Project Metric Management System

Project work done at

Sofil Information Systems Pvt. Ltd., Chennai

PROJECT REPORT

Submitted in partial fulfillment of the requirements
for the award of the degree of
Master of Computer Applications
of Bharathiar University, Coimbatore.

P-783

Submitted by
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Under the guidance of

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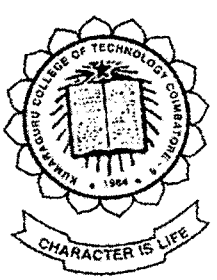

Department of Computer Science & Engineering
KUMARAGURU COLLEGE OF TECHNOLOGY
Coimbatore – 641 006

May 2002

Department of Computer Science & Engineering

KUMARAGURU COLLEGE OF TECHNOLOGY

Coimbatore -641 006

CERTIFICATE

This is to certify that the project work entitled "**Project Metric Management System**" for Sofil Information System Pvt. Ltd., Chennai is a Bonafide Record of work done by

Sv.Kasinathan 9938M0612

Under my guidance during the period January 2002 to April 2002

Head of the Department

30/04/02

Internal Guide

Submitted to the University Examination held on 10/5/2002

10/5/02

Internal Examiner

External Examiner

ISO 9001 Registered KPMG Quality Registrar
The Quality Advantage

SOFIL
Information Systems Pvt. Ltd.

May 7, 2002

CERTIFICATE

This is to certify that **Mr. Kasinathan Sv** of final year - Master of Computer Applications from Kumaraguru College of Technology has successfully completed his project work titled **"Project Metric Management System"** at SOFIL Information Systems Pvt Ltd under my guidance from January 2002 to April 2002.

For SOFIL Information Systems Pvt Ltd

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I thank my beloved parents, friends, department teaching and non teaching staff who have been a pillar of support from the start, until the completion of the entire project.

SYNOPSIS

The Project Management in general can be seen as the process of setting objectives for a system and then monitoring the system to see what its true performance is. The Project Metric Management System developed for Sofil Information Systems Pvt. Ltd., automates the process of software project management and monitors the project with the software metrics.

The system maintains a database for recording the details about the software projects involved in the organization and provides reports about the planned and actual performance of the projects. The system also generates graphs and data charts, which aid in tracking the progress of the projects. The system helps the project management group to Manage, Monitor and Control the projects in the organization.

The Project Metric Management System is a multi-user system that has been designed using the Active Server Pages (ASP), MS SQL 2000 as database manager, MS Word for generating reports, MS Excel for generating charts and Visual Basic Script and Java Script as script languages.

The system has been designed and developed according to the standard followed in the organization. The system is flexible enough to support future enhancement and accepts any modifications without affecting the present system functionally to a maximum extent.

CONTENTS

1. INTRODUCTION

1.1. Project Overview

The main objectives of the project are as follows:

- Automate the process of Project Management and Software Metrics calculation involved with the software development, as well as creating a database for future extraction and reference of the data concerned with the projects.

- Provides a tool for resource management during the software development process.

- Provides a tool for tracking the development and testing phase of the project.

- Provides a tool for calculating the quality factors involved during the process of Software Quality Analysis.

- Automate the generation of the reports and charts, which aid in monitoring and controlling the project.

1.2. Organization Profile

Sofil Information Systems

Thinking beyond the normal. At Sofil they approach IT challenges in a creative, yet structured manner. With excellent domain expertise and remarkable ability to convert knowledge to design they provide appropriate solutions. "Sofil's Operational Philosophy is to go beyond the basics of the out source product development for effective collaboration relies on having the right tools and the power of people working together".

Background

Sofil is a global software services and solutions provider and has over 15 satisfied customers across US, Japan and APAC and some Fortune 500 Companies.

Services

Sofil's IT services include e-Business solutions, Application development, Networking Solutions and Offshore development. The target industries are Manufacturing, Retail, Utilities, Telecom, Hardware and Software Product Companies. Sofil's geographical reach spans over USA, Japan, Singapore, Middle East and India.

Infrastructure

They have established strong infrastructural facilities for Development, Maintenance and Re-engineering of our projects. The quality standards include ISO 9001 certification and they have implemented CMM practices to software projects and support functions, and aim to reach CMM level 5 by 2002. Sofil's strengths lie in the large and diverse technical pool of over 200 software engineers.

Value Proposition

Sofil integrates People, Processes and Technology to deliver innovative solutions to a customer problem. Quality, Cost effective solutions, On-time and On-budget project delivery are their proposition.

Sofil in Japan

Focus

Top management committed to be in Japan market. At Sofil, they provide one technical coordinator proficient in Japanese for every project and developed in-house bilingual software development capability. In-house Japanese language training for engineers. Established Japan Desk a group of Japanese language translators for specification translation.

Experience

The Management and the technical team have the experience of working with Japanese clients like NEC, OKI ELECTRIC, NSW, TOYO INFORMATION SYSTEM, UNISIA JECS, CSK, CITI BANK, OSK OSAKA, IBM, NISSIN, SIMPLEX RISK MANAGEMENT, ETC. They are fully aware of Japanese business practices and quality expectations. They have been successfully running off shore Development Centers for the Japanese Clients.

Marketing

Established branch in Tokyo and Representative office at Osaka. They have an alliance partner company 'NSW ' in Japan. They have 3 Indian business development managers fluent in reading, writing and speaking Japanese, for marketing, placed in Tokyo and Osaka. They have 3 native Japanese business support professionals for marketing and customer support.

Offshore Development

Three ODC (Off Shore Development Center) as dedicated development centers. Customer engineer is Present in one of the ODC at Chennai. Stream lined procedures for executing projects and some of the projects use Japanese Quality methodology. To support ODC they place one on site coordinator at customer site if needed.

Strategies for Success

- Quality delivery.
- Excellent communication skills in Japanese.
- Japanese business associates.
- Highly qualified consultants from the best universities of the world.
- Competence centers across major technology platforms.
- Sofil's total project management approach offers clients a rare opportunity to achieve their business goals with minimum disruption and optimal results .

SYSTEM STUDY AND ANALYSIS

2. SYSTEM STUDY & ANALYSIS

2.1. Existing System

- The Project Metric & Management System at present remains a manual procedure.

- The Project Management Team collects the data about the project by manually filled forms. There is a lot of time spent in retrieving data related to the Project Management process in order to monitor the effectiveness of the software development.

- The Project Management Team manually evaluates the status of the project and gives a manually generated report to the Project Steering Committee for suggestions.

- The Quality Coordinator collects the quality factors manually and uses electronic spreadsheet to generate the charts needed for monitoring and controlling.

- Establishing the baseline is also done manually which needs lot of effort and time.

The reasons behind undertaking this project and the advantages derived are

- The Project Metric & Management System at present remains a manually completed procedure. Creating a database that will keep track of each project can eliminate this. Automating it will result in making it user-friendly and less time consuming.

- Automation of the Project Management through designing customized forms helps to generate the (Just In Time) report during the project development and keep tracking of the project status and make it mandatory for the members of the organization to follow it.

- The Metric calculation of the project is automated, so less time is spent to know the quality of the software developed.

2.2. Proposed System

The proposed Project Metric Management System has the following features

- Automation of the system through designing customized forms helps to keep track of each software project involved in the organization with the help of the efficient database.

- Provides tools for the resource allocation especially the human resource allocation for the project by checking the availability of the resource.

- The quality factors involved with the quality analysis of the project are calculated automatically by using the data captured during the Project Management.

- The system provides a tool for the Project Managers to know about the status and the progress of the project just in time.

- The system provides forms to enter the Module, Screen, Test and Quality details of the project and tools to generate the reports during the development of the software.

- The security of the system allows the authenticated users to access their project data.

2.3. Requirements on New System

- The system should gather the details about the clients of the organization, the employees of the organization, and the details of the project about the requirements, the duration and other details about the project.

- The project resources such as the hardware, software and people involved in the project must be allotted. Then the project must be divided in to modules, which involves screens.

- The responsibilities of the team members must be specified with duration of the work and planned dates.

- The progress of the project should be calculated with various factors to know the actual status of the project.

- The system must provide tools to calculate the quality factors with the data captured during the development and testing of the project for the software quality analysis.

- The reports about the project progress and the status should be provided as pre the standard followed in the organization.

2.4. Uses Characteristics

- The system is used by the software development organization, so the user must be the part of the organization.

- The user must know about the organization's procedures and rules involved during the development of the project.

- Knowledge about how to use a browser and using Microsoft Office tools such as Microsoft Word and Microsoft Excel.

PROGRAMMING ENVIRONMENT

3. PROGRAMMING ENVIRONMENT

3.1. Hardware Configuration

- A Pentium Based Server machine which is capable to handle the Internet Information Server and the MS SQL Server.

- The Pentium Based client machines with any Microsoft Workstations (As pre the Users requirements)

- Network facility connecting the Servers and the Client machines.

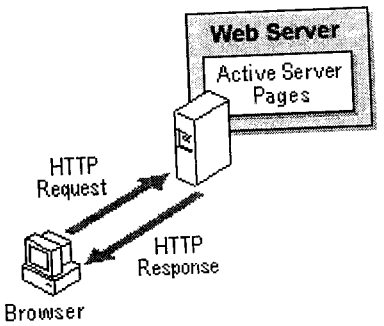
3.2. Software Configuration

Introduction to Active Server Pages (ASP)

Active Server Pages (ASP) is a server-side scripting environment that you can use to create dynamic Web pages or build powerful Web applications. ASP pages are files that contain HTML tags, text, and script commands. ASP pages can call ActiveX components to perform tasks, such as connecting to a database or performing a business calculation. With ASP, you can add interactive content to your Web pages or build entire Web applications that use HTML pages as the interface.

The Active Server Pages Model

An ASP script begins to run when a browser requests an .asp file from your Web server. Your Web server then calls ASP, which reads through the requested file from top to bottom, executes any script commands, and sends a Web page to the browser.



Because your scripts run on the server rather than on the client, your Web server does all the work involved in generating the Web pages that you send to browsers. You need not worry whether a browser can process your scripts: your Web server does all the script processing, transmitting standard HTML to the browser. Server-side scripts cannot be readily copied because only the result of the script is returned to the browser. Your users cannot view the script commands that created the page they are viewing. Active Server Pages provides a framework for using existing scripting languages, such as Microsoft VBScript and Microsoft JScript, in an HTML page.

Working with Scripting Languages

Scripting languages are an intermediate stage between HTML and programming languages such as Java™, C++, and Visual Basic. HTML is generally used for formatting text and linking pages. Programming languages are generally used for giving a series of complex instructions to computers. While scripting languages can also be used to give instructions to computers, their syntax and rules are generally less rigid and intricate than those of compiled programming languages. Scripting languages focus on formatting text or calling and using compiled components written in a programming language.

Active Server Pages makes it possible for the Web developer to write complete procedures by using a variety of scripting languages. In fact, several scripting languages can be used within a single .asp file. In addition, because scripts are read and processed

on the server side, the client browser that request the .asp file does not need to support scripting.

You can use any scripting language for which the appropriate scripting engine is installed on your Web server. A *scripting engine* is a program that processes commands written in a particular language. Active Server Pages comes with two scripting engines: Microsoft Visual Basic Scripting Edition (VBScript) and Microsoft JScript. You can install and use engines for other scripting languages, such as REXX and Perl.

If you are already a Visual Basic programmer, you can immediately begin using VBScript, which is a subset of Visual Basic. If you are a Java, C, or C++ programmer, you may find that JScript syntax is familiar to you, even though JScript is not related to Java or C.

If you are familiar with another scripting language, such as REXX or Perl, you can obtain and install the appropriate scripting engine so that you can use the language you already know. Active Server Pages is an ActiveX scripting host; to use a language you must install a scripting engine that follows the ActiveX Scripting standard and resides as a COM (Component Object Model) object on the Web server.

Internet Information Server

Microsoft's IIS is the connection between the client and the server in an Internet/intranet browser-based development solution. In this type of solution, the client is the browser like the Internet Explorer, Netscape Navigator. The server is the combination of tools and applications that we use on our Web site to produce the content.

MS SQL

Fundamentals of SQL Server Architecture

Microsoft® SQL Server™ is a Structured Query Language (SQL) based, client/server relational database. Each of these terms describes a fundamental part of the architecture of SQL Server.

Database

A database is similar to a data file in that it is a storage place for data. Like a data file, a database does not present information directly to a user; the user runs an application that accesses data from the database and presents it to the user in an understandable format.

Database systems are more powerful than data files. The data is more highly organized. In a well-designed database, there are no duplicate pieces of data that the user or application has to update at the same time. Related pieces of data are grouped together in a single structure or record, and relationships can be defined between these structures and records.

When working with data files, an application must be coded to work with the specific structure of each data file. In contrast, a database contains a catalog that applications use to determine how data is organized. Generic database applications can use the catalog to present users with data from different databases dynamically, without being tied to a specific data format.

A database typically has two components: the files holding the physical database and the database management system (DBMS) software that applications use to access data. The DBMS is responsible for enforcing the database structure, including:

- Maintaining the relationships between data in the database.

- Ensuring that data is stored correctly, and that the rules defining data relationships are not violated.
- Recovering all data to a point of known consistency in case of system failures.

Relational Database

There are different ways to organize data in a database but relational databases are one of the most effective. Relational database systems are an application of mathematical set theory to the problem of effectively organizing data. In a relational database, data is collected into tables (called relations in relational theory).

A table represents some class of objects that are important to an organization. For example, a company may have a database with a table for employees, another table for customers, and another for stores. Each table comprises columns and rows (attributes and tuples in relational theory). Each column represents some attribute of the object represented by the table. For example, an **Employee** table would typically have columns for first name, last name, employee ID, department, pay grade, and job title. Each row represents an instance of the object represented by the table. For example, one row in the **Employee** table represents the employee who has employee ID 12345.

When organizing data into tables, you can usually find many different ways to define tables. Relational database theory defines a process, normalization, which ensures that the set of tables you define will organize your data effectively.

Client/Server

In a client/server system, the server is a relatively large computer in a central location that manages a resource used by many people. When individuals need to use the resource, they connect over the network from their computers, or clients, to the server. Examples of servers are:

- Print servers

  Manage the printers used by a team or unit.

- File servers

  Store large files used by a team or unit by using large disk drives.

- E-mail servers

  Run a company's e-mail system.

In a client /server database architecture, the database files and DBMS software reside on a server. A communications component is provided so applications can run on separate clients and communicate to the database server over a network. The SQL Server communication component also allows communication between an application running on the server and SQL Server.

Server applications are usually capable of working with several clients at the same time. SQL Server can work with thousands of client applications simultaneously. The server has features to prevent the logical problems that occur if a user tries to read or modify data currently being used by others.

While SQL Server is designed to work as a server in a client/server network, it is also capable of working as a stand-alone database directly on the client. The scalability and ease-of-use features of SQL Server allow it to work efficiently on a client without consuming too many resources.

Structured Query Language (SQL)

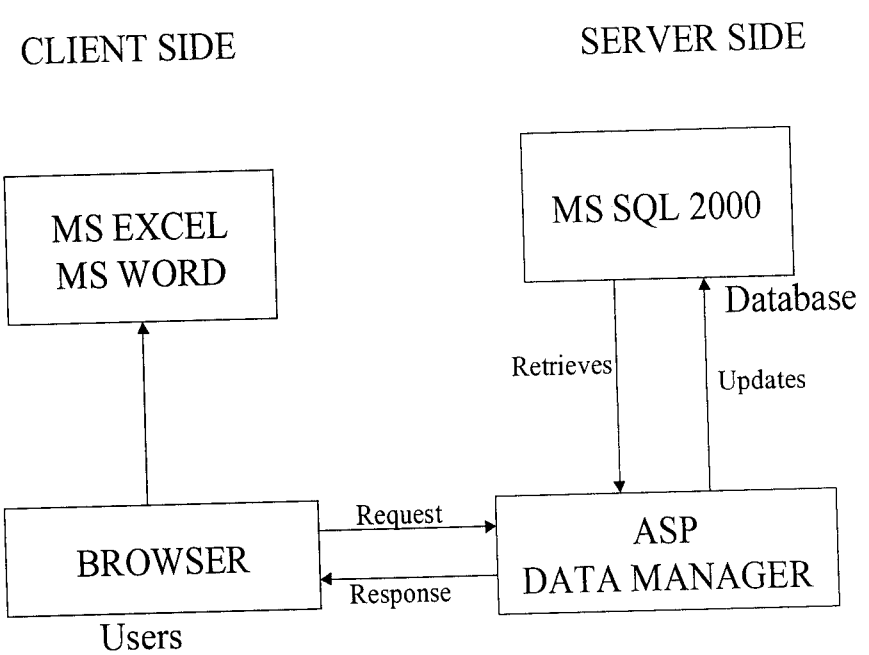
To work with data in a database, you must use a set of commands and statements (language) defined by the DBMS software. There are several different languages that can be used with relational databases; the most common is SQL. Standards for SQL have

been defined by both the American National Standards Institute (ANSI) and the International Standards Organization (ISO). Most modern DBMS products support the Entry Level of SQL-92, the latest SQL standard (published in 1992).

Reasons for the choice.

- The existing LAN can be used to supports the intranet with the of IIS and database server MS SQL.
- The ASP is a part of IIS and it provides support to heavy transfer of data and helps the people to access the system from their client machines.
- The MS SQL supports the ASP applications and manages the data efficiently.

3.3. System Architecture



SYSTEM DESIGN AND DEVELOPMENT

4. SYSTEM DESIGN AND DEVELOPMENT

4.1. Screen Design

The Project Metric Management System Consist of the following Modules

- Project Management
- Development Management
- Test Management
- Metric Management
- Report Management

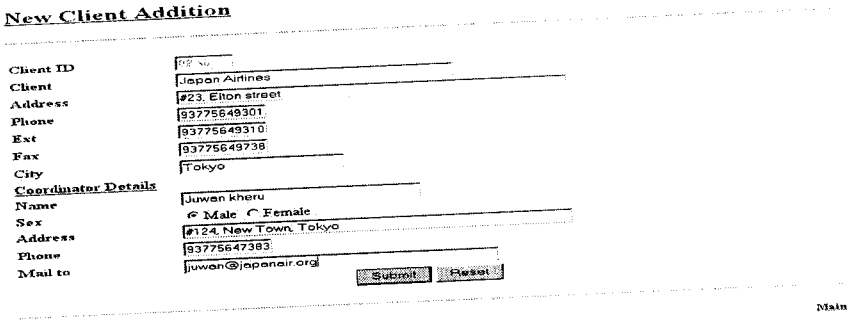
Module 1: Project Management

The project client, and team details, the scheduling of resource required for the project is done in this module.

The Project Management consists of the following screens

- New Client Addition
- View & Modify Client Details
- New Project Type Addition
- View & Modify Project Type Details
- New Application Type Addition
- View & Modify Application Type Details
- New Project Addition
- View & Modify Project Details
- New Skill Set Addition
- View & Modify Skill Set Details
- New Employee Addition
- View & Modify Employee Details
- New Team Formation
- View & Modify Team Details

New Client Addition



Input:

The Client details like Client Name, Address, City, Phone with Extension and Fax. The details about the Coordinator of the project from the client place like the Coordinators Name, Gender, Address, Phone and Email id.

Process:

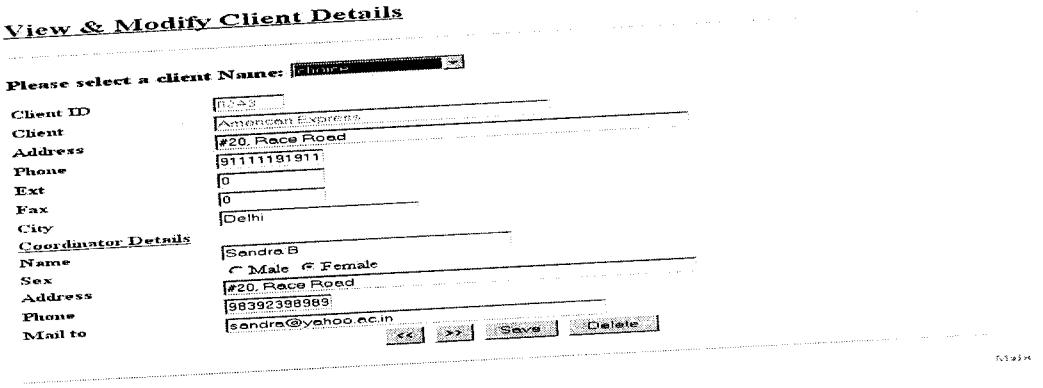
The Client ID is auto generated. The submit button helps to check the validations of the data and add to the table. The Reset button helps to reset the values entered in the screen.

The input values are checked, if any violation a message to correct the input is shown. The Name fields allows only the characters and space, the phone field allows only 11 digit numbers and the Email field checks for correct email address. If all input values are checked then the values entered are submitted to the database table.

Output:

The Client table gets the values form the screen. The screen clears the fields and auto generates the Client ID for the next client data entry.

View & Modify Client Details



Input:

The Client Name is taken as input from the user by displaying a list of all clients. The Client details like Client Name, Address, City, Phone with Extension and Fax. The details about the Coordinator of the project from the client place like the Coordinators Name, Gender, Address, Phone and Email id. The buttons are used to View, Modify & Delete the records.

Process:

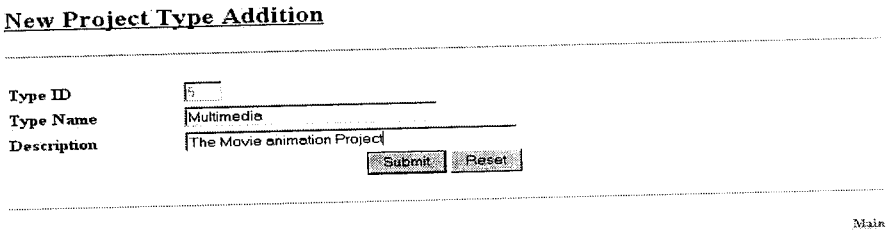
The Client records are viewed using the Previous & Next arrow buttons. The Save button is used to save the modification done to the record after checking the validation. The delete button helps to delete the record selected. If the client is involved in some project then the deletion of the record in not possible.

The input values are checked, if any violation a message to correct the input is shown. The Name fields allows only the characters and space, the phone field allows only 11 digit numbers and the Email field checks for correct email address. If all input values are checked then the values entered are submitted to the database table.

Output:

The Client table gets the values form the screen if modification is done to the records.

New Project Type Addition



Input:

The Project Type name & Description is taken as input from the user. The project screen uses the Project Type details.

Process:

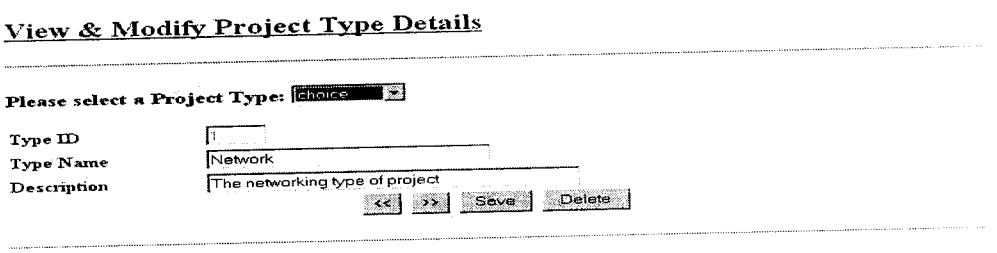
The Project Type ID is automatically generated. The Submit button is used to store the project type record in the table. The Reset button resets the screen.

The Type Name & Description is checked for the values. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Project Type table stores the values form the screen.

View & Modify Project Type Details



Input:

The Project Type is taken as input from the user to display the Project Type details. The buttons are used to View, Modify & Delete the records.

Process:

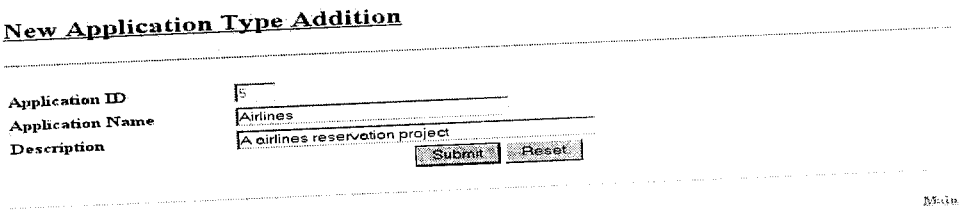
The Project Type is used to display the type name & description. The Save button is used to save the modification done to the project type record in the table. The Previous & Next button is used to view the records.

The Type Name & Description is checked if the values are modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Project Type table stores the values form the screen.

New Application Type Addition



Input:

The Application Type name & description is taken as input from the user. The project screen uses the Application Type details.

Process:

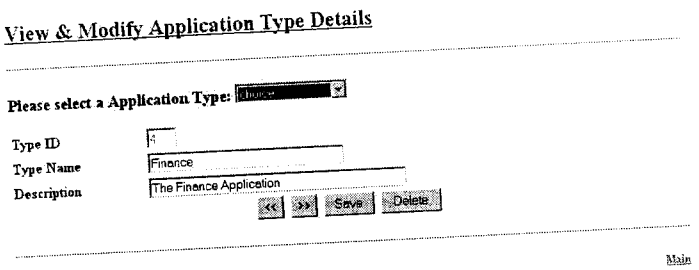
The Application Type ID is automatically generated. The Submit button is used to store the application type record in the table. The Reset button resets the screen.

The Application Name & Description is checked for the values. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Application Type table stores the values form the screen.

View & Modify Application Type Details



Input:

The Application Type is taken as input from the user to display the Application Type details. The buttons are used to View, Modify & Delete the records.

Process:

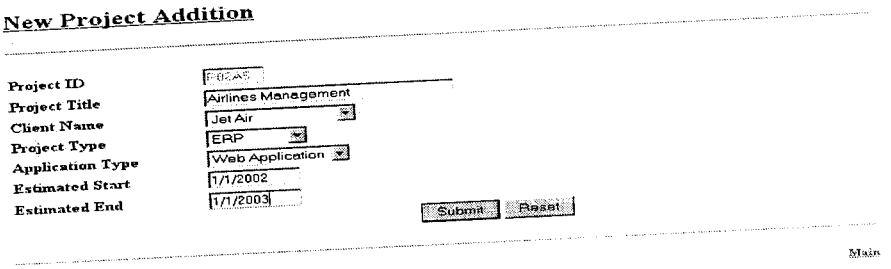
The Application Type is used to display the type name & description. The Save button is used to save the modification done to the project type record in the table. The Previous & Next button is used to view the records.

The Application Name & Description is checked if the values are modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Application Type table stores the values form the screen.

New Project Addition



Input:

The Project screen gets the details about the project from the user. The Project details are the Project Title, the Project code, the Client, the Project & Application type and the plan details of the project.

Process:

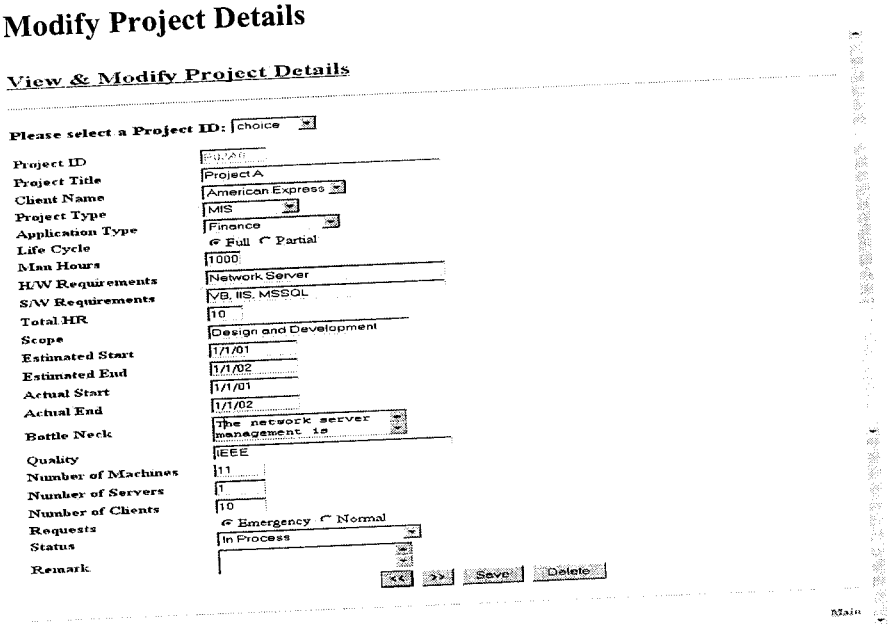
The Project ID is automatically generated. The Project Type, Application Type, Client are displayed in the list box for selection. Submit button is used to store the project details to the table. The Reset button resets the screen.

The validation is done for Project Title, the list box items and date field items. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Project table stores the values form the New Project screen.

View & Modify Project Details



Input:

The Project Title is taken as input from the user to display the Project details. The Resource allocation and other details of the project is taken as the input. The buttons are used to View, Modify & Delete the records.

Process:

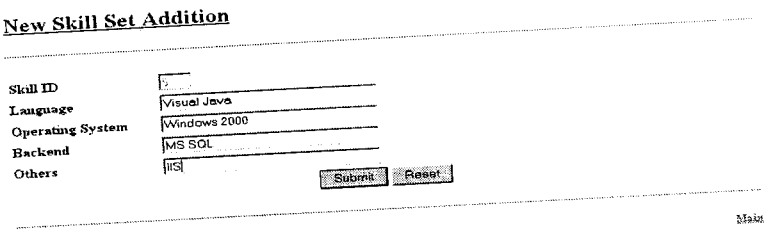
The Project Title select from the drop down list box is used to display the type name & description. The Save button is used to save the modification done to the project record in the table. The Previous & Next button is used to view the records.

The Fields are checked when the values are modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Project table stores the values form the screen.

New Skill Set Addition



Input:

The Skill set details like the Language, Operating System, Backend and other skill required are taken as input form the user. The Skill ID is used to identify the Skill set.

Process:

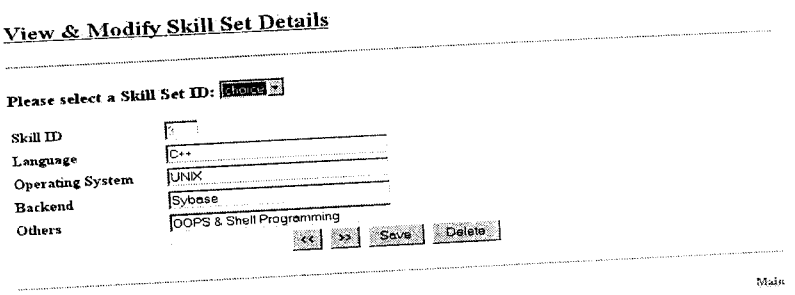
The Skill ID is automatically generated. The Submit button is used to store the employee record in the table. The Reset button resets the screen.

The fields are checked for valid inputs. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Skill table stores the value form the screen. It is used in the Employee table to identify the employee's skills.

View & Modify Skill Set Details



Input:

The Skill ID is taken as input from the user to display the Skill Set details. The buttons are used to View, Modify & Delete the records.

Process:

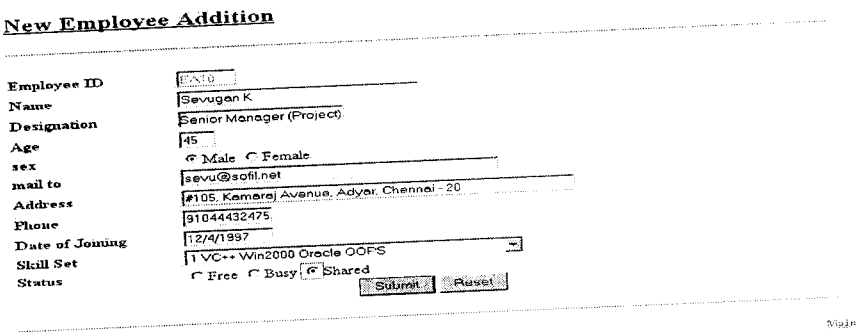
The Skill ID is used to display the details. The Save button is used to save the modification done to the Skill record in the table. The Previous & Next button is used to view the records.

The Fields are checked if the values are modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Skill table stores the values form the screen.

New Employee Addition



Input:

The Employee details like his Name, Age, DOJ, Designation & the current status of the employee is taken as input from the user. The Employee ID is used to identify the employee.

Process:

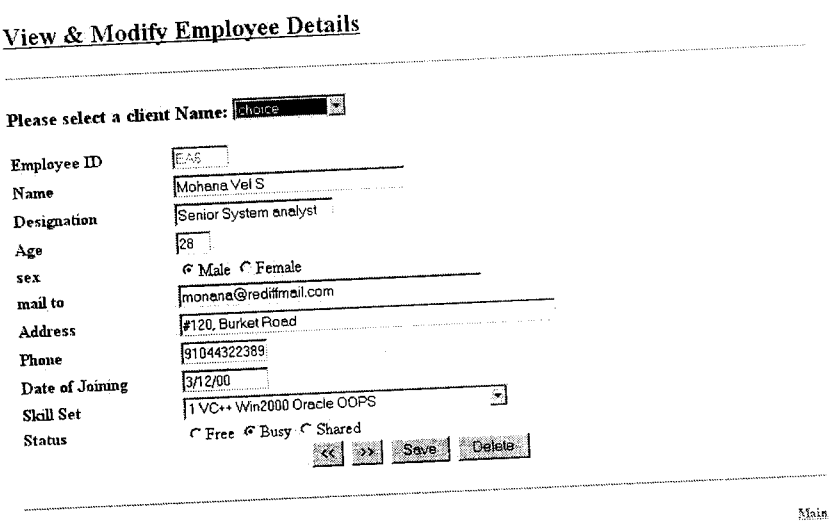
The Employee ID is automatically generated. The Submit button is used to store the employee record in the table. The Reset button resets the screen.

The Name field is checked for characters, the phone field checks for 11 digit number, the radio buttons are checked for input. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Employee table stores the values form the screen.

View & Modify Employee Details



Input:

The Employee Name is taken as input from the user to display the Employee details. The buttons are used to View, Modify & Delete the records.

Process:

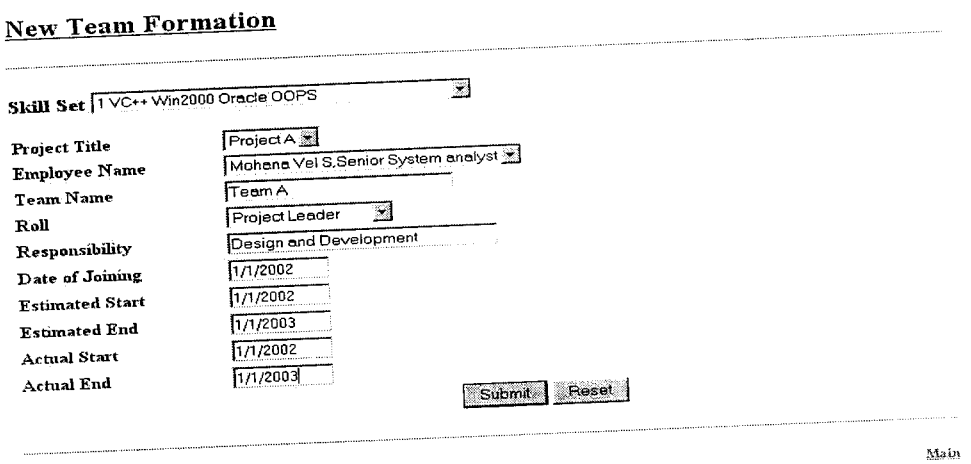
The Employee Name is used to display the details. The Save button is used to save the modification done to the Employee record in the table. The Previous & Next button is used to view the records.

The Fields are checked if the values are modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Employee table stores the values form the screen.

New Team Formation



Input:

The Project ID, Employee ID, the Team Name, the Responsibility and the DOJ of the team are taken as the input from the user.

Process:

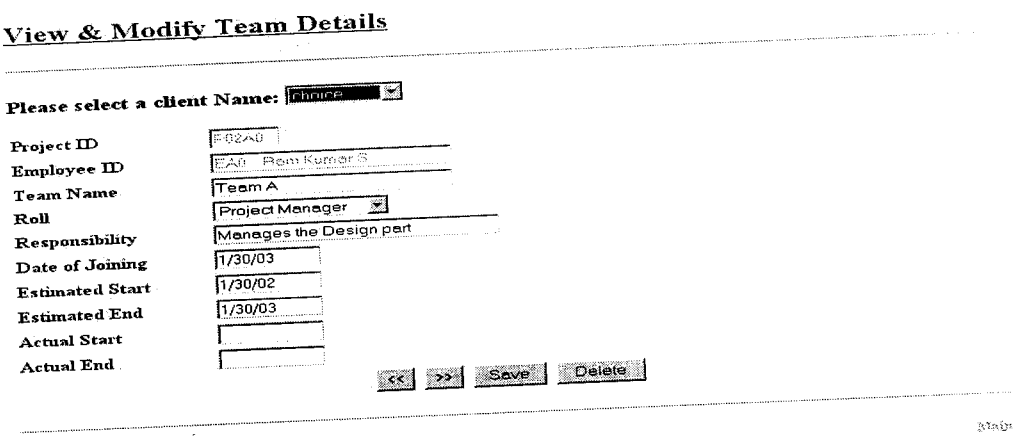
The Project ID and Employee ID are available by the list box. The Submit button is used to store the Team record in the table. The Reset button resets the screen.

The fields are checked for the values. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Team table stores the values form the screen.

View & Modify Team Details



Input:

The Team ID (Project ID + Employee ID) is taken as input from the user to display the Team details. The buttons are used to View, Modify & Delete the records.

Process:

The Team ID is used to display the details. The Save button is used to save the modification done to the team record in the table. The Previous & Next button is used to view the records.

The fields are checked for modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Team table stores the values form the screen.

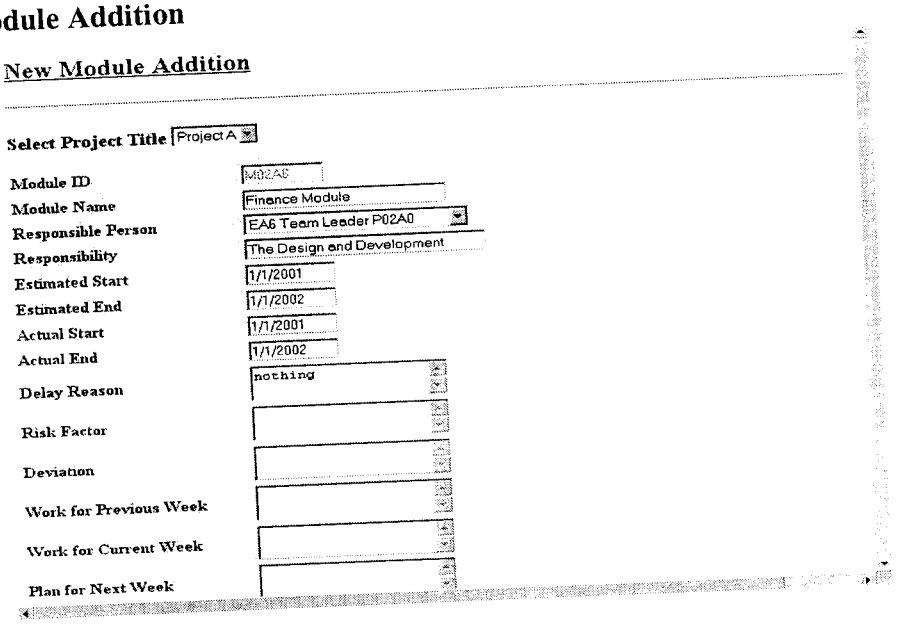
Module 2: Development Management

The project is divided into modules and screens, and the responsibilities of the team members are assigned in this module.

The Development Management consists of the following screens

- New Module Addition
- View & Modify Module Details
- New Screen Addition
- View & Modify Screen Details

New Module Addition



Input:

The Project ID, Responsible Persons ID, the Module Name, the plan, the reasons for delay if any are given as the input form the user.

Process:

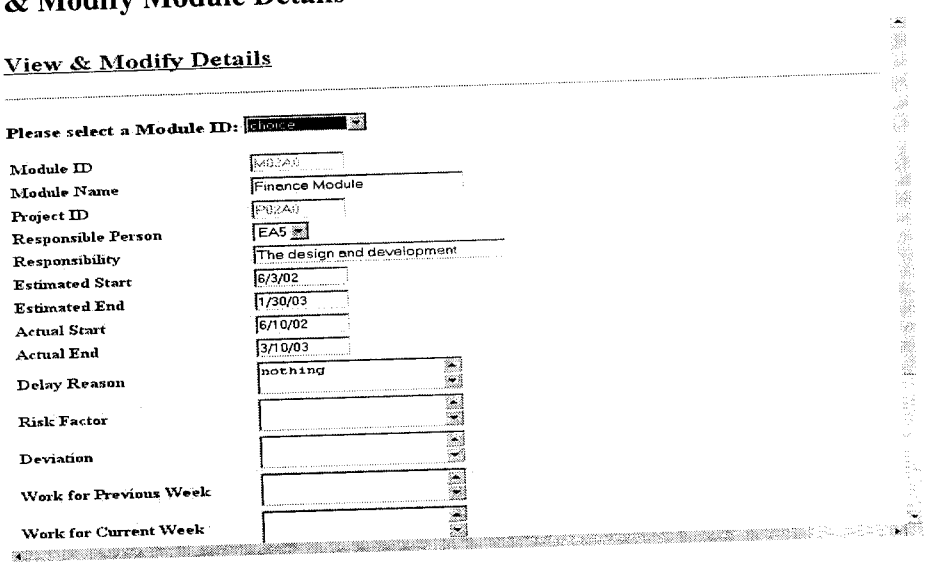
The Module ID is auto generated. The Project ID and Responsible Persons ID are available by the list box. The Submit button is used to store the module record in the table. The Reset button resets the screen.

The Responsible Persons must be in the team, the validation for the date fields are checked. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Module table is used to store the values form the screen.

View & Modify Module Details



Input:

The Module ID is taken as input from the user to display the module details. The buttons are used to View, Modify & Delete the records.

Process:

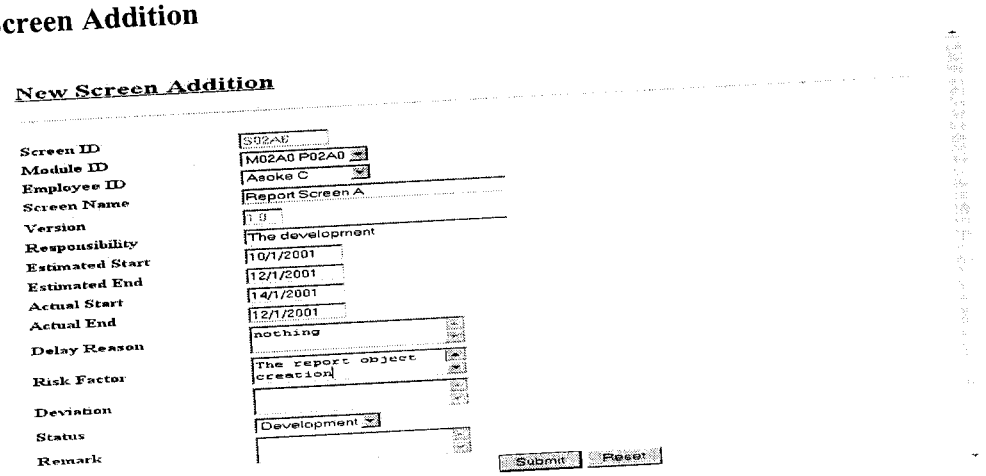
The Module ID is used to display the details. The Save button is used to save the modification done to the module record in the table. The Previous & Next button is used to view the records.

The Responsible person should be in the team, and all fields are checked for modification. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Module table is used to store the values form the screen.

New Screen Addition



Input:

The Module ID, Responsibility, the plan, the reasons for delay if any are given as the input from the user.

Process:

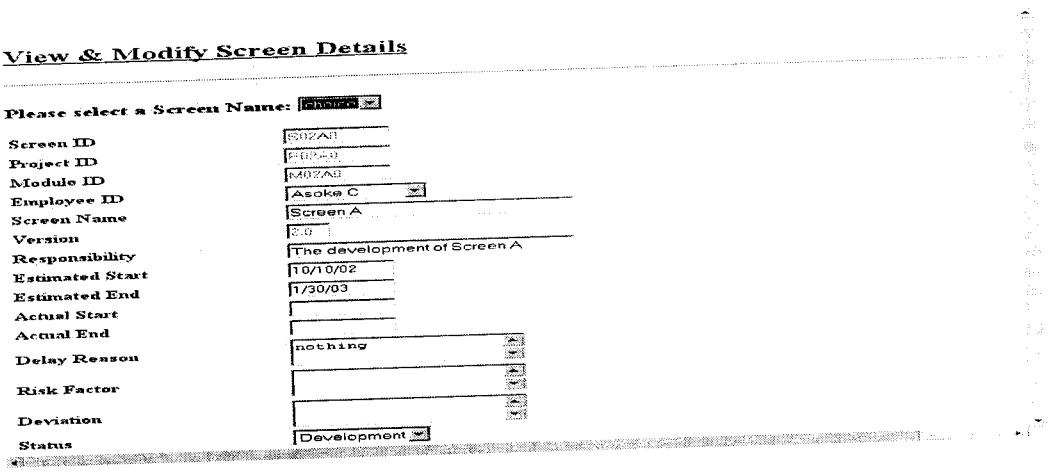
The Screen ID is auto generated. The Project ID and Responsible Persons ID are available by the list box. The Submit button is used to store the screen record in the table. The Reset button resets the screen.

The Responsible Persons must be in the team, the validation for the date fields are checked. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Screen table is used to store the values form the screen.

View & Modify Screen Details



Input:

The Screen ID is taken as input from the user to display the screen details. The buttons are used to View, Modify & Delete the records.

Process:

The Screen ID is used to display the details. The Save button is used to save the modification done to the screen record in the table. The Previous & Next button is used to view the records.

The Responsible person should be in the team, and all fields are checked for modification. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Screen table is used to store the values form the screen.

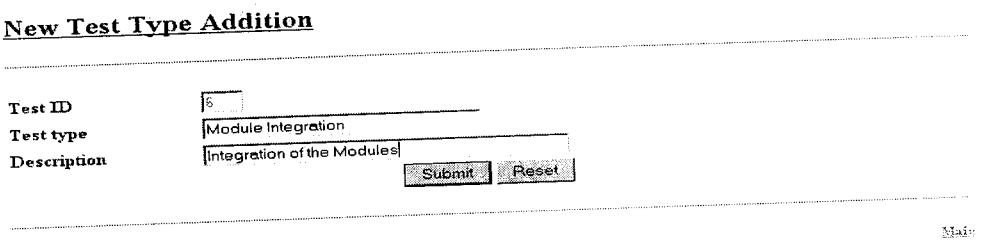
Module 3: Testing Management

The details about the test done to the Project deliverables, the version details are maintained in this module.

The Testing Management consists of the following screens

- New Test Type Addition
- View & Modify Test Type Details
- New Test Addition
- View & Modify Test Details
- New Defect Addition
- View & Modify Defect Details
- New Release Addition
- View & Modify Release Details

New Test Type Addition



Input:

The Test Type name & description is taken as input from the user. The test screen uses the Test Type details.

Process:

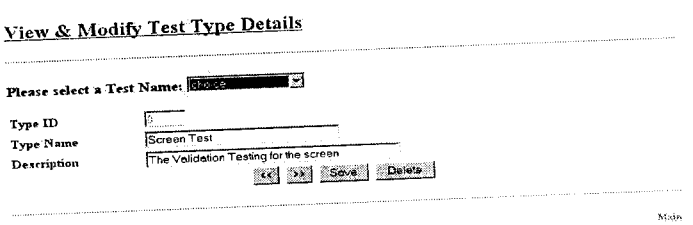
The Test Type ID is automatically generated. The Submit button is used to store the project type record in the table. The Reset button resets the screen.

The Test Name & Description is checked for the values. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Test Type table stores the values form the screen.

View & Modify Test Type Details



Input:

The Test Type is taken as input from the user to display the Test Type details. The buttons are used to View, Modify & Delete the records.

Process:

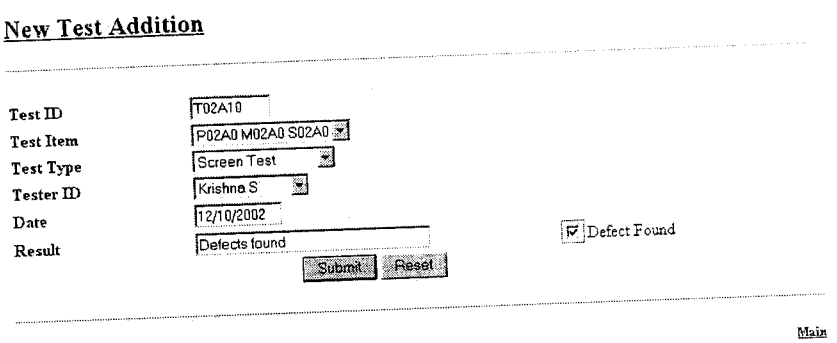
The Test Type is used to display the type name & description. The Save button is used to save the modification done to the project type record in the table. The Previous & Next button is used to view the records.

The Test Name & Description is checked if the values are modified. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Test Type table stores the values form the screen.

New Test Addition



Input:

The Test Item, Test Persons ID, the Date of testing, the result of the test are given as the input form the user.

Process:

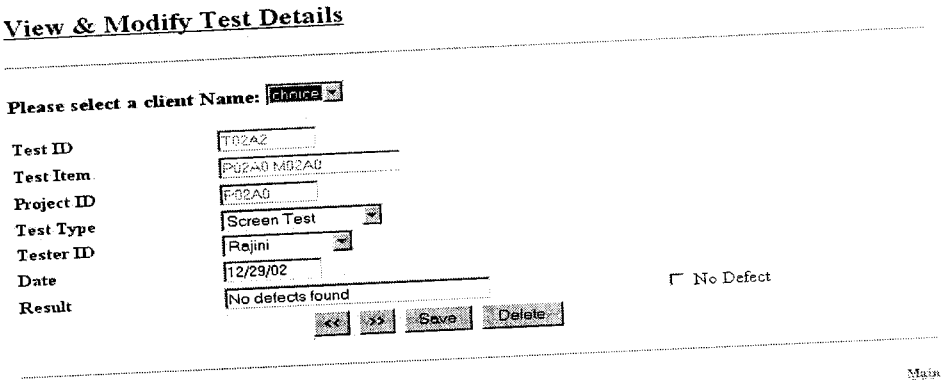
The Test ID is auto generated. The Test Type and Test Persons ID are available by the list box. The Submit button is used to store the test record in the table. The Reset button resets the screen.

The Test Persons must be in the team, the validation for the date fields are checked. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Test table is used to store the values form the screen.

View & Modify Test Details



Input:

The Test ID is taken as input from the user to display the test details. The buttons are used to View, Modify & Delete the records.

Process:

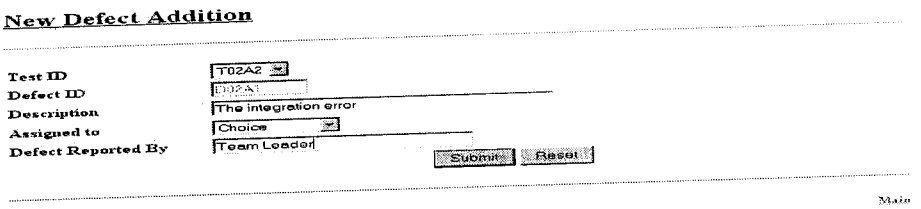
The Module ID is used to display the details. The Save button is used to save the modification done to the module record in the table. The Previous & Next button is used to view the records.

The Test person should be in the team, and all fields are checked for modification. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Test table is used to store the values form the screen.

New Defect Addition



Input:

The Item, Responsible Persons ID, the Defect, the Defect reported by are taken as the input form the user.

Process:

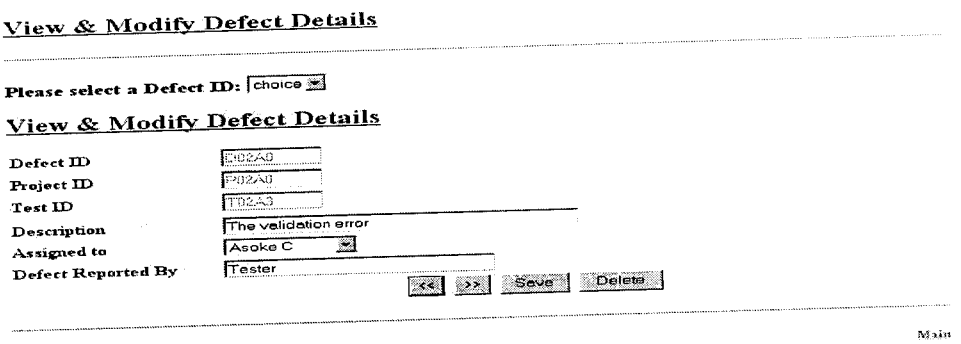
The defect ID is auto generated. The item and responsible Persons ID are available by the list box. The Submit button is used to store the test record in the table. The Reset button resets the screen.

The responsible Persons must be in the team, the validation for the date fields are checked. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The defect table is used to store the values form the screen.

View & Modify Defect Details



Input:

The Defect ID is taken as input from the user to display the Defect details. The buttons are used to View, Modify & Delete the records.

Process:

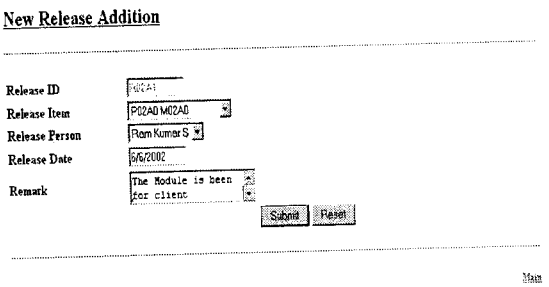
The Defect ID is used to display the details. The Save button is used to save the modification done to the module record in the table. The Previous & Next button is used to view the records.

The responsible person should be in the team, and all fields are checked for modification. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The defect table is used to store the values form the screen.

New Release Addition



Input:

The Item, Release Persons ID, the date of release, the remark are taken as the input form the user.

Process:

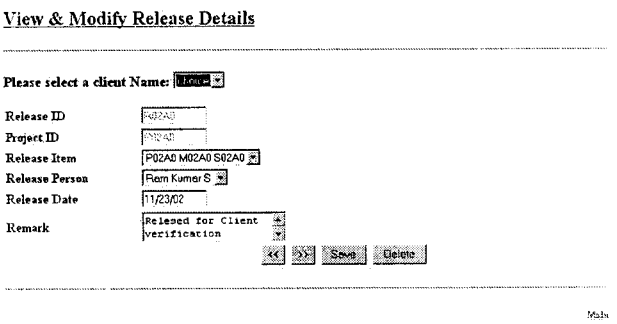
The Release ID is auto generated. The Item and release Persons ID are available by the list box. The Submit button is used to store the test record in the table. The Reset button resets the screen.

The release Persons must be in the team, the validation for the date fields are checked. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The Release table is used to store the values form the screen.

View & Modify Release Details



Input:

The release ID is taken as input from the user to display the Defect details. The buttons are used to View, Modify & Delete the records.

Process:

The release ID is used to display the details. The Save button is used to save the modification done to the defect record in the table. The Previous & Next button is used to view the records.

The responsible person should be in the team, and all fields are checked for modification. If all the values are correct the record is submitted to the table otherwise the message is displayed for correction.

Output:

The release table is used to store the values form the screen.

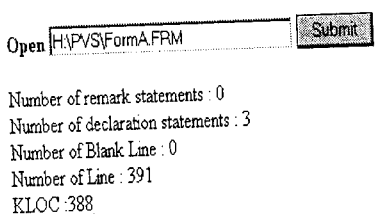
Module 4: Metric Management

This module tracks the progress of the project with the help of the software metrics and helps in the monitoring and controlling process.

The Metric Management consists of the following screens

- KLOC Calculation
- Variance and Defect Density Calculation
- Productivity and Process Efficiency Calculation

KLOC Calculation



Input:

The KLOC calculation screen takes the path of the file as the input to calculate the factors.

Process:

The specified file is found and the logic is applied to calculate the Kilo Lines of Code and the result is displayed and stored. If the specified file is not found then file not found message is displayed. The KLOC can be calculated only for C and VB source code.

Output:

The calculation value is taken for the other quality factor calculations.

Variance and Defect Density Calculation

Input:

The Actual and Planned duration, effort, size and defect details are taken as the input form the database to calculate the quality factors.

Process:

The Schedule Variance, Effort Variance and Size Variance are calculated using the inputs and the values are transferred to the reports. The Defect Densities are also calculated and send to the reports.

Output:

The calculation values are taken for generating report in the report module.

Productivity and Process Efficiency Calculation

Input:

The KLOC, effort, review details are taken as the input form the user and the database to calculate the quality factors.

Process:

The Productivity, SRS review efficiency, Design review efficiency, Overall review efficiency, Review Effort Ratio and Test case Ratio are calculated using the inputs and the values are transferred to the reports.

Output:

The calculation values are taken for generating report in the report module.

Module 5: Report module

The module provides overall report about the project, the project tracking reports, the resource availability report, and provides charts for tracking the status of the project.

The Report Management consists of the following Reports

- Project Plan Report
- Project Tracking Report
- Project Risk Report
- Project Closer Report
- Resource Availability Report
- Skill set Report
- Project Variance Report
- Defect Distribution Report
- Employee Tracking Report

Reports is information delivered to users through information system. Output can take many forms:

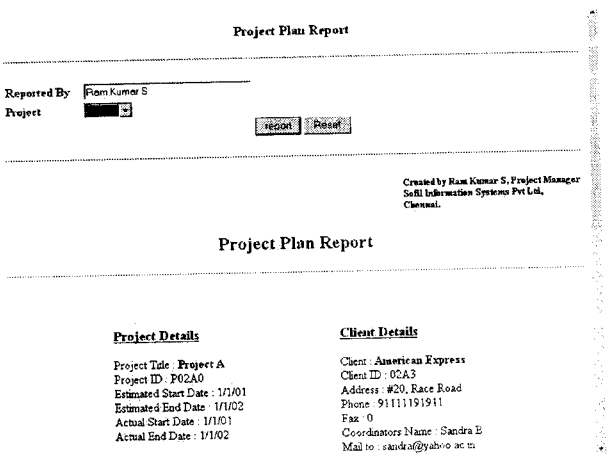
- Traditional hard copy of printed reports.
- Soft copy such as display screens.

The reports are classified into two types:

- The Detail Report.
- The Graphical Report.

Project Plan Report

The Project Plan Report is a detail report about the project plan with resource allocations



Project Tracking Report

The Project Tracking Report gives the detail and graphical report about the current status of the project.

Project Risk Report

The Risk in the project are reported with screen and module delay reasons.

Project Closer Report

The project Closer Report gives the exact closing dates of the Modules, Screens and the Project.

Resource Availability Report

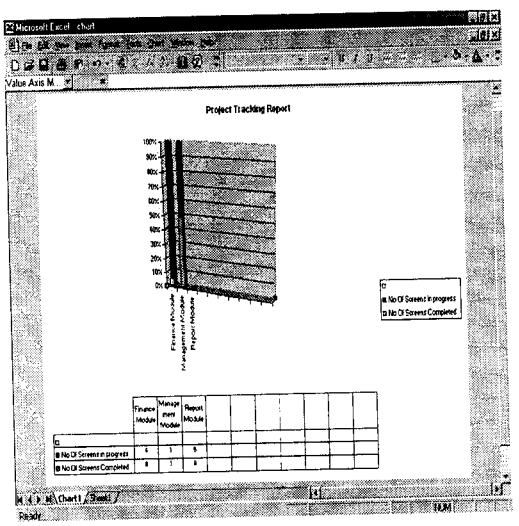
The Resource availability report gives the details about the resource available and the availability date and current status.

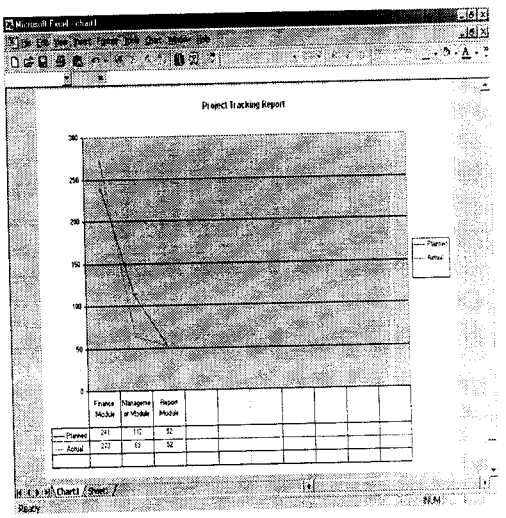
Skill set Report

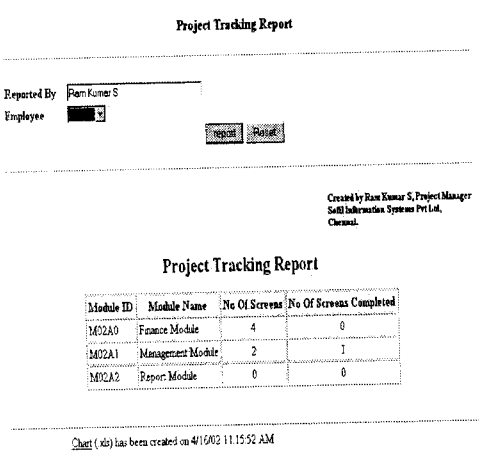
The report gives the details about the Skill Set available and the persons belong to the Skill set.

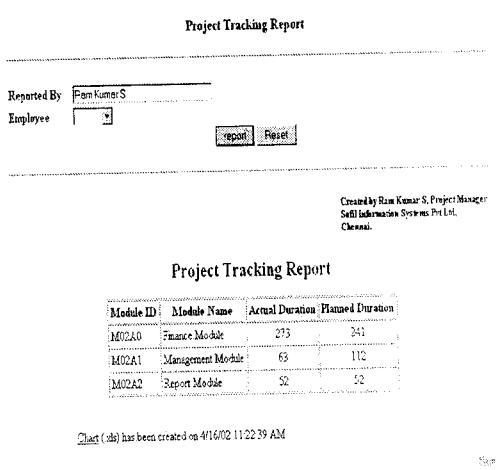
Project Variance Report

The variance Chart gives the details about the Baseline, the Upper Control Limit and the Lower Control Limit for the project.









Defect Distribution Report

The report gives the details about the Defect Distribution metrics and the defects in the modules and screens.

Employee Tracking Report

The Employee Tracking Report gives the details about the work done by the employee with the duration of the work and the Employees current status.

4.2. Database Design

General Description

Database Management System

A Database Management System **DBMS** consist of a collection of interrelated data and a set of programs to access those data. The primary goal of a **DBMS** is to provide an environment that is efficient and effective to use in retrieving and storing database information.

Data Requirements

The data that is captured from various forms is stored in the following tables from which they can be retrieved by suitable queries.

1. Client
2. Project_Type
3. Application_Type
4. Project
5. Skill
6. Employee
7. Team
8. Module
9. Screen
10. Test_Type
11. Test
12. Defect
13. Release

Table 1: Client

The table contains the details about the client name, address, phone, coordinators name etc. This table supports the project table with the help of unique client id.

Fields	Description
Client_ID(P)	The unique code to identify the client in text.
Client_Name	The name of the client in text.
Client_Address	The address of the client in text.
Client_Phone	The 11 digit numeric field.
Client_Fax	The 11 digit numeric field.
Client_Extension	The 11 digit numeric field.
Coordinator	The project coordinator name from client place in text.
Co_Sex	The sex of the coordinator single character either M/F
Co_Address	The coordinators address in text.
Co_Phone	The coordinators phone in text.
Co_Email	The email address of the coordinator.

Table 2: Project_Type

The table describes the project type with the type name for the projects. It supports the project table.

Fields	Description
Type_ID(P)	Numeric field to identify the record
Type_Name	The project type name.
Description	The description of the type.

Table 3: Application

The table describes the application with the application name for the projects. It supports the project table.

Fields	Description
Type_ID(P)	Numeric field to identify the record
Application	The application name.
Description	The description of the type.

Table 4: Project

This table stores the contents about the project, unique id for the project, the type of application, the client, the estimated start and end date, the actual start and end date, requirements of the project. The project id from this table will be foreign key in other related table like the team, quality, module etc.

Fields	Description
Project_Title	The title of the project in text.
Project_ID(P)	The unique code for the project in text.
Client_ID(F)	The client is identified from table client with the unique client id.
Project_Type	The text field describes the type of the project by choice.
Application	The text field describes the application of the project by choice.
Life_Cycle	The life cycle of the project by choice in text.
Man_Hours	Numeric field describes man hours required for project.
H/W_Requirements	The hardware requirements of the project by choice in text.
S/W_Requirements	The software requirements of the project by choice in text.

Total_HR	The man power requirements of the project in numeric.
Scope	The scope of the project in text.
Estimated_Start	The estimated start date in date.
Estimated_End	The estimated end date in date.
Actual_Start	The actual start date in date.
Actual_End	The actual start date in date.
Bottle_Neck	The memo field which describes the bottle neck in the project.
Quality	The text field which has the details about the quality to be maintained.
No_Machine	The number of machine required for the project development in numeric.
No_Servers	T he number of servers required for the project development in numeric.
No_Clients	The number of clients required for the project development in numeric.
Request	The choice field either has Emergency/Normal value.
Status	The current status of the project.
Remark	The memo field which describes the remark about the project.

Table 5:Skill

The details about the Skill Set of the organization are recorded in this table. The table stores the Language, OS, Backend, other skills and skill id which is unique. It supplies the required information to the Employee table.

Fields	**Description**
Skill_ID(P)	The unique code for the skill set in numeric.
Language	The language description in text.
OS	The Operating System description in text.
Backend	The Backend description in text.
Others	The other skill description in text.

Table 6: Employee

The details about the employees of the organization are recorded in this table. The table stores the name, age, designation, employee id is unique, phone & address of the employee. It supplies the required information to the team, module, screen tables.

Fields	Description
Employee_ID(P)	The unique code for the employee in text.
Name	The name of the employee in text.
Designation	The designation of the employee in text.
Age	The 2 digit numeric field.
Sex	The single character field has either M or F.
Email_ID	The text field which contain the email address of the employee.
Phone	The 10 digit numeric field.
Address	The address is a composite field, has the door no, the street name & city.
DOJ	The date of joining in date.
Skill Set	The numeric field to identify skill set.
Status	The status of the employee busy/shared/free.
Password	The Password of the employee.

Table 7: Team

The team table contains the team name, the employee id & the project id in which the employee works currently. The many to many relation between the project & employee is achieved with the help of this table. The Project_ID & Employee_ID form the primary key.

Fields	Description
Project_ID(F)	The project id from the project table.
Employee_ID(F)	The employee id from the employee table.
Team_Name	The name of the team in text.
Roll	The roll of the employee of the project in text.
Responsibility	The employees responsibility of the project in text.
DOJ	The date of joining in the team.
Estimated_Start	The estimated start date in date.
Estimated_End	The estimated end date in date.
Actual_Start	The actual start date in date.
Actual_End	The actual start date in date.

Table 8: Module

The module table contains the details about the modules. The module contains the item name, responsibility, and the status of the module. The Module_ID and Project_ID combines to form the primary key.

Fields	Description
Module_ID(P)	The code to identify the module in text.
Module_Name	The name of the item for the module number.
Project_ID(P)	The project code from the project table.
Employee_ID(F)	The employee responsible for the module.
Responsibility	The responsibility of the module in the project in text.
Estimated_Start	The estimated start date of the module in date.
Estimated_End	The estimated end date of the module in date.
Actual_start	The actual start date of the module in date.
Actual_End	The actual end date of the module in date.
Delay_Reason	The memo field which describe the reason for delay.
Risk_Factor	The memo field which describe the risk in the module.
Deviation	The text which describes the deviation in the module.
WDPK	The text which describes the work done by the previous week.
WDCK	The text which describes the work done by the current week.
PFNK	The text which describes the plan for the next week.
Status	The current status of the module.
Remark	The memo field for the remark about the module.

Table 9: Screen

The screen table contains the details about the screens. The screen name, responsibility, and the status of the screen. The Screen_ID, Module_ID and Project_ID combines to form the primary key.

Fields	Description
Screen_ID(P)	The code to identify the screen in text.
Module_ID(P)	The module code from module table.
Project_ID(P)	The project code from the project table.
Screen_Name	The name of the item for the module number.
Version	Numeric field to describe the version.
Employee_ID(F)	The employee responsible for the module.
Responsibility	The responsibility of the module in the project in text.
Estimated_Start	The estimated start date of the module in date.

Estimated_End	The estimated end date of the module in date.
Actual_start	The actual start date of the module in date.
Actual_End	The actual end date of the module in date.
Delay_Reason	The memo field which describe the reason for delay.
Risk_Factor	The memo field which describe the risk in the module.
Deviation	The text which describes the deviation in the module.
Status	The current status of the screen.
Remark	The memo field for the remark about the module.

Table 10: Test Type

The table describes the project type with the type name for the projects. It supports the project table.

Fields	Description
Type_ID(P)	The ID to identify the test type
Test Type	The project type name.
Description	The description of the type.

Table 11: Test

The table contains the details about the test item, the type of the test done and the date of the test.

Fields	Description
Test_ID(P)	The code to identify the test item in text.
Test_Item(F)	The test item code from the screen/module table.
Project_ID(F)	The project code from the project table.
Test_Type	The type of test in text.
Employee_ID(F)	The employee responsible for the testing the item.
Date	The date of the test.
Result	The result of the test in text.

Table 12: Defect

The defect table describes the defect in the test item & the person to rectify the defect. The Test_ID and Defect_ID combines to from the primary key.

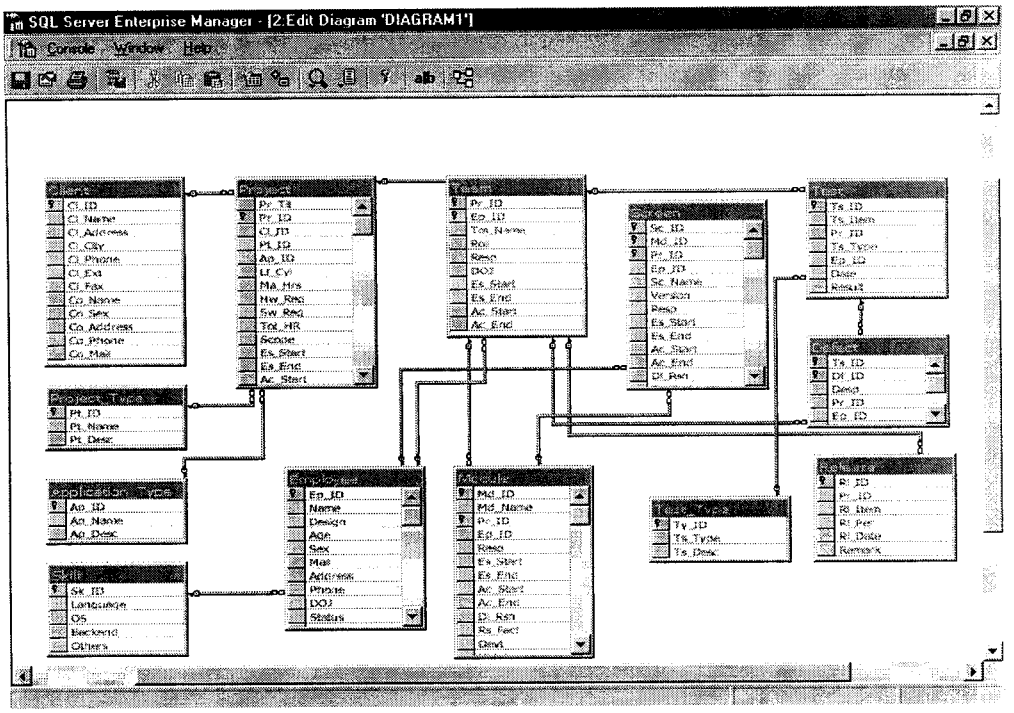
Fields	Description
Test_ID(F)	The code to identify the test item in text.
Defect_ID	The code to identify the defect in text.
Description	The description about the defect.
Employee_ID(F)	The employee to rectify the defect.

Table 13: Release

The release table describes the release in the release item & the person who released the item. The Release ID is the primary key.

Fields	Description
Release_ID(F)	The code to identify the release item in text.
Project_ID	The project code of the item
Release_Item	The release item in text.
Release_Person(F)	The employee who released the item.
Release Date	The date of release.
Remark	The remark of the release.

A Schematic diagram to show table relationship using Primary/Foreign Key



Database Tables used by Screens

Forms	Database Tables used (Table No)
New Client Addition	1
View & Modify Client Details	1
New Project Type Addition	2
View & Modify Project Type Details	2
New Application Type Addition	3
View & Modify Application Type Details	3
New Project Addition	1,2,3,4
View & Modify Project Details	1,2,3,4
New Skill Set Addition	5
View & Modify Skill set Details	5
New Employee Addition	5,6
View & Modify Employee Details	5,6
New Team Formation	4,6,7
View & Modify Team Details	4,6,7
New Module Addition	4,6,7,8
View & Modify Module Details	4,6,7,8
New Screen Addition	4,6,7,8,9

View & Modify Screen Details	4,6,7,8,9
New Test Type Addition	10
View & Modify Test Type Details	10
New Test Addition	4,6,7,8,9,10,11
View & Modify Test Details	4,6,7,8,9,10,11
New Defect Addition	4,6,9,11,12
View & Modify Defect Details	4,6,9,11,12
New Release Addition	4,6,11,13
View & Modify Release Details	4,6,11,13

Database Tables used by Reports

Reports	Database Tables used (Table No)
Project Plan Report	1,2,3,4,6,7
Project Tracking Report	1,2,3,4,6,7,8,9
Project Risk Report	1,2,3,4,6,7,8,9
Project Closer Report	1,2,3,4,6,7,8,9,13
Resource Availability Report	5,6,7,8,9
Skill set Report	5,6
Project Variance Report	1,2,3,4,6,7,8,9
Employee Tracking Report	1,2,3,4,5,6,7,8,9,10
Defect Distribution Report	1,2,3,4,6,7,8,9,10,11,12

4.3. Process Design

Login Process

- The Login screen gets the Employee ID and Password. If the Employee is found in the Employee table and a password exits, it identifies the user and shows the screens according to the permission of the Employee. If the password is not found for the Employee ID, then it goes to the registration screen for setting the password.

- The Administrator controls the Project Metric Management System and sets the permission for the Employees. The Administrator can reset the password of Employee.

- The Project Managers, Project Leaders, Team Leader, Test Team Leader, Quality Coordinator are the users of the Project Metric Management System. The Main Screen will be displayed by verifying the Employees responsibility in the projects.

Overall Process

The Project Metric & Management System has a fixed format and protocol as guided by the Project Steering Committee of Sofil Information System Pvt. Ltd., The steps followed in their logical order are

- The Project Steering Committee decides the project and does the business dealings with the client and a project proposal is made. The committee decides the Project Managers for the Project.

- The Project Managers Plans & forms a Team for the development of the Project, the team consists of the Project Leaders, the Team Leaders, the Test Team Leader, the Quality Coordinator, the Programmers and the Testers.

- The Project Leader and the Project Managers decides the Project Plan and the resources required for the project. The Exact plan is made for the project development.

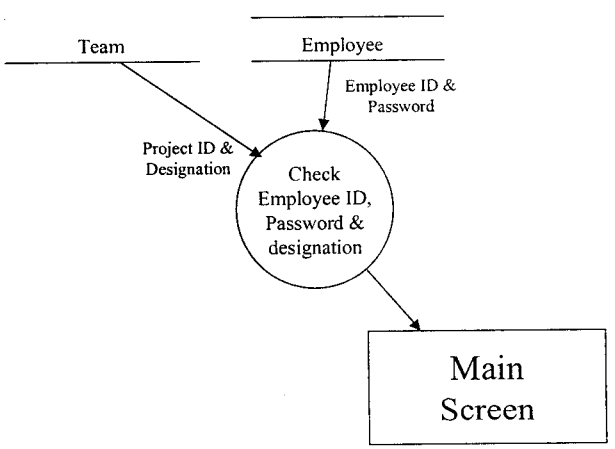
- The Project Leader analysis the project and divides the project into modules which comprises of the screens. The responsibilities of the team members are assigned.

- The Team Leaders are responsible for the modules and the Programmers are responsible for the screens. The Team leader reports the status of the module by verifying the status of the module's screens to the Project Leader. The Project Leader analysis the project with the help of the project tracking tools and reports the status of the project to the Project Manager.

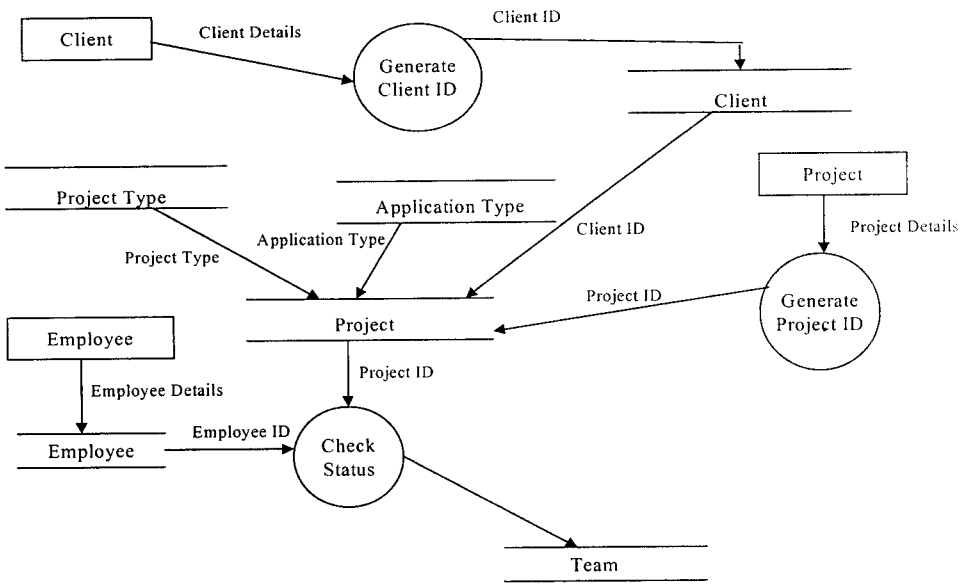
- The Test Team Leader with the help of the test plan and the Testers tests the screens and the modules and gives the test report to the Project Leader.
- The Quality Coordinator with the Quality Plans and standards gives a report to the Project Leader about the Quality of the project for the redesigning of the project to improve the quality.
- The release of the modules or screens of the project are made by the Project Manager to the client after above procedures. The Project Release comprises of the release items (modules or screens).
- The client's remark about the project release items is captured and redesigning is done if required.

Data Flow Diagram

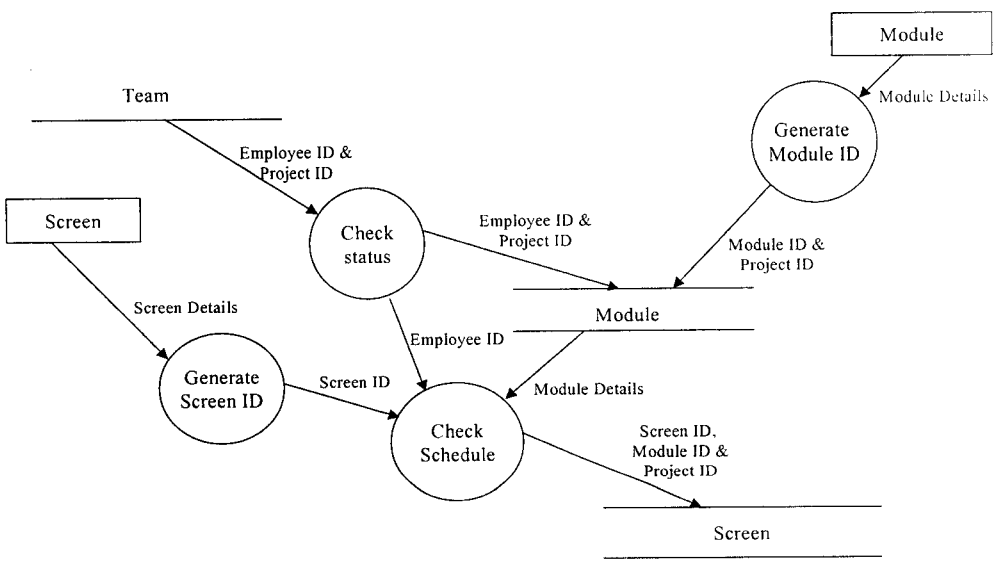
Login Process



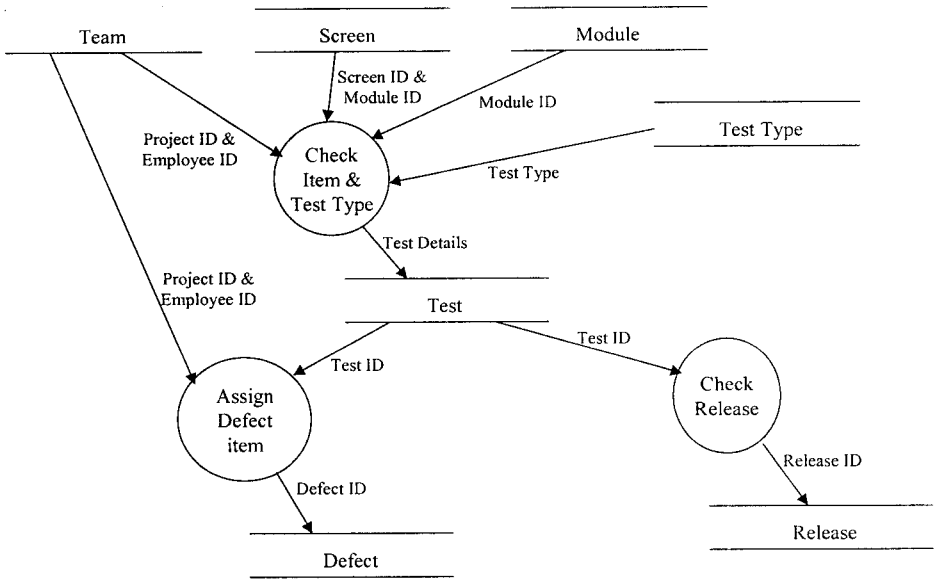
Project Management



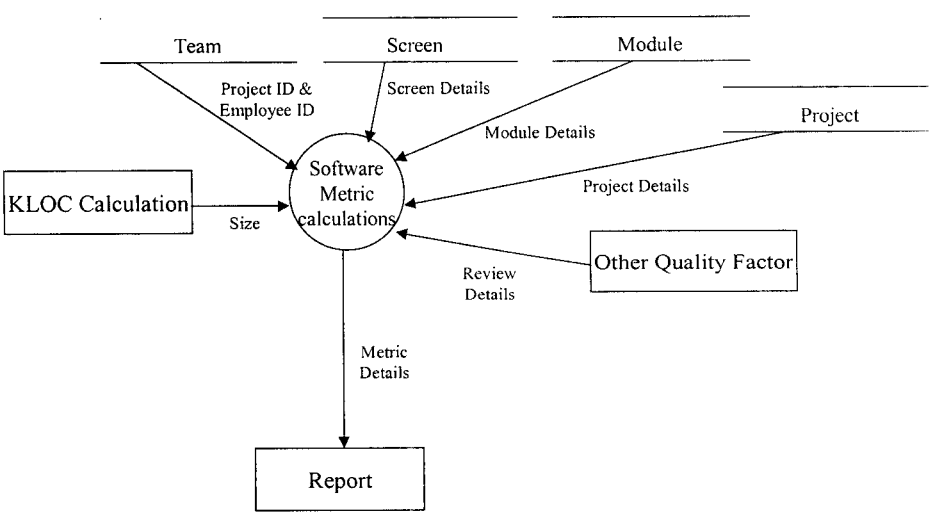
Development Management



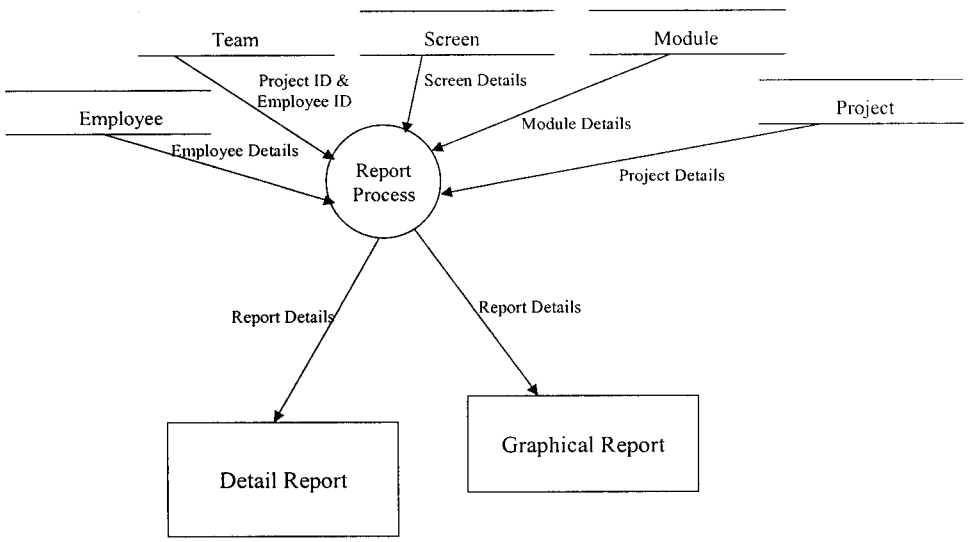
Test Management



Metric Management



Report Management



SYSTEM TESTING AND IMPLEMENTATION

5. SYSTEM TESTING & IMPLEMENTATION

5.1. System Testing

One of the Murphy's laws states that anything that can go wrong will go wrong. This is especially true in system's development. Hence the system must be thoroughly tested to reveal its errors and misconceived functions.

Unit testing

Unit testing is the basic level of testing where individual components are tested to ensure that they operate correctly. The Screens are tested to get valid data and the output of the screens was also checked.

Integration testing

The Modules is a collection of Screens, which are interdependent. All the Modules in the Project Metric Management System were checked for integration among the screens.

System testing

The interfacing of the Modules in the Project Metric Management System were checked and the interfacing mismatches found were rectified.

Acceptance testing

The Acceptance of the Project Metric Management System was tested with the help of the real data and by the verification of the project guide in the organisation.

5.2. System Implementation

The System implementation was done after the Testing Process. The system was implemented after the acceptance of the members of the organization. The system was implemented in the intranet facility with the help of existing LAN. The system

administrator of the organization administrates the system. The system was easy to use for the organization member.

5.3. Refinements Based on Feedback

- The user-friendly nature of the system was improved after the testing process.
- The reports were changed after the suggestions from the quality department of the company.
- The interfacing problems among the modules were rectified after the system testing.

CONCLUSION

The Project has been a rewarding experience in more ways than one. Firstly I have gained an insight into the working of the software development organization. I have gained knowledge about the project management and software metrics practical experience.

Secondly I gained my experience in working with ASP and Script Languages. In order to generate the reports, I learned about the Visual Basic Application objects. I have gained valuable insight about the working of IIS server and MS SQL support to ASP applications.

The Design and Development of the Project Metric Management System was according to the procedure followed in the organization which helped to learn about the procedure followed in the organization and quality standards maintained by the organization.

The VB components helped me to get the calculations and reports according to the standard followed in the organization. I have also benefited through the valuable suggestion given by my guides, teachers and friends.

The Project Metric Management System was designed and developed with my experience, so the suggestion on the System can make it more efficient.

SCOPE FOR FUTURE DEVELOPMENT

- The Software Metrics can be enhanced to gets the maximum gains from the projects.
- The KLOC calculation can be extended to calculate for other language coding also.
- The back up copies of the source code developed can also be maintained and managed.
- Review Management can be added to the System as future enhancement.
- The project evaluation functions can also be added to evaluate the project and its risk before the development phase of the project.

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