**OPS-12 — Schema & Data Migration Playbooks (Zero Downtime)**

**Intent**  
Ship schema changes safely: preview, phased rollout, backfill, and rollback with receipts.

**Preconditions**

* Migration tool (DDL + data), shadow tables support.

**Flow**

1. **Plan**: migration RFC with blast radius & rollback steps.
2. **Guard**: feature flag to gate new fields/paths.
3. **DDL**: additive first (nullable columns, new tables); write dual-writes if needed.
4. **Backfill**: idempotent batches; emit **Backfill Receipt** (counts, hashes).
5. **Cutover**: flip reads to new schema; monitor; then remove old path.
6. **Rollback**: one-click revert path with receipts; purge partial writes.
7. **Verify**: data consistency queries; decision replay sample.

**Edge cases**

* Long backfills → throttle windows; resume from checkpoints.
* Conflicting online edits → optimistic locks + retry.

**Done when**

* Cutover completes with zero downtime; receipts stored; verification green; rollback rehearsed in staging