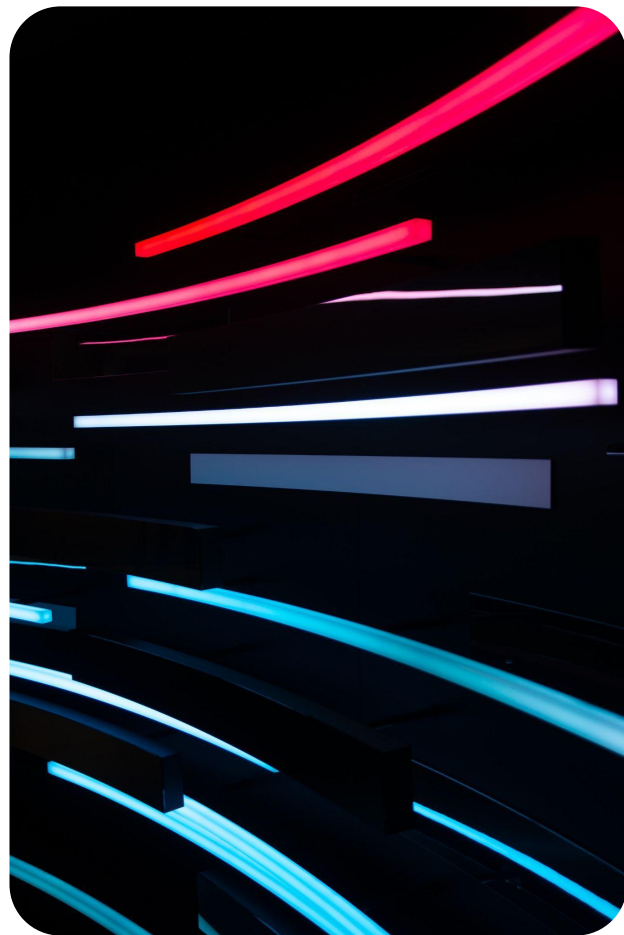




From Oracle to Postgres for 40 Million Users: What a National G2C Migration Actually Looks Like

Hari P Kiran
Founder & CEO

PostgreSQL Conference Europe 2026
October 20th, Valencia



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 @ pgEdge, GE, Oracle, Optum, 2ndQuadrant and EDB



Your servers have been taken over by CryptoLocker!



Private key will be destroyed on

23:07

Time left

71 : 58 : 09

Instead of encrypting your files, we have installed hundreds of hidden copies of Oracle database all over your server farm.

Pay us 10 Bitcoins, and we will remove them.

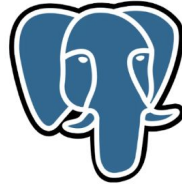
If you do not pay, we will report you to Oracle for running unlicensed software.

[Click here to pay](#)

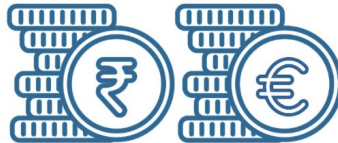
Next >>



The FOSS Signal



Every rupee/euro spent on a
proprietary database licence is
a rupee/euro not spent on the public.



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

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



DASHBOARD

Operational analytics & monitoring dashboard



TSPAYGTY

Payment gateway transactions processing



SACENTRAL

Central portal — citizen services processing

THE COST REALITY

₹10 Crore (\$1.1 mil)

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.

MeeSeva ESD Database Landscape

- App Databases: **DASHBOARD; TSPAYGTY; SACENTRAL**
- Data Storage: **4000+ Tables** with **6.5TB DB size**
- Data Integrity: **443 Primary Keys, 9 Foreign Keys**
- Performance: **805 Indexes**
- Programing Logic: **400+ objects (SPs; Triggers; Packages; etc.)**
- Reporting: **307 Views**



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

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

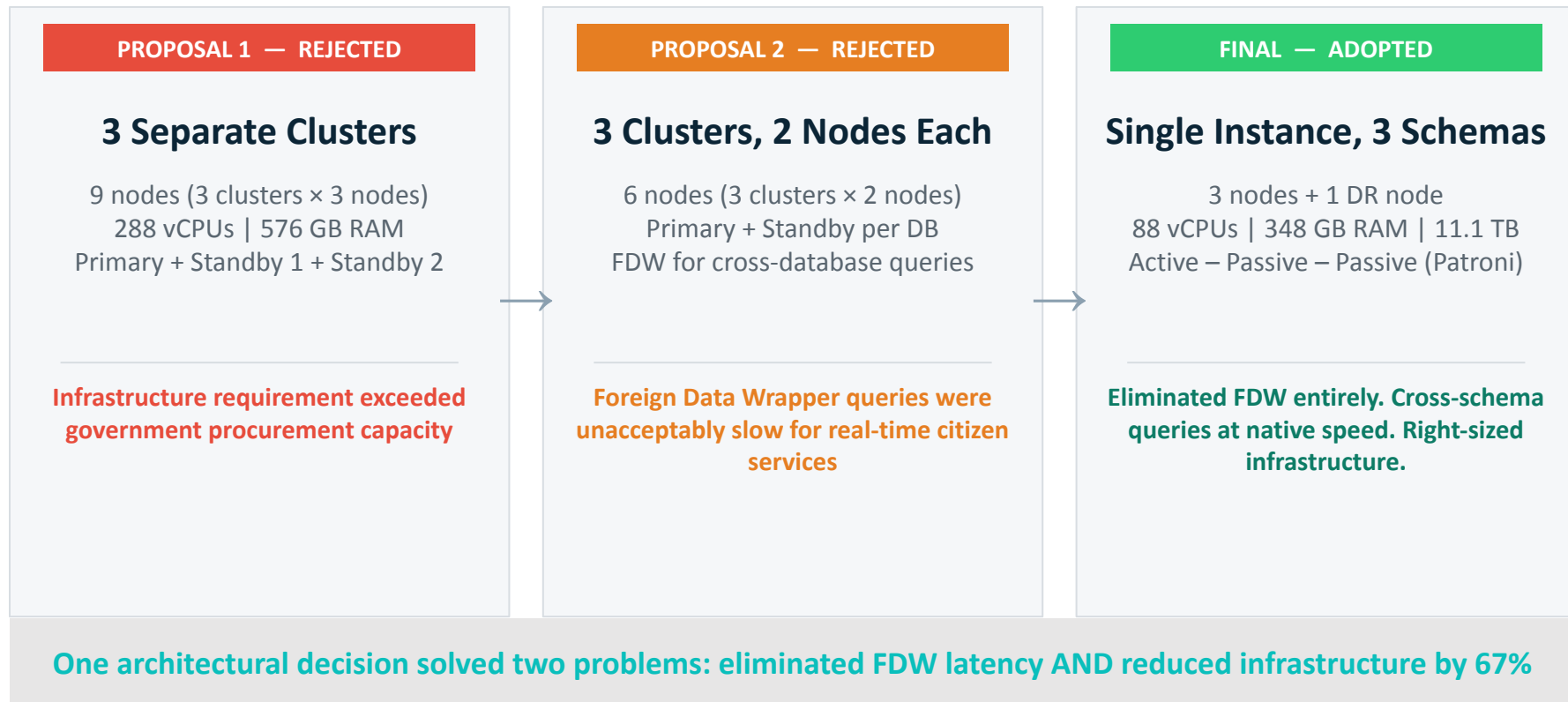
Data Loss

Full parity confirmed

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

Architecture Evolution: From 9 Nodes to 3

Three iterations of architecture design before arriving at the optimal solution



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 data type 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

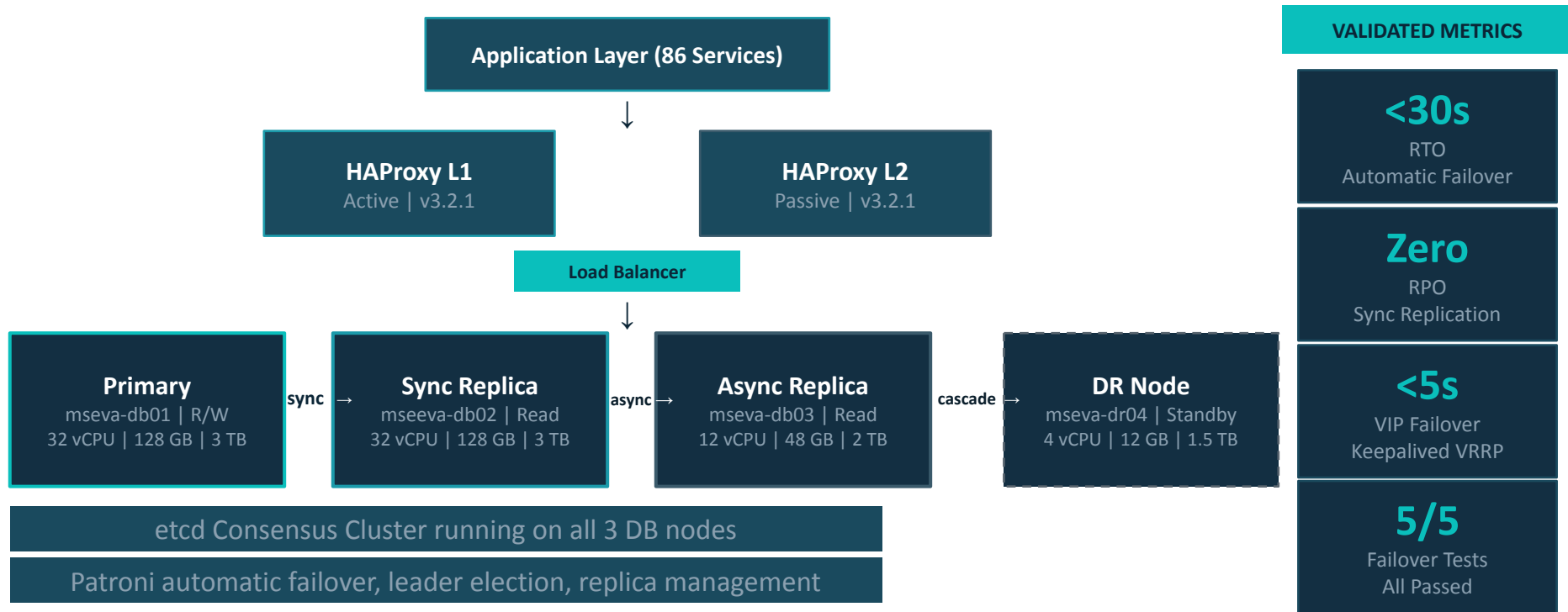
Application Code Patches

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.

High Availability & Disaster Recovery Architecture

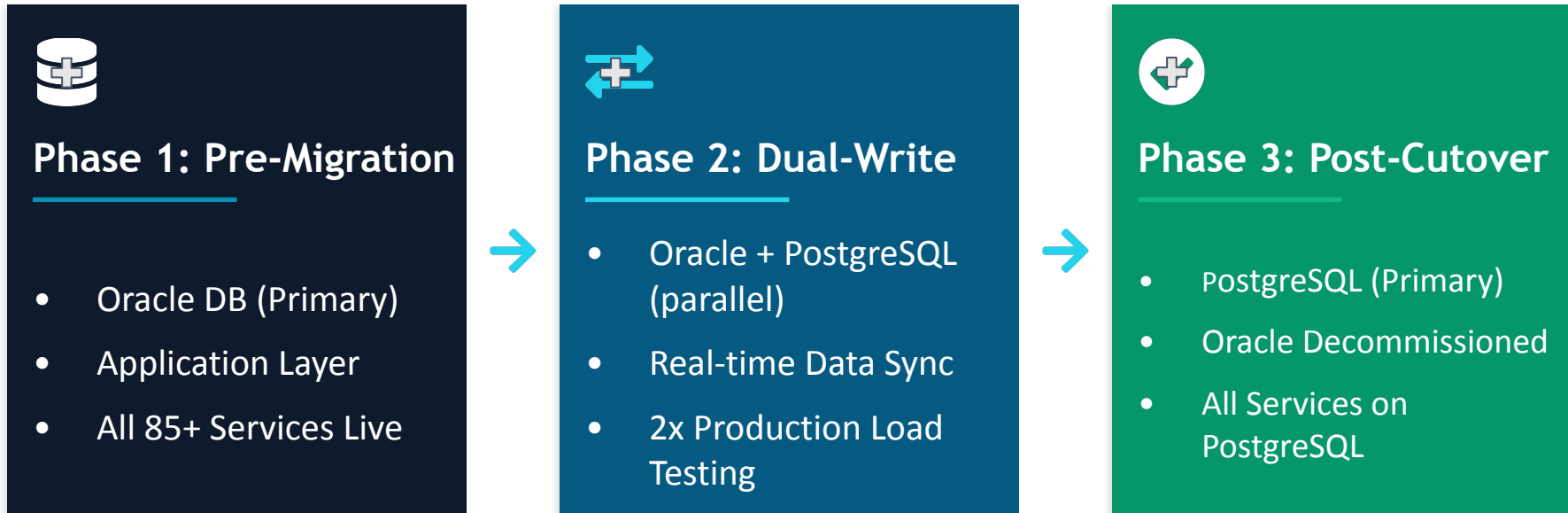
Production-validated failover with zero data loss and <30 second recovery



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

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.

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

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 data type 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.

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

Outcome



500+

Critical Citizen Services
Migrated



~12 hrs

Total Cutover
Window



100%

Innovation Enabler
AI-enabled Analytics

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 modernization unlocked innovation, with a flexible architecture ready for AI/ML workloads at national scale
- Population-scale AI analytics enabled data-driven decisions across 40M+ citizen records

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

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

"I never once used **Oracle**"



Wanna know more?



Case Study



Webinar



hari-kiran-pg



Or write to me at hari@opensource-db.com