

D&A TRANSFORMATION TALES

Achieve Performance Optimization by Migrating to **AWS** Cloud infrastructure and **AWS Aurora**



BACKGROUND

Our client is a leading K12 courseware services provider that wanted to migrate a set of enterprise applications from on-premises to AWS Cloud infrastructure & Oracle Application Infrastructure to AWS Aurora. However, there were some critical pain points and challenges that resulted in this collaborative business project. Here are some of the major challenges that required an immediate solution:

- **Blackbox migration:** The applications were not developed by our team, adding complexity to the migration process.
- **Complex codebase:** The packages involved ran between 1,000 to 13,000 lines of code.
- **Performance benchmarking:** Each page with procedure calls had to load within 15 milliseconds.
- **Large data transfers:** Significant data transfers occurred between applications during procedural calls.
- **Job queue conversions:** All DBMS job queues in Oracle had to be converted to PostgreSQL for parallel execution.
- **SQL conversion:** Only 25% of the SQL code could be converted using the AWS SCT tool, with the remaining 75% requiring manual conversion.
- **Data synchronization:** DBMS data sync (CDC) had to be established after full migration between Oracle and PostgreSQL databases.
- **Data volumes:** The database volumes ranged from 30GB to 5TB, with the largest migrated table size being 245GB.
- **Indexing and optimization:** Indexing and optimization were required for very large tables.



THE SOLUTION

For this enterprise application and database migration from on-premises to AWS Cloud, we employed a comprehensive strategy utilizing a range of tools and techniques. Our solution involved a holistic data migration approach, robust data modeling, and rigorous development and testing cycles to ensure functional parity, performance optimization, and a seamless transition to the AWS Aurora PostgreSQL environment.

Data Migration Model Design and Development:

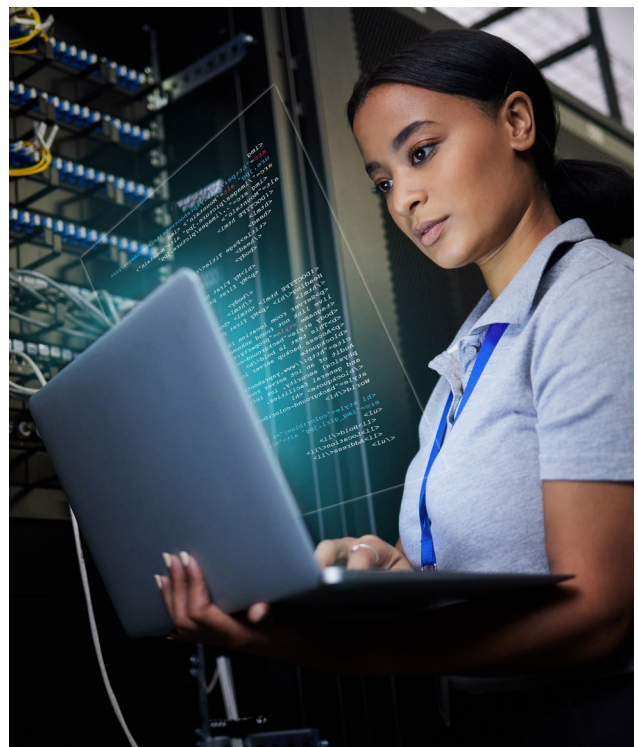
- Mirrored source database structure in PostgreSQL using AWS Schema Conversion Tool (SCT)
- Corrected data attribute changes post-conversion
- Leveraged AWS DMS for full migration (tables with PKs) and CDC replication
- Used Full Converter for tables without PKs
- Implemented table partitioning based on volume requirements
- Redefined indexes based on query patterns
- Tuned PostgreSQL parameters for hardware optimization
- Performed VACUUM/ANALYZE maintenance tasks

Development and Testing:

- Screened and tuned all queries for optimal performance
- Converted 25% queries via AWS SCT, rewrote 75% complex queries manually
- Migrated Oracle DBMS jobs to PostgreSQL for parallel processing
- Developed PostgreSQL objects for functional parity with Oracle

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- Rewrote Oracle collection objects in PostgreSQL
- Conducted unit testing for individual components
- Performed integration testing for end-to-end functionality
- Used Datadog for performance monitoring and tuning
- Optimized queries to achieve <15ms response time

Through this approach, we successfully migrated the applications and databases to AWS, leveraging Aurora PostgreSQL for scalability and cost-efficiency while meeting stringent performance benchmarks.





TECHNOLOGY SNAPSHOT

- T-SQL, PL/SQL, shell scripts, cron jobs
- PostgreSQL, Oracle, MySQL
- AWS DMS, AWS DCT, Full Converter, Replicator, HVR



BUSINESS BENEFITS

- Total cost savings of USD 34.2 Mn
- 151.6 TB of data transferred in 11 months with more than 366 objects migrated
- 10+ TB of DB data migrated after performing over 270 rounds of performance testing
- Over 18000+ tables migrated with 12 billion rows





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For more info contact: info@aspiresys.com or visit www.aspiresys.com

USA
+ 1 630 368 0970

SINGAPORE
+65 3163 3050

INDIA
+91 44 6740 4000

BELGIUM
+ 32 3 204 1942

NETHERLANDS
+ 31 (0)30 800 92 16

POLAND
+48 58 732 77 71

MEXICO
+52 222 980 0115