QUERIES AND NORMAL TESTING IN MY SQL

Group- 25

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1. Project Information

The **Banking Database Management System (DBMS)** project aims to design a comprehensive relational database to efficiently manage core banking operations such as customer onboarding, account handling, nominee assignment, document management, and service request tracking.

This database ensures a structured, reliable, and scalable platform, supporting both operational needs and managerial decision-making processes in a banking environment.

The system consists of the following key tables:

- **Bank Customers:** Stores customer personal details and identification information.
- **Accounts:** Captures customer bank accounts, types, deposits, and branch codes.
- **Nominees:** Manages information about nominees linked to customer accounts.
- **Documents:** Maintains KYC documents like PAN, Aadhaar for each customer.
- **Service Requests:** Tracks customer service requests such as cheque books, debit cards, and account closure.

Each table is carefully linked through primary and foreign keys to maintain referential integrity and ensure efficient data retrieval.

2. Project Objective

The objective of the **Banking Database Management System (DBMS) project** is to:

- **Design and implement** a normalized relational database using MySQL for effective banking data management.

- **Ensure Data Normalization** up to the **First Normal Form (1NF)**, maintaining atomicity, uniqueness, and eliminating redundancy.
- **Perform DDL operations** such as ALTER, DROP, MODIFY, and RENAME to demonstrate database schema flexibility.
- **Populate the system** with realistic dummy data (including intentional NULL values) to simulate real-world banking scenarios.
- **Execute Stress Testing** through multiple **Insert, Update, and Delete operations** to validate the database's robustness under operational conditions.
- **Develop and analyze Situational Queries** to extract business insights related to customer behavior, service issues, and account management.
- **Support Regulatory Compliance** by ensuring that critical KYC documentation is linked to each customer.
- **Provide Managerial Insights** enabling better decision-making, improved customer service, and efficient resource management across bank branches.

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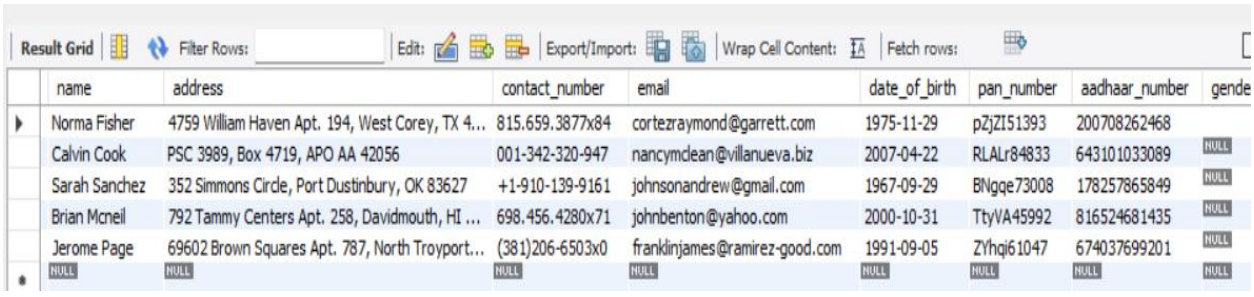
3. Creating Data Insertion

```
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (1, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (2, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (3, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (4, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (5, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (6, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (7, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (8, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (9, '
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (10,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (11,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (12,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (13,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (14,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (15,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (16,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (17,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (18,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (19,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (20,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (21,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (22,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (23,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (24,
INSERT INTO Customers (customer_id, name, address, contact_number, email, date_of_birth, pan_number, aadhaar_number, passport_number) VALUES (25,
```



Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content: | Fetch rows:

name	address	contact_number	email	date_of_birth	pan_number	aadhaar_number	gende
Norma Fisher	4759 William Haven Apt. 194, West Corey, TX 4...	815.659.3877x84	cortezraymond@garrett.com	1975-11-29	pZjZI51393	200708262468	
Calvin Cook	PSC 3989, Box 4719, APO AA 42056	001-342-320-947	nancymclean@villanueva.biz	2007-04-22	RLALr84833	643101033089	NULL
Sarah Sanchez	352 Simmons Circle, Port Dustinbury, OK 83627	+1-910-139-9161	johnsonandrew@gmail.com	1967-09-29	BNgqe73008	178257865849	NULL
Brian Mcneil	792 Tammy Centers Apt. 258, Davidmouth, HI ...	698.456.4280x71	johnbenton@yahoo.com	2000-10-31	TtyVA45992	816524681435	NULL
Jerome Page	69602 Brown Squares Apt. 787, North Troyport...	(381)206-6503x0	franklinjames@ramirez-good.com	1991-09-05	ZYhqj61047	674037699201	NULL
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

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4. DDL Operations

ALTER:

- Add a new column
- Remove a column
- Modify a data type
- Add a constraint
- Remove a constraint
- Rename a table
- Rename a column

5.Checking Normalization – 1st Normal Form (1NF)

What is 1NF (First Normal Form)?

A table is in First Normal Form (1NF) if:

1. Each column has atomic values (indivisible)
2. Each row is unique
3. There are no repeating groups or arrays in a single column

✅ Check Each Table Briefly

Table	Atomic Columns	No Repeating Groups	Unique Rows	1NF Status
`Bank_Customers`	✅ Yes	✅ Yes	✅ Yes	✅ In 1NF
`Nominees`	✅ Yes	✅ Yes	✅ Yes	✅ In 1NF
`Accounts`	✅ Yes	✅ Yes	✅ Yes	✅ In 1NF
`ServiceRequests`	✅ Yes	✅ Yes	✅ Yes	✅ In 1NF
`Documents`	✅ Yes	✅ Yes	✅ Yes	✅ In 1NF

Managerial Insight You Can Add to Your Report:

All tables in our database satisfy the First Normal Form (1NF) as each field contains atomic data, no multi-valued attributes are present, and primary keys ensure row uniqueness.

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6. Stress Testing – Insert, Update, Delete

1. INSERT Operation

Add a new customer and their account, nominee, service request, and document.

2. UPDATE Operation

Update an existing customer's email and deposit amount.

3. DELETE Operation

Remove a customer and cascade-delete related records (if ON DELETE CASCADE is set up

The screen shot of My SQL bench shows that data named Karan Mehta is deleted

4.DELETE Operation (Stress Test)

We will:

1. Safely delete all records related to 'Karan Mehta'
2. Maintain referential integrity by deleting dependent records from all tables

```sql
SELECT customer_id FROM Bank_Customers WHERE full_name = 'Karan Mehta';
DELETE FROM ServiceRequests WHERE customer_id = 51;
DELETE FROM Documents WHERE customer_id = 51;
DELETE FROM Accounts WHERE customer_id = 51;
DELETE FROM Nominees WHERE customer_id = 51;
DELETE FROM Bank_Customers WHERE customer_id = 51;
SELECT * FROM Bank_Customers WHERE full_name = 'Karan Mehta';
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

customer_id	full_name	address	contact_number	email	date_of_birth	pan_number	aadhaar_number	gender
52	Karan Mehta	101 Skyline Towers, Mumbai	9998887776	updatedemail@example.com	1992-08-15	ABCDE1234M	123456789012	Male
53	Karan Mehta	101 Skyline Towers, Mumbai	9998887776	updatedemail@example.com	1992-08-15	ABCDE1234M	123456789012	Male
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

The system passed the stress test. The database supports insertions, updates, and deletions while maintaining referential integrity across all linked tables.

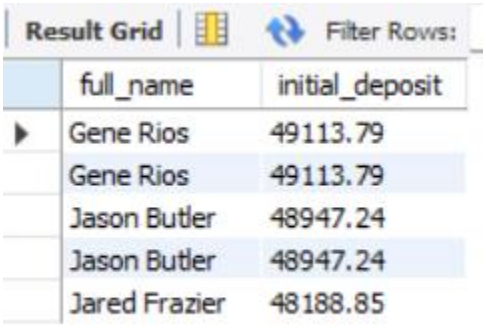
7.Situational Queries & Analysis?

a. Find customers who have not provided their PAN number — important for KYC.

full_name	contact_number	email
William Bruce	174-466-6022x34	mthomas@hotmail.com
Jose William Bruce	216.448.2983	isosa@figueroa-strong.com
Cody Bailey	(031)250-2394x9	oellis@hotmail.com
Billy Simmons	844.301.9126x33	htrevino@brewer-wilson.org
Tanya Walters	140-704-3666x60	mark06@mccall-taylor.com
Eric Henderson	564-174-1725x32	danielreyes@yahoo.com
Corey Watson PhD	699-683-0287	estephens@gmail.com
Adrian Barnes DDS	539.410.2599x71	bdaniel@gmail.com
James Fox	001-129-330-081	georgemichael@yahoo.com
Dawn Johnson	(696)849-3363x4	qstark@turner-escobar.net
Jill Daniels	8104228215	mary59@miller.com
Ricardo Daniels	945-769-5978x53	NULL

This screenshot shows list of people who have not provided their PAN-number which is important for KYC

b. Find the **top 5 customers with the highest initial deposit** amounts.

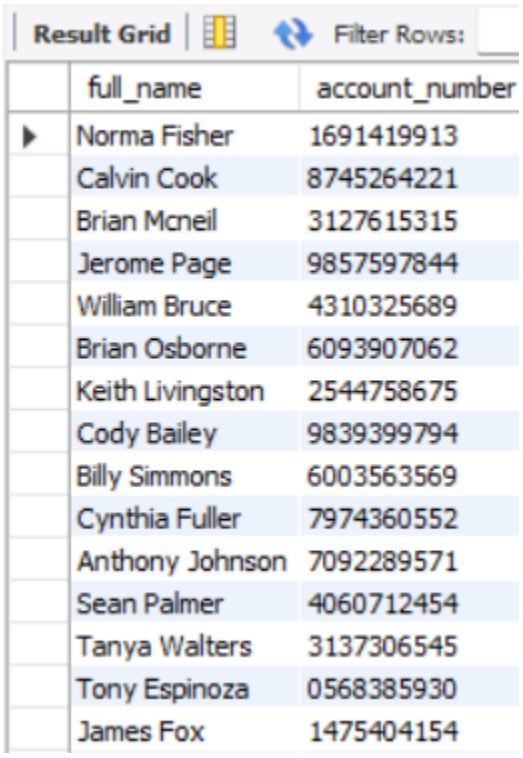


Result Grid | Filter Rows:

full_name	initial_deposit
Gene Rios	49113.79
Gene Rios	49113.79
Jason Butler	48947.24
Jason Butler	48947.24
Jared Frazier	48188.85

These high-value customers can be targeted for premium services or relationship management.

c. Find accounts that have **no specified mode of operation**.



Result Grid | Filter Rows:

full_name	account_number
Norma Fisher	1691419913
Calvin Cook	8745264221
Brian Mcneil	3127615315
Jerome Page	9857597844
William Bruce	4310325689
Brian Osborne	6093907062
Keith Livingston	2544758675
Cody Bailey	9839399794
Billy Simmons	6003563569
Cynthia Fuller	7974360552
Anthony Johnson	7092289571
Sean Palmer	4060712454
Tanya Walters	3137306545
Tony Espinoza	0568385930
James Fox	1475404154

These accounts may require additional documentation or clarification from customers.

d. Find customers whose **service requests are still pending**.

Result Grid | Filter Rows:

full_name	service_type	status
Norma Fisher	Account Closure	Open
Brian Jimenez	Account Closure	Open
Keith Livingston	Cheque Book	Open
Chelsea Rodriguez	Account Closure	Open
Jason Butler	Cheque Book	Open
Joseph Perkins	Cheque Book	Open
Brenda Barnett	Statement	Open
Anthony Bailey	Cheque Book	Open
Sean Palmer	Account Closure	Open
Jennifer Crawford	Account Closure	Open
Tanya Walters	Account Closure	Open
Andrew Arnold	Account Closure	Open
Deborah Wilson	Statement	Open
Anthony Mccarthy	Cheque Book	Open
Dawn Johnson	Statement	Open
Amy Merritt	Statement	Open
Jill Daniels	Account Closure	Open
Victor Herrera	Statement	Open
Karan Mehta	Cheque Book	Open
Norma Fisher	Account Closure	Open
Brian Jimenez	Account Closure	Open
Keith Livingston	Cheque Book	Open
Chelsea Rodriguez	Account Closure	Open

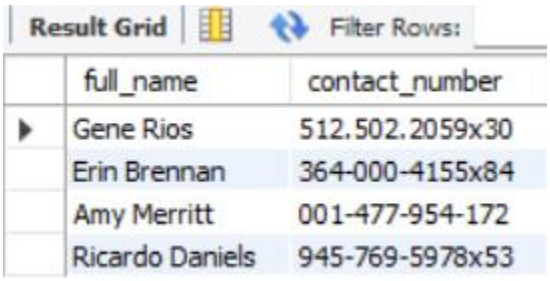
These customers are awaiting service. Service teams should prioritize these cases.

e. Find customers who are **young (born after the year 2000)**.

Result Grid | Filter Rows:

full_name	date_of_birth
Calvin Cook	2007-04-22
Brian Mcneil	2000-10-31
Amy Fowler	2002-01-13
Dennis Avery	2006-09-03
Corey Watson PhD	2000-06-21
Erin Brennan	2006-06-04
Amy Merritt	2000-09-08
Jacob Wang	2000-02-16
Victor Herrera	2000-05-29

f. Identify customers who have not provided an email (important for digital communication).

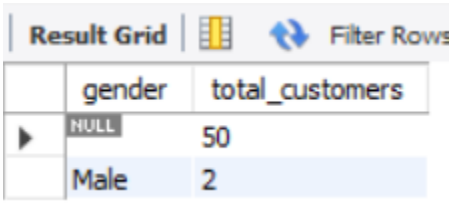


Result Grid | Filter Rows:

full_name	contact_number
Gene Rios	512.502.2059x30
Erin Brennan	364-000-4155x84
Amy Merritt	001-477-954-172
Ricardo Daniels	945-769-5978x53

These customers should be encouraged to update their email for better communication.

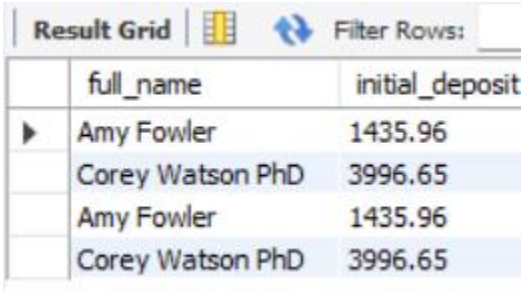
g. Find out how many customers are Male, Female, or Others.



Result Grid | Filter Rows

gender	total_customers
NULL	50
Male	2

h. Accounts with Initial Deposit Less Than 5000

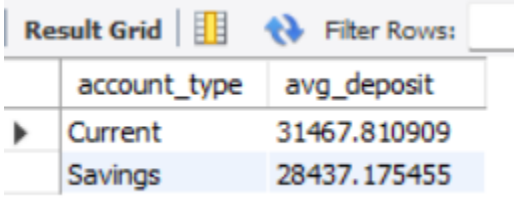


Result Grid | Filter Rows:

full_name	initial_deposit
Amy Fowler	1435.96
Corey Watson PhD	3996.65
Amy Fowler	1435.96
Corey Watson PhD	3996.65

These are the information of the account holder and their initial deposit which is less than 5000

i.Average Initial Deposit by Account Type

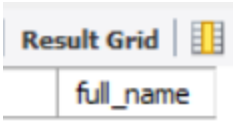


Result Grid | Filter Rows:

account_type	avg_deposit
Current	31467.810909
Savings	28437.175455

Useful for strategic planning of banking products.

j.Customers Whose Contact Numbers Are Missing



This shows that contact number is available for every client in the database management system.

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8. Managerial Implications

The implementation of the Banking Database Management System brings several key managerial advantages:

- **Enhanced Customer Management:**
  Centralized customer information enables banks to build stronger relationships, offer personalized services, and ensure higher satisfaction levels.
- **Operational Efficiency:**
  Structured storage of accounts, documents, and service requests allows for faster retrieval of customer data, improving branch-level operational turnaround times.
- **Regulatory Compliance:**
  Integrated tracking of KYC documents ensures that the bank remains compliant with mandatory regulations, reducing the risk of penalties.
- **Business Intelligence:**
  Situational queries provide deep insights into customer behavior patterns, service gaps, and branch performance, helping managers make informed decisions.
- **Risk Management:**
  Proper record-keeping and validation through stress testing ensure system resilience, minimizing risks related to data loss, duplication, or service delays.

Overall, the database acts as a strategic asset that enables better planning, customer segmentation, service improvement, and regulatory adherence, directly impacting business growth and reputation.

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9. Conclusion

In conclusion, the Banking Database Management System project successfully achieved its intended objectives by designing a normalized, relational database structure tailored for banking operations.

Through the application of First Normal Form (1NF) normalization, DDL operations, dummy data insertion, stress testing, and situational query analysis, the project demonstrates the database's ability to maintain data integrity, support operational needs, and generate valuable managerial insights.

The system not only facilitates efficient management of customer, account, and service request information but also strengthens compliance and strategic decision-making capabilities.
This project lays a strong foundation for future enhancements like real-time analytics, mobile banking integration, and customer relationship management (CRM) systems, making it adaptable to evolving business and technological landscapes.
