

PROJECT MANAGEMENT SYSTEM OVERVIEW

Introduction

The aim of this project was to develop a java web application that can be used in the management of software projects of a software development company.

Project Scope

Basic Functionality

The basic functionality should consist of a web application which enables a project manager to set up projects, manage teams and customers and track project progress.

The information was to be saved in a relational database management system (JavaDB, SQLServer, MySQL, Oracle or Access). The database should be normalised and use primary key and foreign key constraints. The web application must be created as a Java EE Web Application. Implemented either in JSF or JSP.

Intermediate Functionality

Intermediate functionality entails amending the web application to make use of Enterprise Java Beans. Make use of Session Beans to encapsulate all business logic. Use Entity Classes for all communication with the database.

This section also entails development of a component which that can calculate the duration or finishing date of a project (based on its critical path) when provided with a project object.

Advanced Functionality

The advanced functionality covers development of a web service to expose the team leader functionality of managing tasks. It is intended to be used remotely and implementation was to be on a web frontend or desktop remote application.

Requirements

The system will need to provide the following functionality:

- Project Managers can set up projects
- Project Managers can manage team and customer details
- Project Managers can divide projects into tasks
- Duration and sequence of tasks can be defined (a task can have none, one or more successor tasks)
- Different tasks can be assigned to different teams (working for the company or outsourced to external teams)
- The system will provide functionality for team leaders to register task progress. Project progress can be tracked by the project manager
- The customer who commissioned the project can get summary information about the structure of the project, distribution of work and progress "

The system should provide login functionality for the different types of users of the system i.e:

- Project manager
- Team leader
- Customer

SECTION ONE

System Design and Implementation

The Basic functionality was be implemented using a 3-tier design model.



- Database was developed in MySQL and includes the following tables, views and stored procedures:

Tables

- ✓ customers
- ✓ developers
- ✓ location
- ✓ projectmanagers
- ✓ projects
- ✓ tasks
- ✓ team
- ✓ teamleaders
- ✓ users

Views

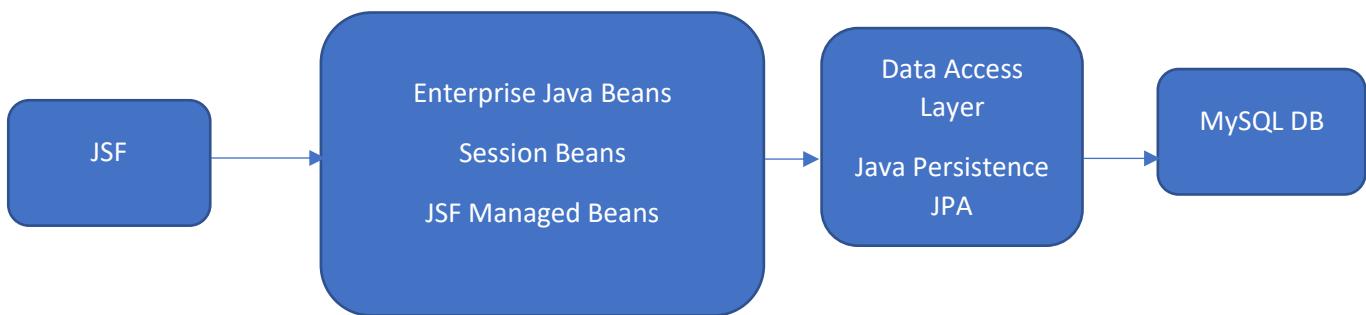
- ✓ critical_path_view
- ✓ customer_view
- ✓ Tasktime_view

Stored Procedures

- ✓ project_status
- ✓ task_status

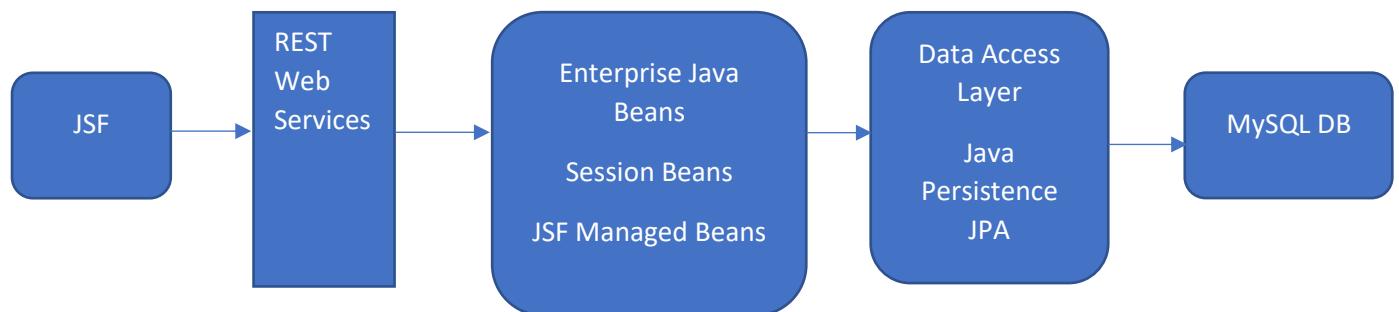
- Java programming language was used
- Frontend was developed using java server pages (JSP)
- Development tool used – Eclipse
- Web server -Apache Tomcat v9

The Intermediate functionality and advanced functionality will be implemented using a 4-tier design model



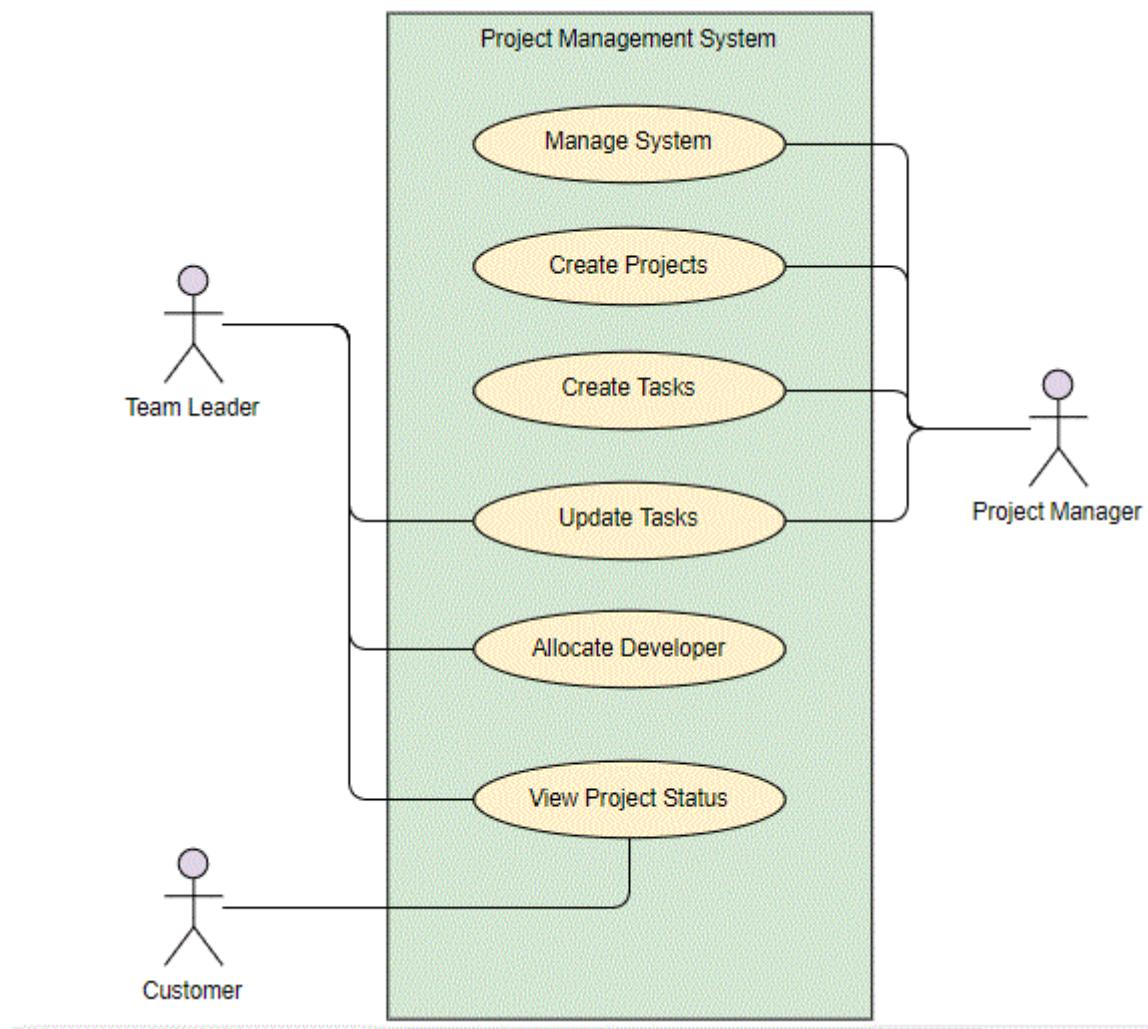
- Utilized the same MySQL database
- Java programming language was used
- Frontend was developed using java server pages (JSF)
- Development tool used – NetBeans

Advanced functionality will be implemented using a 5-tier design model

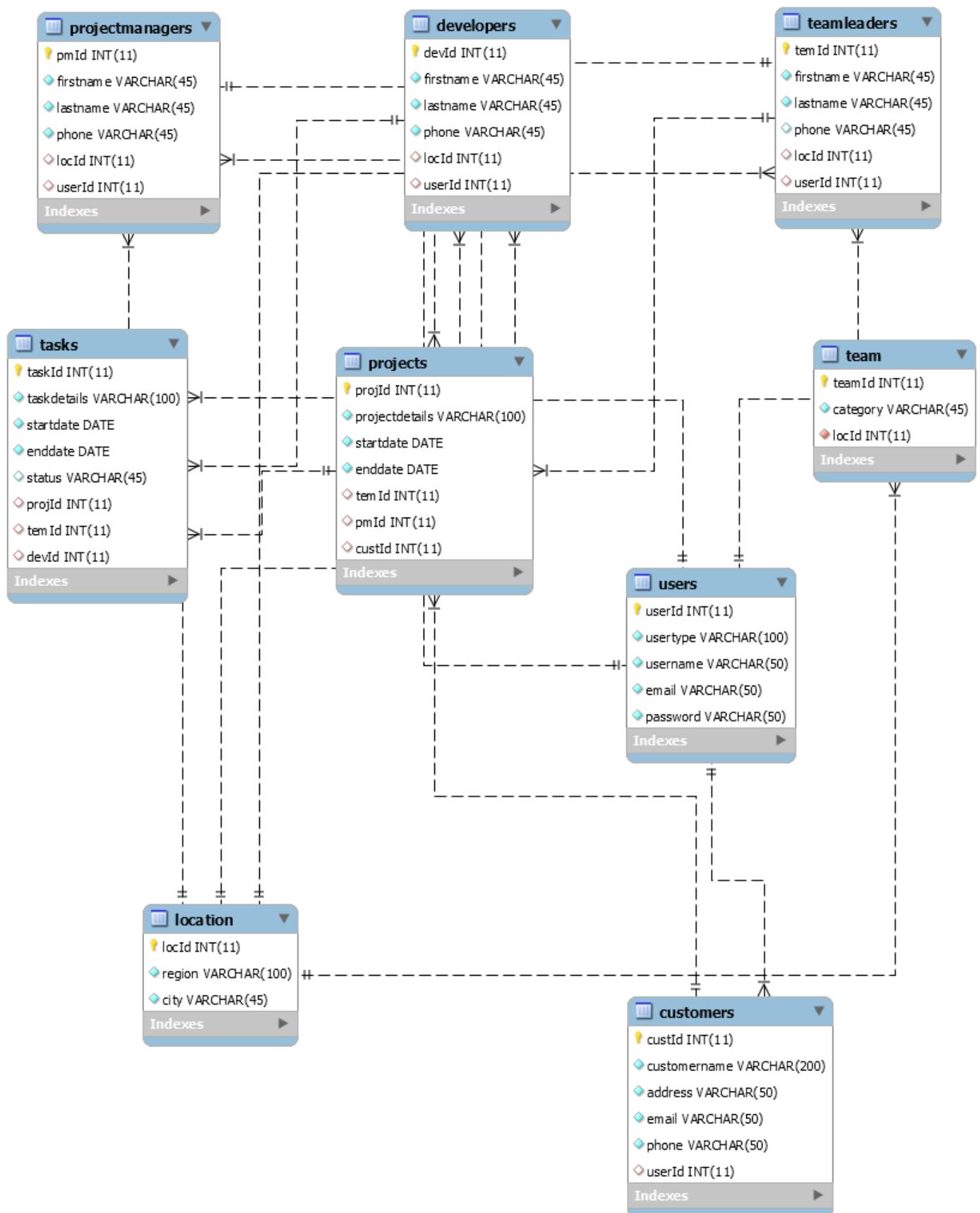


- Utilized the same MySQL database
- Java programming language was used
- Frontend was developed using java server pages (JSF)
- Development tool used – NetBeans
- Restful Webservices implemented.
- Webserver- Glassfish server v4

Use Case Diagram



Database ERD Diagram



SECTION TWO

Screenshots

Database

The screenshot shows the MySQL Workbench interface with the 'users' table selected in the Navigator. The table structure is as follows:

userId	userType	username	email	password
3	TeamLeader	Patrick Musila	pkmill@yahoo.com	kmall
4	TeamLeader	Maro	maro@yahoo.com	maroks
6	Developer	Alen	alen@gmail.com	alemkon
9	Developer	Otachi	otachi@gmail.com	otadikisb
11	ProjectManager	Selay	selay@gmail.com	selai
13	ProjectManager	ElanMuziki	elanmuziki@gmail.com	elanmuzuki
16	Customer	apple	apple@carif.com	apple
17	Customer	amazon	amazon@gmail.com	amazon

The 'Object Info' tab shows the table definition:

```
Table: users
Columns:
userId int(11) AI PK
userType varchar(100)
username varchar(50)
email varchar(50)
password varchar(50)
```

The 'Output' pane shows the execution history:

#	Time	Action	Message	Duration / Fetch
1	13:56:23	SELECT * FROM projects.tasks LIMIT 0, 1000	8 row(s) returned	0.000 sec / 0.000 sec
2	16:04:07	SELECT * FROM projects.users LIMIT 0, 1000	24 row(s) returned	0.000 sec / 0.000 sec

MySQL database with tables, views and stored procedures

The screenshot shows the MySQL Workbench interface with the 'critical_path_view' view selected in the Navigator. The view structure is as follows:

projectdetails	taskdetails	startdate	enddate	status	criticalpdays
Develop Parcel Tracking App	Create database	2019-06-02	2019-07-18	70	166
Develop Warehouse Management System	Create database	2019-07-10	2019-07-19	0	212

The 'Object Info' tab shows the view definition:

```
View: critical_path_view
Columns:
projectdetails varchar(100)
taskdetails varchar(100)
startdate date
enddate date
status varchar(45)
criticalpdays double
```

The 'Output' pane shows the execution history:

#	Time	Action	Message	Duration / Fetch
1	13:56:23	SELECT * FROM projects.tasks LIMIT 0, 1000	8 row(s) returned	0.000 sec / 0.000 sec
2	16:04:07	SELECT * FROM projects.users LIMIT 0, 1000	24 row(s) returned	0.000 sec / 0.000 sec
3	16:24:54	SELECT * FROM projects.critical_path_view LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec

MySQL project critical path view by critical path days

MySQL Workbench

Local instance MySQL56 - W...

File Edit View Query Database Server Tools Scripting Help

Navigator: users tasks users critical_path_view customer_view

SQLAdditions: My Snippets

Result Grid | Filter Rows: Export: Wrap Cell Content: Result Grid

Output: Action Output

View: customer_view

Columns:

projectdetails	customername	taskdetails	status
Develop Warehouse Management System	Barclays Bank	Create database	0
Develop Warehouse Management System	Barclays Bank	Create business logic	10
Develop Warehouse Management System	Barclays Bank	create web services	0
Develop Warehouse Management System	Barclays Bank	web front end	15
Develop Parcel Trading App	Amazon Online Stores	Create database	70
Develop Parcel Trading App	Amazon Online Stores	Business Logic development	20
Develop Parcel Trading App	Amazon Online Stores	web frontend	05
Develop Parcel Trading App	Amazon Online Stores	security interfaces	0

Object Info Session

Query Completed

MySQL customer project status view by task

MySQL Workbench

Local instance MySQL56 - W...

File Edit View Query Database Server Tools Scripting Help

Navigator: users tasks users critical_path_view customer_view tasktime_view

SQLAdditions: My Snippets

Result Grid | Filter Rows: Export: Wrap Cell Content: Result Grid

Output: Action Output

View: tasktime_view

Columns:

projectdetails	taskdetails	startdate	enddate	status	taskdays
Develop Warehouse Management System	Create database	2019-07-10	2019-07-19	0	9
Develop Warehouse Management System	Create business logic	2019-07-10	2019-07-31	10	21
Develop Warehouse Management System	create web services	2019-07-16	2019-08-10	0	94
Develop Warehouse Management System	web front end	2019-08-22	2019-09-10	15	88
Develop Parcel Trading App	Create database	2019-06-02	2019-07-18	70	116
Develop Parcel Trading App	Business Logic development	2019-07-11	2019-07-16	20	5
Develop Parcel Trading App	web frontend	2019-07-11	2019-07-26	05	15
Develop Parcel Trading App	security interfaces	2019-08-01	2019-08-31	0	30

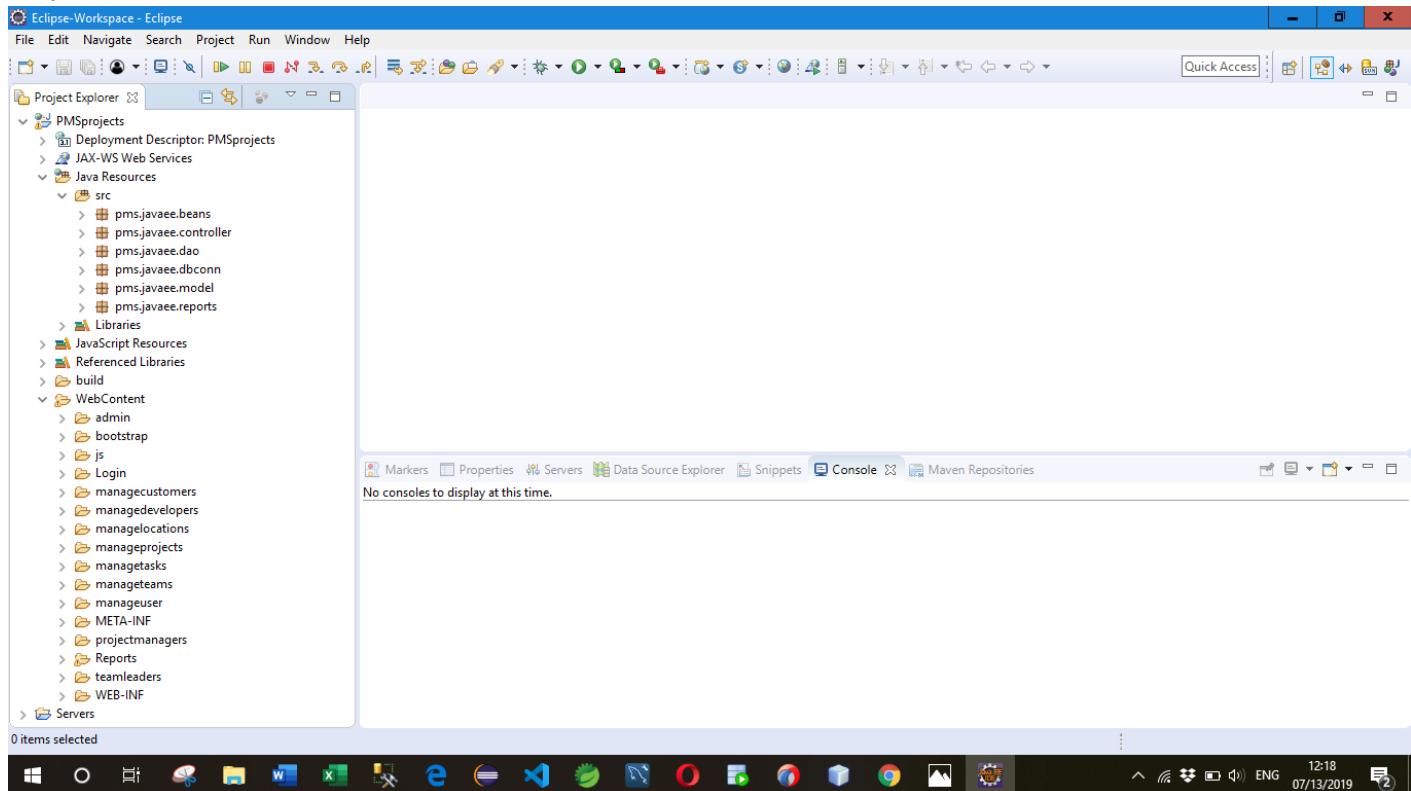
Object Info Session

Query Completed

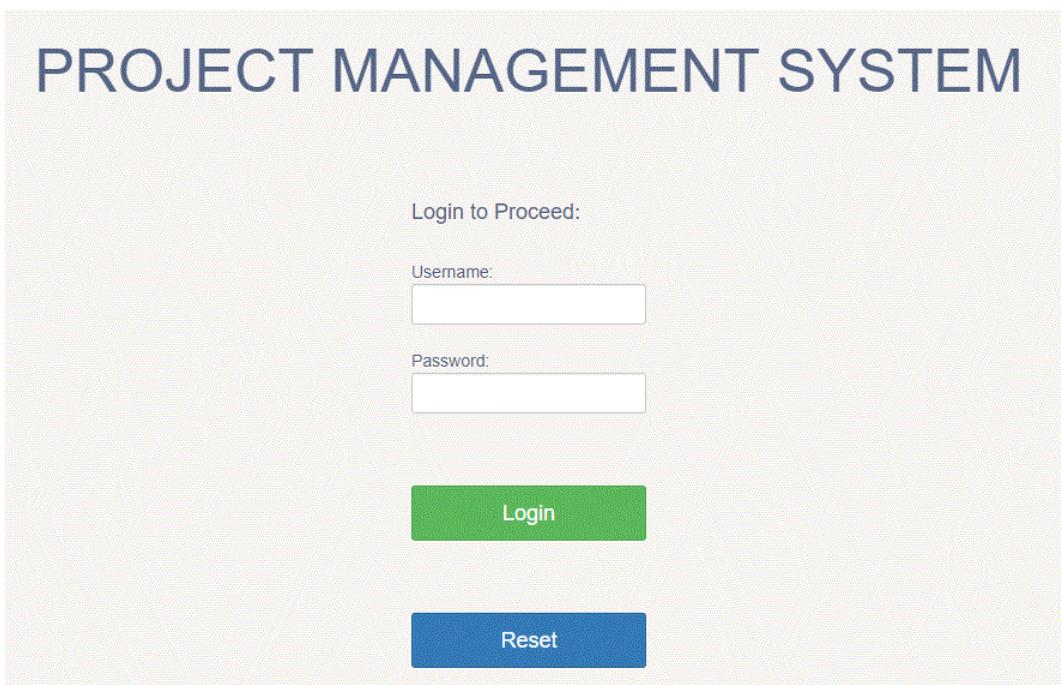
MySQL project critical path view by task days

Basic Web Application

Project structure



The security is implemented using a servlet to control login to the different areas of the application. A registered user is identified by user type and allowed access to only the webpages relevant to him or her.



Main Login

PROJECT MANAGEMENT SYSTEM

Login to Proceed:

Username:

Jmekubo

Password:

.....

Login

Reset

Invalid user credentials

Invalid Login screen

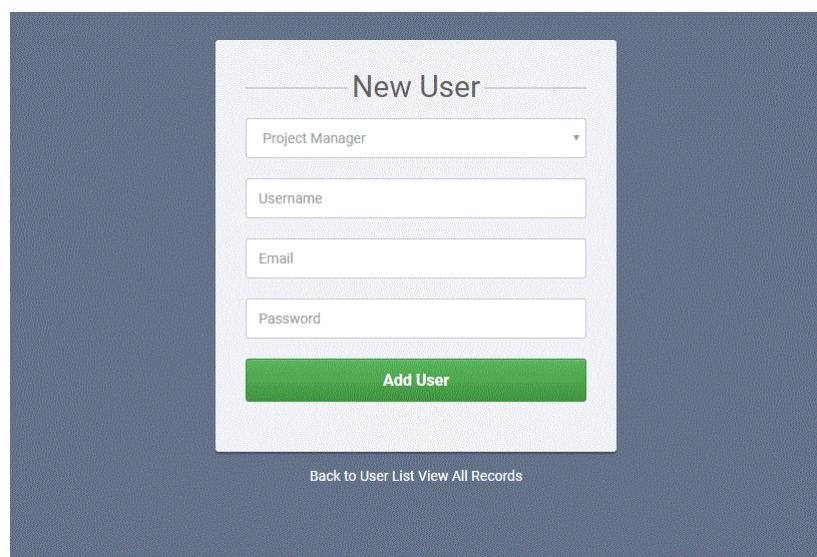
PROJECT MANAGEMENT SYSTEM

- [Manage Users](#)
- [Manage Customers](#)
- [Manage Location](#)
- [Manage Teams](#)
- [Manage Developers](#)
- [Manage Team Leaders](#)
- [Manage Project Managers](#)
- [Manage Projects](#)
- [Manage Tasks](#)
- [View Project Progress](#)
- [View Project Critical Path](#)

Login successful and project manager's main screen

Manage Users					
Id	User Type	User Name	Email	Password	Actions
11	ProjectManager	Selay	selay@gmail.com	selai	
13	ProjectManager	ElaniMuziki	elanimuziki@gmail.com	elanimuxiki	
19	ProjectManager	Jmekubo	jmekbs@yahoo.com	jmekbs	

Manage users main screen. Project manager can search, add, edit or delete users.



New User

Project Manager

Username

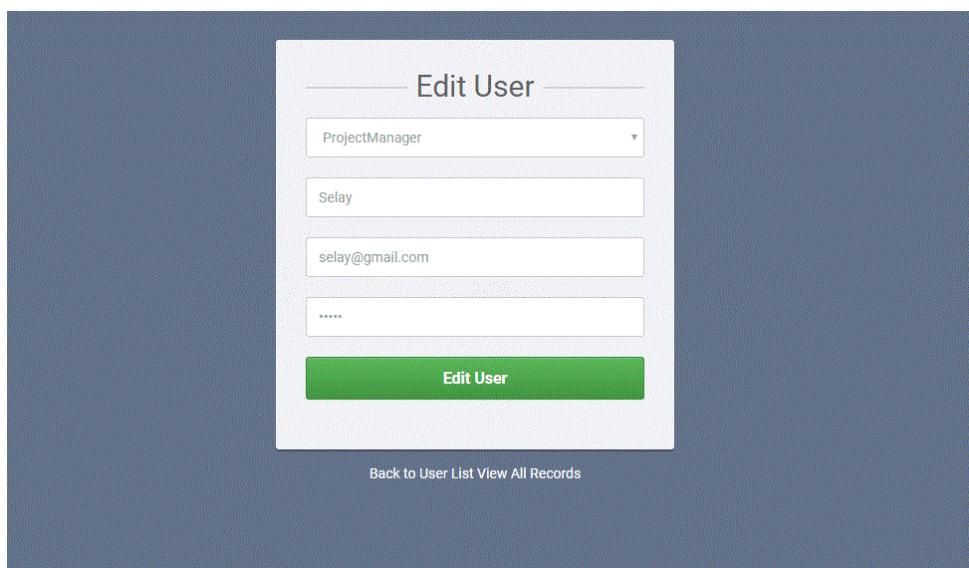
Email

Password

Add User

Back to User List View All Records

Add User screen



Edit User

ProjectManager

Selay

selay@gmail.com

.....

Edit User

Back to User List View All Records

Edit user screen

Manage Projects							
ID	Project Details	Start Date	Completion Date	TeamLeaderID	ProjectManagerID	CustomerID	Actions
18	Develop Warehouse Management System	2019-07-10	2019-10-31	15	20	17	
19	Develop Parcel Tracking App	2019-07-20	2019-11-30	16	22	4	
20	Develop Library management App	2019-02-01	2019-06-30	15	21	6	

[Add New Project](#)

Manage projects screen. Project manager can search, add, edit or delete projects

New Project

Select Customer

Select Project Manager

Select Team Leader

Enter project details

mm/dd/yyyy

mm/dd/yyyy

Add Project

Add project screen

Edit Project

Develop Sales forecasting tool for the company

07/07/2019

07/31/2019

16

20

22

Edit Project

Edit project screen. Note that some fields are inactive as they should not be altered.

Manage Tasks								Search by Name	<input type="button" value="Search"/>
ID	Project Details	Start Date	Completion Date	Completion Status	ProjectID	TeamLeaderID	DeveloperID	Actions	
14	Create database	2019-07-10	2019-07-19	0	18	15	31		
15	Create business logic	2019-07-10	2019-07-31	10	18	15	31		
16	create web services	2019-07-16	2019-08-10	0	18	15	34		
17	web front end	2019-08-22	2019-09-10	15	18	15	34		
18	Create database	2019-06-02	2019-07-18	70	19	16	31		
19	Business Logic development	2019-07-11	2019-07-16	20	19	16	31		
20	web frontend	2019-07-11	2019-07-26	05	19	16	31		
21	security interfaces	2019-08-01	2019-08-31	0	19	16	34		

[Add New Task](#)

Tasks main screen for adding, editing or deleting tasks

New Task

Enter task details

25 % Completion Status:

50 % Completion Status:

75 % Completion Status:

100 % Completion Status:

[Add Task](#)

[Back to Task List](#) [View All Records](#)

New Task screen for adding new tasks to project. Initially the completion status is left blank to be updated by team leaders.

Edit Tasks

Create database

07/10/2019

07/19/2019

25 % Completion Status:

50 % Completion Status:

50 % Completion Status:

75 % Completion Status:

100 % Completion Status:

21

16

34

Edit Task Details

[Back to Project List](#) [View All Records](#)

The screenshot displays the 'Edit Tasks' interface. At the top, there's a title bar. Below it, a task card for 'Create database' is shown with a due date of '07/10/2019' and a completion date of '07/19/2019'. There are three completion status sliders: one at 25%, one at 50%, and one at 75%. Below these are three numerical fields containing the values 21, 16, and 34. A large green button at the bottom right is labeled 'Edit Task Details'. At the very bottom, there are two links: 'Back to Project List' and 'View All Records'.

Edit task screen for updating tasks. Team leaders can select completion status

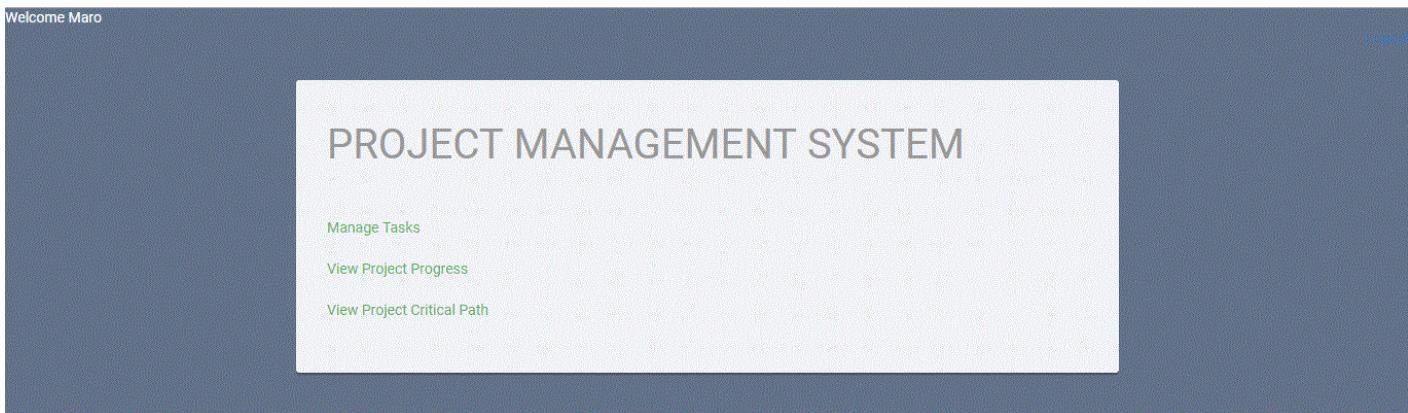
The Project manager can view overall project status as below

Overall Project Progress Status		
Project	Customer Name	Project Status
Develop Parcel Tracking App	Amazon Online Stores	95.0
Develop Warehouse Management System	Barclays Bank	25.0
Develop Sales forecasting tool for the company	Jackies	25.0

The Project manager can view project critical path as below

Overall Project Critical Path Status		
Project	Customer Name	Project Critical Path(Days)
Develop Parcel Tracking App	Amazon Online Stores	166.0
Develop Sales forecasting tool for the company	Jackies	210.0
Develop Warehouse Management System	Barclays Bank	212.0

Team Leader main screen



Team leader can update task progress and view progress

Team Leaders can view task progress report as below

Task Progress Status			
Project	Customer Name	Task	Task Status
Develop Warehouse Management System	Barclays Bank	Create database	0
Develop Warehouse Management System	Barclays Bank	Create business logic	10
Develop Warehouse Management System	Barclays Bank	create web services	0
Develop Warehouse Management System	Barclays Bank	web front end	15
Develop Parcel Tracking App	Amazon Online Stores	Create database	70
Develop Parcel Tracking App	Amazon Online Stores	Business Logic development	20
Develop Parcel Tracking App	Amazon Online Stores	web frontend	05
Develop Parcel Tracking App	Amazon Online Stores	security interfaces	0
Develop Sales forecasting tool for the company	Jackies	Develop ETL pipelines	25%

Team Leaders can view task critical path as below

Task Critical Path Status				
Project	Customer Name	Task	Task Status	Task Critical Path(Days)
Develop Warehouse Management System	Barclays Bank	Create database	0	9.0
Develop Warehouse Management System	Barclays Bank	Create business logic	10	21.0
Develop Warehouse Management System	Barclays Bank	create web services	0	94.0
Develop Warehouse Management System	Barclays Bank	web front end	15	88.0
Develop Parcel Tracking App	Amazon Online Stores	Create database	70	116.0
Develop Parcel Tracking App	Amazon Online Stores	Business Logic development	20	5.0
Develop Parcel Tracking App	Amazon Online Stores	web frontend	05	15.0
Develop Parcel Tracking App	Amazon Online Stores	security interfaces	0	30.0
Develop Sales forecasting tool for the company	Jackies	Develop ETL pipelines	25%	210.0

EJB JPA REST Application

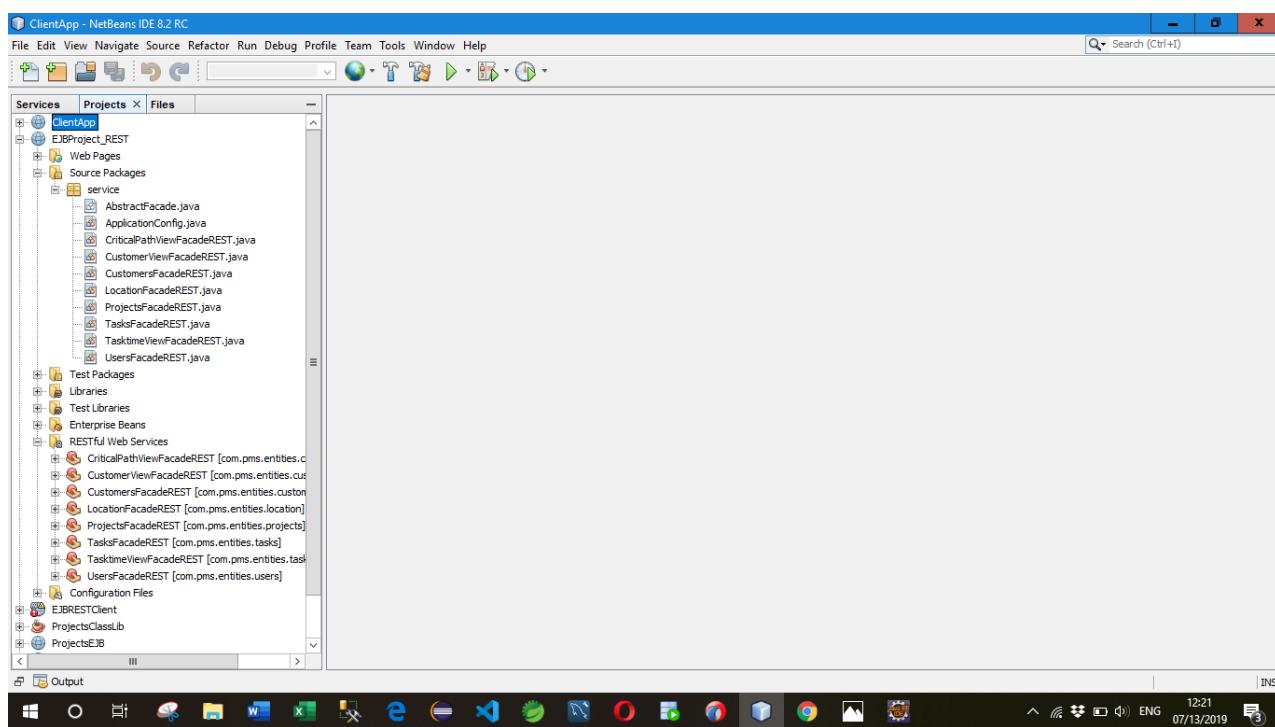
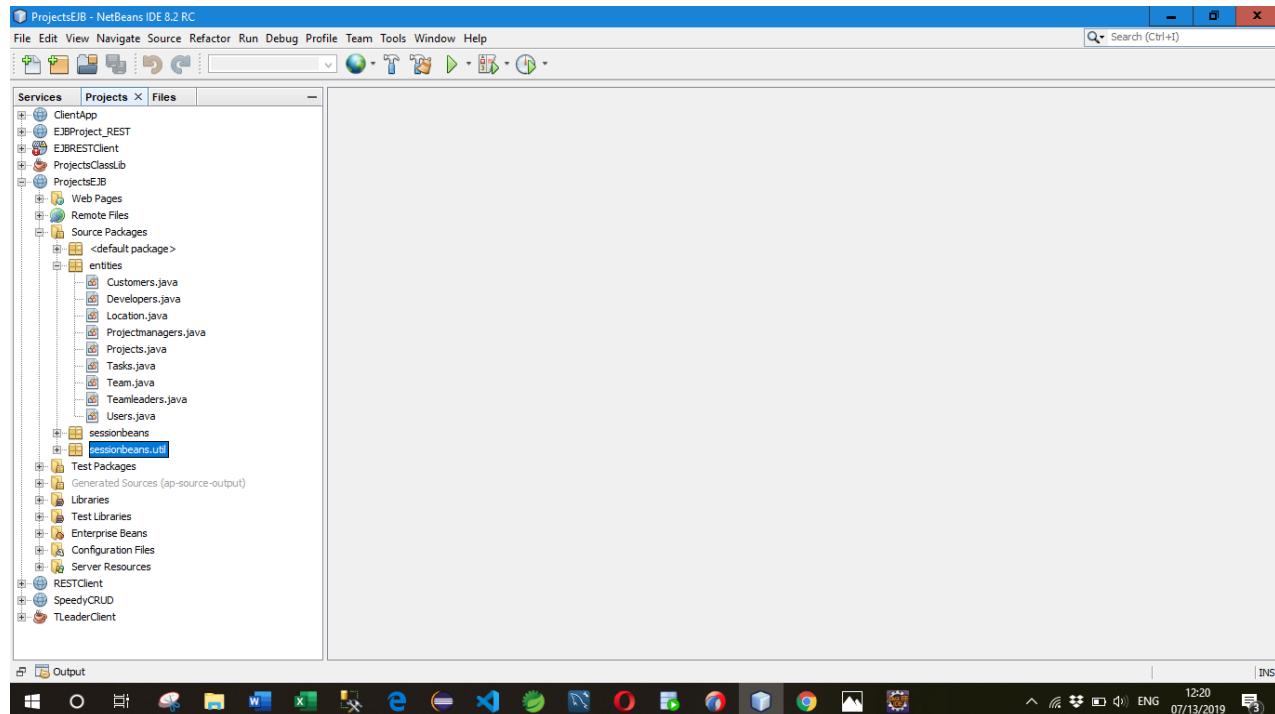
Project Structure

ProjectEJB contains entities to map tables from database and session beans for business logic.

ProjectsClassLib project contains data access entities for the

EJBProject_REST project for web service

RESTClient project contains front end JSF managed Beans and JSF Pages.



REST service created to expose business logic

The screenshot shows a browser window with multiple tabs open, all related to Java and JSON. The main content area displays a REST API interface for a project named 'EJBProject_REST'. On the left, a sidebar lists various entity packages under 'EJBProject_REST'. The central panel shows a specific endpoint for 'com.pms.entities.projects' with a 'GET' method selected. Below this, there are sections for 'Custom Request Headers' and a preview of the JSON response. The response body contains two objects representing projects:

```
[{"custId": "1", "address": "Canary Wharf", "custId": "1", "customername": "Barclays Bank", "email": "bbk@barclays.co.uk", "phone": "+44 20 7033 1234", "userid": "1", "username": "Barclays Bank", "userType": "Customer"}, {"custId": "2", "address": "Milton Keynes Central", "custId": "2", "customername": "Amazon Online Stores", "email": "amazon@gmail.com", "phone": "+44 1992 654321", "userid": "2", "username": "Amazon", "userType": "Customer"}]
```

The screenshot shows a browser window with multiple tabs open, all related to Java and JSON. The main content area displays a "Test RESTful Web Services" interface for an application named "EJBProject_REST".

WADL: http://localhost:9090/EJBProject_REST/webresources/application.wadl

Test RESTful Web Services

EJBProject_REST

Resource: com.pms.entities.tasks
(http://localhost:9090/EJBProject_REST/webresources/com.pms.entities.tasks)

Choose method to test: [GET\(application/json\)](#) [Test](#)

Custom Request Headers

Status: 200 (OK)

Response:

Tabular View	Raw View	Sub-Resource	Headers	Http Monitor
[{"enddate": "2019-07-19T00:00:00+01:00", "projid": {"custId": "17", "customername": "Barclays Bank", "email": "bbk@bbkuk.co.uk", "phone": "1144552", "userid": "18", "username": "Barclays Bank", "userType": "Customer"}, "enddate": "2019-10-31T00:00:00Z", "projid": "18", "projdetails": "Develop Warehouse Management System", "startdate": "2019-07-10T00:00:00+01:00", "startdate": "2019-07-10T00:00:00+01:00", "status": "0", "taskid": "14", "taskdetails": "Create database"}, {"enddate": "2019-07-31T00:00:00+01:00", "projid": {"custId": "17", "customername": "Barclays Bank", "email": "bbk@bbkuk.co.uk", "phone": "1144552", "userid": "18", "username": "Barclays Bank", "userType": "Customer"}, "enddate": "2019-10-31T00:00:00Z", "projid": "18", "projdetails": "Develop Warehouse Management System", "startdate": "2019-07-10T00:00:00+01:00", "startdate": "2019-07-10T00:00:00+01:00", "status": "0", "taskid": "14", "taskdetails": "Create database"}, {"enddate": "2019-07-31T00:00:00+01:00", "projid": {"custId": "17", "customername": "Barclays Bank", "email": "bbk@bbkuk.co.uk", "phone": "1144552", "userid": "18", "username": "Barclays Bank", "userType": "Customer"}, "enddate": "2019-10-31T00:00:00Z", "projid": "18", "projdetails": "Develop Warehouse Management System", "startdate": "2019-07-10T00:00:00+01:00", "startdate": "2019-07-10T00:00:00+01:00", "status": "0", "taskid": "16", "taskdetails": "Create business logic"}, {"enddate": "2019-08-10T00:00:00+01:00", "projid": {"custId": "17", "customername": "Canary Wharf", "email": "bbk@barclays.co.uk", "password": "bbkuk", "userid": "18", "username": "Barclays Bank", "userType": "Customer"}, "enddate": "2019-08-10T00:00:00+01:00", "projid": "18", "projdetails": "Develop Warehouse Management System", "startdate": "2019-07-10T00:00:00+01:00", "startdate": "2019-07-10T00:00:00+01:00", "status": "0", "taskid": "16", "taskdetails": "Create business logic"}]				

Main Screen



Manage Users screen

List				
User Id	User Type	Username	Email	Password
3	TeamLeader	Patrick Musila	pkhill@yahoo.com	kimall
4	TeamLeader	Maro	maro@yahoo.com	maroks
6	Developer	Alen	alen@gmail.com	allemskn
9	Developer	Otachi	potachi@gmail.com	otachisb
11	Project Manager	Selay	selay@gmail.com	selai
13	Project Manager	ElaniMuziki	elanimuziki@gmail.com	elanimuxiki
16	Customer	apple	apple@carlif.com	apple
17	Customer	amazon	amazon@gmail.com	amazon
18	Customer	Barclays Bank	bbk@barclays.co.uk	bbkuk
19	Project Manager	Jmekubo	jmeeks@yahoo.com	jmeeks

Add User Screen

List

UserId	UserType	Username	Email	Password
3	TeamLeader	kimall	@yahoo.com	
4	TeamLeader	maroks	@yahoo.com	
6	Developer	allemksn	gmail.com	
9	Developer	otachisb	i@gmail.com	
11	ProjectManager	selai	@gmail.com	
13	ProjectManager	elanimuxiki	uziki@gmail.com	
16	Customer	apple	@carlif.com	
17	Customer	amazon	n@gmail.com	
18	Customer	bbkuk	barclays.co.uk	
19	ProjectManager	jmekst@yahoo.com	jmekst@yahoo.com	jmekst

Create New Users

User Id: *

User Type: *

Username: *

Email: *

Password: *

Save **Cancel**

Edit User Screen

ProjectsEJB

List

UserId	UserType	Username	Email	Password
31	Customer	tesco	@tescouk.co.uk	
32	Customer	asda	@gmail.com	
33	Developer	colmsee	see@gmail.com	
34	Developer	omari	@gmail.com	
35	pmanager	amazonmgr	nmgr@amazon.co.uk	
36	Customer	sportsbet	esa@sportsbet.com	sportsbet

Edit Users

User Id: * 36

User Type: * Customer

Username: * sportsbet

Email: * sporspesa@sportsbet.co

Password: * sportsbet

Save **Cancel**

Delete user removes user from database

Manage Projects screen

ProjectsEJB

List

ProjId	Projectdetails	Startdate	Enddate	TemId	PmId	CustId
18	Develop Warehouse Management System	07/09/2019	10/31/2019	15	20	17
19	Develop Parcel Tracking App	07/19/2019	11/30/2019	16	22	4
20	Develop Library management App	02/01/2019	06/29/2019	15	21	6
21	Develop Sales forecasting tool for the company	07/06/2019	07/30/2019	16	20	22

+ Create
View
Edit
Delete

Project manager can add, edit, delete projects

ProjectsEJB

List

ProjId	Projectdetails	Startdate	Enddate	TemId	PmId	CustId
18	Develop Warehouse Management System	07/09			20	17
19	Develop Parcel Tracking App	07/19			22	4
20	Develop Library management App	02/01			21	6
21	Develop Sales forecasting tool for the company	07/06			20	22

Create New Projects

ProjId: *

Projectdetails: *

Startdate: * [cal]

Enddate: * [cal]

TemId:

PmId: [x]

CustId: [down]

Save Cancel

New project screen

ProjectsEJB

List

ProjId	Projectdetails	Startdate	Enddate	TemId	PmId	CustId
18	Develop Warehouse Management System	07/09			20	17
19	Develop Parcel Tracking App	07/19			22	4
20	Develop Library management App	02/01			21	6
21	Develop Sales forecasting tool for the company	07/06			20	22

Edit Projects

ProjId: *

Projectdetails: *

Startdate: * [cal]

Enddate: * [cal]

TemId:

PmId:

CustId: [down]

Save Cancel

Edit project screen

Manage Tasks

ProjectsEJB

List

TaskId	Taskdetails	Startdate	Enddate	Status	TemId	DevId	ProjId
14	Create database	07/09/2019	07/18/2019	0	15	31	18
15	Create business logic	07/09/2019	07/30/2019	10	15	31	18
16	create web services	07/15/2019	08/09/2019	0	15	34	18
17	web front end	08/21/2019	09/09/2019	15	15	34	18
18	Create database	06/01/2019	07/17/2019	70	16	31	19
19	Business Logic development	07/10/2019	07/15/2019	20	16	31	19
20	web frontend	07/10/2019	07/25/2019	05	16	31	19
21	security interfaces	07/31/2019	08/30/2019	0	16	34	19
22	Develop ETL pipelines	07/19/2019	09/29/2019	25%	16	34	21

Tasks can be added, edited or removed

ProjectsEJB

TaskId	Taskdetails	Startdate	Enddate	Status	TemId	DevId	ProjId
14	Create database	07/09/2019				31	18
15	Create business logic	07/09/2019				31	18
16	create web services	07/15/2019				34	18
17	web front end	08/21/2019				34	18
18	Create database	06/01/2019				31	19
19	Business Logic development	07/10/2019				31	19
20	web frontend	07/10/2019				31	19
21	security interfaces	07/31/2019				34	19
22	Develop ETL pipelines	07/19/2019				34	21

Create New Tasks

TaskId: *

Taskdetails: *

Startdate: *

Enddate: *

Status:

TemId:

DevId:

ProjId: Develop Warehouse Management System

Save **Cancel**

New task screen

ProjectsEJB

TaskId	Taskdetails	Startdate	Enddate	Status	TemId	DevId	ProjId
14	Create database	07/09/2019				31	18
15	Create business logic	07/09/2019				31	18
16	create web services	07/15/2019				34	18
17	web front end	08/21/2019				34	18
18	Create database	06/01/2019				31	19
19	Business Logic development	07/10/2019				31	19
20	web frontend	07/10/2019				31	19
21	security Interfaces	07/31/2019				34	19
22	Develop ETL pipelines	07/19/2019				34	21

Edit Tasks

TaskId: * 22

Taskdetails: * Develop ETL pipelines

Startdate: * 07/20/2019

Enddate: * 09/30/2019

Status: 25%

TemId: 16

DevId: 34

ProjId: Develop Sales forecasting tool for the company

Save **Cancel**