

**Governors State University**  
**OPUS Open Portal to University Scholarship**

---

All Capstone Projects

Student Capstone Projects

---

Spring 2017

# Digitized Engineering Notebook

Vishwanath Prasad Bingi  
*Governors State University*

Srikanth Y. Mallaboena  
*Governors State University*

Shreya Nyapati  
*Governors State University*

Manousha Penubakula  
*Governors State University*

Follow this and additional works at: <http://opus.govst.edu/capstones>

 Part of the [Computer Sciences Commons](#)

---

## Recommended Citation

Bingi, Vishwanath Prasad; Mallaboena, Srikanth Y.; Nyapati, Shreya; and Penubakula, Manousha, "Digitized Engineering Notebook" (2017). *All Capstone Projects*. 289.  
<http://opus.govst.edu/capstones/289>

For more information about the academic degree, extended learning, and certificate programs of Governors State University, go to [http://www.govst.edu/Academics/Degree\\_Programs\\_and\\_Certifications/](http://www.govst.edu/Academics/Degree_Programs_and_Certifications/)

Visit the [Governors State Computer Science Department](#)

This Project Summary is brought to you for free and open access by the Student Capstone Projects at OPUS Open Portal to University Scholarship. It has been accepted for inclusion in All Capstone Projects by an authorized administrator of OPUS Open Portal to University Scholarship. For more information, please contact [opus@govst.edu](mailto:opus@govst.edu).

## **ABSTRACT:**

Digitized Engineering notebook (DEN) refers to the number practices used by corporations to become aware of, create, represent, and distribute understanding for reuse, cognizance and mastering across the corporation. Digitized Engineering notebook applications are normally tied to organizational goals and are intended to result in the success of specific consequences which include shared intelligence, advanced overall performance, competitive benefit or better tiers of innovation. In this given project, the aim is to develop an online intranet Digitized Engineering notebook system that is of importance to either a corporation or an academic institute. The Digitized Engineering Notebook (DEN) is primarily an Intranet based application that may be accessed for the duration of the institute or a targeted group or branch. This application may be used as knowledge or records management system for the institute. Students or personnel logging in will be able to add any sort of instructional facts. Students, Administrators, Staff or guests logging in may additionally get admission to or seek any information put up by using others. DEN will facilitate knowledge sharing from the grass root degree like project groups to departments to the whole university.

## TABLE OF CONTENTS:

1) Introduction of Digitized Engineering Notebook: .....	1
(A) Introduction	
(B) Proposed System	
(C) Need for computerization	
2) Software requirements.....	1
3) Hardware requirements.....	2
4) Modules:.....	2
(A) Administrator	
(B) Users	
(C) Public Users	
5) Process Diagram.....	3
6) System Analysis:.....	4
(A) Background	
(B) System details	
7) Feasibility Study:.....	5
(A) Technical Feasibility	
(B) Economical Feasibility	
(C) Operational Feasibility	
8) Project instructions.....	7
9) System Analysis:.....	7
(A) Analysis Model	
(B) SDLC Methodologies	
(C) Three tier-architecture in ASP.NET	
(D) Summary	
10) System Requirements Specifications (SRS):.....	9
(A) Introduction	
(B) Functional requirements	
(C) Non-Functional requirements:	
(a) Performance requirements	
(b) Safety requirements	
(c) Product security requirements	
(d) Software quality attributes	
11) System Design:.....	9
(A) Introduction	
(B) High-level design	
(C) Sub-system design	
12) Web User Interface:.....	10
(A) Account handler	
(B) Administrator handler	
(C) User handler	
(D) Public User handler	
(E) Reports handler	
(F) Database storage	
(G) Registration handler	
13) Unified Modelling Language:.....	11

(A) Introduction	
(B) UML Diagrams	
(C) User Model view	
(D) Structural model view	
(E) Behavioral model view	
(F) Implementation model view	
(G) Environmental model view	
14) Data flow diagrams:.....	12
(A) DFD Symbols	
(B) Constructing a DFD	
(C) Salient features of DFD's	
(D) Types of DFD:	
(a) Current Physical	
(b) Current Logical	
(c) New Logical	
(d) New Physical	
(E) Process	
(F) Data Storage	
(G) Source or Sink	
(H) Data flow	
(I) Levels of DFD	
(J) Context diagrams	
15) Database tables:.....	15
(A) Admin Login	
(B) City details	
(C) Country details	
(D) Document category	
(E) Document details	
(F) Rating comments	
(G) State details	
(H) Status	
(I) User details	
(J) User login account	
(K) User type	
16) References.....	17

## 1) INTRODUCTION TO DIGITIZED ENGINEERING NOTEBOOK:

### (A) INTRODUCTION:

Digitized Engineering Notebook (DEN) is an intranet based application that can be accessed throughout the institute or by any group or branch. This application can be used as an expertise or statistics control application for that institute. Students or staff logging in will be able to upload any kind of educational information. Students or team of workers logging in will also get right of entry to or seek any data placed up with the aid of others from this application. DEN will facilitate understanding or sharing knowledge from the very basic level like challenge groups to departments to the whole institution.

### (B) PROPOSED SYSTEM:

The proposed system helps remove procedures that cause data redundancy, make proper navigational sequence, provides information about audits on different levels and reflects the current work status depending on organization. This also builds a strong password mechanism.

### (C) NEED FOR COMPUTERIZATION:

Computerization is of utmost importance these days. People do not want to waste lots of time on doing something manually that can be done by the computers at a very great speed to save their time. The work done by the computer or a machine will consume very less time and is also very accurate.

## 1) SOFTWARE REQUIREMENTS:

The following are the software requirements for the project:

Content	Description
OS	Windows XP with SP2 or Windows Vista
Database	MS-SQL server 2008
Technologies	ASP.NET with C#.NET, CSS
IDE	Visual Studio .Net 2008
Browser	IE

## 2) HARDWARE REQUIREMENTS:

Below given are the requirements for the project.

Content	Description
Processor	Pentium
HDD	20 GB Min 40 GB Recommended
RAM	1 GB Min 2 GB Recommended

## 3) MODULES:

There are three modules in the project and they are:

- (A) Administrators
- (B) Users (Student/ Staff)
- (C) Public Users

### (A) ADMINISTRATORS:

In this module, the Administrator will have the privileges to add or remove any of the Users i.e., Students or Staff, upload or delete any document which was posted by the user. The Administrator can search all the information about the documents and Users. The Administrator can read as well as delete any irrelevant posts by the members of the organization or corporation.

### (B) USERS (STUDENT/ STAFF):

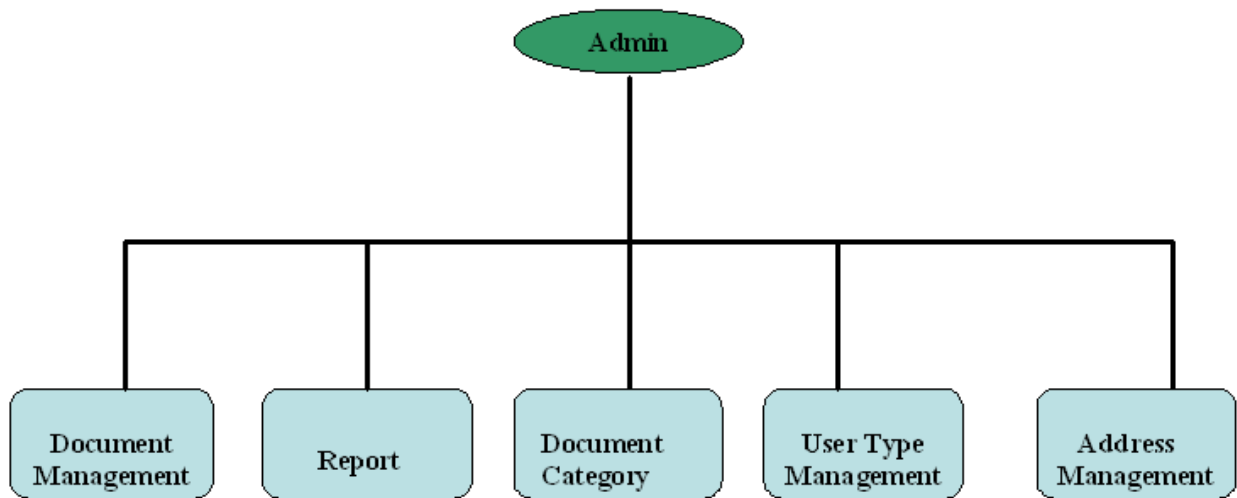
A user will be able to register giving just the basic information. The user can change his or her password after logging in into the system. The user can post a document or any information and edit or delete his or her contributions. The registered user can access any document or information posted by others (only read access). The user can also search information by different parameters like rating, key words, relevance or category. In this module, the User can add and update his own documents. Either student or staff is considered as a user. Only a registered user can upload any document.

### (C) PUBLIC USERS:

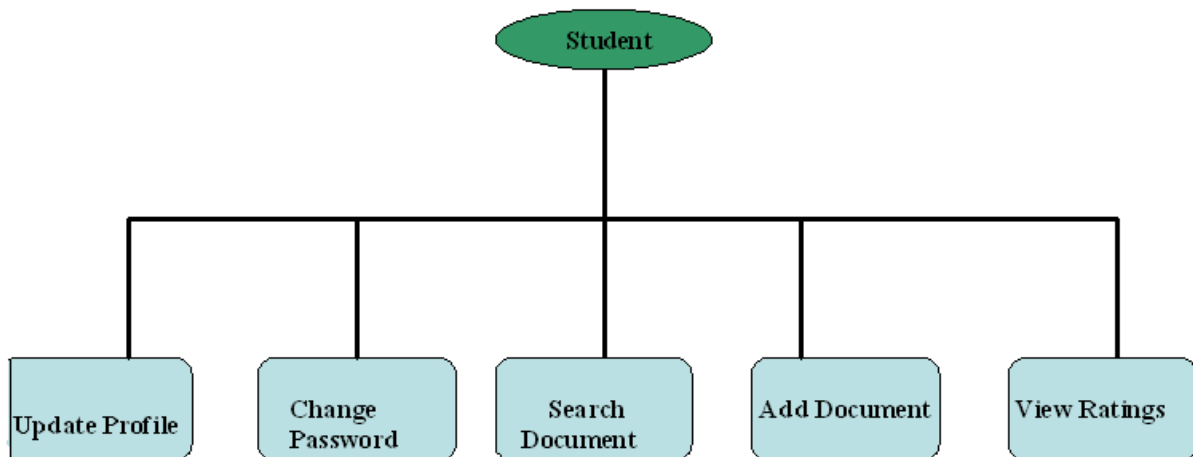
In the Public Users module, a public user can search the documents and download any document that he wishes to without any authentication. The public user does not have any privileges to modify or delete any documents.

4) PROCESS DIAGRAM:

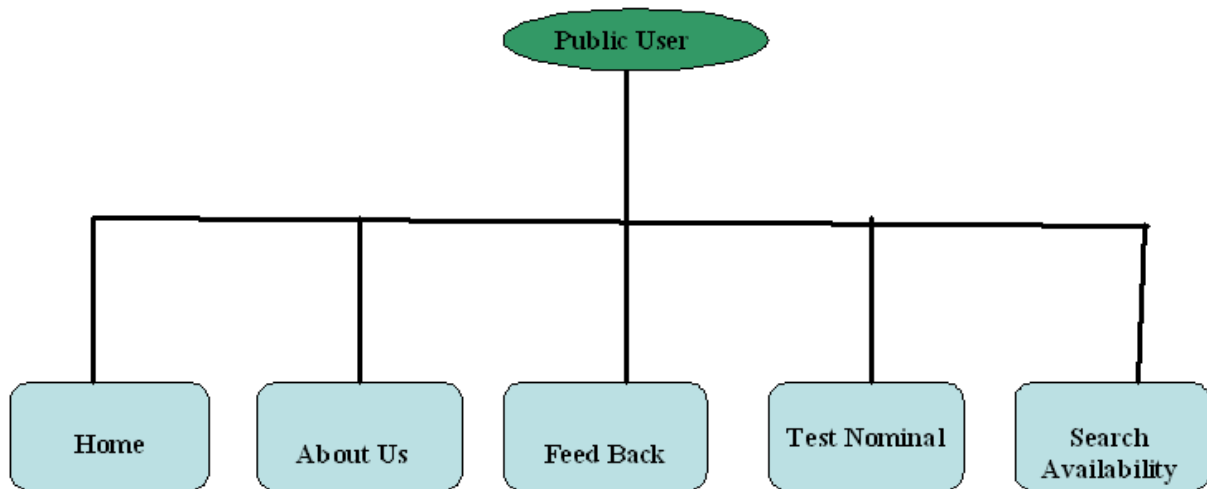
ADMIN:



STUDENT:



## PUBLIC USER:



### 5) SYSTEM ANALYSIS:

#### (A) BACKGROUND:

After analyzing the necessities of the task that ought to perform, succeeding step is to research the drawback and perceive its context. The primary activity within the part is learning the prevailing system and therefore the next step is to know the requirements and domain of the new system. Each of the activities are of equal importance, however the primary activity is a basis of giving the practical specifications than advantageous style of the projected system. Understanding the properties and needs of a replacement system is harder and needs power and understanding of existing running system is additionally difficult.

#### (B) SYSTEM DETAILS:

The first requirement within the section is to review the prevailing system and the next is to grasp the requirements and domain of the new system. Each of the necessities are of equal importance, whereas the primary necessity can function a basis of giving the purposeful specifications then sure-fire style of the projected system. Understanding the properties and necessities of a brand-new system is way harder and needs power and understanding of existing running system. Improper understanding of that system can result in a diversion from answer.

In the flexibility of the user, the interface has been developed with graphics. This is associated with a browser's interface. The GUI's at the top level have been categorized as follows:



1. Administrative user interface.
2. The Operational or generic user interface

The Administrative user interface concentrates on the consistent data that is much an area of the structure activities that desires proper authentication for the information assortment. The interfaces facilitate the administrations with all the transactional states like data insertion, deletion and change beside the in-depth information search capabilities.

The Operational interface helps the users upon the system in transactions through the present knowledge services. The operational program additionally helps the standard users in managing their own information in a very bespoke manner as per the assisted flexibilities.

## 6) FEASIBILITY STUDY:

Feasibility Study is a high-level capsule version of the entire process intended to answer several questions. Feasibility study is conducted once the problem is clearly understood. Feasibility study is necessary to determine that the proposed system is feasible by considering the technical, operational and economical factors. By having a detailed feasibility study, the management will have a clear-cut view of the proposed system.

The following feasibilities are considered for the project to ensure that the project is variable and it does not have any major obstructions. Feasibility study encompasses the following things:

- (A) Technical Feasibility
- (B) Economical Feasibility
- (C) Operational Feasibility

### (A) TECHNICAL FEASIBILITY:

In this step, we verify whether the proposed systems are technically feasible or not i.e., all the technologies required to develop the system are available readily or not.

Technical Feasibility determines whether the organization has the technology and skills necessary to carry out the project and how this should be obtained. The system can be feasible because of the following grounds:

- All necessary technology exists to develop the system.
- This system is too flexible and it can be expanded further.
- This system can give guarantees of accuracy, ease of use, reliability and the data security.
- This system can give instant response to inquire.
- Our project is technically feasible because, all the technology needed for our project is readily available.

Front End: ASP.NET with C#, CSS  
Back End: MSSQL Server 2008  
Web-Server: IIS 5.0  
Host: Windows-XP

#### (B) ECONOMICAL FEASIBILITY:

In this step, we verify which proposal is more economical. We compare the financial benefits of the new system with the investment. The new system is economically feasible only when the financial benefits are more than the investment and expenditure. Economical Feasibility determines whether the project goal can be within the resource limits allocated to it or not. It must determine whether it is worthwhile to process with the entire project or whether the benefits obtained from the new system are not worth the costs. Financial benefits must be equal or exceed the costs. In this issue, we should consider:

- The cost to conduct a full system investigation.
- The cost of hardware and software for the class of application being considered.
- The development tool
- The cost of maintenance.

Our project is economically feasible because the cost of development is very minimal when compared to financial benefits of the application.

#### (C) OPERATIONAL FEASIBILITY:

In this step, we will verify totally different operational factors of the planned systems like man-power, time, etc., whichever resolution uses less operational resources is the best operationally possible resolution. The answer ought even be operationally potential to implement. Operational feasibility determines if the proposed system satisfied user objectives could be fitted into the current system operation. The present system Enterprise Resource Information System can be justified as Operationally Feasible based on the following grounds.

- The methods of processing and presentation are completely accepted by the clients since they can meet all user requirements.
- The clients have been involved in the planning and development of the system.
- The proposed system will not cause any problem under any circumstances.

Our project is operationally feasible because the time requirements and personnel requirements are satisfied. We are a team of four members and worked on this project for three working months.

## 7) PROJECT INSTRUCTIONS:

- Based on the solution requirements, conceptualize the Solution Architecture. Depict the various architectural components, show interactions and connectedness and show internal and external elements. Discuss suitability of typical architectural types like Pipes, Filters, Event Handlers and layers etc.
- Distribute work specifications and carry out coding and testing.

## 8) SYSTEM ANALYSIS:

### (A) ANALYSIS MODEL:

The model that is primarily being followed is the waterfall model, that stated that the phases are organized in a very linear order, Initial of all the practicableness study is finished. Once that half is over the necessity analysis and project coming up with begins. If system exists one and modifications and addition of latest module is required. Analysis of this system is used as basic model. The design starts once the necessity analysis is complete and the cryptography begins once the look is complete. Once the programming is completed, the testing is finished during this model the sequence of activities performed during a software package development project are: Requirement Analysis, Project Planning, System design, Detail design, Coding, Unit testing, System integration and testing.

Here the linear ordering of those activities is vital. End of this section and therefore the output of one section is that the input of alternative section. The output of every section is to be in keeping with the general demand of the system. Several qualities of spiral model are incorporated like when the folks involved with the project review completion of every of the section the work done.

### (B) SDLC METHODOLOGIES:

SDLC stands for Software Development Life Cycle. It is essentially a series of steps or phases that provides a model for the development and lifecycle management of an application or a piece of software.

The steps included in SDLC are as follows:

- Requirement Analysis
- Project Planning
- Project Design
- Development
- Testing
- Implementation
- Maintenance

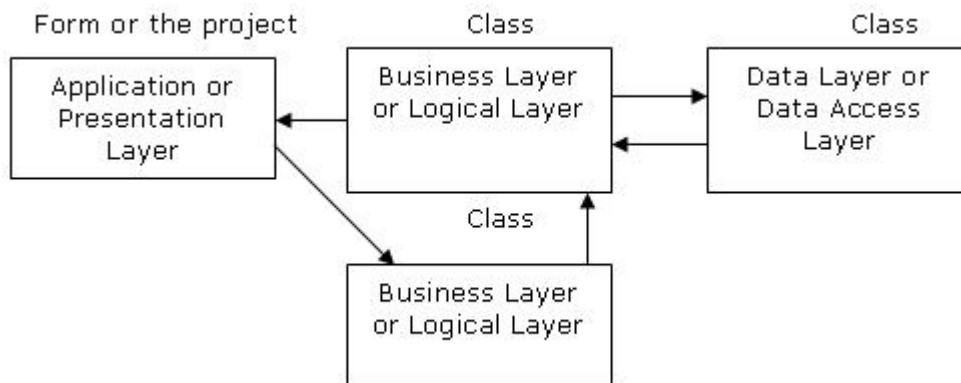
The Spiral Model is like the increment model with more emphasis on risk analysis. The spiral model has four phases including Planning, Risk Analysis, Engineering and Evaluation. A software project repeatedly passes through these phases in iterations. The baseline spiral, starting in the planning phase, requirements is gathered and risk is assessed. Each subsequent spiral build on the baseline spiral. Requirements are gathered during the planning phase.

(C) THREE TIER-ARCHITECTURE IN ASP.NET:

All the three major tiers are arranged on layers in the three-tier architecture. The layers will increase the reusability of the code. The three layers are as follows, namely:

- (1) Application layer
- (2) Business layer
  - (a) Property layer (Sub-layer of the Business layer)
- (3) Data layer

(D) SUMMARY:



- Application layer is the profile where we plan the usage of the controls like textbox, labels, command buttons and many others.
- Business layer is the elegance where we write the features which get the facts from the application layer and passes through the records get access to layer.
- Data layer is like the class which gets the information from the business layer and sends it to the database or receives the statistics from the database and sends it to the commercial enterprise layer or the business layer.
- Property layer is the sub-layer of the commercial enterprise layer in which we make the properties to send or get the values from the software layer.

## 9) SYSTEM REQUIREMENT SPECIFICATION (SRS):

### (A) INTRODUCTION:

The SRS document conscripts all essential requirements that are vital for the project development. To descend the requirements, we should have clear and in-depth understanding of the procedure to be developed. This is organized after detailed communications with the project team and customer. A SRS, a requirements specification for a software system, is a complete explanation of the performance of a system to be developed and may comprise a set of use cases that designate connections the users will have with the software.

### (B) NON-FUNCTIONAL REQUIREMENTS:

#### (a) PERFORMANCE REQUIREMENTS:

Identifying the shortest route to reach the end will progress the performance. Good band width, decreased congestion on the network.

#### (b) SAFETY REQUIREMENTS:

No destruction is anticipated by using the product either to the Operating System or any data.

#### (c) PRODUCT SECURITY REQUIREMENTS:

The product is protected from unofficial users from using it. The system allows only genuine users to work on the application. The users of this system are organization and administrator.

#### (d) SOFTWARE QUALITY ATTRIBUTES:

The product is operator friendly and its availability is from the client. The application is dependable and safeguards its operative maintaining. As it is developed in .NET, it is extremely interoperable with OS that has provided backing for MSIL (server side).

## 10) SYSTEM DESIGN:

### (A) INTRODUCTION:

System layout sits on the technical core of the software program engineering method and is applied to the enhancement model and place of utility. System layout is step one in the upgrading section for any engineered product or system. The developer's intent is to produce a version or illustration of an entity to later be built.

(B) HIGH-LEVEL DESIGN:

Considering greater application with its peripheral interfaces is called System Design.

(C) SUB-SYSTEM DESIGN:

Understanding higher system into minor independent working systems is called sub-system design.

11) WEB USER INTERFACE:

Web User Interface will deliver the interface to the user to connect with the system.

(A) ACCOUNT HANDLER:

This is to know the details about the customer account like balance inquiry, etc.

(B) ADMINISTRATOR HANDLER:

In this module, the Administrator has the rights to add the Users (Students or Staff), document type and delete any documents which was posted by the user. The Admin can explore all the information about the documents and users. Admin can read and delete any unrelated posts by the members.

(C) USER HANDLER:

A user will be able to register providing basic information. Login to the system and change the password after logging in. Posts, documents or information and edit or delete, all these can be done by the user.

(D) PUBLIC USER HANDLER:

The Public User can browse the documents and download any document that he wants without any authentication. He doesn't have any privileges to modify or delete any document.

(E) REPORTS HANDLER:

The following are the reports that can be generated. Implementation of more reports which can be useful can also be done.

- List of members registered in the system and the number of contributions made by them.
- Number of contributions by category and type.

(E) DATABASE STORAGE HANDLER:

This helps us to store data or retrieve the data from database.

(F) REGISTRATION HANDLER:

Registration handler will show the registration details to the user.

12) UNIFIED MODELLING LANGUAGE:

(A) INTRODUCTION:

Constructing a model for a software system preceding to its creation is crucial for having a drawing for constructing a huge building. Decent models are essential for connection amongst project teams. As the complication of the system increases, the reputation of good modelling techniques also increases.

(B) UML DIAGRAMS:

Every complex system is approached by minor set of independent views of a model. Each model may be articulated at various levels of fidelity. The best models are connected to reality.

- (a) Class diagram
- (b) Object diagram
- (c) Use case diagram
- (d) Sequence diagram
- (e) Collaboration diagram
- (f) Activity diagram
- (g) ER diagram
- (h) State Chart diagram
- (i) Component diagram
- (j) Deployment diagram
- (k) Dataflow diagram

(C) USER MODEL VIEW:

This view represents the framework of user point of view. This study illustrates the procedure of handling the situation from end-user's point view.

(D) STRUCTURAL MODEL VIEW:

This model views the static structures and useful information touched from inside the framework.

(E) BEHAVIORAL MODEL VIEW:

This model view describes the active behavioral as parts of system, represents communication between various structural elements which is discussed in user model and structural model view.

(F) IMPLEMENTATIO MODEL VIEW:

In this the structural and behavioral as parts of the system are represented as they are to be built.

(G) ENVIRONMENTAL MODEL VIEW:

In this sort of model view the structural and behavioral aspects of the environment are produced. UML is particularly constructed during unusual domain they are

- UML Analysis modeling: Analysis modeling focuses on the user model and structural model views of the system.
- UML Design modeling: Design modeling focuses on the behavioral, implementation and environmental model views.

13) DATA FLOW DIAGRAMS:

A data flow diagram represents the graphical view and it describes the flow of data through the system. The data will flow from input to output and it may describe logically and independently of physical things associated with the system.

In the DFD, there are four symbols

Square – Source

Arrow – Data flow

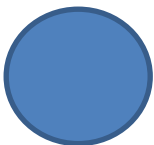
A circle or a bubble - A process that transforms incoming data flow into outgoing data flows.

An open rectangle - data store, data at rest or a temporary repository of data.

(A) DFD Symbols:



Square



Circle





Arrow



Open Rectangle

### **(B) CONSTRUCTING A DFD:**

1. The data flow from top to bottom and from left to right. Data Traditionally flow from source to the destination although they may flow back to the source.
2. When a process is blast into lower level details, they are numbered.
3. We must write down the data storage and end points are written in capital letters and dataflow names are in first letter capital in word.

### **(C) SAILENT FEATURES OF DFD's:**

1. The control loops and considerations will not come in DFD, it shows the dataflow.
2. DFD won't indicate the time factor, like daily, weekly and monthly or yearly.

### **(D) TYPES OF DATA FLOW DIAGRAMS:**

1. Current Physical
2. Current Logical
3. New Logical
4. New Physical

#### **(a) CURRENT PHYSICAL:**

This process carry's the people name and their positions might provide some overall system processing label name of technology, used to flow the data. Data flow and stores label of physical media, on that data will store like computer tapes and files.

#### **(b) CURRENT LOGICAL:**

The materialistic aspect of the system deleted as soon as possible, so that present system is decreased to processor that convert them as physical form.

#### **(c) NEW LOGICAL:**

This is same as current logical, but having some technical issues were not understand internally.

## RULES GOVERNING THE DFD'S:

### (E) PROCESS:

- 1) No process can have only outputs.
- 2) No process can have only inputs.
- 3) A process has a verb phrase label.

### (F) DATA STORE:

- 1) Data cannot flow directly from one data store to another data store.
- 2) A data store has a noun phrase label.

### (G) SOURCE OR SINK:

The origin and /or destination of data.

- 1) Data cannot flow from a source to sink it must be moved by a process
- 2) A source and /or sink has a noun phrase label

### (H) DATA FLOW:

- 1) A Data Flow was occurred only one direction of flow between symbol.
- 2) A join in DFD means, same data came from two or more different processes data store.
- 3) A Data flow to a data store means update (delete or edit).
- 4) A data Flow from a data store means retrieve or use.

### (I) Level Of DFD:

- LEVEL-1: SUBSYSTEM LEVEL DATAFLOW FUNCTIONAL
- LEVEL-2: FILE LEVEL DETAIL DATA FLOW.

I/O data should have from one level to next level.

### **LEVEL-1: SUBSYSTEM LEVEL DATA FLOW**

A level-1 DFD explains the upcoming level of details within the system, detailing the data flows between subsystems, which makeup the whole.

### 13) DATABASE TABLES:

(A) Admin Login:

	Column Name	Data Type	Length	Allow Nulls
▶	<b>AdminLoginId</b>	varchar	50	
	Password	varchar	20	

(B) City Details:

	Column Name	Data Type	Length	Allow Nulls
▶	<b>CityId</b>	int	4	
	CityName	varchar	50	
	CityDescription	varchar	255	✓
	StateId	int	4	
	CountryId	int	4	
	StatusId	int	4	

(C) Country Details:

	Column Name	Data Type	Length	Allow Nulls
▶	<b>CountryId</b>	int	4	
	CountryName	varchar	50	
	CountryDescription	varchar	255	✓
	StatusId	int	4	✓

(D) Document Category:

	Column Name	Data Type	Length	Allow Nulls
▶	<b>CategoryId</b>	int	4	
	CategoryName	varchar	50	
	Description	varchar	250	✓

(E) Document Details:

	Column Name	Data Type	Length	Allow Nulls
▶ 🔑	<b>DocumentId</b>	int	4	
	UserId	int	4	
	StatusId	int	4	
	CategoryId	int	4	
	DocumentTitle	varchar	100	
	ShortDescription	nvarchar	2000	✓
	FullDescription	ntext	16	✓
	DocumentUploaded	varchar	250	✓
	SubmittedBy	varchar	50	✓
	SubmittedDate	datetime	8	✓
	KeyWords	varchar	250	✓

(D) Rating Comments:

	Column Name	Data Type	Length	Allow Nulls
▶ 🔑	<b>RatingCommentID</b>	int	4	
	Rating	int	4	
	Comments	nvarchar	2000	
	CommentsBy	varchar	250	
	CommentsPersonEmail	varchar	250	
	DocumentId	int	4	

(E) State Details:

	Column Name	Data Type	Length	Allow Nulls
▶ 🔑	<b>StateId</b>	int	4	
	StateName	varchar	50	
	StateDescription	varchar	255	✓
	CountryId	int	4	
	StatusId	int	4	

(F) Status:

	Column Name	Data Type	Length	Allow Nulls
▶ 🔑	<b>StatusId</b>	int	4	
	StatusName	varchar	20	
	StatusDescription	varchar	255	✓

(J) User Details:

	Column Name	Data Type	Length	Allow Nulls
▶ ?	<b>UserDetailsId</b>	int	4	
	UserId	int	4	
	ContactNo	varchar	50	
	Address	varchar	150	
	CityId	int	4	
	StateId	int	4	
	CountryId	int	4	
	StatusId	int	4	
	EmailId	varchar	50	
	DOB	datetime	8	
	Sex	varchar	10	
	FirstName	varchar	50	
	MiddleName	varchar	50	✓
	LastName	varchar	50	✓
	UserTypeId	int	4	
	Qualification	varchar	50	
	RegisteredDate	datetime	8	✓

(K) User Login Account:

	Column Name	Data Type	Length	Allow Nulls
▶ ?	<b>UserId</b>	int	4	
	UserName	varchar	30	
	Password	varchar	30	

(L) User Type:

	Column Name	Data Type	Length	Allow Nulls
▶ ?	<b>UserTypeID</b>	int	4	
	TypeName	varchar	100	✓
	Description	varchar	255	✓

## 17) REFERENCES:

- <http://www.engineering.com/DesignSoftware/DesignSoftwareArticles/ArticleID/4678/Digital-Notebooks-for-Engineering.aspx>
- [https://www.youtube.com/watch?v=8tz9\\_6aORHc](https://www.youtube.com/watch?v=8tz9_6aORHc)
- <https://www.ischool.utexas.edu/~jacekg/docs/masc/MASc-Thesis.pdf>