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Leading Learning Company Saves $13.5M Annually Through Mass Cloud Migration Testing

About The Customer

Our customer is a global learning company that combines new ideas and new ways of thinking and interacting to create next-generation learning solutions that help prepare students to become global citizens in a more interconnected, digital world. They carry a longstanding tradition of innovation and leadership in K-12 education.

Challenges:

*Migrating about **10TB+** data across **30+** applications in the cloud environment without disrupting the current users while ensuring the following was a feat.*

- *Zero breakage*
- *No impact on app UI*
- *Integration of apps & modules*
- *Meet load demand*
- *Solve Complex infrastructure issues*
- *Test migrated content in S3*
- *Check Critical integration of apps for users & classes*
- *Ensure no change in migrated data*

Solution:

- *End-to-End Testing Ownership*
- *Exhaustive DB validation and data quality testing*

The Need

As the customer needed to become an independent entity to support its end-users better, they wanted to do the following:

- Migrate all their live products to cloud that are used by millions of Kindergartens to grade 12 students

- Migrate 8 database and 22 in-house datacenter products that are about 10+ TB data in total

- Migrate a few apps from the Enterprise version to the Open Source version

- Additionally, the applications using Oracle Java needed to be replaced with OpenJDK

Results:

- *Cost-saving of over $13.5M per year*

- *Time to market reduced to 11 months*

- *2.3M+ test cases executed*

- *8 apps re-platformed*

- *29 billion database records validated*

- *10+ TB size of database migrated*

- *200+ rounds of regression testing completed*

- *150+ rounds of performance testing were completed*

The Challenges

30+ applications had to be migrated to new cloud infrastructure within 11 months. The customer wanted to migrate Oracle Database to the AWS PostgreSQL database to reduce the license and annual maintenance cost.
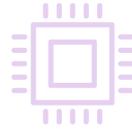
Testing Challenges

The following are the major challenges in testing:

- The migration was planned during the academic year and they had to ensure no data loss

- Migrating 30+ live products without any impact on the performance

- 10+ TB data validation and integration for different apps Lack of integration test cases between applications

- The migration testing should be done both in parallel and sequential due to time constraint and integrated apps

- Complexity in existing functional workflows, refactoring of automation, and performance test scripts

- Existing performance benchmarks should not be affected due to DB re-platforming

- Validation of delta migration

- Validation of integrity between the application which depends on publishing and subscription events.

Testing Technology Snapshot

» **Testing tools:** ROBOT UI, JMeter, SOAP UI Pro, RestAssured

» **Build Management Tool:** Gradle

» **Testing Framework (Unit):** TestNG

» **Continuous Integration:** Jenkins

» **Source Code Management:** Bitbucket

Aspire's Solution

The engagement with the customer for over a decade helped us to understand their challenges and needs to transform from legacy to cloud platform. We proposed our **cloud testing services** where we can take complete testing ownership of all the enterprise software testing for LOB applications.

Team Structure:

We came up with a modularized and self-owned team structure (Application, Database, CloudOps, DevOps & Testing teams) so that each team was clear on their objective and scope of the change. We prioritized the complex and upstream application to be migrated first so that other dependent applications could be started with this change.

Implementation of Testing Framework:

We implemented the customer provided Learning Services Test Framework to perform various types of testing like API Testing, Mobile Testing, Performance Testing, Security Testing, Functional Testing, and Disaster Recover Testing.

- Our testing team came up with clear phased approach – Analyze & Plan, Pre-Migration setup, Post-Migration Testing and Sign off

- As part of migration testing, we focused on:

DB Data Testing	• Comprised of Schema validation, record by record data validation, SQL Query validation, UI data validation post-migration, and manual validation of sample records in the DB • To ensure no loss of data, cell to cell comparison between source and target tables was done using the data validation tool
Regression Testing	• Comprised of smoke testing, functional testing, and integration testing
Performance Testing	• Migrated applications were thoroughly performance tested to ensure the application exceeded baseline performance

Our Prompt Actions:

- To ensure quality was achieved in the earlier cycles of migration, testing was done in multiple lower environments before the migrated app was moved to production

- The testing team came up with strict quality criteria/standards so that each environment was fully tested

- 500+ integration scenarios were added for the identified gap in existing test coverage
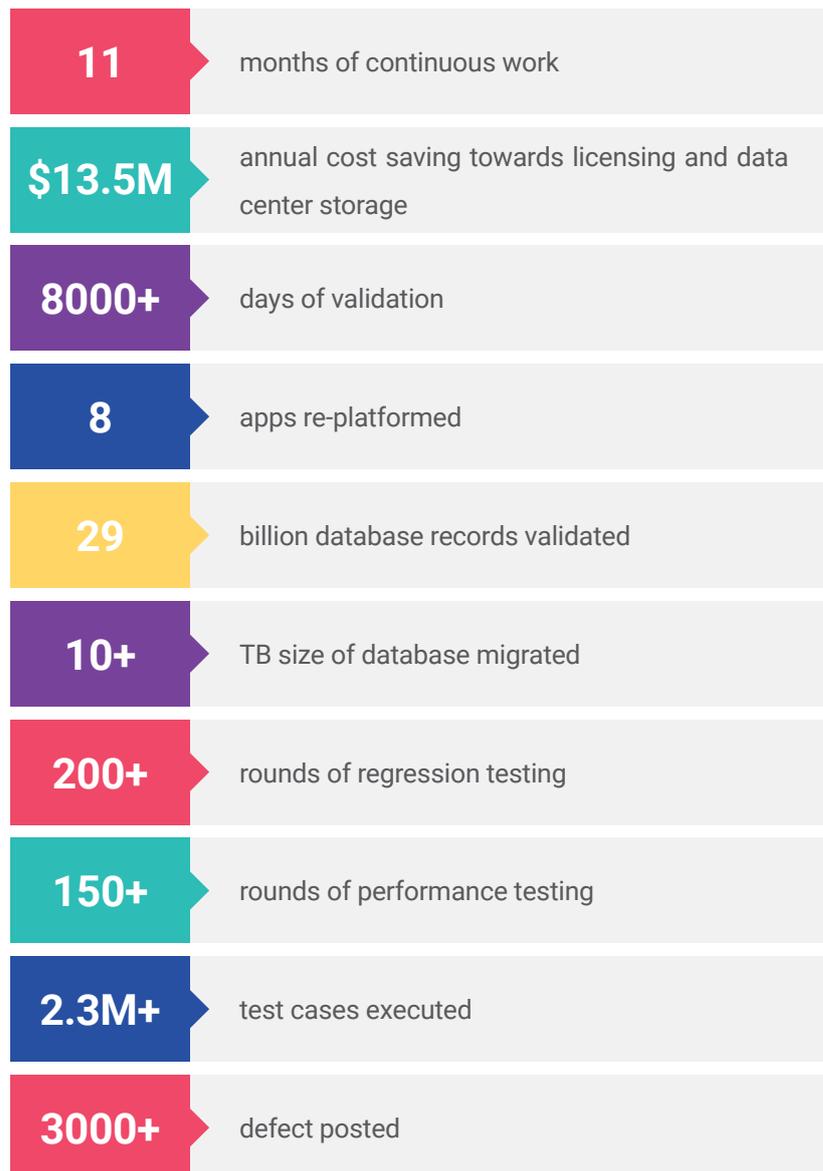
Results and ROI

All the apps were migrated successfully as per the defined quality standards and delivered as per the schedule.

- Proposed instance management in AWS, which helped in optimizing the sizing of instance depends on the load and adds additional cost savings in the long run

- Met the baseline performance across all the apps

- Post-migration, we ensured there was no dependency on source databases and the segregated part of the company was able to manage the infrastructure independently.

Testing Achievements in a Nutshell

11	months of continuous work
$13.5M	annual cost saving towards licensing and data center storage
8000+	days of validation
8	apps re-platformed
29	billion database records validated
10+	TB size of database migrated
200+	rounds of regression testing
150+	rounds of performance testing
2.3M+	test cases executed
3000+	defect posted

Future Impact

- This project has opened up new options for the customer to scale and adapt newer technologies at a faster pace as the base code and infrastructure was completely validated

- Efficient use of new continuous integration process for all the upcoming deployments

- Implemented containerization will help in quicker deployments

- The team can focus on their next business priorities because of zero blockers and no critical defects post-migration

- Newly added integration scenarios would be useful in future enhancements and testing

Aspire Systems is a global technology services firm serving as a trusted technology partner for our customers. We work with some of the world's most innovative enterprises and independent software vendors, helping them leverage technology and outsourcing in our specific areas of expertise. Our core philosophy of "Attention. Always." communicates our belief in lavishing care and attention on our customer and employees.

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