SILK

White Paper

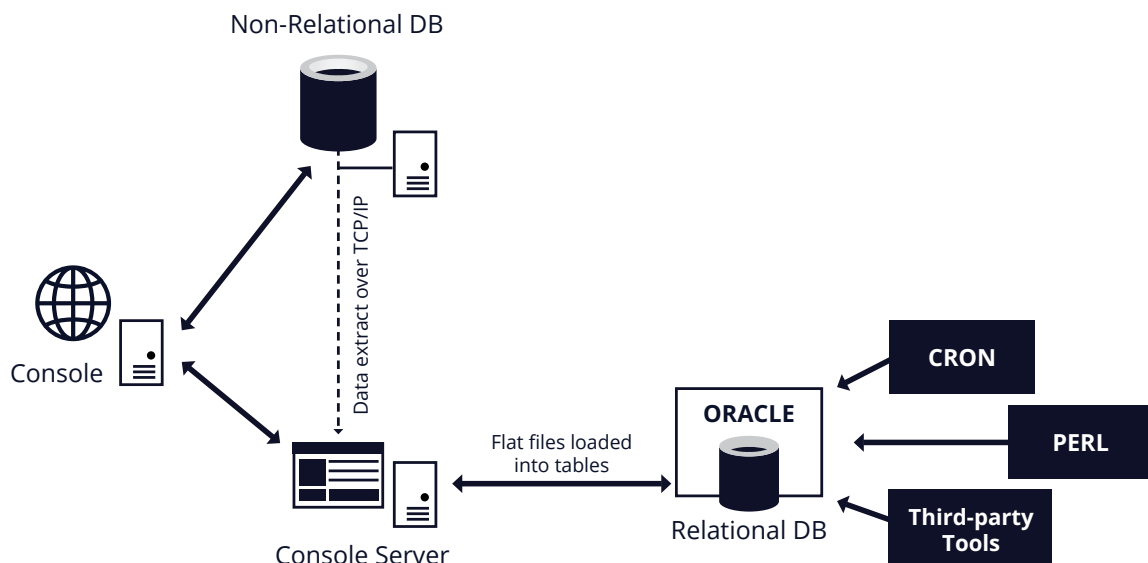# Oracle to SQL EHR Migration

Introduction

 The market's leading EHR provider has communicated to their customers that they will no longer support Oracle for analytics environments past the lifecycle of Oracle version 23c. Healthcare organizations leveraging Oracle for analytics environments may want to consider planning their re-platforming and migration journey to transition to SQL Server. This may seem like a daunting and expensive task, however, we share examples later in this document that demonstrate up to a 72% reduction in licensing and support costs, while simultaneously improving performance and accelerating cloud adoption velocity. Migrating from Oracle to SQL Server is a strategic decision that is a critical part of a comprehensive strategy to modernize and streamline existing workflows and processes.
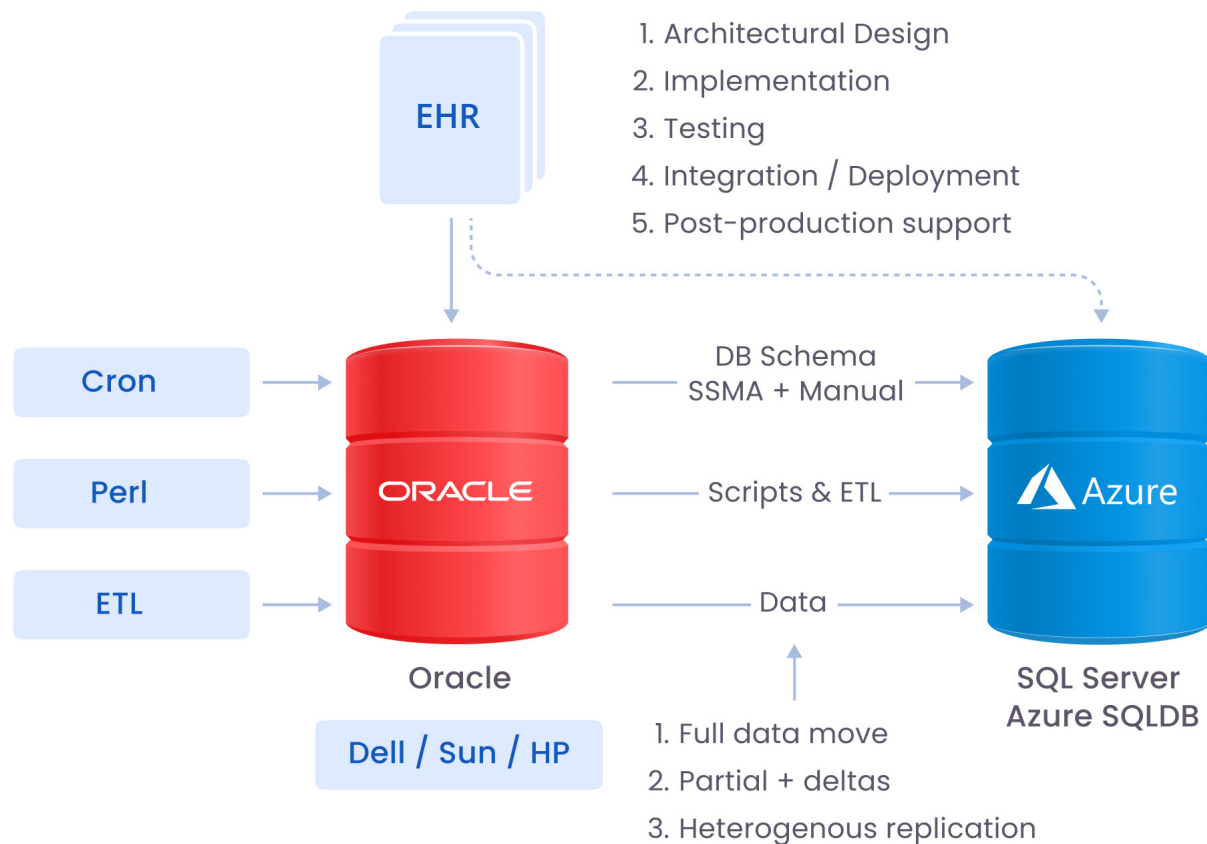
Moving from Oracle to SQL Server enables organizations to significantly reduce costs and take advantage of Azure cloud-native features that are not available with Oracle. Oracle licensing and support are historically expensive, and these costs quickly increase as analytics environments grow and Oracle support contracts are expanded.

In recent years, there has been a push centered around incorporating artificial intelligence (AI) and machine learning (ML) in Decision Support Systems (DSS). Cloud native features in Microsoft Azure enable healthcare organizations to more quickly implement AI and ML solutions. Modernizing the traditional on-premises solutions to take advantage of cloud native services delivers better patient insights and outcomes.

Migration Process

The diagram below depicts a traditional Oracle-based analytics environment. There are up to 2,400 tables and views in various schemas and sub systems with a large amount of stored logic. This makes migrating to SQL Server a challenging task. However, when breaking it down into different modules, it becomes manageable. The Data Mart and Reporting services modules are a good place to start the modernization journey by migrating them to SQL Server.

EHR

1. Architectural Design
2. Implementation
3. Testing
4. Integration / Deployment
5. Post-production support

Cron

Perl

ETL

ORACLE

Oracle

Dell / Sun / HP

DB Schema
SSMA + Manual

Scripts & ETL

Data

1. Full data move
2. Partial + deltas
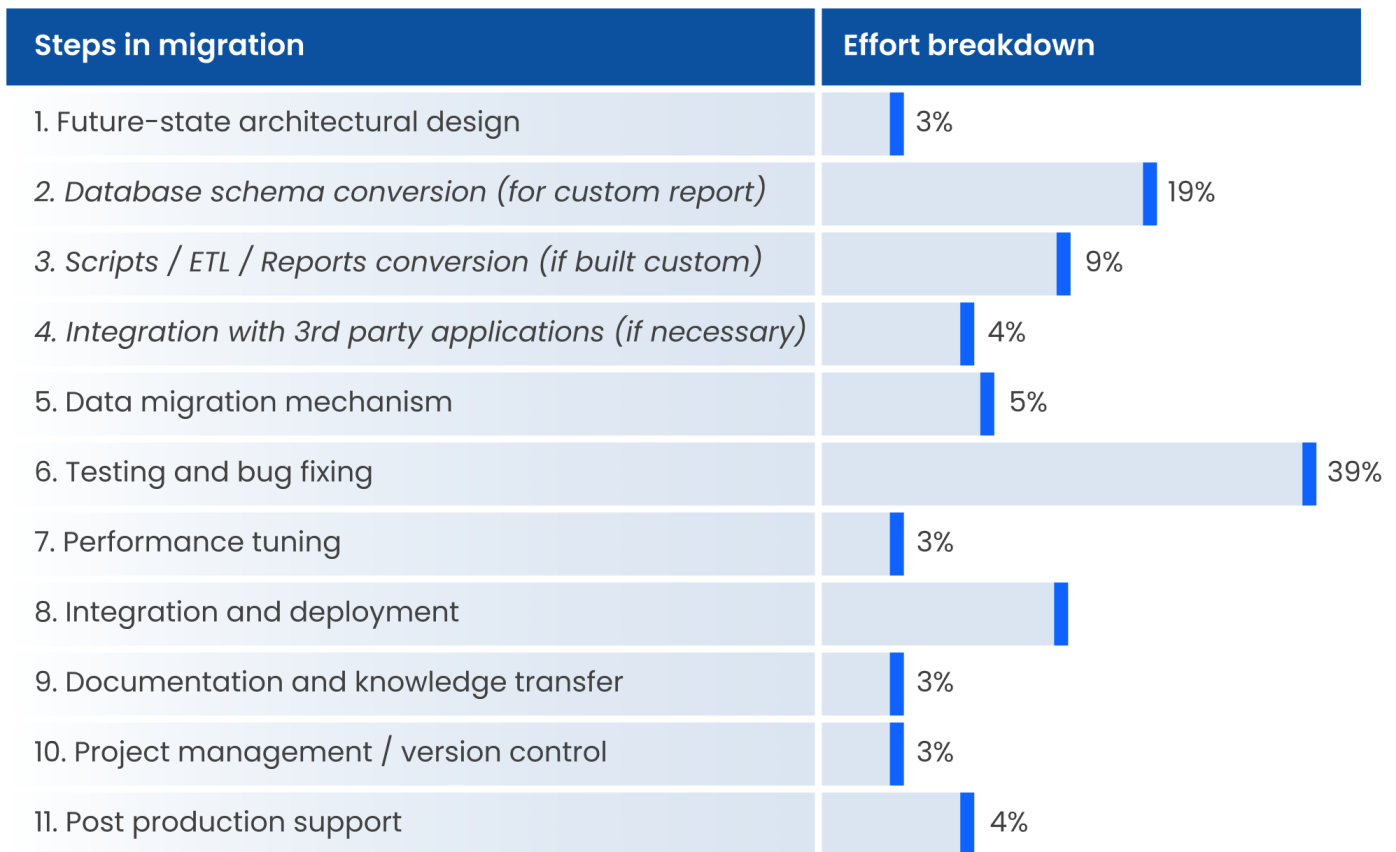3. Heterogenous replication

Azure

SQL Server
Azure SQLDB

The typical EHR Oracle database migration includes thousands of tables, views and reports totaling multiple terabytes of data.   An analysis of the existing database is necessary to determine the appropriate plan for the migration to minimize disruption. It is typical to encounter customizations within the EHR reporting database environment which can complicate the migration.

After the analysis, the next step in a migration is to convert the database schema. This includes tables, indexes, constraints, defaults, rules, stored procedures, triggers, packages, sequences, views, functions, and so on. No schema changes will need to be made, only the customizations need to be moved.

Next, any custom code written for Oracle is converted to SQL Server. Organizations can leverage the SQL Server Migration Assistant (SSMA) tool to automate aspects of database migrations to SQL Server. While this is an excellent tool, it does not convert 100% of the code automatically, some manual effort may be required. Typically, 80% is automated and 20% is manual.

Custom reports are commonly found in EHR analytics environments. These custom reports need to be converted to run against the new database.   The SSMA tool can also convert these custom reports to the new database format.

Our migration partner, ABCloudz is a full-service technical consulting firm with over 20 practices. Their legacy includes the creation of SQL Server Migration Assistant (SSMA) and Schema Conversion Tool (SCT). ABCloudz provides services around platform, application, and database **Migration/Modernization**, application and analytic systems **Development**, and **Managed Services**.

Steps in migration	Effort breakdown
1. Future-state architectural design	3%
2. *Database schema conversion (for custom report)*	19%
3. *Scripts / ETL / Reports conversion (if built custom)*	9%
4. *Integration with 3rd party applications (if necessary)*	4%
5. Data migration mechanism	5%
6. Testing and bug fixing	39%
7. Performance tuning	3%
8. Integration and deployment	
9. Documentation and knowledge transfer	3%
10. Project management / version control	3%
11. Post production support	4%

The steps in the migration process as described above apply to Oracle to SQL Server.

Cost Analysis

The scenario below highlights the potential cost savings achieved by migrating from Oracle to SQL Server.

In this example, the Production Analytics DB running on Oracle is sized with 128 (non-hyperthreaded) vCPUs, which require 64 Oracle processor licenses due to Oracle's.5 core license factor for Intel processors. We also need to consider the annual support costs, which are traditionally 22% of the licensing costs. At list price, taken from Oracle's Technology Guide Price List, this costs $47,500 per vCPU per year plus any licensable add-ons like Advanced Security Option, Partitioning, In Memory, etc. In this example, it is assumed that Oracle Partitioning is in scope as a licensable add-on as it is common in data warehousing environments. Oracle Partitioning costs $11,500 per processor per year at list price. The first-year costs are as follows:

Oracle Processor Licensing 64 x $47,500	**$3,040,000**
Oracle Partitioning Add-on 64 x $11,500	**$736,000**
Oracle Annual Support	**$668,800**
Total	**$4,444,800**

If we run the same exercise under the assumption that the customer receives an Enterprise Level 65% discount, we see the following costs for the first year:

Oracle Processor Licensing 64 x $16,625	**$1,064,000**
Oracle Partitioning Add-on 64 x $4,025	**$257,600**
Oracle Annual Support	**$234,080**
Total	**$1,555,680**

Now let's compare that to first year SQL Server licensing and support costs shown below, taken from the Azure Pricing Calculator:

MS SQL M128 (128 vCPU)	**$420,480**
MS SQL Professional Direct Support	**$12,000**
Total	**$432,480**

Even with a 65% Oracle discount, the same configuration for SQL Server costs 72% less than the Oracle configuration.

Additionally, organizations often need to overprovision vCPU to get the same level of performance that they were achieving on-prem. Using the same example as above, let's assume that we need move to the next largest VM size for the database to perform as well as it was running on-prem.

MS SQL M208 (208 vCPU)	**$683,280**
MS SQL Professional Direct Support	**$12,000**
Total	**$695,280**

Although it is still more cost effective than the Oracle solution, there is a 38% increase in licensing costs due to the need to overprovision.

Silk provides a virtual data platform that is built on native cloud resources for databases that need ultra-high throughput and extremely low latency. Because the Silk platform utilizes the compute network, rather than the much slower managed disk network, the performance of the database is not bound by the limits of smaller VM shapes greatly reducing overprovisioning across the data estate. Silk enables organizations to lift and shift databases to the cloud achieving better performance as on-prem, while utilizing fewer amounts of vCPU, helping control database licensing costs.
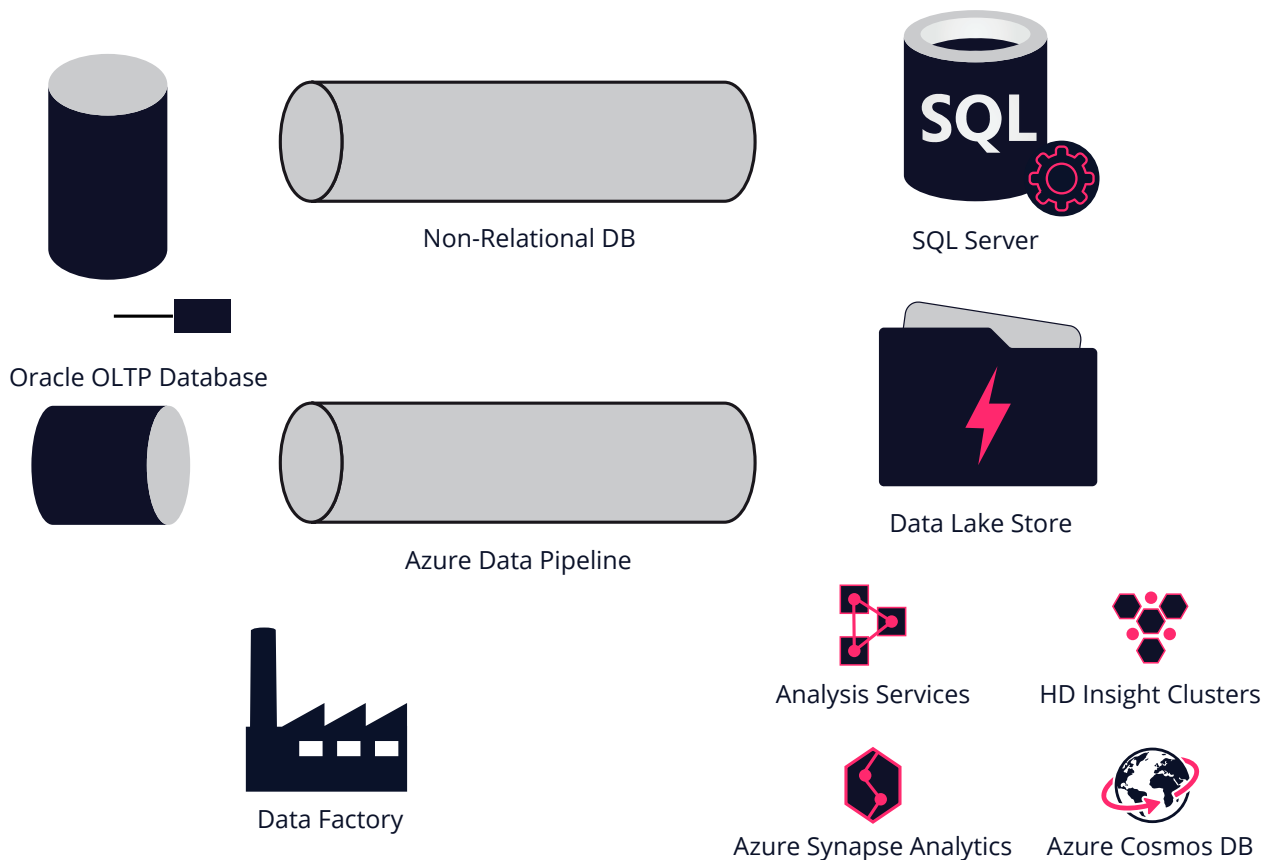
In the example above, the Silk platform helps the customer save 38% on licensing costs, which equates to $262,800 annually on just one Clarity database.

With the ability to dynamically scale environments in Microsoft Azure, futureproofing is easier than ever before. Adding computing power and storage is now done on-demand. With Microsoft Azure, there are no up-front hardware costs, there is no need to budget for replacement hardware, and licensing is built into your monthly fee when taking the Cloud Native approach. For the purposes of budgeting, this activity is called "FinOps." This is the practice of further managing cloud costs to gain more financial control and predictability. When you layer your databases on top of Silk in the Azure cloud, the Silk and Azure combination allows organizations to control costs, reduce cloud waste and eliminate overspending.

While Silk may help to right size cloud infrastructure, the additional advanced features that Silk provides include the ability to thin provision, deduplicate, and compress data in real time improves overall data utilization. Silk increases the return on cloud investment with its ability to provide thin instantaneous snapshots for refreshing lower-level environments, reporting, and operational recovery.

Future State: Cloud Native Services

Re-platforming from Oracle to SQL Server accelerates cloud adoption timelines, enabling quicker integration of powerful cloud native services. For example, Azure Data Lake is a service that healthcare organizations, especially academic and research organizations, leverage in the cloud. In this example, the newly migrated SQL Server databases supporting analytics environments become a tributary to a larger Azure Data Lake. Using Azure services like HDInsight, Data Lake Analytics and Azure Data Lake Storage enables organizations to build a state-of-the-art Big Data Analytics platform. The customer is also able to utilize existing operational datastores that may still exist within the legacy Oracle database. The diagram below depicts this type of configuration:

Non-Relational DB

SQL Server

Oracle OLTP Database

Data Lake Store

Azure Data Pipeline

Analysis Services

HD Insight Clusters

Data Factory

Azure Synapse Analytics

Azure Cosmos DB

Once you have migrated data into the cloud onto SQL Server, these are some of the cloud native data services that are useful to healthcare organizations..

Analysis Services

This PaaS solution offers data modeling capabilities far beyond relational models and allows you dynamically refactor schemas and data models.

Azure Synapse Analytics

Azure Synapse Analytics is a Data Engineering design studio that offers integration, management, monitoring, and security services as a PaaS offering.

Azure HDInsight

Azure HDInsight is a managed Apache Hadoop service that lets you run Apache Spark, Apache Hive, Apache Kafka, Apache HBase, and more on Azure.

Azure Cosmos DB

Azure Cosmos DB is a managed, serverless NoSQL database for high-performance applications for large scale data sets.

Conclusion

The market's leading EHR provider's announcement to discontinue support of Oracle for their customers' analytics environments is a great opportunity to drastically reduce costs by modernizing and accelerating your cloud journey. We showed herein that there are many benefits that come with re-platforming from Oracle to SQL Server:

- 72% cost reduction in licensing and support
- Take advantage of rich data services making data more useful to improve patient insights and outcomes
- Improve business process automation and workflow

We proved that a transition to SQL Server hosted on Silk + Azure will save money on licensing and infrastructure for a single database. When expanded across all analytics environments within a healthcare organization, the cost savings become substantial. The ability to take advantage of cloud native data services enables healthcare organizations to make their data more useful resulting in better patient insights and outcomes. A migration to SQL Server and a migration to the cloud also helps to streamline future update and upgrade procedures.

Patient care is the sole focus of every health system. Making your data more useful by re-platforming from Oracle to SQL Server, moving to the cloud, streamlining your upgrade and update procedures, and taking advantage of cloud native services allow technical staff members to focus more on patient-centric initiatives thus improving patient care.

About Silk

The Silk Data Virtualization Platform gives demanding workloads up to 10x faster performance in the cloud. Without refactoring, applications can move to the public cloud without compromising on performance or overspending to mitigate risk. Industry leaders in ecommerce, SaaS, FinTech, and healthcare trust Silk with their business-critical workloads to get the ultra-fast speeds their customers demand. Silk is headquartered outside of Boston, MA. To learn more, visit silk.us.