ARCHITECTURE FIRM MANAGEMENT SYSTEM

Submitted in the partial fulfillment of the requirements for

MASTERS IN BUSINESS ADMINISTRATION

TO

PES UNIVERSITY

BY

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ABSTRACT

The handling of data effectively and the streamlining of processes are critical in the quickly changing environment of modern corporate operations. This study examines the conception, creation, and assessment of an Architecture Firm Management System (AFMS), an extensive programme developed to meet the requirements of architectural companies. By utilizing the potential of a strong database system, the AFMS seeks to improve the management of projects, drawings, design processes and team members.

This project is done using the software MySQL, the data base generated is implemented here in MySQL. In this project the relationship between the entities and ER diagram is given to get an idea of the output, schema is populated through MySQL, for the assumed query the necessary output is pulled out and explanation regarding the same is provided.

KEYWORDS:

"Architecture Firm Management System, ER Diagram, Entities, Queries"

INTRODUCTION

Beginning with a crystal-clear problem description that highlights the difficulties faced by architecture companies, this project deeply digs into the AFMS's development process. This projects aim is to develop data by user-friendly interface which is MySQL. This process entails creating a database with a relational schema, creating the primary key and the foreign key to get the schema connected and required queries are drawn and the results areinterpreted.

By turning concepts into physical structures, architecture companies play a crucial part in defining the built environment. However, the complexity of architectural projects necessitates effective project management, smooth cooperation, and adherence to legal requirements. The idea of an Architecture Firm Management System (AFMS) develops in order to overcome these problems and make use of technology.

As the technology is improving there is better scope for the architecture firm to do the designs and the related drawing with the help of the AI tools, which will also give a better experience for their clients, maybe a 3D model would work better with client experience. And the concept 3D model could also be

implemented to the schema and can be shown in the schema. We can also look upon to the sustainable architectural styles and bring up the concept of using eco-friendly products for construction purposes. Materials and the type of materials we use for the designing the buildings may an interior design will give out the architectural beauty and brings good fame to the architecture firm.

FUNCTIONS OF ARCHITECTURE FIRM MANAGEMENT SYSTEM:

An architecture firm management system's main objective is to offer a complete solution that will assist architectural businesses in streamlining their operations, fostering cooperation, enhancing project management, and optimising design procedures. The system's features are made to serve the goals of architecture companies and to meet theirrequirements.

1) PROJECT MANAGEMENT:

- Create new projects, provide project specifics, and establish project goals.
- Task Distribution: Distribute tasks among team members and architects while outlining theirduties.
- Tracking the timeline: Keep track of project deadlines, phases, and milestones.
- Budget management involves tracking expenses, comparing actual spending to plannedspending, and managing project budgets.
- Resource Allocation: Allocate architects and resources in accordance with the abilities, accessibility, and project needs.
- Storage of project-related paperwork, including contracts, drawings, and permits.

2) COMMUNICATION AND COLLABORATION:

- Real-time Collaboration: Enable concurrent design work so that various team members can participate and work together.
- Discussion forums: Give architects a forum to talk about project specifics, concepts, and problems.
- Send automatic alerts and notifications for new task assignments, status updates, and duedates approaching.
- Allow teammates to interact in context for prompt questions and updates using instant messaging.

3) CLIENT AND MATERIAL:

- Keep track of client preferences, information, and contact history in a client database.
- Client portals give customers access to communications, design updates, and projectupdates.
- Feedback gathering: Ask clients for their opinions on new design ideas and updates.
- Control substances, vendors, prices, and stock levels with the materials database.
- Tracking the usage of resources that are utilised for projects and estimate consumption.
- Keep track of orders, delivery timelines, and supplier information.

PROBLEM STATEMENT:

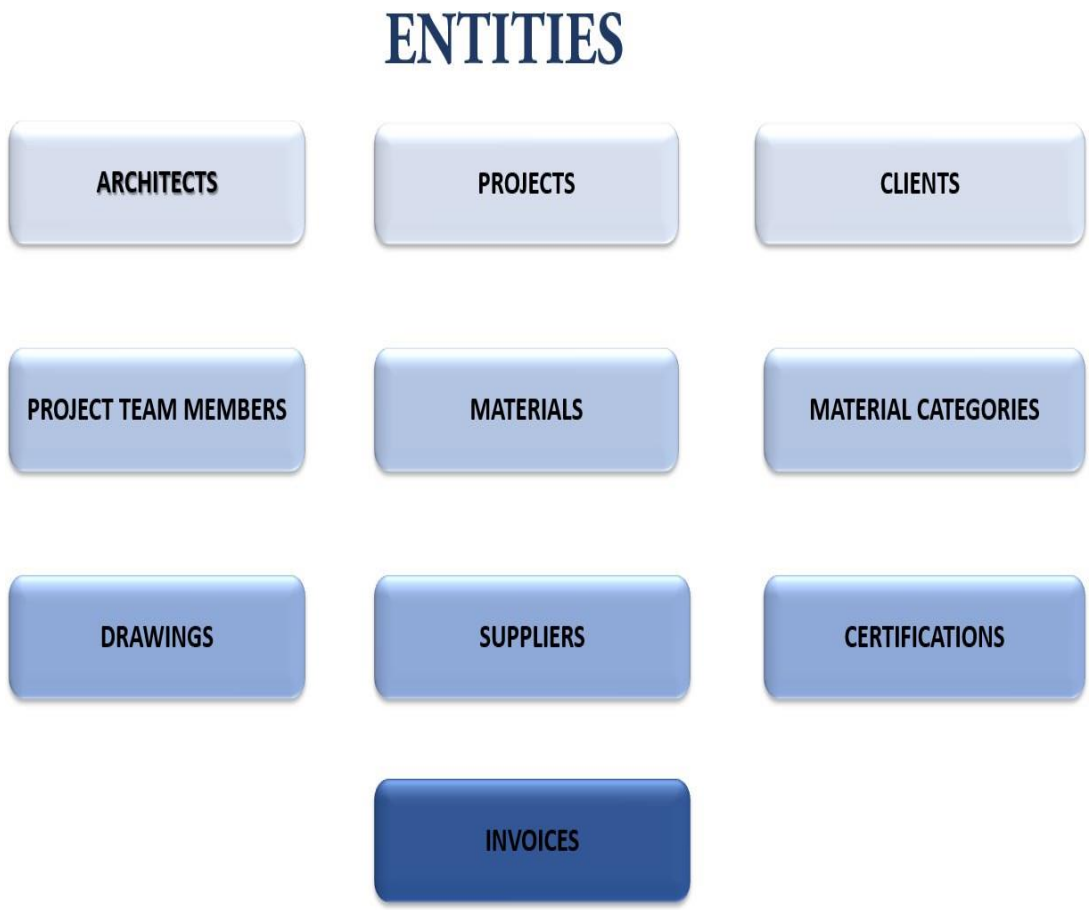
- Architecture firms confront difficulties in effectively managing projects, engaging with team members, optimizing's design processes, and guaranteeing adherence to building codes andlaws.
- Lack of a complete and integrated system frequently causes scattered workflows, communication breakdowns, delays, and challenges managing the project's progress and financials.
- A strong architecture firm management system is required to address these issues and offer a unified platform to optimize project delivery, boost collaboration, and streamline operations.

OBJECTIVE:

- To create a database system which keeps all the information intact and which would helpthe architecture firm to run smoothly, and keep accounts of all the entities.
- To develop database and executing the same in MySQL
- Running the queries and getting the output of the queries, so it is easy to get the exact dataneeded.
- Building ER diagram with the entities and attributes and getting out the schema.

METHODOLOGY:

In this research paper the database is inserted to MySQL to get the get the output. The software is much easier to use and get the answers to all the queries by using accurate codes and syntax. So, in order to get the output at first, we must create the entities and attributes which has the primary and foreign key to connect to the schema, in this Architecture firm management system there are 10 entities.

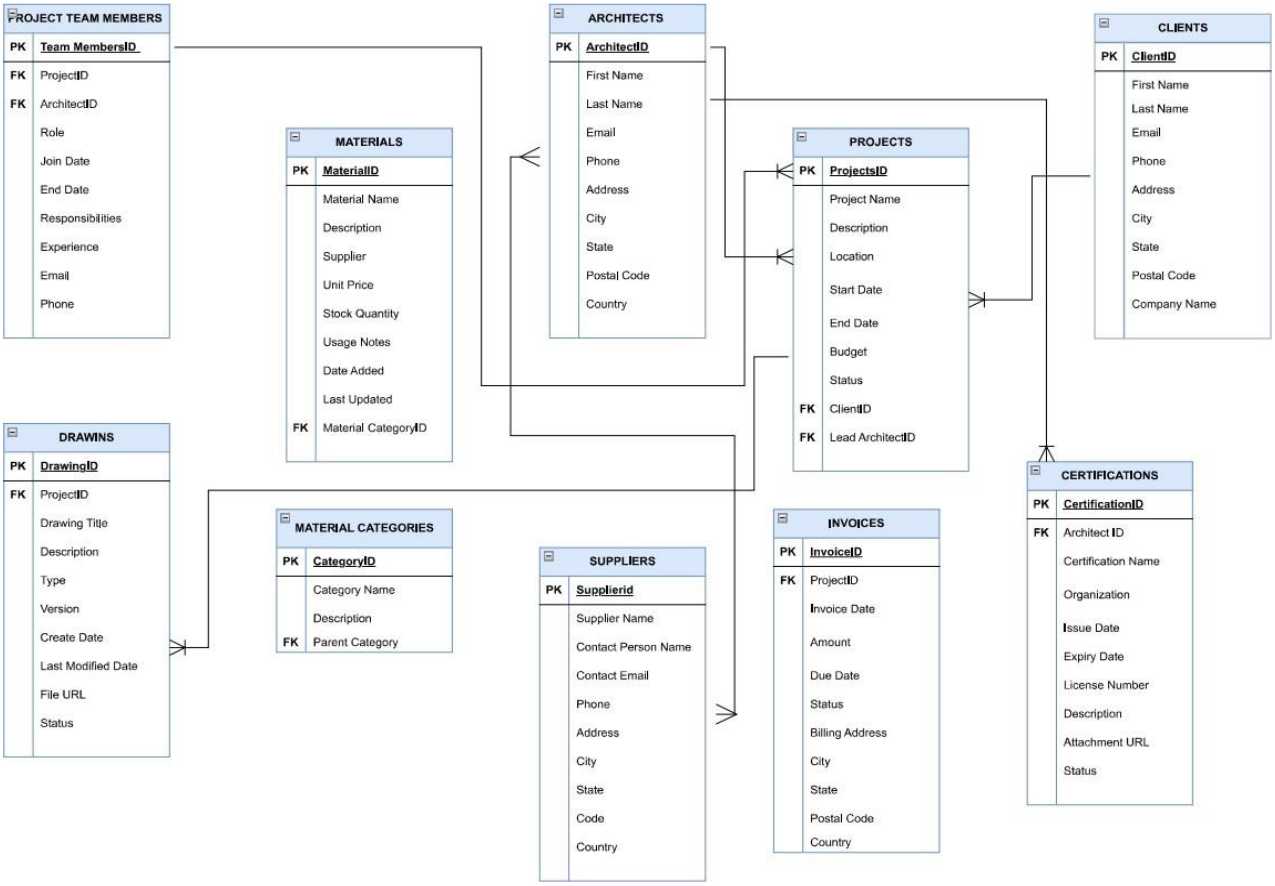

ENTITIES
ARCHITECTS
PROJECTS
CLIENTS
PROJECT TEAM MEMBERS
MATERIALS
MATERIAL CATEGORIES
DRAWINGS
SUPPLIERS
CERTIFICATIONS
INVOICES

RELATIONSHIPS BETWEEN ENTITIES:

1. Architects - Projects (One-to-Many)
2. Projects - Clients (Many-to-One)
3. Projects - Project Team Members (One-to-Many)
4. Architects - Certifications (One-to-Many)
5. Projects - Drawings (One-to-Many)
6. Materials - Material Categories (Many-to-One)
7. Projects - Invoices (One-to-Many)
8. Architects - Suppliers (Many-to-Many, through Certifications)

ENTITY	PRIMARY KEY	FOREIGN KEY
ARCHITECTS	ArchitectID	--
PROJECTS	ProjectID	ClientID LeadArchitectID
CLIENTS	ClientID	--
PROJECTTEAM MEMBERS	Team MemberID	ProjectID ArchitectID
MATERIALS	MaterialID	Material CategoryID
MATERIAL CATEGORIES	CategoryID	--
DRAWINGS	DrawingID	ProjectID
SUPPLIER	SupplierID	--
CERTIFICATIONS	CertificationID	ArchitectID
INVOICE	InvoiceID	ProjectID

ER DIAGRAM:



ABOUT DATABASE:

Database systems provide organized ways to divide data into rows, and columns, makinginformation management and access simpler.

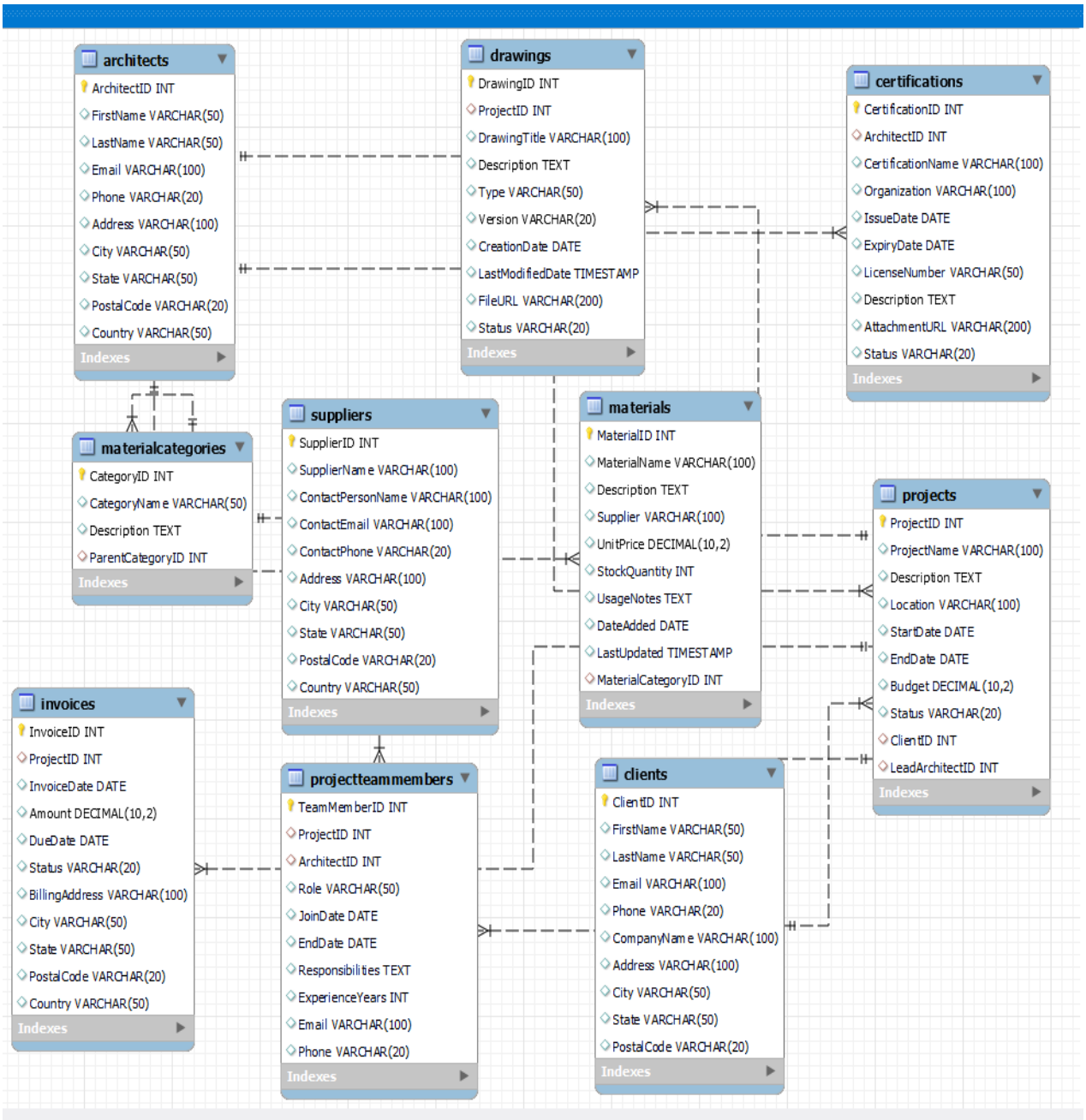
Database systems use restrictions and rules to maintain data integrity, which prevents theuse of unnecessary, incorrect, or inconsistent data.

To guard against unauthorized access, database systems offer security features includinguser identification, control of access.

SQL queries are a strong querying tool that database systems enable, enabling users toretrieve specified data.

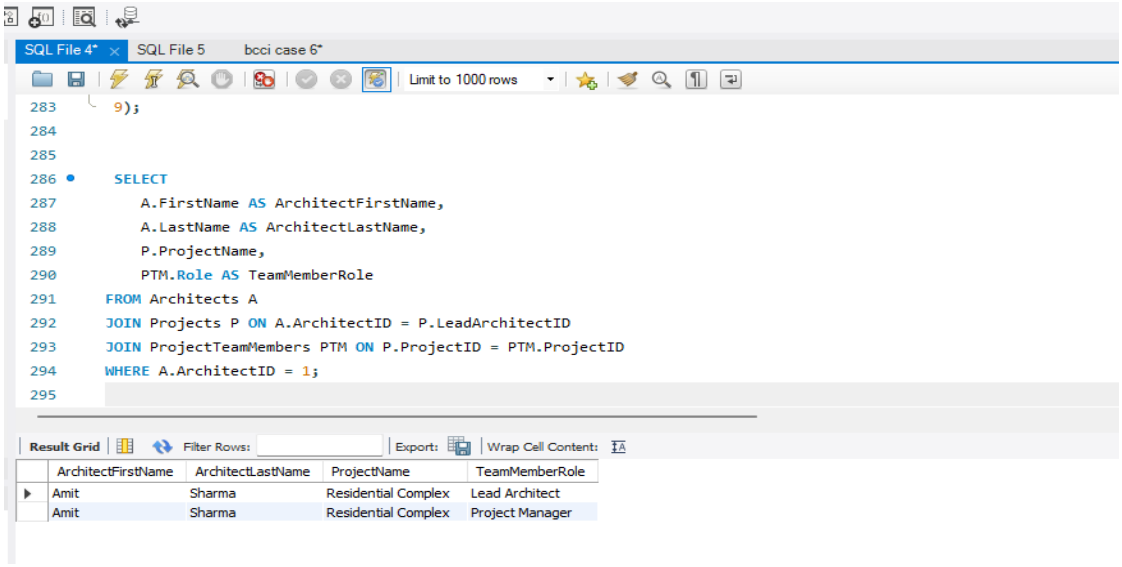
By allowing multiple people and apps to obtain and share information obtained from a singlesource, less data duplication of data can be seen, and improved collaboration are the results.

SCHEMA


architects
ArchitectID INT
FirstName VARCHAR(50)
LastName VARCHAR(50)
Email VARCHAR(100)
Phone VARCHAR(20)
Address VARCHAR(100)
City VARCHAR(50)
State VARCHAR(50)
PostalCode VARCHAR(20)
Country VARCHAR(50)
Indexes
drawings
DrawingID INT
ProjectID INT
DrawingTitle VARCHAR(100)
Description TEXT
Type VARCHAR(50)
Version VARCHAR(20)
CreationDate DATE
LastModifiedDate TIMESTAMP
FileURL VARCHAR(200)
Status VARCHAR(20)
Indexes
certifications
CertificationID INT
ArchitectID INT
CertificationName VARCHAR(100)
Organization VARCHAR(100)
IssueDate DATE
ExpiryDate DATE
LicenseNumber VARCHAR(50)
Description TEXT
AttachmentURL VARCHAR(200)
Status VARCHAR(20)
Indexes
materialcategories
CategoryID INT
CategoryName VARCHAR(50)
Description TEXT
ParentCategoryID INT
Indexes
suppliers
SupplierID INT
SupplierName VARCHAR(100)
ContactPersonName VARCHAR(100)
ContactEmail VARCHAR(100)
ContactPhone VARCHAR(20)
Address VARCHAR(100)
City VARCHAR(50)
State VARCHAR(50)
PostalCode VARCHAR(20)
Country VARCHAR(50)
Indexes
materials
MaterialID INT
MaterialName VARCHAR(100)
Description TEXT
Supplier VARCHAR(100)
UnitPrice DECIMAL(10,2)
StockQuantity INT
UsageNotes TEXT
DateAdded DATE
LastUpdated TIMESTAMP
MaterialCategoryID INT
Indexes
projects
ProjectID INT
ProjectName VARCHAR(100)
Description TEXT
Location VARCHAR(100)
StartDate DATE
EndDate DATE
Budget DECIMAL(10,2)
Status VARCHAR(20)
ClientID INT
LeadArchitectID INT
Indexes
invoices
InvoiceID INT
ProjectID INT
InvoiceDate DATE
Amount DECIMAL(10,2)
DueDate DATE
Status VARCHAR(20)
BillingAddress VARCHAR(100)
City VARCHAR(50)
State VARCHAR(50)
PostalCode VARCHAR(20)
Country VARCHAR(50)
Indexes
projectteammembers
TeamMemberID INT
ProjectID INT
ArchitectID INT
Role VARCHAR(50)
JoinDate DATE
EndDate DATE
Responsibilities TEXT
ExperienceYears INT
Email VARCHAR(100)
Phone VARCHAR(20)
Indexes
clients
ClientID INT
FirstName VARCHAR(50)
LastName VARCHAR(50)
Email VARCHAR(100)
Phone VARCHAR(20)
CompanyName VARCHAR(100)
Address VARCHAR(100)
City VARCHAR(50)
State VARCHAR(50)
PostalCode VARCHAR(20)
Indexes

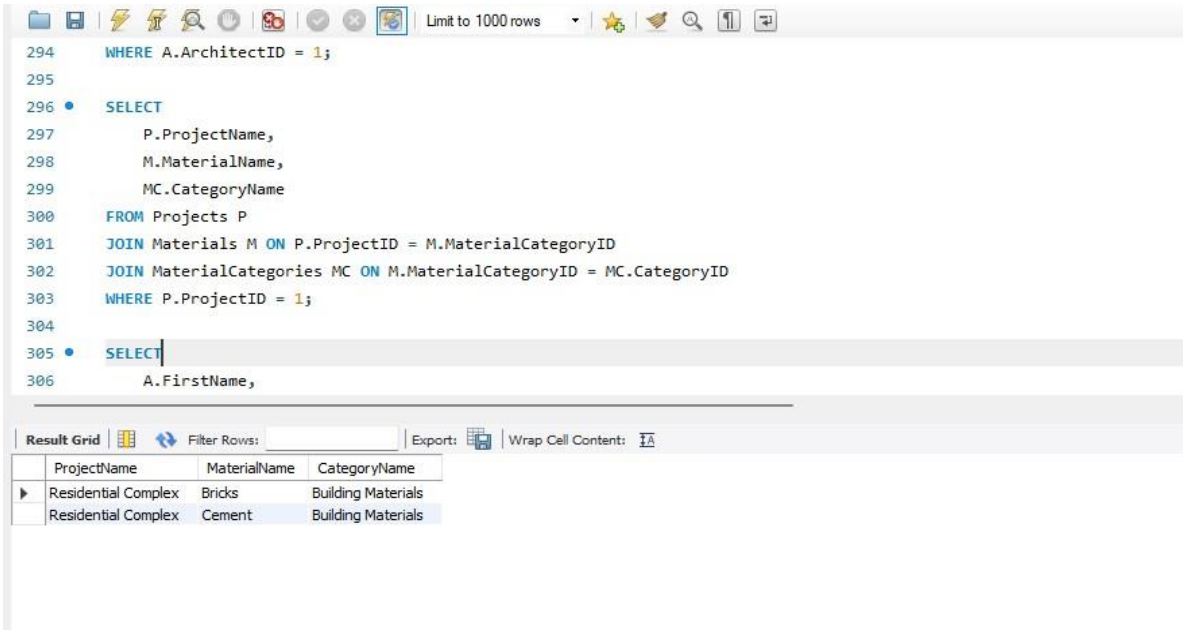
BUSINESS QUERIES:

1) To get the information about the architect's projects and roles:



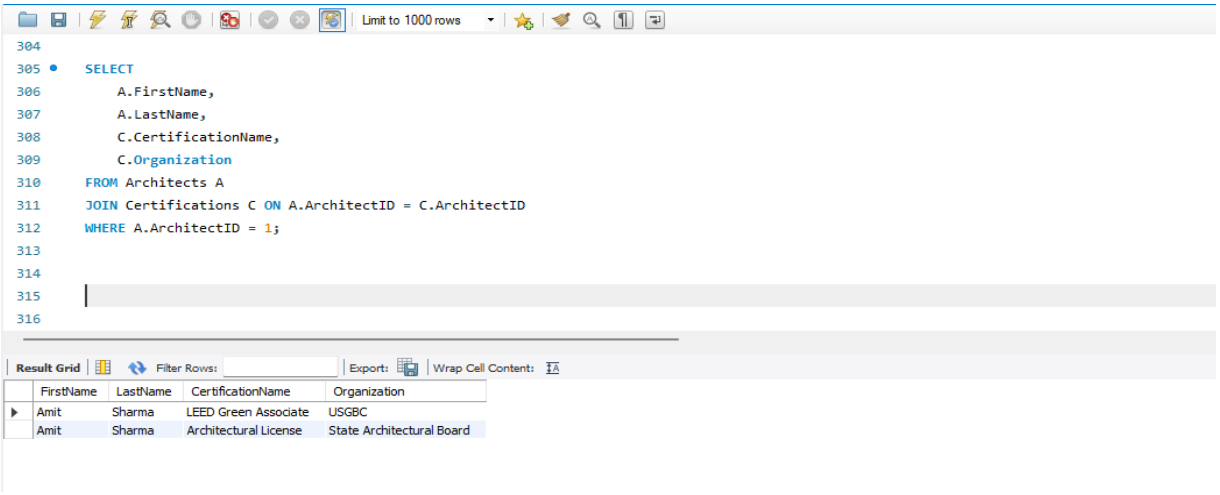
From this query output we got to know the Architect's first and last name Amit Sharma, working for the project residential complex and his role is lead architect, project manager. This will be helpful for quick access of roles and projects.

2) To get information about the projects, materials, and categories:



From the query we got the information about the project name which is of residential complex, material name is bricks and cement and the category name is building materials.

3) To get names of architects and their certifications:



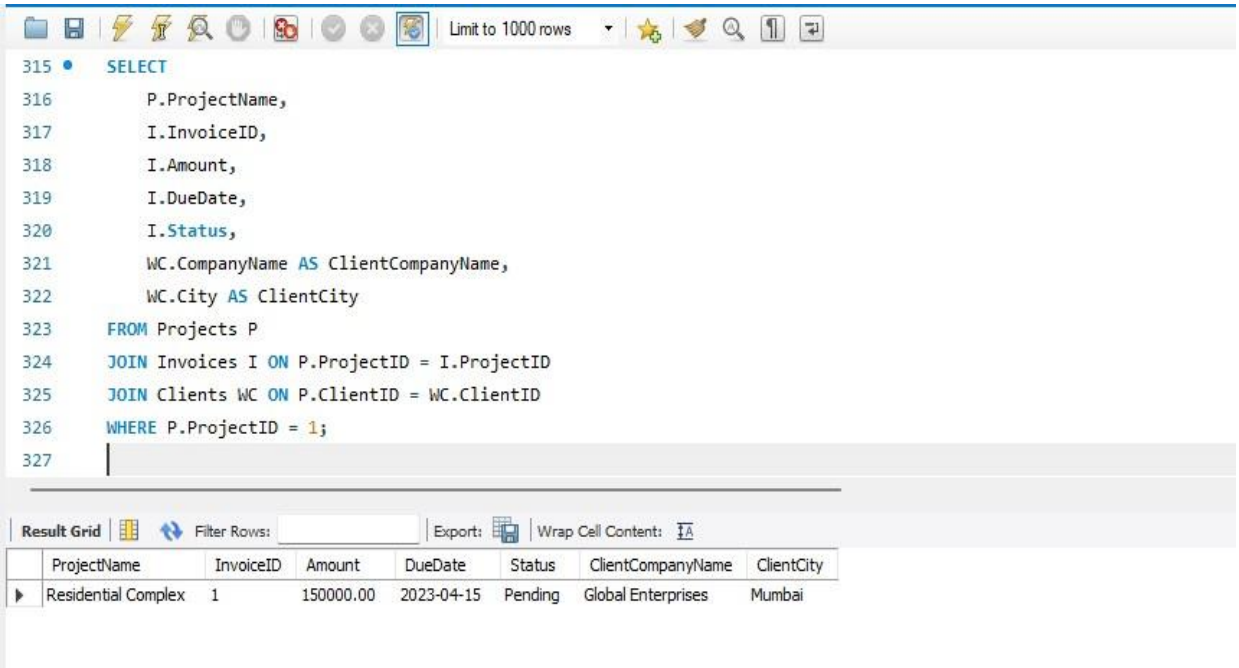
```
304
305 •  SELECT
306        A.FirstName,
307        A.LastName,
308        C.CertificationName,
309        C.Organization
310    FROM Architects A
311    JOIN Certifications C ON A.ArchitectID = C.ArchitectID
312    WHERE A.ArchitectID = 1;
313
314
315
316
```

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

FirstName	LastName	CertificationName	Organization
Amit	Sharma	LEED Green Associate	USGBC
Amit	Sharma	Architectural License	State Architectural Board

From the query above we get the information about the architects who have done their Certifications and the name of the certificates and from where they got their certification from meaning from which organization. Here in this query Amit Sharma has completed LEED green associate and Architectural license certificates from USGBC and State Architectural board respectively.

4) To get information about project invoices and client details:



```
315 •  SELECT
316        P.ProjectName,
317        I.InvoiceID,
318        I.Amount,
319        I.DueDate,
320        I.Status,
321        WC.CompanyName AS ClientCompanyName,
322        WC.City AS ClientCity
323    FROM Projects P
324    JOIN Invoices I ON P.ProjectID = I.ProjectID
325    JOIN Clients WC ON P.ClientID = WC.ClientID
326    WHERE P.ProjectID = 1;
327
```

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

ProjectName	InvoiceID	Amount	DueDate	Status	ClientCompanyName	ClientCity
Residential Complex	1	150000.00	2023-04-15	Pending	Global Enterprises	Mumbai

This query provides the information about the name of the project residential complex having the due amount of 150000 from the global enterprises, and the due date is on 15- 04-2023.

5) To get information about the project names and the budget:

```
332
333
334
335 •   SELECT P.ProjectName, SUM(P.Budget) AS TotalBudget
336       FROM Projects P
337       GROUP BY P.ProjectName;
338
339
340
341
342
343
344
```

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

ProjectName	TotalBudget
Residential Complex	2000000.00
Commercial Plaza	1500000.00
Tech Park Expansion	3000000.00
Hotel Renovation	1000000.00
Resort Development	2500000.00
Educational Institute	1800000.00
Hospital Expansion	1200000.00
Shopping Mall	3500000.00
Residential Tower	2800000.00
Cultural Center	900000.00

As we can see in the result grid the query output provides the different project nameand the total budget of each project.

6) To get information of the clients who have their projects in progress:

```
338
339
340
341 •   SELECT WC.FirstName, WC.LastName
342       FROM Clients WC
343       JOIN Projects P ON WC.ClientID = P.ClientID
344       WHERE P.Status = 'In Progress';
345
346
347
348
349
350
```

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

FirstName	LastName
Ramesh	Kumar
Neha	Singh
Sanjay	Kumar

This query provides the information about architects who are having the projects inprogress, and the Architects names are Ramesh Kumar, Neha Singh, and Sanjay Kumar.

7) To get information about the certificates which are active:

```
344     WHERE P.Status = 'In Progress';
345
346 •  SELECT A.FirstName, A.LastName
347     FROM Architects A
348     JOIN Certifications C ON A.ArchitectID = C.ArchitectID
349     WHERE C.Status = 'Active';
350
351
352
353
354
355
356
```

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

FirstName	LastName
Amit	Sharma
Amit	Sharma
Priya	Verma
Priya	Verma
Rajesh	Patel
Rajesh	Patel
Kavita	Singh
Kavita	Singh
Arun	Gupta
Arun	Gupta

From the above query we get the information about the certifications which was done by the architects are in active status, the result grid shows the names of the architect who havetheir active certifications.

8) To get information of the suppliers and the total quantity supplied:

```
351
352
353 •     SELECT P.ProjectName, AVG(PTM.ExperienceYears) AS AvgExperienceYears
354     FROM Projects P
355     JOIN ProjectTeamMembers PTM ON P.ProjectID = PTM.ProjectID
356     GROUP BY P.ProjectName;
357
358
359
360
361
362
363
```

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

SupplierName	TotalSupply
Hardware Solutions	46700
Roofing Supplies Inc.	46700
Pipes & Fittings Corp.	46700
ElectroWires Ltd.	46700
ColorCo Paints	46700
Tile Emporium	46700
Timber Merchants	46700
Glass Solutions Ltd.	46700
Steel Manufacturing Inc.	46700
Building Materials Co.	46700

The above query provides information about the names of the supplier and the totalquantity which they have supplied.

9) To get the information about the project name and lead architect name:

```
350
351
352
353 •       SELECT P.ProjectName, AVG(PTM.ExperienceYears) AS AvgExperienceYears
354       FROM Projects P
355       JOIN ProjectTeamMembers PTM ON P.ProjectID = PTM.ProjectID
356       GROUP BY P.ProjectName;
357
358
359
360
361
362
```

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

ProjectName	FirstName	LastName
Residential Complex	Amit	Sharma
Commercial Plaza	Rajesh	Patel
Tech Park Expansion	Arun	Gupta
Hotel Renovation	Kavita	Singh
Resort Development	Priya	Verma
Educational Institute	Sneha	Rao
Hospital Expansion	Vikram	Pillai
Shopping Mall	Sanjay	Kumar
Residential Tower	Anjali	Nair
Cultural Center	Deepa	Shah

The above query gets the information of the different projects name and the Architectsname which they are working on.

10) To get the information for projects due invoices:

```
358
359
360 •   SELECT P.ProjectName, SUM(I.Amount) AS TotalDueAmount
361       FROM Projects P
362       JOIN Invoices I ON P.ProjectID = I.ProjectID
363       WHERE I.Status = 'Pending'
364       GROUP BY P.ProjectName;
365
366
367
368
369
370
```

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

ProjectName	TotalDueAmount
Residential Complex	150000.00
Commercial Plaza	125000.00
Hotel Renovation	75000.00
Educational Institute	135000.00
Hospital Expansion	95000.00
Residential Tower	240000.00
Cultural Center	80000.00

From this query we get the information about the different projects name and the totalamount due for that respective project.

SCOPE OF FUTURE DEVELOPMENTS:

1. Create complete platforms with integrated project management, architectural design, with collaborative tools. Architects, developers, and stakeholders may communicate with one another in real time while sharing data easily thanks to the platform's backbone, MySQL.

2. AI-Powered Designing Assistance: Make use of AI algorithms that examine previous design data saved to MySQL to recommend design options, optimize layouts, and occasionally propose novel solutions based on trends and user preferences.

3. Virtual Reality Designs Reviews: Create programmes that access design information from MySQL to offer immersive virtual tours of architecture designs. This enables interested parties to visit areas prior to construction, which results in more informed design choices.

4. Smart Buildings: Integrate MySQL with devices to construct smart buildings that maximize energy usage, occupant comfort, and security. To improve management of buildings and user experiences, real-time data via sensors can be saved and analyzed.

5. Sustainable Architectural Insights: Examine historical projects using data saved in MySQL to uncover sustainable design principles that result in energy- and environmentally-friendlystructures.

REFERENCES:

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