

## **Towards Automated Generation of ER-Diagram using a Web Based Approach**

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**Abstract :** *Diagrams plays an important role in the software development process. Drawing the diagrams manually is the time consuming task, so there are many tools to draw and modify the diagram. From all the diagrams ER (Entity Relationship) Diagram plays an important role in the software development process in Computer Engineering. This paper will describe the existing tools and presents a Web Application to generate the Entity Relationship Diagram automatically. This Web Application will allow us to generate Entity Relationship Diagram automatically by a form filling method which will take the Entity, Attribute and Relationship as an input and gives the Entity Relationship Diagram as output automatically.*

**Keywords -** *Automated ER-Diagram, Entity Relationship Diagram, Software Development Process, Web Application*

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### **I. INTRODUCTION**

There are numerous Diagrams like block diagrams, organizational chart for showing the hierarchical structure, network diagram of an association, Pie Chart, Flow Chart, ER-Diagram and so forth. In any case, out of every one of these Diagrams ER-Diagram is critical in the programming development process. In today's business world, databases are almost significant, as they describe information about an organization and entity relationship modeling is by a wide margin the most well-known approach to express the expository consequence of an early stage in the creation of the new database [1]. In this paper, we are going to see the distinction between the ER-Diagram creating tools which is a manual procedure, additionally require the lots of knowledge about tools and a web Application that we are going to create. Presently there are different tools to draw the diagram. These tools are not at risk for automatic generation of ER-Diagram (Entity Relationship graph). These tools provide the platform for the user to represent the ER-diagram using various symbols. Currently used tools for creation of ER-diagram are Edraw [7], DIA [8] and so forth. These tools are producing the Entity Relationship Diagram manually.

This infer to requirement of dragging and dropping the items which are required to draw the Entity Relationship Diagram. It should to be noticed that there are numerous representations of ER-Diagram for the same problem. We additionally plan to implement the web Application in the three stages

Step1:- Taking the input from the user, i.e. Entity, Attribute and Relationships

Step2:- Providing input to a web form.

Step3:- Generate and Store the ER-Diagram.

DIA [7] and Edraw [8] is a manual tool to produce ER-Diagram. Paper [1] has not more concentrate on ER-Diagram, paper [2] has not Clear thought regarding the how to produce an ER-diagram naturally, paper [3] have the troublesome procedure for creating ER-Diagram automatically, so we are developing the Web application which is generating the Entity Relationship Diagram automatically. As this process is automatic this can be very useful for the user.

### **II. LITERATURE SURVEY**

ADG (Auto-Diagram generator) tool is used to create the Flow Chart, Block Diagram and Entity Relationship Diagram by form filling and text selection method [1]. Form filling strategy used is one of the best methodologies for a novice user to determine the diagram prerequisites. The diagram generator and editor is the principle part of this tool. DeZign tool is utilized for generation of a diagram [2]. DeZign tool creates the Extended Entity Relationship Diagram and this is utilizing the form filling system as like the ADG (auto graph generator) tool. DeZign utilize the three modules to create the Diagram. DeZign device utilizes a Simple English explanation as information and gives the Entity Relationship Diagram as a yield. Paper [3] Explains about an ABCM (Association based theoretical model) and how the ABCM utilizes a connection Adaptive way to deal with creating the Entity Relationship chart. Before creating the ER diagram a graphical tool called Association based theoretical model is utilized to discover a relationship between a two or more objects

described in the business depictions. The ABCM can deal with a three or more objects and also two ones in a breath.

AER (Articulated Entity Relationship) is created from the Entity-Relationship diagram [5]. The AER is an expansion to the ER-graph. In the AER, diagram is produced automatically, but the ER-diagram is taken manually. NLP (natural language processing) is used for producing the Entity-Relationship diagram [6]. Heuristic methodology is utilized for producing the Entity Relationship diagram. The semantic Heuristics will be utilized to decide the Entity, Attribute and Relationships from a database specification. Heuristics are a superior methodology however the Diagram generation process is complicated because of this. Syntactic Heuristics are executed in the ER-converter. Diagram generation algorithms are given in [4]. Building block diagrams, graphical objects, diagram resizing and graph altering algorithms are depicted. However, the procedure utilized is manual.

Table 1 demonstrates the correlation between the distinctive tools like ADG, ABCS and DeZign. Table 1 additionally indicates how these devices are ideal to produce the Entity relationship graph.

Right now there are numerous tools existing for the generation of an ER-diagram (entity relationship diagram). These tools are DIA [7], Edraw [8] and so on. DIA device is utilized to create the diagrams like stream flow chart, block diagram, ER-Diagram and so on. In any case, before drawing the diagram we need to first install that tool on our machine and should have knowledge about the DIA tool. In the DIA process, drawing diagram is manual. Thus, diagram generation process in DIA is tedious. Edraw is another tool as like DIA which additionally utilizes the manual procedure to draw the diagram.

Tool Name	Survey Details	Findings
ADG Tool[1]	This explains about Automating diagram process and for atomization they use ADG tool which uses the form filling method.	Tool explains about atomization of other diagrams and does not focus on ER-diagram.
DeZign Tool[2]	This explains about automating diagram process and use DeZign tool to generate the Entity Relationship Diagram.	Clear thought regarding how to produce ER-diagram automatically is not clarified.
ABCS(Association-Based Conceptual Based Systems) Tool[3]	For ER-diagram generation process uses ABCS(Association-Based Conceptual Based Systems).This uses the Context Adaptive approach to generate the ER-Diagram	Difficult process for generating ER-diagram automatically.

Table 1:- Comparison between Automated Tools

### III. PROPOSED SYSTEM

Proposed system discusses about system architecture and mathematical model of automated ER-Diagram generation.

#### 3.1 System Architecture

System architecture indicates how we are developing the web Application to produce the Automated Entity Relationship Diagram. Figure 1 demonstrates a System Architecture for producing the Entity Relationship Diagram automatically. As the architecture is a web based so, we need to build up a web application. In Automated ER-Diagram Generation we have the web page which will take the Entity, Attribute, Relationships as data and giving the ER-Diagram as output. A Proposed plan for an automated ER-Diagram is partitioned into the 3 modules.

Module1: Accepting Entity, Attribute and Relationships.

Module2: Generating ER-Diagram automatically.

Module3: Storing ER-Diagram onto the device.

In the module 1, we are accepting the Entity details, Attribute details and Relationship details from the user through the user interface. Entity details contain the quantity of Entities, name of every Entity and type of each entity. Attribute details contains the quantity of Attributes for respective entity, the name of each Attribute, the type of each attribute. Relationship details contain the name of the relationship between any two entities. As this procedure is on the web so in the wake of giving the data this data is sent to the server. At the point when

data goes to a server then this data is saved into a database. This data will be given in the following module to create the output.

In module 2, we are giving Entity detail, attribute details & Relationship details as input to this module and generating the ER-Diagram automatically.

In module 3 we are taking the ER-Diagram which is created by the Module 2 and this Diagram is saved into the format which a user is comfortable. After saving a file in this format the file is stored onto a storage device and then provided to the user. The User needs to give all the data to create the ER-Diagram automatically.

Figure 1 shows the proposed design diagram which takes the input as an Entity, Attribute & Relationships. Then this input information is provided on the web page which generates ER-Diagram automatically. Figure 1 shows this basic system architecture to generate the ER-Diagram. Arrows in the diagram show the input and output to and from the web application. Initially a user gives an input which is provided to the webpage and these web pages will give the output as the ER-Diagram as shown in the Diagram. Figure 1 also shows an IIS (internet information server) Server. The ISS sever is the server on which our automated ER-Diagram generation web application is running. When contrasted with the past devices this Web Application is the better way to deal with produce ER-diagram furthermore as these are accessible on the web so it is easy to use for the User.

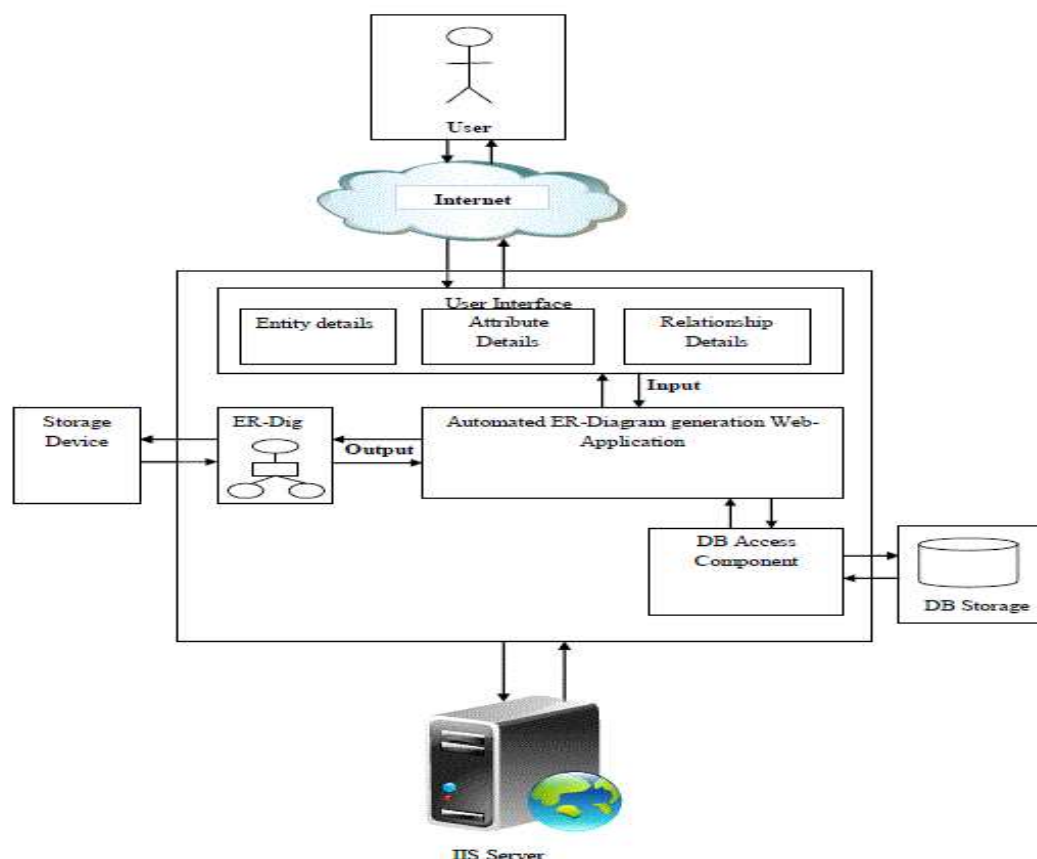


Fig. 3.1: System Architecture for Automated ER-Diagram Generation.

### 3.2. Mathematical Model

Set Theory:

Let S be the set then,  $S = \{EN, AT, RS\}$

Where,

EN=set of entities

AT=set of attributes

RS=set of relationships and

EN, AT and RS are represented as

$EN = \{E1, E2, E3, \dots, En\}$

$AT = \{A11, A12, A13, \dots, A1n,$

$A21, A22, A23, \dots, A2n,$

$An1, An2, An3, \dots, Ann\}$

$RS = \{R1, R2, R3, \dots, Rn\}$

#### IV. EXPERIMENTAL RESULTS

This section discusses about how ER-diagram is generated automatically. Screenshot 4.1, shows the Entity filter details for three levels, i.e. low, middle and expert.

TABLE NO	TABLE NAME	IS LOW	IS MEDIUM	IS EXPERT
1	Employee	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Department	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Payment	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Screenshot 4.1: Entity filters Details.

Screenshot 4.2, shows the Attribute filter details for three levels, i.e. Low, Middle and Expert. Screenshot 4.3, shows the Relationship filter details for three levels, i.e. Low, Middle and Expert. Screenshot 4.4, shows the low level ER-diagram which is generated by filtering Entity, Attribute and Relationship. Screenshot 4.5, shows the Middle level ER-diagram which is generated by filtering Entity, Attribute and Relationship. Screenshot 6 shows the Expert level ER-diagram which is generated by filtering Entity, Attribute and Relationship.

HomeSettingsFilter SettingsContact

Employee D

Attribute

FILTER

TABLE NO	ATTR NO	ATTR NAME	IS LOW	IS MEDIUM	IS EXPERT
1	1	Name	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	2	Phone Num	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1	3	Salary	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1	4	Empl ID	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	1	Dept Num	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	2	Dept name	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	3	Budget	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	1	DOB	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	2	Name	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	3	Age	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

SAVE

Screenshot 4.2: Attribute filters Details.

HomeSettingsFilter SettingsContact

Employee D

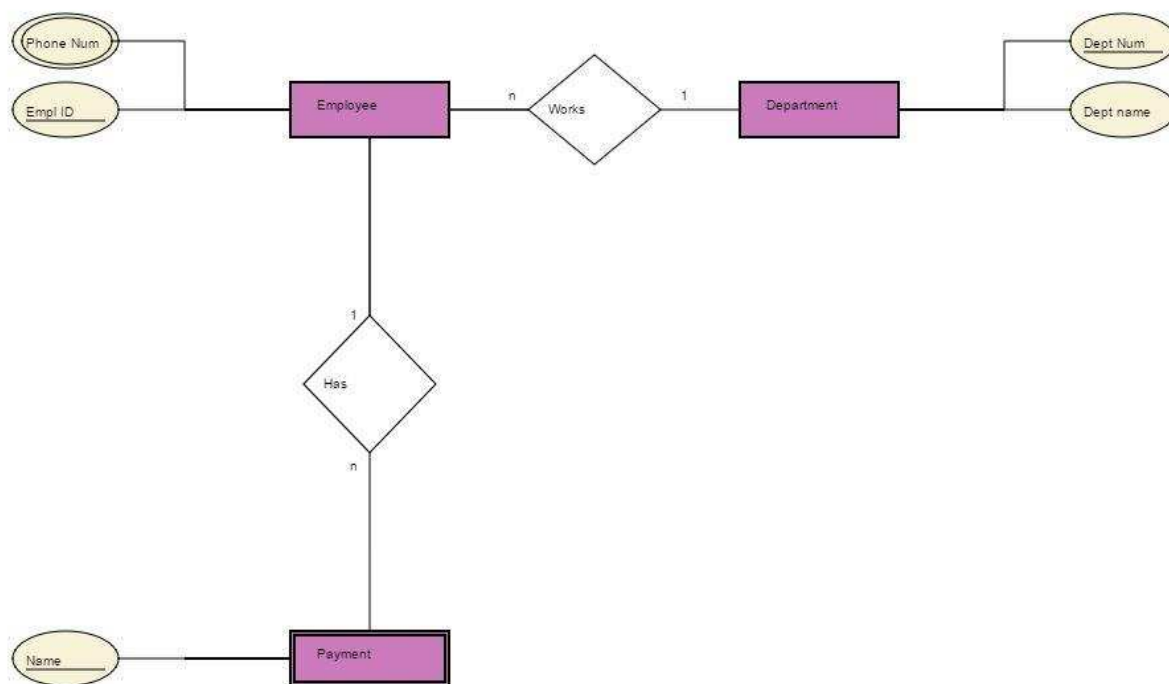
Relation

FILTER

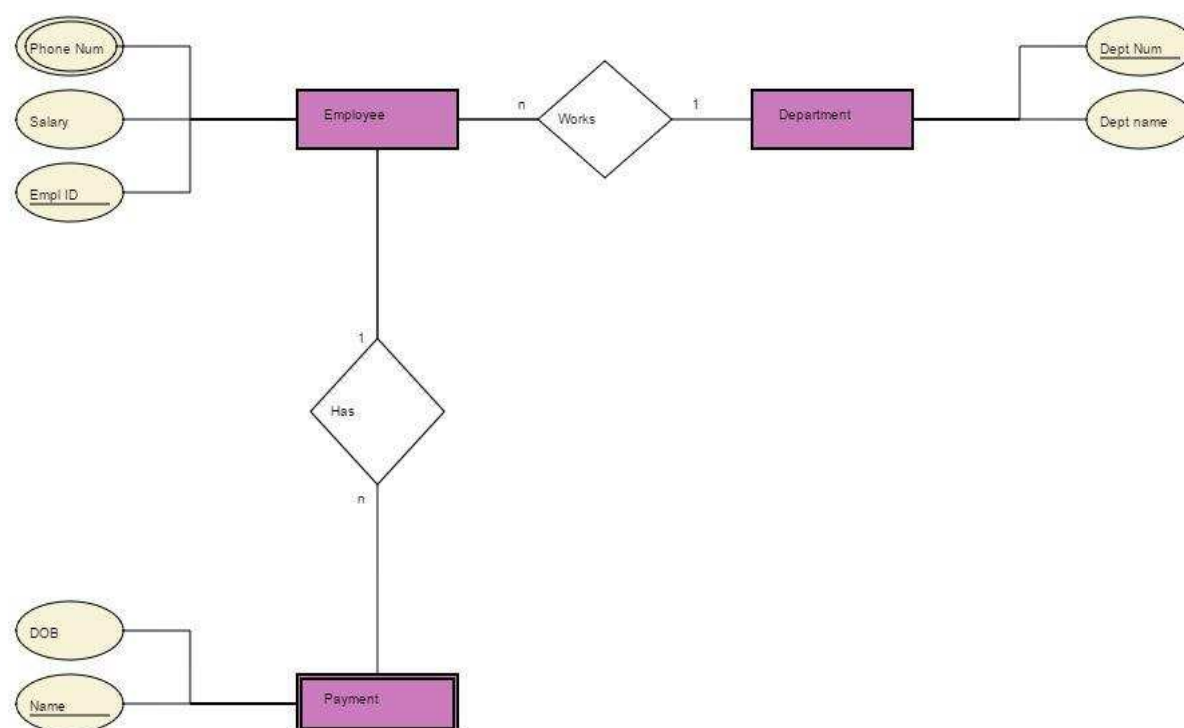
REL NO	TABLE NAME1	TABLE NAME2	RELATION	IS LOW	IS MEDIUM	IS EXPERT
1	Employee	Department	Works	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Employee	Payment	Has	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

SAVE

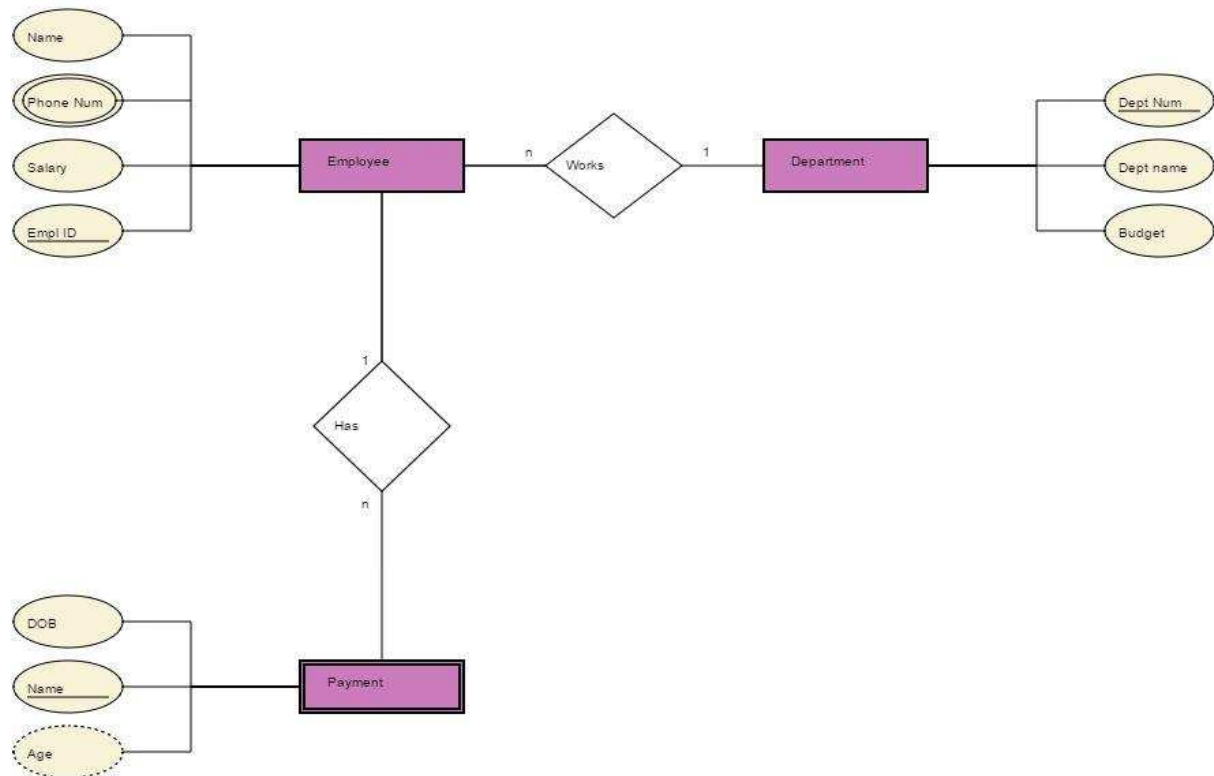
Screenshot 4.3: Relationship filters Details.



Screenshot 4.4: Low level ER-Diagram.



Screenshot 4.5: Medium level E-R Diagram.



Screenshot 4.6: Expert level E-R Diagram.

## V. CONCLUSION

A Web Application for Automated generation of ER-Diagram provides a way to generate Automated ER-diagrams, which makes it usable for a wide range of users. This Web Application is user friendly and rather than drag and drop approach it uses an automated approach to generate the diagram. A user does not require more knowledge to generate the diagrams as compared to other available tools.

A Web Based approach towards Automated ER-Diagram generation can be extended to generate the Extended Entity Relationship Diagram (EED) automatically by providing input as an attribute, entity and so forth. In future we can also extend this for generating all the UML diagrams like Use case diagram, Data Flow diagram, Class Diagram and so forth.

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