

REAL ESTATE DEVELOPMENT AND MANAGEMENT SYSTEM

Presented by **Yash Vilas More**

Data Analytics Course | Monitor: Shalini Verma

A comprehensive database solution for modern real estate management



ABOUT THE PRESENTER



YASH VILAS MORE

Course: Data Analytics

Specialisation: Data Analytics

Academic Monitor: Shalini Verma

Passionate about leveraging data-driven solutions to solve complex business challenges in the real estate sector. This project represents a comprehensive approach to modernising property management through systematic database design and analytics integration.

The focus of this presentation is to demonstrate how proper database architecture can revolutionise real estate operations, bringing transparency, efficiency, and data-driven insights to an industry that has traditionally relied on fragmented systems and manual processes.



PROJECT INTRODUCTION

REAL ESTATE DEVELOPMENT AND MANAGEMENT SYSTEM

Domain: Real Estate & Property Management

CENTRALISED MANAGEMENT

Unified platform for managing projects, sites, clients, contractors, vendors, agents, sales, and financial operations within a single integrated system.

DATA-DRIVEN OPERATIONS

Ensuring smooth operation of real estate businesses through centralised data storage, real-time reporting, and comprehensive analytics capabilities.

PROCESS AUTOMATION

Streamlining complex workflows from initial project planning through to final property handover and ongoing maintenance management.

This system addresses the critical need for integrated data management in the real estate industry, where multiple stakeholders, complex processes, and substantial financial investments require sophisticated tracking and coordination mechanisms.

PROJECT SCOPE & COVERAGE



CONSTRUCTION PROJECTS

Complete project lifecycle management from initial planning and site acquisition through construction phases, task scheduling, resource allocation, and project completion. Includes milestone tracking, budget monitoring, and timeline management for multiple concurrent developments.



STAKEHOLDER MANAGEMENT

Centralised database for all parties including clients, real estate agents, contractors, vendors, employees, and legal representatives. Maintains contact information, transaction history, performance metrics, and communication logs for improved relationship management.



MAINTENANCE & SUPPORT

Post-sale property maintenance scheduling, service request management, warranty tracking, and ongoing customer support. Preventive maintenance planning and vendor coordination to ensure property value preservation and customer satisfaction.



SALES & LEASES

Comprehensive sales pipeline management covering lead generation, property listings, client interactions, contract negotiations, payment processing, and lease agreements. Integration with marketing channels and customer relationship management for enhanced conversion rates.



FINANCIAL OPERATIONS

End-to-end financial tracking including purchase orders, invoices, payments, expense management, revenue recognition, and financial reporting. Integration with accounting systems and automated reconciliation processes for improved accuracy and compliance.



LEGAL & COMPLIANCE

Management of legal documents, permits, regulatory compliance, contract administration, and dispute resolution. Automated compliance monitoring and document version control to ensure adherence to local regulations and industry standards.

BUSINESS IMPACT & IMPORTANCE

OPERATIONAL EFFICIENCY

Enables companies to manage multiple concurrent projects with improved coordination and resource allocation. Centralised data eliminates information silos, reduces duplication of effort, and enhances cross-departmental collaboration for faster project delivery and reduced operational costs.

COST & TIME OPTIMISATION

Process automation significantly reduces manual administrative tasks, minimises errors, and accelerates routine operations. Automated workflows for approvals, document generation, and reporting save substantial time whilst ensuring consistency and reducing labour costs across all business functions.

ENHANCED TRANSPARENCY

Real-time visibility into sales processes, payment status, project progress, and financial performance builds trust with stakeholders. Automated reporting and dashboard analytics provide comprehensive insights for management decision-making and client communications.

SUPERIOR CUSTOMER EXPERIENCE

Comprehensive tracking of client interactions, property preferences, and transaction history enables personalised service delivery. Quick access to property information, payment status, and service requests improves response times and customer satisfaction levels significantly.

DATA-DRIVEN DECISION MAKING

Advanced analytics capabilities support strategic planning through market analysis, performance metrics, trend identification, and predictive insights. Evidence-based decision making improves investment outcomes and competitive positioning in the dynamic real estate market.

DATABASE ARCHITECTURE OVERVIEW

25

6

100+

TOTAL TABLES

Comprehensive database structure covering all aspects of real estate operations

The database architecture follows a modular approach with clearly defined functional areas, each containing multiple interconnected tables that work together to provide comprehensive business functionality. This design ensures scalability, maintainability, and optimal performance whilst supporting complex business processes and reporting requirements.

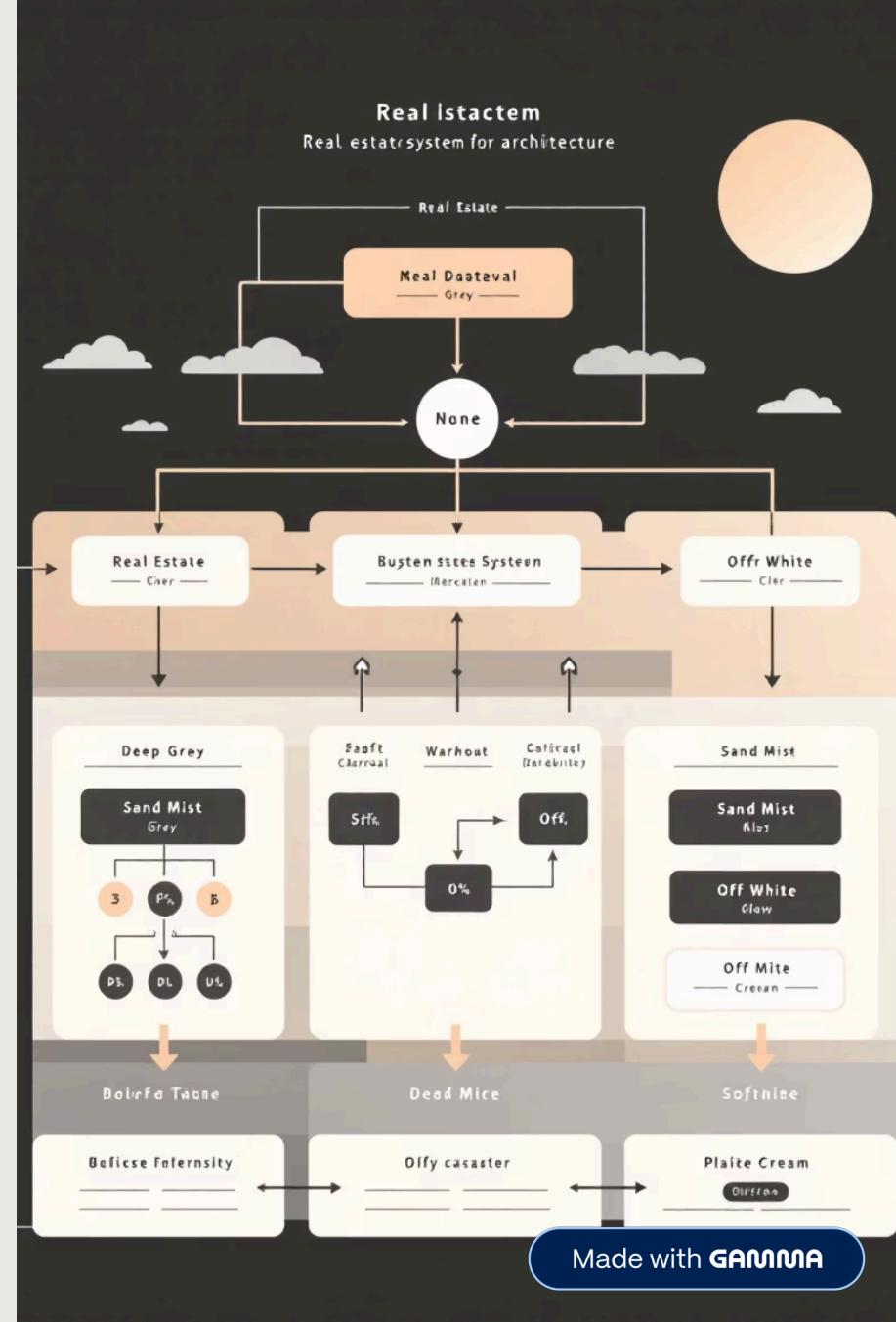
The system is designed with normalisation principles to eliminate data redundancy whilst maintaining referential integrity through carefully planned foreign key relationships. Each module can operate independently whilst sharing data seamlessly with other modules through standardised interfaces.

CORE MODULES

Integrated functional areas for complete business coverage

RELATIONSHIPS

Complex interconnections ensuring data integrity and consistency



CORE DATABASE MODULES

PROJECTS & SITES MANAGEMENT

Tables: T1, T2, T19, T20, T23

- Project planning and tracking
- Site information and specifications
- Construction phases and milestones
- Task management and scheduling
- Resource allocation and monitoring

1

STAKEHOLDER MANAGEMENT

Tables: T3, T4, T5, T9

- Client profiles and preferences
- Agent performance and commissions
- Employee records and responsibilities
- Contractor qualifications and assignments
- Contact management and communication history

2

PROPERTY & SALES OPERATIONS

Tables: T6, T7, T8, T15, T16, T25

- Property listings and specifications
- Sales pipeline and opportunity tracking
- Lead management and conversion
- Pricing strategies and market analysis
- Customer feedback and satisfaction metrics

3

FINANCIAL MANAGEMENT

Tables: T10, T11, T12, T13, T24

- Vendor management and procurement
- Purchase orders and inventory tracking
- Invoice processing and payment management
- Financial reporting and budget control
- Cost analysis and profitability tracking

4

LEGAL & COMPLIANCE

Tables: T14, T17, T18

- Legal document management
- Regulatory compliance tracking
- Permit applications and approvals
- Contract administration
- Dispute resolution and legal proceedings

5

OPERATIONS MANAGEMENT

Tables: T21, T22

- Quality inspections and audits
- Maintenance scheduling and tracking
- Service request management
- Performance monitoring and reporting
- Operational workflow automation

6

ENTITY RELATIONSHIP STRUCTURE



PROJECTS ↔ SITES ↔ CONSTRUCTION PHASES ↔ TASKS



Hierarchical relationship managing the complete project lifecycle from initial concept through detailed task execution. Each project contains multiple sites, sites have construction phases, and phases are broken down into manageable tasks with dependencies and resource requirements.

CLIENTS ↔ PROPERTY LISTINGS ↔ SALES ↔ PAYMENTS



Sales pipeline relationships tracking client interactions with available properties through to successful transactions and payment processing. Maintains complete audit trail of all sales activities, pricing negotiations, and financial settlements for comprehensive revenue management.

VENDORS ↔ MATERIALS ↔ PURCHASE ORDERS ↔ INVOICES



Supply chain management relationships ensuring efficient procurement processes from vendor selection through material delivery and financial settlement. Tracks material specifications, delivery schedules, quality requirements, and cost management for optimal project execution.

AGENTS ↔ LEADS ↔ FEEDBACK



Customer relationship management structure connecting sales agents with potential clients and capturing feedback throughout the sales process. Enables performance tracking, commission calculations, and continuous improvement of sales strategies based on client feedback and conversion metrics.

The ERD demonstrates the complex interconnections between different business entities, ensuring data consistency and enabling comprehensive reporting across all aspects of real estate operations. Each relationship is carefully designed to support both operational efficiency and analytical requirements.

SYSTEM INTEGRATION & DATA FLOW

QUALITY INSPECTIONS

Regular quality assessments linked to construction phases and property development milestones

SITES & PROPERTIES

Central property database linking all operational, legal, and financial activities



LEGAL DOCUMENTATION

Comprehensive legal document management for contracts, permits, and compliance requirements

PERMITS & APPROVALS

Regulatory permit tracking and approval workflows integrated with project timelines

The system design ensures seamless data flow between all modules, with inspections, legal documents, and permits directly linked to their respective sites and properties. This integration provides a complete operational picture, enabling automated workflows, compliance monitoring, and comprehensive reporting capabilities.

Cross-module data relationships facilitate advanced analytics, including project performance analysis, financial forecasting, and regulatory compliance tracking. The integrated approach eliminates data silos and ensures consistency across all business functions whilst maintaining flexibility for future system enhancements and scalability requirements.

PROJECT CONCLUSION & FUTURE POTENTIAL



COMPREHENSIVE SOLUTION

Successfully designed a 25-table database system that addresses all critical aspects of real estate development and management, from initial project conception through ongoing property maintenance and customer support.



OPERATIONAL EXCELLENCE

The integrated system promotes operational efficiency through automated workflows, centralised data management, and real-time reporting capabilities that transform traditional real estate business processes into streamlined, data-driven operations.



ANALYTICS-DRIVEN GROWTH

Advanced data analytics capabilities embedded within the system architecture support strategic decision-making, market analysis, and performance optimisation, positioning real estate businesses for sustainable growth and competitive advantage.

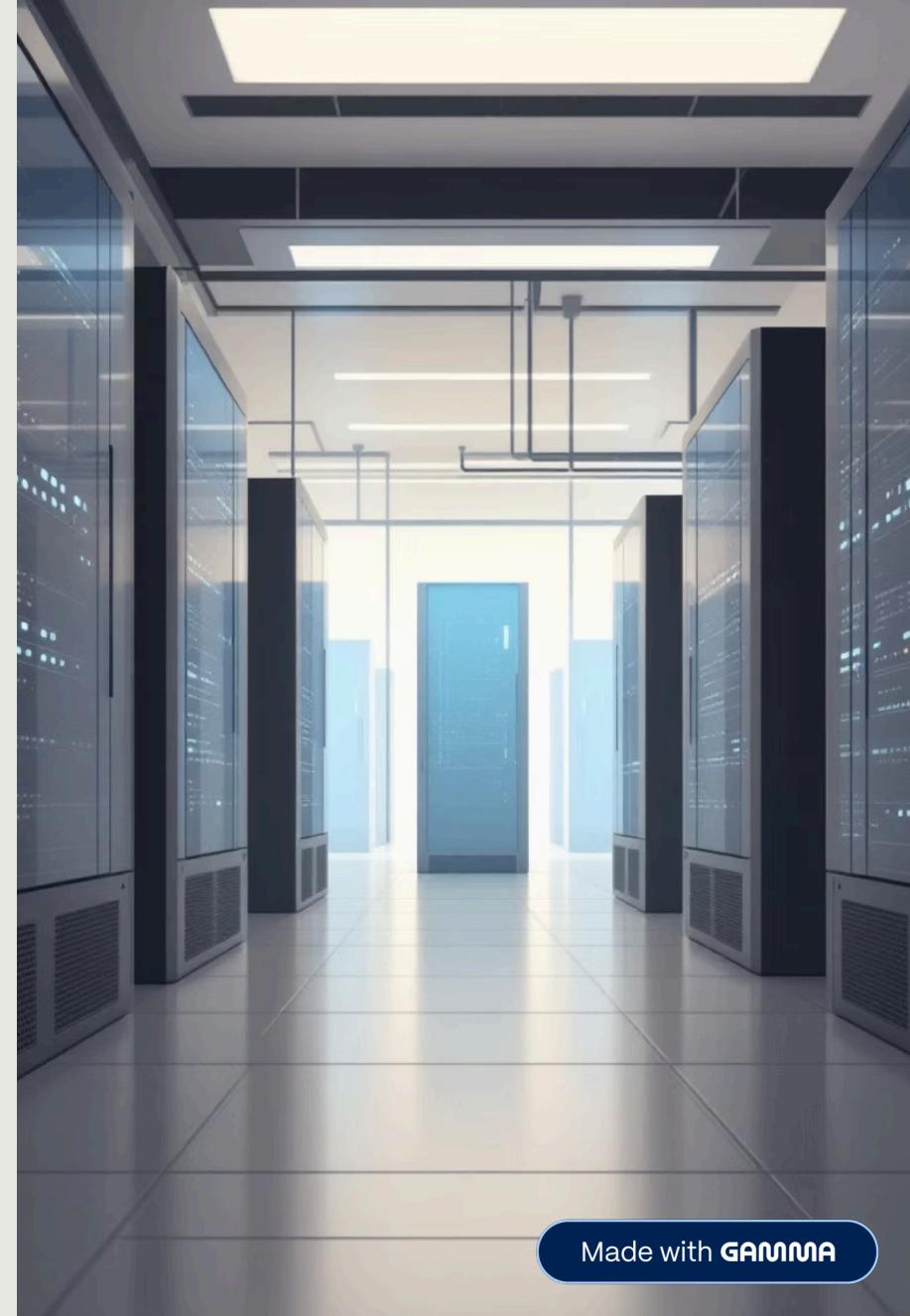
This Real Estate Development and Management System represents a comprehensive approach to modernising property management through systematic database design and integration. The project demonstrates the practical application of data analytics principles in solving complex business challenges within the real estate sector.

The system's modular architecture ensures scalability and adaptability to evolving business requirements whilst maintaining data integrity and operational efficiency. Future enhancements could include integration with IoT devices for smart building management, artificial intelligence for predictive analytics, and mobile applications for enhanced stakeholder engagement.

Thank you for your attention. Questions and feedback are welcome.

ADVANCED SQL DATABASE MANAGEMENT

Mastering complex database operations through practical implementation and real-world examples



ADVANCED WINDOW FUNCTIONS

GLOBAL RANKING

Rank records across entire dataset using comprehensive ordering criteria

PARTITIONED RANKING

Create rankings within specific groups or categories for targeted analysis

```
SELECT Name, Type,  
DENSE_RANK() OVER (PARTITION BY Type  
ORDER BY StartDate) AS TypeRank  
FROM Projects;
```



VIEWS: SIMPLIFYING COMPLEX QUERIES

Created persistent virtual tables to streamline data access and improve query efficiency

θ1

CREATE ONGOING PROJECTS VIEW

Establish virtual table filtering active projects with essential details

```
CREATE VIEW OngoingProjects AS  
SELECT ProjectID, Name, Budget  
FROM Projects WHERE Status = 'Ongoing';
```

θ2

QUERY SIMPLIFIED DATA

Access filtered information through clean, reusable view interface

STORED PROCEDURES: ENCAPSULATING LOGIC

BASIC PROCEDURE

Developed stored procedure to display project names using cursor iteration

```
DELIMITER //
CREATE PROCEDURE ShowProjectNames()
BEGIN
    CURSOR FOR SELECT Name
    FROM Projects;
END; //
DELIMITER ;
```

KEY BENEFITS

- Encapsulates complex business logic
- Improves performance through pre-compilation
- Enhances security and maintainability



PARAMETERIZED STORED PROCEDURES

Created flexible procedures accepting input parameters for dynamic operations

LOCATION-BASED UPDATES

Procedure increases project budgets by specified amount for given location

MASS DATA MANAGEMENT

Efficiently handle bulk operations across multiple records with single call

```
CREATE PROCEDURE IncreaseBudgetByLocation(  
    IN loc VARCHAR(100),  
    IN inc DECIMAL(12,2))  
BEGIN  
    UPDATE Projects SET Budget = Budget + inc  
    WHERE Location = loc;  
END;
```

TRANSACTION CONTROL LANGUAGE

Implemented TCL commands ensuring data integrity through atomic operations

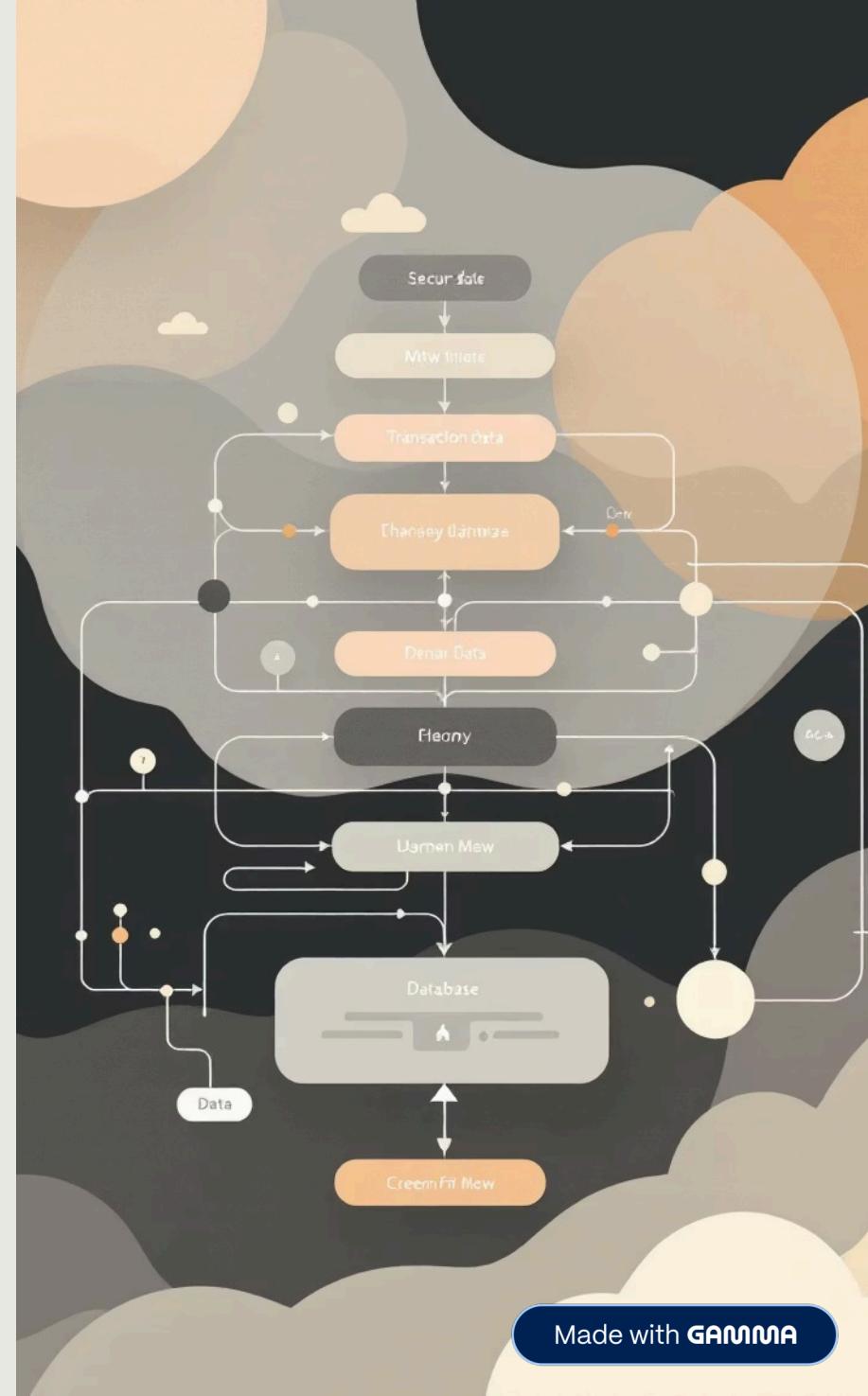


Begin atomic operation sequence

Perform multiple related database changes

Finalize all changes permanently

- Atomicity Principle:** Ensures all operations succeed together or fail together, maintaining database consistency





DATA CONTROL LANGUAGE

GRANT PERMISSIONS

Giving read access to feedback table for authorized users

```
GRANT SELECT ON Feedback  
TO user_name;
```

REVOKE ACCESS

Removing delete privileges to maintain data security

```
REVOKE DELETE ON Feedback  
FROM user_name;
```

Managed user access control ensuring proper security protocols and data protection

FEEDBACK ANALYSIS INSIGHTS



VOLUME TRENDS

Analyzed monthly feedback submission patterns to identify peak periods



RESOLUTION STATUS

Tracked feedback resolution rates and response times for improvement

```
SELECT EXTRACT(MONTH FROM SubmittedDate) AS Month,  
COUNT(*) FROM Feedback GROUP BY Month;
```



DATA TYPE CONVERSION & FORMATTING



STRING FORMATTING

Used UPPER() function to standardize project name display

```
SELECT ProjectID, UPPER(Name)  
FROM Projects;
```



SUBSTRING EXTRACTION

Extracted first character from comments for categorization

```
SELECT SUBSTR(Comments, 1, 1)  
FROM Feedback;
```

Demonstrated advanced string manipulation and data formatting techniques

PROJECT CONCLUSION & FUTURE SCOPE

VENDOR & MATERIAL MANAGEMENT

Executed specialized queries for supplier search and material status tracking

1

2

3

FUTURE DEVELOPMENT

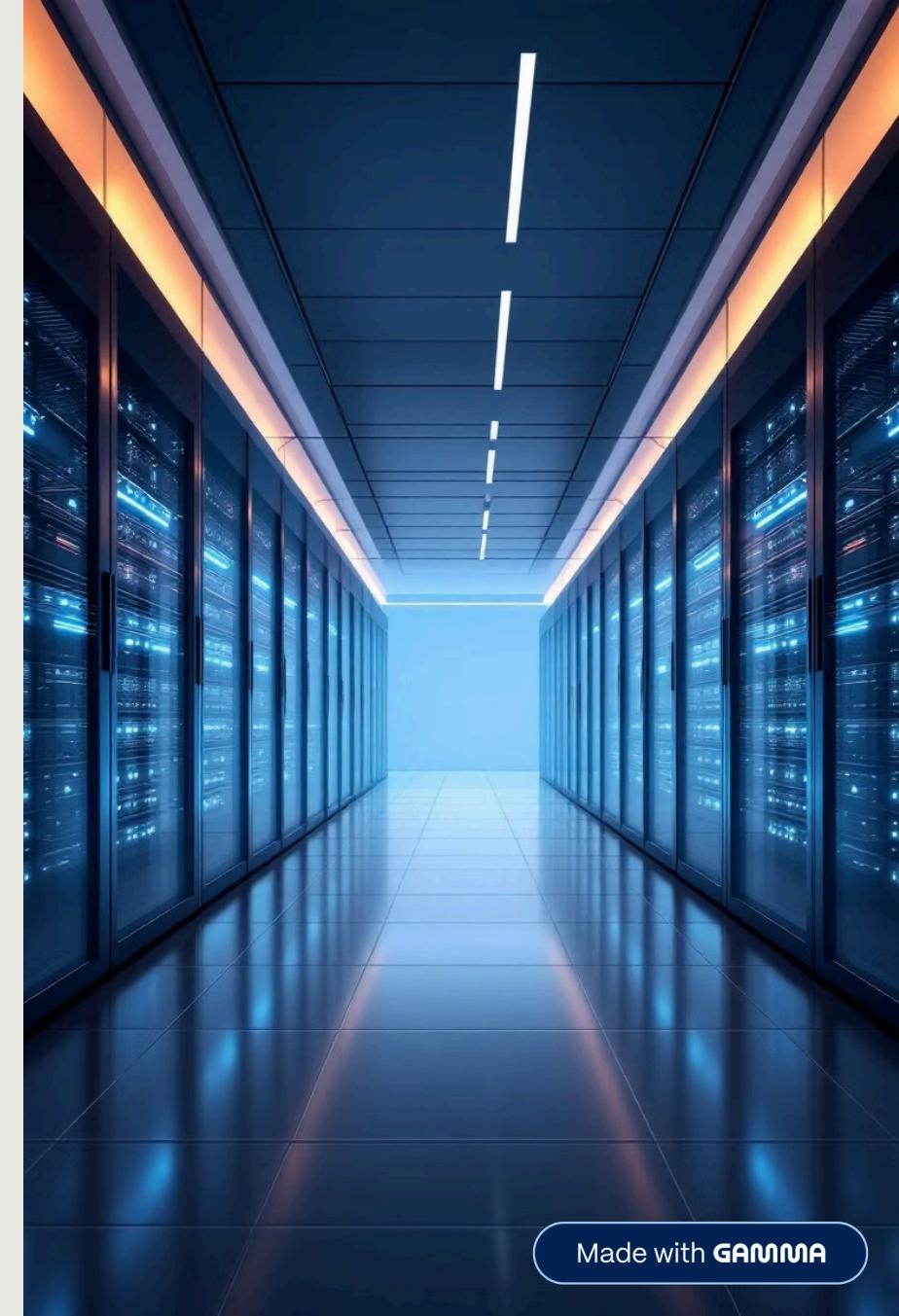
Develop API endpoints for seamless application integration

IMMEDIATE NEXT STEPS

Implement automated triggers for enhanced database functionality

SQL DATABASE MANAGEMENT MASTERY

Comprehensive guide to advanced SQL operations for procurement, inventory management, and transaction control in enterprise systems.



HIGH- QUALITY PROCUREME NT

VENDOR RATING FOCUS

Identify top-performing vendors with ratings above 4.5 for quality assurance and strategic partnerships.

SERVICE EXCELLENCE

Filter vendors by service type and performance metrics to ensure optimal procurement decisions.

```
SELECT CompanyName, Rating, ServiceType  
FROM Vendors  
WHERE Rating > 4.5  
ORDER BY Rating DESC;
```



LOCATION-BASED VENDOR ANALYSIS

GEOGRAPHIC TARGETING

Streamline vendor selection by analyzing location-specific suppliers for reduced logistics costs and improved service delivery.

```
SELECT CompanyName, ContactName  
FROM Vendors  
WHERE Address LIKE '%Mumbai%';
```





SMART INVENTORY MANAGEMENT

LOW STOCK ALERTS

Comprehensive monitoring system identifies materials below 100 units to prevent stockouts and maintain operational continuity.

REAL-TIME TRACKING

Track stock quantities and last updated timestamps for accurate inventory visibility and decision-making.

```
SELECT Name, StockQuantity, LastUpdated  
FROM Materials  
WHERE StockQuantity < 100;
```

CRITICAL STOCK DEPLETION

ZERO STOCK IDENTIFICATION

Immediate detection of completely depleted materials to trigger emergency procurement processes.

CATEGORY ANALYSIS

Analyze stock depletion patterns by material category and pricing for strategic restocking decisions.

```
SELECT Name, Category, PricePerUnit  
FROM Materials  
WHERE StockQuantity = 0;
```



PREMIUM MATERIAL ANALYSIS

1

HIGHEST COST ITEM

Quickly identify the most expensive material for budget planning and cost optimization strategies.

```
SELECT Name, PricePerUnit  
FROM Materials  
ORDER BY PricePerUnit DESC  
LIMIT 1;
```

PERFORMANCE ANALYTICS DEEP DIVE



AGENT PERFORMANCE

Identify underperforming agents with ratings below 3.0 for targeted improvement initiatives.

```
SELECT AgentID, AVG(Rating)  
FROM Feedback  
GROUP BY AgentID  
HAVING AVG(Rating) < 3;
```

FEEDBACK TRENDS

Analyze yearly feedback patterns to understand customer satisfaction evolution over time.

```
SELECT YEAR(SubmittedDate) AS Year,  
COUNT(*) AS TotalFeedback  
FROM Feedback  
GROUP BY YEAR(SubmittedDate);
```

TRANSACTIONS ON CONTROL LANGUAGE

θ1

TRANSACTION START

Initialize secure transaction boundary for data integrity.

θ2

DATA MODIFICATION

Update purchase orders and insert payment records atomically.

θ3

COMMIT CHANGES

Finalize all operations to ensure database consistency.

```
START TRANSACTION;  
UPDATE PurchaseOrders SET Status = 'Completed' WHERE OrderID =  
21;  
INSERT INTO Payments (OrderID, Amount) VALUES (21, 5000);  
COMMIT;
```



DATA CONTROL LANGUAGE SECURITY



GRANT PERMISSIONS

Provide selective access to feedback data for authorized personnel only.



REVOKE ACCESS

Remove delete permissions to prevent unauthorized data removal and maintain audit trails.

```
GRANT SELECT ON Feedback TO analyst_role;  
REVOKE DELETE ON Feedback FROM temp_user;
```



BULK OPERATIONS EXCELLENCE

1

MASS STATUS UPDATE

Efficiently update multiple feedback records to resolved status for streamlined case management.

2

CLEANUP OPERATIONS

Remove resolved feedback entries to maintain database performance and storage optimization.

```
UPDATE Feedback SET Status = 'Resolved' WHERE Resolved = TRUE;  
DELETE FROM Feedback WHERE Status = 'Resolved' AND  
DATEDIFF(NOW(), ResolvedDate) > 365;
```

ADVANCED SQL TECHNIQUES

Mastering complex database operations for real estate management systems



3-WAY JOIN OPERATIONS

GOAL

Full visibility across clients, properties, and agents in a single query

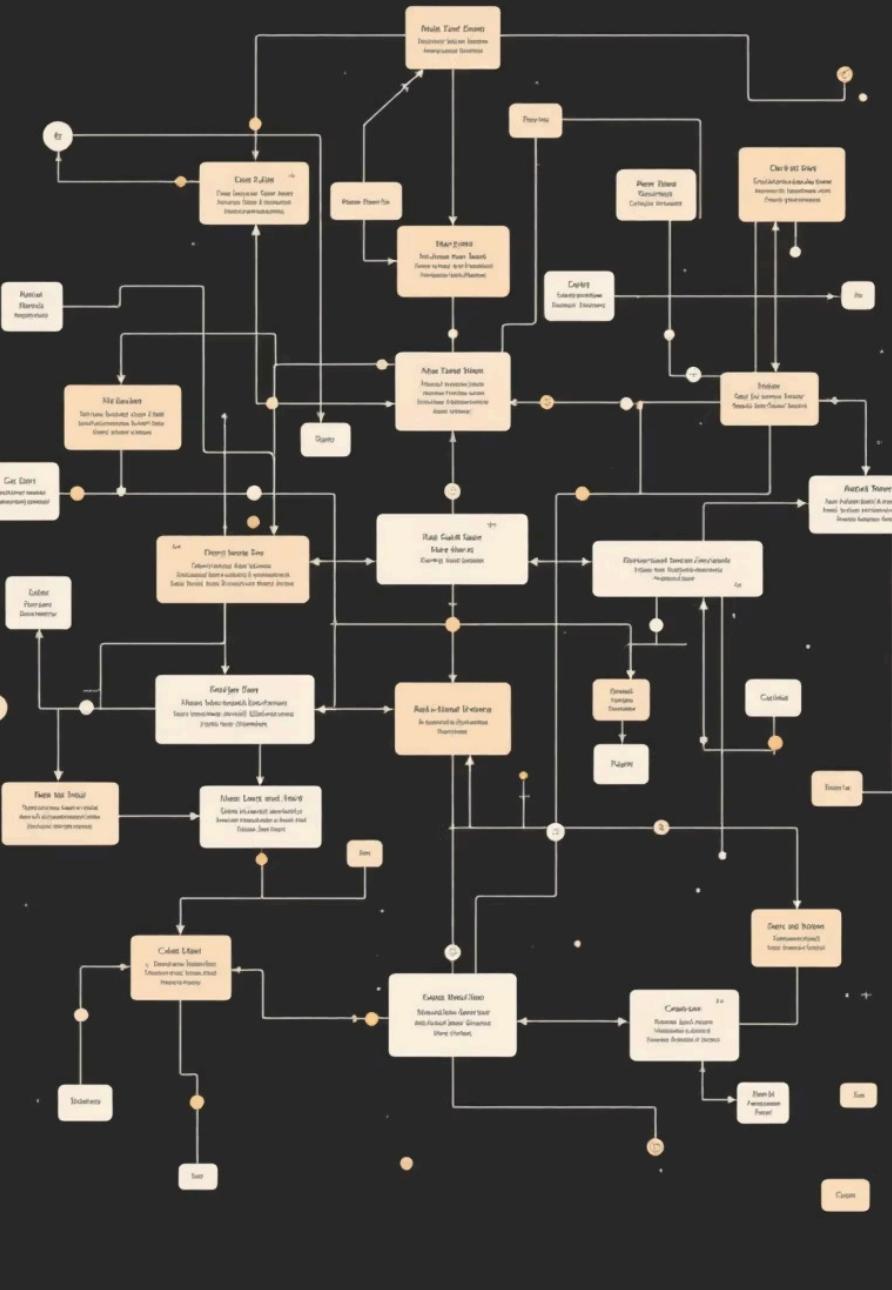
IMPLEMENTATION

JOIN three tables: Sales, Clients, and Agents for comprehensive reporting

OUTPUT

Client names, property titles, final prices, and agent information combined

```
SELECT C.FullName, P.Title, S.FinalPrice, A.Name AS AgentName  
FROM Sales S  
JOIN Clients C ON S.ClientID = C.ClientID  
JOIN Agents A ON S.AgentID = A.AgentID;
```



CORRELATED SUBQUERIES

ADVANCED FILTERING

Identify projects managed by agents with above-average experience in their specialization

Enables dynamic comparison based on contextual data relationships

```
SELECT * FROM Projects P  
WHERE ManagerID IN (  
    SELECT ManagerID FROM  
    Agents A  
    WHERE A.ExperienceYears >  
        (AVG(A.ExperienceYears))  
    WHERE A.Specialization =  
        P.Type)  
);
```

UNSOLD INVENTORY ANALYSIS

CRITICAL INSIGHT

Real estate businesses need visibility into unsold properties for strategic decision-making

LEFT JOIN STRATEGY

Uses LEFT JOIN to identify properties without corresponding sales records

ACTIONABLE DATA

Returns property titles and prices where SaleID is NULL, indicating unsold inventory

```
SELECT PL.Title, PL.Price  
FROM PropertyListings PL  
LEFT JOIN Sales S ON PL.PropertyID = S.PropertyID  
WHERE S.SaleID IS NULL;
```



DATA QUALITY CONTROL



DUPLICATE DETECTION

Implemented GROUP BY with HAVING clause to identify duplicate GST numbers in vendor records



DATA INTEGRITY

Ensures compliance and prevents data corruption through systematic duplicate identification

```
SELECT GSTNumber, COUNT(*) AS cnt  
FROM Vendors  
GROUP BY GSTNumber  
HAVING cnt > 1;
```

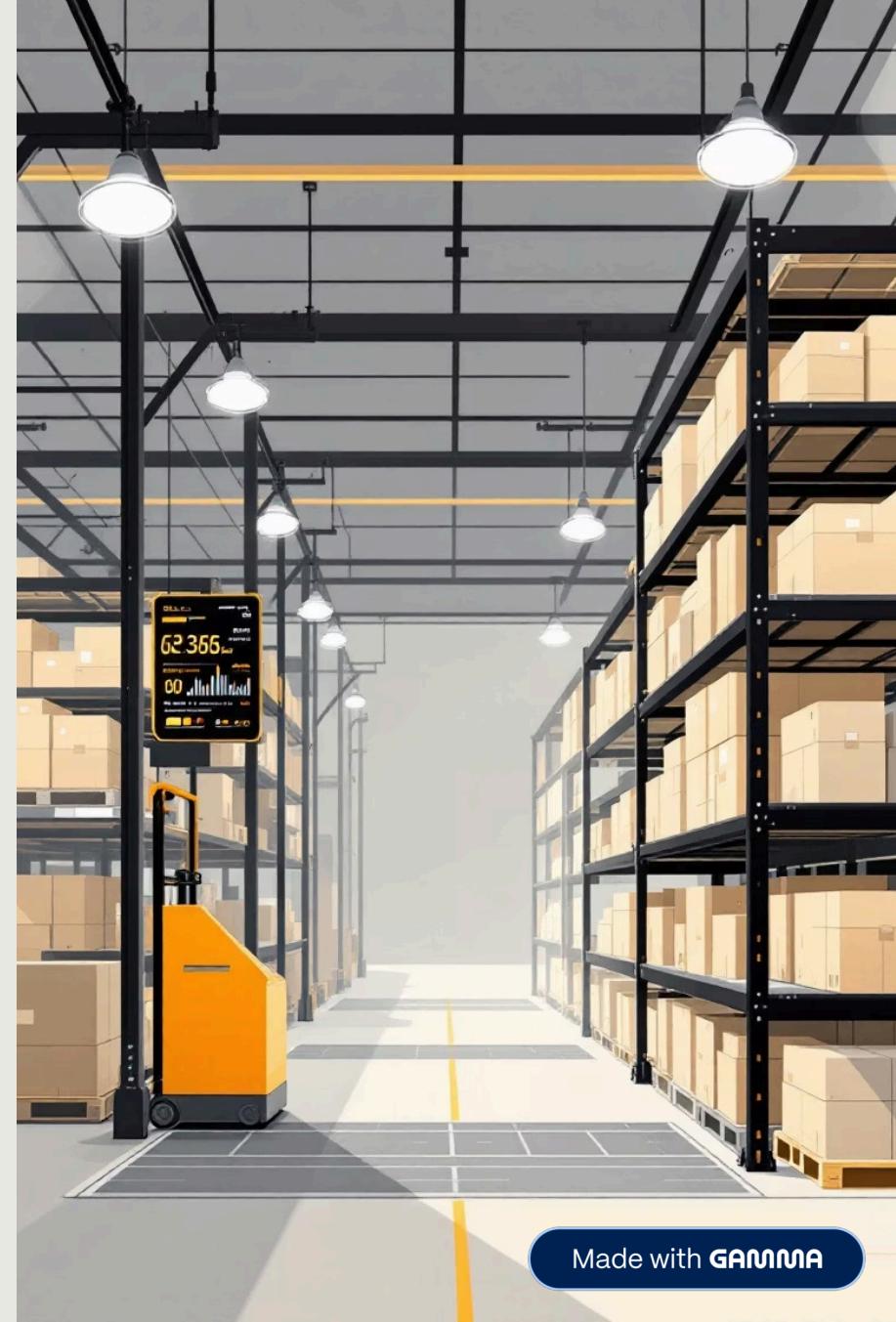
MATERIAL MONITORING SYSTEM

PROACTIVE TRACKING

Query monitors materials requiring updates, ensuring data freshness and operational efficiency

Identifies records with LastUpdated dates before 2025-01-01 threshold

```
SELECT Name,  
LastUpdated  
FROM Materials  
WHERE LastUpdated <  
'2025-01-01';
```



WINDOW FUNCTIONS: LAG ANALYSIS

1

CURRENT PROJECT

Track project budgets in chronological order

2

PREVIOUS BUDGET

LAG function retrieves previous project's budget for comparison

3

TREND ANALYSIS

Enables budget progression tracking across projects

```
SELECT ProjectID, Name, Budget,  
LAG(Budget, 1, 0) OVER (ORDER BY StartDate) AS PreviousBudget  
FROM Projects;
```

STORED PROCEDURES

θ1

CURSOR DECLARATION

```
DECLARE proj_cursor CURSOR FOR  
SELECT Name FROM Projects
```

θ2

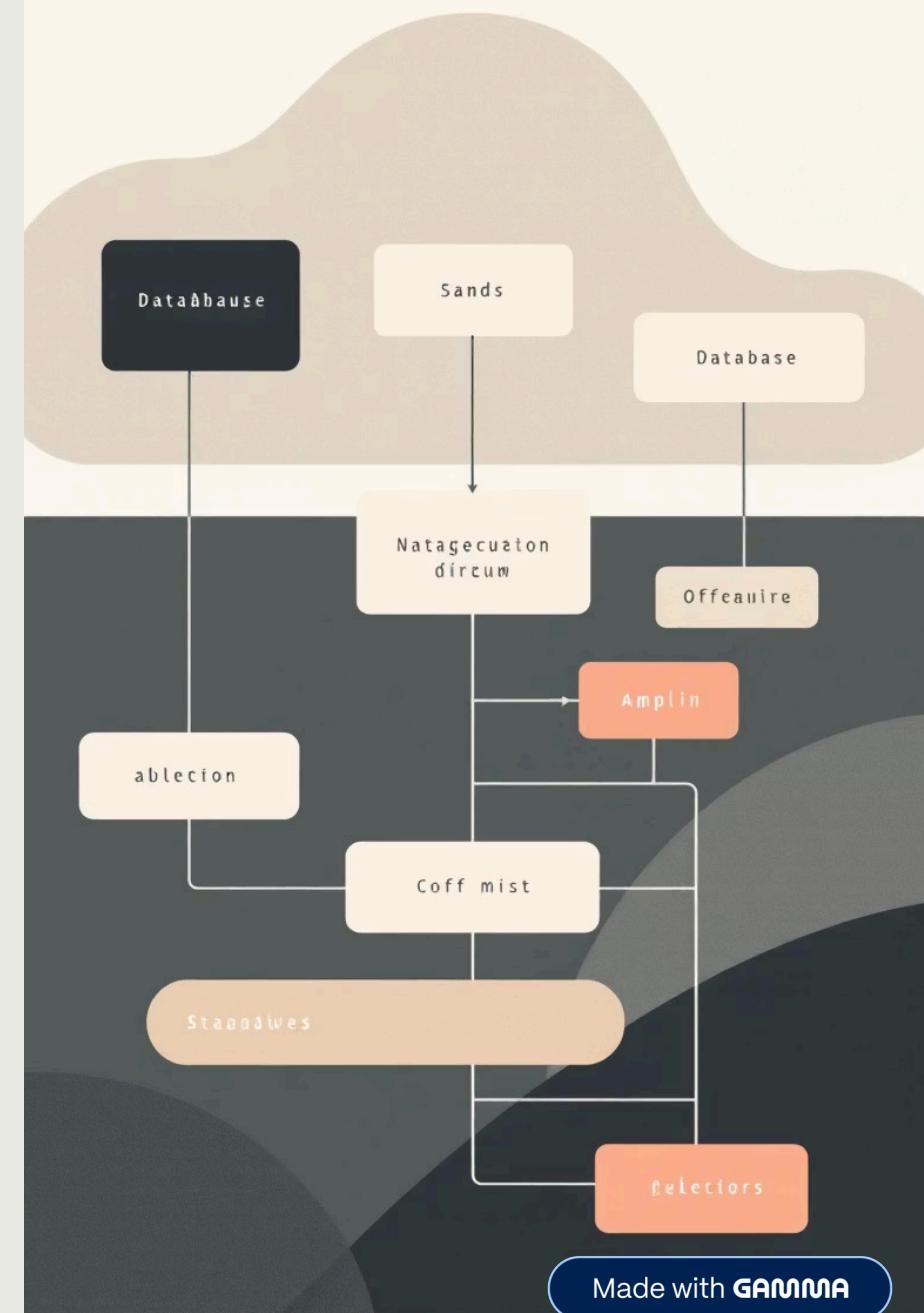
HANDLER SETUP

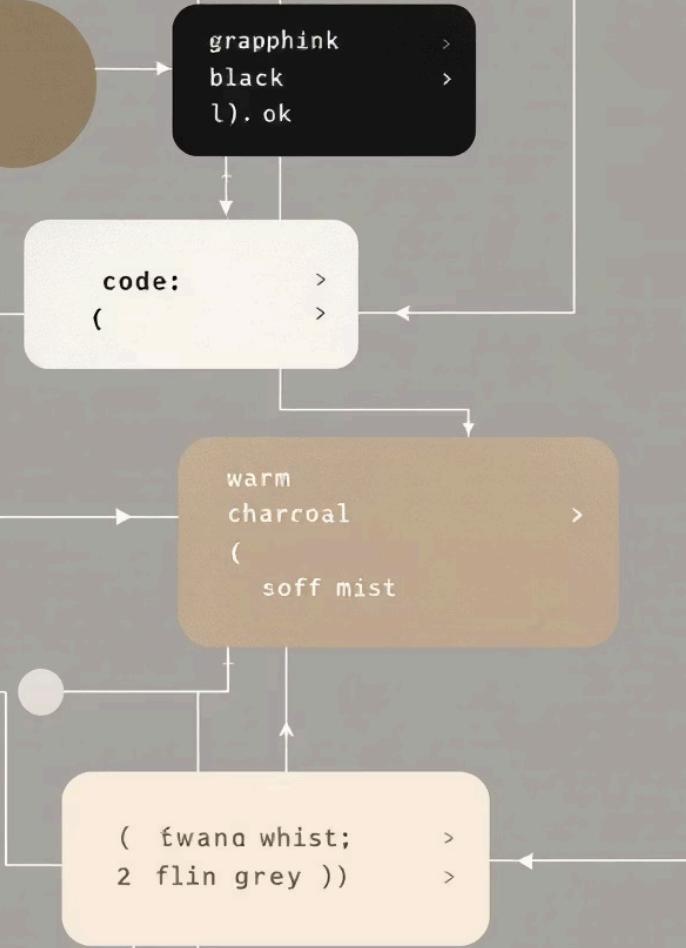
```
DECLARE CONTINUE HANDLER FOR NOT  
FOUND SET done = TRUE
```

θ3

PROCEDURAL LOGIC

Demonstrates complex procedural programming within database environment





USER-DEFINED FUNCTIONS

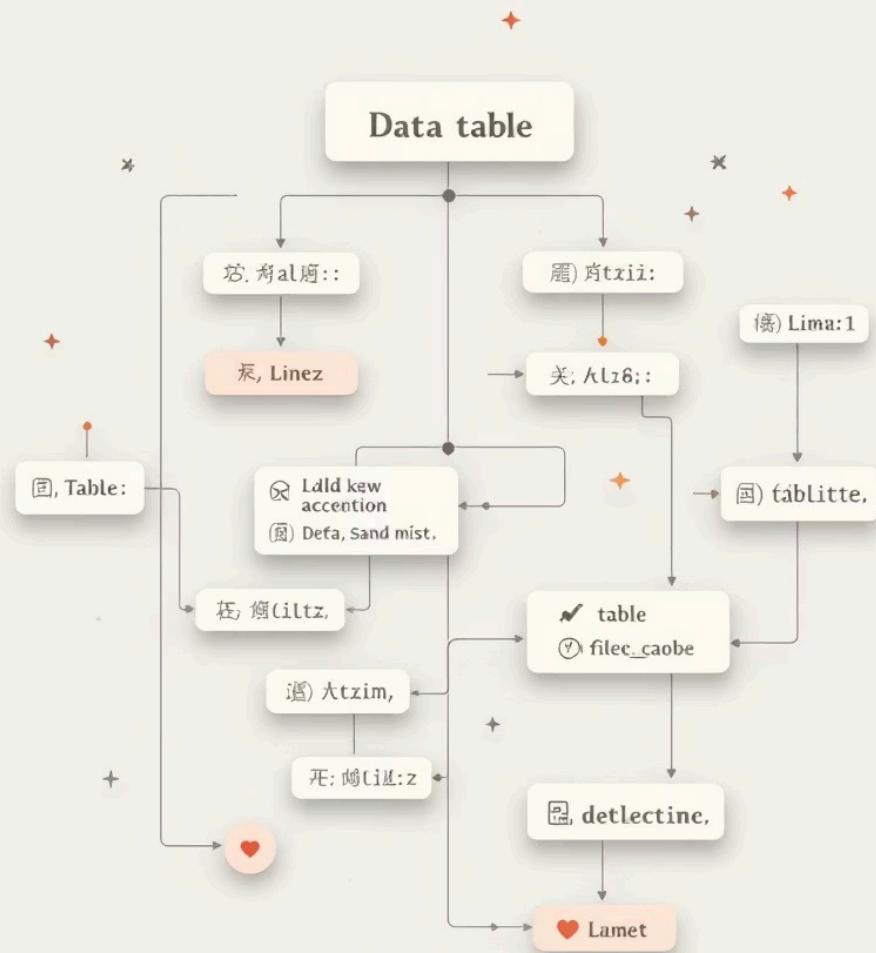
CUSTOM FUNCTION CREATION

```
CREATE FUNCTION IsPositive(r  
INT)  
RETURNS VARCHAR(10)  
DETERMINISTIC  
RETURN IF(r>=4, 'Yes', 'No');
```

FUNCTION IMPLEMENTATION

```
SELECT FeedbackID,  
IsPositive(Rating)  
FROM Feedback;
```

Simplifies complex logic into reusable components



DATABASE SCHEMA MANAGEMENT

ALTER TABLE OPERATIONS

Add Priority column: ALTER TABLE

Feedback ADD Priority VARCHAR(20)

COLUMN RENAMING

Rename Response to Reply: ALTER
TABLE Feedback RENAME COLUMN
Response TO Reply

DATA SORTING & SUBSTRING

Top 5 ratings: ORDER BY Rating DESC LIMIT 5; Comment snippets:
SUBSTR(Comments, 1, 10)



ADVANCED SQL FOR CONSTRUCTION & REAL ESTATE

A comprehensive guide to data-driven management in construction and real estate sectors using advanced SQL techniques.

PROJECT PERFORMANCE ANALYTICS

LINKING QUERY CONCEPT

Connect projects, property listings, and sales data to analyze performance across the entire pipeline.

```
SELECT P.Name, P.Budget,  
SUM(S.FinalPrice)  
FROM Projects P  
JOIN PropertyListings PL  
ON P.ProjectID = PL.ProjectID
```



FINANCIAL TRACKING SOLUTIONS

CUMULATIVE BUDGET ANALYSIS

Track running totals to monitor budget allocation over time and identify spending patterns.

```
SELECT Name, Budget,  
SUM(Budget) OVER  
(ORDER BY StartDate)  
AS RunningBudgetTotal  
FROM Projects;
```

PREVIOUS PERIOD COMPARISON

Use LAG function to compare current project budgets with previous periods for trend analysis.

```
SELECT Name, Budget,  
LAG(Budget, 1, 0) OVER  
(ORDER BY StartDate)  
AS PreviousBudget  
FROM Projects;
```

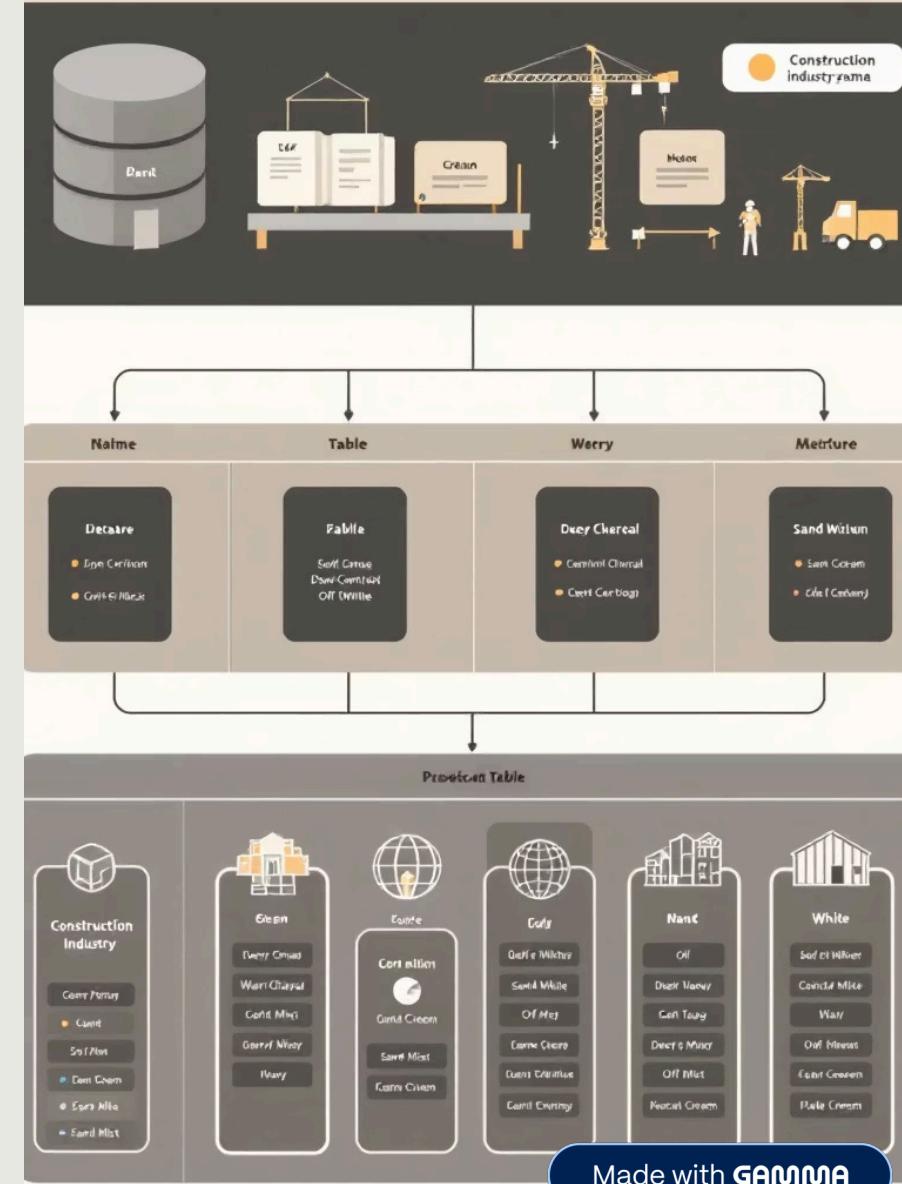
DATABASE STRUCTURE MANAGEMENT

TABLE MODIFICATIONS

Efficiently manage database schema changes with ALTER TABLE commands for evolving business needs.

```
ALTER TABLE Feedback RENAME TO CustomerFeedback;  
ALTER TABLE Feedback DROP COLUMN OldColumn;
```

Database



CUSTOM FUNCTIONS & AUTOMATION

$f(x)$



USER-DEFINED FUNCTIONS

Create custom functions for sentiment analysis and business logic automation.

```
SELECT FeedbackID,  
IsPositive(Rating)  
AS PositiveSentiment  
FROM Feedback;
```

STORED PROCEDURES

Automate complex operations like budget adjustments across multiple projects.

```
CALL IncreaseBudgetByLocation(  
'Pune', 5000000.000);
```

DATA QUALITY ASSURANCE



CONSISTENCY VALIDATION

Implement automated checks to ensure data integrity across property listings and pricing structures.

```
SELECT COUNT(*) FROM PropertyListings  
WHERE ProjectID IS NULL  
AND Price > 0;
```





SECURITY & ACCESS CONTROL

DATA CONTROL LANGUAGE (DCL)

Implement robust security policies to protect sensitive employee and project information.

```
REVOKE DELETE ON Employees  
FROM 'all_users'@'%';
```



BUSINESS INTELLIGENCE INTEGRATION

θ1

POWERBI CONNECTION

Seamlessly connect SQL databases to visualization tools for real-time reporting and analytics.

CONNECT TO PowerBI;

PROJECT IMPACT & RESULTS

100%

DATA INTEGRATION

Complete integration of construction and real estate data systems

50%

QUERY EFFICIENCY

Improved query performance through optimized SQL techniques

24/7

MONITORING

Continuous system monitoring and data quality assurance

ROBUST BLUEPRINT FOR SUCCESS

CREATED BY: YASH

Comprehensive SQL system design and implementation for construction industry data management.

MONITOR: SHALINI Verma

Ongoing system monitoring and optimization to ensure peak performance and reliability.

This SQL system provides a robust blueprint for data-driven management in the construction and real estate sectors, enabling informed decision-making and operational excellence.

