SCW Strategy Document

SQL Server Strategy

March 2023

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**Document Location**

The approved version of this document is to be held by Enterprise Architecture and will be subject to change control.

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Executive Summary

Background

As part of SCW’s ongoing Technical Roadmap, each area of technology needs to have a strategy on how they will proceed moving forwards.

This document will look to provide a strategy on how to move forward and is a live SQL document that will evolve over time as SCW collaborates with partners to support best practice, learns lessons from migrating workloads, and adapts to changes, both in terms of customer footprint and strategic direction of the organisation.

To be successful, the SCW SQL strategy requires support and sponsorship across the organisation including business, technology, operations, finance, and sourcing to succeed. For IT to push alone is not sufficient or broad enough for SCW to succeed.

Where are we now?

SCW is currently running versions of SQL Server from 2008 through to 2019 excluding SQL Server 2017, only SQL Server 2019 is still in Mainstream support, SQL Server 2016 is in Extended support until 14/07/2026. A table of version information can be seen in Appendix A.

Where do we want to be?

There are two parts to where we want to be:

1. Consolidation of servers where appropriate using instances where possible ensuring correct licensing is adhered to
2. As part of the Server & Database Project to bring these up to a supported standard there is the intention to create a CMDB, which will be linked to assets, to do this SCW will need to identify.

A picture containing outdoor object, honeycomb

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*Figure 1. Where we want to be*

SCW Strategy

The SCW SQL Strategy

The current strategy is to stay with on premise SQL Server for the next 3 years unless its more appropriate to migrate to the cloud.Diagram

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*Figure 2. SQL Server Roadmap*

SCW have decided that our preferred choice is to migrate from unsupported versions of SQL to SQL Server 2022**,** this will be done over two phases that will provide SCW with the ability to remove the unsupported versions of SQL Server in phase 1, and subsequently those in extended support as part of phase 2.

A significant proportion of SCW’s SQL estate is either out of support or in extended support. This also means we need to look at how we get from where we are now, to where we want to be.

We can migrate any of the following SQL version database to 2022 in compatibility mode, currently SQL Server 2022 (16.x) supports upgrade from the following versions of SQL Server:

* SQL Server 2012 (11.x) SP4 or later
* SQL Server 2014 (12.x) SP3 or later
* SQL Server 2016 (13.x) SP3 or later
* SQL Server 2017 (14.x)
* SQL Server 2019 (15.x)

For SQL Server 2008 (10.0.x) and SQL Server 2008 R2 (10.50.x), we will either need to do a side-by-side upgrade, or a migration, to move to SQL Server 2022 (16.x) as there's no common overlap between a supported mainstream operating system. SCW will look to the most appropriate option depending on database compatibility, the likely outcome for SCW will be a migration which will be discussed later in this document.

For Cloud appropriate databases and their accompanying application infrastructure we will be looking to use Platform as a Service (PaaS) which is a cloud delivery model for applications composed of services managed by a third party. It provides elastic scaling of their applications which allows developers to build applications and services over the internet.

Review existing infrastructure

The strategy requires a baseline of existing infrastructure, and audit of applications, connectivity and workloads as the strategy is to assess applications and workloads.

We have been gathering information on the existing portfolio to inform the decisions we need to make and to ensure we are not reinventing the wheel:

* How are teams and departments using technology?
* What tools, software or systems do they use?
* What’s working?
* What isn’t?
* What is in our SLAs for SQL Server?
* What are our current KPI’s?

Create a roadmap for resource allocation and architecture

The strategy requires a resource allocation and to do this there will be a resource draw from several areas for the following:

Diagram

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*Figure 3. Resource Allocation Roadmap*

The strategy also requires architecture governance to be built and implemented which will require:

* Define an overall technology architecture of the current environment, which is made up of the major software, hardware, and other tools we will be using.
* Right size current estate and optimise where possible.
* Calculate current costs.
* Identify current customer charging model and costs.
* Determine critical applications and workloads.
* Current performance characteristics i.e., Storage, compute latency, or availability etc.
* Business Continuity / Disaster Recovery (Backup/Restore)

SCW SQL Migration Strategy

The Migration strategy is a detailed plan of how the migration will take place.

Preparatory Work (Business Analyst)

This is fundamental to the migration strategy, and possibly the longest part of the migration process, with the business analysis approach to:

* Align to the overall goals of the Migration.
* Have responsibility for identify and solving problems affecting the Migration.
* Coordinate the business analysis tasks with the activities and deliverables of the overall Migration.
* Include tasks to manage any risks.
* Work with users to draw up a test plan for UAT testing at various stages in the upgrade and migration.
* Baseline of existing environment
* Audit of application environment
  + Application Details (Internal SCW/Third Party)
  + Newer version of Application
  + Compatibility of SQL version with Application
  + SQL Dependencies, i.e. database collation
  + Owner
  + Connectivity
  + Security
  + Size of database(s), with expected growth over 1, 3 and 5 years
  + Check if any integration services are used that will need exporting.
  + Check if Analysis Services databases used.
  + Check if there are any SSRS / On Prem Power BI reports in use.

Design SQL Architecture

This is where the DBA will take the information from the Business Analysis, design and define the specification of the environment, such as:

* Ensure the appropriate licensing is in place.
* Define the OS.
* Define the storage type.
* Define the storage structure.
* Define the memory required.
* Define the CPU required.

Server Build (Technical Operations)

This is where the servers are built:

* Windows Template based on design in 3.2.
* Add specified Storage based on design in 3.2.
* Add specified Compute based on design in 3.2.

SQL install (DBA’s)

This is the SQL install component of the migration.

* SQL Build Script, this is documented in the Standard operating Procedure document ***SOP - Automated SQL Installs 2022 v0.1 (draft).docx***

Database Migration (DBA’s)

This is the main part of the migration from a database perspective, and is completed in line with the Application Migration

* Preparatory migration work
  + Script Login information
  + Script SQL Server user roles
  + Script Linked Servers
  + Script to reverse engineer database mail.
  + Script mail operators
  + Backup SSISDB Service master key if required! *(****Note****, this cannot be done using the current backup solution)*
  + Export any integration services if required!
  + Backup any Analysis Services databases if required!
  + Export any SSRS / On Prem Power BI reports if required!
  + Power BI (cloud) data gateway config update
  + Document any server name changes for the upgrade for impact to Foglight and Actifio
  + Document patching schedule in Manage Engine for impact to rework with the new server names.
* Migrate Databases to Test Environment
  + Run the script created with Login information.
  + Run the script created with SQL Server user roles.
  + Run the script created with Linked Servers
  + Run the script created to reverse engineer database mail.
  + Run the script created with mail operators.
  + Restore database backups using current backup solution.
  + Restore SSISDB Service Master Key if required!
  + Import any integration services if required!
  + Restore any Analysis Services databases if required! *(****Note****, this cannot be done using the current backup solution)*
  + Import any SSRS / On Prem Power BI reports if required!
* Once Test migration signed off migrate databases to Production Environment following the bullets above.
* Migrate to Power BI Cloud where possible.
* Any server name changes for the upgrade will impact configuration in Foglight and Actifio
* Amend patching schedule in Manage Engine to rework with the new server names.

Application Migration

At the same time as the database migration is taking place the application will also need to be migrated / updated to newer version. The application maybe internal to SCW, or from a third party, as prescribed by the Business Analyst.

This activity would not be completed by a DBA, however, would be linked to the database migration.

Test & Signoff (Users)

The final part of the migration is for the users to ensure the system is working correctly for them, to do this they would need to:

* Write a detailed test plan.
* Test the Application(s) work in the Test Environment
* Signoff Test environment, and agree Production Migration
* Confirm the Application(s) work in the Production Environment
* Signoff Production environment

**Monitoring**

Monitoring the environments when live should be done using the provided 3rd party monitoring tool, alongside SQL scripts such as the first responder kit by Brent Ozar or the SQL Server maintenance solution by Ola Hallegren

**Backups**

Backups are completed by a third-party tool and monitored on a daily basis by the DBA team, each database server has an SLA which explains how often and what type of backup is taken. A Table of SLA’s can be seen in Appendix B – Current SQL Backup SLA’s.

**KPI’s**

Currently KPI’s for SQL Server are limited, this should be rectified. Below are the recommended KPIs for SQL Servers. These should be enforced on both an individual Database/Server level, and across the SQL Estate

Diagram, shape

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*Figure 3. Potential KPIs and Success Criteria*

Appendix A – Current SQL Build Versions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Release** | **Build Version** | **Codename** | **Release Date** | **Support End Date** | **Extended Support End Date** | **RTM (no SP)** | **Latest CU / SP** |
| SQL Server 2022 | SQL Server 16 | Dallas | 16/11/2022 | 11/01/2028 | 11/01/2033 | 16.0.1000.6 | CU1 (16.0.4003.1, February 2023) |
| SQL Server 2019 | SQL Server 15 | codename Aris Seattle | 04/11/2019 | 07/01/2025 | 08/01/2030 | 15.0.2000.5 | CU19 (15.0.4298.1, February 2023) |
| SQL Server 2017 | SQL Server 14 | Helsinki | 02/10/2017 | 11/10/2022 | 12/10/2027 | 14.0.1000.169 | CU31 (14.0.3456.2, September 2022) |
| **Starting from SQL Server 2017 Service Packs will no longer be released** | | | | | | | |
| SQL Server 2016 | SQL Server 13 |  | 01/06/2016 | 13/07/2021 | 14/07/2026 | 13.0.1601.5 | SP3 (13.0.6300.2) |
| SQL Server 2014 | SQL Server 12 | Hekaton | 01/04/2014 | 09/07/2019 | 09/07/2024 | 12.0.2000.8 | SP3 (12.0.6024.0) |
| SQL Server 2012 | SQL Server 11 | Denali | 06/03/2012 | 11/07/2017 | 12/07/2022 | 11.0.2100.60 | SP4 (11.0.7001.0) |
| SQL Server 2008 R2 | SQL Server 10.5 | Kilimanjaro | 21/04/2010 | 08/07/2014 | 09/07/2019 | 10.50.1600.1 | SP3 (10.50.6000.34) |
| SQL Server 2008 | SQL Server 10 | Katmai | 07/08/2008 | 08/07/2014 | 09/07/2019 | 10.0.1600.22 | SP4 (10.0.6000.29) |

Appendix B – Current SQL Backup SLA’s

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Policy Template** | **Location** | **Days Kept Local** | **Weeks at Alternate DC** | **Archive** | **Log** |
| SQL-DC2-7d-4W-6m-without-log | Southgate House, Devizes | 7d | 4W | 6m | No Log |
| CC\_SQL - DC1 - 14d 4w 13m with logs 15 Min | UHBW, Bristol | 14d | 4w | 13m | 15 min |
| SQL - DC1 - 14d 4w 13m with logs 180 Min | UHBW, Bristol | 14d | 4w | 13m | 180 min |
| SQL - DC1 - 14d 4w 13m with logs 60 Min | UHBW, Bristol | 14d | 4w | 13m | 60 min |
| SQL - DC1 - 14d 4w 13m without logs | UHBW, Bristol | 14d | 4w | 13m | No Log |
| SQL - DC1 - 14d 4w 6m without logs | UHBW, Bristol | 14d | 4w | 6m | No Log |
| SQL - DC1 14d 4w 3m without logs | UHBW, Bristol | 14d | 4w | 3m | No Log |
| SQL - DC2 14d 4w 13m without logs | Southgate House, Devizes | 14d | 4w | 13m | No Log |
| SQL - DC2 14d 4w 3m without logs | Southgate House, Devizes | 14d | 4w | 3m | No Log |

Document Status

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Version Control

|  |  |  |  |
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| 0.2 | 21/03/2023 | Chris Borman | Updates after feedback |
| 1.0 | 22/03/2023 | Chris Borman | Approved version after latest feedback |