



FACULTY OF ENGINEERING

II LEVEL SPECILIZING MASTER IN E- BUSINESS AND ICT FOR MANAGEMENT

Department of Information Engineering

Information Systems for E-Business

Final Report: Second Assignment

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1 Introduction

The University's department expresses some requirements, which need the implementation of a new information system. The main goal of this report is to describe the design of a new integrated information system for the University's department.

The new information system is necessary to integrate and facilitate the tasks from the people related with missions and purchasing processes. This new system, called "Travel & Material", will be a new module for the University's website www.polito.it.

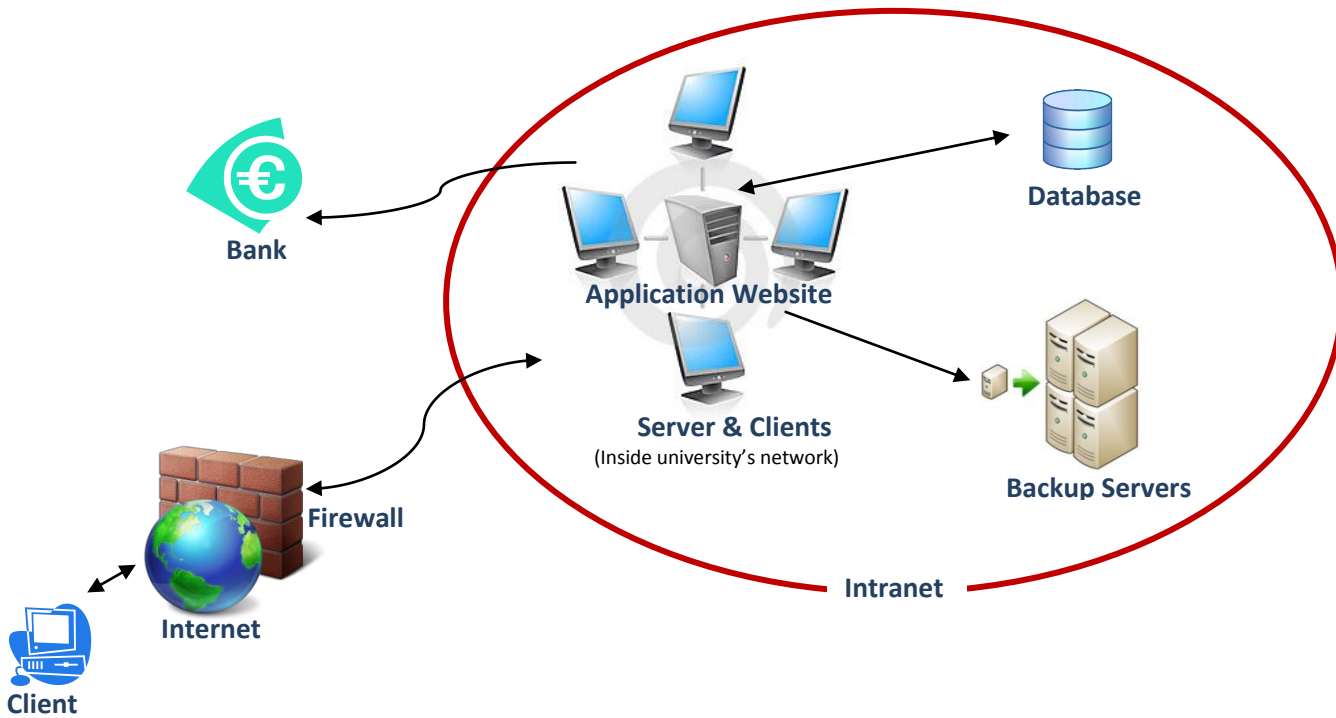
The services provided by "Travel & Material" are interrelated with the following entities:

1. **Administrative people**
2. **Traveler**
3. **Department chair**
4. **Purchase office**
5. **Purchaser**

The structure for the following report content, based on the department's requirements, start with the system's physical and logical architecture. Then going through the description of the Business Process using BP Diagrams. After that the requirements' analysis using OTS components and finally the system cost estimation.

2 Architecture

2.1 Physical Architecture

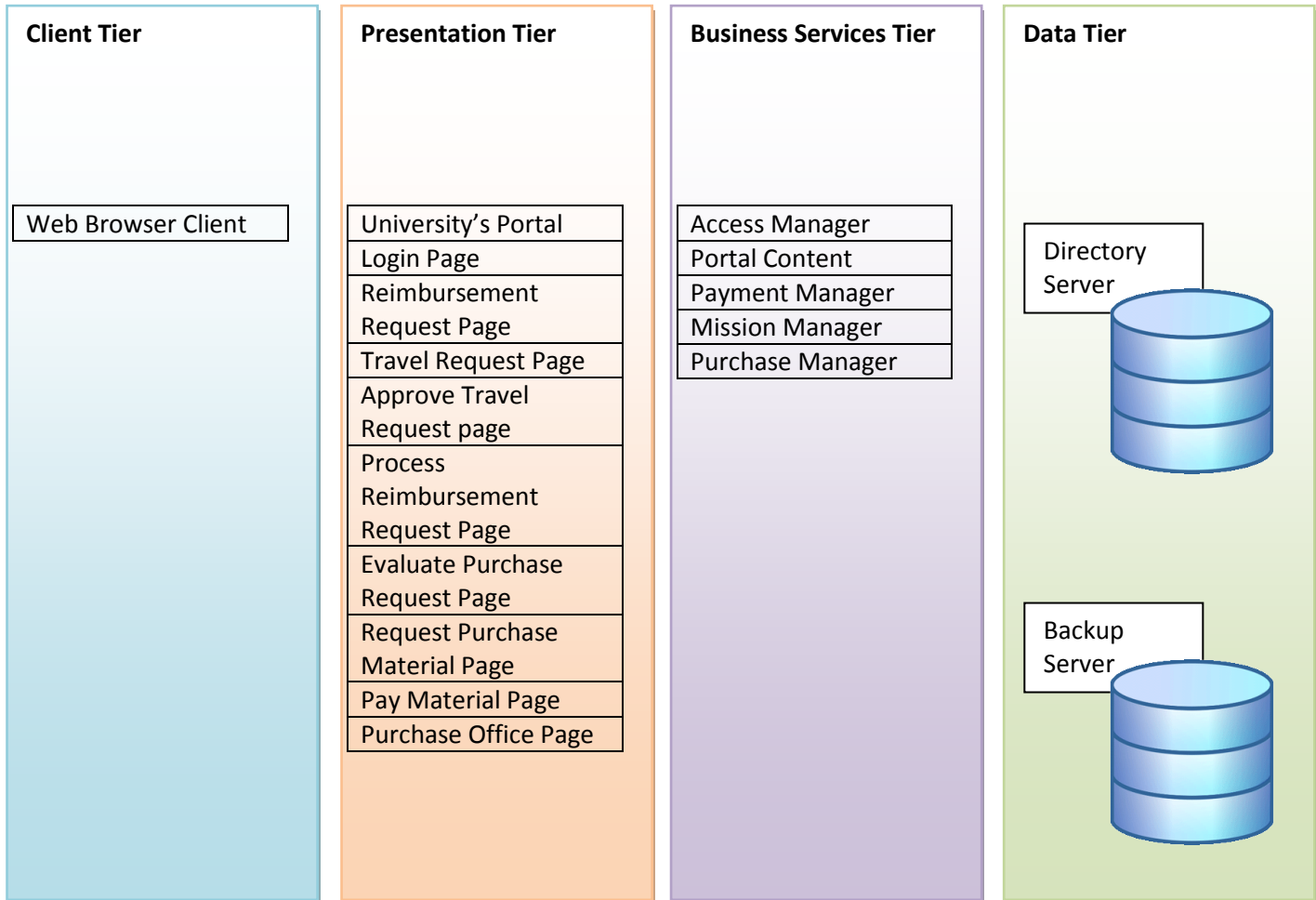


The physical architecture components:

- **Main Server:** This computer contains the Application Website (web pages) of the web site. “Travel & Material” using the Hypertext Transfer Protocol (HTTP) over the World Wide Web.
- **Application Website:** The collection of web pages.
- **Clients:** The computers running and accessing the “Travel & Material” system and can be inside or outside the University’s network.
- **Intranet:** It is the private University’s computer network.
- **Database:** Contains all the information regarding with, users passwords, Researchers information as address, bank account etc. Also stores the information regarding with missions and purchase orders.
- **Backup Servers:** The computers used for to save the copy of the data in case of losing the original one.
- **Firewall:** It is a part of the “Travel & Material” system’s network that is designed to block unauthorized access while permitting authorized communication.

2.2 Logical Architecture

The following diagram shows the system components that provide the services needed to meet the users' goals of the "Missions & Material" deployment. The different tiers identifies many components that must work together and share information to achieve the successfully services required by the University's department.



The logical architecture components:

- **Web Browser Client:** It is the program in which the client can visualize the system's content.
- **University's Portal:** Is the framework for integrating information, people and processes related with the university.
- **Login Page:** The page where the actors related with "Missions & Material" can log in, in order to have access to the new system.
- **Reimbursement Request Page:** It is the page in with the Traveler may request the reimbursement mission.
- **Travel Request Page:** It is the page in with the Traveler may request the travel mission.
- **Approve Travel Request page:** It is the page where in with the Department Chair may evaluate the travel mission request and determine if it is approved or not.
- **Process Reimbursement Request Page:** It is the page in with the Administrative Person may evaluate the reimbursement mission request and process it and determine if each single expense is approved or not.
- **Evaluate Purchase Request Page:** It is the page in with the Purchaser may request the material purchasing and wait until the purchasing is approved or not.
- **Request Purchase Material Page:** It is the page where the Purchaser may request the material purchasing and wait until the purchasing is approved or not
- **Pay Material Page:** It is the page where the Purchaser Office pays for requested material.
- **Purchase Office Page:** It is the page where the Purchase Office can send orders to the suppliers, receive materials from the suppliers, send material to purchasers and pay material.

3 Business Process Diagram

The following diagram describes the set of activities that must be completed to produce the result expected by the University's department. The process diagram is supported by the workflow.

3.1 Business Model

Context business process diagram. The researcher (traveler) should select one of the two options the travel request or request of reimbursement. The Department Chair and the Administrative Employee are allowed to evaluate and approve the requests coming from the researcher.

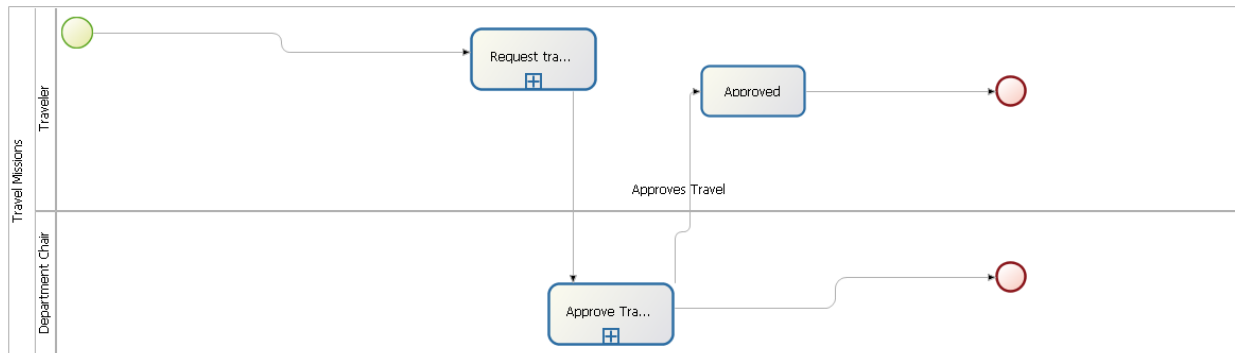


Diagram No. 1: Travel Missions

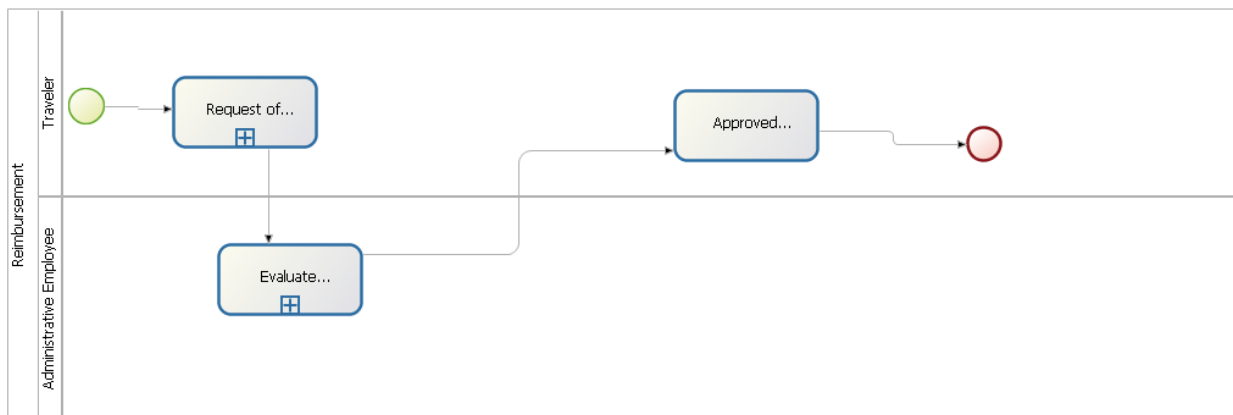


Diagram No. 1: Reimbursement Request

The diagrams above represents the general process for travel requests and reimbursement request. The diagrams shows the relationship between Traveler, Department Chair and Administrative Employee. The sub processes that

contain the business details are the Travel Request, Approve Travel Request, Request of Reimbursement and Evaluate Reimbursement Request.

3.2 Request of Reimbursement Process

The following process diagrams describe the sub-processes: Request of Reimbursement and Evaluate Reimbursement Request.

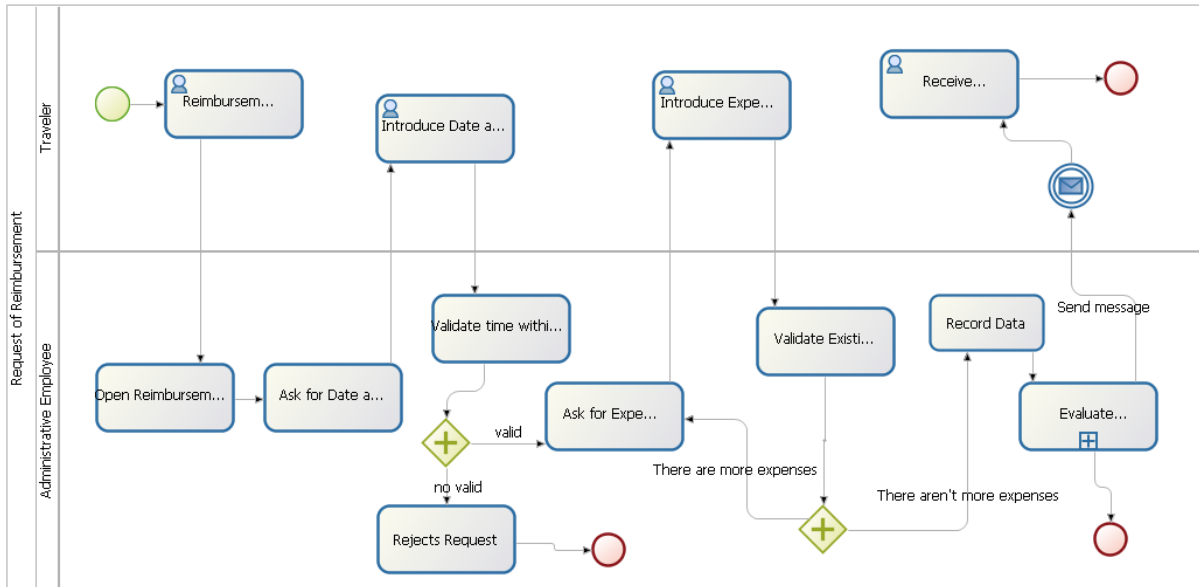


Diagram No. 2: Request of Reimbursement

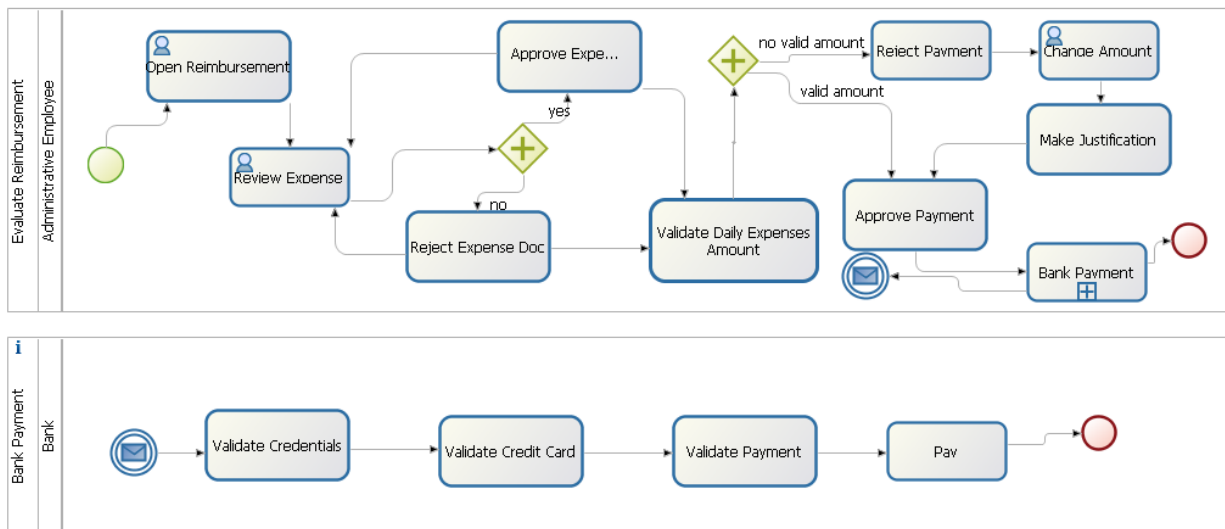


Diagram No.3: Evaluate Reimbursement

4 OTS Components Selection

Regarding the physical architecture, we decided to select the XAMPP architecture because it allows us to re-use the existing web server in the University, which is running over a Microsoft Operating System. As XAMPP is also available for Microsoft Operating Systems, gives us the possibility to run it over this operating system.

XAMPP is a free and open source cross-platform web server package, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages.

X, Cross-platform: That could be implemented and inter-operate on multiple computer platforms.

A, Apache HTTP Server: Web server software.

M, MySQL: Relational database management system (RDBMS).

P, PHP: Scripting language.

P, Perl: Dynamic programming language.

After finishing the Physical Architecture components selection, we are able to proceed to the formal selection of others OTS components. This kind of formal selection brings us the possibility to find the correct OTS components based on the criteria that is suitable for our specific case.

We are going to perform the formal selection for the DBMS that we will implement in our project. In order to do that, we will use the AHP technique.

All the selected candidates are free and open-source DBMS. They are:

- PostgreSQL
- MySQL
- Firebird

The features that will be used in order to evaluate the mentioned DBMS are the following:

- **Compact and efficient data stored:** Data stored through the DBMS is not using so much space in the computer's hard disk and is accessed in very quick time.
- **Support community:** Because the selected DBMS are open-source, it is needed that there exists some developing community able to solve the problems that the user could face.
- **Backup and replication possibility:** It is needed to make regularly copies of the stored data in case the primary disks or other equipment fail.
- **Security:** It could be desirable to manage and limit who is able to read and change which data.
- **Event logging:** Often one wants to know who accessed what attributes, what was changed, and when it was changed. Logging services allow this by keeping a record of access occurrences and changes.

4.1 DBMS selection - AHP technique

Criteria comparison for DBMS

	Compact and efficient data stored	Support community	Backup and replication possibility	Security	Event logging	
Compact and efficient data stored	1,00	5,00	0,33	0,20	3,00	0,14
Support community	0,20	1,00	0,14	0,14	3,00	0,08
Backup and replication possibility	3,00	7,00	1,00	5,00	9,00	0,42
Security	5,00	7,00	0,20	1,00	0,11	0,16
Event logging	0,33	0,33	0,11	9,00	1,00	0,19
	9,53	20,33	1,79	15,34	16,11	1,00

After performing the criteria comparison for the selected features, we could observe that the most important one is 'Backup and replication possibility', follow in second place for the 'Event logging' feature, then the 'Security' feature, after that the 'Compact and efficient data stored' and finally the 'Support community' feature.

Products comparison for DBMS

Compact and efficient data stored

	PostgreSQL	MySQL	Firebird	
PostgreSQL	1,00	7,00	0,33	0,43
MySQL	0,14	1,00	9,00	0,35
Firebird	3,00	0,11	1,00	0,22
	4,14	8,11	10,33	1,00

Support community

	PostgreSQL	MySQL	Firebird	
PostgreSQL	1,00	3,00	9,00	0,67
MySQL	0,33	1,00	5,00	0,27
Firebird	0,11	0,20	1,00	0,06
	1,44	4,20	15,00	1,00

Backup and replication possibility

	PostgreSQL	MySQL	Firebird	
PostgreSQL	1,00	0,33	3,00	0,24
MySQL	3,00	1,00	7,00	0,67
Firebird	0,33	0,14	1,00	0,09
	4,33	1,47	11,00	1,00

Security

	PostgreSQL	MySQL	Firebird	
PostgreSQL	1,00	1,00	5,00	0,42
MySQL	1,00	1,00	9,00	0,51
Firebird	0,20	0,11	1,00	0,07
	2,20	2,11	15,00	1,00

Event logging

	PostgreSQL	MySQL	Firebird	
PostgreSQL	1,00	5,00	0,33	0,29
MySQL	0,20	1,00	0,20	0,09
Firebird	3,00	5,00	1,00	0,62
	4,20	11,00	1,53	1,00

Having finished the products comparison, we are able to obtain the final ranking for our products selection. In order to do that, we are going to use the vectors obtained for each product in the previous comparison and the weight vector obtained in the features comparison.

AHP Ranking for the selected DBMS

w=	0,14	0,08	0,42	0,16	0,19	
	Compact and efficient data stored	Support community	Backup and replication possibility	Security	Event logging	Ranking
PostgreSQL	0,43	0,67	0,24	0,42	0,29	0,34037
MySQL	0,35	0,27	0,67	0,51	0,09	0,45512
Firebird	0,22	0,06	0,09	0,07	0,62	0,20409

The table above gives us the final ranking for the selected products. Regarding this table we could consider that the best option to implement in our project is: MySQL.

4.2 List of OTS components

Taking into account the already exists company servers and prioritizing the using as much open-source components as possible, we have selected the following components in order to apply them in our project:

List of selected components

Operative System	Windows 2003 Server
Web Server	Apache HTTP Server
DBMS	MySQL
Programming language	PHP
Bank component	2checkout.com

5 Cost Estimation

For this project, there are four different costs that should be estimated as shown below;

1. Human Resources Cost
2. SW Cost
3. HW Cost
4. Additional Cost

5.1 Human Resource Cost

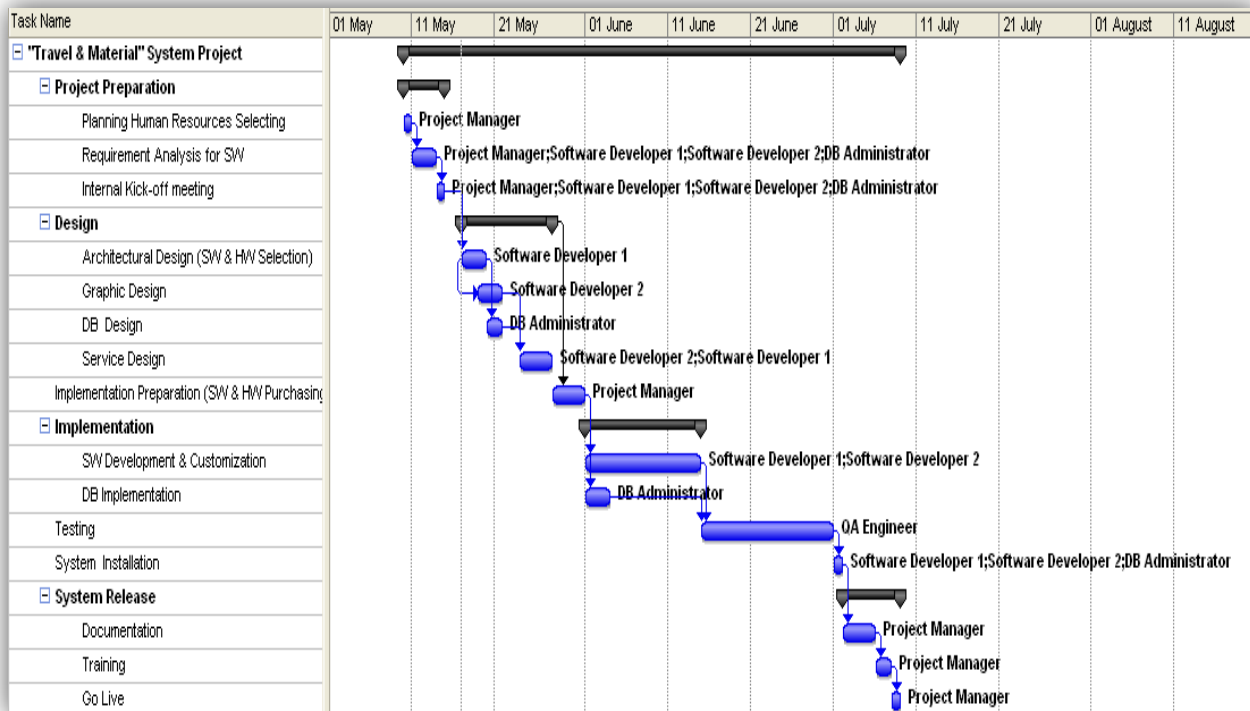
5.1.1 Human Resource Price List

Team Members	Price
Project Manager	15 €/h
Software Developer-1	10 €/h
Software Developer-2	10 €/h
DB Administrative	8 €/h
QA Engineer	8 €/h

5.1.2 Project Plan

Task Name	Duration	Start	Finish	Predecessors	Resource Names
"Travel & Material" System Project	44 days	Mon 10/05/10	Thu 08/07/10		
Project Preparation	5 days	Mon 10/05/10	Fri 14/05/10		
Planning Human Resources Selecting	1 day	Mon 10/05/10	Mon 10/05/10		Project Manager
Requirement Analysis for SW	3 days	Tue 11/05/10	Thu 13/05/10	3	Project Manager;Software Developer 1;Software Developer 2;DB Administrator
Internal Kick-off meeting	1 day	Fri 14/05/10	Fri 14/05/10	4	Project Manager;Software Developer 1;Software Developer 2;DB Administrator
Design	9 days	Mon 17/05/10	Thu 27/05/10		
Architectural Design (SW & HW Selection)	3 days	Mon 17/05/10	Wed 19/05/10	5	Software Developer 1
Graphic Design	3 days	Wed 19/05/10	Fri 21/05/10	7SS+2 days	Software Developer 2
DB Design	2 days	Thu 20/05/10	Fri 21/05/10	7	DB Administrator
Service Design	4 days	Mon 24/05/10	Thu 27/05/10	9;8	Software Developer 2;Software Developer 1
Implementation Preparation (SW & HW Purchasing)	2 days	Fri 28/05/10	Mon 31/05/10	6	Project Manager
Implementation	10 days	Tue 01/06/10	Mon 14/06/10		
SW Development & Customization	10 days	Tue 01/06/10	Mon 14/06/10	11	Software Developer 1;Software Developer 2
DB Implementation	3 days	Tue 01/06/10	Thu 03/06/10	11	DB Administrator
Testing	12 days	Tue 15/06/10	Wed 30/06/10	13;14	QA Engineer
System Installation	1 day	Thu 01/07/10	Thu 01/07/10	15	Software Developer 1;Software Developer 2;DB Administrator
System Release	5 days	Fri 02/07/10	Thu 08/07/10		
Documentation	2 days	Fri 02/07/10	Mon 05/07/10	16	Project Manager
Training	2 days	Tue 06/07/10	Wed 07/07/10	18	Project Manager
Go Live	1 day	Thu 08/07/10	Thu 08/07/10	19	Project Manager

5.1.3 Gant Chart



5.1.4 Breakdown Sheet

	Task Name	Cost
1	"Travel & Material" System Project	€ 20.320,00
2	Project Preparation	€ 5.520,00
3	Planning Human Resources Selecting	€ 400,00
4	Requirement Analysis for SW	€ 3.840,00
5	Internal Kick-off meeting	€ 1.280,00
6	Design	€ 4.560,00
7	Architectural Design (SW & HW Selection)	€ 840,00
8	Graphic Design	€ 840,00
9	DB Design	€ 640,00
10	Service Design	€ 2.240,00
11	Implementation Preparation (SW & HW Purchasing)	€ 800,00
12	Implementation	€ 6.560,00
13	SW Development & Customization	€ 5.600,00
14	DB Implementation	€ 960,00
15	Testing	€ 0,00
16	System Installation	€ 880,00
17	System Release	€ 2.000,00
18	Documentation	€ 800,00
19	Training	€ 800,00
20	Go Live	€ 400,00

Human Resources Cost: 20,320.00 €

5.2 HW & SW Costs

SW Cost: Open Source SW Components: *free*

HW Cost: We need to buy 2 servers, one for the database and the other one for the BackUp.

Hardware	Server	Price
Database Server	Dell PowerEdge T710 Server	6,216.91 €
BackUp Server	Dell PowerEdge T710 Server	6,216.91 €
		12,433.82 €

HW Cost: 12,433.82 €

5.3 Additional Cost

We will need to pay the Bank component which is going to enable us to make the payment transactions.

Bank component: 38.73 € per year

- Plus 5.5% commission on each transaction
- Plus a 0.35 € charge per transaction