# DDL in the Middle of a Transaction

Understanding and Mitigating Implicit Commits in Oracle Database

# THE ATOMICITY CHALLENGE

## ACID Principles

Transactions are designed to be "All or Nothing." Oracle strictly follows this for DML, but DDL behaves as a global disruptor.

## Implicit COMMIT

Executing DDL (CREATE, ALTER, DROP) triggers a silent, mandatory commit before and after the statement execution.

## Data Integrity

The silent commit makes partial rollbacks impossible, potentially leaving the database in an inconsistent business state.

# INTERNAL EXECUTION ANATOMY

### 1. Implicit COMMIT

Oracle clears the session's undo log and commits all pending DML changes to the data blocks.

### 2. DDL Execution

The structural change is applied to the Data Dictionary tables. This is an atomic operation.

### 3. Final COMMIT

A second commit ensures the metadata changes are finalized. Pass or fail, the previous DML is now permanent.

# CASE STUDY: THE "DANGER ZONE"

```
INSERT INTO temp_data VALUES (1, 'test');
-- DDL triggers commit here!
CREATE INDEX idx_temp ON temp_data(id);
-- ROLLBACK is now ineffective.
ROLLBACK;
```

In this scenario, the **INSERT** is finalized the moment **CREATE INDEX** begins. The developer's intention to rollback data is subverted by structural intent.

# ANATOMY OF A FAILURE

**0%**

**Rollback Recovery Rate**

### Why it's "Too Late"

When the ROLLBACK command is issued after the DDL, it finds no active transaction in the Undo Segment to reverse. The transaction was technically terminated at the start of the CREATE INDEX statement.

- DML undo records were purged.
- Redo logs were flushed to disk.
- SCN (System Change Number) was advanced.

# THE ARCHITECTURAL NECESSITY

## Data Dictionary Consistency

The Data Dictionary (tables like TAB$, IND$) is a shared resource. Oracle prevents transactional locks on metadata to ensure high concurrency across all system sessions.

## Shared Resource Locking

By forcing a commit, Oracle releases dictionary locks immediately, preventing a single long-running user transaction from blocking system-wide schema changes.

# IMPACT ON DATA INTEGRITY

- ⚠ **Orphaned Records:** Mixed scripts may commit parent records without validating the full batch, leading to referential logic errors.
- ⚠ **Audit Compliance:** Automated audit logs may show incomplete transactions as "finalized," complicating forensic data analysis.
- ⚠ **Migration Risks:** Deployment scripts that fail mid-way cannot be easily "reset" if DDL was mixed with data transformation.
- ⚠ **Resource Leakage:** Partial data commit followed by a DDL failure still leaves the data committed, requiring manual cleanup.

# DB COMPARISON: DDL BEHAVIOR

| Database Engine | DDL in Transactions | Rollback Behavior |
| --- | --- | --- |
| **Oracle Database** | Not Supported (Implicit Commit) | Impossible once DDL starts. |
| **PostgreSQL** | Supported | Can rollback DDL and DML together. |
| **SQL Server** | Supported | Transactional DDL allowed in blocks. |
| **MySQL (InnoDB)** | Not Supported (Implicit Commit) | Similar to Oracle's behavior. |

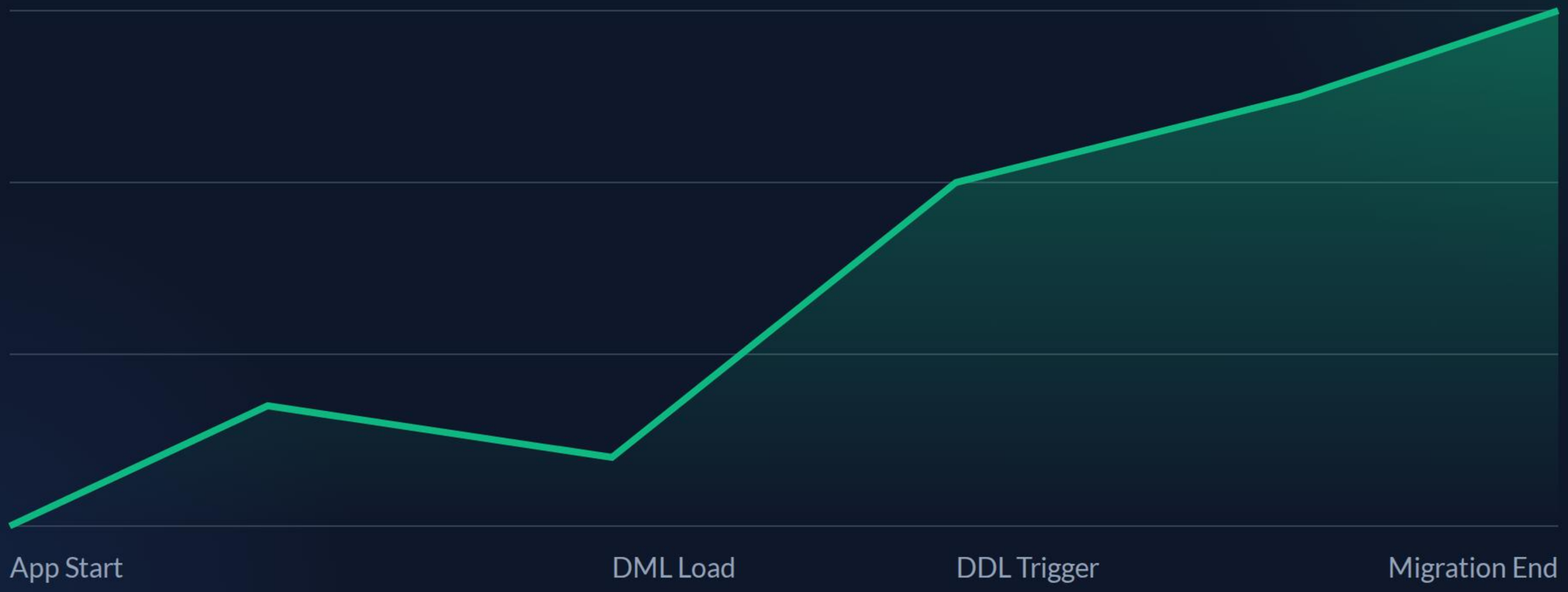
# THE GTT WORKAROUND

**Global Temporary Tables (GTT)**

If you require temporary structures during complex logic, define the GTT structure **once** (DDL phase) and use session-specific data (DML phase) that obeys standard rollback rules.

- ✓ Private session-level data.
- ✓ Standard DML atomicity.
- ✓ No implicit commits during usage.

# IMPLICIT VS. EXPLICIT COMMITS




*Note: DDL activity causes sharp spikes in commit finalization, overriding standard batch commit strategies.*

# BEST PRACTICES FOR DEVELOPERS

## Decouple Phases

Run all structural DDL in an administrative phase before executing business DML.

## Monitor State

Check v$transaction before DDL to ensure no pending data is at risk.

## Defensive SQL

Use explicit commits **before** DDL to acknowledge intent and control the state.

# Questions & Discussion

Thank you for your attention to Oracle Transaction Integrity.

# IMAGE SOURCES

https://st3.depositphotos.com/8846918/37244/i/1600/depositphotos_372448352-stock-photo-padlock-chain-closeup-heavy-metal.jpg

Source: depositphotos.com

---

https://png.pngtree.com/background/20250721/original/pngtree-a-blueprint-of-an-architectural-plan-with-detailed-floor-plans-sketches-picture-image_16817030.jpg

Source: pngtree.com

---

https://letscatapult.org/wp-content/uploads/2026/02/smiling-businesswoman-presenting-on-a-whiteboard-in-a-bright-office-space.-5466235-scaled.jpg

Source: letscatapult.org