AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH

Software Project I

Industrial Engineering Data Management System for Garments industry

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Declaration

We declare that the submitted project is our original work and has not been submitted in any form for another degree or diploma at any university or other institute of tertiary education. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given.

We declare that this project does not contain any content that discloses the secret of any organization or related parties. American International University – Bangladesh (AIUB) will not be held liable for any such activities, as for the project is presented as our original work.

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Approval

This software project "Industrial Engineering Data Management System for Garments industry" has been submitted to the following respected members of the board of examiners of the Department of Computer Science in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Software Engineering on 10th June 2017 has been accepted as satisfactory.

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Chapter 1: Statement of Work

1.1 Documentation History & Distribution

Table 1-A: Revision History

Revision	Revision Date	Description of Change	Author(s)
1.0	15-02-2017	----------	i)Noman,Md Abdullah Al ii)Das, Sudipta iii)Mustafa, H.M. Faysal Ibne

Table 1-B: Distribution

Recipient Name	Recipient Organization	Distribution Method
Md. Shamsur Rahim	AIUB	Hard Copy

1.2 Purposes/Objectives

- Find out the problems about "Industrial data management system".
- Figure out the requirements.
- Define a solution.
- Develop the software.
- Gathering information about input, output.

1.3 Anticipated Benefits

- Time saving
- Cost reducing
- More avail
- User friendly control panel
- Not a Manual system

Software/Technology Proposed

- Programming language: C#
- Database: MS SQL
- Architecture: MVC

- Project Management: Meistertask
- Version Controlling: Tortoise SVN, Deveo
- SDLC Model: Scrum

1.4 Customers/End Users Impacted

- Owners of the industry.
- Managers of the industry.
- Supervisors of the industry.

1.5 Requirements

- Computers
- MS SQL Database
- Operating System: Windows 7, Windows 8 Windows 10

1.6 Deliverable include in scope

- Full software
- Technical documentation
- User manual

1.7 SDLC methods

SDLC stands for Software Development Life Cycle. SDLC is a process to develop high qualified software. SDLC have six stages. The following figure is a graphical representation of the stages of a typical SDLC.

Phase of SDLC :

Descriptions are given below:

1. **Planning:** This stage contains requirement analysis. This is the most important part of SDLC. In this stage senior members talk to the customer and collects the requirement of the software. Project related study, risk and revenue calculation are also done in this stage.

2. **Defining:** This is the documentation stage. After requirement analysis, requirements are clearly documented and approved from the customer. It's called SRS (software Requirement Specification). It contains all the product requirements.

3. **Designing:** Based on the requirements, more than one design is proposed. Designed are also documented. It's called DDS (Design Document Specification). After analysis the DDS, the best design approach is selected for the product

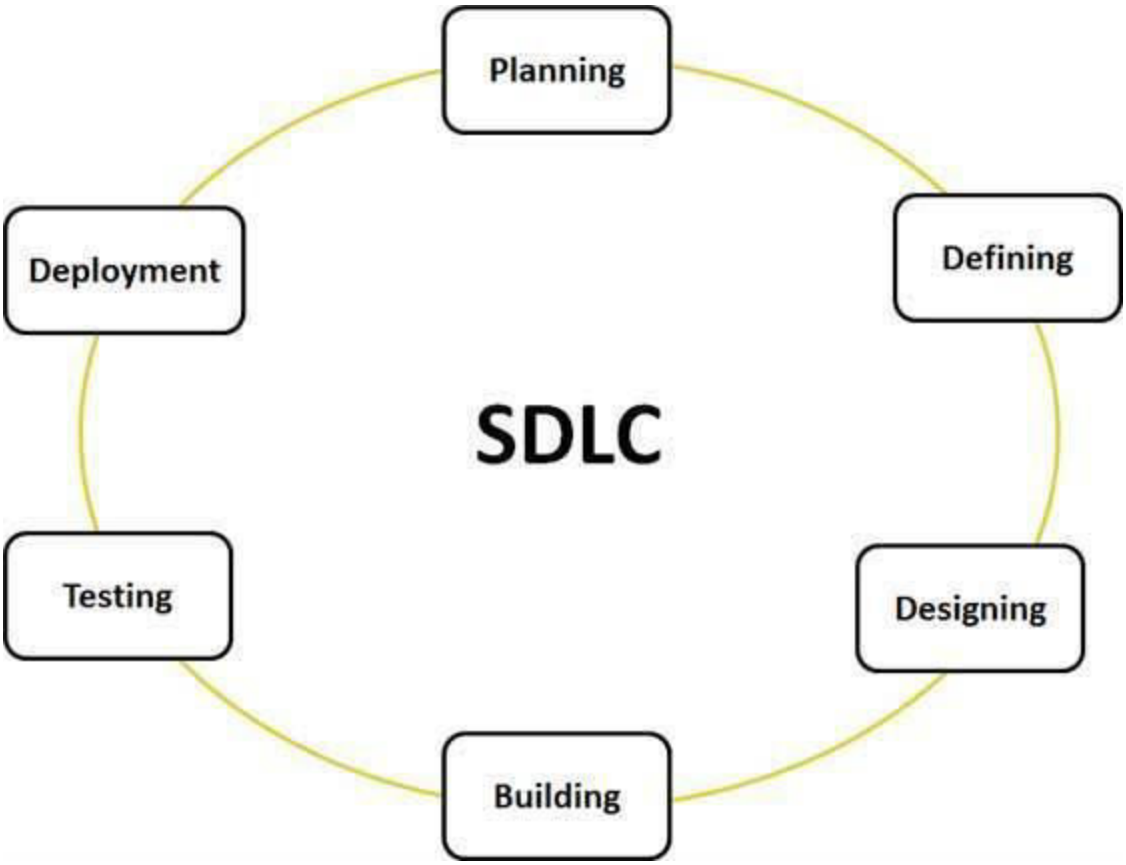


Fig 1-1: Phase of SDLC

4. **Building:** In this stage programmer start programming with the chosen tools (programming language, compiler etc.). Usually tools are defined by the organization. In this stage actual development is start. The programmer implement the DDS. And the product is built.

5. **Testing:** In this stage tester try to find bugs and check if the software meets the requirements or not.

6. **Deployment:** After the product is tested then it's ready to release. Release date depends on organization and market conditions. This stage is also contain maintenance. Based on feedback and customer demand, software maintenance happen.

SDLC Models :

There are different kinds of SDLC process model. Some are traditional and some agile and other.

Traditional Models:

1. **Waterfall Model:** Waterfall model was the first widely used SDLC model. Phase of waterfall model are given below:

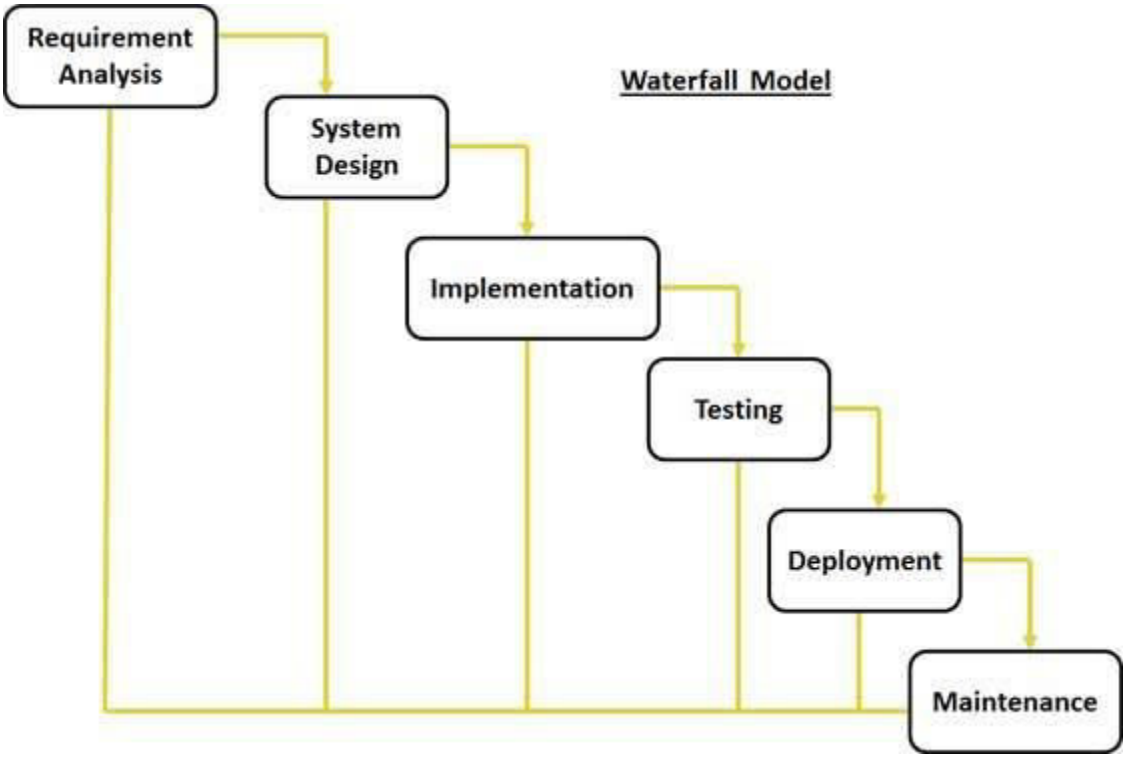


Fig 1-2: SDLC Models

In this model, output of a phase is used as input for the next phase. The phase of waterfall model is similar as SDLC. But there is no planning phase.

Waterfall model is used when the project is small and requirements are well defined. So, in big project and requirements are changing then, waterfall model is problematic.

2. **Iterative Model:** Iterative process is start from implementation. It starts implement a subset of the software. This method is based on repeated cycle (iterative). The main plot of this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental).

Phases of iterative model are:

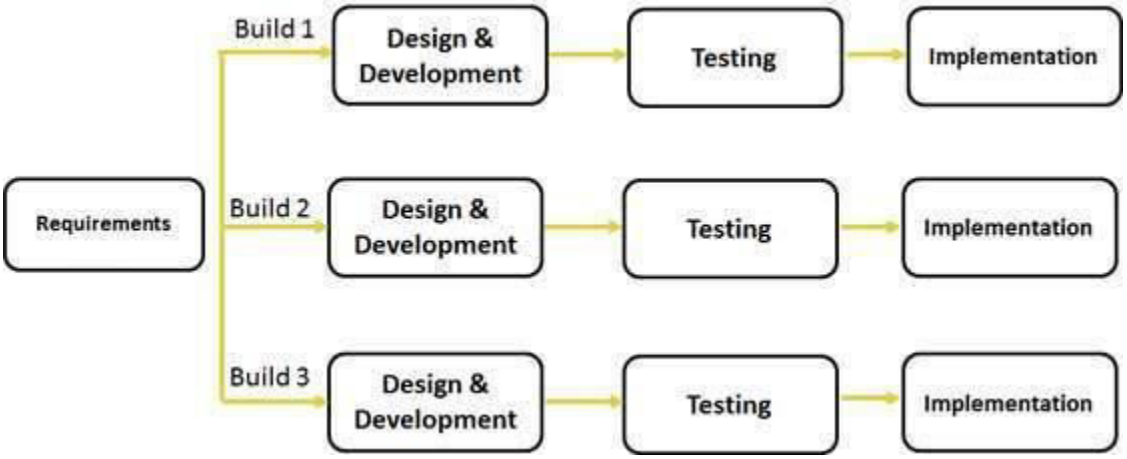


Fig 1-3: Phase of iterative model

Iterative process is an incremental process. More than one iteration may process at a time. Every iteration includes requirement analysis, design, development, testing and implementation.

In this model risk can easily analyze. But this model is so complex. Skilled people need for management.

3. **Spiral Model:** Spiral model is combination of iterative model and waterfall model. Spiral model has four phase. Phases are spiral. One iteration happens when a software project passes every phase. A software project repeatedly passes through these phases.
   Phases of spiral method are given below:

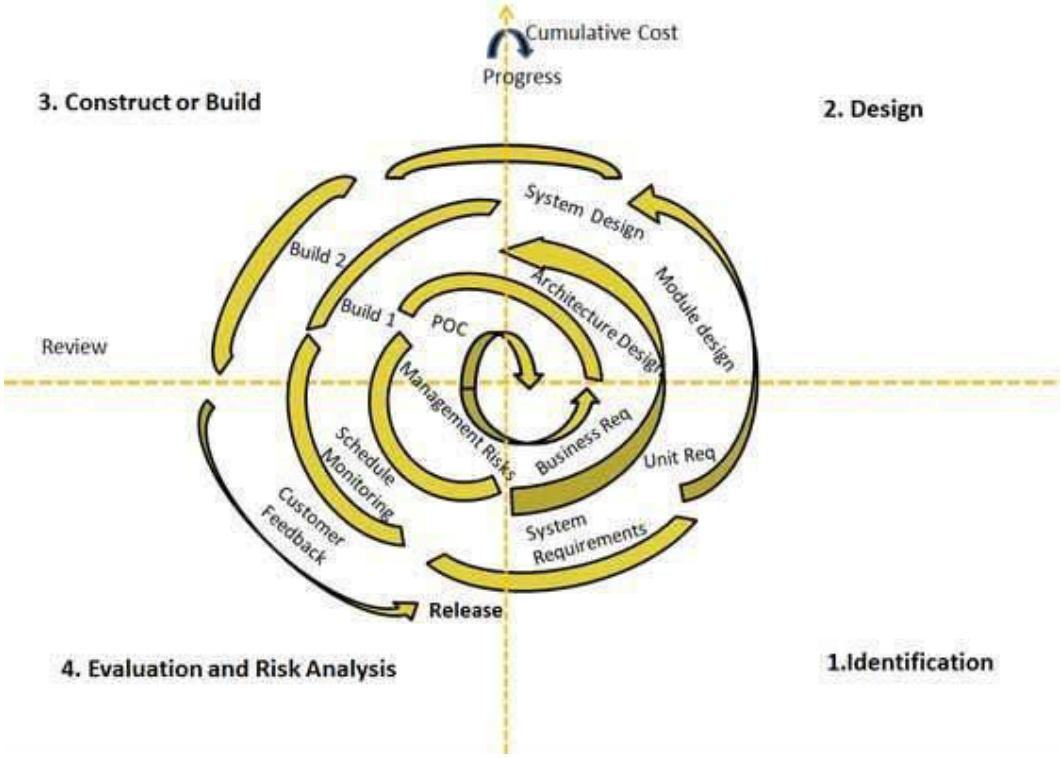


Fig 1-4: Spiral model

Spiral method is used for big projects and when requirements are not stable.

4. **V – Model:** V – model is a model where execution of processes are happened in a sequence like v – shape.

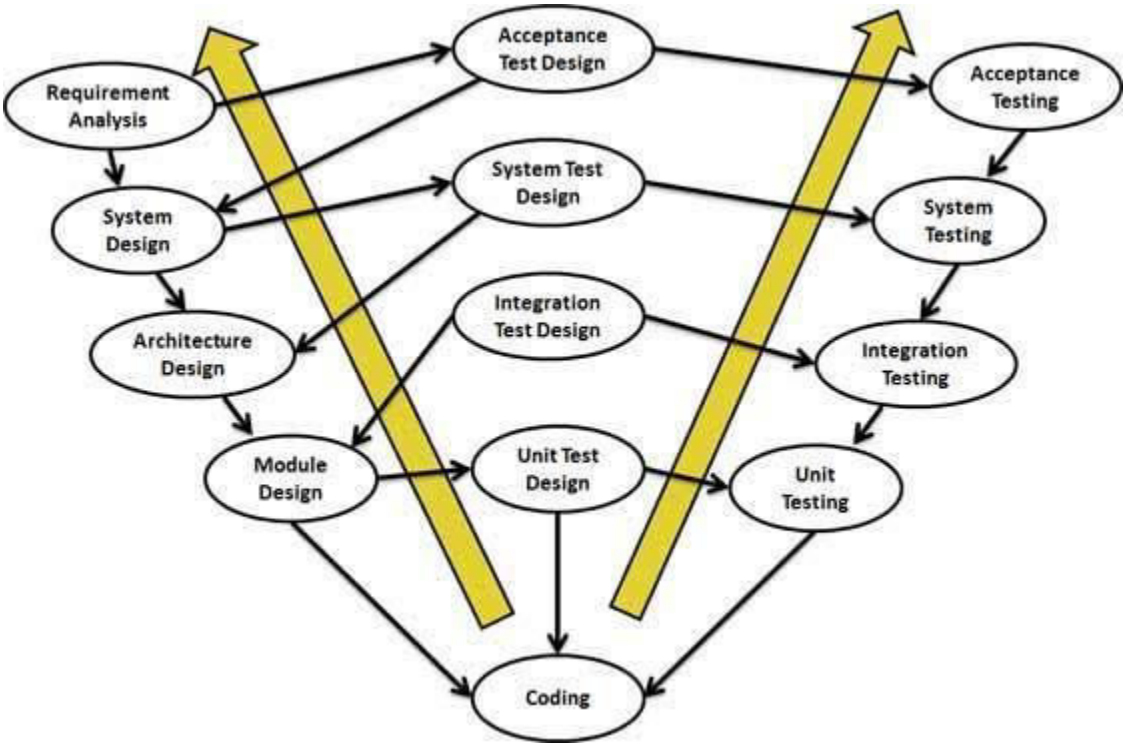


Fig 1-5: V-model

In V-model testing are parallelly done with the other phase. This model is used when project is short and requirements are well defined. But this model is not a good model for object oriented projects and it also have high risk.

5. **Prototyping Model:** Prototyping model is used when requirements are not clear. Project iteration occur when customer is satisfied.

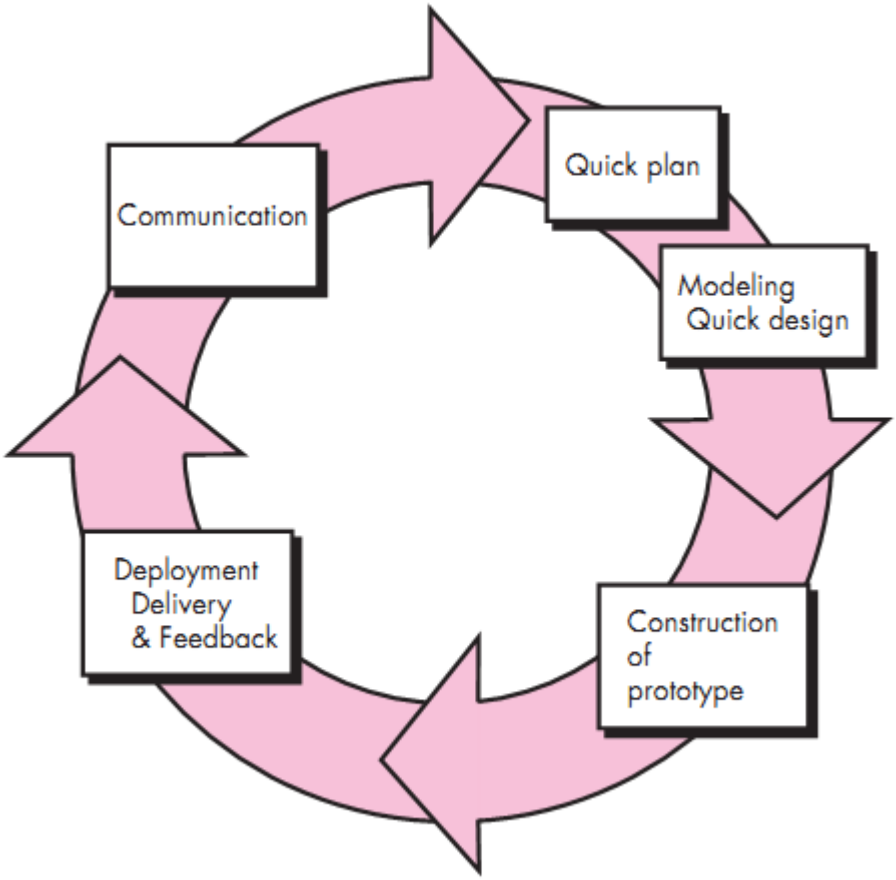


Fig 1-6: Prototyping model

Prototyping model is used when the project is short.

Agile Methods:

1. **Scrum:** Scrum have three phase. These are:
   1.1. Pre-game
   1.2. Development
   1.3. Post-game

In pre-game phase planning and design are happen. It includes requirements analysis, risk calculation and other documentation part. And in development phase, project is built. Post-game phase come when there is no more requirement. And then the project is being released.

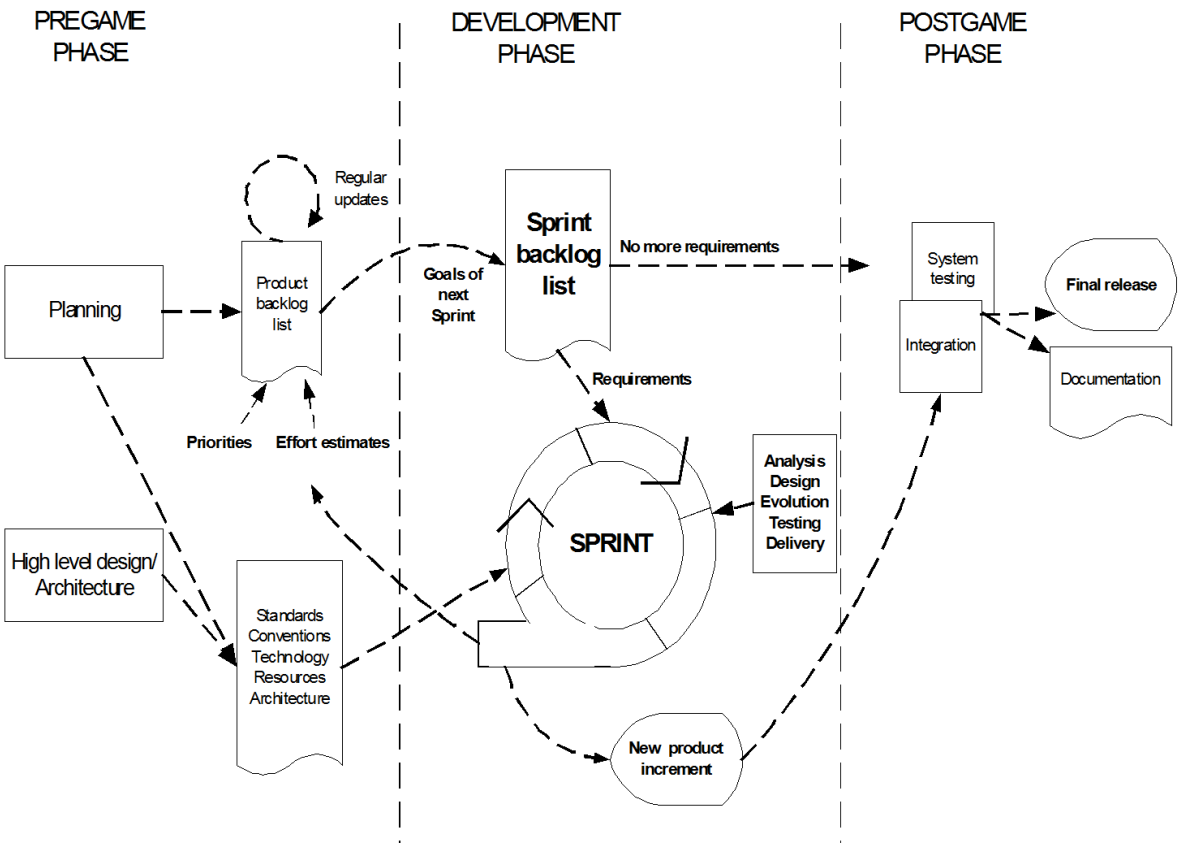


Fig 1-7: Scrum

Product backlog and sprint are special features of scrum. Product backlog is a list of priority based requirements. And sprint is iteration cycle.

2. **Extreme Programming (XP):** Agile Modeling (AM) is a practices-based software process. In XP method, software may release after every iteration.

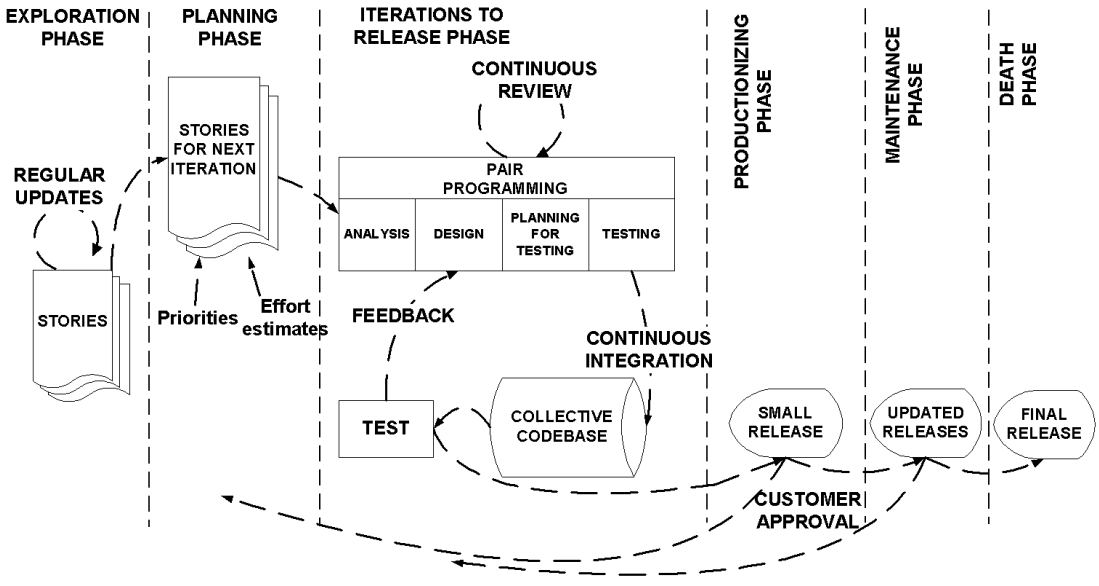


Fig 1-8: Extreme programming

3. **Feature Driven Development (FDD):** FDD is iterative and incremental software development process. FDD have short iteration process. FDD consist five basic activities.

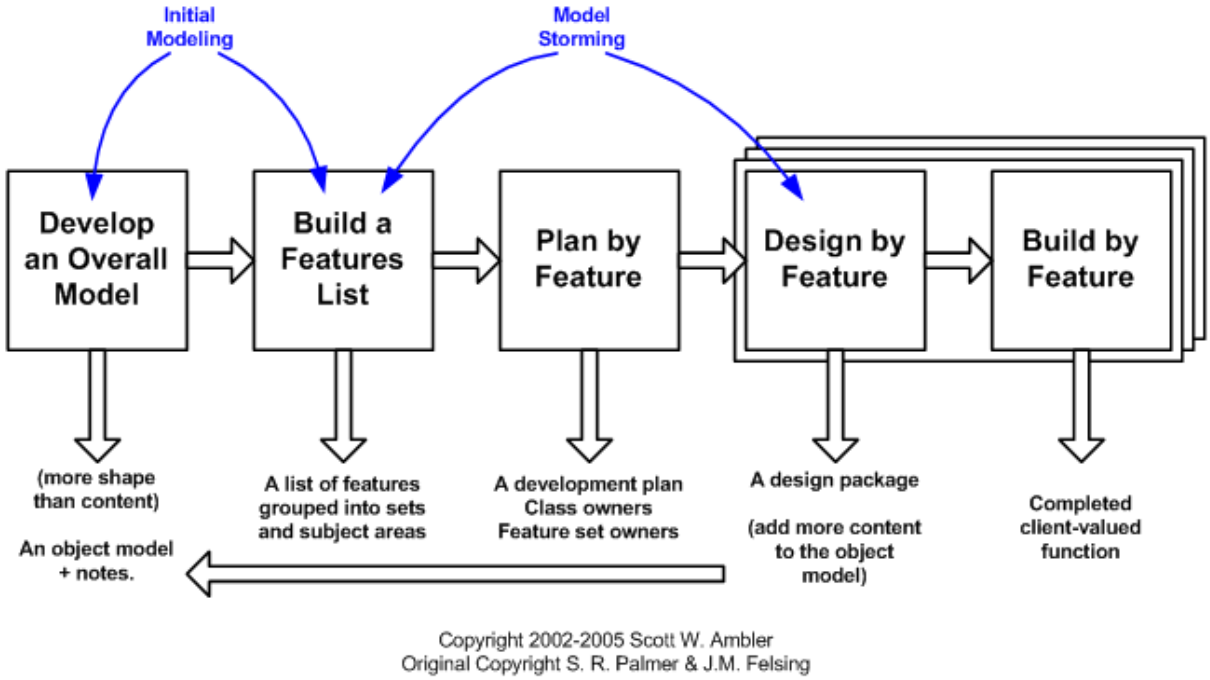


Fig 1-9: Feature driven development

First two activities are the overall model of the project. The final three activities are iterated for each feature.

4. **Dynamic Systems Development Method (DSDM):** DSDM is a rapid application development process. DSDM is also a combination of iterative and incremental software development process. The main focus of DSDM is to deliver what business needs when it needs it.

Phases of DSDM:

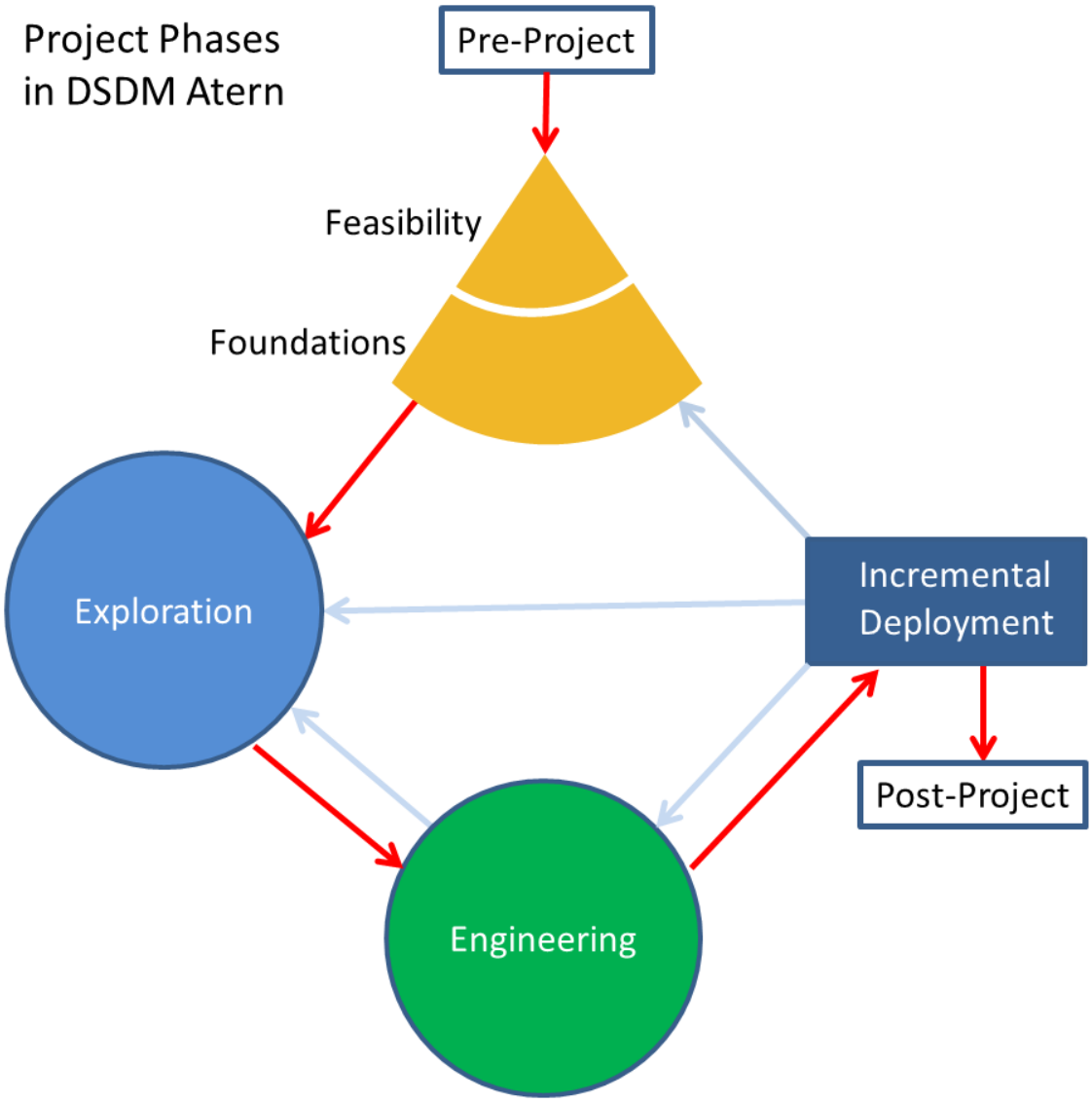


Fig 1-10: Dynamic Systems Development Method

1.8 Why we choose Scrum

- Our requirements are not clear and software is not safety critical. So waterfall model is not good for us. There will be also good amount of change in requirements. Iterative method is an option but our time limit is too short for iterative method. As we need to adapt change overtime, so V-model and spiral model will not work. Prototyping model is a good option for us as our requirements are not clear but it also does not support mass amount of change. So we have to select any agile process for the development.

- Among agile models, we can't follow XP because our team is too short. FDD needs some experience for the development and also features can be changed over time. DSDM support urgent business need but there is no industry's business need now. So, DSDM is not a good choice.

- That leads us to Scrum. It is agile, it supports small iteration or sprint, it support small group.

- In scrum method project manager is not responsible for the project management. Scrum team is responsible for project management. In the other SDLC method, we need a project manager but we don't have any project manager. So SCRUM is best for us in this sector.

- Communication is easy in scrum method. Scrum meeting will be held regularly.

- Sprint review meeting is a plus point of scrum. We can define current status of our project in the sprint review meeting.

- In traditional method, development team is not involve in the definition of criteria for acceptance. But in scrum method development team defines the boundary of acceptance state.

That's why scrum is better SDLC for our project and we chose scrum for our development.

1.9 Related Work Study

In software market, many farms already introduce their software for Garments data management. In this part we analysis their software and find out pros and corns of these software. That will help our project development.

1.9.1 Faabee:

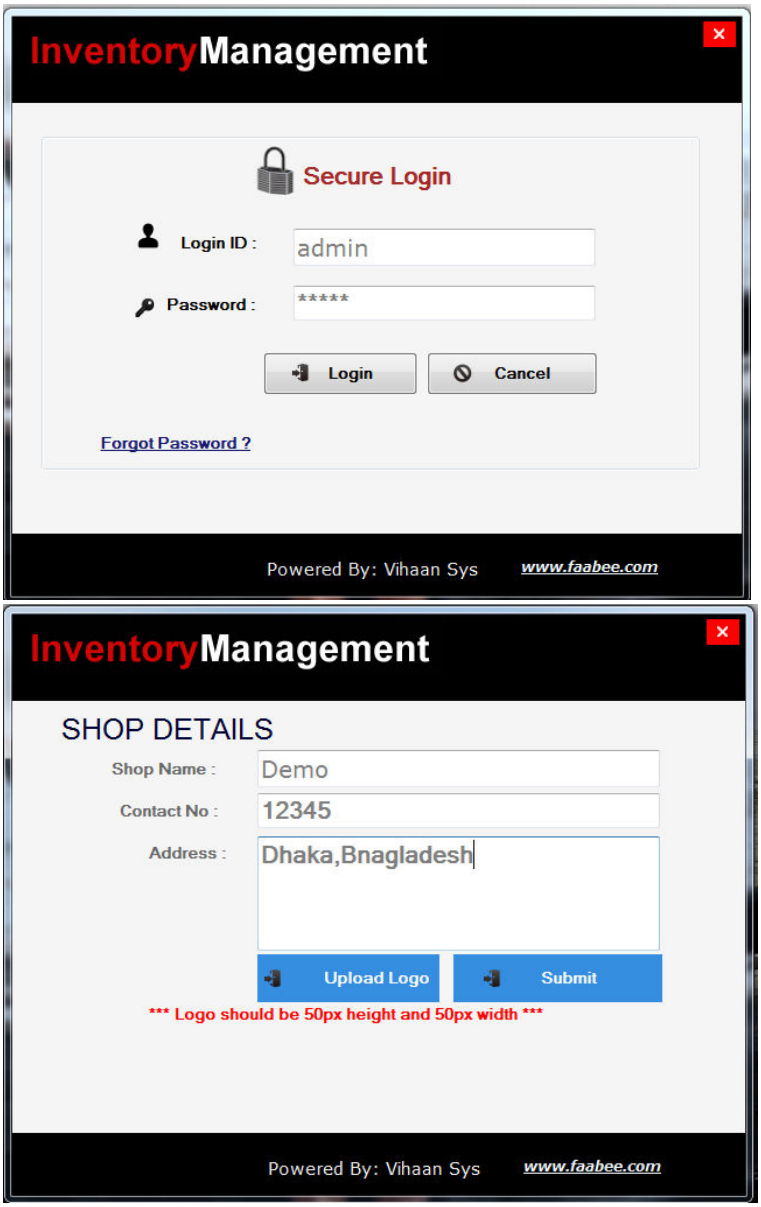


Fig 1-11: Faabee login and detail page

For using Faabee we need to login first and then we need to add a Garments details.

After adding garments details, main page will appear. It has lots of option and many features including calculation part, report and history part.

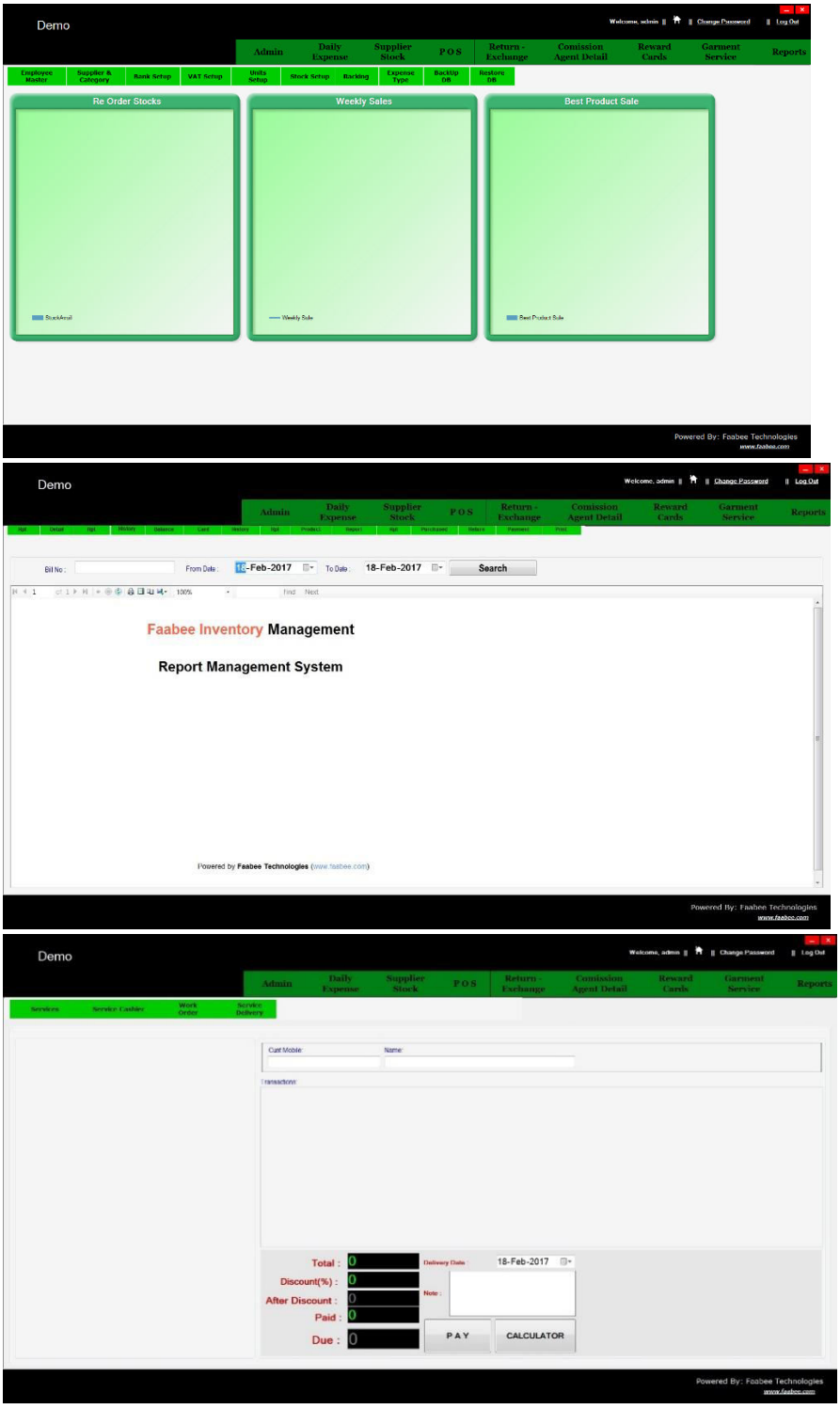


Fig 1-12: Faabee management system

Faabee have some limitation. Firstly, admin is the only user of the software. But in our project supervisor, manager and owner are the user of the software. Secondly, Faabee don't have any kind of option that provides workers capabilities.

1.9.2 Marg:

Fig 1-13: Marg web page

Marg is well known garment software. According to their website, more than 6 lakh user use this software. Marg is mainly product based software. It stored information about the products that garments made.

But in our project we're not just concern about the products, we also concern about the people who work here.
First page of MARG:

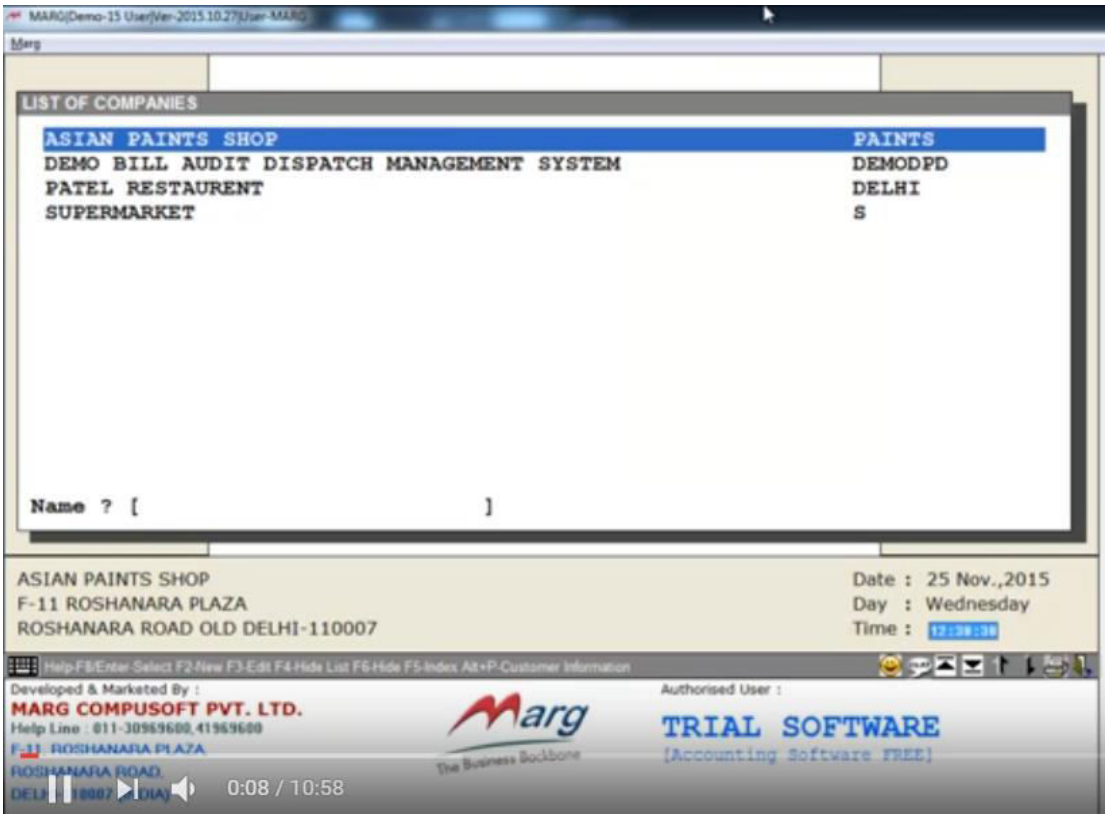


Fig 1-14: Marg management system

Marg is not user friendly. As a user I can't understand anything at the first look.

Fig 1-15: Marg data entry page

Marg is so much messy. Fronts are very small. Color combination is not so good. Only trained people can use this software.

1.9.3 Startex:

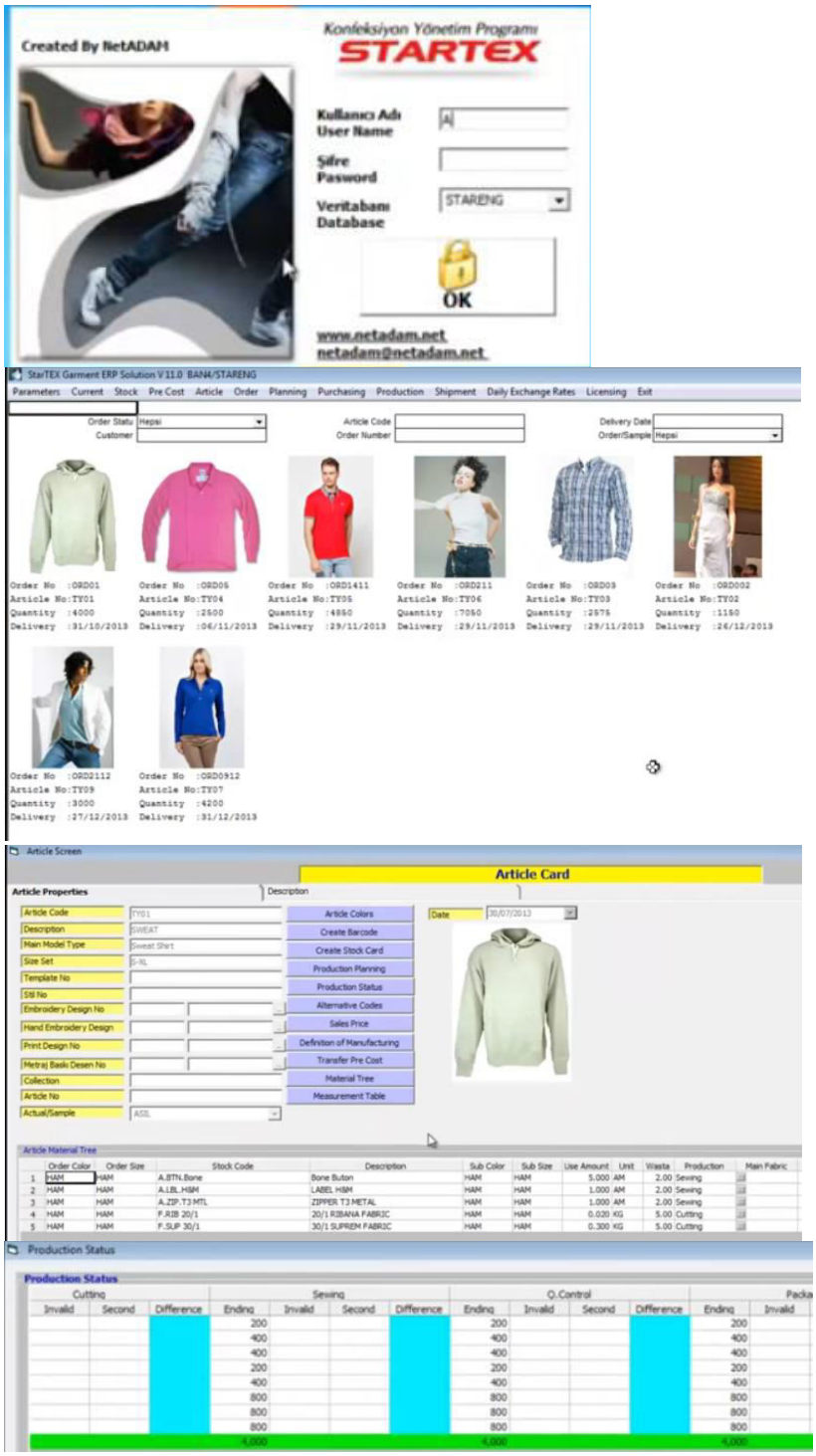
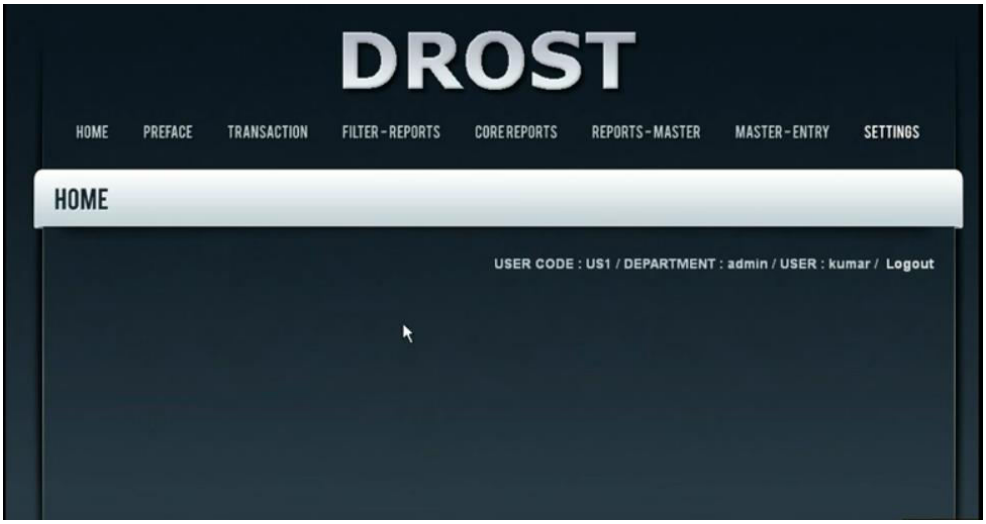


Fig 1-16: Startex management system

Like Marg, Startex is also product base software. But it have more features than Marg. Startex have option to store daily productions data. But like Faabee, the user of Startex is just an admin.

1.9.4 Drost:



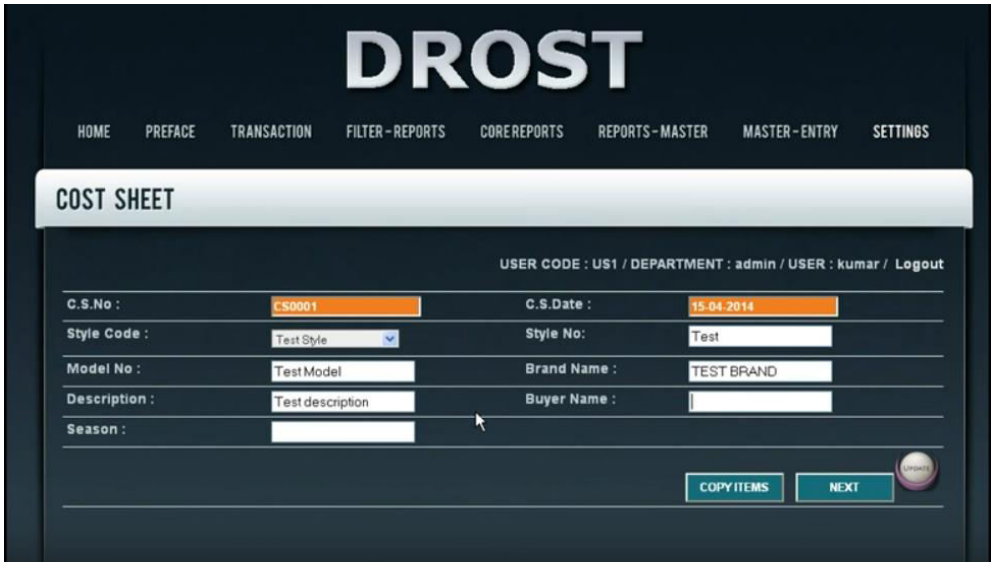


Fig 1-17: Drost management system

Data Entry Page

Drost is another software for garments industry. Limitation of this software is that, there is no option for trace workers capabilities.

Chapter 2: Software Requirement Specification

2.1 Project Summary:

2.1.1 Field Study:

We have chosen to develop a software for "**Industrial Engineering Data Management System for Garments Industry**".

We went to visit an industry named Sadia Fashion. Address Plot # 4, Road # 27/Ka, Rupnagar Rd, Dhaka, Bangladesh. They are Contract based small production industry.
Monthly Production Size: 30,000 unit
Product type: clothes and garments for man, women, children. products are specially Knit (T-shirt, polo shirts, Sweat Shirt, Tank Top, Vest, Trouser, Bermuda Shorts, Pajama Set, Thermal Set, Long John, Boxer, Briefs, underwear, nightwear, Sportswear, lingerie's, shorts, pajamas, baby clothes and such like knitted products).
Besides manufacturing and selling regular products to customers' applying different types of typographic and color Technics (Cool pigment, Asudel etc.).
Type of works: Cutting, Sewing, Finishing.
Workers distribution: Total 30 workers. 8 cutting line, 15 sewing line, 7 finish line

2.1.2 Problematic field:

The production reduces roughly after lunch. It can only produce 25 % max after the lunch time [1]. As their order size small (5000-15000) and production line is max 2 to 3, they can handle their data manually by pen and paper, no computerized data collection. This causes a minor problem for report generating and further analysis after a month or year, on profit- loss. But if the industry is big, multiple line of work then it is near impossible to handle such massive amount of data. This why we need automated system that will work for any kind, any size of garments industry.

Users will able to store the data of daily production. Data can be stored for each shift, for each hour, for each worker according to the needs of different users. Users can edit data later. The data will be used to make weekly, monthly and yearly report. The users will be able to see the change in work progress each week, identify each worker skill, progress or reduction in production. They can monitor the change in the production due to implementing any change in existing work process.

Users of different role will handle different part of the software. Accessing to the software and database will be controlled according to their role.

2.1.3 Background to the Problem:

Due to lack of data, they cannot analyze their production. They cannot evaluate each worker accurately. As they do not keep data of employee, they cannot point out the fault in the production line. They cannot monitor hourly production rate. They cannot accurately predict production for each employee and their maximum capability of production.

2.1.4 User Story:

1.0 **Log in** (supervisor)

"As a supervisor, I want to log in to the software, so that I can enter into the data entry section to enlist each workers hourly production data"

1.1 **Log in** (Manager)

"As a manager, I want to log in to the software, so that I can see the daily, weekly or monthly data of production and order data"

1.2 **Log in** (Owner)

"As an owner, I want to log in to the software to see the daily, weekly, monthly report of the industry, Investment and profit"

2.0 **entry Data** (supervisor)

"As a supervisor, I want to enter the hourly data into the software for each employee about what product they working on, how much they produces, what is the hourly and daily target, so that I can monitor each worker evaluate them and submit report on them"

3.0 **Report** (manager)

"As a manager, I want to get all the monthly daily weekly, monthly, yearly report with grading, so that I can evaluate the employees"

3.1 **Report** (Owner)

"As an owner, I want to get report on monthly basis and yearly basis regarding how much order received, how much delivered on time, how many in time, how many late, what money is spend and how much profit each order carry, so that I can set up business goal and determine further policies"

2.2 Project Scope

In Scope:

- User Registration
- Log in
- Categorized homepage
- User Information Insert, update ,delete
- Product Information Insert, update ,delete
- Team Information Insert, update ,delete
- Workers Information Insert, update ,delete
- Team update history
- Workers update history
- Product update history

Out of Scope:

- Report generating
- Automated Management System (Salary, HR etc.)

2.3 Overall Description

2.3.1 Product Perspective

This software is for Garments Industry. Users are Owners, Managers and Supervisors of the industry.

2.3.2 Project Feature

- Maintain product database.
- Login system for different kinds of users.
- Registration for the new employee.
- Add new product, employee, and team.
- Particular control panel for particular user.
- Editing Data.
- Accessing data level according to the user.
- Report generation.

2.3.3 Operating Environment

The software will run in windows 7 or higher Windows operating system.

2.3.4 Design & Implementation Constraints

This software is developed with C# programming language and metro framework. We also use MS SQL database for storing data. There are particular login system for accessing.

2.3.5 Assumption and Dependencies

There is a dependency of the software and it is,

- MS SQL server to store the database.
- .Net platform

2.4 System Features

2.4.1 User Option

There are multiple login system in the software. Every user has a particular homepage. To access the system the need to login through id and password.

2.4.2 Stimulus/Response Sequence

User can login through the id and password or log out. For login, when user give id and password, the software will verify them. If it is allowed it will give access to the user.

2.4.3 Interface Requirement

Graphical user interface will demonstrate the page that will appear to user. GUI contains lots of form that will be used by the user.

2.4.4 User Interface

User interface will contains lots of features that used by users. They will appear step by step while accessing the system. There must be some rules that should follow the user.

2.4.5 Login Page

Login page will appear when a user will registration to the system. After successfully done user can enter into the system by registered id and password. If someone don't have id and password, he can register by clicking "Create a new account".

2.4.6 Minimum Hardware Requirement

Server Side:

- OS: Linux/Windows Server
- CPU: Minimum Intel Xenon or higher
- RAM: 8 GB or higher
- Hard Drive: 20 GB or more

Client Side:

- OS : Linux/Windows operating system
- CPU: Minimum Intel Pentium or higher
- RAM: 2 GB or higher
- Hard Drive: 1 GB or more

2.4.7 Software Interfaces

- Database: MS SQL
- Programming language: C#
- Development tool: Microsoft Visual Studio 2015

2.4.8 Communication Interface

- LAN connection.

Chapter 3: Software Design Specification Plan

3.1 Documentation History & Distribution

Table 3-A: Revision History

Revision	Revision Date	Change	Author
1.0A	29-03-2017	N/A	i)Noman, Md Abdullah Al ii)Das, Sudipta iii)Mustafa,H.H. Faysal Ibne

Table 3-B: Distribution

Recipient Name	Recipient Organization	Distribution Method
Md, Shamsur Rahim	AIUB	Hard Copy

3.2 Introduction

In software design specification plan there will be some system diagram, some software UI screenshots, architecture plan, test plan and system overview.

3.3 System Overview

3.3.1 Use Case

Fig 3-1: Use Case Diagram

3.4 System Architecture

3.4.1 Activities

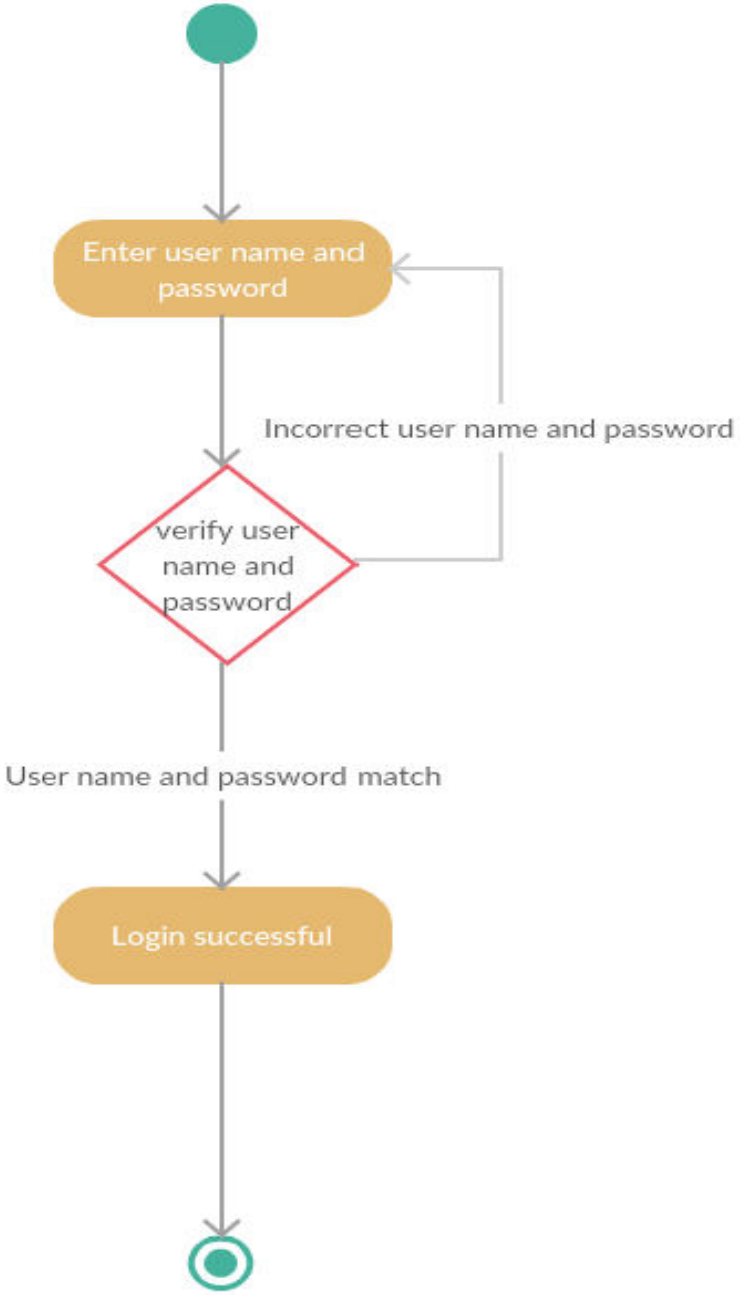


Fig 3-2: Activity of Login

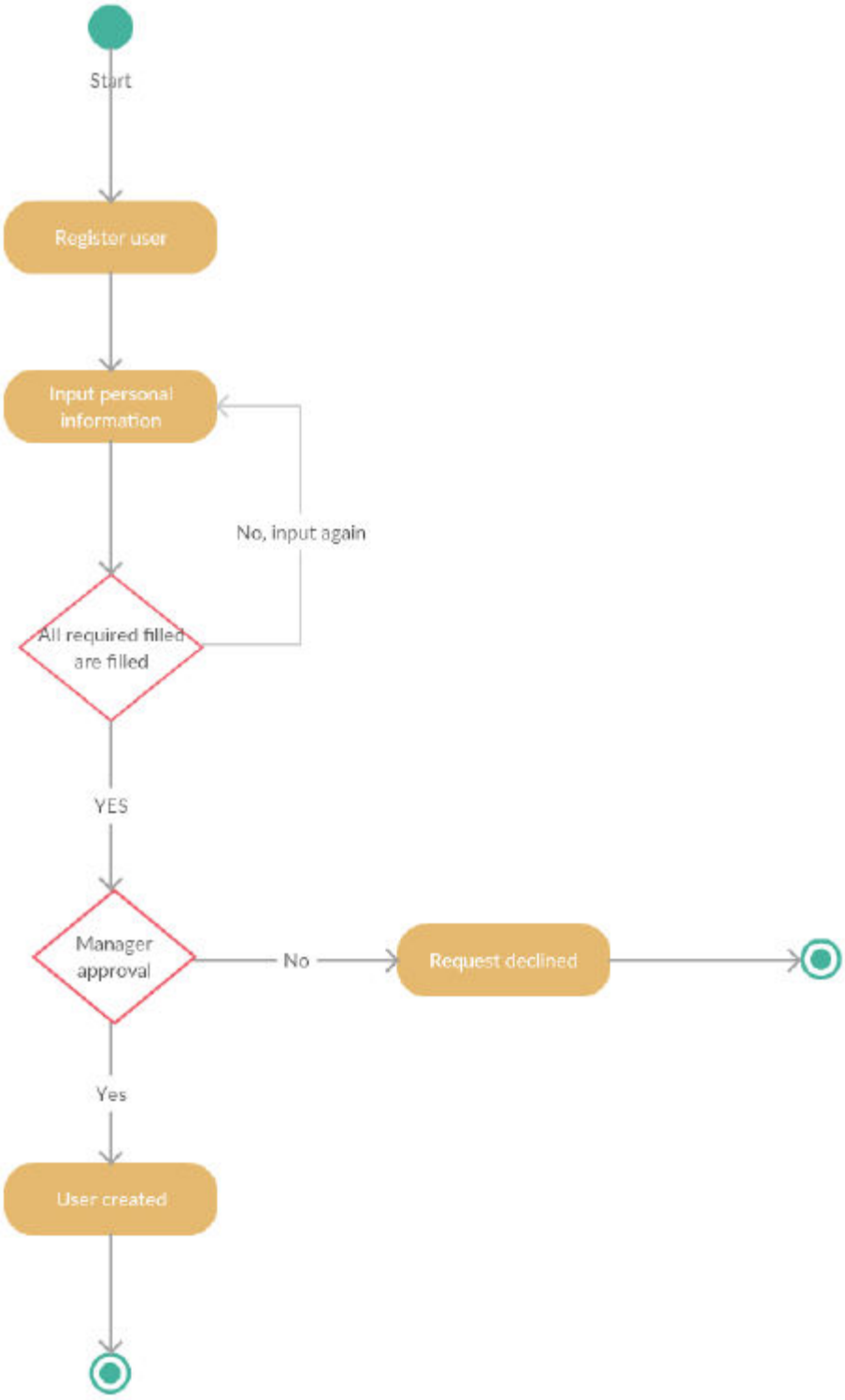


Fig 3-3: Activity of Sign up

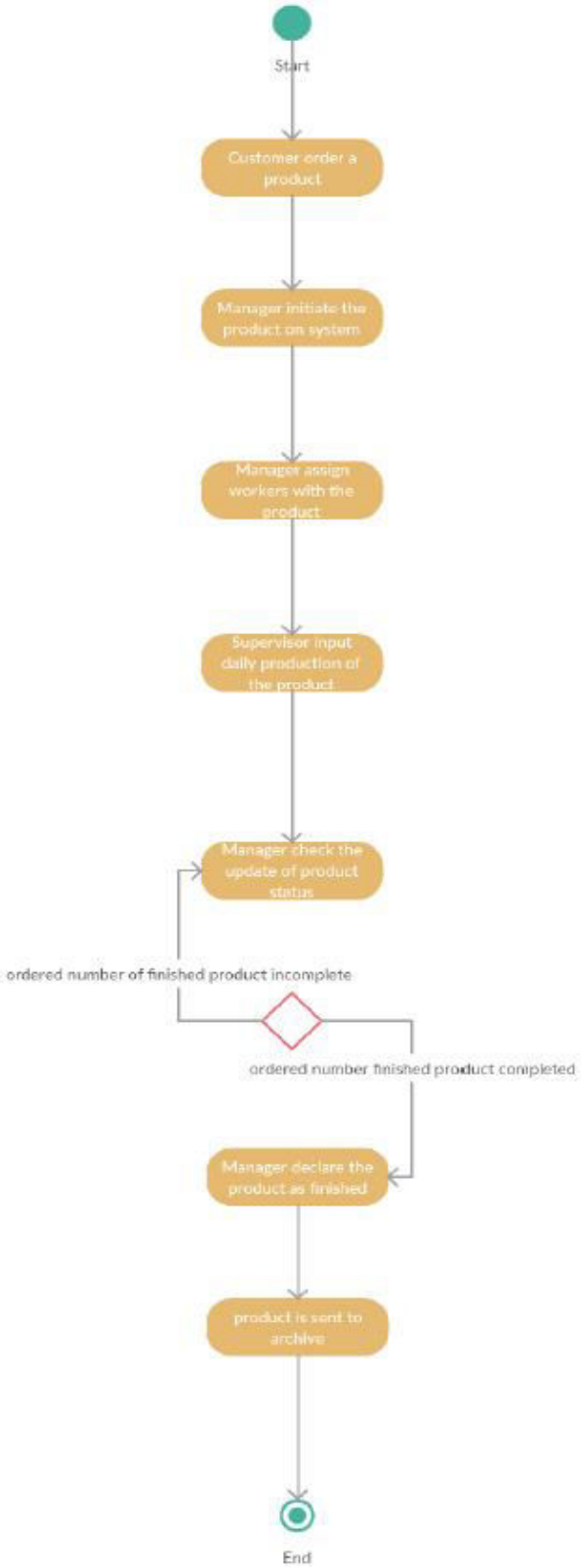


Fig 3-4: Activity of production data entry

3.4.2 ER Diagram

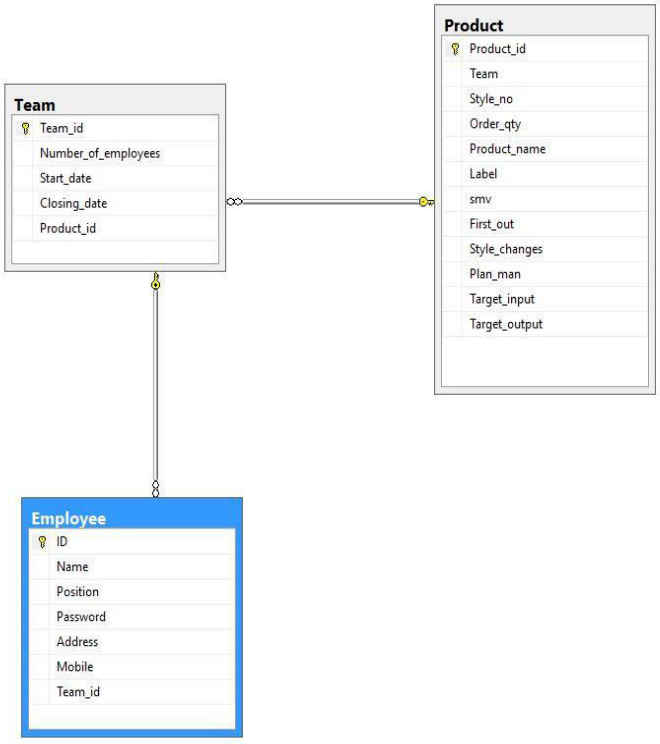


Fig 3-5: ER Diagram

3.5 Human Interface Design

3.5.1 welcome Page

Fig 3-6: Welcome Page

3.5.2 Log in Page

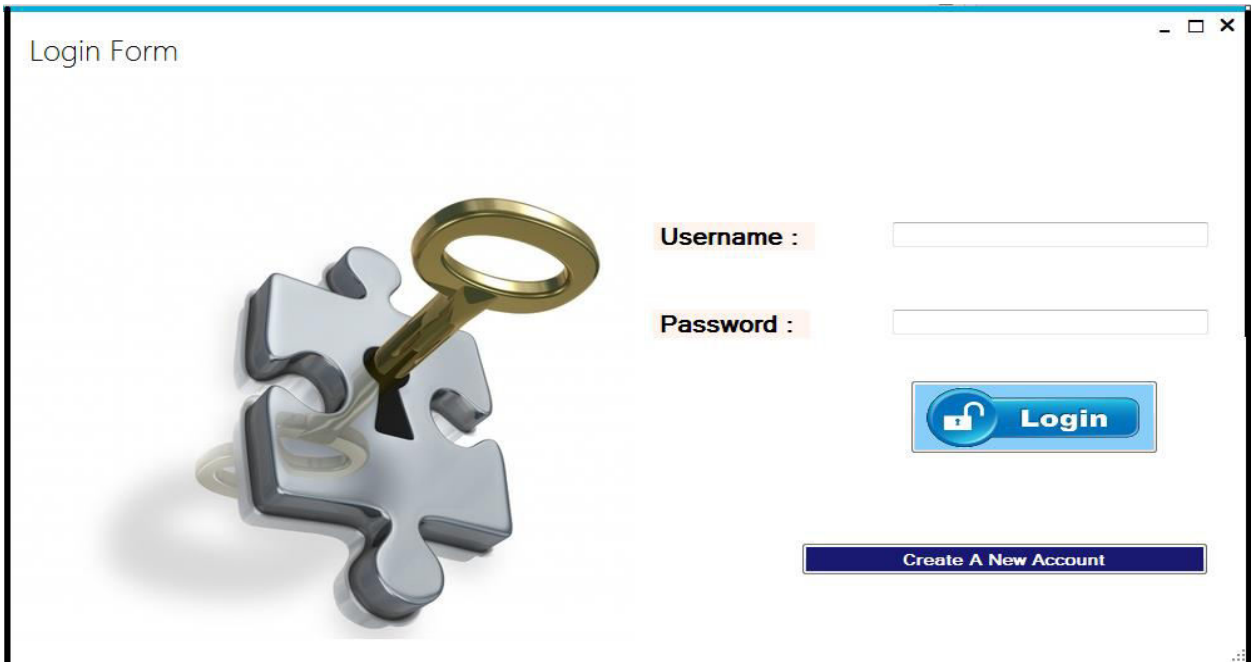


Fig 3-7: Log in Page

3.5.3 Manager Homepage

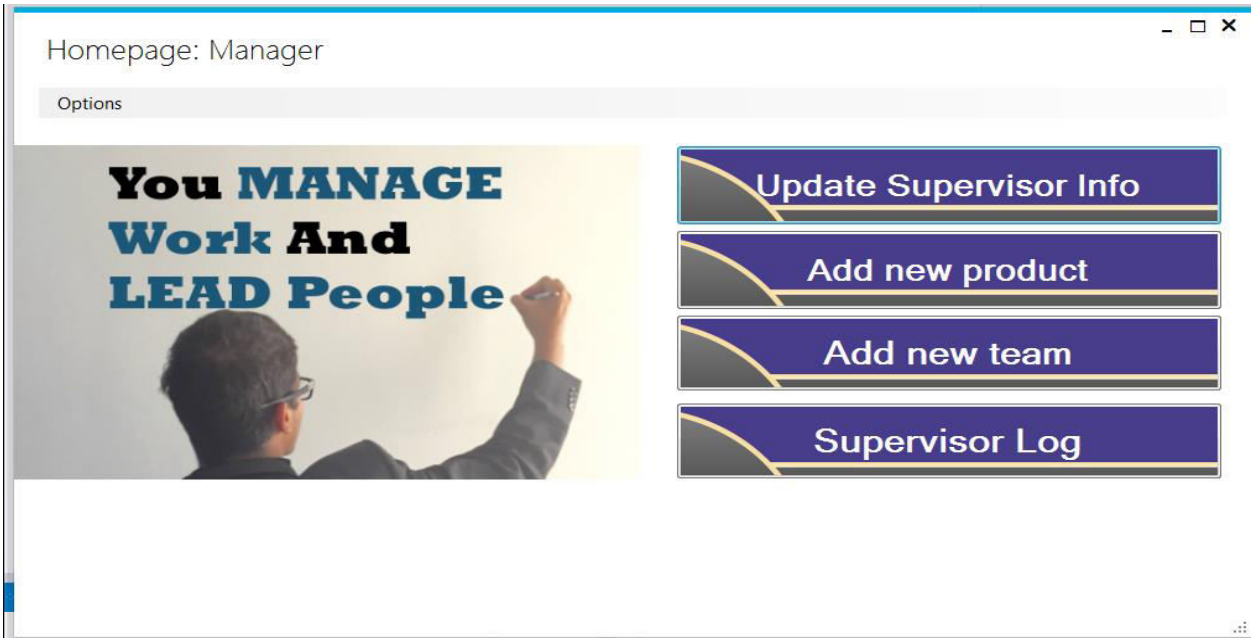


Fig 3-8: Manager Homepage

3.5.4 Supervisor Info from manager accounts

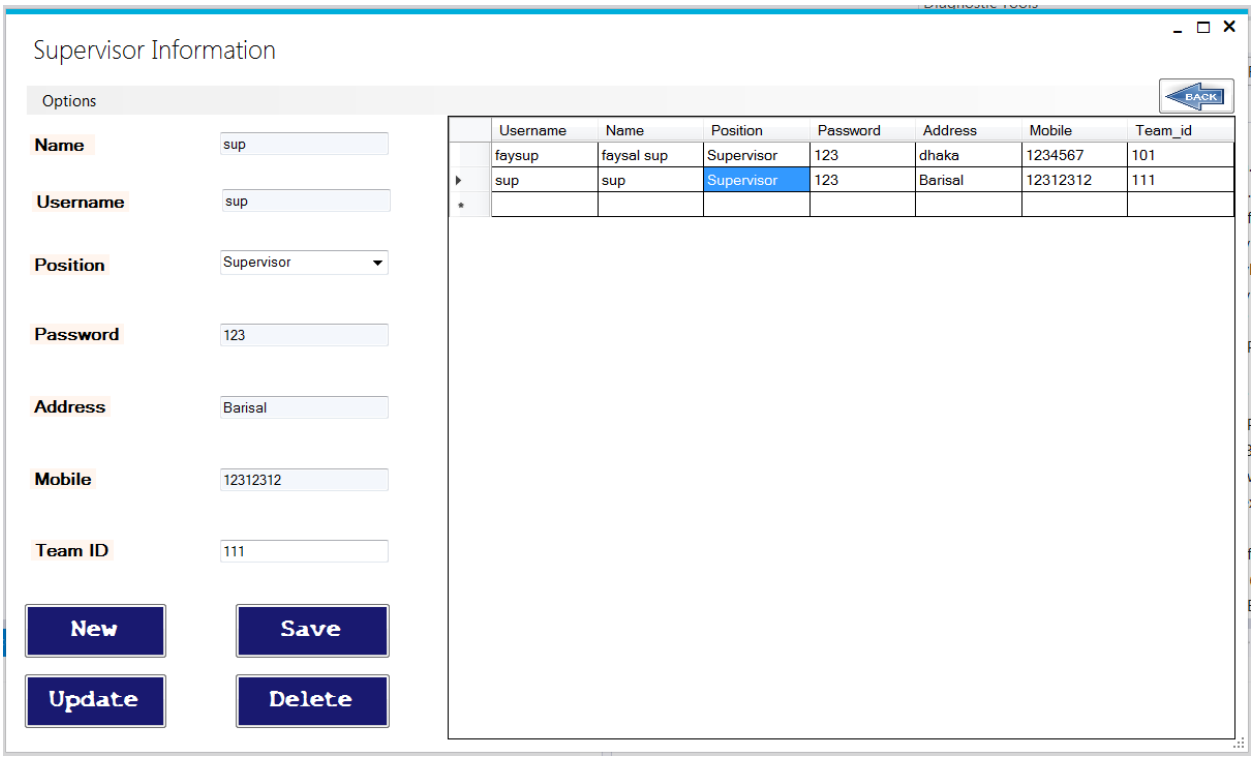


Fig 3-9: Supervisor Info from manager accounts

3.5.5 Edit Team Info From manager accounts

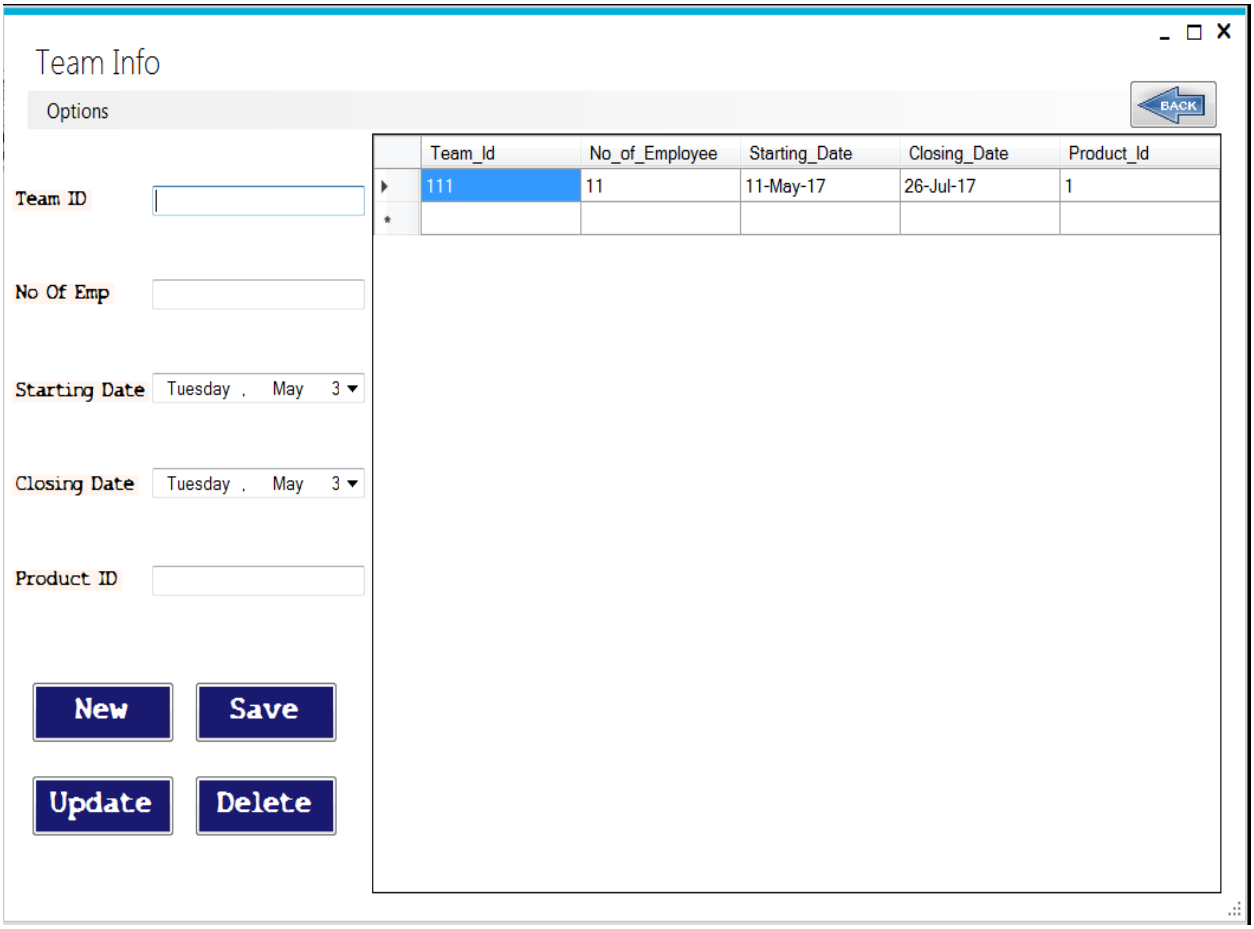


Fig 3-10: Edit team info from manager accounts

3.5.6 Edit Product Information

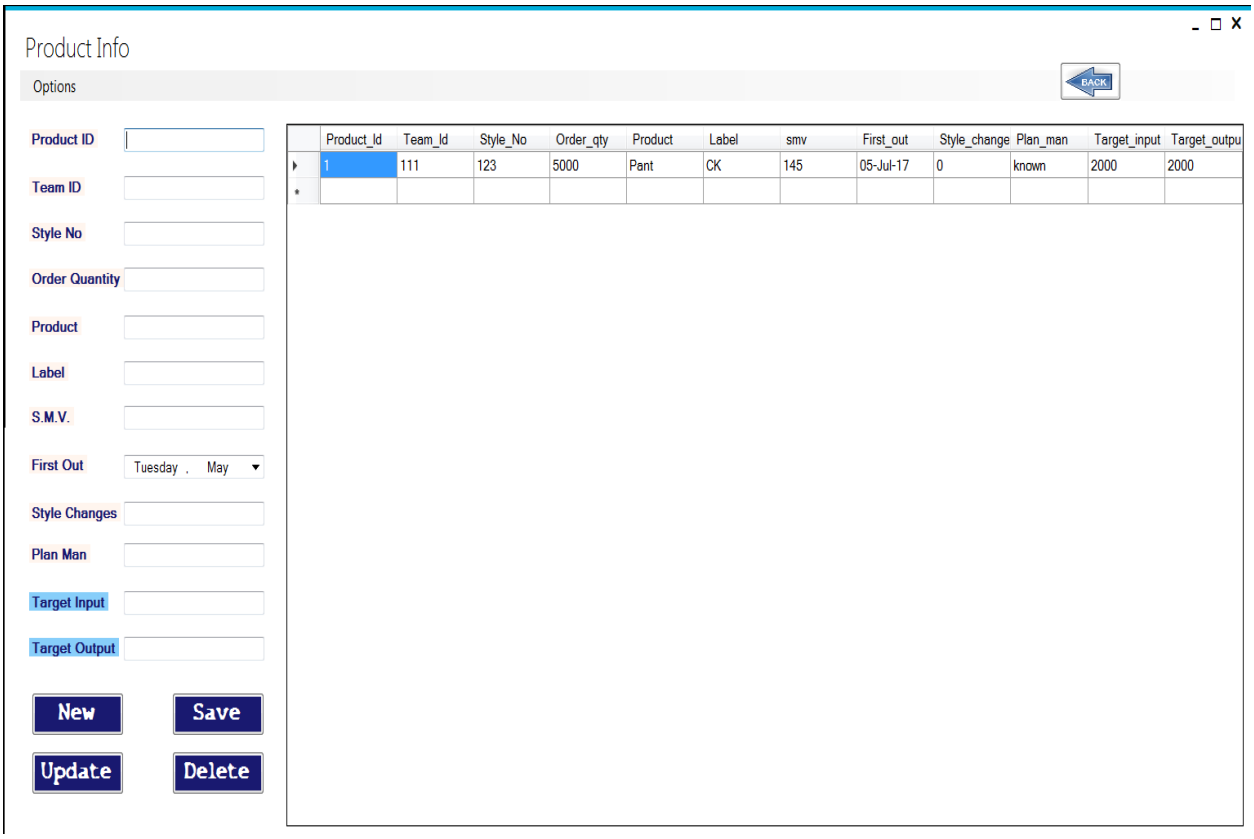


Fig 3-11: Edit Product Information

3.5.7 Supervisor Log

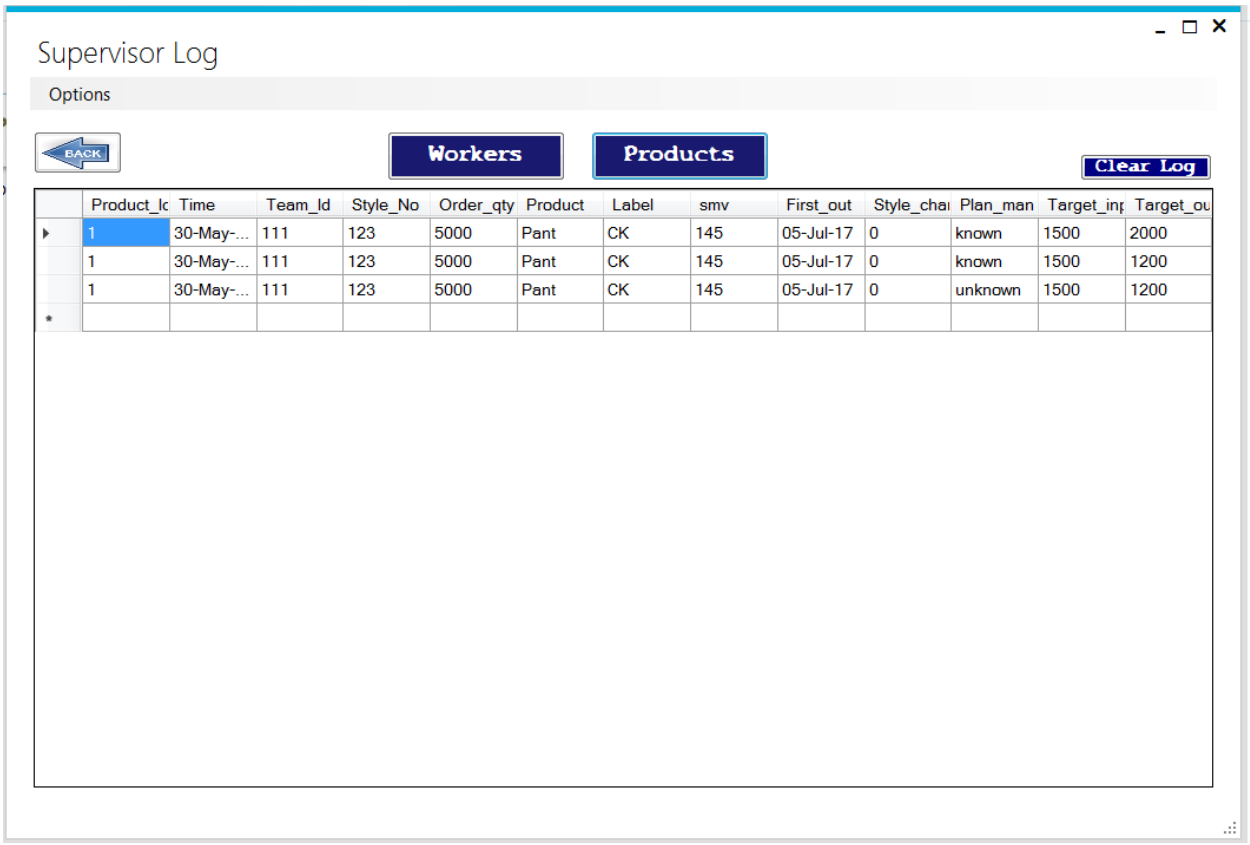


Fig 3-12: Supervisor Log

3.5.8 Owner Homepage

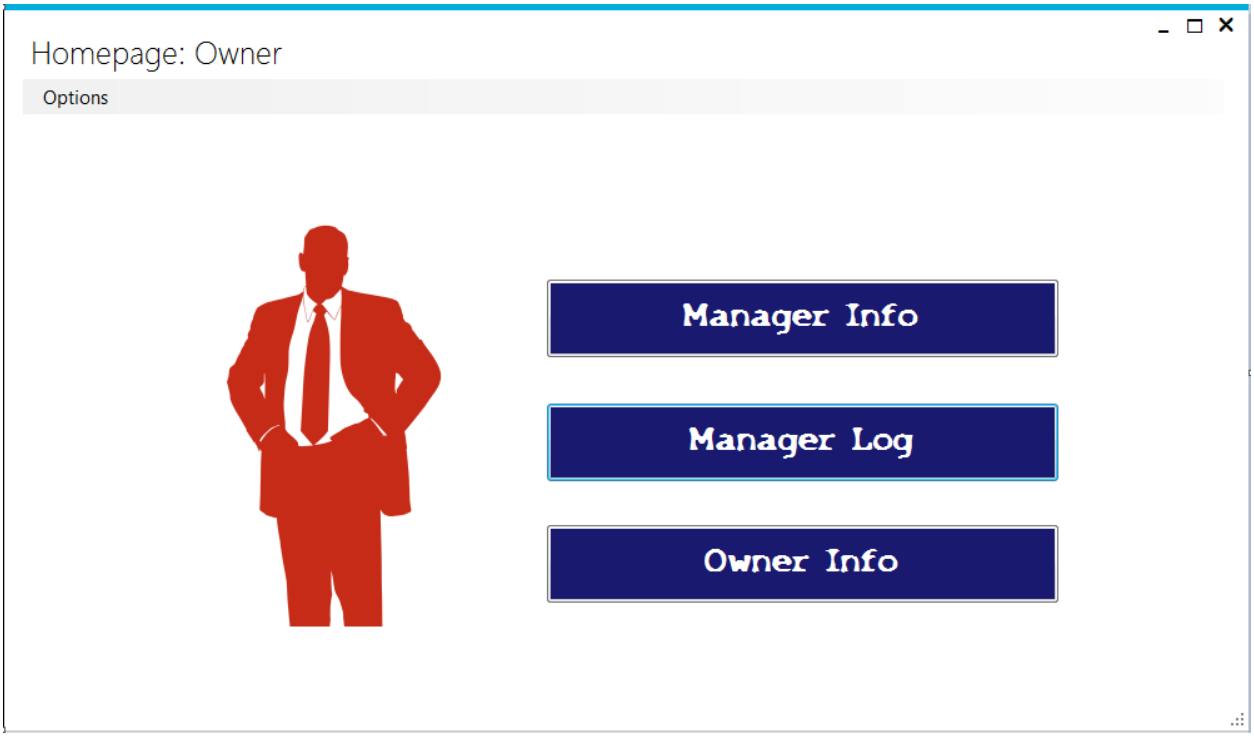


Fig 3-13: Owner Homepage

3.5.9 Edit Manager Information

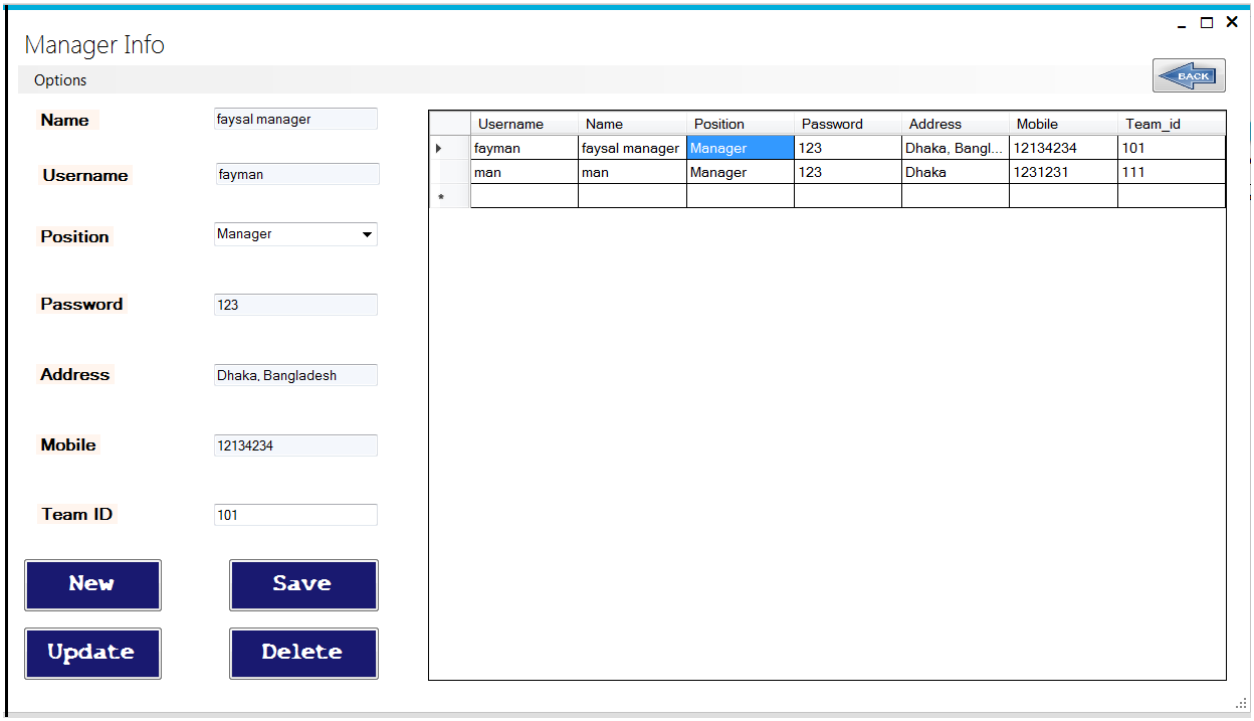


Fig 3-14: Edit Manager Information

3.5.10 Editing Owner Information

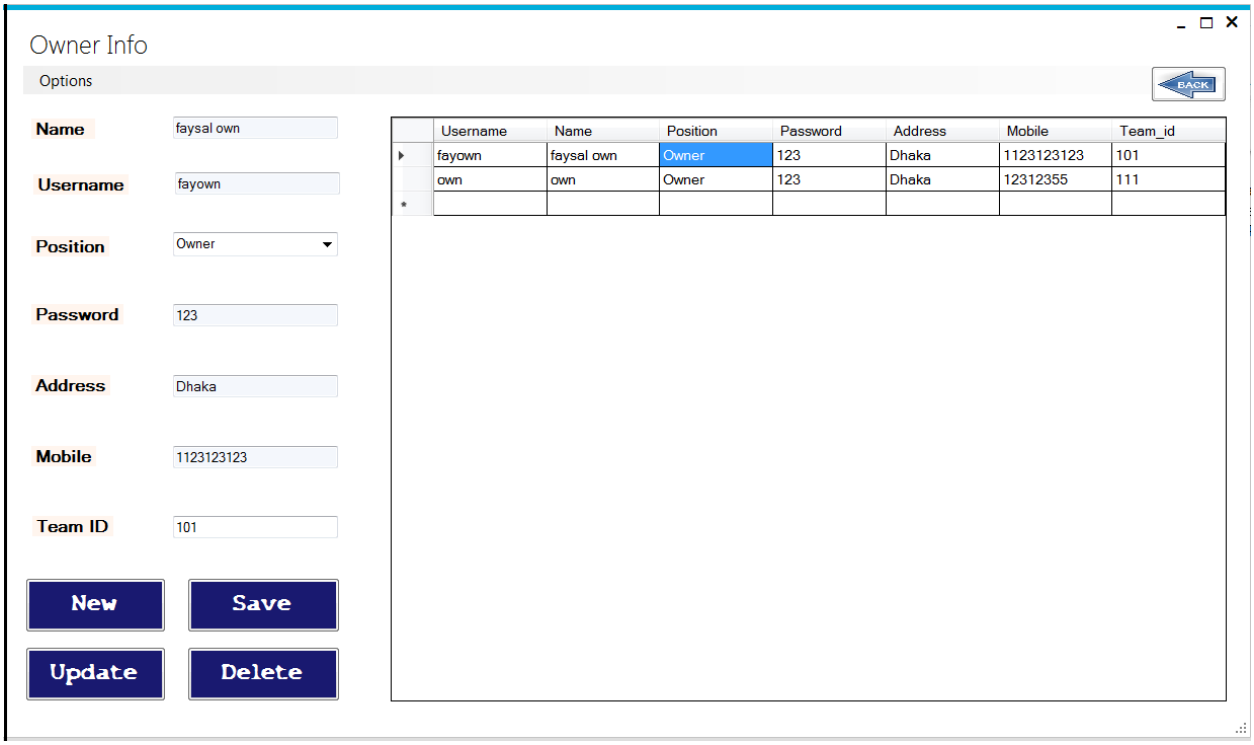


Fig 3-15: Editing Owner Information

3.5.11 Manager Log (Product)

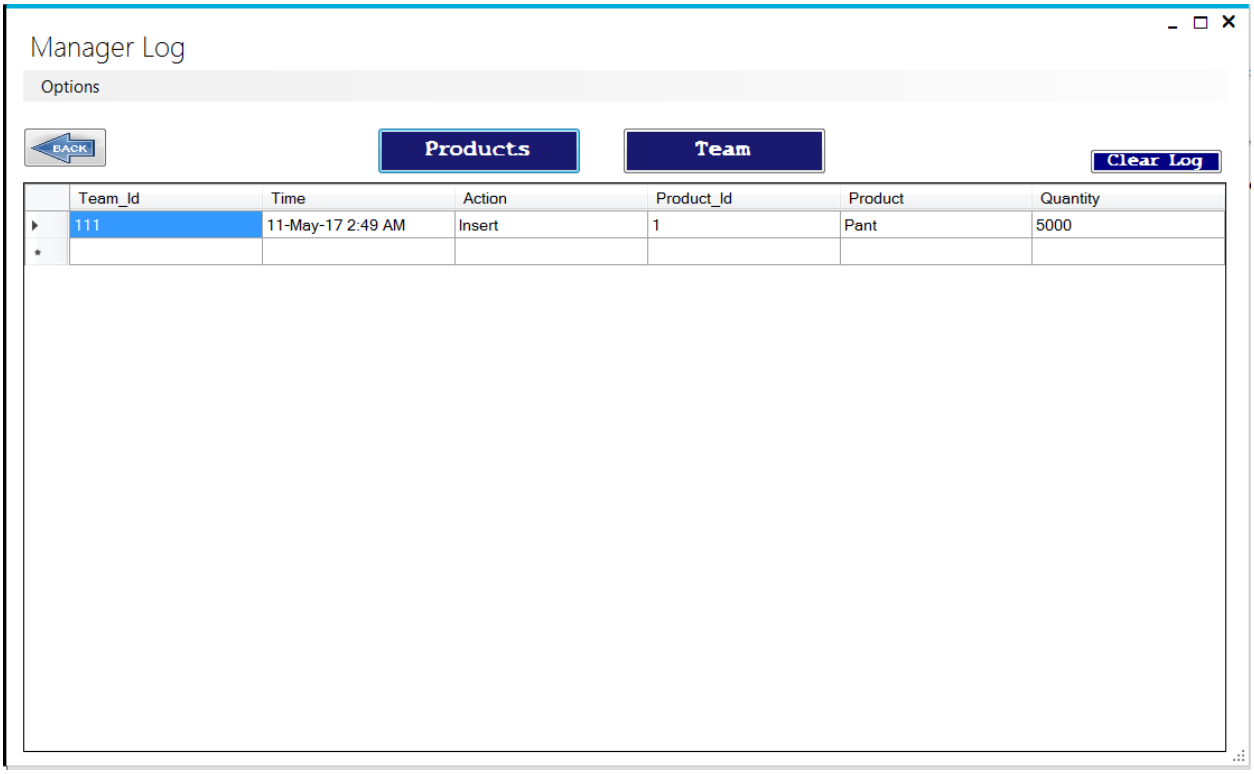


Fig 3-16: Manager Log (Product)

3.5.12 Manager Log (Team)

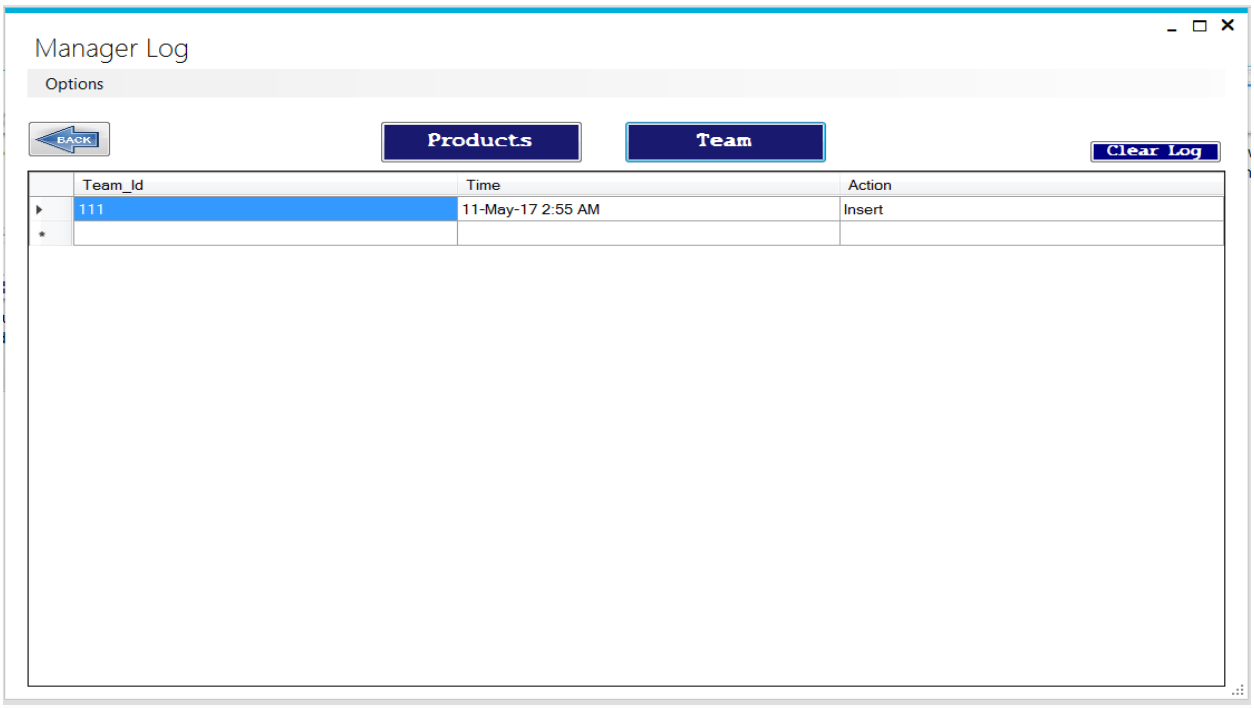


Fig 3-17: Manager Log (Team)

3.5.13 Supervisor Homepage

Fig 3-18: Supervisor Homepage

3.5.14 Edit Worker Information

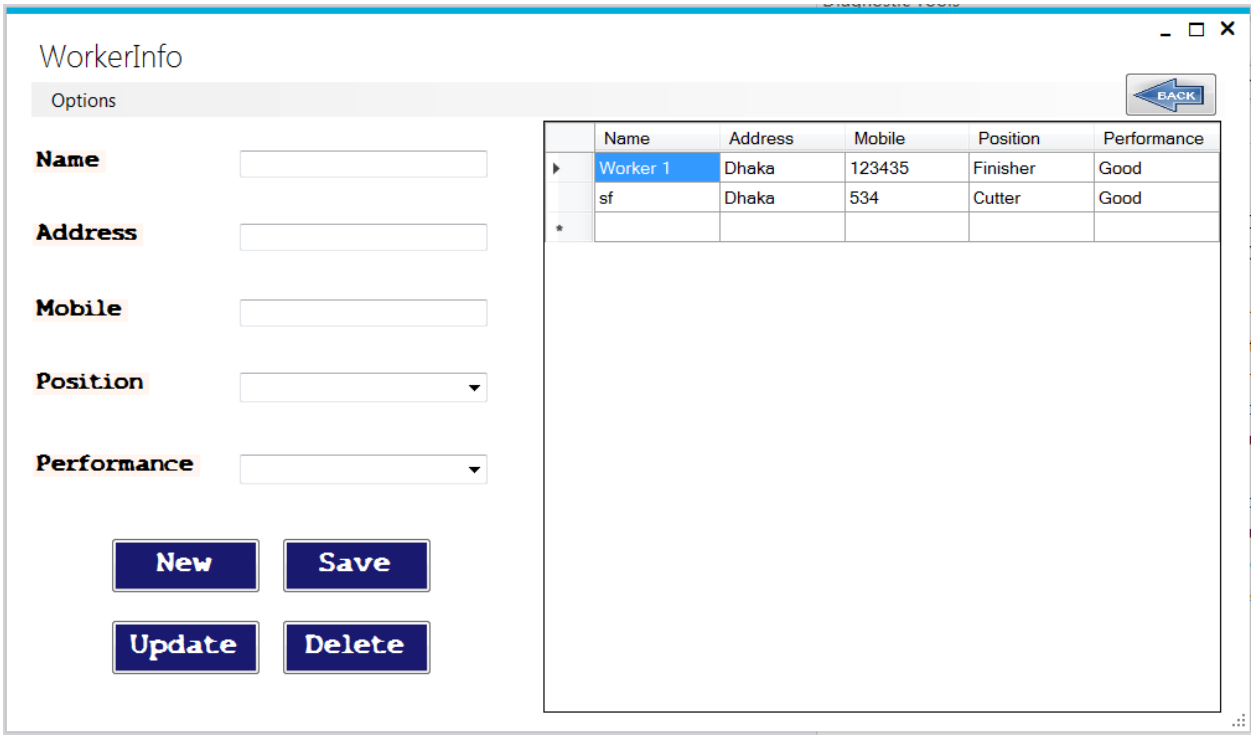


Fig 3-19: Edit Worker Information

3.5.15 Registration

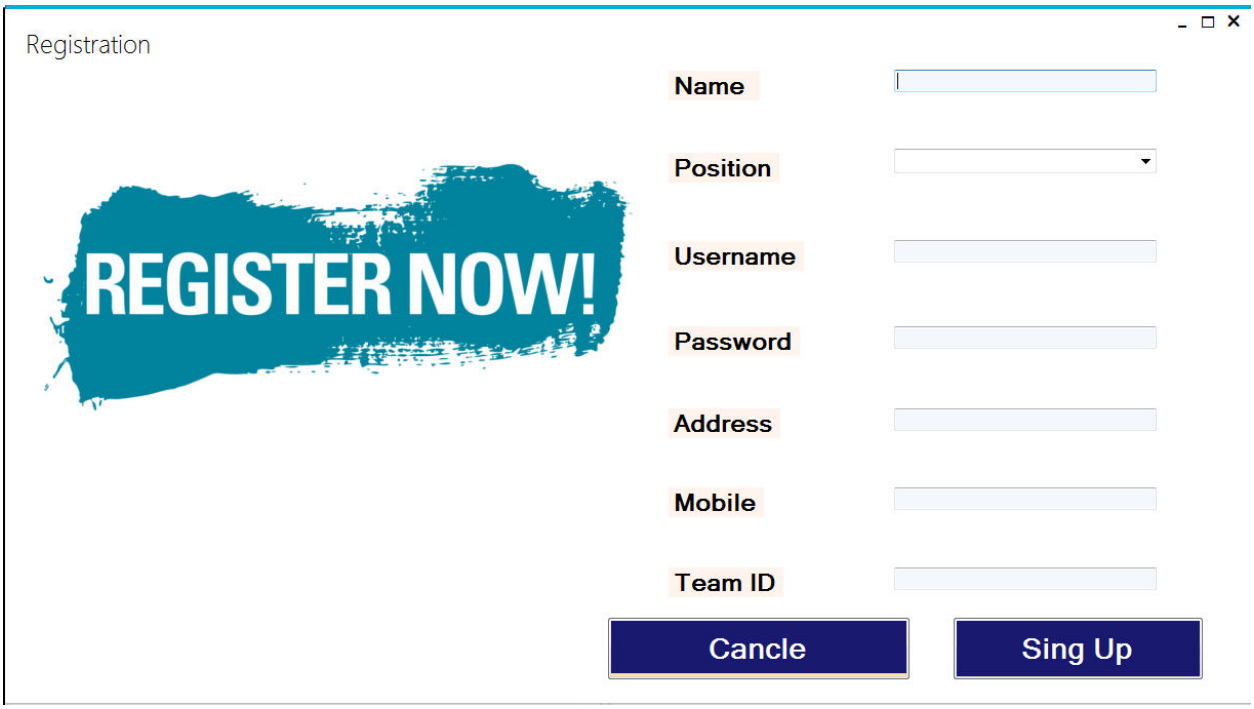


Fig 3-20: Registration Page

3.5.16 Successful Message

Fig 3-21: Successful Message

Testing

3.6 Test plan

3.6.1 Create account

	Test	Case	Coverage
1	Create Account	Check all the text boxes accepct text and number	Check text boxes take valid input
			Check dropdown list in the boxes
			check all the data inputed in database
2		Check the buttons	Cancel button take back to login page
			Create account button create new account
3		All the boxes are filled with specific type	mobile number is 11 digit , not more, not less
			drop down boxes only recive data from drop down
			check all the boxes are flled with data , else show error message
4		Check confirmation text of new account created	Confirmation massage of new account created

Fig 3-22: Create account

3.6.2 Login

5	Login test	Check the buttons and text boxes	Check all the bution action is performed
			Check test can be written in the text boxes
			Check password cant be seen when typed
6		Check the functionalaty	Check only correct passowrd accepted
			Error notified with a massage
			According to usename and password appropiate homepage opens
7		Check the error massages	Error massage are shown in masssage box

Fig 3-23: Login

3.6.3 Homepage test

8	Homepage test	Manager homepage	Clicking all the buttons move to next page
			Navigation options
9		supervisor homepage	Clicking all the buttons move to next page
			Navigation options
10		owner homepage	Clicking all the buttons move to next page
			Navigation options

Fig 3-24: Homepage test

3.6.4 User data

11	User data (inside Supervisor info, Manager info and Owner info)	content	All the required data category present dropdown boxes have all catagories
12		table	All data inputed are saved in table table update rapidly with operations
13		operations	Save button save newly input dat update button edit previous data remove buton delete entire seleted row

Fig 3-25: User data

3.6.5 Production data

14	production data	Content	All the required data category present Unique ID generated for each product each order
15		Table	All data inputed are saved in table table update rapidly with operations
16		Operation	update button edit previous data Save button save newly input data No production data can be removed from table

Fig 3-26: Production data

3.6.6 Remark the worker

17	Remark the workers	Content	All the required data category present dropdown boxes have all catagories
18		Table	All data inputed are saved in table table update rapidly with operations
19		Operation	Save button save newly input dat update button edit previous data

Fig 3-27: Remark the worker

3.6.7 Manager log

20	Manager Log	Product	All new product added are listed in table with all data inputed
21		Team	Any new team created are listed with all information about the team
22		Clear Log	Clear log delete all the informationand reset log

Fig 3-28: Manager log

3.6.8 Supervisor log

23	Supervisor Log	Product	All new product added are listed in table with all data inputed
24		Worers	Any new worker profile created are listed with all information about the team
25		Clear Log	Clear log delete all the informationand reset log

Fig 3-29: Supervisor log

3.6.9 Team info

26	Team info	Content	All the required data category present dropdown boxes have dates
27		Table	All data inputed are saved in table table update rapidly with operations
28		Operation	Save button save newly input dat update button edit previous data Delete button delete entire row

Fig 3-30: Team info

3.6.10 Additional test

29	Additional Test	Homepage	Buttons are working
30		Navigation (options in every page)	Clicking back (in option or icon) moves back to previous page clicking logout takes back to login form Clicking exit close the application
31		Form icons (for all pages)	Clicking minimize icon minimize the app clicking fullscreen icon make the app fullscreen Clicking cross icon exit the app

Fig 3-31: Additional test

3.7 Test Cases

Title	Description	Expected reasult	Actual Reasult	Pass/fail
Check the Strting of software	1. Double click the icon of the sofware from desktop 2. now observe the reasult	The system should open without any error	The system opened without any error	Pass
Check the minimize icon of any new page	1. After any change in page/form repete test case 2 2. Click the minimize icon 3. Observe the reasult	The system should minimize in system tray without any error	The system was minimized in system tray without any error	Pass
Check full screen icon of any new page	1. After any change in page/form repete test case 3 2. Click the fulscreen icon 3. Observe the reasult	The system should Exit without any error	The system exit without any error	Pass
check exit cross icon of any new page	1. After any change in page/form repete test case 4 2. Click the fulscreen icon 3. Observe the reasult	The system should go fulscreen without any error	The system went fulscreen without any error	Pass
Check the log in button in front screen	1. Repeat test case 1 2. Click the log in button 3. Observe the reasult	Login form with username and password box, login and create a new account button , log in form written and login picture should arrive	Login form with username and password box, login and create a new account button , log in form written and login picture arrived	Pass
check login process with valid username and valid password of supervisor	1. Repeat test case 5 2. Fill valid supervisor username and password 3. Observe the reasult	Log in should be successful and supervisor homepage should appeare	Log in was successful and supervisor homepage appeared	Pass
check login process with valid username and invalid password of supervisor	1. Repeat test case 5 2. Fill valid supervisor username and invalid password 3. Observe the reasult	Login should be unsuccessful and a massese box with "Username or password is wrong , please try again " test and ok button should arrive	Login was unsuccessful and a massese box with "Username or password is wrong , please try again " test and ok button arrived	Pass
check login process with valid username and valid password of Manager	1. Repeat test case 5 2. Fill valid manager username and valid password 3. Observe the reasult	Log in should be successful andmanager homepage should appeare	Log in was successful andmanager homepage appeared	Pass
check login process with valid username and invalid password of Manager	1. Repeat test case 5 2. Fill valid manager username and invalid password 3. Observe the reasult	Login should be unsuccessful and a massese box with "Username or password is wrong , please try again " test and ok button should arrive	Login was unsuccessful and a massese box with "Username or password is wrong , please try again " test and ok button arrived	Pass
check login process with valid username and valid password of Owner	1. Repeat test case 5 2. Fill valid owner username and valid password 3. Observe the reasult	Log in should be successful and owner homepage should appeare	Log in was successful and owner homepage appeared	Pass
check login process with valid username and invalid password of Owner	1. Repeat test case 5 2. Fill valid owner username and invalid password 3. Observe the reasult	Login should be unsuccessful and a massese box with "Username or password is wrong , please try again " test and ok button should arrive	Login was unsuccessful and a massese box with "Username or password is wrong , please try again " test and ok button arrived	Pass
check login process with invalid username and password	1. Repeat test case 5 2. Fill invalid username and password 3. Observe the reasult	The box should dissappear and login form should be back functional	The box dissappeared and login form was back functional	Pass

Fig 3-32: Test cases

Chapter 4: Project Management

4.1 Project Scheduling

Total Project Time: 18 Weeks
Start Date: 15 February, 2017
Release Date: 11 June, 2017

Task	Time (Week)
Field study	0-1
Study on SDLC	1-2
Study on previous works	1-2
Prepare user story	2-3
Identify user requirements	3-4
Develop Use case diagram	4-5
Develop Activity diagram	4-5
Develop Class diagram	4-5
Develop E-R diagram	4-6
Create Database	6-7
Create user interface	6-8
Software Development	6-16
Prepare Test plan	3-4
Prepare Test Suit	4-6
Software Testing and Debugging	7-17
Documentation	17-18

4.2 Project Management tool (Meistertask)

MeisterTask was used as our project management and issue tracking tool.

Some sample screenshots of related works are given

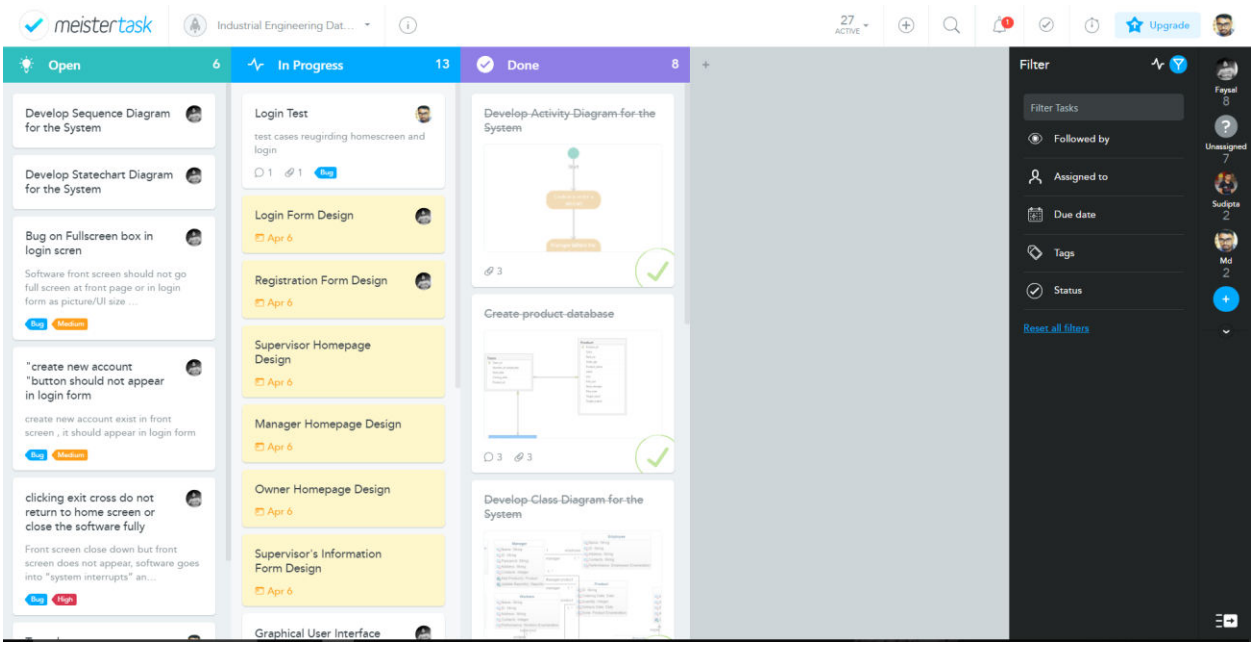


Fig: 4.1 MeisterTask project Homepage

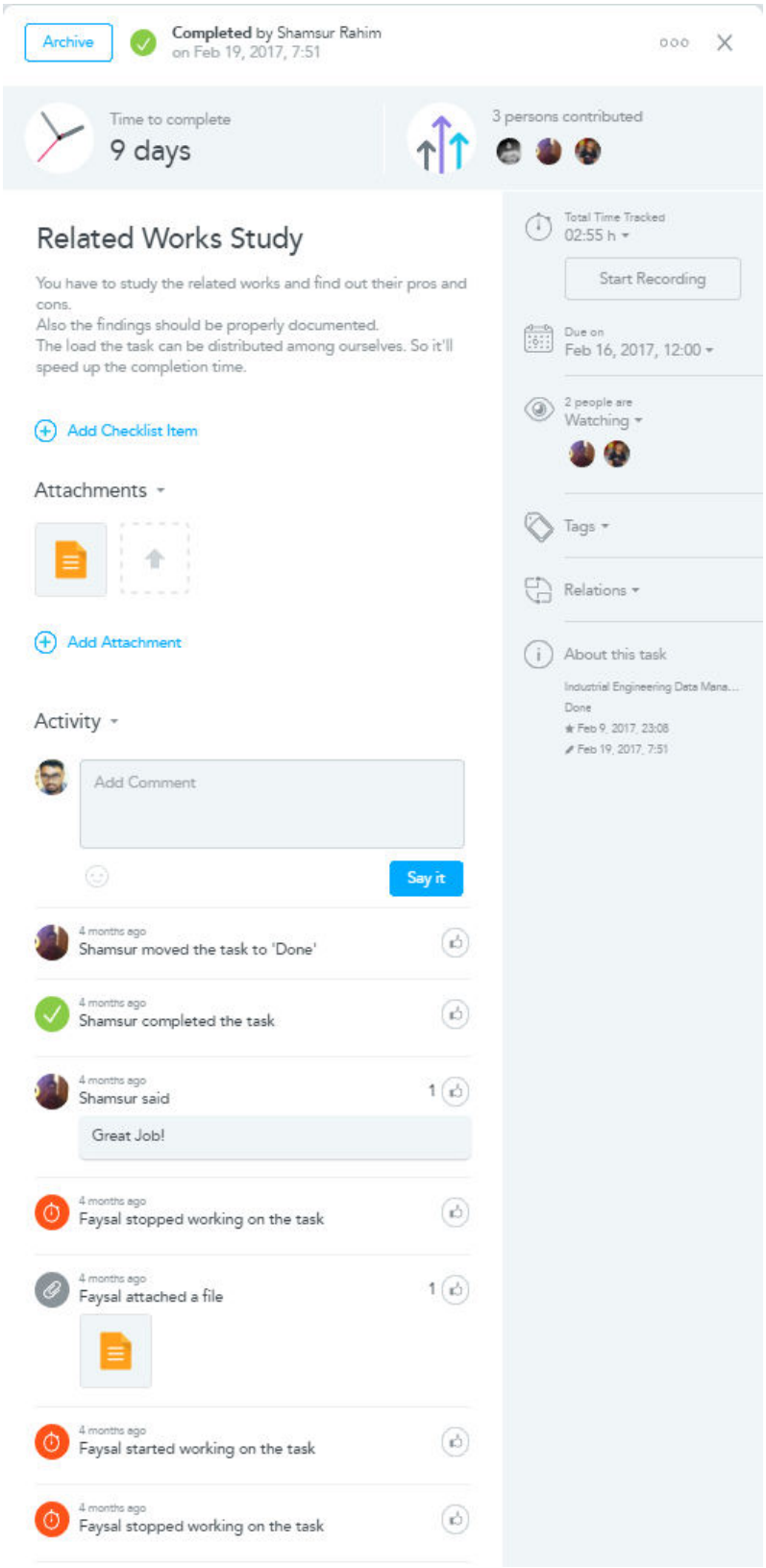


Fig: 4.2 Sample task

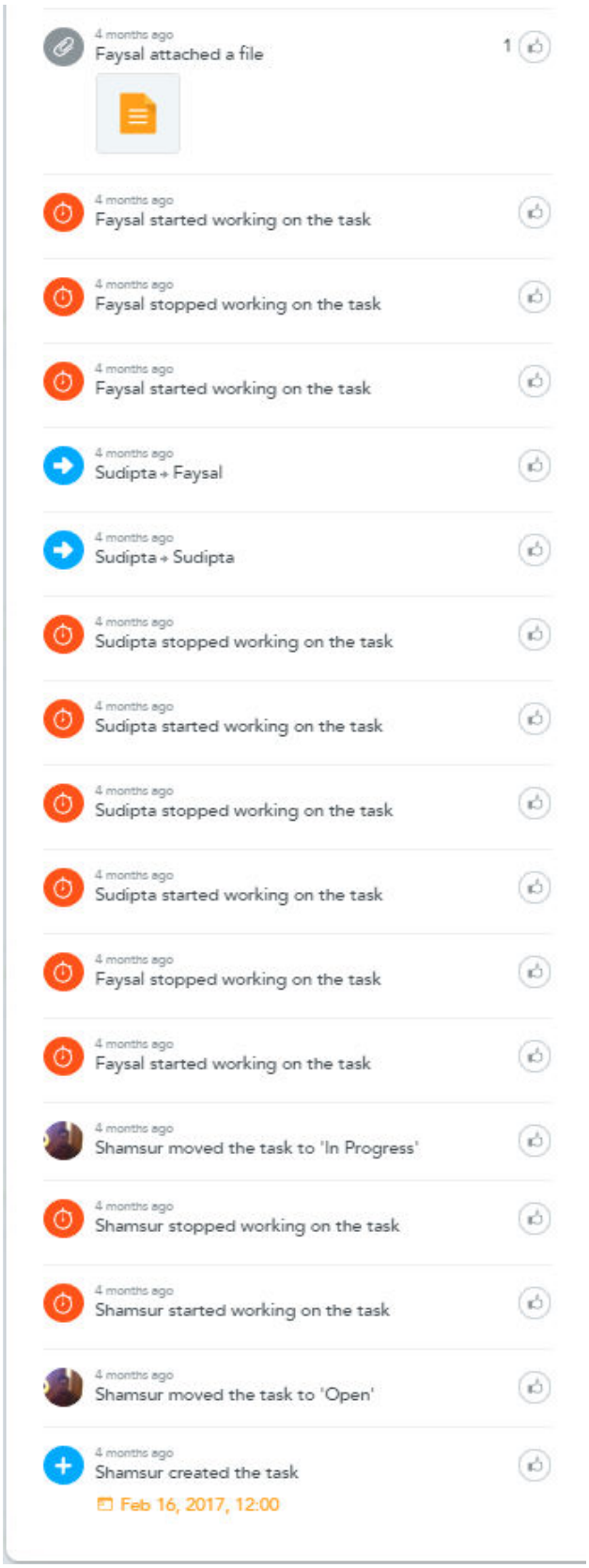


Fig: 4.3 Activities related to task

4.3 Repositories (deveo)

We used Deveo as our online repository. By using Tortoise SVN we can access the repository from everyone's computer.

Some sample screenshots of related works are given:

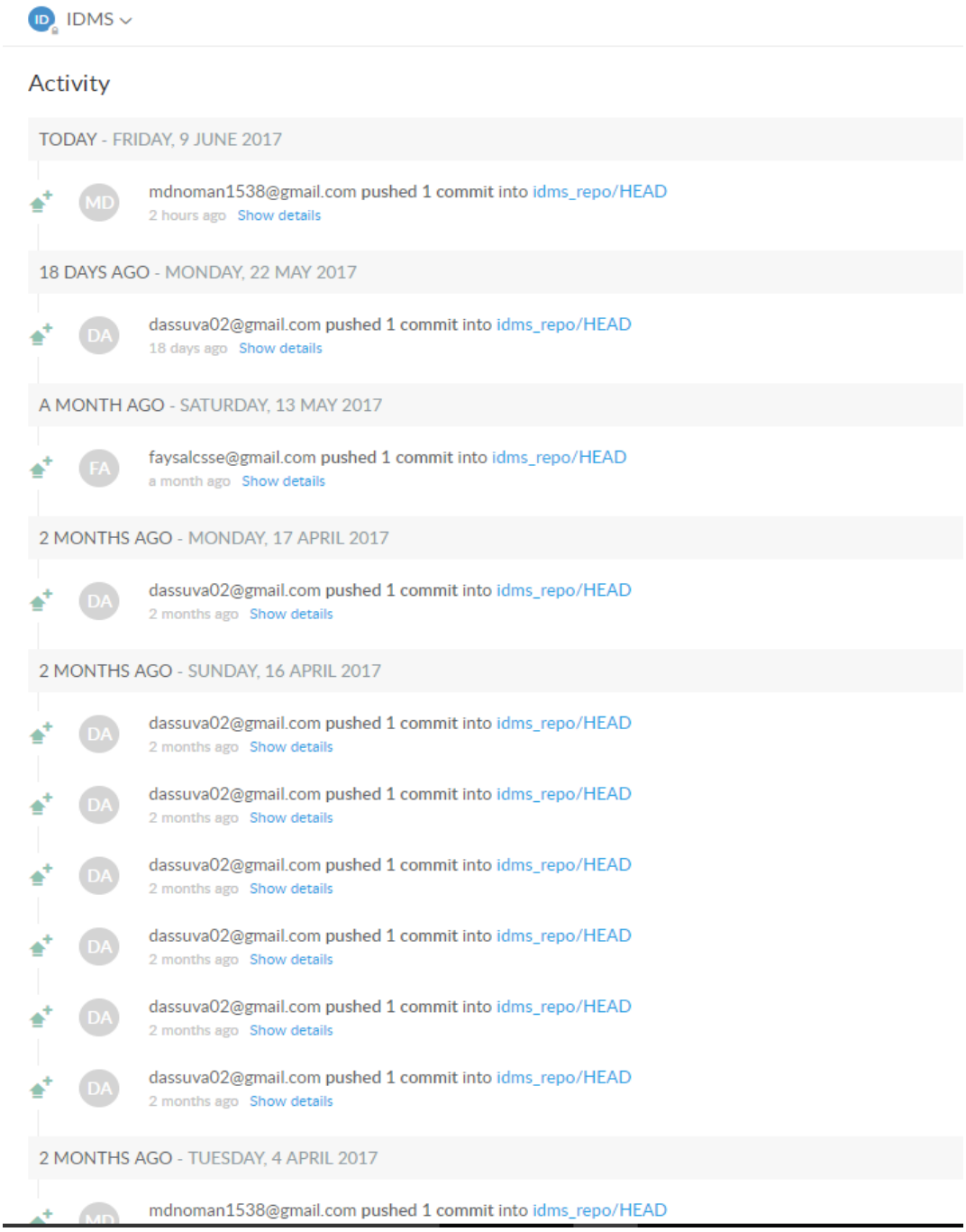


Fig: 4.4 Repository use history

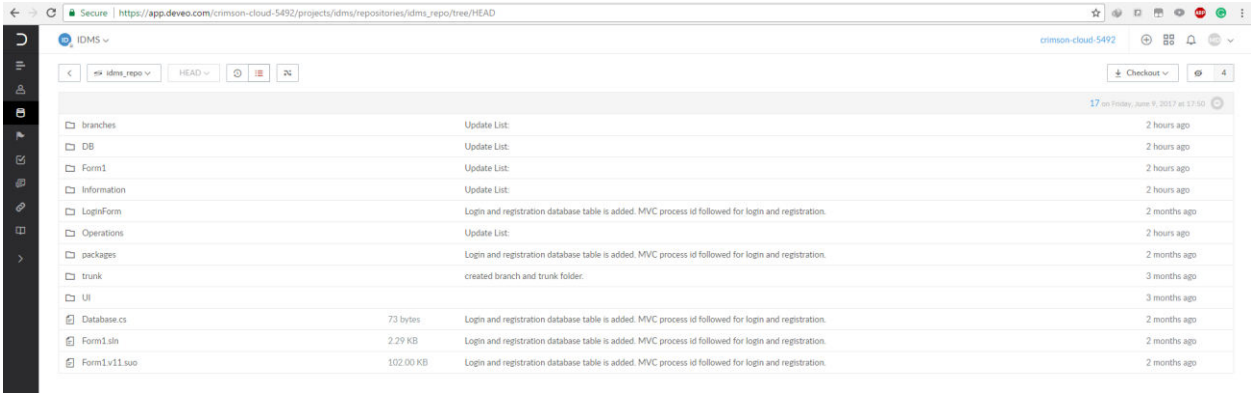


Fig: 4.5 Repository folders

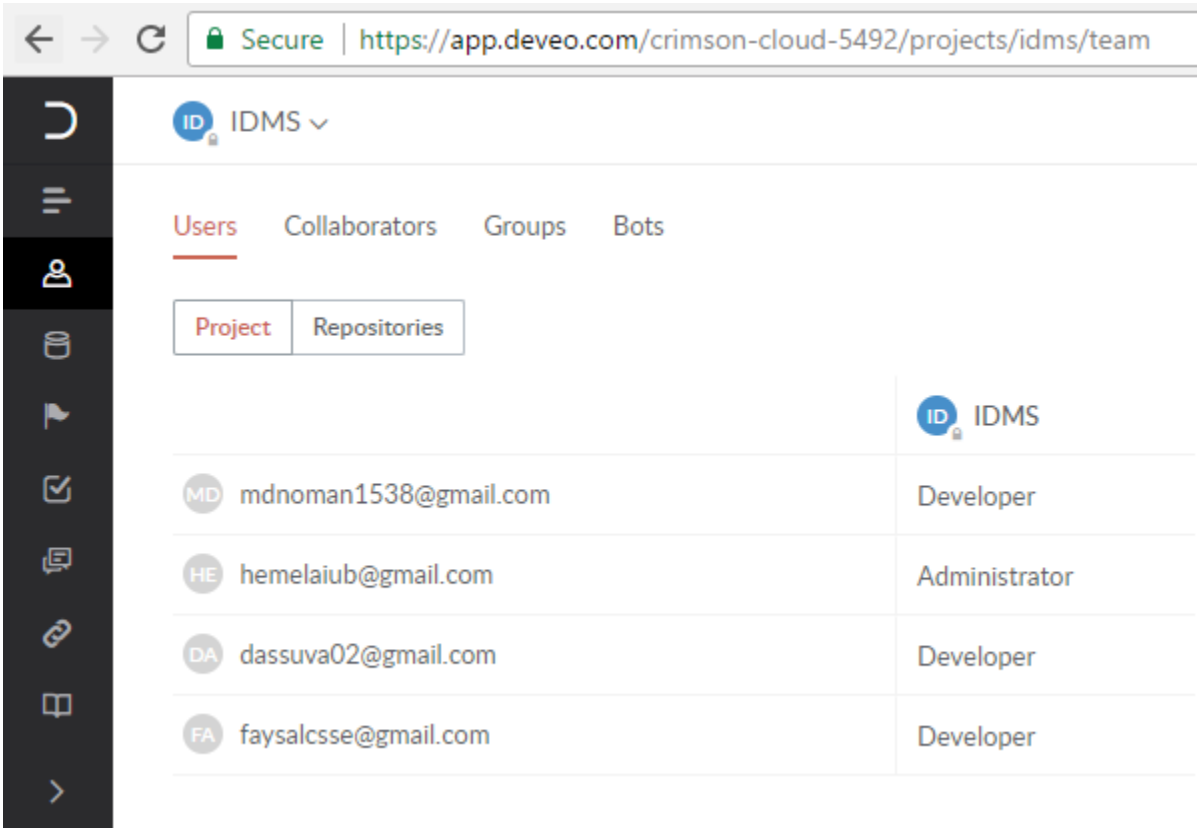


Fig: 4.6 Repository users

4.4 Version controlling tool (tortoise SVN)

We used Tortoise SVN as our version controlling tool with the help of Deveo repository.

Some sample screenshots of related works are given:

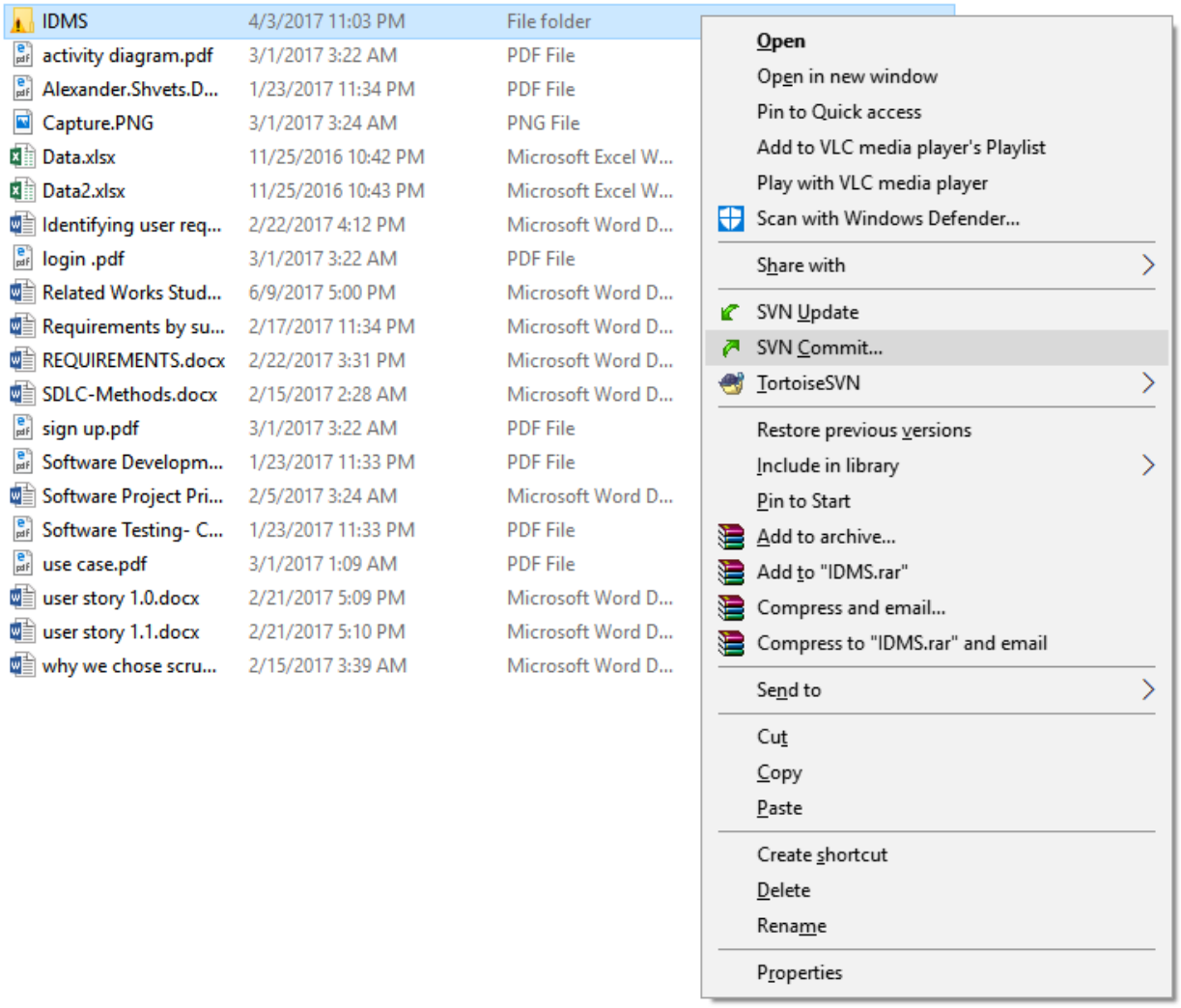


Fig: 4.7 Update or step 1 to commit

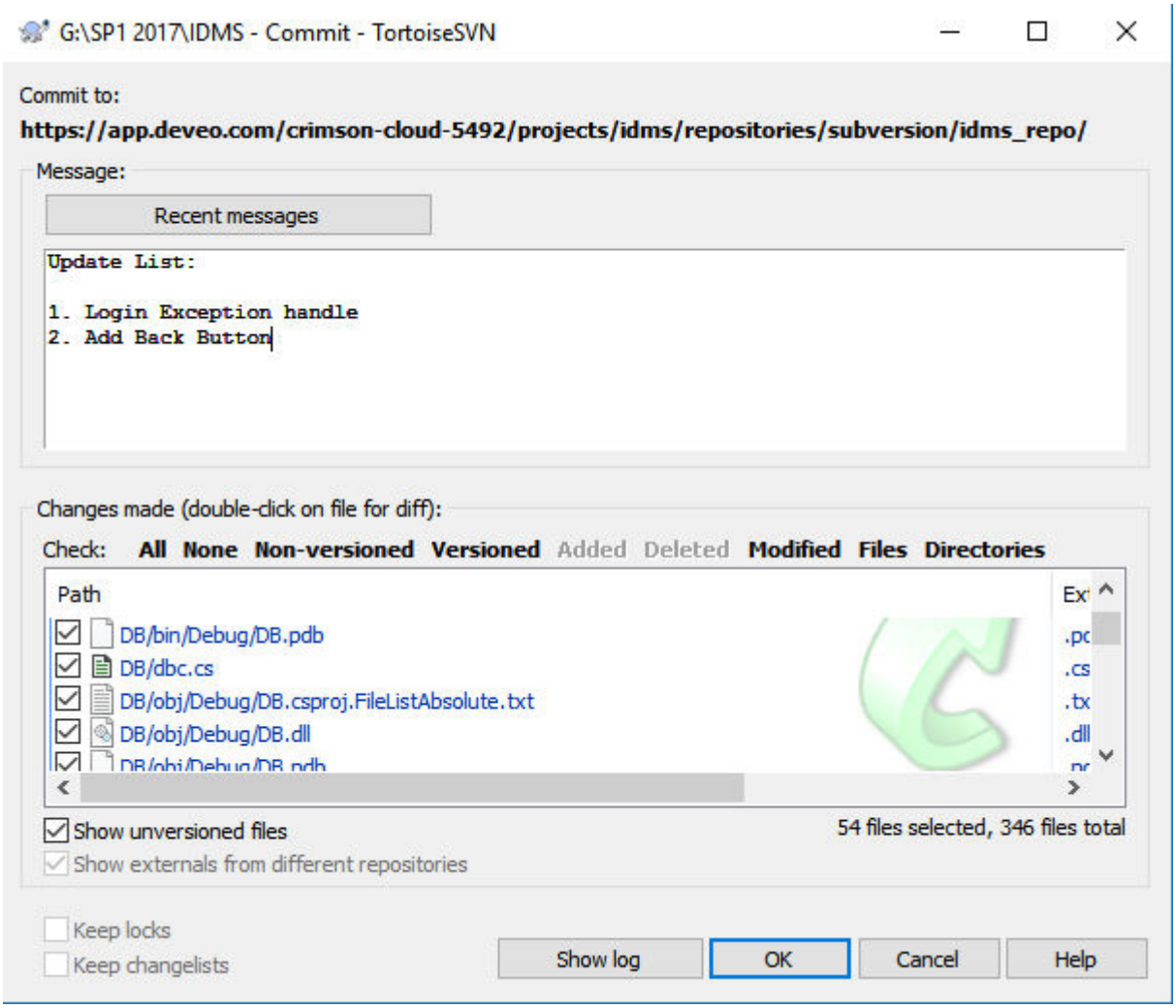


Fig: 4.8 step 2 for commit (adding message about update)

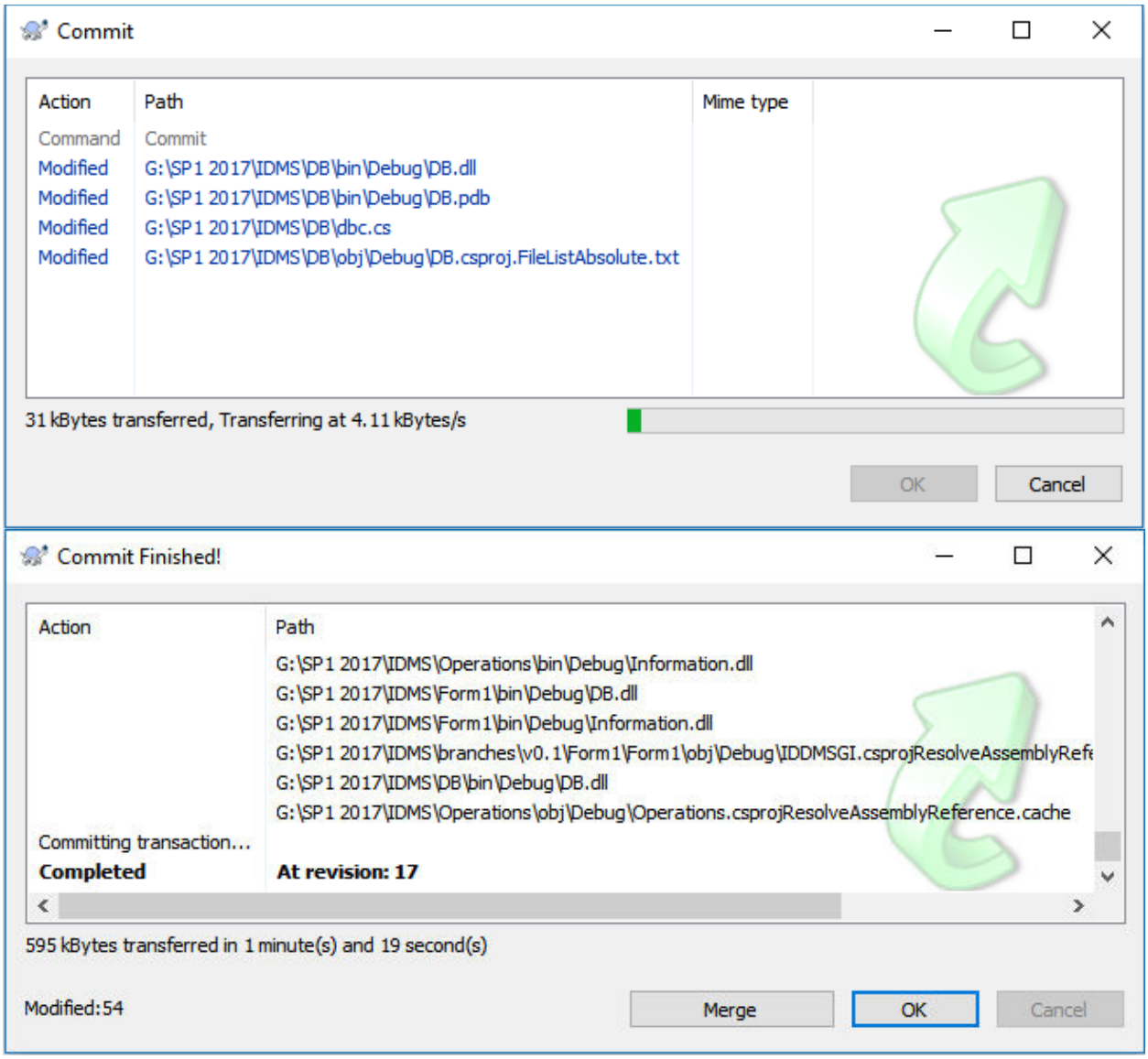


Fig: 4.9 committing process

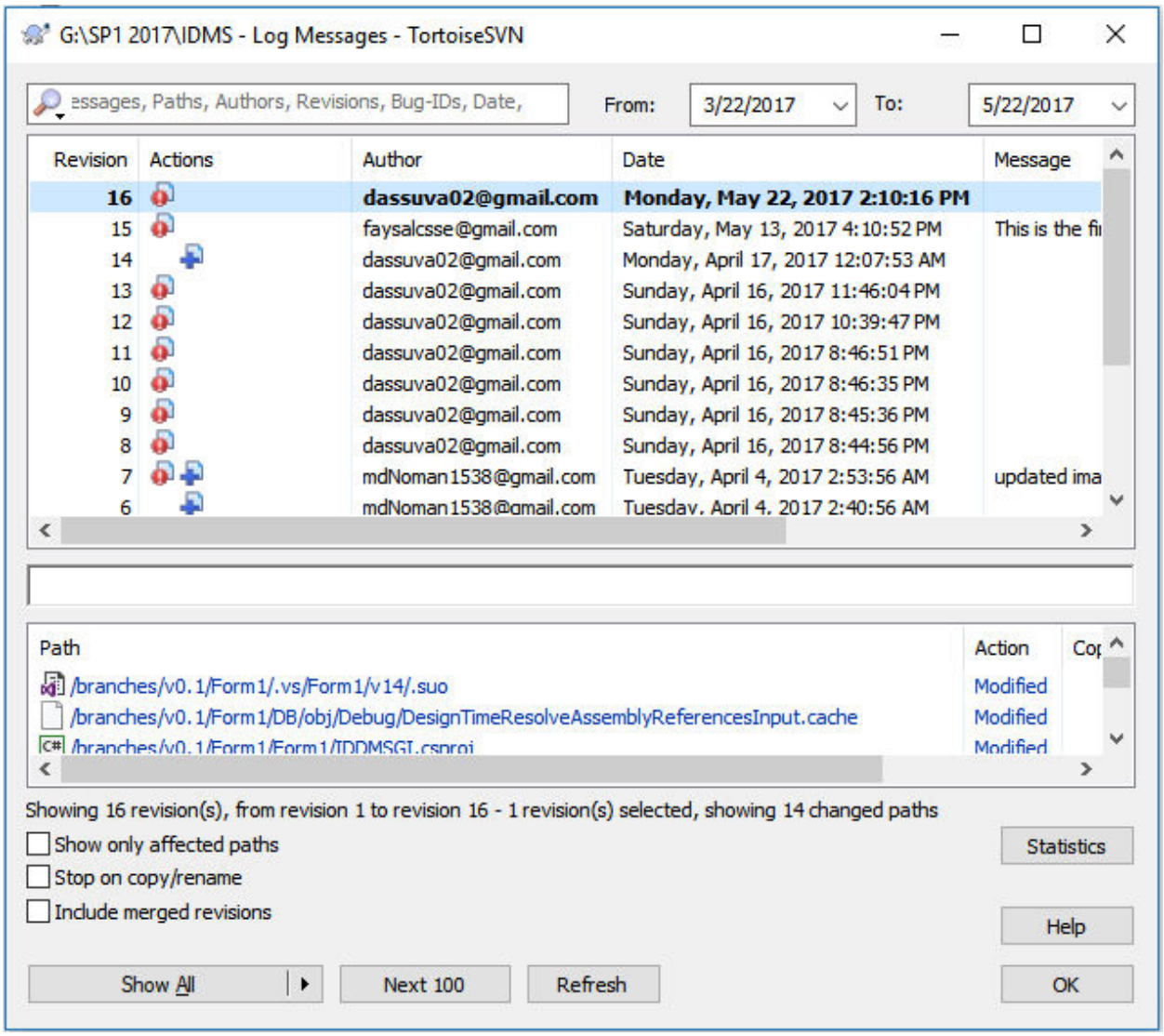


Fig: 4.10 Commit history and version switching

References

1. Shamsur, M., Rahman, M., & Ehtesham, A. (2017). Mining Industrial Engineered Data of Apparel Industry: A Proposed Methodology. International Journal of Computer Applications, 161(7), 1-7. doi:10.5120/ijca2017913262
2. http://en.wikipedia.org/wiki/Software_documentation
3. http://www.meistertask.com/app/dashboard
4. http://tortoisesvn.net/downloads.html
5. http://app.deveo.com/login