of projects will be developed in an organization and there will be issues raised now and then by different people at different periods of time. Managing and tracking these issues manually can be a cumbersome job and that's where an Issue Tracking System gains its importance.

Issue Tracking System is a web-based tool to manage the issues and track them to resolution through the different stages in the Software Development Life Cycle (SDLC). It will provide detailed information on the status of the issues associated with the project or a phase.

1.1.1 Features

Functionalities of Issue Tracking System are as noted below,

- Tracking the Issue from Initiation till Closure
- Separate User and Administrator functionalities
- Creation of Issue
- Searching/Modifying Issues
- Reports

1.1.2 Application Flow

The user validates at first and logs on to the system. A valid user can be a System administrator or a Project administrator or a user. System administrator is the only valid person to change or update the entire Master tables. Project administrator can able to view all the issues raised in his project. Project administrator can either assign the issues to his project members or reject the issues. User can able to view all the issues in his current project, create a new issue and provide resolution to issues assigned to him. User can only view the issues created by him and have no access to assign the issue to any one.

There are several types of issue status and can be viewed by all the users (Project Administrator and User). The issue status can be any one of the following (Raised, Assigned, Rejected/Cancelled and Closed). The user is also allowed to print the issue details.

1.1.3 Different Users and functionalities

The different users and functionalities involved in this Issue tracking System are as follows,

The System Administrator can,

- Update all the Master Tables

The Project Manager can,

- View all existing issues in his project
- Approve & Assign the created issue in his project
- Reassign the Assigned issue in his project
- Reject the created issue in his project

The User can,

- Create new issue(s)
- Modify the existing issue(s)
- View existing issue(s) that was created by him
- Provide resolution to the issue(s) assigned to him.

1.1.4 Issue Creation

This tool can be used to track all issues, raised during the Software Development Life Cycle (SDLC). When an issue is encountered during the development of project, then the user must mention the Project Name, Project Phase, Issue Type, Priority, and Issue Description in which it occurred. The administrator alone is authorized to validate the issue that was created and assign it to appropriate person.

1.1.5 Searching/Modifying the Issues

The search screen acts as the home page from where the user may view a list of issue(s) or modify issue(s). The search criteria may include the project name, phase name, Issue raised by and its Status. Similarly the User can modify only his issue(s) and the administrator does deletion of an issue.

1.1.6 Reports

The user will be able to view a single or a list of reports based on the criteria given. The criteria may be based on the particular period of time, project name, project phase, domain on which issue occurred a lot, issue raised by or based on the issue Status.

1.2 ORGANIZATION PROFILE

Caritor India Pvt. Ltd incorporated and headquartered in USA, Caritor is a global IT consulting & Systems Integration firm that delivers high quality IT services to leading clients around the world. Caritor have been playing the role of a trusted IT partner to our clients since 1993 by helping them translate their IT vision into solid, measurable value. Today Caritor have a presence that spans the USA, UK, France, the Middle East, India and Singapore with a number of caritorians working across these locations to deliver winning solutions for our clients.

Caritor offers cost-effective and intelligent IT solutions to clients in the Financial Services, Communications, Retails, Manufacturing, High Technology, Travel & Transportation and Public Sector industries. Caritor offer IT services in the areas of Application Development, Application Management, Enterprise Business Solutions, Software Testing and System Integration through a global delivery model that ensures security, cost-effectiveness and quality for clients.

Since our inception we have firmly believed in ensuring the highest quality and security for the IT solutions that Caritor deliver to clients. Caritor quality and security processes & certifications are a testament to this commitment – Caritor are one of the very selected companies in the world to be certified at SEI-CMM Level 5, PCMM Level 5, CMMI Level 5, ISO:9001 and the BS7799 standards. As part of their continuing quality initiatives they are also rolling out Six-Sigma processes internally.

As testament to our growth, capabilities and long-term customer relationships Citigroup Venture Capital International (CVC), a business unit of Citigroup Alternate Investments, came on board as partner for strategic initiatives in December 2004 through a private investment deal.

CHAPTER 2

2. SYSTEM STUDY AND ANALYSIS

2.1 PROBLEM STATEMENT

A Number of projects will be developed in an organization and there will be issues raised now and then by different people at different periods of time. Managing and tracking these issues manually can be a cumbersome job.

The user should follow many unwanted formalities and lots of paper works too. We cannot generate any reports for further use. There was no structure or strategies involved to display the issue details. There are lots of analyses involved for data retrieval and as a result Data retrieval takes long time. Determining the nature of the error is time consuming. Various records are to be verified for generating the reports and it's a very difficult process to do. There may be a chance of miscommunication between various departments and it may often result in chaos. Another drawback is only one level of user who acts both as a user and as an administrator.

A Naïve user does not know whom to communicate with when an issue is raised. Access and retrieval of relevant information requires considerable overhead. It requires more man power so it is inefficient and not flexible. It involves high cost and resources. So the organization requires a system, which could help ease out the problems faced in the scenario mentioned above. This system should be user friendly and should able to provide access to the user who has appropriate username and password.

2.2 EXISTING SYSTEM

The existing system was the manual system where all the process is done manually. "To err is human" and so the system contains plenty of errors since it makes use of User-to-User communications.

The current system in the company is a manual one. There are various different situations, which the user needs to understand. When an undesirable event occurs, the users of the system raise the issue to the senior people. The senior people then needs to analyze the nature of the error, identify the log files, which would contain details on the reason of the occurrence of the error. They need to read the entire description; if the message is understandable and they are familiar with it then they can go ahead and resolve the issue. If the reason cannot be determined they need to hunt through the system manuals and the help system and try to resolve the errors.

The existing system is quite time consuming and needs a lot of effort for determining the cause of errors and arriving at the proper solutions.

2.2.1 DRAWBACKS OF THE EXISTING SYSTEM

The drawbacks of the existing systems can be summarized as below:

- Determining the nature of the error is time consuming.
- Lot of paperwork.
- Historical data retrieval takes a long time.
- Not easy to understand for a naïve user.
- Generation of reports is difficult, since various records are to be verified.
- No structure or strategies involved displaying the issue details.
- Only one level of user who acts both as a user and as an admin.

2.3 PROPOSED SYSTEM

The proposed system aims at providing different levels of user for accessing the issues. Hence when an issue is raised it will be approved or rejected by a project administrator and there will be a system level administrator who accesses all the master tables alone. The features of the proposed system provide the consolidated way of synchronizing the users by authentication process for logging in. Based on the login, the user will be differentiated and will be provided with different access rights. Only the normal users and the project administrator will be allowed to search for issues, whereas the system administrator is not allowed to view so. It has been decided that the proposed system will have computerized entry for all the operations carried out in the company.

Thus the proposed system provides separate user and administrator functionalities and allows the user to search for issues based on their access rights. Hence not all users can access all the parts of the site, providing tight security. The system provides a click and view environment for searching issue(s) and its details.

2.3.1 ADVANTAGES OF THE PROPOSED SYSTEM

The expected benefits of the Proposed System are as follows:

- Intuitive and easy to use.
- Flexible and scalable.
- Easy and quick recovery from errors.
- Data from a single source ensuring integrity.
- Various reports can be generated as and when required.
- Determining the nature of the error is very easy.
- There is a structured format or strategies to display the issue details.

2.4 FEASIBILITY ANALYSIS

Feasibility analysis is the measure of how beneficial or practical the development of Issue Tracking System will be to the Organization. Once the scope of the problem has been identified and initial analysis of the system has been completed, the feasibility of the project and the software to be developed is put under the test. This is done at this point to basically verify whether the software that is to be developed meets the scope and whether the project is feasible to do. Preliminary investigations would reveal whether the entire project would be possible to carry out in the current environment. The three stages of feasibility analysis are described below.

2.4.1 TECHNICAL FEASIBILITY

Technical Feasibility is the measure of practicality of a specific technical solution and the availability of technical resources and expertise. It centers on the existing computer system (hardware, software, etc.) and to what extent it can support the new addition. The technical issues that have to deal within this phase are regarding the technology the system uses and its modifiability. It will be verified that the system would be within the state of the art and defects, if any can be reduced to a level matching the application needs.

Other considerations include:

- Existing of the necessary technologies.
- Capacity of the proposed system holds the required data.
- Ability of the system responds accurately to all inquiries.
- Scope of expandability of the system
- Technical guarantee of accuracy, reliability, ease of access and data security.

2.4.2 OPERATIONAL FEASIBILITY

Operational Feasibility asks if the system will work when it is developed and installed. It checks for the support of the management, the current business methods, user's involvement and their attitude towards the proposed system, etc. The proposed system is said to be operationally feasible only if it meets all the requirements of the client. The proposed system has found encouraging from all type of users as the system is said to be flexible and its operations are transparent. Organizational, political and human aspects are considered in order to ensure that the proposed system will be workable when implemented. Impact of "Issue Tracking System" workflow is assessed.

- Reactions of Users are assessed.
- It is ensured that the solution has the management support and the users have been involved in the development of this Issue Tracking System
- This application has more user-friendly screens that helps user to run the product effectively and efficiently.

2.4.3 ECONOMIC FEASIBILITY

Economic Feasibility is the measure of the cost-effectiveness of the proposed system. The investment to be made in the proposed system must prove a good investment to the organization by returning benefits equal to or exceeding the costs incurred in developing the system.

The proposed benefits of the system will outweigh the costs to be incurred during system developed since the system does not require procurement of additional hardware facilities it is economically feasible. In addition capability of the system to incorporate future enhancement will improve the performance to suit the future need of the client organization.

2.4.4 SCHEDULE FEASIBILITY

The schedule feasibility refers to the probability of the organization completing the development in the allocated time:

- Projects generally run over time and budget so the time schedule proposed needs careful examination.
- Adding more resources due to problems encountered in the development will not usually decrease development time.

2.4.5 OUTCOME OF FEASIBILITY STUDY

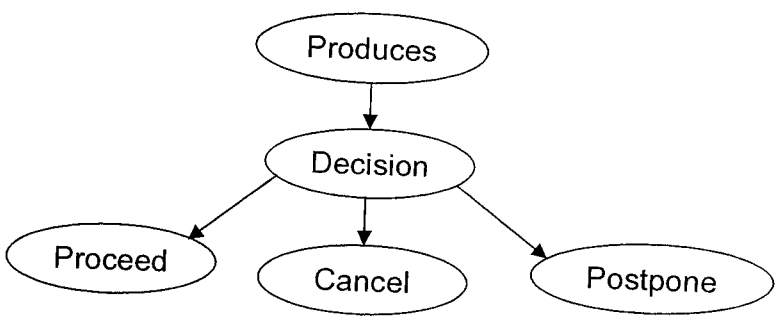


Figure – 2.1

Projects, which are becoming the subject of feasibility study, will be identified either by senior management, or in organizations, in which users are matured with information technology, by a steering committee comprising user and data processing management. The same was applied to "Issue Tracking System". The study culminates in written and oral reports. Management uses these reports to make the decision either to proceed with implementing a solution recommended by the study team, to postpone the development or to cancel the project.

So, taking an overall consideration, the project is said to be feasible and would definitely prove beneficial.

CHAPTER 3

3. DEVELOPMENT ENVIRONMENT

3.1 HARDWARE REQUIREMENT

The section specifies the hardware components in which the application was developed and the minimum hardware configuration in which the system will work without any problem.

PROCESSOR	:	Intel Pentium IV 1.8 GHz
RAM	:	512 MB SD RAM
HARD DISK DRIVES	:	40 GB
MONITOR	:	15" Color Monitor
KEYBOARD	:	Standard 102 Keyboard
MOUSE	:	Logitech

3.2 SOFTWARE REQUIREMENT

The section specifies the software in which this application was developed.

OPERATING SYSTEM	:	Windows XP
IDE	:	Microsoft Visual Studio 2005
TECHNOLOGIES	:	AJAX and NHibernate
BACK END	:	SQL Server 2005
FRAME WORK	:	Dot Net 2.0
TESTING TOOL	:	Visual Studio Team System Application Centered Testing

3.3 PROGRAMMING ENVIRNOMENT

3.3.1 . NET FRAMEWORK

The building blocks of .NET platform include the three key entities that make it all possible: the CLR, CTS and CLS. Dot NET can be simply understood as a new runtime environment and a common base class library. The runtime layer is properly referred to as the common language runtime, or CLR. The primary role of CLR is to locate, load and manage .NET types on your behalf. CLR takes care of a number of low-level details such as automatic memory management, language integration. The .NET Framework is a multi-language environment for building, deploying, and running XML Web services and applications.
Its features are,

- Fully interoperability with existing Win32 code
- Complete and total language integration
- A common runtime engine shared by all .NET aware language

3.3.2 ASP.NET

ASP .NET is a part of .NET Framework. It is a programming framework builds on the Common Language Runtime that can be used on a server to build powerful Web applications. ASP .NET runs alongside ASP. ASP .NET has page file extension as aspx. It supports multiple languages like VB .NET, C#, Jscript, etc. Caching techniques, Session Management, Configuration and Deployment are some of the features. It is a simplified and event based programming model. ASP.NET builds on the programming classes of the .NET Framework, providing a Web application model with a set of controls and infrastructure that make it simple to build ASP Web applications. ASP.NET also provides infrastructure services; such as session state management and process recycling that further reduces the amount of code a developer must write and increase application reliability.

3.3.3 ASYNCHRONOUS JAVA SCRIPT AND XML

It is a technique for making the user interfaces of web applications more responsive and interactive. AJAX increases the speed and usability of an application's web pages by updating only part of the page at a time, rather than requiring the entire page to be reloaded after a user-initiated change. Through the power of AJAX, the pages of any application can exchange small amounts of data with the server without going through a form submit? Ajax is not a technology. It's really several technologies, each flourishing in its own right, coming together in powerful new ways.

3.3.3.1 AJAX INCORPORATES

- Standards-based presentation using XHTML and CSS
- Dynamic display and interaction using the Document Object Model
- Data interchange and manipulation using XML and XSLT
- Asynchronous data retrieval using XMLHttpRequest
- And JavaScript binding everything together

3.3.3.2 POSITIVE ASPECTS

- Can produce smooth, uninterrupted user workflow.
- Saves bandwidth by only transmitting new information.
- Creates possibility of entirely new types of user interfaces not possible in traditional model.
- Doesn't require 3rd party software like JAVA or Flash.

3.3.3.3 NEGATIVE ASPECTS

- Can be difficult to implement WAI and other accessibility guidelines.
- Poor compatibility with very old or obscure browsers, and many mobile devices

3.3.4 NHIBERNATE FOR .NET

NHibernate is a port of Hibernate Core for Java to the .NET Framework. It handles persisting plain .NET objects to and from an underlying relational database. Given an XML description of your entities and relationships, NHibernate automatically generates SQL for loading and storing the objects. Optionally, we can describe our mapping metadata with attributes in our source code.

NHibernate supports transparent persistence, our object classes don't have to follow a restrictive programming model. Persistent classes do not need to implement any interface or inherit from a special base class. This makes it possible to design the business logic using plain .NET (CLR) objects and object-oriented idiom.

NHibernate allows us to write our business objects as .NET classes. The NHibernate engine then takes XML mapping files that correspond to our .NET classes and handles all of the CRUD (Create, Read, Update and Delete) functions for us. It loads the XML mapping files at runtime to determine how our objects relate to each other. The idea behind NHibernate is to simplify the code required to keep objects in a database. NHibernate does not dictate what database we use or is limited to a single database engine.

3.3.4.1 FEATURES

1. Natural programming model
2. Native .NET
3. Support for fine-grained object models
4. No build-time byte code enhancement
5. The query options
6. Support for "conversations"
7. Free/open source

4.2.5 DATABASE DESIGN

Database design defines the method of data organization. As the product caters to various requests with multiple databases, the database designing is a serious issue. A database is a collection of interrelated data stored with minimum redundancy to serve many users quickly and efficiently. The general objective of database design is to make the data access easy, inexpensive and flexible to the user. The database was designed with the following features.

- Redundancy reduction
- Data integrity
- Data Availability Constraints

The database design is done according to the following procedure. The database design transforms the information domain model created during the analysis into the data structures that will be required to implement the system or software. The database design is made up of two levels.

- Conceptual level
- Normalization

Conceptual level

This level represents the major data object and relationship between them. It describes the essential features of the system data. Various entities, which are distinct in the system, are identified. Attributes of these entities are also identified. Relationships between the entities are drawn and these make up the database structure. The table design in the appendix gives the conceptual level of database.

3.3.5 SQL SERVER 2005

Microsoft SQL Server 2005 is a database and data analysis platform for large-scale online transaction processing (OLTP), data warehousing, and e-commerce applications.

Microsoft SQL Server 2005 extends the performance, reliability, availability, programmability, and ease-of-use of SQL Server 2000. SQL Server 2005 includes several new features that make it an excellent database platform. A database system is an overall collection of different database software components and database containing the parts. SQL server provides a mechanism called a trigger for enforcing procedural integrity constraints. A trigger is a mechanism that is invoked when a particular action occurs on a particular table.

3.3.4.1 FEATURES

SQL Server 2005 provides more user friendly and security system environment for the user. The new user can easily familiarize with his technology. Some of the features available are,

- T-SQL (Transaction SQL) Enhancements
- Service Broker
- CLR (Common Language Runtime)
- Data Encryption
- SMTP Mail
- HTTP Endpoints
- Database Mirroring
- Multiple Active Result Sets (MARS)
- Dedicated administrator connection
- SQL Server Integration Services (SSIS)

CHAPTER 4

4. SYSTEM DESIGN AND DEVELOPMENT

4.1 INTRODUCTION

System design is the process of planning the software product. The design is the process of applying various techniques and principles for the purpose of defining a process or a system in sufficient detail. The design acts as a link between the actual problem specification and the actual implementation. After the thorough analysis of the existing system, the design of the system is carried out.

4.2 BASIC DESIGN APPROACH

The system's life cycle follows "Water Flow Model" which demands a systematic, sequential approach to software development with the following phases: Analysis, Design, Coding, Testing, Integration and Maintenance.

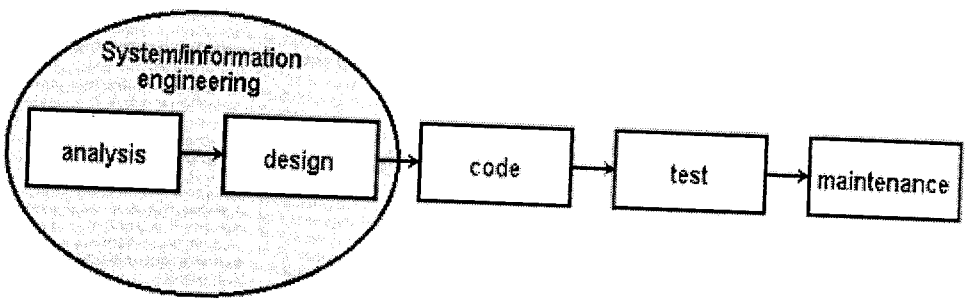


Figure – 4.1

"Top-Down Approach" is the design strategy followed, starting at the general levels to gain an understanding of the system and gradually moving down to levels of greater details. The high-level design document will help to understand the system more clearly and on the basis of this document detailed design of the system can be done.

In Issue Tracking System each module is been designed individually and it is been designed in such a manner that it runs in minimized mode or it's hidden in the system tray. In the administrators mode the design is concentrated on the security issues, each module is been designed individually and integrated. It has been designed in a user-friendly manner as menu form. The output of the system is designed as storage, for future reference of the administrator. In design an efficient and effective system is of great importance to consider the human factor and equipment that these will require to use. System analyst must evaluate the capabilities and limitations of the personal and corresponding factors of the equipment itself.

The characteristics associated with effective system operation are:

- Accessibility
- Decision making ability
- Economy
- Flexibility
- Reliability
- Simplicity

The steps carried out in the design phase of this project are File Design, Modular Design, Input Design, Output Design and Database Design.

4.2.1 FILE DESIGN

Software tools are used to describe, manipulate and manage data. Database files are the key source of information into the system. It is the process of designing database files, which are the key source of information to the system. The files should be properly designed and planned for collection, accumulation, editing and retrieving the required information. The objectives of the file design are to provide effective auxiliary storage and to contribute to the overall efficiency of the computer program component of the system.

4.2.2 MODULAR DESIGN

It is always difficult for any System Development team to grasp a system without breaking it into several smaller systems. These smaller systems will be a part of the original system yet they will be independent in the sense that they will incorporate within them the major functionalities of the proposed system. A software system is always divided into several subsystems, which make it easier to develop and perform tests on the whole system. The subsystems are known as the modules and the process of dividing an entire system into subsystems is known as Decomposition.

The modules identified for the proposed Issue Tracking system are as below:

- User Authentication
- Add new issue(s)
- Search for issue(s)
- Modify existing issue
- Email Integration
- Report Generation

4.2.2.1 User Authentication

The validation of user id and password of the existing users are authenticated. If the user types in the wrong user id and password, an error message would be triggered.

4.2.2.2 Add New Issue

The user can add one or more issues at a time and all the newly created issue will be in the raised state, which will then be validated by the respective project administrator.

4.2.2.3 Search Issue(s)

The user can search for the details of each and every issue that were hosted by various users. The search criteria may include the project name, phase name, Raised by, and its status. Thus the result will be the selected issue details.

4.2.2.4 Modify issue(s)

The user can modify existing raised issues and the respective project administrator will again validate these modified issues.

4.2.2.5 Email Integration

Whenever the status of any raised issues changes from one state to another, then automatically an email message is sent to the respective person regarding the status of the issue and its details.

4.2.2.6 Report Generation

The details of the issues in a particular project or phase are displayed in report format, which could be printed out in a white paper. The report gives complete detail about the issue and its details right from creation date till closure date.

4.2.3 INPUT DESIGN

The input design is the process of converting the user-oriented inputs into computer-based format. The goal of designing input data is to make sure that the automation is easy, logical and free from errors. The input design requirements such as user friendliness, consistent format and interactive dialogue that provide users with timely help and correct messages are given high priority.

Some of the input forms for the various modules are as below:

- User Login Form
- User Form
- Add Issue Form
- Project Admin Form
- System Admin Form
- Report Form

- Various users of the system use the Login form and the system restricts access to the database on the type of user logged in.
- The User form is used for searching the issues by giving Project Name, Project Phase, Issue Raised By and Issue Status.
- The Add Issue form is used to add new issues by giving Project Name, Issue Subject, Description, Project Phase and Issue Priority as inputs.
- The Project Admin form is used for assigning the issue to the appropriate user. The fields involved are Project Name, Issue Status and Assigned to.
- The purpose of System Admin is Create New User, New Role, New Project, New Project Phase, New Issue Status and New Account. The input fields involved are User Name, Role type, Project Name, User Id and Password.

4.2.4 OUTPUT DESIGN

Computer output is the most important and direct source of information to the user. Efficient and intelligent output design should improve the system's relationships with the user and help in decision making. A major form of output is a hard copy from the printer.

For any system to be developed in a convenient manner the system task has to be broken in to modules each module has to be developed separately and it has to be integrated at the final stage. Because of breaking up into modules, testing and finding errors in the system would be easy.

The standards for printed output suggest the following:

- Give each output a specific name or title.
- Provide a sample of the output layout, including areas where printing may appear and the location of each field.
- Specify the procedure for providing the accuracy of output data.
- The output design focuses on to serve the intended purposes, to fit the user, deliver the appropriate quality of output.

The system that assists the Users, Project Admin and System Admin generate various reports in different ways. All the reports are exported to Excel Sheet. The reports presented are:

- Project wise Report
- Phase wise Report

- Project wise Report gives the complete detail about the issues raised in the particular or all project that are in process.
- Phase wise Report gives the complete detail about the issues raised in the particular or all phases that are in process.

Normalization

Organizing the structure of the database into a good shape is called normalization. The normalization simplifies the entries, removes redundancies from the system data, and finally builds a data structure, which is both flexible and adaptable to the system. "Issue Tracking System" satisfies up to the third normal form.

- First Normal Form (1NF)

  The values in each table entry are atomic.

- Second Normal Form (2NF)

  Non-prime attributes are fully functionally dependant on prime attributes.

- Third Normal Form (3NF)

  Does not allow partial or transitive (derived) dependencies

The primary key is defined for every entity that has unique identification property. Foreign keys are also defined wherever applicable to ensure data integrity and data consistency. The following characteristics of efficient database are obtained by the database of the proposed system:

- Reduction of Redundancies
- Data Independence
- Accuracy and Integrity
- Recovery from failure
- Privacy and Security

4.3 TABLE STRUCTURE

4.2.1 Table Name : User_Master
Table Description : Lists all User Name and Password for User Authentication

Column Name	Data Type	Length	Constraints
User_Id	Varchar	10	Primary key
User_Name	Varchar	50	
Password	Varchar	20	
Email_Id	Varchar	100	

4.2.2 Table Name : Role_Master
Table Description : Maintains list of all possible user roles

Column Name	Data Type	Length	Constraints
Role_Id	Varchar	10	Primary Key
Role_Type	Varchar	20	
Role_Description	Varchar	500	

4.2.3 Table Name : Project_Master
Table Description : Maintain information of each unique project being executed

Column Name	Data Type	Length	Constraints
Project_Id	Varchar	15	Primary Key
Account_Id	Varchar	10	Foreign Key
Project_Name	Varchar	100	
Project_Description	Varchar	500	
Project_Start_Date	Date/Time	8	
Project_End_Date	Date/Time	8	
Project_Status	Varchar	10	

4.2.4 Table Name : Project_Phase_Master
Table Description : Lists all possible phases during SDLC

Column Name	Data Type	Length	Constraints
Project_Phase_Id	Varchar	10	Primary Key
Project_Phase_Name	Varchar	100	
Project_Phase_Description	Varchar	500	

4.2.5 Table Name : Account_Master
Table Description : Maintains accounting information for each project

Column Name	Data Type	Length	Constraints
Account_Id	Varchar	10	Primary Key
Account_Name	Varchar	100	
Account_Description	Varchar	500	

4.2.6 Table Name : Project_UserRole_Mapping
Table Description : Maps all users to their roles and the project involved with

Column Name	Data Type	Length	Constraints
User_Id	Varchar	10	Foreign Key
Project_Id	Varchar	15	Foreign Key
Role_Id	Varchar	10	Foreign Key

4.2.7 Table Name : Status_Master
Table Description : Lists all possible types of issue status

Column Name	Data Type	Length	Constraints
Status_Id	Varchar	10	Primary Key
Status_Value	Varchar	100	
Status_Desc	Varchar	100	

4.2.8 Table Name : Issue_Details_Master
Table Description : Lists all issue(s) for each unique project

Column Name	Data Type	Length	Constraints
Issue_Id	Auto Increment	15	Primary key
Project_Id	Varchar	15	Foreign key
Status_Id	Varchar	10	Foreign Key
Project_Phase_Id	Varchar	10	Foreign Key
Issue_Description	Varchar	5000	
Issue_Subject	Varchar	100	
Raised_Date	Date	8	
Raised_By	Varchar	10	Foreign Key
Resolution	Varchar	5000	
Assigned_To	Varchar	10	Foreign Key
Modified_Date	Date	8	
Closed_Date	Date	8	
Closed_By	Varchar	10	Foreign Key
Issue_Priority_Id	Varchar	10	Foreign Key
Rejection/ Cancellation Reason	Char	5000	

4.2.9 Table Name : Issue_Priority_Master
Table Description : Holds all possible types of priority for each issue

Column Name	Data Type	Length	Constraints
Issue_Priority_Id	Varchar	10	Primary Key
Issue_Priority_Name	Varchar	100	
Issue_Priority_Description	Varchar	100	

CHAPTER 5

5. IMPLEMENTATION AND TESTING

System Implementation is the part of the software engineering life cycle, where, the design artifacts are converted to a working application. Coding is done in this stage using an apt framework and programming language, which would solve the specific problem the best way. Once the design is coded into a working application, it has to be verified, validated and tested in detail. The tested product if successful is deployed in the user environment.

5.1 SYSTEM VERIFICATION

System Verification answers the question "Am I building the product right?" It includes the review of interim work steps and interim deliverables during a project to ensure they are acceptable. Verification also determines if the system is consistent, adheres to standards, uses reliable techniques and prudent practices, and performs the selected functions in the correct manner. In data access, it verifies whether the right data is being accessed, in terms of the right place and in the right way.

For e.g., the drop downs gather data from the database, so each dropdowns should be verified whether they are bound to the correct database field. It is done during development of the key artifacts. Verification is a demonstration of consistency, completeness, and correctness of the software at each stage and between each stage of the development life cycle. In Issue Tracking System, verification is done during the development itself. Each database bindings are verified after binding to test whether the right data fields are listed on the Internet pages.

5.2 SYSTEM VALIDATION

Validation answers the question "Am I building the right product?" This checks whether the developer is moving towards the right product, whether the development is moving towards the actual intended product that was agreed upon in the beginning. Validation also determines if the system complies with the requirements and performs functions for which it is intended and meets the organization's goals and user needs. It is traditional and is performed at the end of the project. In data access, it checks whether we are accessing the right data, in terms of data required to satisfy the requirement.

Validation is performed after a work product is produced against established criteria ensuring that the product integrates correctly into the environment. It determines the correctness of the final software product by a development project with respect to the user needs and requirements.

Functional validation is done in Issue Tracking System to check whether each of the functions is done correctly as expected in every page. Each control in a Screen is designed to do some function. These functions are checked against the requirements stated for them. E.g., clicking 'Search' button should take the user to the search page. Clicking the 'Back' button should take the user back to the previous page. This checking is usually done after the system is developed so that all activities that are affected can be checked.

The validation is done in a step-by-step process. When the user moves between controls on the screen, the validation events for the control that lost the focus are fired and appropriate error messages (if any) are displayed.

5.3 TESTING

Testing is a critical element of software quality and assurance and represents the ultimate review of specification design and coding. It is a vital activity that has to be enforced in the development of any system. This could be done in parallel during all the phases of system development. The feedback received from these tests can be used for further enhancement of the system under consideration. The testing phase conducts test using the Software Requirement Specification as a reference and with the goal to see whether the system satisfies the specified requirements.

In Caritor (India) private Limited they use the Application Center Testing for all ASP.Net projects. Application Center Test is a Microsoft load-testing tool for web servers, focused on ASP. Tests can be written in either of the Microsoft scripting languages: VBScript and JScript.

Standard procedures have been followed in testing Issue Tracking System. Test cases are generated for each screen. These test cases will cover every possibility, which could result in both positive and negative results. These test plans are maintained for any further testing done on the system. The test plan stores information such as, the test script/input, expected output, actual output, comments and the name of the tester. This plan will be followed for all types of testing done in the system.

The main types of tests carried out on Issue Tracking System are:

- Unit Test
- Integration Test
- System Test
- User Acceptance Testing
- Application Center Testing

5.3.1 UNIT TESTING

Module or Unit Testing is the process of testing all the program units that make up a system. Unit testing focuses on an individual module thus allowing one to uncover all the errors made logically and while coding in the module. Unit testing comprises the set of tests performed by and individual programmer prior to integration of the unit into a larger system. A Program unit is usually small that the programmer who developed it can test it in great detail and that will be possible when the unit is integrated into an evolving software product.

Unit Testing focuses on verification. In the smallest unit of software design the module unit testing is done for each module to ensure that it functions properly as a unit. In unit testing, the module interface is tested to ensure that information properly flows into and out of the test.

Unit testing is performed to recover errors of the following types:

- Erroneous Initialization.
- Incorrect Variable names.
- Inconsistent Data types.
- Underflow, Overflow and addressing exceptions.

In Issue tracking System each page is tested separately as a unit. Initially the flow of control and data through that page is checked. When considering a module as a unit, the flow of data and control through the whole module is tested. The result is stored in the test plan. The process is done in all the pages of the system. Once the errors are rectified, the testing procedure is repeated with same test cases to ensure this hasn't produced new errors. Hence this is a continuous process.

5.3.2 INTEGRATION TESTING

Integration testing tests the process of integrating the various modules to form the complete system. Integration starts with a set of units each individually tested in isolation and ends when the entire application has been built. Integration testing verifies that the combined units function together correctly. It facilitates in finding problem that occur at interface or communication between the individual parts.

Issue Tracking System follows a top down approach. The menus are assembled and they are linked one by one to the appropriate pages. All errors are then recorded.

5.3.3 SYSTEM TESTING

System testing is actually a serious of different tests, whose primary purpose is to fully exercise the computer-based system. This helps in verifying that all the system elements have been properly integrated and perform the allocated functions. It verifies the entire product after having integrated all software and hardware components, and validates it according to the original project requirement. The system testing takes into consideration the hardware, and the software. That is, Issue Tracking system should be able to be run on the specified hardware for variety of cases.

5.3.4 USER ACCEPTANCE TESTING

User acceptance of the system is a key factor for the success of any system. The system under consideration is tested for user acceptance by constantly keeping in touch with prospective system and user at the time of developing and making changes whenever required.

5.3.5 APPLICATION CENTER TESTING

Application Center Test is a Microsoft load-testing tool for web servers, focused on ASP. Net. It simulates numerous HTTP sessions from one machine. Using a bank of say four personal computers, all-firing off repeated HTTP requests, a significant load can be simulated. Tests can be written in either of the Microsoft scripting languages : VBScript and JScript. The tool can also be used for functional testing, although that is not what it is designed for. It contains a 'tape recorder' like function to create test cases without having to program them in.

5.3.5.1 FEATURES

- Application Center Test is designed to stress test Web servers and analyzes performance and scalability problems with Web applications, including Active Server Pages (ASP) and the components they use.

- Application Center Test simulates a large group of users by opening multiple connections to the server and rapidly sending HTTP requests.

- Application Center Test supports several different authentication schemes and the SSL protocol, making it ideal for testing personalized and secure sites.

- Although long-duration and high-load stress testing is Application Center Test's main purpose, the programmable dynamic tests will also be useful for Functional testing.

- Application Center Test is compatible with all Web servers and Web applications that adhere to the HTTP protocol.

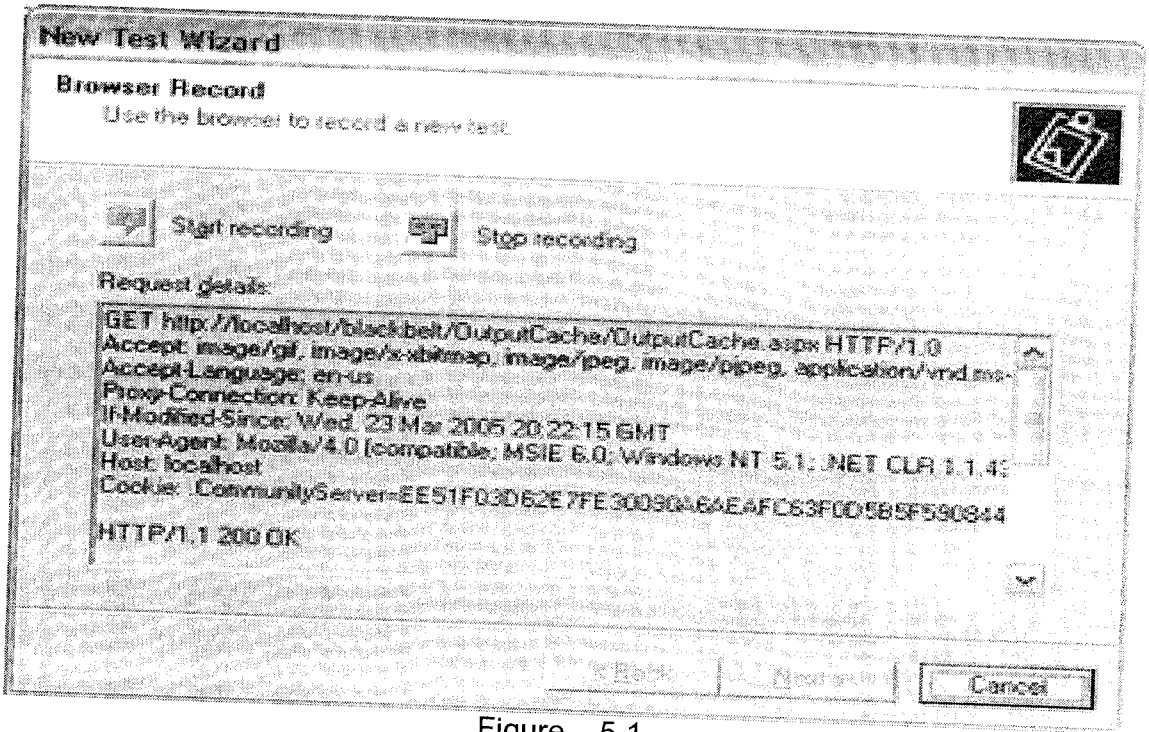


Figure – 5.1

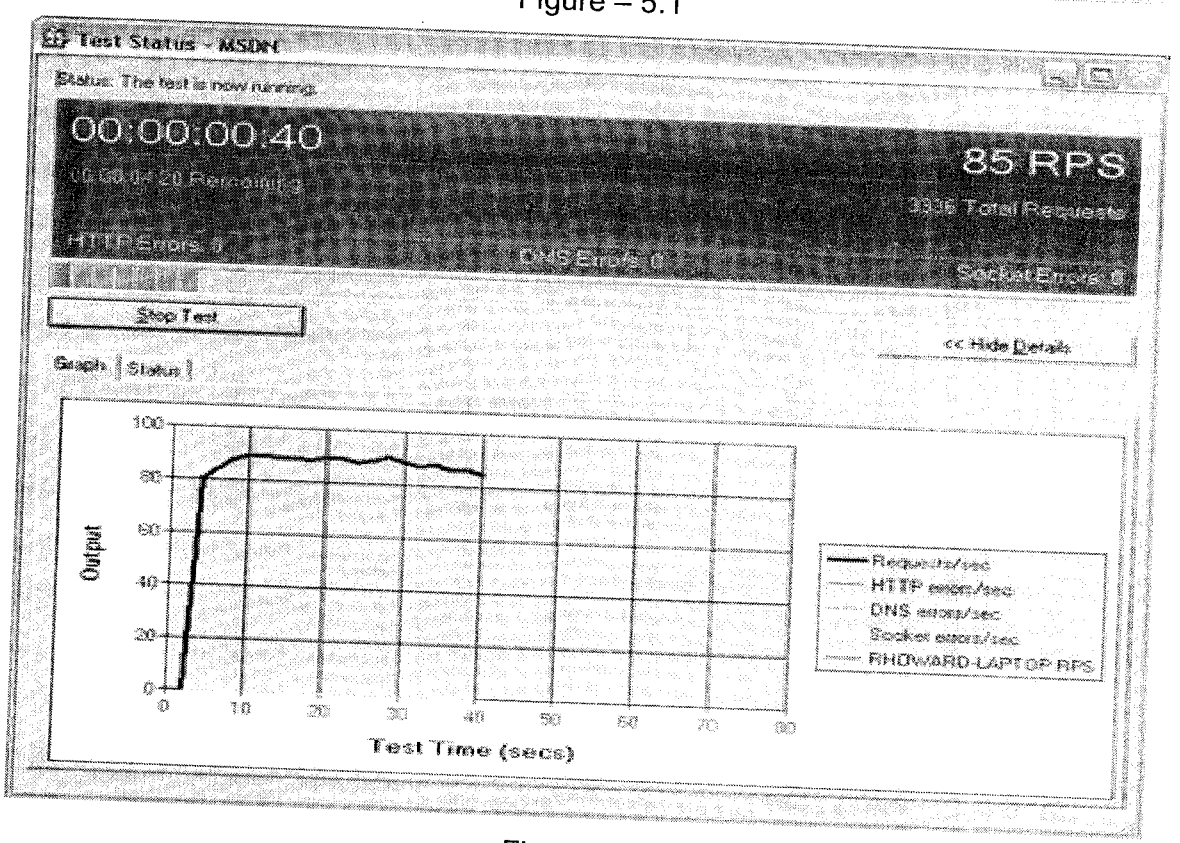


Figure 5.2

5.3.5.2 Application Center Test

Overview: Summary

Test Name	: ACTReal: Issue Tracking System Testing
Test Run Name	: Report- Issue Tracking System - June 07, 2007 15-20-34
Test Started	: 06/06/2007 10:22:32 AM
Test Duration	: 00:00:05:00
Test Iterations	: 34,028

Test Notes

Properties

Test type	: Dynamic
Simultaneous browser connections	: 1
Warm up time (secs)	: 0
Test duration	: 00:00:05:00
Test iterations	: 34,028
Detailed test results generated	: Yes

Summary

Total number of requests	: 34,029
Total number of connections	: 34,028
Average requests per second	: 113.43
Average time to first byte (msecs)	: 5.74
Average time to last byte (msecs)	: 5.94
Average time to last byte per iteration (msecs)	: 5.94
Number of unique requests made in test	: 1
Number of unique response codes	: 1

Errors Counts

HTTP	: 0
DNS	: 0
Socket	: 0

Additional Network Statistics

Average bandwidth (bytes/sec)	: 619,894.95
Number of bytes sent (bytes)	: 11,842,092
Number of bytes received (bytes)	: 174,126,393
Average rate of sent bytes (bytes/sec)	: 39,473.64
Average rate of received bytes (bytes/sec)	: 580,421.31
Number of connection errors	: 0
Number of send errors	: 0
Number of receive errors	: 0
Number of timeout errors	: 0

Response Codes

Response Code	: 200 - The request completed successfully.
Count	: 34,029
Percent (%)	: 100.00

5.3.6 TEST CASES

The following test cases have been performed to test the functionalities of the system.

Test Case Number	Test Case	Expected Result	Observed Result	Status
1	User id: G100, Password: XYZ	Invalid Login	Invalid Login	Pass
2	User id: G100, Password: server	Login Successful	Login Successful	Pass
3	User id: Xyz, Password: abc	Invalid Login	Invalid Login	Pass
4	To verify that the Issue ID# field will focus on loading.	The Issue ID# field should be focused.	The Issue ID# field is focused.	Pass
5	To verify that the Search button will focus on loading.	The Search button should be focused.	The Search button is focused.	Pass
6	To verify that the Project Name field will be disabled on loading.	The Project Name field should be disabled on loading.	The Project Name field is disabled on loading.	Pass
7	To verify that the Project members List will set to "Select" by default.	The option should set to "Select".	The option is set to "Select".	Pass
8	To verify that the Save Button will be disabled at the time of loading.	The Save Button should be disabled.	The Save Button is disabled.	Pass
9	To verify that the Submit Button will be disabled at the time of loading.	The Submit Button should be disabled.	The Submit Button is disabled.	Pass
10	To verify that the Tab Buttons will be focused at the loading time	The Tab Buttons should be focused.	The Tab Buttons is focused.	Pass
11	To verify that the Project Name field will be focused at the loading time.	The Project Name field should be focused.	The Project Name field is focused.	Pass

CHAPTER 6

6.1 CONCLUSION

An attempt has been made to computerize the ISSUE TRACKING SYSTEM and is implemented in Caritor (India) Private Limited, Bangalore to the satisfaction of the company. Validation has been done when and where it is been required. It produces timely reports from the most compatible centralized database.

The Issue Tracking System was found to be much faster and reliable and user friendly than the existing system, the system has been designed and developed step-by-step and tested successfully. The newly implemented system can also be modified and expanded to a greater extent by introducing new entities.

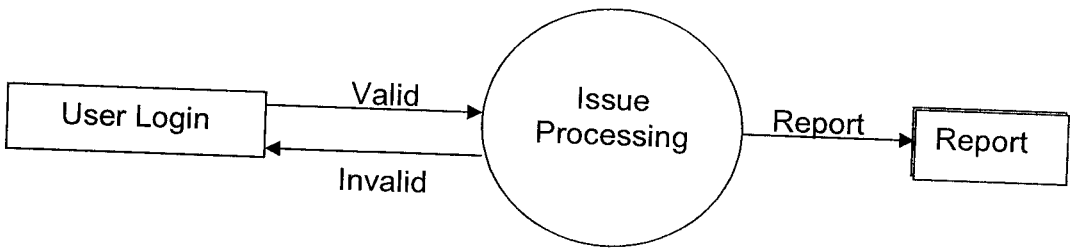
In conclusion, it is note worthy to mention the performance of the computer system, against the manual system. Comparative analysis was carried out and it was found that the new system was successfully working for the test data provided by the authors and hope that the software will be extremely helpful to the company.

6.2 FORESEEABLE ENHANCEMENTS

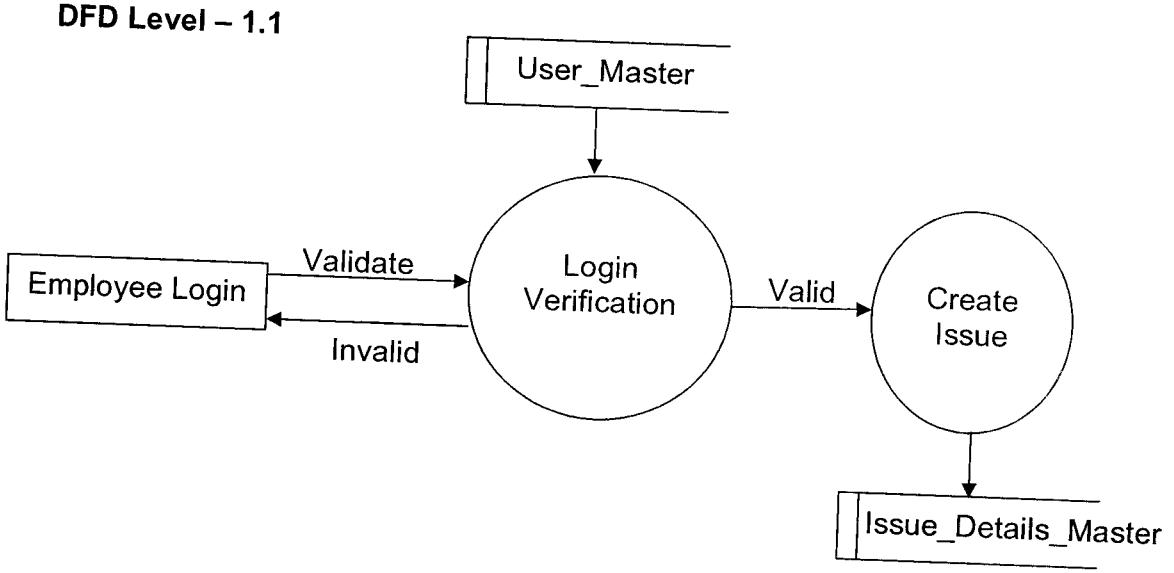
As an enhancement the raising of an issue and authorizing the raised one can be still made as a common chat room where any employee can reply back. Apart from exporting the issue details to an Excel, the system can also do the processing of sending a compressed one and can also have the ability to import data from an Excel, which is now being done through separate system.

DATA FLOW DIAGRAM

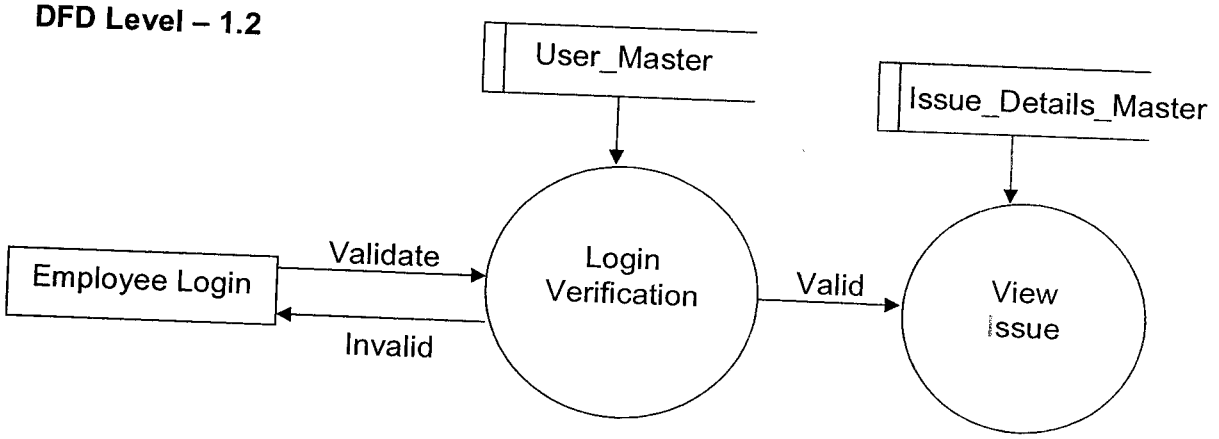
DFD Level – 0



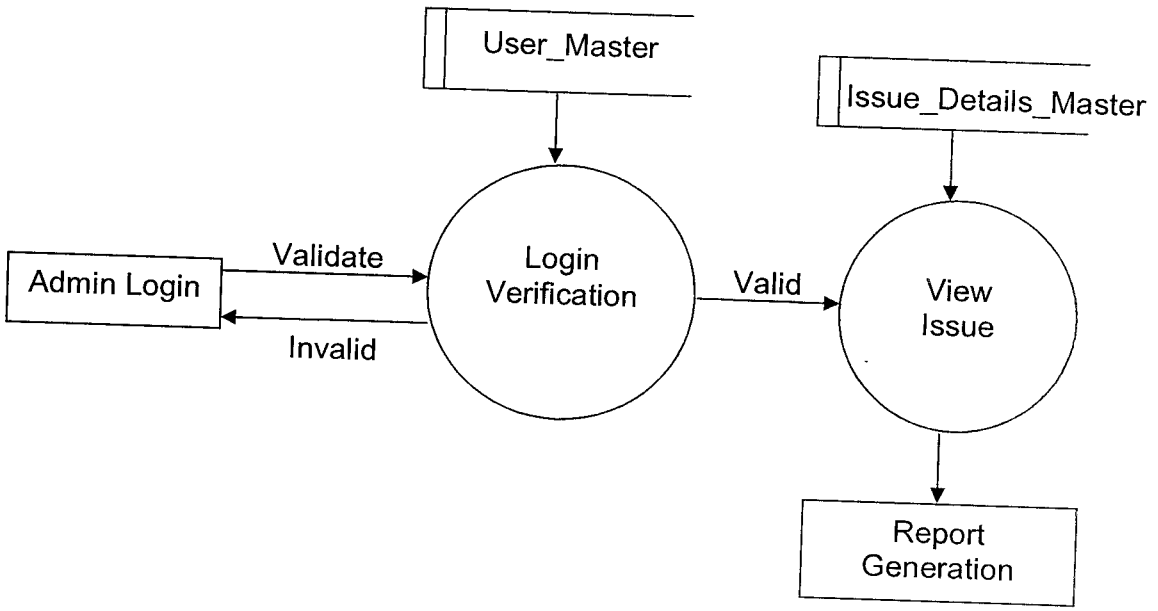
DFD Level – 1.1



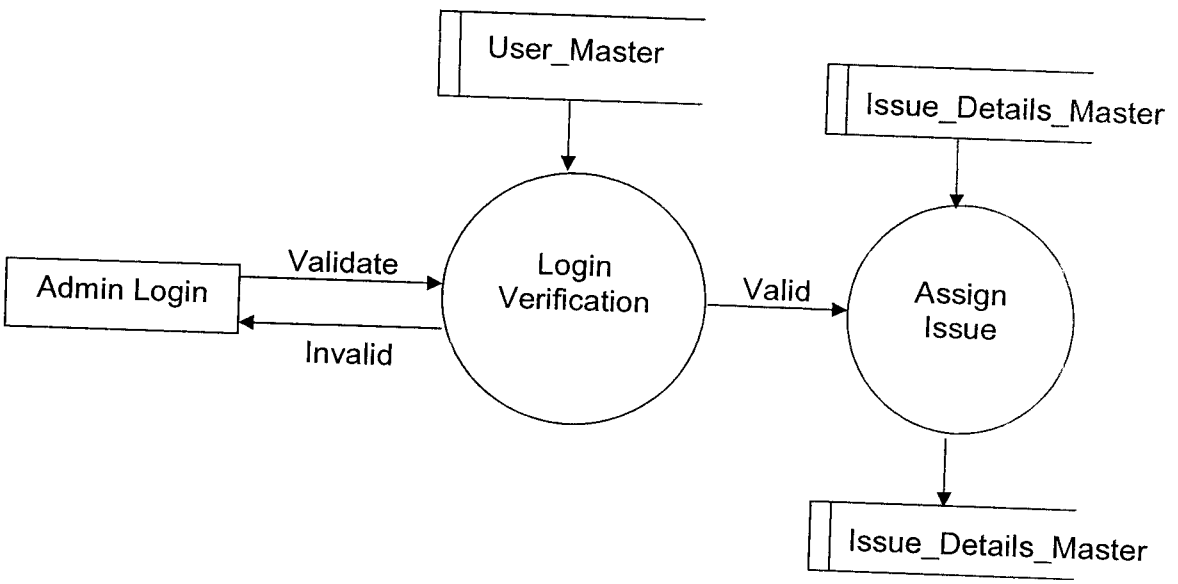
DFD Level – 1.2



DFD Level – 1.3



DFD Level – 1.4



DATABASE DIAGRAM

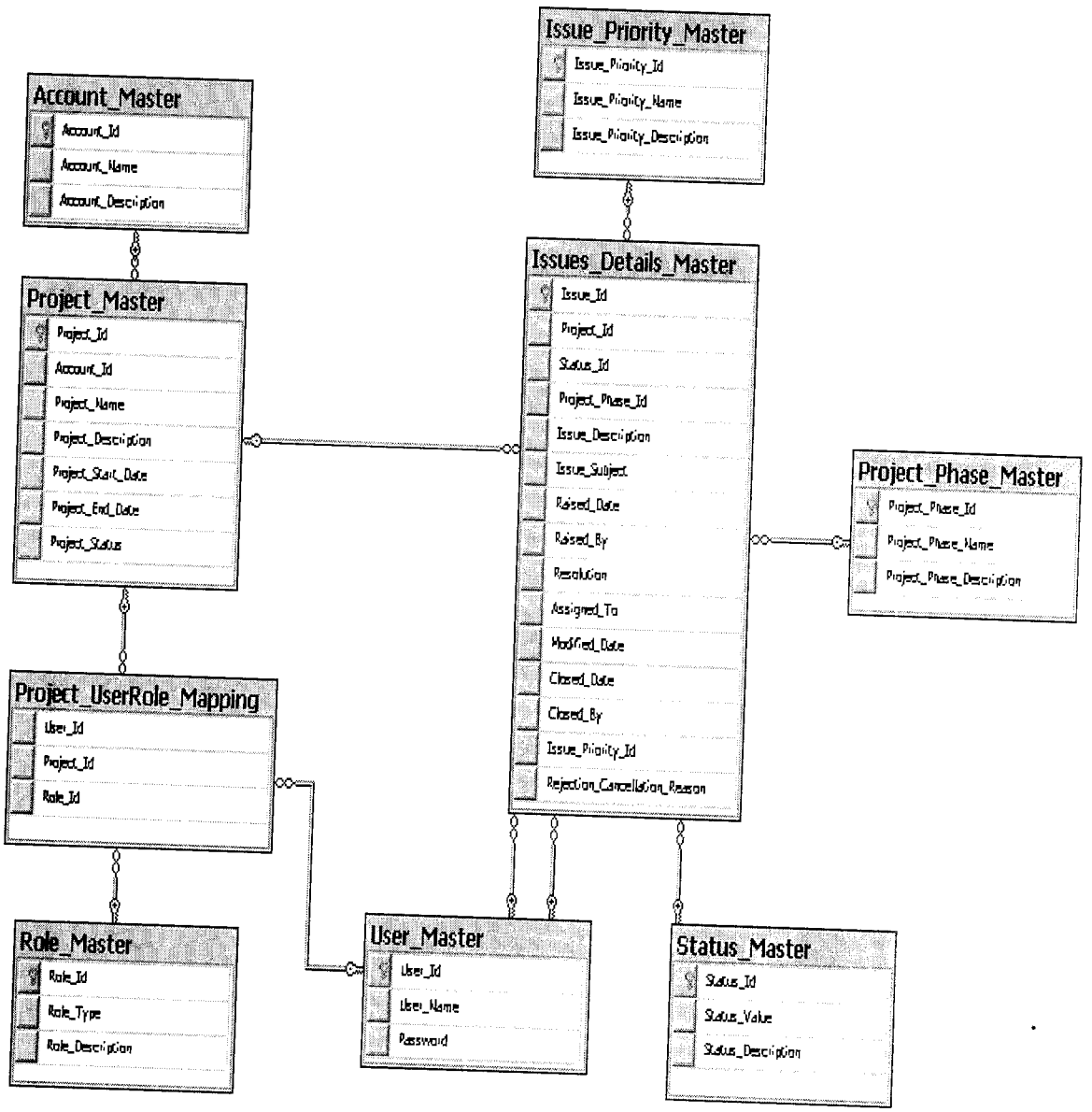


Figure 1.2

FUNCTIONALITY FLOW DIAGRAM

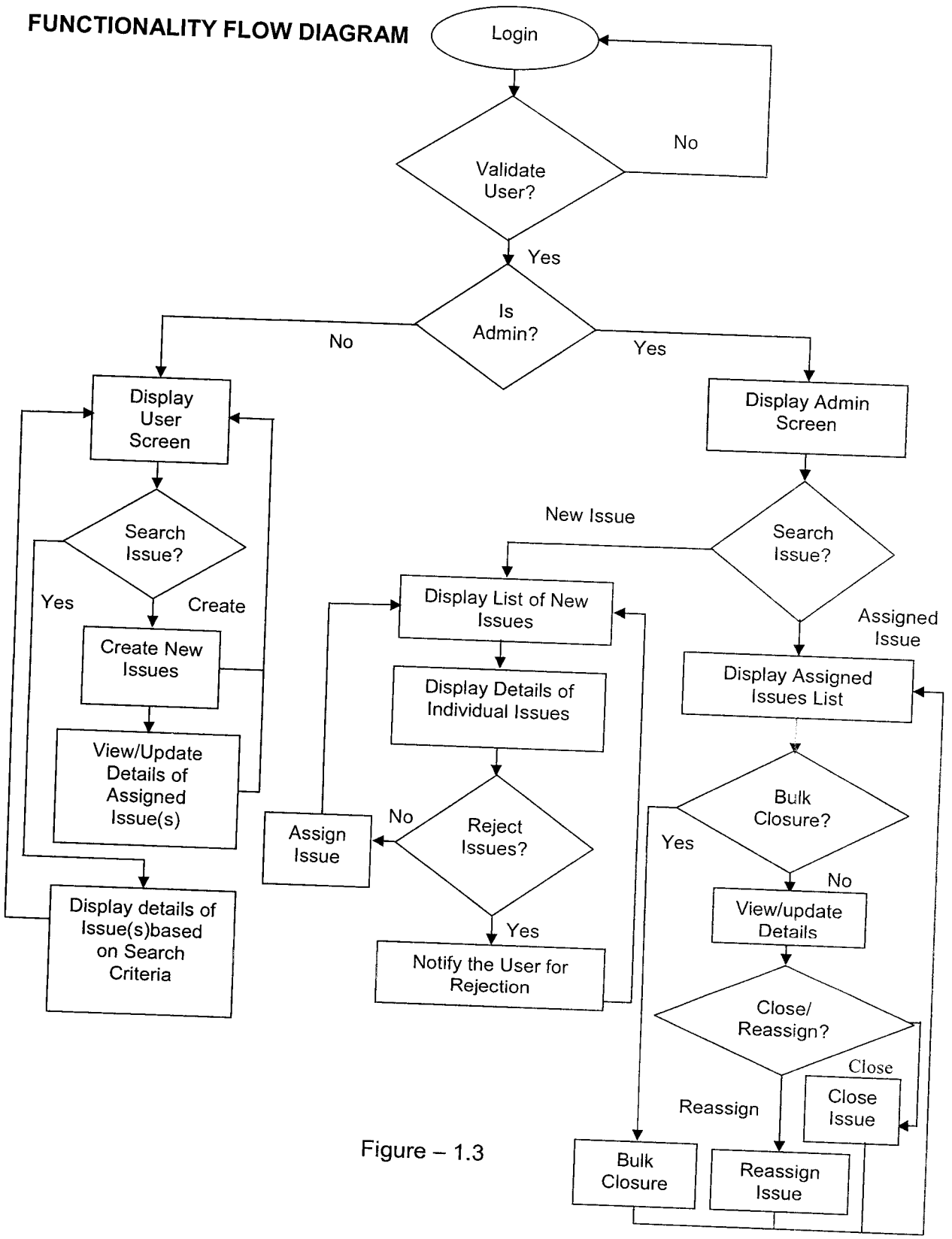


Figure – 1.3

HIGH LEVEL DESIGN

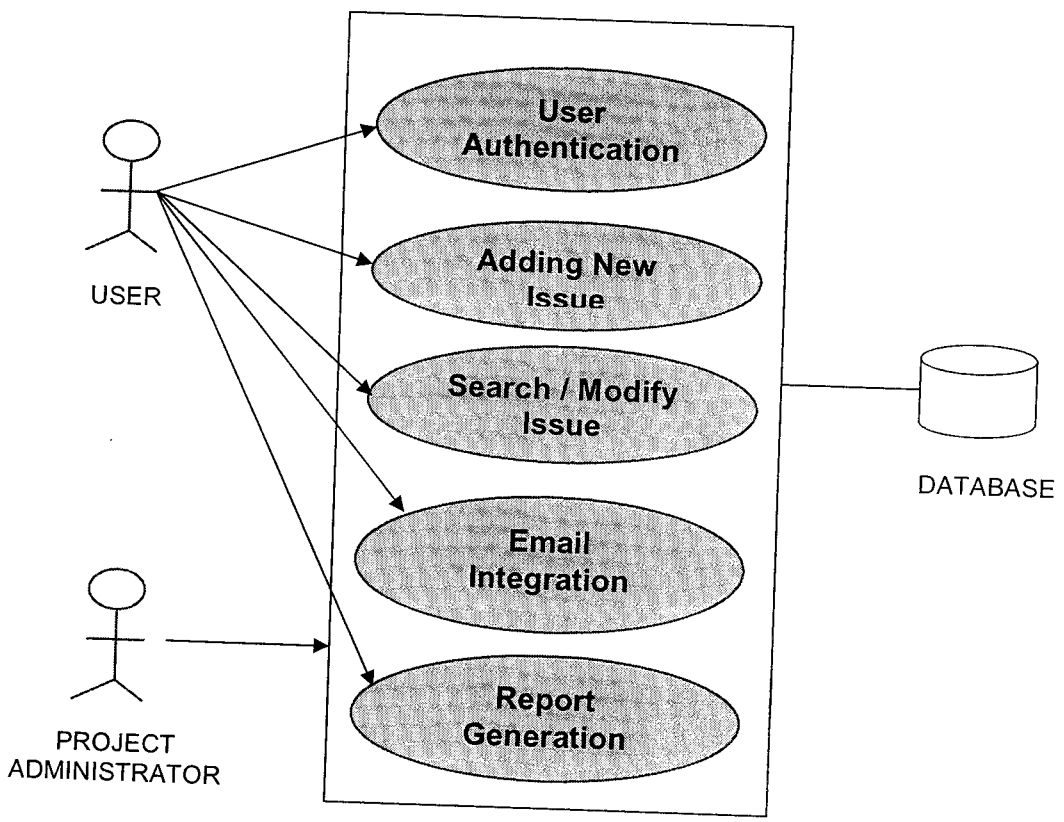


Figure 1.4

LOW LEVEL DESIGN

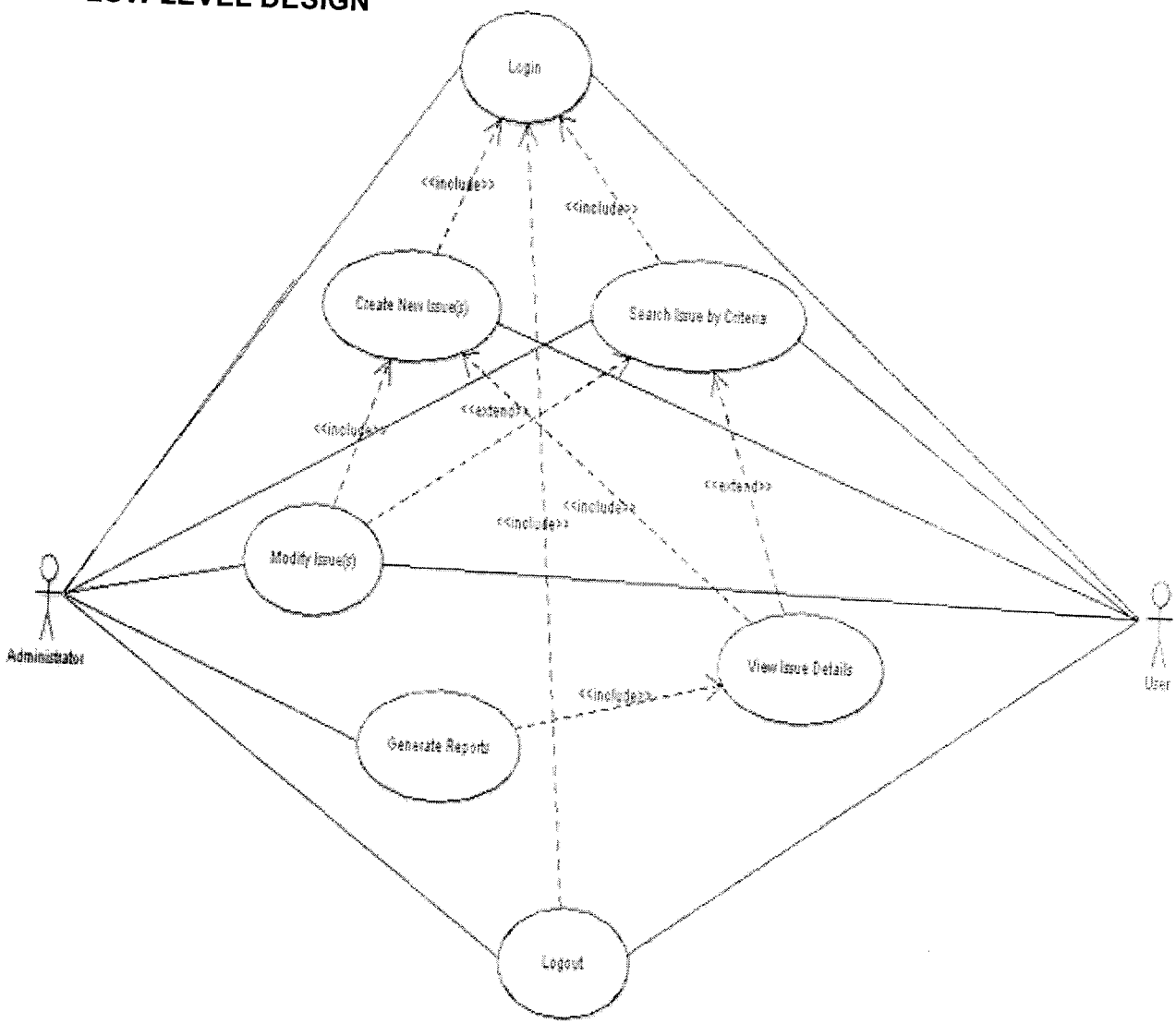


Figure 1.5

STATE CHART DIAGRAM

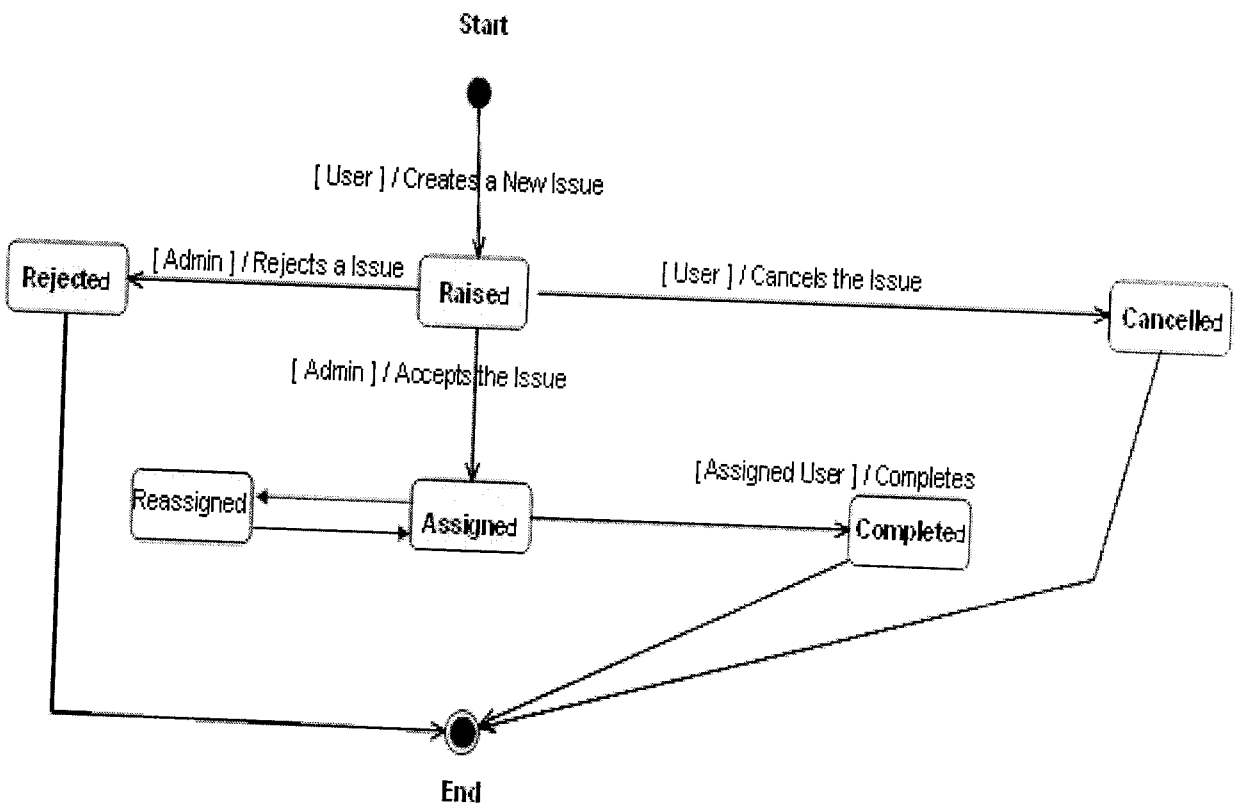


Figure 1.6

USER LOGIN PAGE

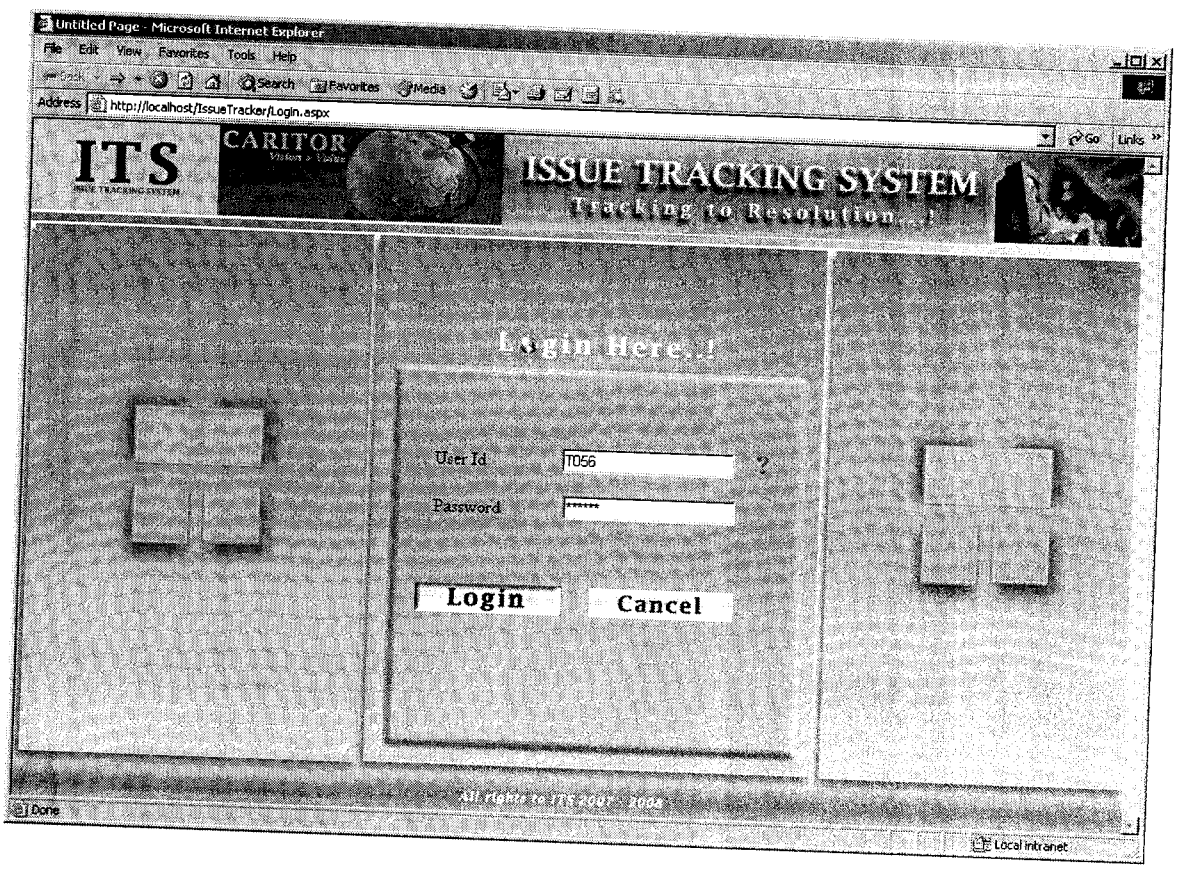


Figure – 2.1

ADD NEW ISSUE

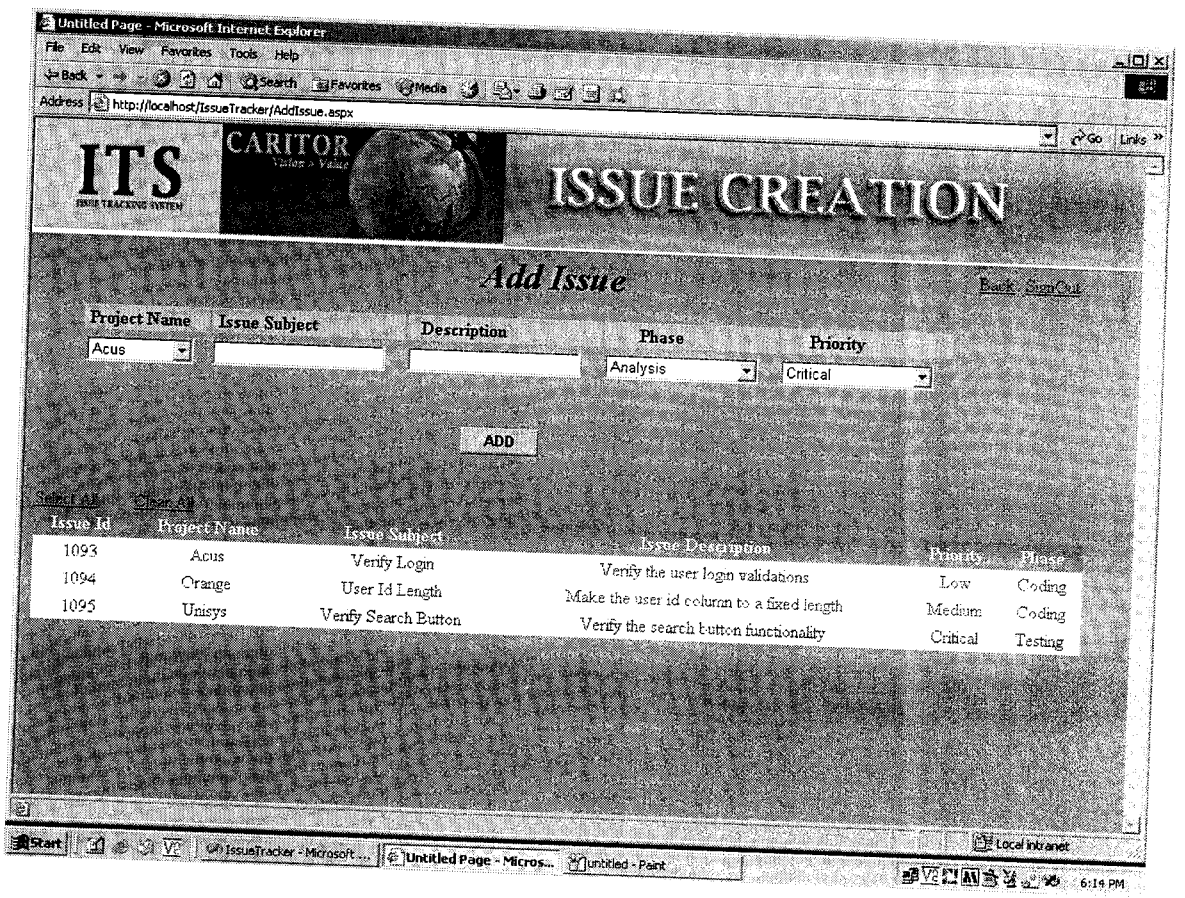


Figure – 2.2

RAISED ISSUES

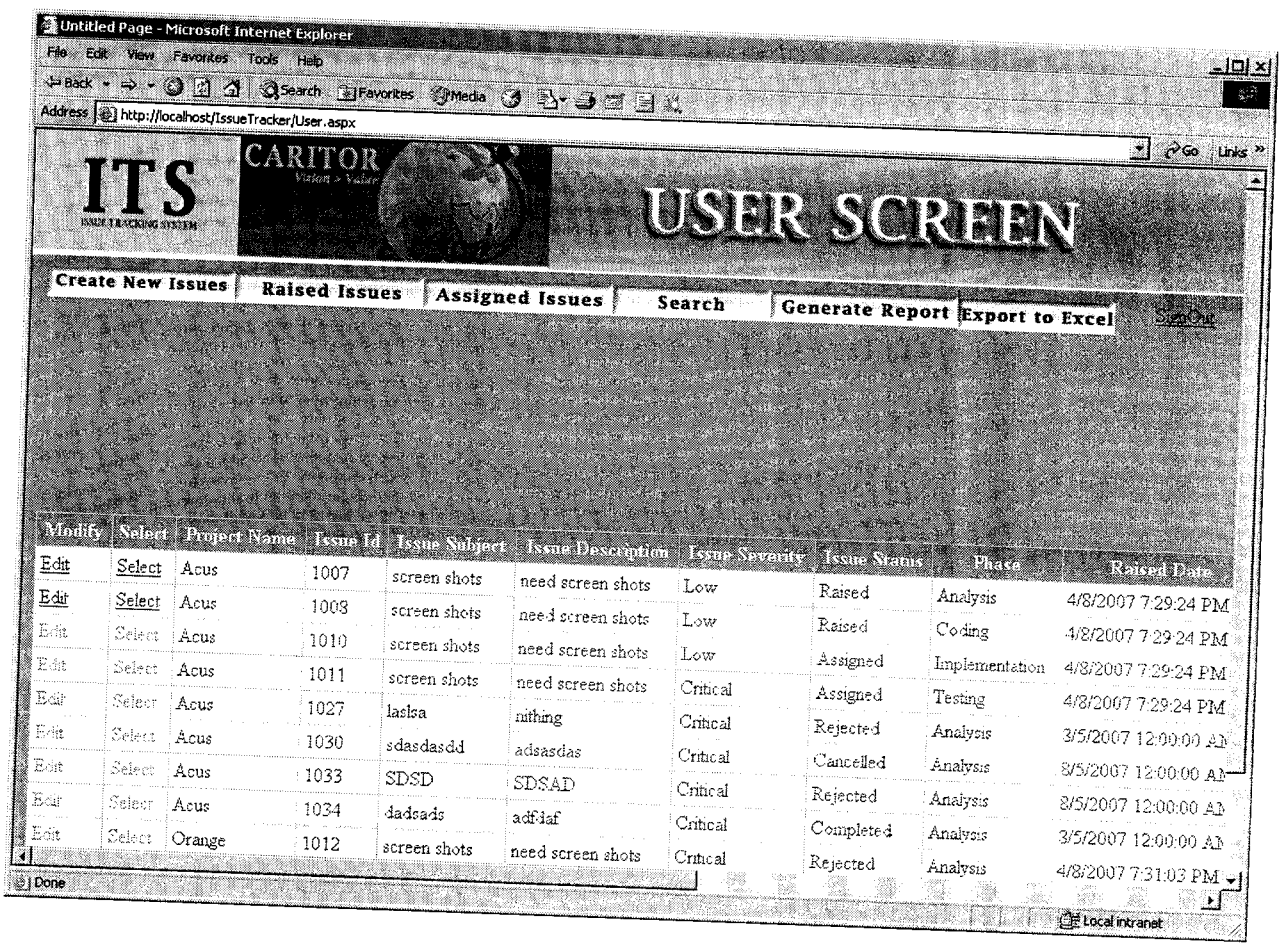


Figure – 2.3

ASSIGNED ISSUE

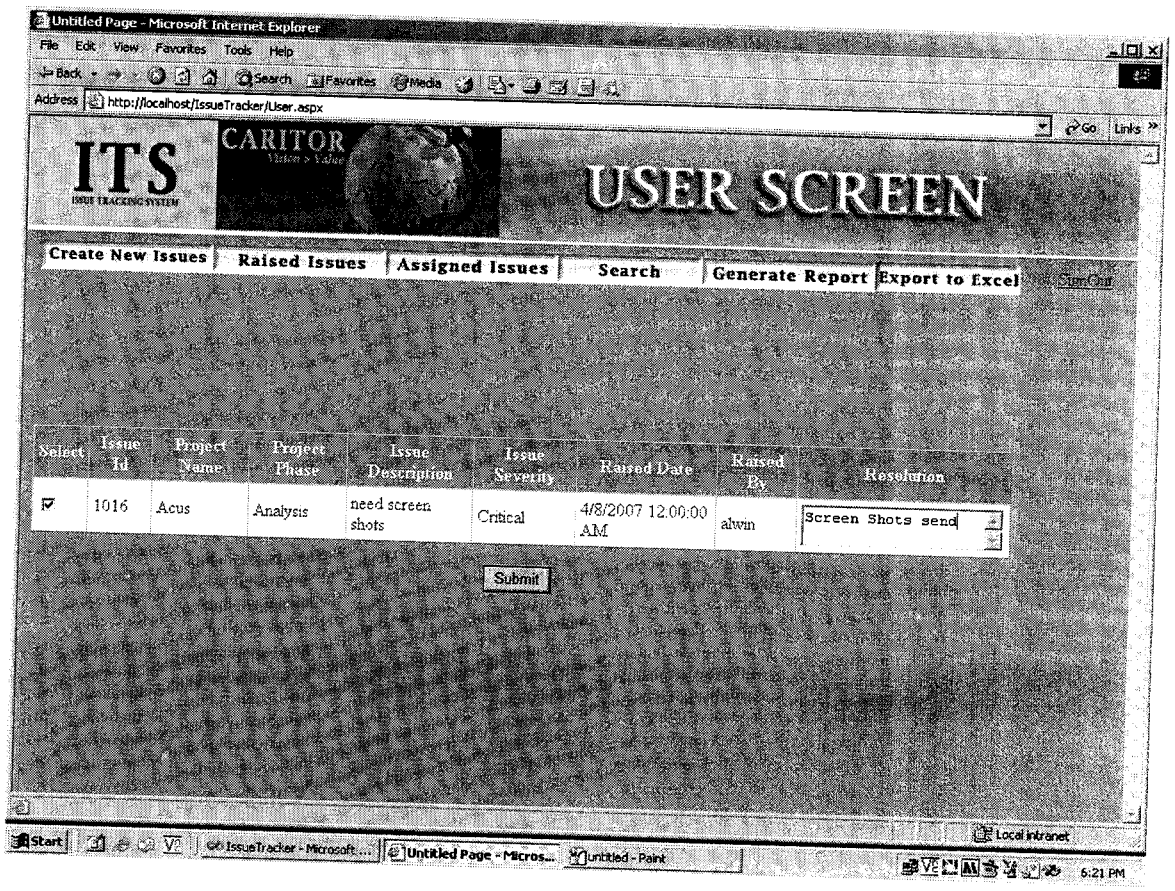


Figure – 2.4

SEARCH RESULTS

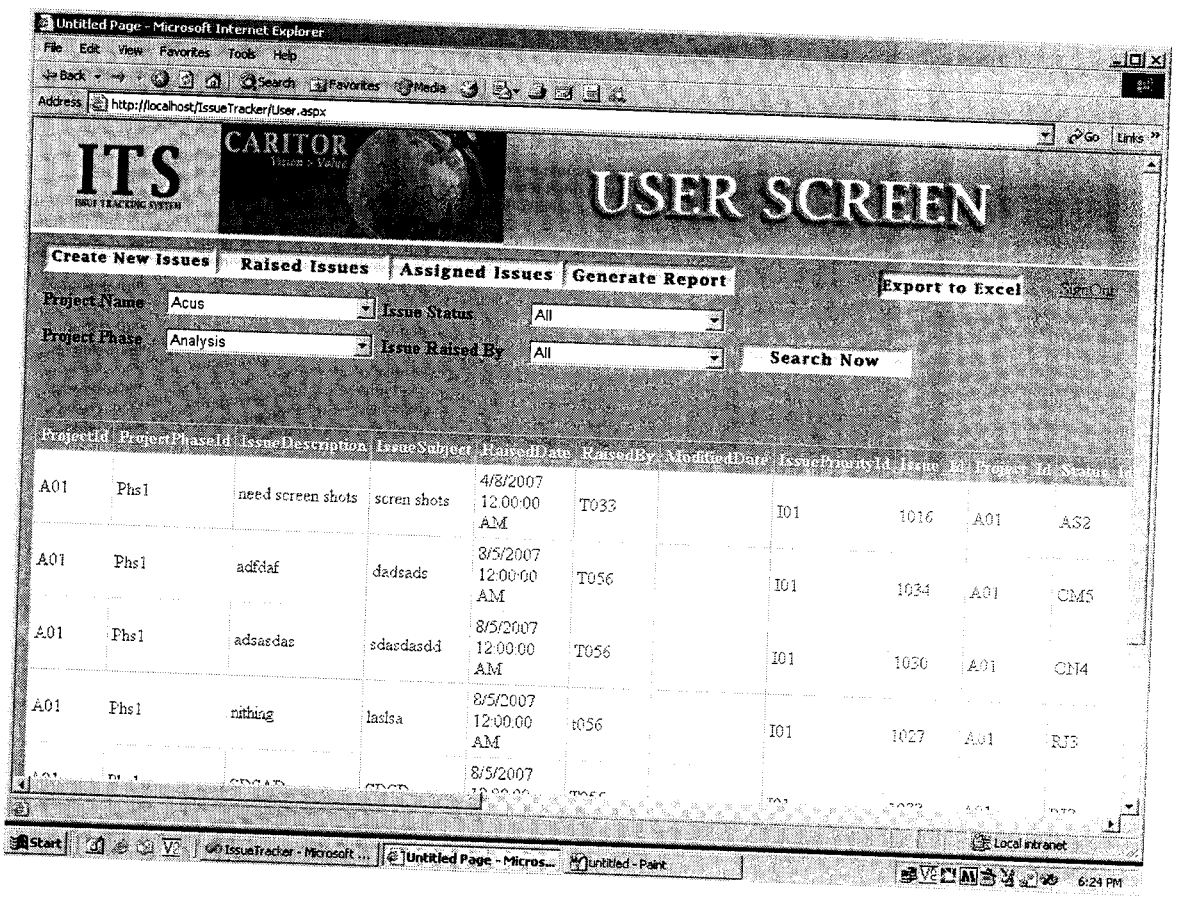


Figure – 2.5

PHASE LEVEL REPORT

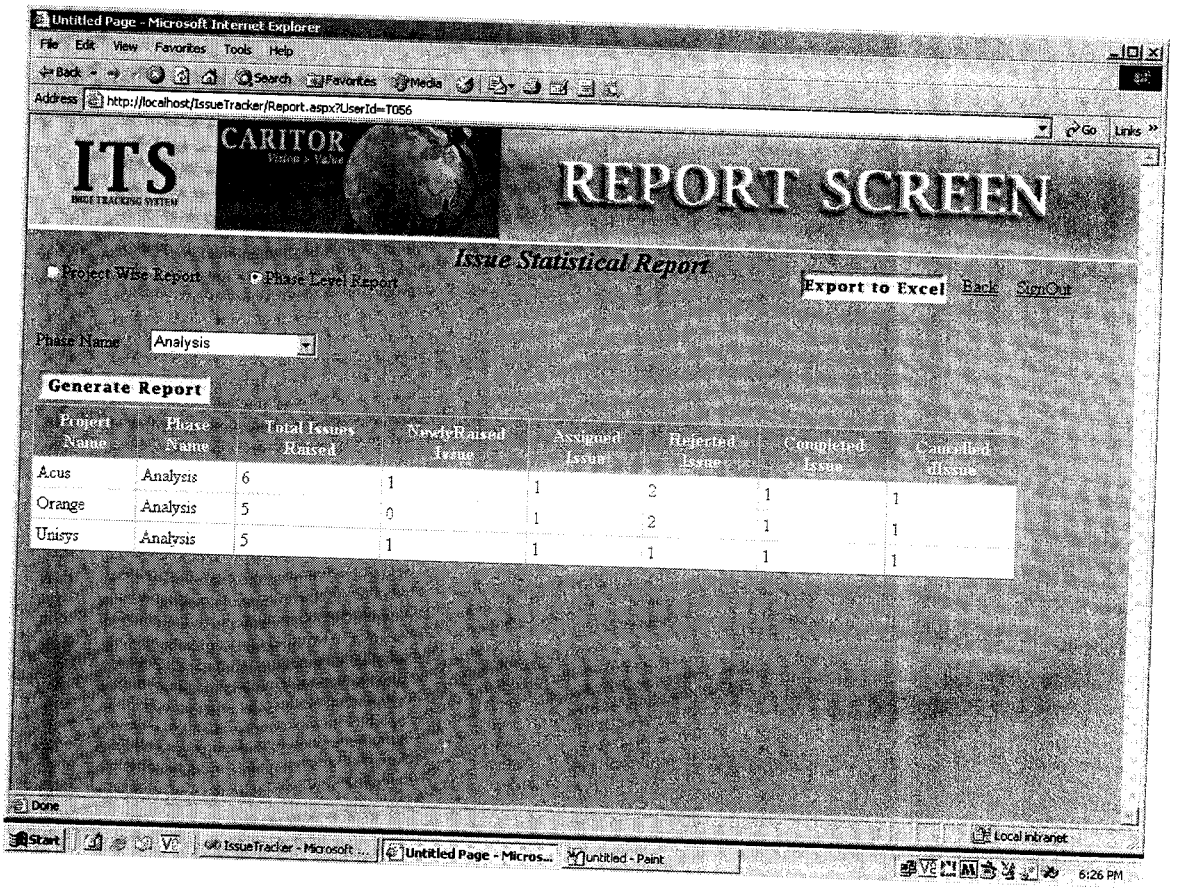


Figure – 2.6

PROJECT LEVEL REPORT

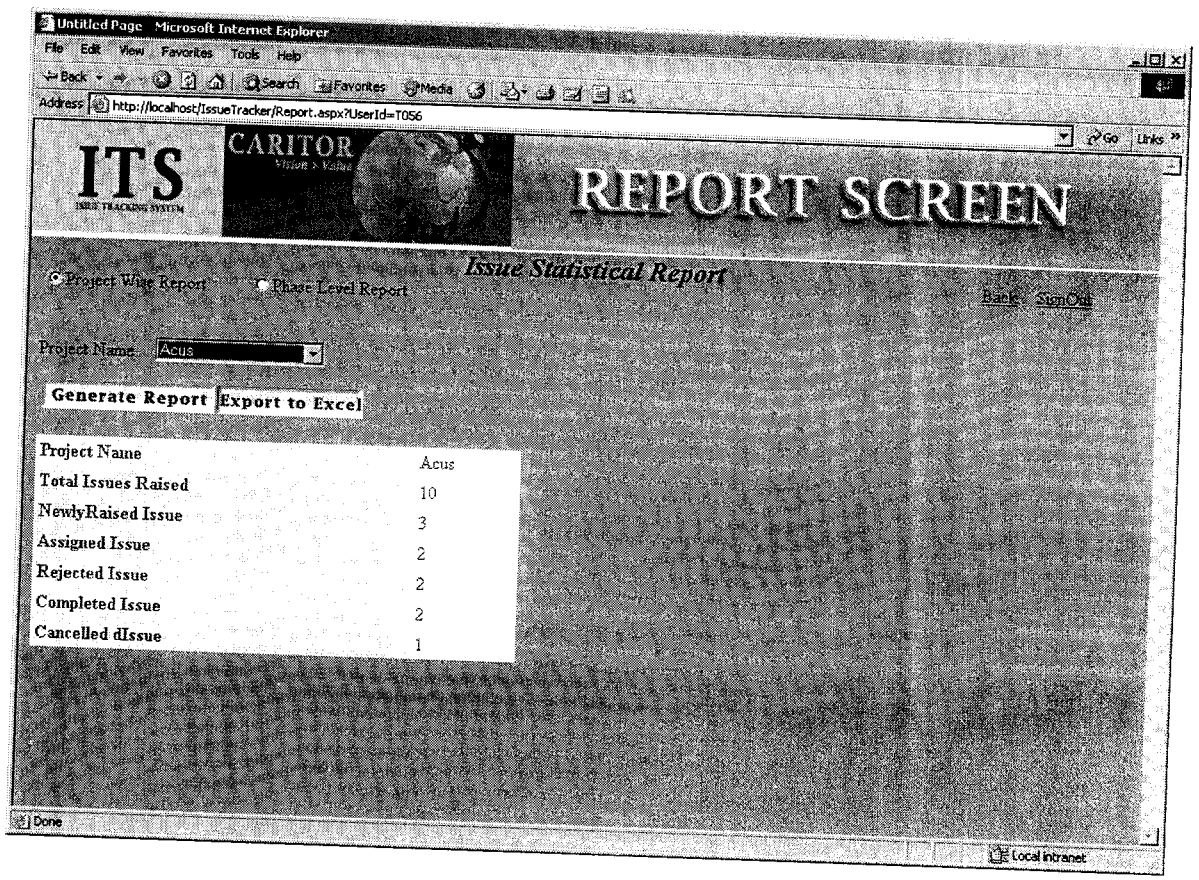


Figure – 2.7

EXPORTING TO EXCEL SHEET

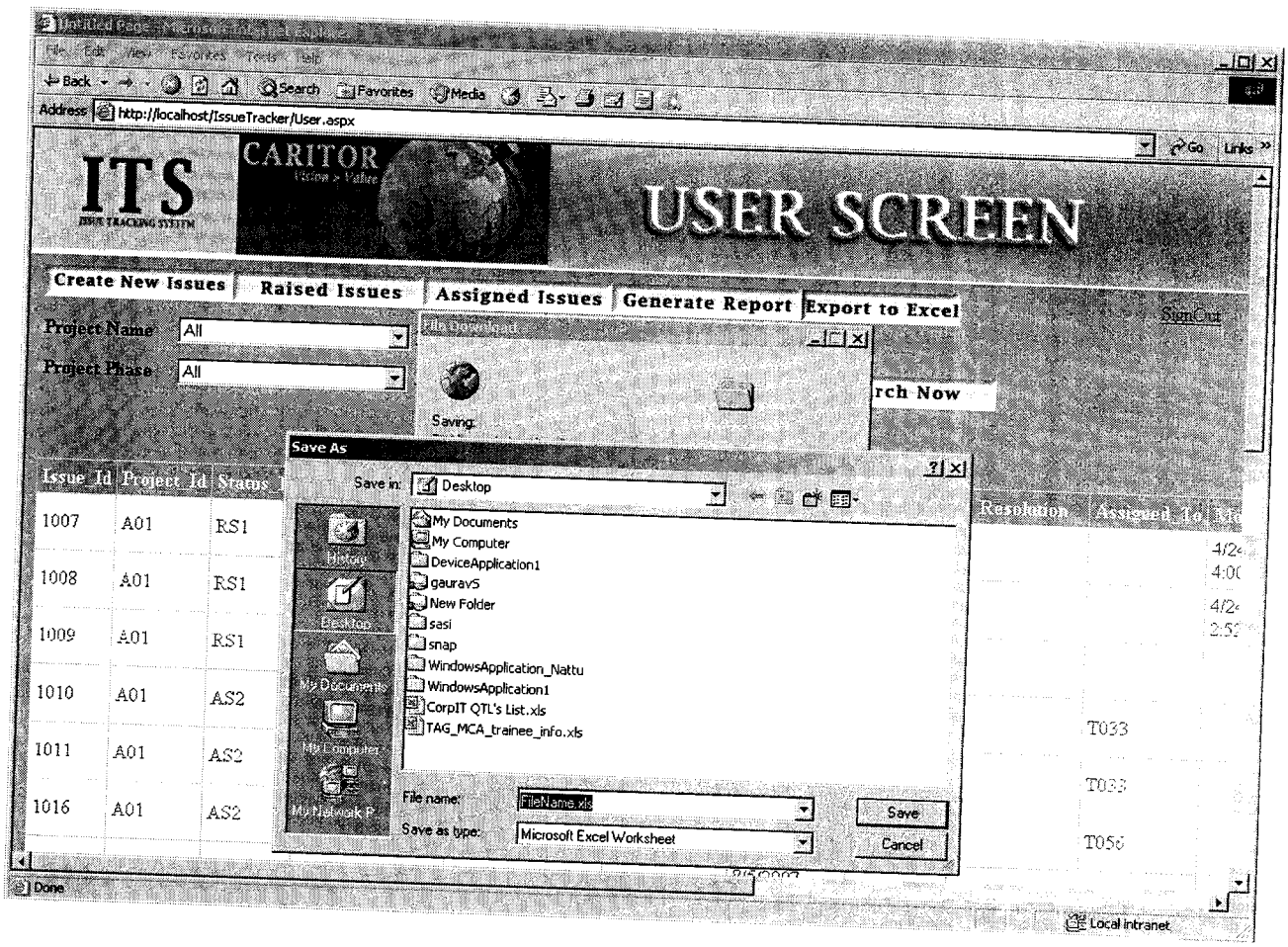
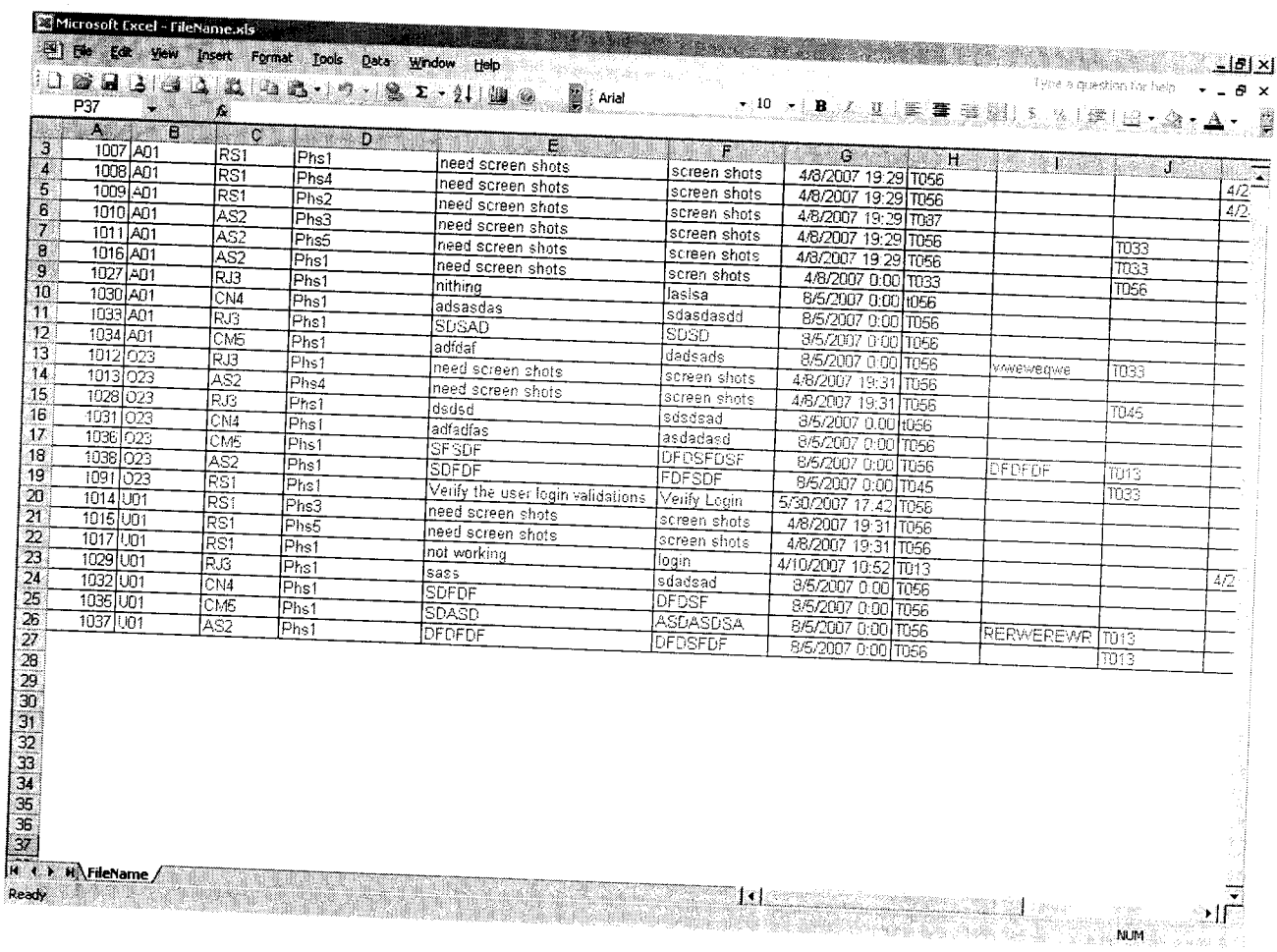


Figure – 2.8

EXPORTED TO EXCEL SHEET



	A	B	C	D	E	F	G	H	I	J	
3	1007	A01	RS1	Phs1	need screen shots	screen shots	4/8/2007 19:29	T056			
4	1008	A01	RS1	Phs4	need screen shots	screen shots	4/8/2007 19:29	T056			4/2
5	1009	A01	RS1	Phs2	need screen shots	screen shots	4/8/2007 19:29	T037			4/2
6	1010	A01	AS2	Phs3	need screen shots	screen shots	4/8/2007 19:29	T056		T033	
7	1011	A01	AS2	Phs5	need screen shots	screen shots	4/8/2007 19:29	T056		T033	
8	1016	A01	AS2	Phs1	nithing	scren shots	4/8/2007 0:00	T033		T056	
9	1027	A01	RJ3	Phs1	adsasdas	lasisa	8/5/2007 0:00	t056			
10	1030	A01	CN4	Phs1	SDSAD	sdasdasdd	8/5/2007 0:00	T056			
11	1033	A01	RJ3	Phs1	adfdaf	SDSD	8/5/2007 0:00	T056			
12	1034	A01	CM5	Phs1	need screen shots	dadsads	8/5/2007 0:00	T056	vwewegwe	T033	
13	1012	O23	RJ3	Phs1	need screen shots	screen shots	4/8/2007 19:31	T056			
14	1013	O23	AS2	Phs4	dsdsd	screen shots	4/8/2007 19:31	T056		T046	
15	1028	O23	RJ3	Phs1	adfadfas	sdsdsad	8/5/2007 0:00	t056			
16	1031	O23	CN4	Phs1	SFSDF	asdadasd	8/5/2007 0:00	T056			
17	1036	O23	CM5	Phs1	SDFDF	DFDSFDSF	8/5/2007 0:00	T056	DFDFDF	T013	
18	1038	O23	AS2	Phs1	Verify the user login validations	FDFSDF	8/5/2007 0:00	T045		T033	
19	1091	O23	RS1	Phs1	need screen shots	Verify Login	5/30/2007 17:42	T056			
20	1014	U01	RS1	Phs3	need screen shots	screen shots	4/8/2007 19:31	T056			
21	1015	U01	RS1	Phs5	not working	screen shots	4/8/2007 19:31	T056			
22	1017	U01	RS1	Phs1	sass	login	4/10/2007 10:52	T013			
23	1029	U01	RJ3	Phs1	SDFDF	sdadsad	8/5/2007 0:00	T056			4/2
24	1032	U01	CN4	Phs1	SDASD	DFDSF	8/5/2007 0:00	T056			
25	1035	U01	CM5	Phs1	DFDFDF	ASDASDSA	8/5/2007 0:00	T056	RERWEREWR	T013	
26	1037	U01	AS2	Phs1		DFDSFDF	8/5/2007 0:00	T056		T013	
27											
28											
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35											
36											
37											

Figure – 2.9

EXPORTING TO PRINTER

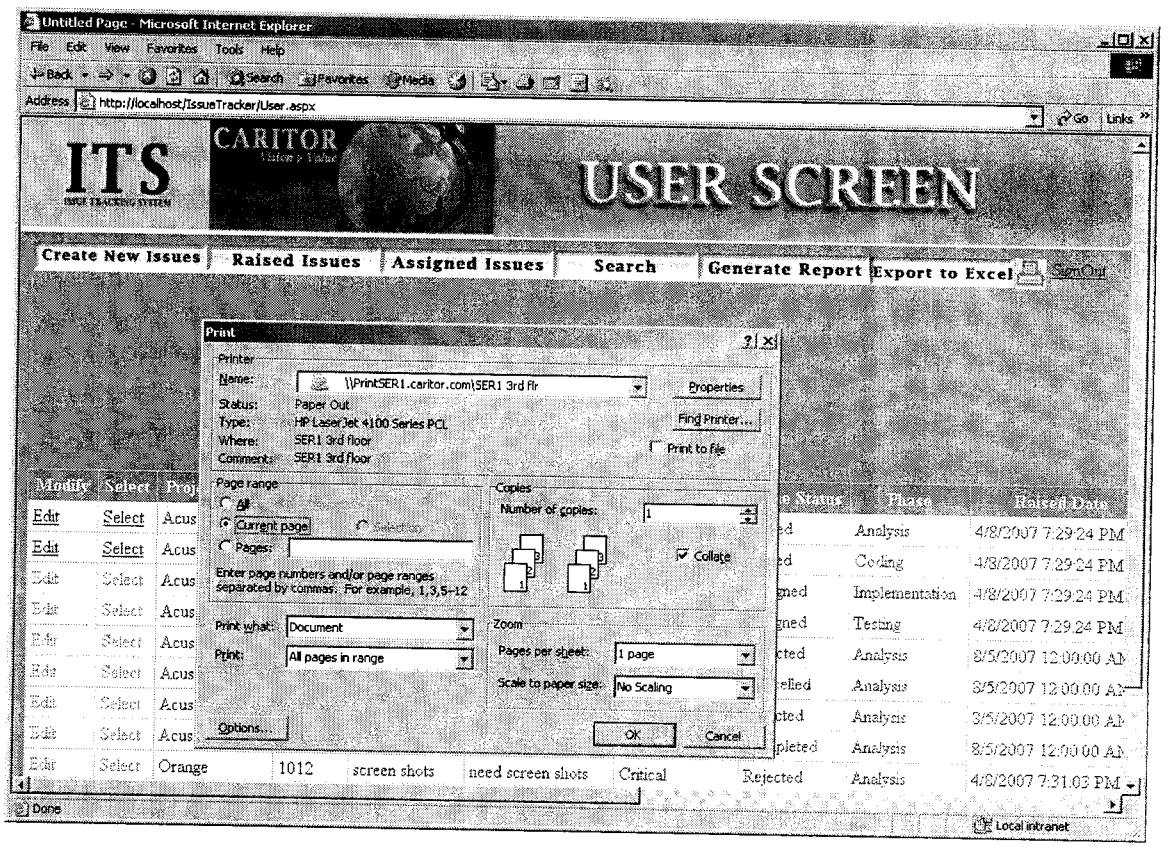

Figure – 2.10

REASSIGNING BY PROJECT ADMIN

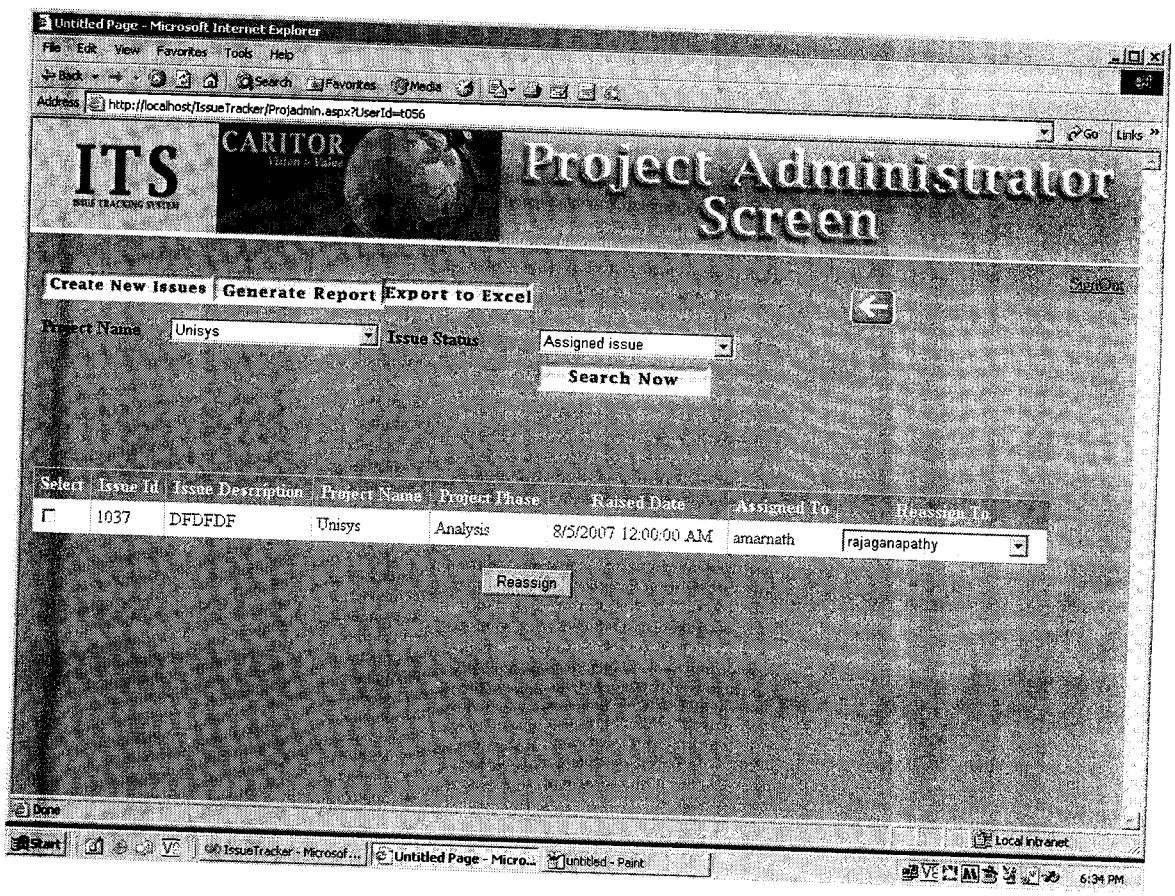

Figure – 2.11

REJECTION BY PROJECT ADMIN

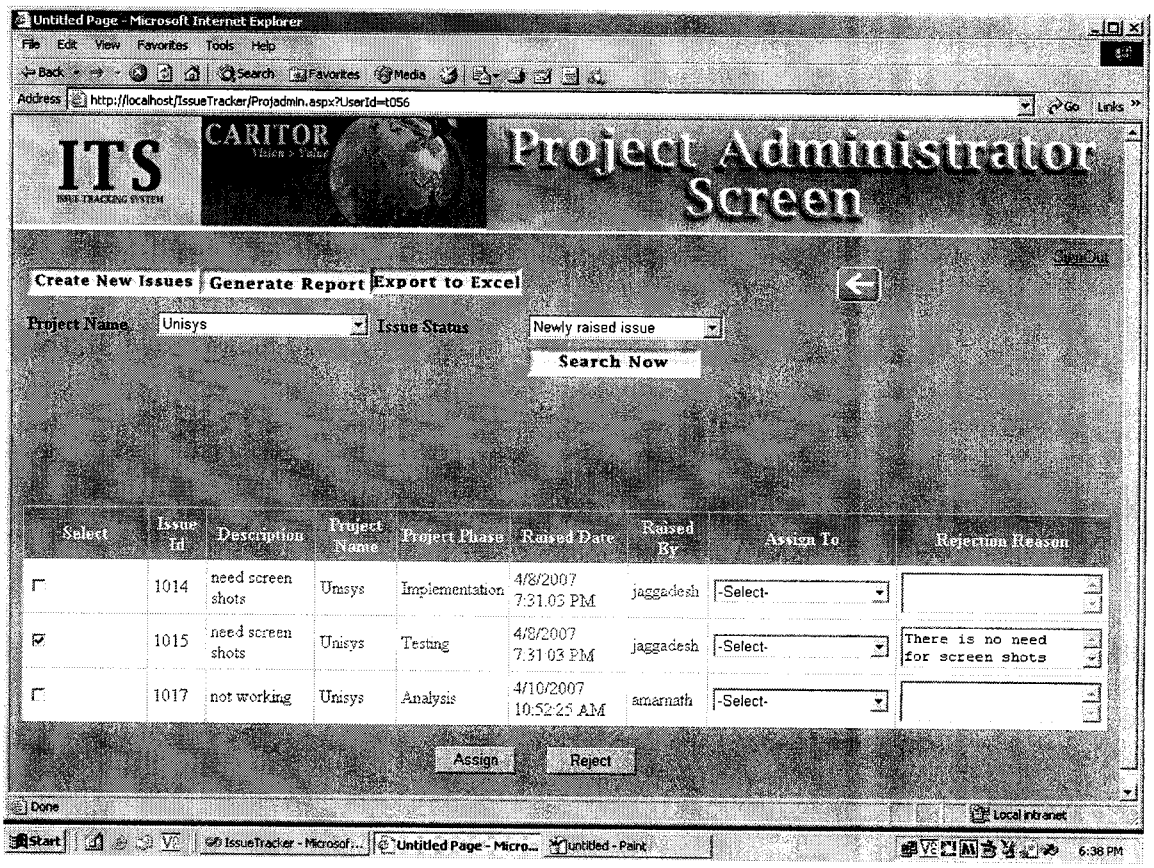

Figure – 2.12

SYSTEM ADMIN LOGIN PAGE

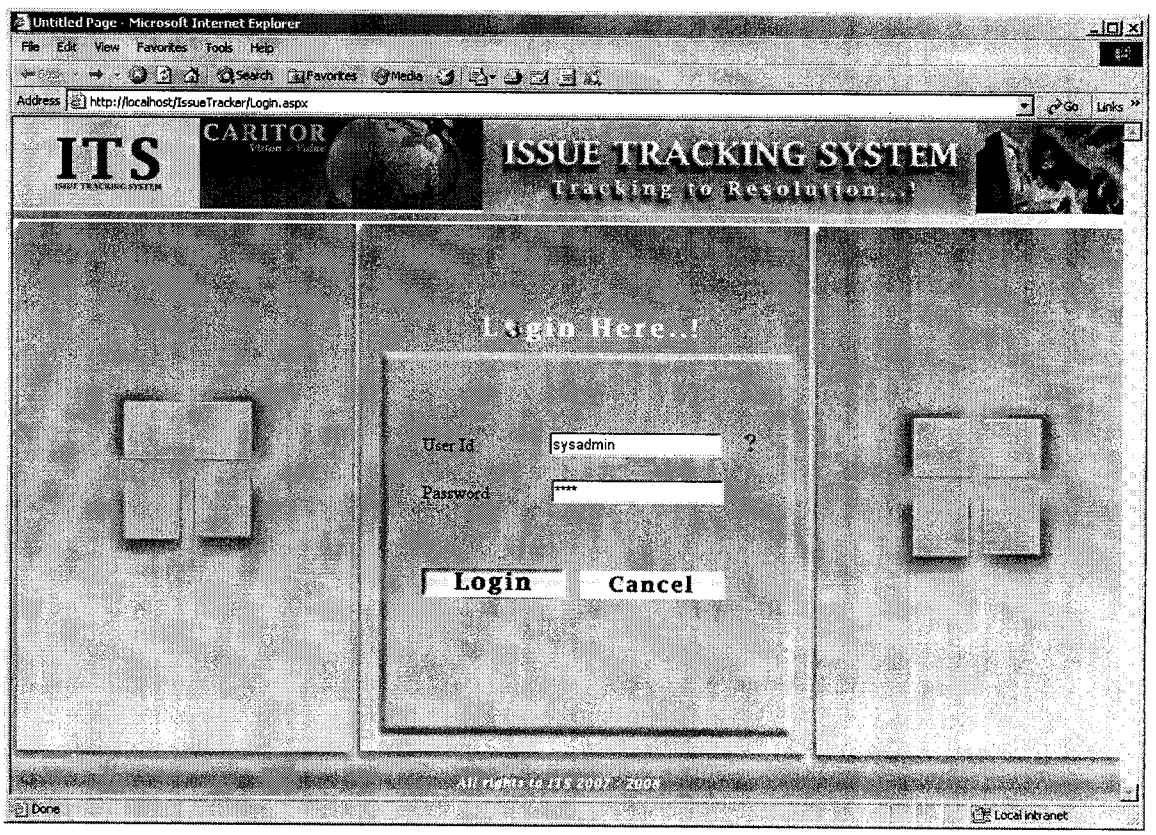

Figure – 2.13

MAP USER BY SYSTEM ADMIN

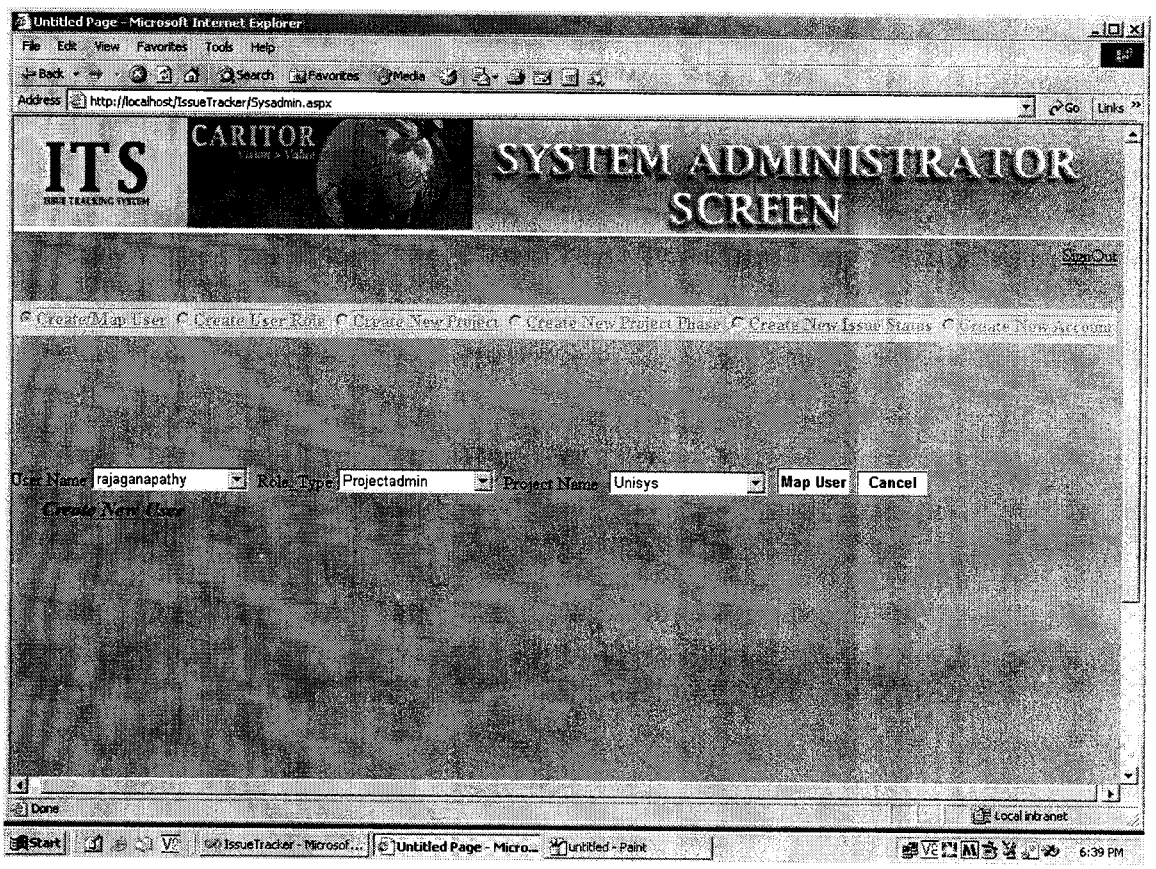

Figure – 2.14

CREATE NEW PROJECT BY SYSTEM ADMIN

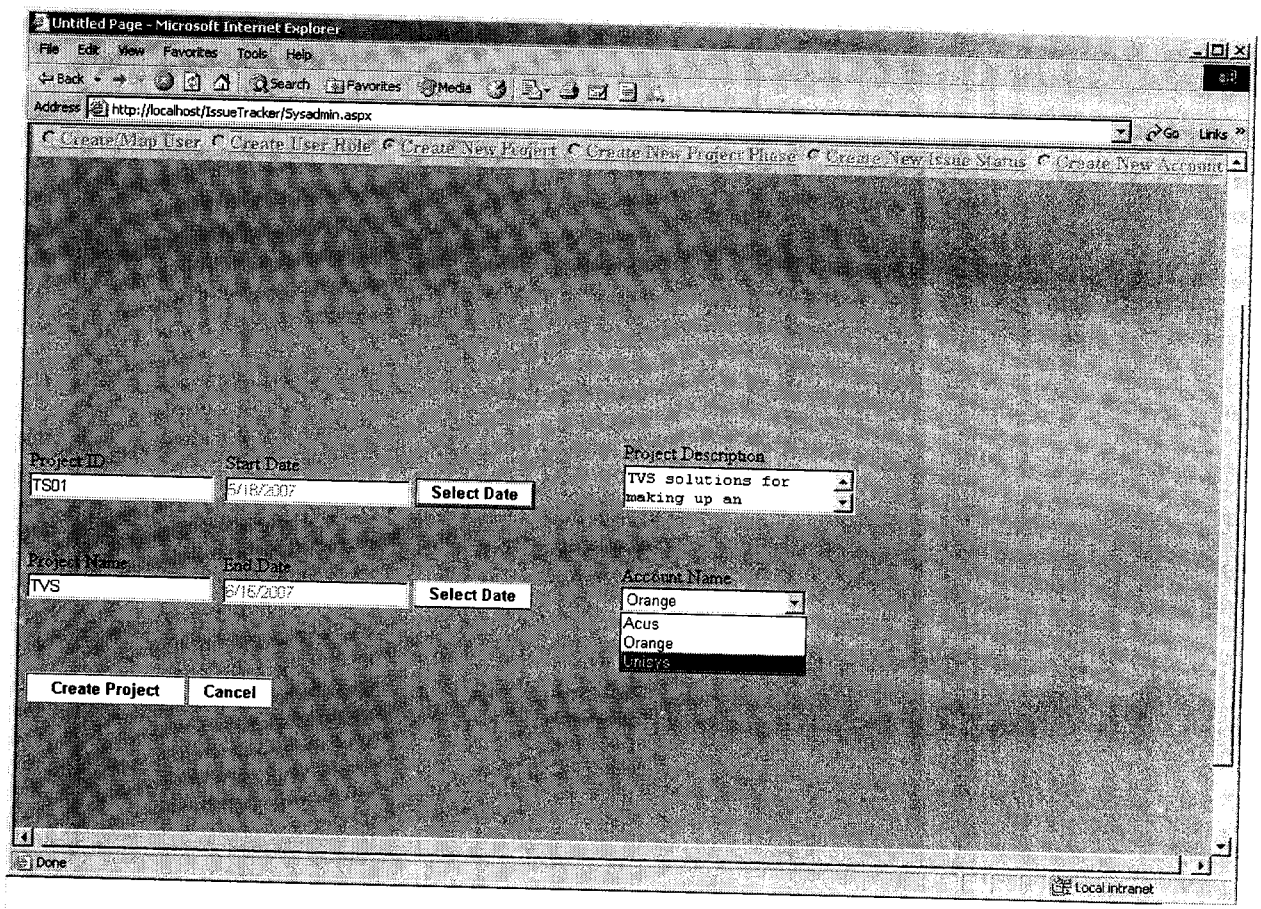

Figure – 2.15

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