NTTDATA

1 Managed Relational Standard Database

1.1 Overview of Service

This service provides configuration and management of Relational Standard Database(s) on supported operating systems in the cloud or in the Client's on-premises or colocation data center.

This service does not include the management of the underlying operating systems, which must be contracted separately.

1.2 Client Responsibilities

Client is responsible for:

(a) Except in cases where database software is provided by NTT, any licensing, software or use rights are Client responsibility

(b) SQL Server Query Construction and/or Reconstruction

(c) Identification of Audit and Compliance Requirements

(d) Use, management, configuration of any third-party tooling and Vendors

1.3 Service Specific Operations

(a) Monitors

The following monitors can be configured by default. if supported by the hardware and software:

PostgreSQL & MySQL

Monitor	Description	Alerts	Performance Info	Action
Availability of PostgreSQL service port*	A connection to port 5432/TCP can be performed and the banner is returned	Yes	Graphs for Round Trip Time and Packet Loss	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
Availability of MySQL service port*	A connection to port 3306/TCP can be performed and the banner is returned	Yes	Graphs for Round Trip Time and Packet Loss	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
PostgreSQL/MySQL processes	Existence of the service process or a group of them running in the server	Yes	N/A	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
PostgreSQL Active Sessions	Recollects number of active sessions in Database	Yes	Graphs for the number of active sessions	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
PostgreSQL Free space in Database files	Free Mb in the fullest database file	Yes	Graphs for free space	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
Disk (for each one)	Disk usage in % inode usage (Linux)	Yes	Graphs for each one of the parameters measured over time	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
System Processes (Linux)	Existence of the following key system processes: . syslog . ssh . cron	Yes	N/A	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
System Processes (Windows)	Existence of the following key system processes: . Remote Desktop Service . WorkStation . DNS client . Scheduled Tasks	Yes	N/A	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.

SQL Server

Monitor	Description	Alerts	Performance Info	Resolution
SQL Server processes / SQL agent processes	Existence of a process or a group of processes running on the server	Yes	N/A	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
Disk (for each one)	Disk usage in %	Yes	Graphs for each one of the parameters measured over time	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
Core OS Metrics (CPU, Memory)	% Utilization	Yes	Graphs for each one of the parameters measured over time	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.
Availability of SQL server service port*	Establishes a connection to port 1433/TCP and returns banner	Yes	Graphs for the response time of the connection	Engineering Teams will attempt to diagnose, try to solve the issue and escalate to the Client if needed.

(b) Service Requests

As part of the Service, the fulfillment of the following types of requests are included:

Task	Description
Management of storage (tablespaces, datafiles)	Creation, change and deletion of files that support the storage subsystem of the database; this includes management of different growth settings and policies
Management of performance (RAM and CPU allocation, disk use)	Implementation of changes to settings that affect how the instance uses the underlying operating system resources; this includes RAM allocation, CPU affinity, Disk use, etc.
Management of name resolution and network protocols (connections)	Changes affecting the way the instance is accessible by connecting servers; this includes changes to protocols and ports
Management of database and schema objects (indexes, tables, etc.)	Object creation as requested by Client
Management of security (users, groups, etc.)	Creation, change and deletion of users, groups and roles in the database; this includes changes to group membership and permission assignment to databases with different roles
Database creation and deletion	Creation and removal of additional databases
Import and export of data using native tools	Import data to and export data from the DB Server using native tools; the files generated will be made available via FTP or any alternate method and can be scheduled
Recreate and configure replication (replicated instance only)	Creation and recreation of the replication configuration to recover from loss of sync or other issues
Secondary instance promotion (replicated instance only)	Change server roles; promote the slave to master and demoting the master to slave, and the reverse operation
Cluster node additions and deletions (cluster only)	Addition and removal of cluster nodes in the cluster, and implementation of changes to the cluster group
Management of networks and Services (cluster only)	Addition and removal of additional networks and resources in cluster groups; changes to settings of the cluster group (node affinity, priority) and the cluster resources (retry policy, service affection)

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Mirroring Management (SQL server mirror clusters)	Creation and recreation of the mirror setup, including the creation of certificates; changes to the current settings for changing from synchronous to asynchronous
Secondary instance promotion (SQL server mirror clusters)	Change of roles of the servers to promote the slave to master and to demote the master to slave; the reverse operation is also included
Failover management (XtraDB only)	Failover and failback triggering to move cluster groups between nodes

(c)   Ongoing Maintenance tasks

The following ongoing tasks will be performed in an effort to maintain solution stability, ensure optimal performance and to prevent the occurrence of Incidents:

Task	Frequency	Description
Index recreation	Monthly	Recreation of the indexes in the database to avoid fragmentation
Log rotation	Weekly	Compression and deletion/backup of the logs associated with the database
Statistics recalculation	Weekly	Recalculation of table and index statistics to ensure that SQL optimizer finds the most efficient execution plan. Without recalculation, the accuracy of this information degrades over time
Performance improvement report of the database	Quarterly	On-demand only: creation of a report with information on database has performance over a period of time, including the evolution of disk space usage and trends
Database Level Patching	Quarterly	Apply upon mutual agreement for the latest database level patches

1.4   Supported Technologies

The following versions are supported:

(a)   MySQL 5.x. (32-bit and 64-bit), MariaDB

(b)   PostgreSQL 9.x on RHEL 7, 8 (64 bit)

(c)   Microsoft SQL Server:

(i)   Microsoft SQL Server 2014 Standard and Enterprise (64-bit)

(ii)   Microsoft SQL Server 2016 Standard and Enterprise (64-bit)

(iii)   Microsoft SQL Server 2017 Standard and Enterprise (64-bit)

(iv)   Microsoft SQL Server 2019 Standard and Enterprise (64-bit)

(v)   Microsoft SQL Server 2022 Standard and Enterprise (64-bit)

The following configurations are supported:

(d)   Standalone server: a single server

(e)   Failover cluster server: two or more clustered servers using supported clusterware (RHCS or Windows Clustering); up to two database instances running active/passive

(f)   MySQL Server replicated instance: A master server (can be a cluster) replicating to one or more servers; the replication mechanism is asynchronous transactional replication. The replicas are read-only. Used mostly for disaster recovery

(g)   Percona XtraDB Cluster:three or more servers with MySQL 5.x standalone with Galera library and Percona XtraDB cluster

(h)   PostgreSQL Transaction Log Shipping (only 9.x)

(i)   PostgreSQL Binary Replication Middleware (only 9x)

(j)   SQL Server; Transparent Data Encryption (TDE)

(k)   SQL Server cluster: two or more servers clustered using supported clusterware (Windows Clustering):

(i)   Up to two database instances running active/passive

(l)   SQL Server replicated instance: a master server (can be a cluster) replicating to a secondary one:

(i)   The replication mechanism is log shipping

(ii)   Typically used for Disaster Recovery

(m)   SQL Server mirror cluster: a pair of servers with mirrored databases

(i) The mirroring mechanism can be either synchronous (no data-loss) or asynchronous (high performance)

(n) SQL Server AlwaysOn clustering: a pair of SQL servers with AlwaysOn:

(i) On SQL 2014 and above only

(ii) External shared storage not required

(iii) Virtual Machines are supported

(iv) Contained AlwaysOn Group (only for SQL 2022)

(o) SQL Server Specific Prerequisites

Supported storage backends:

(i) iSCSI Connectivity

(ii) FC Connectivity

1.5 Supported Environments

The following environments are supported:

(a) Client premises

(b) Colocation data center

(c) Private or Public Cloud (clustering exclusions may apply depending on the underlying technology, check the Operating Systems Service Descriptions for further information)

1.6 Limitations

The following limitations apply:

(a) Available disk space on the server must be 3 times the size of the MySQL or PostgreSQL database(s) in order to accommodate backup data (which requires at least twice the space provided for data files) into a local or remote filesystem

(b) Disk size has to be greater than or equal to the primary/production site if any replication between servers exists

(c) Some features are only available in certain editions of RDBMS; consult a professional when choosing editions if you have doubt, such examples can include:

(i) Number of Cores

(ii) AlwaysOn Availability Groups

(iii) Online Index Rebuilds

Limitations for Percona XtraDB:

(d) Tables will be InnoDB type:

(e) *LOCK TABLES, FLUSH TABLES {explicit table list} WITH READ LOCK, (GET_LOCK(), RELEASE_LOCK(),etc.)* are not supported

(f) All tables should have a primary key (multi-column primary keys are supported)

(g) XA transactions are not supported

(h) Transaction size. The wsrep_max_ws_rows and wsrep_max_ws_size system variables limit transaction rows to 128K and the transaction size to 1Gb by default

1.7 Tasks Included in the Standard Transition

As part of the Service, the following tasks are included in the setup fee:

Task	PostgreSQL	mySQL	MS SQL
Installation and configuration of the necessary packages or Windows components	✅	✅	✅
Configuration of the required Operating System parameters (kernel/ libraries) or registry settings	✅	✅	✅
Installation of the database engine software	✅	✅	✅
Configuration of the storage system (InnoDB, etc.)		✅	
Creation of database instances	✅	✅	✅
Database best practice configuration (log mode, RAM and cache Tuning, storage engines configuration, etc.)	✅	✅	✅

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Configuration of the users/databases/permissions (based on provided specs)	✅	✅	✅
Integration with Active Directory (requires Managed Active Directory, contracted separately)			✅
Installation of reporting and integration packages (SSRS/SSAS/SSIS)			✅
Maintenance job configuration (indexing, log file rotation, vacuum, alerting) on certain editions	✅	✅	✅
Replication setup (replicated Instance)	✅	✅	✅
Clustering setup (clustered environments)	✅	✅	✅
Mirroring setup			✅
Q&A activities for HA and clustering	✅	✅	✅
Setup SQL Server with TDE (master key, obtain certificate, database encryption)			✅

(a)   Specific Tasks Associated with Taking Over the Management of a Standard Database

In addition to the tasks described in the *MHIS App Management - Common Functions* service description, NTT will perform the following for an existing Client Solution:

(i)   Reconfiguration of the storage policy

(ii)   Reconfiguration of the replication/clustering policy

1.8   Tasks Not Included in the Standard Transition

The following tasks are not included in the standard transition:

(a)   Design of the service

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