Course	BLG411E - Software Engineering
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Report No.	1 - Project Plan
Project Title	LibReady Library Automation
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1. INTRODUCTION

This report is prepared in Software Project Plan format. Briefly, it consists of project development plan of the Library Automation. Library Automation Project aims to keep track of all sorts of data existing in a library system in a systematic way by designing a database based on design principles in order to ensure efficiency and accuracy on access, search and some similar practical operations. Moreover this project provides two basic softwares including user interfaces for librarians and members.

1.1 Scope and Purpose of Document

This document outlines the necessary time and cost estimates, risks and risk abatement, and resources required to carry out the development of the software project. This document is primarily for use by the development group, and may be used by the project sponsor as information relating to the management and resource estimates of the project.

1.2 Project Objectives

1.2.1 Objectives

Today, software projects enlarged their usage area. In many work areas, specially designed softwares are used to reduce overall cost, time and effort. Furthermore user interfaces of those software applications provide both service suppliers and service users an important usage convenience. Another importance of such software occurs when a large amount of data is wanted to be kept and analyzed. At this point usage of databases takes place in software projects to keep large amounts of data in a more systematic way.

Libready Library Automation Project considered all above factors for a library environment. This project intends to supply several kinds of needs in a library system and reflect properties of this system. Scope of the software is both end-users (members) and administrators (librarians).

There are three parts as a server, administrator and client (member). On the server side Apache 2.0.59, MySQL 5.0.27 or higher must be run and on the client side any browser (like Microsoft Internet Explorer and Mozilla Firefox) supporting HTML 4.0 standard and Java Script required to run the web based software for members. Another user role is the librarian using special software designed as java application. This role will not be operating system dependent and will be available on machines that run Java Runtime. This project is fully time and place independent. Any computer that can connect to the server (via LAN or WAN) and

has a web browser can use this automation as library member, any administrator having Java Runtime on his/her operating system and the software may use designed java application for administrative purposes.

The lifetime of the product is eternal considering feasible software improvements for time varying needs of the system users.

1.2.2 Major Functions

Java application is provided for librarian to add, delete, update, query operations on database entries and implement book loaning, returning, extension, reservation and penalty operations. When librarian wants to achieve any operation on database, he/she chooses the related windows tab/form etc. in the user interface of the application and gives related parameters. The information is read and sent to the server in the form of proper SQL queries. Result is sent back to application and visualized to the user in different types of windows components. Book loaning, returning, extension etc operations are also related to database and object structure of the application. Similarly related parameters are get from user and processed by the application (considering operation rules of the system) connecting /or not to database. And if exists results are again visualized by forms.

Web application is provided for the library members to accomplish search (by author/book/topic/publisher name), book reservation and extension operations. When the member wanted to achieve such operations, he/she connects to the server, the server connects to the database and gathers the information which is wanted, puts it into the form that the browser can understand and transfers it back to user.

1.2.3 Performance Issues

There is no fixed performance for this automation system. There are 5 issues that affect the performance:

1. The size of database: If the size (number of records) of database is too large, it will take more time to make a query and produce the result.
2. The size of query result that user wants: If the user wants to get too much information from database, the answer time will take much longer.
3. Server hardware properties: If the server is powerful (faster CPU, larger RAM, speed of hard drive), the time to produce results will be shorter.
4. Client hardware properties: Client may be considered both as a library member and the library administrator. Hardware on both systems affects software (windows application or web application) speed by direct proportion.

5. Server – Client connection speed: According to connection types, the connection speed differs from 1Gbps to 14Kbps.

- With a LAN connection: From 1Gbps to 10Mbps
- With ADSL connection: From 512Kbps to 64Kbps
- With Cable connection: From 512Kbps to 64Kbps
- With dial-up connection: From 56Kbps to 14Kbps

The automation system is not time-dependent, no real-time needs are important.

1.2.4 Management and Technical Constraints

As mentioned above, the client side (member) of Library Automation requires a web browser and a connection to the server; the server side needs Apache 2.0.59, and MySQL 5.0.27 or higher. Administrator role also needs to work on a platform running Java Runtime to use the designed Java application.

There is no need for any peripherals, math co-processors, memory limitations and processor limitations. Libready Library Automation can work on any computer even on home types.

2. PROJECT ESTIMATES

According to overall plan of the project, the estimations given below are made involving time and other costs.

2.1 Historical Data Used for Estimates

There are similar projects which use for this purpose, but the source codes of these projects can not be reached because of their commercial issues. However, most of the team members have plenty of experience in building and managing databases since previous years in school and internship. These experiences help to make approximate estimations including time, size and cost of the project.

2.2 Estimation Techniques

Size estimation is done with Function Points Method. Numerical estimations for time and cost of the project are made with the CoCoMo Model (Constructive Cost Model). Since the project seems to be complex, it is better to use both Basic CoCoMo Model and the Intermediate CoCoMo Model. The first model we used is the Basic CoCoMo Model which has only one variable (KLOC) and some constants (a, b, c, d).

$pm = a * KLOC^{b}$ (effort)

$t_{dev} = c * pm^{d}$ (development time)

The Intermediate CoCoMo Model has, in addition to KLOC, a second variable, which is Effort Adjustment Factor (EAF). In order to calculate EAF we use 15 Cost Driver attributes, which are grouped in four classes: Product attributes, computer attributes, personnel attributes, project attributes.

$pm = a * KLOC^{b} * EAF$

2.3 Estimations

Calculating Size (LOC) :

Measurement parameters are determined given below and the 'COUNT_TOTAL' variable is calculated using these values. 'Measurement Parameters' table for calculation of CountTotal is given in Appendix-A. Value of this variable is calculated as 237.

Number of user inputs : User inputs are the distinct data to the software and data entry items counted seperately. In our project, user's properties and the properties of the books in input operations (except inquiries) may be counted as user inputs like book barrowing, returning, extention, punishment inputs etc. Number of different user inputs is about **9** including user id, name,book name, isbn, dates, punishment types etc.

Number of user outputs : Output here refers to reports, screens, error messages etc not counting individual items. In our project user output may be estimated as 20considering no reports but many online result screens and few error messages for limits on operations.

Number of user inquiries : parameters for search by name/author/topic/Publisher may be considered as user inquiries : 4

Number of files : Approximately the database will consist **14** data tables (users, user types, publishers, books, authors, topics, visual sources, periodicals, penalties and maybe some crossing tables for normalization).

Number of external interfaces : 2 machine readable interfaces that are used to transmit information to another system may be estimated as on efor database an done for source codes of the application

Complexity Adjustment Values and Calculation of Complexity Value (*Fi*) :

(Answer options : No influence (0), Incidental (1), Moderate (2), Average (3), Significant (4), Essential (5) **)**

Question:	**Answer :**	**Related Value:**
Does the system require reliable backup and recovery?	essential	5
Are data communications required?	essential	5
Are there distributed processing functions?	no influence	0
Is performance critical?	significant	4
Will the system run in an existing operational environment?	significant	4
Does the system require on-line data entry?	essential	5
Does the on-line data entry require multiple screens or operations?	essential	5
Are the files or database tables updated?	essential	5
Are the inputs, outputs, files, or inquiries complex?	moderate	2
Are the internal processing algorithms complex?	moderate	2
Is the code designed to be reusable?	average	3
Is installation included in the software?	moderate	2
Is the system designed for multiple installations in different organizations?	moderate	2
Is the application designed to facilitate change and ease of use by the user?	significant	4

ΣFi : complexity adjustment values: 46

Calculating Function Points:

FP = CountTotal x [0.65 + 0.01 x Σ*Fi*]

= 237 x [0.65 + 0.01 x 46]

= 237 x 1.11

= 263

Calculating Size from Function Points:

Programming languages throughout the development of project are Java, php and html, java script. For calculation simplicity Java's LOC / FP ratio is used:

LOC / FP (Java) = 53

LOC = 53 * 263 = 13942 => **14 KLOC**

Using the Basic CoCoMo Model:

The project is semi-detached, so these are the empirical constants we are going to use in basic CoCoMo Model:

a = 3.0 b = 1.12 c = 2.5 d = 0.35

pm = a * $(KLOC)^b$

$=3.0 * 14^{1.12}$ = **57.65** person-months (effort)

tdev = $2.5 * 57.65^{0.35}$ = **10.33** months (development time)

pm / t_{dev} = 5.58

6 people must work in this project.

Using the Intermediate CoCoMo Model:

FACTOR :	**Range of Factor :**	**Our EAF Estimation :**
Product Attributes:		
Required reliability:	0.75 – 1.40	1.30
Database size:	0.94 – 1.16	1.10
Product complexity:	0.70 – 1.65	1.20
Computer Attributes:		
Execution time Constraint:	1.00 – 1.66	1.10
Main storage constraint:	1.00 – 1.56	1.50
Virtual Machine volatility:	0.87 – 1.30	1.20
Computer turnaround time:	0.87 – 1.15	0.87
Personnel Attributes:		
Analyst capability:	1.46 – 0.71	0.85
Programmer capability:	1.42 – 0.70	1.00
Application experience:	1.29 – 0.82	1.00
Virtual Machine Experience:	1.21 – 0.90	1.00
Programming language experience:	1.14 – 0.95	1.00
Project Attribute:		
Use of modern programming practices:	1.24 – 0.82	1.00
Use of SW tools:	1.24 – 0.83	1.10
Required development Schedule:	1.23 – 1.10	1.20
	Multiplied EAFs =	3.32

The project is semi-detached, so these are the constants we are going to use in Intermediate CoCoMo Model:

a = 3.0 b = 1.12

pm = a * KLOC ^{b} * EAF

pm = 3.0 * $14^{1.12}$ * 3.32 = 191.2 (effort)

3. PROJECT RISKS

3.1 Risk Analysis

3.1.1 Identification

The following risk groups are the identified risks that can occur during the project.

3.1.1.1 Team Risks (ST)

Risks that are related to the team members are;

- Inexperienced project manager
- Inexperienced project team members
- Team members work part time on the project
- Project members' lack of knowledge about the programming languages and development environment that will be used.
- Lack of motivation of team members
- High turnover
- Some of the team members can drop the course or leave the project team
- Insufficient people for the project
- Lack of communication between project team members
- Team members may be can not learn the new programming language or technology which will be used in the project in the determined period of time.
- Wrong distribution of work to the project team members
- The disagree on the leisure of the team members

3.1.1.2 Customer / User Risks (CU)

Risks that can be classified as customer/user are;

- Users have little computer experience
- Users unsure of their needs
- Change of costumer expectations and needs during project development process.

3.1.1.3 Project / Application Risks (PS)

- Project may end with some missing sections or not working properly.
- Project may be inadequate to meet library automation system's requirements.
- After the finish of the project, it may not respond to the needs of the users.
- Because of the multi-parted system of the project, delay at any modules affects the whole process of the project.
- Because of the limited time project may not end in the determined period of time.
- The lack of communication between users and the programmers at the development process of the project

3.1.2 Risk Estimation

The importance factor for each risk is provided below:

RISK IDENTIFICATION Importance factor

Value	Definition
1	Catastrophic
2	Critical
3	Marginal
4	Negligible

- Inexperienced project manager → 3
- Inexperienced project team members → 3
- Team members work part time on the project → 1
- Project members' lack of knowledge about the programming languages and development environment that will be used. → 4
- Lack of motivation of team members → 4
- High turnover → 3
- Some of the team members can drop the course or leave the project team. → 2
- Insufficient people for the project → 4
- Lack of communication between project team members → 3
- Team members may not learn the new programming language or technology which will be used in the project in the determined period of time. → 3
- Wrong distribution of work to the project team members → 3

- Disagreement on the leisure of the team members → 2
- Users have little computer experience. → 2
- Users unsure of their needs → 3
- Change of costumer expectations and needs during project development process →3
- Project may end with some missing sections or not working properly. → 3
- After the finish of the project, it may not respond to the needs of the users. → 3
- Project may be inadequate to meet library automation system's requirements. → 4
- Because of the multi-parted system of the project, delay at any modules affects the whole process of the project. → 4
- Because of the limited time project may not end in the determined period of time. → 3
- The lack of communication between users and the programmers at the development process of the project → 1

3.1.3 Evaluation

The detailed evaluation of risks and their impact on the project are below;

Risks	Category	% Probability	Impact
Inexperienced project manager	ST	%30	3
Inexperienced project team members	ST	%30	3
Team members work part time on the project	ST	%70	1
Project members' lack of knowledge about the programming languages and development environment that will be used	ST	%20	4
Lack of motivation of team members	ST	%10	4
High turnover	ST	%50	3
Some of the team members can drop the course or leave the project team	ST	%10	2
Insufficient people for the project	ST	%20	4
Lack of communication between project team members	ST	%40	3
Team members may not learn the new programming language or technology which will be used in the project in the determined period of time	ST	%20	3
Wrong distribution of work to the project team members	ST	%20	3

The disagree on the leisure of the team members	ST	%20	2
Users have little computer experience	CU	%50	2
Users unsure of their needs	CU	%40	3
Change of costumer expectations and needs during project development process	CU	%30	3
Project may end with some missing sections or not working properly	PS	%10	3
After the finish of the project, it may not respond to the needs of the users	PS	%20	3
Project may be inadequate to meet library automation system's requirements	PS	%10	4
Because of the multi-parted system of the project, delay at any modules affects the whole process of the project	PS	%30	4
Because of the limited time project may not end in the determined period of time	PS	%40	3
The lack of communication between users and the programmers at the development process of the project	PS	%10	1

3.2 Risk Management

3.2.1 Risk Aversion Options

For the risks included in the risk table, a method for controlling that risk is given below;

Risks	Aversion method
Inexperienced project manager	Authority of the project manager can be distributed to the team members.
Inexperienced project team members	Project manager can arrange some workshops among team members to gain experience.
Team members work part time on the project	The project can be divided into modules which can be terminated in short time periods and use time scheduling tools to complete these modules in appropriate time intervals.
Project members' lack of knowledge about the programming languages and development environment that will be used	Sources about the new programming language can be provided. Or the members who have experience about the technology can teach others about the issue.

Lack of motivation of team members	The project can be divided into modules and share them among team members according to their experiences and interests. Thus the risk of lacking in motivation can be reduced.
High turnover	Friendship among the employees may be supported.
Some of the team members can drop the course or leave the project team	More than one member can be assigned for the main modules of the project to reduce this risk.
Lack of communication between project team members	Instant messaging programs can be used to communicate in any time
Team members may not learn the new programming language or technology which will be used in the project in the determined period of time	Other team members can share their experience and knowledge about the technologies.
Wrong distribution of work to the project team members	If there are breakdown points based on wrong entrusting, project manager can change tasks or give additional actions to project members.
The disagree on the leisure of the team members	All the project members are students, so arranging project meetings at the weekends will reduce this risk.
Users have little computer experience	Before the release of the product, a training plan will be planned to instruct the end users about the product and a comprehensive user manual will help user while their adaptation process.
Users unsure of their needs	Planning a good versioning plan and giving information about this version plan to customer will reduce the risk about irresistible customer demands.
Change of costumer expectations and needs during project development process	A flexible software model may be deployed in order to reduce the cost of modification.
Project may end with some missing sections or	Team members can apply tests at each

not working properly	milestone of the project. Applying tests reduce the risk of faulty run of the product.
After the finish of the project, it may not respond to the needs of the users	During development process the continuous communication between customers and developers reduce this risk.
Project may be inadequate to meet library automation system's requirements	During the project development process interactions with the costumer and experienced companies will reduce the inadequate qualified product risk
Because of the multi-parted system of the project, delay at any modules affects the whole process of the project	A time scheduling tool can be used to control each module to complete in determined period of time. Also more than one team member can be assigned for the dependence modules of the project.
Because of the limited time project may not end in the determined period of time	This risk can be reduced by making well determined deadlines for each modules of the project.
The lack of communication between users and the programmers at the development process of the project	At the planning period, arranging periodic customer and developer meetings and adding these meetings to the project schedule will reduce the risk.

3.2.2 Risk Monitoring Procedures

All the risks will be monitored through documentation, comments in the code, time-table delays and internal communication.

4. SCHEDULE

4.1 Project Work Breakdown Structure

LibReady project is a library automation program that contains two main parts:

- Administration desktop application
- User web interface

Administration Desktop Application

This interface will be used to access and administrate library database and do transactions about publications. There is only one type of user which is library staff. Library staff can perform these operations:

- Addition, modification, removal and listing of data.
- Publication borrowing, returning and date extension
- Publication reservation
- Punishment operations

User Based Web Application

This interface will be used to search through publication database and do operations like reserving books. Users which will use the web application are academicians and students. Academicians and students both have same privileges. Operations they can perform are:

- Search according to author name
- Search according to publication name
- Search according to subject
- Search according to publisher name
- Publication reservation (user password required)
- Extending return date (user password required)

All subsystems of LibReady use MySql Server for storing all system data. Java will be used in desktop application and JSP and HTML will be used in web interface.

4.2 Task Network

Network Diagram for project

Task – 1 : Database Design

Task – 2 : Normalization

Task – 3 : Entering sample data for database

Task – 4 : Java Education

Task – 5 : Design of Web Application

Task – 6 : Design of Desktop Application

Task – 7 : Code Behind Programming with JSP

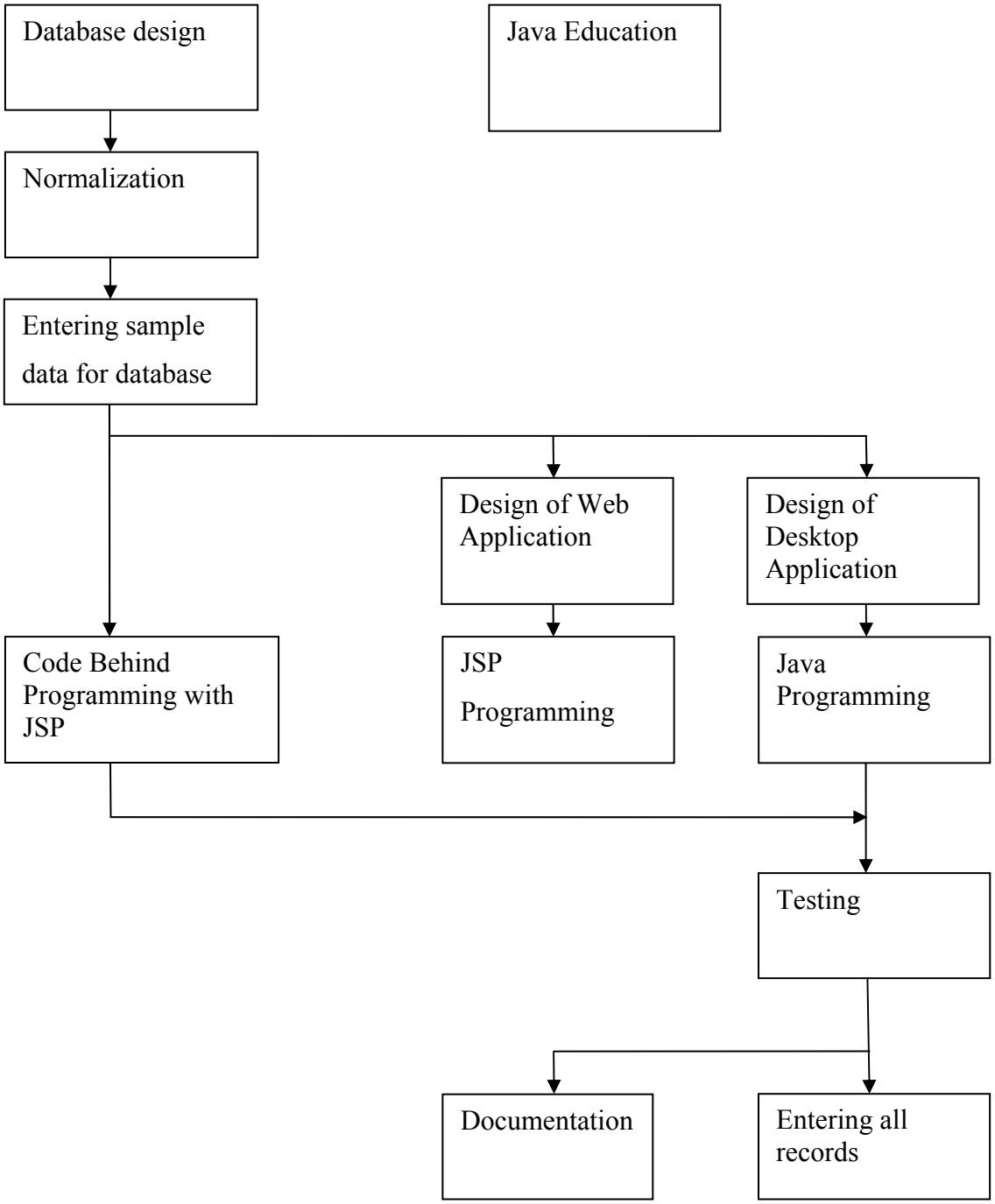
Task – 8 : JSP Programming

Task – 9 : Java Programming

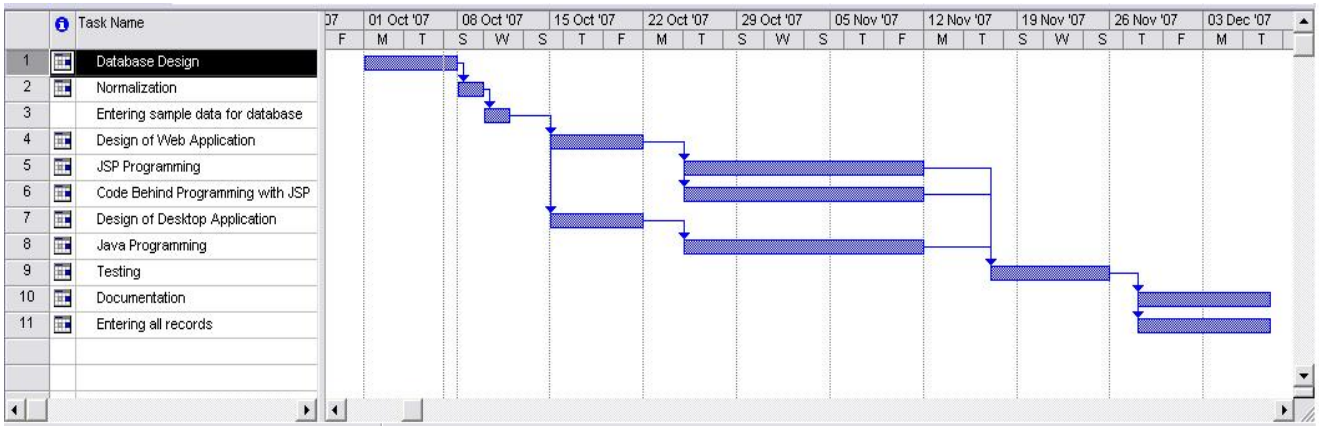
Task – 10 : Testing

Task – 11 : Entering all records

Task – 12 : Documentation



4.3 Timeline Chart



5. PROJECT RESOURCES

5.1 People

The team consists of five people. People in team are:

- G. Selda KURUOĞLU → Project Manager / Programmer /Database Design
- Birkan ÇİLİNGİR → Programmer / Database Programmer / Research
- Samet BULU → Programmer / Web Design / Quality Assurance
- U. Cem BİNBİR → Programmer / Database Analyze / Interface Design
- Ersin ERDİNÇ →

G. Selda KURUOĞLU has been a Computer Engineering student at ITU since 2004. She is experienced at C/C++, MSSQL and MySQL, PHP, HTML. She has been studying about Java technologies. She is the project manager of this project. She is also responsible in database designing and testing the system.

Birkan ÇİLİNGİR has been a Computer Engineering student at ITU since 2004. He is experienced at C/C++, C#.NET, Java, PHP, MSSQL and MySQL. He has been studying about Java technologies.

He is working at CSCRS (Center of Satellite Communication and Remote Sensing) for the part-time worker. He is also responsible of analyzing the database system, web programming and researching.

Samet BULU has been a Computer Engineering student at ITU since 2003. He is experienced at C/C++, C#.NET, Java, PHP, MSSQL and MySQL, HTML. He has been studying about Microsoft .NET technologies. He is working at The Information Technologies Department of Istanbul Technical University for the part-time worker. He is also responsible in web-based programming, web designing and testing the whole system.

U. Cem BİNBİR has been a Computer Engineering student at ITU since 2004. He is experienced at C/C++, C#.NET, MSSQL and MySQL, PHP, HTML. He has been studying about Java technologies. He is also responsible in web-based programming, database programming, and researching documents etc. for the project.

Ersin ERDİNÇ is unknown.

5.2 Hardware and Software

Hardware:

PC's that will be used for developing project are configured with

- Processors higher than Pentium IV 1.7 GHz
- Memories higher than 512 MB RAM.
- Hard drive requirement is minimum 5 GB.

Software:

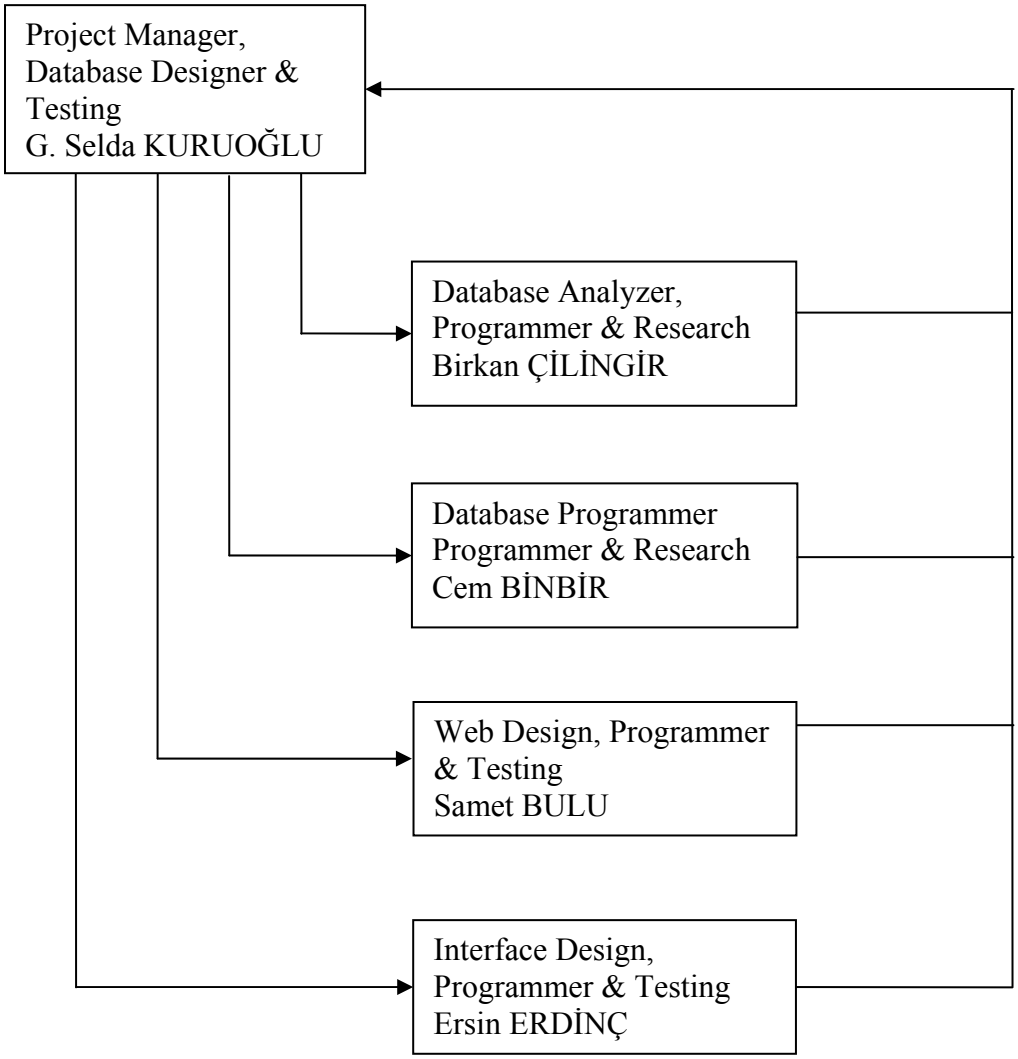
- Windows XP, Linux.
- Eclipse SDK 3.2
- MySQL 5.0
- Apache

5.3 Special Resources

Basic resources are enough for developing the project.

6. STAFF ORGANIZATION

6.1 Team Structure



6.2 Management Reporting

For easy and tractable reporting, all group members should keep the same style for documentation.

Database Development & Analyze Group

Project Folder Names: LibReadyDB

Sub – Folder: BeforeNormalization

Sub – Folder: AfterNormalization

Sub – Folder: Tables

Sub – Folder: Relations

Code Development Group

Project Folder Names: LibReadyCD

Sub – Folder: Development

Sub – Folder: Release

Sub – Folder: Bugs

Sub – Folder: Reported Bugs

Sub – Folder: Corrected Bugs

Project Folder Names: LibReadyWD

Sub – Folder: StaticCode

Sub – Folder: Development

Sub – Folder: Release

Sub – Folder: Bugs

Sub – Folder: Reported Bugs

Sub – Folder: Corrected Bugs

Sub – Folder: Dynamic Code

Sub – Folder: Development

Sub – Folder: Release

Sub – Folder: Bugs

Sub – Folder: Reported Bugs

Sub – Folder: Corrected Bugs

7. Tracking Mechanisms

The project members will have meeting every week regularly to keep track of the project. Meetings will take place mostly on weekends. During these meetings every member of the project, will report the developments, researches and accomplishments about his part of the project. And every member will present his/her ideas about the project. At the end of the every meeting, the day of the next meeting will be decided. No enforcement and/or punishment strategies are developed yet.

8. Appendices

APPENDIX – A : Measurement Parameters

Measurement Parameter	Estimate Count	Weighting Factor			Count
		Simple	Average	Complex	
Number of user inputs	9	**3**	4	6	27
Number of user outputs	20	**4**	5	7	80
Number of user inquiries	4	**3**	4	6	12
Number of files	14	**7**	10	15	98
Number of external interfaces	2	**5**	7	10	10
Number of external interfaces	2	**5**	7	10	10
					237