Digitized Engineering Notebook

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ABSTRACT

Digitized Engineering Notebook is a Web Based Application which is subject to the project status and their development reports and statistics. All the engineering students and professionals who work on the development of projects and mechanical applications maintain their notes and design process and other important attributes for the project.

A General Engineering Notebook consists of Images, prototype sketches, development phases, data, and even text. These notebooks help the team members keep up with their work progress and make some important updates and notifications for themselves. However, this has a drop back by delaying the work and they take a lot of time in just making their notes because you have to keep up everything for every update instead of updating the previous day work.

As of now we are developing a Web Based Application that will help all the users and project managers and team member connect to each other via portal and update their statistical reports and any other project updates.

The major features about the project include Front End Interface where team members can login into their authorized accounts and make changes to the project. The team members can create new tables, add diagrams and even make changes to a table created by other user only if he is authorized. The portal is mainly used to communicate with each other, upload their reports, share the prototype designs in the form of image files, create appointments, reminders and deadlines for the specifies tasks. These are the important factors that are involved in the project above many other features. And all these features will be used by the user and team members with their level of authorization and information access. Above all the project manager and team leader will be having special access for their entry.
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1 Project Description

The project is Digitized Engineering Notebook is a web based application that simulates and transforms the characteristics of a paper notebook used for recording details of laboratory works into a digital version of such notebook. The Engineering Notebook is a book in which an engineer will formally document all their work associated with their project in a chronological order. An Engineering Notebook needs to have a clear and detailed description of your design process. It is useful if someone unfamiliar with the project work could take over the project responsibilities without additional information.

The purpose of the Digitized Engineering Notebook is to prove the origin of our ideas that led to a solution, prove when the events or ideas occurred, prove the diligence in turning the idea into a solution, and to prove when an idea became a working solution. It improves the research, documentation, and communication skills. The Digitized Engineering Notebook can help as a legal document proof for the research and development team to prove their work.

The web applications allow the users to store the records of data such as text, images, and log history to the database. The website also provides the functionality to view the saved data in the database. It also provides the functionalities with ease of access to the users. Digitized Engineering Notebook has two modules mainly; they are user module and admin module. We are managing the web content based on the access levels for both user and admin. Digitized Engineering Notebook has the following functionalities mainly:

- Welcome page with message and menu for navigation to various pages across the web site.
- Admin console to administrate the web site to keep track of the user activities.
- Feature to create a new project or select an existing project from the list of available projects.
- Project Manager can add the project members to the project.
- Option to add the log entries for ideas, project details, observations, project status, etc.
- Web forms to add the new projects, project members, and discussions.
- Home page to display user information.
- Registration form and Sign-in form for the users.
- Option to upload the files such as image files, pdf files, and text files, etc.
- Table display for listings in the web site.
- Search functionality to filter the results.

Along with the above feature we are also included several other features in the Digitized Engineering Notebook.

1.1 Competitive Information

We analyzed various other similar kind of services which are available in the market, and of course we confirmed that this service has competitors in the market. We are planning to make the Digitized Engineering Notebook more advanced than the other available applications in the market so that we can expect to see the better results from the users. We are also planning to perform
advanced analytics to observe the trends with the available data to predict the future results so that we can recommend the changes for the Digitized Engineering Notebook service. We believe these kinds of advanced features will make us stand alone in the market.

1.2 Relationship to Other Applications/Projects
The Digitized Engineering Notebook relates to several other features such as data storage, and processing the hardware upon the server which the database will be resided and be processed. This application uses the several frameworks such as jQuery and Bootstrap, etc.

1.3 Assumptions and Dependencies
• It is assumed that the Digitized Engineering Notebook application team is going to provide a rest service to be used by other software applications.
• Remote access to the Digitized Engineering Notebook application depends on the multi user internet endpoint clients; and it is assumed that the remote access will be provided by Development Operations team.
• Application backup is dependent on the networking hardware and configuration between these requirements these components; and it is assumed that another team will provide this facility.
• It is assumed that data analytics for the stored data will be provided by another team.
• It is assumed that the Engineering Notebook users will transition from tracking the project details on notebook to tracking it in the web based application.

1.4 Future Enhancements
We are planning to improvise the application in future, but it will be considered as a separate project version. Once the Digitized Engineering Notebook is accepted by the engineers, additional enhancements may be come into play. Requirements which are not included in this document are considered as the future enhancements.

1.5 Definitions and Acronyms
HTML – Hyper Textual Markup Language
MVC – Model-View-Controller
SQL – Structured Language Query
CSS – Cascading Style Sheet
RDBMS – Relational Database Management System
ACID – Atomicity, Consistency, Isolation, Durability
ERD – Entity Relationship Diagram
UI – User Interface
JSP – Java Server Pages
JS – JavaScript
DFD – Data Flow Diagram
IDE – Integrated Development Environment
Digitized – Convert information into a digital form that can be processed by computer
PM – Project Manager
Discussion Board – Message Board
2 Project Technical Description

The Digitized Engineering Notebook application is developed using Java as the platform. The application is being developed in MVC (Model-View-Controller) architecture. We used JavaScript and jQuery as the client scripting language to design the animations and to validate the form data in the Digitized Engineering Notebook application. We also used the User Authentication and Authorization to validate the users and to restrict their access to the web site. The following are the technologies that are being used as part of the Digitized Engineering Notebook application development:

• HTML, JSP for Markup Language
• Cascading Style Sheet to design the web pages
• JavaScript, jQuery for animations, and validations
• MYSQL Server for Relational Database
• Bootstrap framework for responsive web design
• Navigation menus for site navigation
• Java for server coding
• Web Services for posting data to the server
• Session and Application State Cookies
• User authentication and authorization
• User access level verification
• Eclipse as the code IDE (Integrated Development Environment)
• MVC (Model-View-Controller) architecture
• Design patterns such as singleton, factory design pattern

2.1 Application Architecture

Digitized Engineering Notebook application is being developed in the MVC architecture. The database is a relational database, developed using MySQL.

MVC Architecture:
Relational Database Architecture:
2.2 **Application Information flows**
The Information Flow is nothing but the flow of information across several entities in the application. The Digitized Engineering Notebook has several information flows such as the Users, Projects, Project Uploads, Project Tasks, etc. The web application shows the data flow information between different entities involved the application process.

2.3 **Interactions with other Projects (if Any)**
The Digitized Engineering Notebook application will interact with the rest services project.

2.4 **Interactions with other Applications**
The Digitized Engineering Notebook application will interact with the other application which uses this application rest services.

2.5 **Capabilities**
The Digitized Engineering Notebook will provide the capabilities such as A front page with welcome message and a menu for navigation, Admin console for site administration, Option to create a new project or select an existing project, add team members to project, Table of content (or log index), Creation of dated log entries for ideas, details, observations, etc., File upload for text documents, drawings, sketches, figures, etc., Allow multimedia elements such as pictures and videos embedded in Web pages, discussion board.

2.6 **Risk Assessment and Management**
The Digitized Engineering Notebook has involved several possible risks, these risks include database breakdown, app pool reset, deadlocks, etc. If the database is breakdown, then there should be an alternative to use another database server as a backup, similar with the application server too. There must be a proper logging of application events to monitor the application traffic and user actions. We must consider the power failures to revert the data to previous state using table locks.

3 **Project Requirements**

3.1 **Identification of Requirements**

<DENB-1-1WEB-USER-000001>
The feature must allow users to be added, updated, and deleted from the user interface.  
**Required Attributes:** User ID, First Name, Last Name, Email ID, Password, User Role, Delete Flag  
**Optional Attributes:** N/A  
**Specifics:** Users are individual persons that are associated with one, and only one, Digitized Engineering Notebook. We don’t want to store social security number, and doing so would raise privacy concerns; therefore, social security number is not stored. We also store Email Address and Password for the users. Password is encrypted in the table.  
**Implementation:** Mandatory
<DENB-1-1 WEB-PR-000002>
The feature must allow projects to be added, updated, and deleted from the user interface.
**Required Attributes:** Project ID, User ID, Project Name, Project Description, Delete Flag, Created Date
**Optional Attributes:** N/A
**Specifics:** Projects are associated with Users. Users and Projects are in many to many relations. Projects table has the required attributes such as Project ID, User ID, Project Name, Project Description.
**Implementation:** Mandatory

<DENB-1-1 WEB-PRU-000003>
The feature must allow project files to be added from the user interface.
**Required Attributes:** Project ID, Project Upload ID, User ID, File Name, File Type, Created Date, Delete Flag
**Optional Attributes:** N/A
**Specifics:** Project Uploads are associated with Projects and Users. Projects, and Project Uploads are in one to many relations. Project Uploads table has the required attributes such as Project ID, Project Upload ID, User ID, File Name, File Type, Created Date, Delete Flag.
**Implementation:** Mandatory

<DENB-1-1 WEB-PRM-000004>
The feature must allow project members to be added, updated, deleted from the user interface.
**Required Attributes:** Project ID, Project Member ID, User ID, Created Date, Delete Flag
**Optional Attributes:** N/A
**Specifics:** Project Members are associated with Projects and Users. Projects, and Project Members are in one to many relations. Project Members table has the required attributes such as Project ID, Project Member ID, User ID, Created Date, Delete Flag.
**Implementation:** Mandatory

<DENB-1-1 WEB-PRD-000005>
The feature must allow project discussions to be added, updated, deleted from the user interface.
**Required Attributes:** Project ID, Project Discussion ID, User ID, Discussions, Created Date, Delete Flag
**Optional Attributes:** N/A
**Specifics:** Project Discussions are associated with Projects and Users. Projects, and Project Discussions are in one to many relations. Project Discussions table has the required attributes such as Project ID, Project Discussion ID, User ID, Discussions, Created Date, Delete Flag.
**Implementation:** Mandatory

<DENB-1-1 WEB-PRE-000006>
The feature must allow project events to be added, updated, deleted from the user interface.
**Required Attributes:** Project ID, Project Event ID, User ID, Event Name, Event Type, Created Date
Date, Delete Flag  
Optional Attributes: N/A  
Specifics: Project Events are associated with Projects and Users. Projects, and Project Discussions are in one to many relations. Project Events table has the required attributes such as Project ID, Project Event ID, User ID, Event Name, Event Type, Created Date, Delete Flag.  
Implementation: Mandatory

<DENB-1-1 WEB-PRT-000007>  
The feature must allow project tasks to be added, updated, deleted from the user interface.  
Required Attributes: Project ID, Project Task ID, User ID, Task Name, Task Description, Created Date, Delete Flag  
Optional Attributes: N/A  
Specifics: Project Tasks are associated with Projects and Users. Projects, and Project Discussions are in one to many relations. Project Events table has the required attributes such as Project ID, Project Task ID, User ID, Task Name, Task Description, Created Date, Delete Flag.  
Implementation: Mandatory

<DENB-1-1 WEB-PRTS-000008>  
The feature must allow project tasks to be retrieved from the user interface.  
Description: This feature is to retrieve the project tasks from the user interface.  
Implementation: Mandatory

<DENB-1-1 WEB-PRMS-000009>  
The feature must allow project members to be retrieved from the user interface.  
Description: This feature is to retrieve the project members from the user interface.  
Implementation: Mandatory

<DENB-1-1 WEB-PRS-000010>  
The feature must allow projects to be retrieved from the user interface.  
Description: This feature is to retrieve the projects from the user interface.  
Implementation: Mandatory

3.2 Operations, Administration, Maintenance and Provisioning (OAM&P)  
Application and Database backup will be provided for the whole data in the all databases and for the source code in the application servers. In case of any issue happened then the data can be rolled back and the source code back up is also there. Database Administrator team keeps monitor the application quality and performance for the maintenance purpose.

3.3 Security and Fraud Prevention  
Digitized Engineering Notebook users will be assigned to roles, with each role possessing only certain eligible permissions. Networking team continuously monitor for any network breaches.
3.4 Release and Transition Plan
The Digitized Engineering Notebook application will be deployed into a server each time we made the source code changes and we put it to be accessible by all the users.

4 Project Design Description
The Digitized Engineering Notebook application has several functionalities. We try to keep the schema as simple as possible. We designed the Entity Relation diagram which is given below:

5 Internal/External Interface Impacts and Specification
Interfaces are the important part of the Digitized Engineering Notebook web site. This Digitized Engineering Notebook application contains two modules based on the access level specification to provide the facility to control for the application under an administrator and employee. The employee module and administrator module both contains the interfaces per the functionality. The employee module contains the interfaces to create the account, to log in to the account using the credentials which will helpful to add the project information such as contacts, notes, and multimedia info, etc., and view the project information. Employee can also create the contacts, notes, prospects, and project tasks to the existing project. There is an option to add project information, adding the multiple projects, notes, tasks, and files to the existing project. In each form the user has enforced to enter the accurate data in the web forms. As part of this process, JavaScript validations are being used. Some of the web form designs are given below.

Login Page:
Employees and Administrators can login using their credentials from this screen.
PROJECTS DEVELOPED AND ASSIGNED

DIGITIZED ENGINEERING NOTEBOOK

View Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Email</th>
<th>Created Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Project</td>
<td>DBMS</td>
<td><a href="mailto:shravan@gmail.com">shravan@gmail.com</a></td>
<td>2017-04-19 02:32:17.0</td>
</tr>
<tr>
<td>Maths Project</td>
<td>Math</td>
<td><a href="mailto:shravan@gmail.com">shravan@gmail.com</a></td>
<td>2017-04-19 02:35:06.0</td>
</tr>
</tbody>
</table>

TAB TO UPLOAD FILES

DIGITIZED ENGINEERING NOTEBOOK

Upload Files

Select Project Select

Choose File No file chosen
TAB TO VIEW UPLOADED FILES

DISCUSSION BOARD

View Discussion Board

Select Project: Database Project

<table>
<thead>
<tr>
<th>User Name</th>
<th>Email</th>
<th>Discussion</th>
<th>Created Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ashrin</td>
<td><a href="mailto:ashrin@gmail.com">ashrin@gmail.com</a></td>
<td>We all get ready for the project.</td>
<td>2017-04-19 12:00:00</td>
</tr>
<tr>
<td>ashrin</td>
<td><a href="mailto:ashrin@gmail.com">ashrin@gmail.com</a></td>
<td>hello everyone,</td>
<td>2017-04-29 10:00:00</td>
</tr>
</tbody>
</table>

Enter Text: 

Submit
ADMIN PORTAL

DIGITIZED ENGINEERING NOTEBOOK

MANAGE USERS (ADMIN CONTROL)

DIGITIZED ENGINEERING NOTEBOOK

Manage Users
Manage Projects
Users Report
Project Report

USER INFORMATION

Email or Phone: sandeep@gmail.com
Role: ADMIN

Manage Users

First Name  Last Name  Email  User Role  Created Date  Edit  Remove
ashwini  veer  ashwini@gmail.com  EMPLOYEE  2017-04-19 12:00:00  Edit  Remove
Shravan  Kumar  shravan@gmail.com  PROJECTMANAGER  2017-04-19 12:00:00  Edit  Remove
### MANAGE PROJECTS (ADMIN CONTROL)

![Manage Projects screenshot](image1)

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Email</th>
<th>Created Date</th>
<th>Edit</th>
<th>Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Project</td>
<td>DBMS</td>
<td><a href="mailto:sandeep@gmail.com">sandeep@gmail.com</a></td>
<td>2017-04-19 02:30:39.0</td>
<td>Edit</td>
<td>Remove</td>
</tr>
<tr>
<td>Database Project</td>
<td>DBMS</td>
<td><a href="mailto:shivam@gmail.com">shivam@gmail.com</a></td>
<td>2017-04-10 02:32:16.3</td>
<td>Edit</td>
<td>Remove</td>
</tr>
<tr>
<td>Maths Project</td>
<td>Math</td>
<td><a href="mailto:shivan@gmail.com">shivan@gmail.com</a></td>
<td>2017-04-10 02:35:09.3</td>
<td>Edit</td>
<td>Remove</td>
</tr>
</tbody>
</table>

### USER REPORT (ADMIN CONTROL)

![User Report screenshot](image2)

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Email</th>
<th>User Role</th>
<th>Created Date</th>
<th>Delete Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashwini</td>
<td>Ver</td>
<td><a href="mailto:ashwini@gmail.com">ashwini@gmail.com</a></td>
<td>EMPLOYEE</td>
<td>2017-04-19 12:00:00</td>
<td>Not Deleted</td>
</tr>
<tr>
<td>Shivan</td>
<td>Kumar</td>
<td><a href="mailto:shivan@gmail.com">shivan@gmail.com</a></td>
<td>PROJECTMANAGER</td>
<td>2017-04-19 12:00:00</td>
<td>Not Deleted</td>
</tr>
</tbody>
</table>
PROJECT REPORT

DIGITIZED ENGINEERING NOTEBOOK

Project Report

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Email</th>
<th>Created Date</th>
<th>Delete Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database</td>
<td>DBMS</td>
<td><a href="mailto:sandeep@gmail.com">sandeep@gmail.com</a></td>
<td>2017-04-19 02:30:59</td>
<td>Not Deleted</td>
</tr>
<tr>
<td>Database</td>
<td>DBMS</td>
<td><a href="mailto:sharan@gmail.com">sharan@gmail.com</a></td>
<td>2017-04-19 02:32:17</td>
<td>Not Deleted</td>
</tr>
<tr>
<td>Maths</td>
<td>Math</td>
<td><a href="mailto:sharan@gmail.com">sharan@gmail.com</a></td>
<td>2017-04-19 02:35:08</td>
<td>Not Deleted</td>
</tr>
</tbody>
</table>

MANAGE PROJECTS (MANAGER CONTROL)

DIGITIZED ENGINEERING NOTEBOOK

Manage Projects

Add New Project

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Email</th>
<th>Created Date</th>
<th>Edit</th>
<th>Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database</td>
<td>DBMS</td>
<td><a href="mailto:sandeep@gmail.com">sandeep@gmail.com</a></td>
<td>2017-04-19 02:30:59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maths</td>
<td>Math</td>
<td><a href="mailto:sharan@gmail.com">sharan@gmail.com</a></td>
<td>2017-04-19 02:35:08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MANAGE PROJECT USERS (MANAGER CONTROL)
ASSIGNING TASKS (MANAGER CONTROL)

PROJECTS TASKS (MANAGER CONTROL)
6. **Design Units Impacts**

In this module user, can view the information of the website and the he/she can also add their information, can add the multiple contacts, notes, prospects, and projects. Client must login into the system for the adding the client information. User can view only view the client information of the web site. This contains sub modules like registration module, prospect module, and project module.

6.1 **Functional Overview**

User module contains the functionality to set up an account with the Digitized Engineering Notebook web application, posting new project information to the portal and to add the files, notes, contacts, prospects, and project information.

6.2 **Impacts**

This is important module of the Digitized Engineering Notebook. This module contains all the information that user can register, login, manage the user information. In this module, user can register, he/she can add the contacts, notes, prospect, and project information, and upload the files. The user can also update the information of the projects.

6.3 **Requirements**

**User Requirements:**
The user must be able to create a profile, and to add contacts, notes, prospects, and projects for Digitized Engineering Notebook we site.

**Access/Security requirements:**
The data of the client should be in private so that it cannot be accessed by other users. The user must be authenticated by the system software using the OAuth method.

**Interface requirements:**
The user interface provides a way to create client, view clients, search for the clients, and filter the clients among the list of clients. The user should be able to edit the existing clients and update client details easily.

**Scalability requirements:**
The system software must be able to handle many user requests. Bulk amount of data should be easily stored, retrieved and processed by the system software.

**Integration requirements:**
Both the sales management portal and client information module must be integrated and deployed in the system software.

**Quality and Performance requirements:**
Data storage & retrieval should be as quick as possible. The maintenance of events and payment details should have maintained with highest level of security.
7 Open Issues

There are no current open issues now.

8 Acknowledgements

This section should include a reference to prior authors, etc. and others who have assisted in the generation of this document.

9 References

Image File upload to javascript using html Canvas.

http://stackoverflow.com/questions/10906734/how-to-upload-image-into-html5-canvas

Apache Tomat Server running on Windows


SQL Workbench Editor Main Menu


SQL Myworkbench visual performance and data retrieving and query execution wizard.