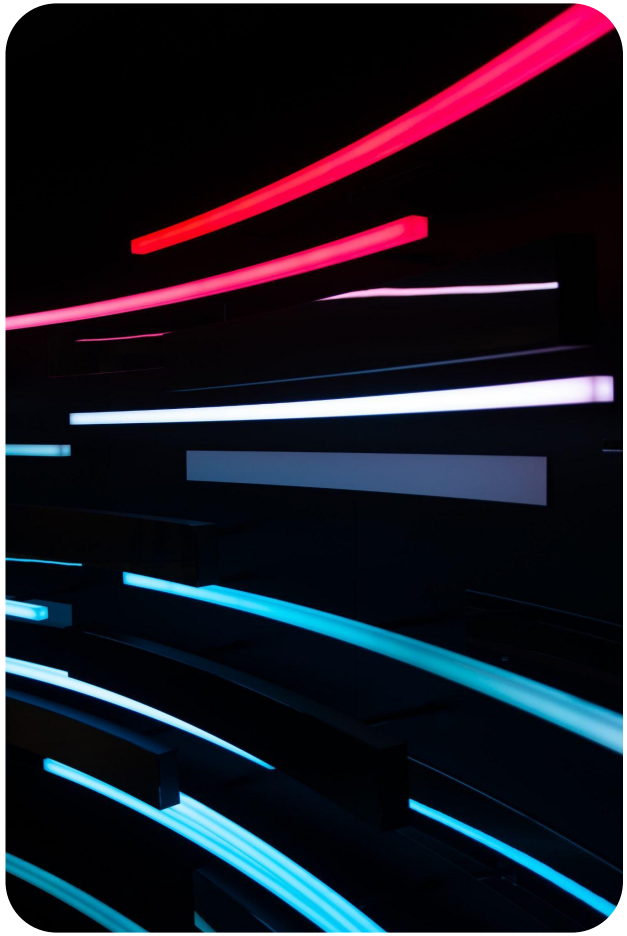
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How India’s Largest G2C Platform Migrated to FOSS and Broke Free from Oracle

Hari P Kiran
Founder & CEO

IndiaFOSS 2026
27th, September, Bengaluru



Who am I?



- 20 years of taming databases and now, 5 years of navigating the cool StartUp<>ScaleUp world, running a Postgres Company
- Founder & CEO @ OpenSource DB
- Founded Postgres Women India | Hyderabad PUG | Vizag PUG
- Postgres CoCC Member | Member of India PostgreSQL Group
- Regular speaker at Postgres Conferences | An avid FOSS Evangelist
- Adjunct Professor @ JNTUH and SSSIHL
- Former Database SME avatars @ GE, Oracle, Optum, 2ndQuadrant and EDB

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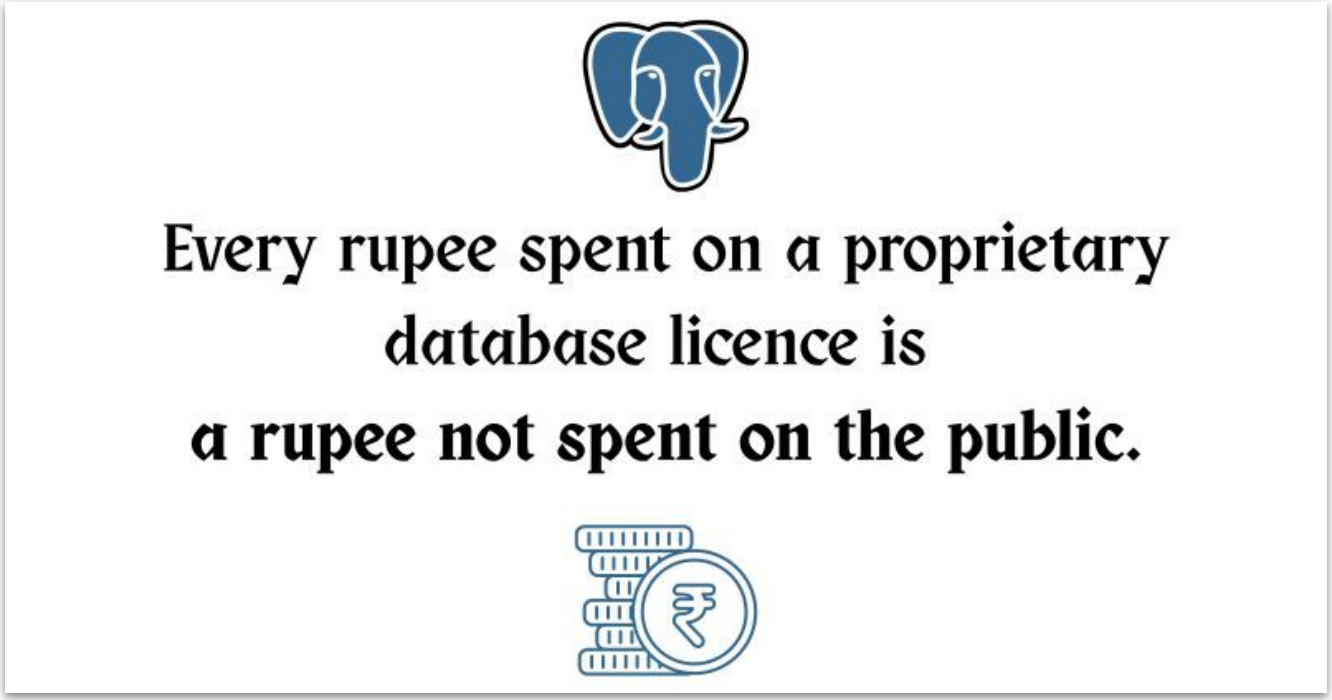
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The FOSS Signal



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Platform Context: MeeSeva ESD (Electronic Services Delivery)

Telangana's flagship e-governance platform delivering government services to citizens and businesses.



500+ G2C & G2B Services

Certificates, licenses, permits, registrations, and utility services available online and through citizen service centers across Telangana.



High-Volume Transaction Platform

Processes thousands of daily transactions with real-time integrations to multiple state government departments and external agencies.



Mission-Critical Availability

Any downtime directly impacts citizen access to essential government services, zero tolerance for data loss or extended outages.

Migration scope: All production databases supporting 85+ critical citizen-facing services

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The Oracle Landscape: Where We Started

Oracle 11g Enterprise Edition: Procured by ITE&C Department for Government of Telangana in 2013

3 SEPARATE ORACLE SERVER INSTANCES

DB

DASHBOARD
Operational analytics & monitoring dashboard

DB

TSPAYGTY
Payment gateway transactions processing

DB

SACENTRAL
Central portal — citizen services processing

THE COST REALITY

₹10 Crore

Perpetual License Cost

Quoted for keeping Oracle 11g Enterprise Edition operational

+

₹1.3 Crore / Year

Annual Support Cost

Recurring annual maintenance for new license renewal

This strategy was not sustainable. Perpetual licensing at ₹10 Crore with ₹1.3 Crore in recurring annual support represents a significant and growing cost burden. It is incompatible with the Government of Telangana's policy direction toward open-source adoption. a direction rooted not just in cost savings, but in vendor independence, transparency, community-driven innovation, and long-term digital sovereignty.

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MeeSeva ESD Database Landscape

- App Databases: **DASHBOARD; TSPAYGTY; SACENTRAL**
- Data Storage: **1,939 Tables with 1.5TB DB size**
- Data Integrity: **443 Primary Keys, 9 Foreign Keys**
- Performance: **805 Indexes**
- Programing Logic: **11 Functions, 7 Procedures, 1 Trigger, 56 Sequences**
- Reporting: **37 Views**



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Business Case for Migration

Why Migrate?



License Cost Elimination

Oracle licensing represent a significant expense; PostgreSQL is open-source with zero license cost.



Vendor Independence

Eliminates vendor lock-in and dependency on proprietary technology



Scalability & Flexibility

PostgreSQL's extensibility supports evolving service demands without proprietary constraints.



Government Open-Source Push

Aligns with national and state policies encouraging adoption of open-source solutions in government IT.

Expected Impact

100%	Oracle License Fee Eliminated
Lower	Total Cost of Ownership (TCO)
Higher	Long-Term Maintainability
Open	Community-Driven Innovation

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Executive Summary

Mission-critical database migration completed with zero data loss and zero service disruption beyond the planned window.



~12 hrs

Cutover Window

00 AM → 12 PM



85+

Services Migrated

Critical citizen services



100%

Data Integrity

Checksum validated



Zero

Data Loss

Full parity confirmed

Platform stabilized and fully operational post-migration with 72-hour hypercare monitoring.

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Architecture Evolution: From 9 Nodes to 3

Three iterations of architecture design before arriving at the optimal solution

PROPOSAL 1 — REJECTED

3 Separate Clusters

9 nodes (3 clusters × 3 nodes)
288 vCPUs | 576 GB RAM
Primary + Standby1 + Standby2 per DB

Infrastructure requirement exceeded government procurement capacity

PROPOSAL 2 — REJECTED

3 Clusters, 2 Nodes Each

6 nodes (3 clusters × 2 nodes)
Primary + Standby per DB
FDW for cross-database queries

Foreign Data Wrapper queries were unacceptably slow for real-time citizen services

FINAL — ADOPTED

Single Instance, 3 Schemas

3 nodes + 1 DR node
88 vCPUs | 348 GB RAM | 11.1 TB
Active – Passive – Passive (Patroni)

Eliminated FDW entirely. Cross-schema queries at native speed. Right-sized infrastructure.

One architectural decision solved two problems: eliminated FDW latency AND reduced infrastructure by 67%

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Ora2Pg: What It Handled & What Required Work

An honest assessment of automated vs. manual effort in the MeeSeva migration

✅ AUTOMATED BY Ora2Pg

Schema Conversion
1,939 tables, 443 PKs, 9 FKs, 805 indexes, 37 views, 56 sequences — all converted with correct datatype mapping

PL/SQL → PL/pgSQL
Bulk translation of functions, procedures, and triggers from Oracle syntax to PostgreSQL syntax

Parallel Data Export
Multi-threaded data extraction from Oracle with COPY-based loading into PostgreSQL for 1.5 TB dataset

Migration Assessment
SHOW_REPORT + ESTIMATE_COST provided realistic scope and effort estimation before first line of code

Constraint & Grant Export
Primary keys, foreign keys, check constraints, unique constraints, and user grants/privileges preserved

✋ REQUIRED MANUAL EFFORT

30+ Functions & Procedures
Complete code rewrite, Oracle packages, autonomous transactions, and proprietary built-in dependencies had no direct PostgreSQL equivalent

Post-Migration Validation
Ora2Pg had no built-in 100% validation. Custom Python utilities built for schema object counts, row count comparison, and checksum verification

Performance Tuning
20% of queries needed rework, advanced indexing, query plan analysis, and PostgreSQL parameter tuning (shared_buffers, work_mem, etc.)

Integration Testing
86 services tested incrementally via dual-write (5 at a time) against real production endpoints, not automatable

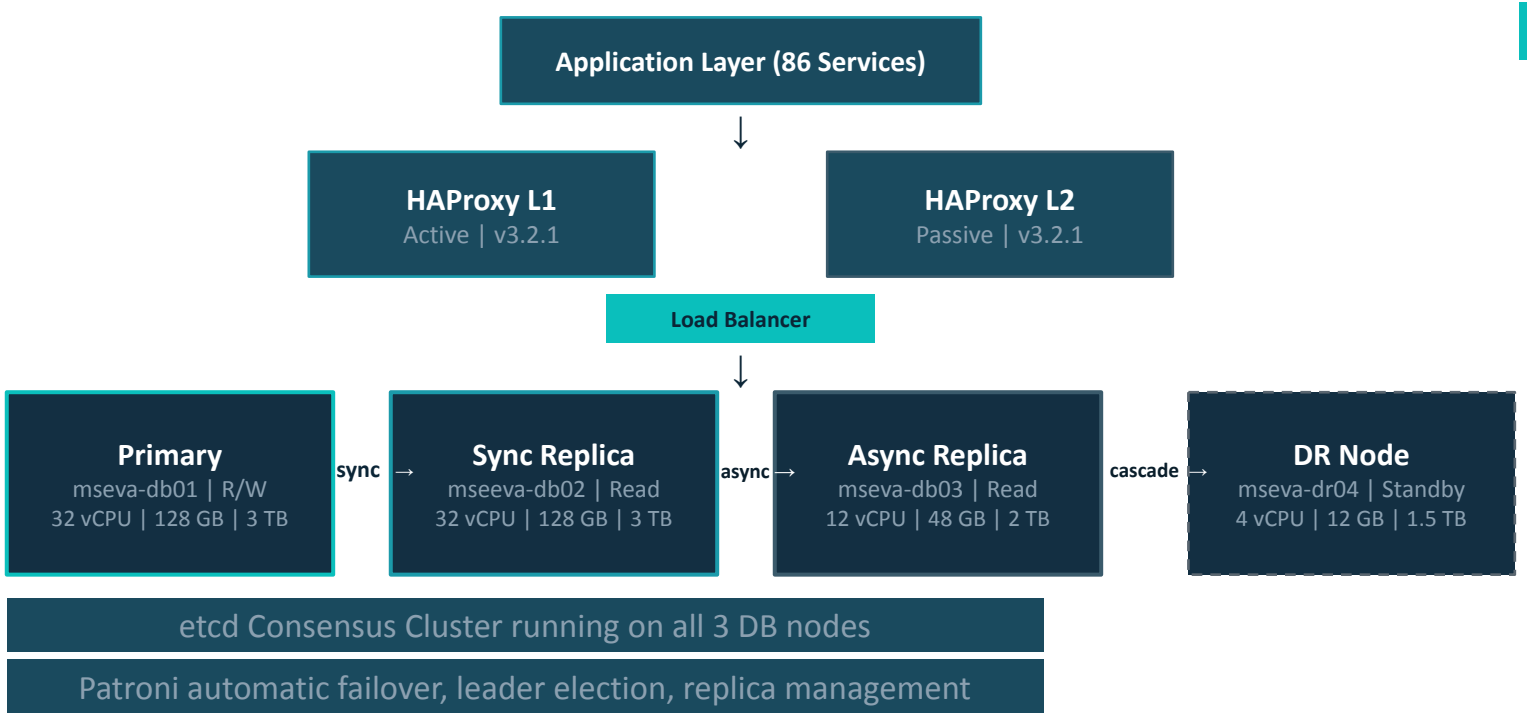
Application Code Patches
Date format discrepancy (CAT-1), JDBC connection reconfiguration, connection pool parameter adjustments

Ora2Pg automated ~70–80% of the migration. The remaining 20–30% was skilled manual work. Budget accordingly.

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High Availability & Disaster Recovery Architecture

Production-validated failover with zero data loss and <30 second recovery



VALIDATED METRICS

<30s
RTO
Automatic Failover

Zero
RPO
Sync Replication

<5s
VIP Failover
Keepalived VRRP

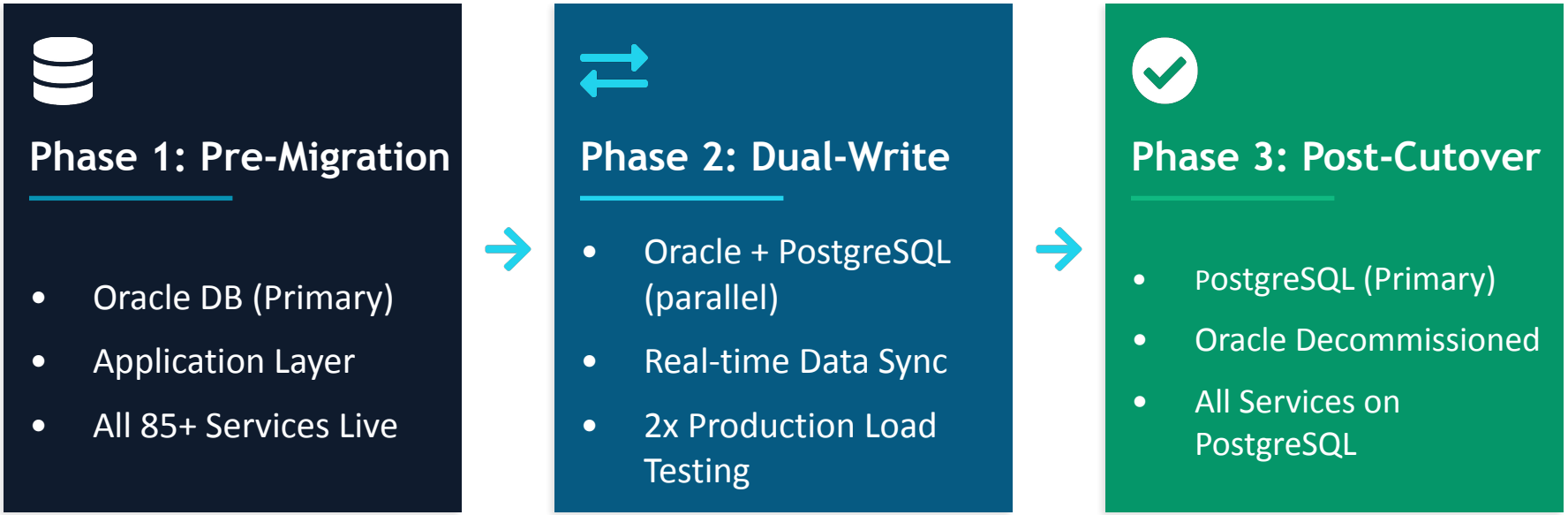
5/5
Failover Tests
All Passed

PostgreSQL 17.9 | Ubuntu 24.04.3 LTS | Patroni | HAProxy | Keepalived | etcd

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Architecture: Migration Approach

Dual-write strategy ensured system stability at 2x production load before final cutover.



Dual-write architecture validated data consistency in real time before committing to cutover, reducing risk to near-zero.

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Migration Execution

04 Apr 2026, 00:00 AM → **04 Apr 2026, 12:00 PM** **~12 hours**

Migration Strategy

- Pre-migration dual-write architecture (Oracle + PostgreSQL running live in parallel)
- System stress-tested at 2x production load prior to cutover

Cutover Approach

- Controlled downtime window for full data migration (Oracle → PostgreSQL)
- Final data sync & validation before go-live

Operational Control

- War-room model: Dev, Infra, DB, QC teams co-located
- Real-time monitoring: DB performance, connections, latency

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Challenges & How We Solved Them

What went wrong, what we didn’t anticipate, and how each issue was resolved

SEV	CHALLENGE	DETAIL	RESOLUTION
HIGH	**Schema migrated via Navicat by Vupadhi without datatype validation**	Oracle NUMBER, DATE, VARCHAR2 copied without conversion rules — risked silent data truncation	**Adopted Ora2Pg as primary tool. Full schema validation audit performed.**
HIGH	**Integration testing conducted against stubs, not live endpoints**	All 86 services tested against static responses. External departments had no staging environments.	**Dual-write on production: 5 services at a time pointed to PostgreSQL. Issues resolved per batch.**
MED	**FDW cross-database queries unacceptably slow**	Inter-DB SQL via postgres_fdw introduced latency breaching SLA targets for real-time services.	**Consolidated 3 databases into 3 schemas in a single instance. FDW eliminated entirely.**
CRIT	**Date format mismatch caused missing rows (Cat-1)**	Oracle DATE ⟶ PostgreSQL timestamp handling caused a chunk of rows to be silently dropped.	**Caught by custom Python validation utilities in pre-prod. Application code patched.**
MED	**20% of queries didn’t meet SLA targets post-migration**	Oracle and PostgreSQL query planners behave differently. 1 in 5 queries underperformed.	**Advanced indexing, query plan analysis, PostgreSQL parameter tuning. All queries now at parity.**

Every challenge was identified before production cutover. No surprises on go-live day.

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Risk Management & Governance



Data Integrity Assurance

- Checksum-based validation ensuring complete parity
- Daily reconciliation during the dual-write phase to catch discrepancies early



Issue Handling Framework

- Immediate triage + Root Cause Analysis + hotfix deployment pipeline
- Service-level isolation capability to contain issues without platform-wide impact



Hypercare Support

- 72-hour intensive monitoring post go-live covering all critical services
- Continuous tracking of transaction throughput and system health metrics



Governance Strength

- End-to-end accountability across the full migration lifecycle
- Cross-team coordination: ESD, IT Infra, Database, and Application teams

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Outcome & Key Metrics

500+

Critical Citizen Services Migrated

100%

Data Integrity Validated

~12 hrs

Total Cutover Window

Migration Success Checklist

- **All 500+ citizen services restored successfully within the planned window**
- **Zero data loss confirmed via checksum-based validation across all databases**
- **Platform stabilized post-migration, consistent CPU, memory, connection metrics**
- **High-volume transaction environment handled seamlessly without degradation**
- **72-hour hypercare period with continuous monitoring and zero critical issues**

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Migration Complete.

Telangana MeeSeva ESD is now running fully on PostgreSQL.

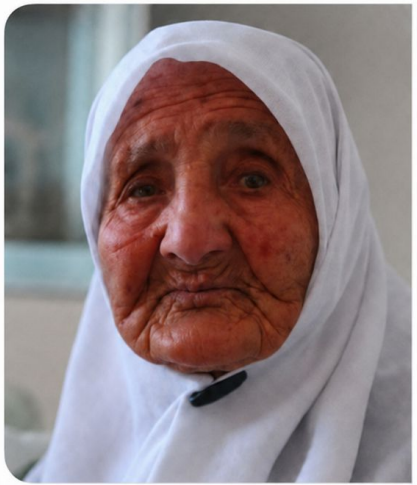
Current Status

- ★ **Transitioned to Day-2 Support, performance benchmarking and optimization**
- ★ **Oracle decommissioned and infrastructure reclamation**
- ★ **Documented migration runbook for replicating across other State Gov. platforms**
- ★ **Established PostgreSQL operational monitoring and R-DBA support model**

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110-year-old Turkish grandma shares her secret to a long life:

"I never once used Oracle"



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Wanna know more?



Case Study



Webinar



hari-kiran-pg



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