QUALITEST™

Qualitest Assures a UK-wide Ministry of Defense Facilities Data Migration Project

Challenges

The Client's data center relied on physical servers in a building scheduled to be decommissioned.

The Client was operating with legacy data which needed cleaning and cleansing.

Solutions

Qualitest established a detailed understanding of the legacy data itself, the locations and structures of that data.

Qualitest conducted an extensive data analysis and supported data clean-up of redundant data objects and processes.

Results

The Client gained detailed data analysis and automated testing, assuring the success of the migration.

Through the meticulous validation of data fields, and data integrity checking covering more than 40,000 records, Qualitest ensured that data integrity was kept with no loss of data and no errors.

Client overview

The Client is a UK Ministry of Defense (MOD) contractor, operating under tight security for the provision of facilities management for all MOD properties across the UK.

Out with the old, in with the new: reviewing legacy data for a fresh start

The Client already had in motion a program that had implemented the new data center, with a virtual server configuration, new and upgraded versions of the existing applications, and was already in daily use for two of its four UK regions. The program consisted of 2 phases.

Phase 1 – the first data migration

Phase 1 was the first migration and was the result of the Client being awarded a new contract. The incumbent for the two new regions had all the data stored on their secure servers, which they did not wish to maintain for longer than contractually necessary. The Client migrated the data to their new "future-proof" servers, and built a new instance of their CRM solution over the top with all the apps that were needed to support their operations. Phase 1 was complete.

The next phase was supposed to start immediately after phase 1, which was to migrate legacy data onto the new Client servers and infrastructure, so that everything was in one place and seamless and clean. However, it was delayed for nearly 4 years. The delay meant that the migration became more challenging because in those intervening 4 years, each data set and each set of infrastructure and apps underwent independent and divergent development, so after 4 years, getting the data structure to match was more of a challenge.
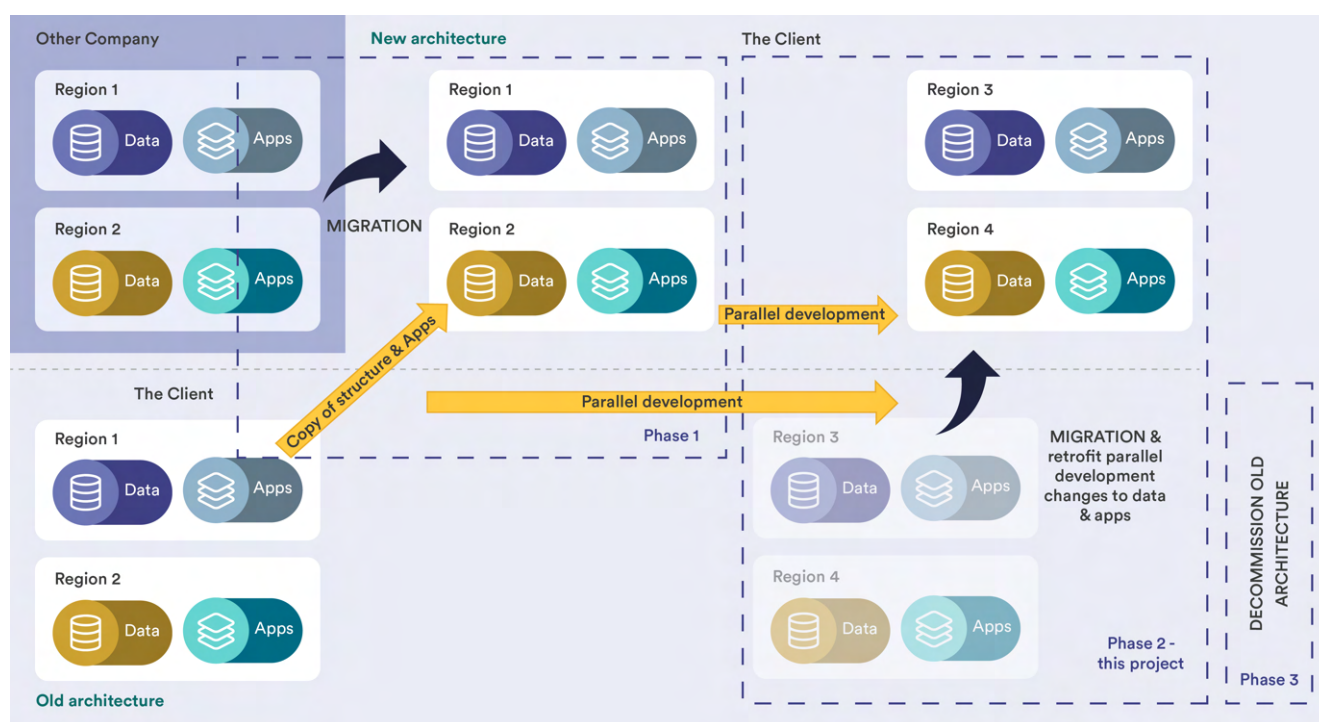
Phase 2 – the transfer of legacy data

This next phase of the program required transfer of the original two larger regions (legacy) data, to the new (target) secure data center location and networks, transforming and merging the legacy data into the target database. Only the new applications/versions would be used, so assurance was needed the migrating data would be migrated fully, integrated effectively, and work seamlessly in the new applications to maintain Business As Usual (BAU).

The project was up against a hard deadline as the existing data center on physical servers was hosted in a building overdue to be decommissioned and demolished, and demolition was already underway.

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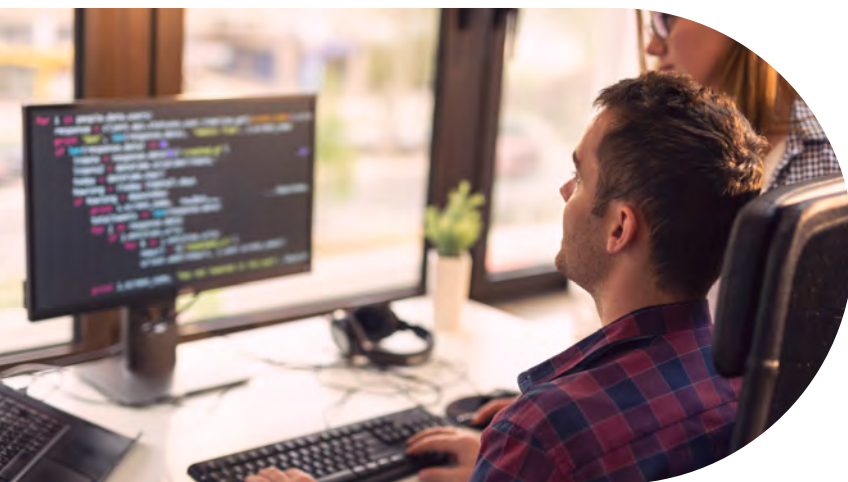
Phase 2 included extensive data analysis, a considerable data clean-up exercise (redundant data objects and processes), the physical migration, data transformation to fit to the target database and business rules, implementation of all the new applications and application versions, hardware upgrades for field staff, training for new hardware, new applications and new business processes, and a managed cutover weekend directed from a central "war room" and post-migration support.

The Qualitest team worked in a blended team, managing the deliverables of other testing suppliers, and integrating with inhouse and contract resources to deliver the program to schedule. Due to the nature of the work, all people involved had to be security cleared and on site, and only authorized personnel could remove hardware from the secure location.

Embracing the future of data management

Qualitest provided support across all aspects of the migration, deploying a small team led by a senior experienced data migration and data warehousing testing specialist. With no data mapping or system diagrams available, it was down to Qualitest to engineer the quality rather than simply "quality assure"

The first task was to establish a detailed understanding of the legacy data itself, the locations and structures of that data, and method of transfer, the transformation stages, and the new applications which access that data.

Qualitest worked very closely with the program designers and developers, the Database Administrators (DBA) and the Data Owners, the Business Analysts and the Business SMEs (Subject Matter Experts) to determine the scale and scope of the migration, to document the legacy data schema with primary, secondary and foreign keys, and create the data dictionary a detailed system architecture diagram, and diagrams documenting the migration process to identify the right validation points.

All this output was reviewed, revised, and approved with all the stakeholders.

Diligent preparation lays the groundwork for first-time success

The identification of the primary, secondary and foreign keys was critical, as there had been some duplication of primary keys between the target data and the legacy data while they were running in parallel, and many legacy tables were missing foreign keys.

This, the subsequent clean-up and testing to prove data integrity, and the continued operation of the legacy applications — with the removal of the duplicated data and processes — was all required before migration could be attempted. Qualitest's detailed test plan addressed all aspects of these risks.

The holistic granular test strategy started with detailed data assurance and incorporated robust end- to- end testing to support the complexity ofintroduced by the sweeping scale of the changes, and the criticality of Operations to the success of the Client organization:

Regression Baseline Testing

Establishing a baseline for comparison with later SQL queries and application regression testing.

Redundancy Testing

Validation that the redundant objects and processes identified and renamed in the database have no impact on application functionality.

Extract Testing

Validation that all and only the required data (excluding redundant data) had been extracted from the source database into the loading area. Included data integrity tests.

Transformation Testing

Validation of data transformations required to fit the new data into the existing fields. Includes data integrity tests and verification of the mapping rules.

Data Migration (Load) Testing

Validation that the data load into the target system is complete and correct. Includes Data Integrity tests.

SQL Queries

Extensive SQL queries were written against the data dictionaries to determine migration completion, and these were automated by building them into the migration code, so the migration was verified every time it was run in test.

Performance Testing

All procedures and table loads measured to ensure the migration could be completed within the available timeframes.

Technical Application Regression

Validation that newly introduced data had not had a detrimental impact on existing functionality. Results compared against baseline established prior to migration.

User Acceptance Testing

Validation of end-to-end integration of business processes and ensuring that the solution met overall business requirements. Validated by UAT application regression testing.

Rollback Testing

To ensure disaster recovery viability.

Application Testing

Performed using the new applications on the migrated data, using the new business processes to ensure the same outcome as in the legacy applications using legacy-hosted data, with users running the same tasks on the same applications side by side for UAT to increase business confidence.

Field testing

Performed with users operating the new hardware solutions for remote job recording. Initial testing was done in the office, with the users supported in performing tests simulating their business processes and real-life scenarios. This was then replicated in various locations to test application behavior and reliability under real world conditions.

Reviewing the data quality for maximum success

Database administrators and business SMEs were brought in to review the target tables and apply hands-on expertise in identifying any missed data clean-up once the data was present in the new tables.

With the number of elements of the program being run simultaneously and the tight timelines, automated reporting of test results and quality progress was a key success factor. Qualitest developed a sophisticated automated dashboard, which provided reporting

across all the projects to all the individual timelines and quality markers. This ensured that data was available daily to empower critical program decision making.

Through the meticulous validation of data fields, and data integrity checking covering more than 40,000 records, data integrity was assured with no loss of data and no error records on the day. The migration was executed well within the time parameters set, with War Room activities completed six hours ahead of schedule.

The migration was scheduled to ensure nationwide coverage of SMEs for production validation. Production validation found a total of 13 errors, all non-critical, which were resolved by the war room over the weekend and before operations recommenced on the Monday morning, assuring production stability and zero impact to operations. The migration was carried out exactly on time, with the rollback procedures completely unused – one-hit migration, right first time.

Key benefits

- The engagement with Qualitest significantly helped the Client to cut down costs and drive greater efficiency, as well as enabled them for the first time to deliver a project on time and within budget in a 7-year program, which included a big emphasis on due diligence throughout.

- A right-first-time migration with no errors in the data records, no corrupted records and no application failures.

- DBA and Business SME approval came within 3 weeks ahead of the migration date, providing high levels of business confidence.

- The Client was able to reduce anticipated production downtime by 20% less than planned.

- There were no priority production defects, and no dropped records.

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