CenturyLink Service Guide

Database Server Software 1.0: Managed Oracle Database

This Service Guide ("SG") sets forth a description of the Database Server Software 1.0: Managed Oracle Database offered by CenturyLink, including technical details and additional requirements or terms. This SG is subject to and incorporated into the Agreement and Hosting Service Schedule between the parties. The specific details of the Service ordered by Customer will be set forth on the relevant Service Order. For avoidance of doubt, any references in the Agreement, Schedule, or Service Orders to SSG, shall mean SG.

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Overview

Database Server Software 1.0: Managed Oracle Database is a Managed Hosting product. The standard "Service" consists of the licensing, installation, configuration, administration, monitoring, maintenance and support for software components.

The Managed Hosting SLA applies to this Service.

Customer chooses the database edition, version and options at the time of purchase. Licensing of the database Software can either be provided by CenturyLink or obtained by Customer.

Supported Editions, Versions, Platforms and Operating Systems

See [Managed Database Services Compatibility Matrix](https://www.ctl.io/legal/managed-hosting/db-compatibility-matrix/) or navigate to https://www.ctl.io/legal/managed-hosting/db-compatibility-matrix/ from any Internet browser.

Access

Customer will be provided login access and access to Oracle directories but not root or sudo access. In the event Customer requires root or sudo access, CenturyLink may grant such access; however, the SLA will not apply to the Service for the period of time that root or sudo access is granted.

Monitoring

CenturyLink will enable application level monitoring for each environment as they are created within the product configuration. CenturyLink will retain primary notification and resolution responsibilities for all automated environment alerts. A Customer technical contact will be engaged to perform primary resolution of incidents associated with a non-production level environment.

Maintenance and Support

- **Change Management:**
  All changes to the CenturyLink managed applications, systems, network and facilities are subject to CenturyLink's change management process. This process is intended to confirm that work is reviewed for completeness (risk assessment, completed test procedure, metrics for measuring progress, back out procedure, etc.) and accuracy prior to scheduling and implementation.

- **Major and Minor Releases:**
  Major and Minor Releases are upgrades and require a new installation of the Software binaries, which is not included in this Service. As a commercially reasonable practice, it is suggested that Customer purchase a new managed server (via a Service Order) and purchase migration services (via a Statement of Work). Customer should contact their sales representative to determine their upgrade options.

- **Patch Releases:**
  CenturyLink certifies, approves, bundles and delivers Oracle Database Security Patch Updates (SPU) and Critical Patch Updates (CPU) for installation in a Customer environment. Customer must approve the installation. Any Outages directly caused by Customer's failure to accept the implementation of a patch will not be subject to SLA Service Credits.

- **Maintenance Windows:** CenturyLink will use commercially reasonable efforts to perform routine maintenance during defined maintenance windows. See our published [Maintenance Window schedule](https://www.ctl.io/legal/managed-hosting/maintenance-windows/), or navigate to https://www.ctl.io/legal/managed-hosting/maintenance-windows/ from any Internet browser. CenturyLink has the right to perform scheduled maintenance (during the windows specified), which may limit or suspend the availability of the Services. CenturyLink shall provide Customer with at least ten (10) days prior notice of any scheduled maintenance activities. In addition to providing written notice, CenturyLink maintenance notifications are available on the SavvisStation customer portal.

- **Support:**
  CenturyLink will provide support for the Service during installation, content migration, Customer validation, and 24x7 monitoring and management by the CenturyLink Service Center after installation.

Optional Services

At Customer's option and expense, Customer can purchase the following additional services for an additional fee. These additional services are available only if Customer has purchased Database Server Software 1.0: Managed Oracle Database, and additional terms and conditions may apply.

Real Application Clusters ("RAC")

For active-active clustering requirements, RAC is an option to Oracle Database Enterprise Edition and included with Oracle Database Standard Edition. RAC supports the deployment of a single database across a cluster of servers that provides

unbeatable fault tolerance, performance and scalability with no application changes necessary.

Partitioning

Partitioning is used to split tables across multiple locations. Oracle Database partitioning is normally done for manageability, performance or availability reasons. This increases performance for sites that have regular transactions involving certain views of data, while maintaining availability and security.

Multitenant

Multitenant is an option with Oracle Database Enterprise Edition that enables customers to easily consolidate multiple databases without changing their applications by delivering the benefits of managing many databases as one, yet retains the isolation and resource prioritization of separate databases. Multitenant enables rapid provisioning and upgrades, and complements other options including Oracle Real Application Clusters and Active Data Guard. A multitenant container database (CDB) can have one or many pluggable databases (PDB).

Diagnostic Pack & Tuning Pack

The Diagnostic and Tuning Packs are licensed options providing improved and more effective access to diagnostic as well as tuning information available in the database.

Transparent Data Encryption (TDE)

The Transparent Data Encryption feature is part of Oracle's Advanced Security Option. Transparent Data Encryption enables encryption for sensitive data in columns without requiring users or applications to manage the encryption key. Transparent Data Encryption only protects data at rest or in a backup set.

Data Guard – Basic

Basic Data Guard includes the management, monitoring, and automation software to create and maintain one or more synchronized copies of a production database to protect the data from failures, disasters, human error, and data corruptions while providing high availability for mission critical applications. Basic Data Guard is included with Oracle Database Standard Edition. Active Data Guard is detailed below under custom related services.

RELATED CUSTOM SERVICES

The following related custom services may be purchased separately. These services can't be delivered in a standard manner as defined in this Service Guide. Instead, they can be requested through your CenturyLink sales representative for consideration of delivery through a CenturyLink statement of work (SOW) under a separate service agreement.

Advanced Security Options

Two features comprise Oracle's Advanced Security Option: Transparent Data Encryption and Data Redaction. Transparent Data Encryption is outlined in the previous section. Oracle Data Redaction enables the ability to redact (mask) column data using several redaction types; full, partial, regular expressions, random, and no redaction.

Data Guard - Active

Active Data Guard is a licensed option for Oracle Database Enterprise Edition. Active Data Guard enables advanced capabilities that that extend Basic Data Guard functionality, such as Real Time Query, automatic block repair, Far Sync, Standby Block Change Tracking and more.

Oracle Enterprise Manager (OEM)

Customers may elect to use a tool called Oracle Enterprise Monitor. This tool is a virtual DBA assistant that can help the Customer manage more Oracle Database servers, tune those servers as well as fix problems that arise.

Advanced Compression

Oracle Advanced Compression provides comprehensive data compression and Information Lifecycle Management (ILM) capabilities for all types of data: structured/unstructured, backup, network, archive, and Data Guard Redo Transport traffic. To facilitate automated ILM, Heat Map and Automatic Data Optimization enable organizations to maintain system-generated data usage statistics. This occurs at the row and segment levels, and permits setting of policies that implement data compression/movement automatically.

Database In-Memory

Oracle Database In-Memory allows any existing Oracle Database-compatible application to automatically and transparently take advantage of columnar in-memory processing, without additional programming or application changes.

Database Vault

The Oracle Database Vault option proactively protects application data from being accessed by privileged database users. Oracle Database Vault can also help discover Oracle Database runtime privileges without disruption.

Label Security

Oracle Label Security provides sophisticated and flexible security based on row labels for fine-grained access control. This option employs labeling concepts used by government, defense, and commercial organizations to assist with protection of sensitive information and provide data separation.

Real Application Testing (RAT)

Oracle Real Application Testing comprises a suite of features that help protect database applications from undesirable impact of routine changes such as hardware/software updates, configuration changes, platform migrations, and so forth. These features enable testing of applications so that issues resulting from system changes can be identified and addressed during testing, and unexpected problems encountered when a change is finally made in the production systems are minimized.

Oracle GoldenGate

Oracle GoldenGate enables the exchange and manipulation of data at the transaction level among multiple, heterogeneous platforms across the enterprise. It moves committed transactions with transaction integrity and minimal overhead on an existing infrastructure. Its modular architecture provides the flexibility to extract and replicate selected data records, transactional changes, and changes to DDL (data definition language) across a variety of topologies.

Quest SharePlex

SharePlex provides high-speed, log-based replication between Oracle instances on Sun Solaris, IBM-AIX, HP-UX, Linux, and Windows platforms and supports replication between dissimilar platforms.

Dedicated Database Administrator

Customers that do not have a Database Administrator (DBA), can purchase this resource by inquiring with their Sales Representative.

CenturyLink Responsibilities

Licensing

- Maintain licensing and Software maintenance with Oracle for CenturyLink provided licenses

Installation

- Prepare server for application service (OS specific parameters)
- Configure Oracle Real Application Clusters (RAC) for Oracle Database Server installation, if purchased
- Install Oracle Database Server
- Install Oracle Enterprise Manager (OEM), Data Guard, GoldenGate or SharePlex, and any available Oracle Options and features, if purchased
- Install applicable Oracle Database Server security patch Updates (SPU) or Critical Patch Update (CPU) with customer approval
- Harden Oracle Database Server to CIS level 1 and CenturyLink standards
- Install CenturyLink Monitoring
- Perform quality assurance against Oracle Server installation/hardening

Configuration

- Create/Configure Oracle Database Server service accounts
- Configure TNS supported protocols (TCP/IP, TCP Port, IP Address and ASO options)
- Configure Oracle RAC or SharePlex replication, if purchased
- Configure login auditing
- Configure Oracle DataGuard Basic Standby asynchronous archive log shipping
- Configure database encryption using TDE within ASO, if purchased
- Configure CenturyLink Monitoring

Administration

- SYSDBA user management
- Rebuild broken DataGuard Basic Standby asynchronous archive log shipping or RAC nodes
- Perform database backups and restores
- Oracle database log monitoring
- Restart/stop/start services
- Update managed servers with all recommended Oracle Database Server Security Patch Updates (SPU) or Critical Patch Update (CPU) upon customer request

- Utilize CIS Level 1 security benchmarks and NIST for additional security standards when deploying the Service and will provide security policies for the Service upon request.

Maintenance and Support

- Coordinate patching with Customer during maintenance hours
- Perform incident related failover/failback or switchover of DataGuard, Basic Standby asynchronous archive log shipping or RAC nodes

If a customer requires any additional services, including the custom related services noted above, which are not explicitly included as either the standard Service or optional services in this SG, they should contact their sales representative for assistance and information.

Customer Responsibilities

Customer acknowledges and agrees that its failure to perform its obligations herein may result in CenturyLink's inability to perform the Services and CenturyLink shall not be liable for any failure to perform, including any SLAs in the event of Customer's failure. CenturyLink shall not be liable for any failure to perform in the event Customer does not fulfill Customer's responsibilities and requirements as detailed herein and in the event of Customer's errors or omissions in setting up the environment. In addition, CenturyLink is not responsible for any loss or corruption of data or information. CenturyLink's obligations related to data are exclusively governed by the Security and Compliance section of the applicable Agreement.

Licensing

- **If CenturyLink-provided:** If any third-party software, including any corresponding documentation, is provided to Customer by CenturyLink in connection with the Service, Customer agrees to be bound by any additional licensing terms and conditions applicable to such third-party software and that it will use such third-party software strictly in accordance with such terms and conditions. CenturyLink makes no representations or warranties whatsoever with regard to such third-party software.
- **If Customer-provided:** If provided by Customer, Customer may obtain, and maintain throughout the Service Term, the required Software licenses. If Customer chooses to obtain the licenses, CenturyLink will install the Software as part of the Service provided Customer secures and grants the applicable accesses to CenturyLink to allow CenturyLink to perform the Service. Customer shall at all times comply with any and all end user license agreements related

to the Software. Customer represents and warrants that a written license agreement exists with the License vendor that permits CenturyLink to perform activities described in the proceeding sections. Customer agrees to provide CenturyLink with evidence of licensing as requested prior to the deployment date and periodically as requested to update the status of the license. If Customer fails to provide the license agreement, CenturyLink may, at its option, delay the deployment date or terminate the Agreement.

Configuration

- Deployment of Customer schema(s), as necessary.
- Data validation, User Acceptance Testing (UAT), Site Acceptance Testing (SAT)
- Configure Fail Safe, Flashback Fine-Grained Auditing, OLAP, Advanced Analytics, Spatial, GoldenGate, Database Vault, Advanced Security Options, ASM, Audit Vault, Multitenant or Secure Backup
- If TDE is purchased, Customer is responsible for migration of existing data into encrypted data space.

Administration

- Maintain Customer database(s)
- Customer database packaging
- Encrypt data within database(s)
- Manage table and index partitioning
- User identity and access management
- Manage database encryption keys
- Logical refresh of schema (e.g. export/import from production environment to dev/test)
- Data purge and object shrink

Maintenance and Support

Analyze database performance, concurrence, lock and durability issues

Acknowledgements and Consent

- **Third-Party Components:** Customer acknowledges that all third-party components of the Service are subject to the applicable vendor's decision to (i) not continue to provide or renew the Service with CenturyLink and/or (ii) modify or end of life a component(s). If any of the foregoing occurs, CenturyLink will use commercially reasonable efforts to migrate Customer to another comparable CenturyLink service at any time. Such migration will occur without regard to Customer's current term.
- **Provide Contact:** Designate and maintain a Customer Contact during the

service term and any applicable renewal term (including current contact information). "Customer Contact" means a technical point of contact with sufficient knowledge, authority and access to address configuration issues, event notifications, system or infrastructure modifications and authentication of applicable systems.

- **Security Precautions:** Neither Customer nor its representatives shall attempt in any way to circumvent or otherwise interfere with any security precautions or measures of CenturyLink relating to the Service or any other CenturyLink equipment.

- **Supportability:**
  a. Customer acknowledges and agrees that it is solely responsible for selecting and ensuring its software and systems are up to date and supportable.
  b. Customer further acknowledges it is solely responsible for ensuring all devices and hardware are upgraded to meet vendor configurations and agrees that CenturyLink's SLA only applies to currently supported configurations (including but not limited to related devices, software, and operating systems) at the time SLA support requests are triggered. If any configuration or version is identified as "unsupported" by a vendor, the Services are subject to all of the following conditions and/or requirements: (i) a service level objective ("SLO") referring to CenturyLink's reasonable effort to provide support will apply in lieu of any other applicable SLA and will automatically apply from the time CenturyLink receives notice from the vendor of such unsupported service; (ii) CenturyLink, in its reasonable discretion may elect to charge the Customer for any support or additional tasks/work incurred by CenturyLink resulting from Customer's continued use of unsupported configuration until Customer purchases the required and supported upgrades or extended support at an additional cost from the vendor. The requirement to purchase upgrades or extended support from vendor shall apply at any time, regardless of any contract term, term commitments, or renewal periods. Customer's failure to do so may result in CenturyLink's inability to provide the Services and CenturyLink shall have no liability therefrom.
  c. CenturyLink is not responsible for the service or the SLA if any changes by Customer affect the infrastructure or monitoring capability of CenturyLink.

- **Data Transfer:**
  a. Customer consents to CenturyLink's and its affiliates or subcontractors' use and transfer to the United States, or other countries, data or information (including Customer Contact information such as names, phone numbers, addresses and/or email addresses) of the Customer for the sole purpose of: (i) fulfilling its obligations under the Agreement; and (ii) providing information to Customer about CenturyLink's products

and services. Customer represents that it will ensure that all information provided to CenturyLink is accurate at all times and that any business contact has consented to CenturyLink's processing of such information for the purposes identified herein.

b. Customer consents to CenturyLink collecting and compiling system and operational metrics data to determine trends and improve service capabilities. CenturyLink may associate this data with similar data of other Customers so long as such data is merged in a manner that will not in any way reveal the data as being attributable to any specific Customer. Customer acknowledges CenturyLink's access to Customer data is generally limited to machine/system generated information and/or metrics, however if required as part of CenturyLink's obligation to provide the Service, or requests by Customer, CenturyLink may have access to Customer data, including personal information.

Monitors

Monitor	Description
Oracle process	Checks that the Oracle processes are running.
Oracle process limit	Checks to see if the number of processes is reaching the configured maximum.
TNS listener	Checks the Oracle listener is running.
Database status	Checks that the database instance is available for use.
Database long lock	Database lock is blocking another session for a long time.
Database jobs	Checks the database job queue for failures.
Oracle alert log	Monitors the Oracle alert log for errors or any other strings that may be important.
Oracle archive destination	Checks the status of the archive destinations. Important for standby/Data Guard configurations that use remote log shipping as it gives an early indication of issues in the redo stream transmission.
Archive check	Checks the amount of archive log that has been generated in the last hour and day. Trap and reset conditions are specified in Megabytes.
Data file status	Detects any data files that are not online.
Unrecoverable file	Checks for unrecoverable/ no logging operations being performed against a data file.
Redo status	Checks the status of redo logs.
Copy redo latch	Monitors for contention of the redo copy latch since startup.
Redo switch	Monitor to report redo logs that have been switched but not archived and the time elapsed in minutes since that log switch. This is to provide an early indicator of potential archiving problems.
Max extents	A segment in the database is approaching its maximum number of allowable extents.
Tablespace status	Checks that all tablespaces are online.
Free tablespace	A tablespace is getting low on free space. Check is based on percentage of free space against total size.

Monitor	Description
Tablespace no extend	A segment in a tablespace is unable to extend due to a lack of free space for its next extent.
RMAN data file backups	Reports database data files that have not been backed up in the last 24 hours and 7 days.
RMAN archive log backups	Reports database archive log files that have not been backed up in the last 24hours and 7 days.
RMAN log	Watches the backup log for a specific database. Any errors are captured and reported.
ClusterWare	Monitors the Oracle ClusterWare managed resources and detects if they are offline.
ASM mount	Checks the mount state of an ASM Disk.
ASM free space	Monitors for ASM Diskgroup free space.
ASM errors	Traps if there is an error in the monitoring of an ASM instance.
ASM state	Monitors for Diskgroup state.
DataGuard process	Indicates that a managed recovery process is not running. Use this monitor if Customer has a requirement for the database to be constantly in managed recovery.
DataGuard archive gap	Monitors an Oracle standby database for archive log gaps that may exist in the redo stream.
DataGuard log standby gap	Checks the gap between the timestamp of the newest log from the primary and the latest that has been applied is larger than NN hours.
DataGuard log standby status	Checks if the logical SQL apply is running for a Data Guard Logical Standby database.
Advanced Replication failures	Monitors the deferred transaction error queue within an Advanced Replication database server.
Advanced Replication delay	Monitors the deferred transaction queue for transactions that have not been propagated to remote sites within a specified number of minutes.
Advanced Replication status	Monitors the replication group status and traps any that are not normal.
Advanced Replication objects	Monitors for invalid replication objects in an Advanced Replication database server.
Advanced Replication age	Monitors the deferred transaction queue for transactions that have not been purged. Performance issue can occur if the queue becomes too large due to full table scanning.
Advanced Replication requests	Monitors the Advanced Replication administrative request queue.
Oracle session limit	Checks to see if the number of sessions is reaching the configured maximum.
Oracle open cursors	Reports on the percentage of available open cursors for a particular database.
Oracle DB scheduler jobs	Prints the number of failures for the jobs in DBA_SCHEDULER_JOBS that are failing due to errors.
Oracle DB datafile max size	Alerts if a datafile is detected to be auto-extensible but the max size is less than the current data file size.

Definitions

Advanced Replication: Advanced Replication enables the copying and maintenance

of database objects in multiple databases that make up a distributed database system. Advanced Replication uses internal Oracle mechanisms to replicate transactions to other databases participating in the replicated solution. Advanced Replication supports Bi- directional Replication with conflict detection and optional resolution. In the event of a disaster at one of the sites, the surviving databases remain online and are able to perform transactions, which can be later replicated to the impacted site.

Advanced Security Option: An Oracle option that provides a single source of integration with network encryption and authentication solutions, single sign-on services, as well as security protocols.

Backups: A managed replication service that affords Customer with the ability to off-load the overhead of backups from the master server. With managed replication service, binary log records are sent directly from a master server to one or more slave servers. Client applications can be coded to automatically redirect their connection information in the event of a master server failure. Multiple slave databases are configurable for a single master database. Replication is asynchronous; data in transit or queued up at the time of a failover could be lost.

Basic Standby: Basic Standby is a physical standby database without the Oracle Data Guard-Logical or Oracle Data Guard-Physical management. Log shipping and redo application need to be performed manually through external tools or scripts. Typically log shipping would use a file system replication tool such as RSYNC, which is used to synchronize files and directories from one server to another while minimizing data transfer using delta encoding when appropriate.

CenturyLink Monitoring: Configurable for client service needs, including auto-notification and application log matching.

CenturyLink Service Center: The primary organization for resolving infrastructure issues that is staffed 24/7/365 to respond in a timely manner to incidents and requests pertaining to the Service.

Database Administrator ("DBA"): Whether a direct employee of the Customer or contracted by the customer to CenturyLink, this role comprises the development and design of database strategies, system monitoring to improve database performance and capacity while taking planned expansion requirements into account. DBAs also coordinate and implement security measures to safeguard the databases.

Database Vault: Database Vault provides a transparent mechanism to prevent DBAs

from viewing and modifying application data without compromising the ability to manage the database.

Major Release: Major Releases (X.y.z) are vehicles for delivering major and minor feature development and enhancements to existing features. They incorporate all applicable error corrections made in prior Major Releases, Minor Releases, and Patch Releases. Software Provider typically has one Major Release per year.

Minor Release: Minor Releases (x.Y.z) are vehicles for delivering minor feature developments, enhancements to existing features, and defect corrections. They incorporate all applicable error corrections made in prior Minor Releases, and Patch Releases.

Oracle Enterprise Manager ("OEM")/ Oracle Management Server ("OMS"): OEM for Oracle databases is a graphical front end tool for managing Oracle databases; either using a web interface (10g and above) or a Java client interface (9i and below). OMS provides tools and services for the central management of Oracle databases using the OEM interfaces. Agents are deployed to servers to provide monitoring and management capabilities through OMS. Clients are advised that in order to get the most from OEM/OMS the diagnostics and tuning packs are required for each server hosting databases that are to be monitored and managed through OEM/OMS.

Oracle Data Guard Logical ("Data Guard Logical"): The Software creates, maintains, and manages one or more logical standby databases typically used for reporting. It maintains these standby databases as transitionally consistent copies of the primary database data.

Oracle Data Guard Physical ("Data Guard Physical"): The Software creates, maintains, and manages one or more standby databases to protect enterprise data from failures, disasters, errors, and corruptions. It maintains these standby databases as physically consistent copies of the production database. If the production database becomes unavailable because of a planned or an unplanned outage, Data Guard Physical can switch any standby database to the production role, thus minimizing the downtime associated with the outage.

Partitioning: Partitioning is used to split tables across multiple locations. Oracle Database partitioning is normally done for manageability, performance or availability reasons. This increases performance for sites that have regular transactions involving certain views of data, while maintaining availability and security.

Patch Release: A Patch Release is a small piece of Software that is used to correct a problem with a Software program or an operating system. Patches are often called "Patch Updates" and are Critical or Security related.

Real Application Clustering (RAC): For active-active clustering requirements, RAC is an option to Oracle Database Enterprise Edition and included with Oracle Database Standard Edition. RAC supports the deployment of a single database across a cluster of servers that provides unbeatable fault tolerance, performance and scalability with no application changes necessary.

SharePlex Data Replication: Provides high availability for active-passive and active-active Oracle 10g, 11g, and 12c database configurations.

Software: The database server software in binary form, any other machine readable materials (including, but not limited to, libraries, source files, header files, and data files).

Software Provider: The third party that makes and sells Software products described in section 1.0.

TNS: Transparent Network Substrate (TNS), a proprietary Oracle computer-networking technology, supports homogeneous peer-to-peer connectivity on top of other networking technologies such as TCP/IP, SDP and named pipes. TNS operates mainly for connection to Oracle databases.

Transparent Data Encryption: This feature is part of the Advanced Security Option and permits Customer to protect sensitive data in database columns stored in operating system files by encrypting the date. Then, to prevent unauthorized decryption, Oracle stores encryption keys in a security module external to the database. Transparent Data Encryption enables simple and easy encryption for sensitive data in columns without requiring users or applications to manage the encryption key. Transparent Data Encryption only protects data at rest or in a backup set.

Upgrades: Upgrades mean a Major Release or Minor Release of the Software.

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