

National Bank of Egypt

Database Triggers & Transaction Log Management

Database Management Solutions Department



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Problem Statement

The bank previously encountered significant challenges during the migration of data from SQL Server to Oracle:

Data Tracking Gaps

No reliable way to capture records **before and after updates**, risking inconsistency.

Transaction Log Growth

SQL Server logs expanded rapidly, overloading storage and complicating migration.

Migration Reliability

Without audit trails and log control, ensuring accuracy and accountability was difficult.

- ✔ ☒ This project was developed to **solve these challenges**, ensuring reliable migration and long-term database stability.

Project Objectives

1

Robust Audit Trail

Create a robust audit trail to capture data before and after changes.

2

Efficient Log Management

Implement transaction log backup and cleanup to manage space efficiently.

3

Demonstration System

Build a demonstration system to show how the solution works in practice.

4

Smooth Migration Support

Support smooth migration from SQL Server to Oracle by ensuring accountability and reliability.

Background & Importance



In banking, **data integrity and accountability** are critical.



Migrating between platforms (SQL Server → Oracle) highlighted weaknesses in tracking changes and log growth.



Strong database management ensures: **Regulatory compliance, System stability**, Smooth migration without data loss

Proposed Solution Overview

The project introduced three main solutions:



Audit Trail

Database triggers to record every change.



Log Management

Regular backups with automated cleanup.



Demonstration Application

A Python GUI to showcase how the solution works in practice.

Database Audit Mechanism

1

Dedicated Audit Table

A dedicated **Audit Table** stores all record changes.

2

Key Events Captured

Captures key events: Insert, Delete, Before Update, After Update

3

Full History

Ensures a **full history of modifications**, useful for migration checks and compliance.

Change Tracking with Triggers

Automatic Recording

Triggers automatically record **changes** without user intervention.



Real-Time Logging

Each operation is logged in real time.



Accuracy & Reliability

Provides accuracy and reliability, essential during migration to Oracle.

Audit Trail Benefits



Transparency

Clear history of changes.



Accountability

Proof of what was changed and when.



Security

Helps detect unauthorized activity.



Compliance

Meets auditing standards for financial institutions.



Migration Support

Ensures migrated data can be verified against original SQL records.



Transaction Log Challenges

Before the project, transaction logs:

Uncontrolled Growth

Grew uncontrollably during operations.

Storage Consumption

Consumed large storage space.

Performance Slowdown

Slowed down performance.

Complicated Migration

Complicated the migration process to Oracle.

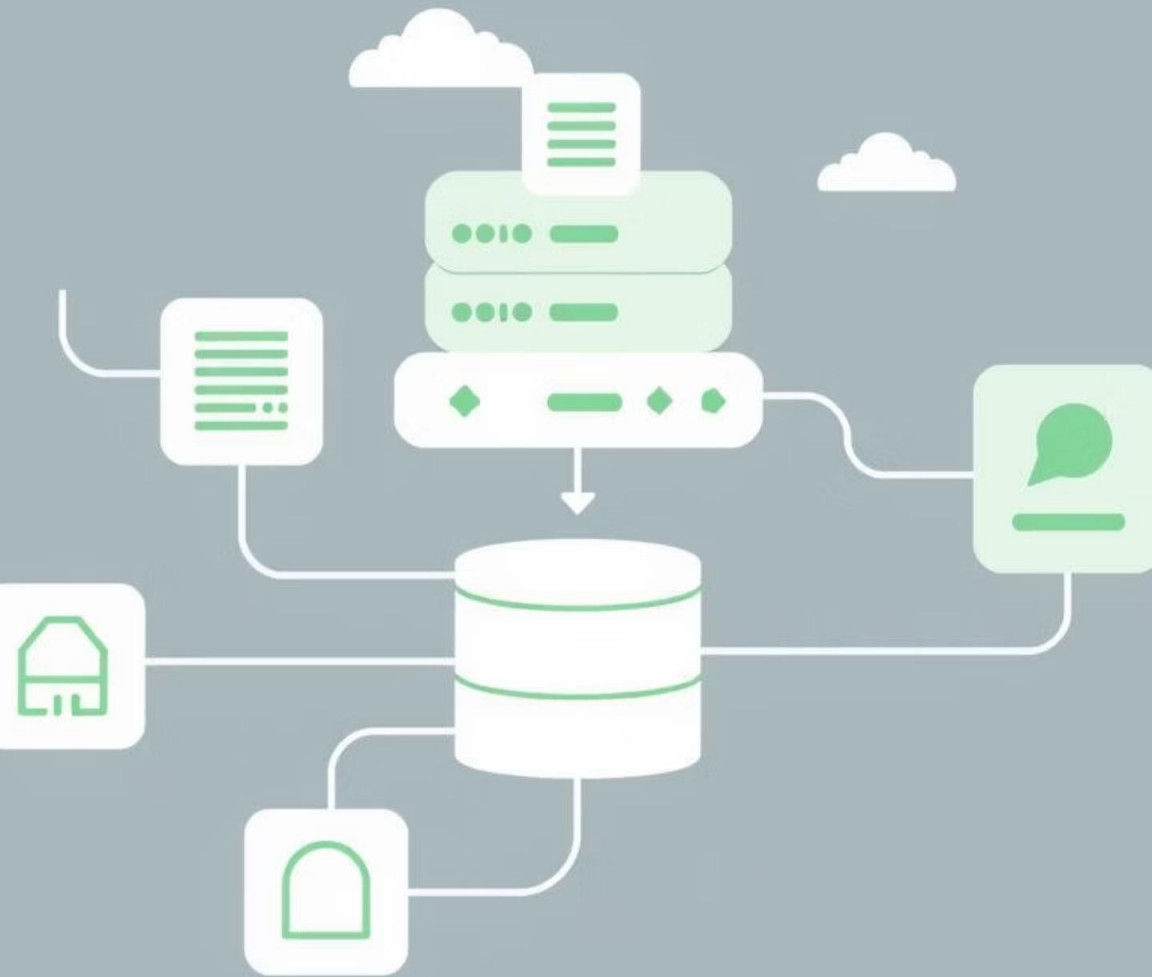


Backup & Retention Strategy

The project introduced a controlled log management process:

- Scheduled backups
 - Retention policy to keep only the latest logs.
 - Automatic cleanup of older logs.
- ✓ This ensured smooth operations during migration and long-term stability.

Ensuring System Efficiency



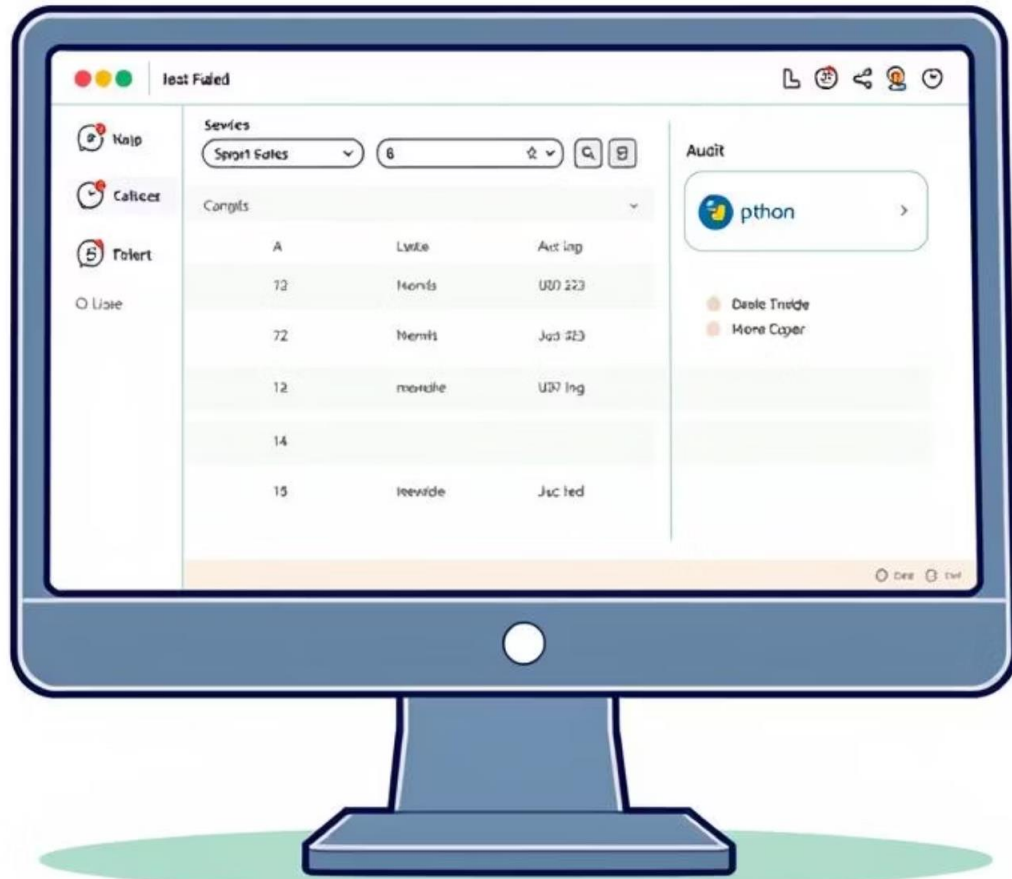
Automatic backups reduced manual effort.

Old logs were deleted to save space.

Database performance remained stable.

Provided a clean environment for reliable migration.

User Application Overview



A Python-based application was built to demonstrate the solution.

Features:

- Manage employee records (insert, update, delete).
- View the **audit log** to confirm all changes are tracked.

Showcases how the solution works in a **practical, user-friendly way**.

Benefits to NBE



Ensured successful migration from SQL Server to Oracle.

Improved data governance with full audit trails.

Optimized system performance through log management.

Enhanced compliance with internal and external standards.

Delivered a scalable solution for future projects.

Conclusion & Future Enhancements



Conclusion:

Creating audit trails for accountability.

Controlling transaction log growth.

Demonstrating practical usage through a custom app.

Future Enhancements:



Add advanced reporting dashboards.



Implement **real-time alerts** for unusual changes.



Expand integration with **enterprise-wide monitoring systems**.



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Employees (DB1) Audit Log (DB2)

EmpID (for Update/Delete):

Name:

Salary:

Age:

Insert

Update

Delete

Refresh

Clear Form

EmpID	EmpName	Salary	Age
2	ahmed hossam	25000	27
3	Marwan	9500	35
6	Omar	8500	27
8	Hossam	8500	27
14	Erfan Nada	50000	20
15	Omar Wael	50000	20
16	Mohamed Attalah	40000	20
17	Ziad Mohamed	70000	21