Oracle® Hospitality Simphony

Server Sizing Guide

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Preface

This document is designed to offer guidance on the topics involved in sizing a server for a Simphony version 18.1 system, as well as provide minimum specifications for hardware purchases. The server configurations published in this document are based on analysis of data collected in lab and production environments and designed to offer the best possible performance.

Due to the fact that many environments have nuances specific to them, these guidelines should be used as a starting point when selecting server hardware. Once a system has gone live in the production environment, it may be necessary to modify the server configuration to account for customer specific requirements and conditions.

Audience

This document is intended for users of Simphony.

Documentation

Oracle Hospitality product documentation is available on the Oracle Help Center at http://docs.oracle.com/en/industries/hospitality/

Revision History

Date	Description of Change
October 2018	• Initial publication
October 2018	• Removed Appendix A
December 2018	• Updated Audience

Acronyms and Abbreviations

The following acronyms and abbreviations are used throughout this document:

Table 1 – Acronyms and Abbreviations

Acronym /Abbreviation	Full Text
CPU	Central Processing Unit
IIS	Internet Information Service
NLB	Network Load Balancing
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory
SAN	Storage Area Network
CAPS	Check And Posting Service
DTS	Data Transfer Service
DPS	Direct Posting Service

1 Simphony Server Sizing

Purpose

This document is designed to offer guidance on the topics involved in sizing a server for a Simphony version 18.1 system as well as provide minimum specifications for hardware purchases. The server configurations published in this document are based on analysis of data collected in lab and production environments and designed to offer the best possible performance.

Due to the fact that many environments have nuances specific to them, these guidelines should be used as a starting point when selecting server hardware. Once a system has gone live in the production environment, it may be necessary to modify the server configuration to account for customer specific requirements and conditions.

Server Sizing Methodology

There are three main components to servers:

- Central Processing Unit (CPU)
- Random Access Memory (RAM)
- Storage

Each component has factors that determine proper sizing. At a high level, CPU and memory are driven by the number of users and the type of processing, for example, transaction processing versus report generation. Disk configuration is driven by data retention length, system configuration (revenue centers, menu items, and employees), resiliency and necessity for speed of access. Long-term storage of such data belongs in a warehouse such as Reporting and Analytics. The price of memory has gone down considerably in the last few years, as of the writing of this document, so the price of RAM is not a major factor. Ideally, memory on a database server should be sized to keep index objects and/or table objects in the buffer cache. This reduces IO latency and reduces the wait for reads.

In addition to the physical attributes of the server, it is necessary to select the correct versions of database and operating system software. At a minimum, the versions chosen for these items must be able to support the hardware that is going to be purchased.

A Note on Virtualization

All recommendations put forth herein regarding the resource requirements for hardware when sizing a Simphony platform are applicable to Virtualized environments as well as physical ones when current Virtualization technologies such as Oracle Virtualbox are used. Current technologies incur no real overhead cost, and therefore do not require separate consideration when choosing resource requirements.

Disk Capacity Sizing

The amount of disk space necessary for a system is driven by the amount of historical data, backups, and database log files retained on the drives. There are two areas that account for the majority of the database growth:

- Check details used for online transaction access (Transaction Data)
- Simphony Reporting and Analytics data

By default, the system automatically purges checks and their associated details that are used for online check access after six (6) weeks from the transaction database.

The Simphony Reporting and Analytics data accumulates for as long as desired. The reporting database contains check detail, totals, and electronic journal information.

The following values can be used as a guideline to determine how much space a database uses. It should be noted that testing used for these figures was based on fast transactions averaging 10 line items per check. Sites with multiple rounds or large check sizes experience more database growth.

The reporting database grows at rate of approximately 20 MB per 1000 checks. Those numbers are approximate values and may vary depending on individual setup and configuration.

Database Objects used for Simphony

The following databases/schemas/tablespaces* are used in a Simphony environment.

Table 2 – Simphony Tablespaces

Database/Schema Name	Purpose	Auto Extend	Max Size	Initial Size	Growth Expectation
**TRANSACTIONDB	Transaction staging DB	Yes	Unlimited	128MB	***Medium
**SECURITYDB	Security Key Storage	Yes	Unlimited	128MB	Negligible
COREDB	Configuration of Users and Organizations (Reporting & Analytics)	Yes	Unlimited	128MB	Negligible
LOCATION_ACTIVITY_DB	Historical data DB (Reporting & Analytics)	Yes	Unlimited	128MB	Significant
PORTALDB	Configuration of the Portal Website (Reporting & Analytics)	Yes	Unlimited	128MB	Negligible
RTA	RTA agent DB (Reporting & Analytics)	Yes	Unlimited	128MB	Negligible

When working with Oracle Database, the schema is the name of the logical place where tables are stored, the tablespace is the definition of the physical file that is given size parameters. In Microsoft SQL Server, this all falls under the umbrella term “Database”.

**Names of these databases (schemas) are chosen during installation. There is no standard naming convention.
***The size of the TRANSACTIONDB remains relatively consistent as older transactions are purged; adding workstations or revenue centers typically causes the size to grow to a new consistent level.

2 Local Disk and RAID Configurations

From an application perspective, Simphony does not require any type Redundant Array of Inexpensive Disks (RAID) configuration. In fact, the application is oblivious to the physical configuration of the disks. However, some form of redundancy such as RAID is strongly recommended for local storage on Database servers.

Depending on the performance and disaster recovery requirements for a customer, there are a wide number of possible hard drive configurations available. Users should consult a current reference, for example, https://en.wikipedia.org/wiki/RAID, and their storage manufacturer's recommendations before selecting a configuration.

RAID may allow for hardware redundancy and performance enhancements depending on what solution is chosen. Some of the solutions are more costly than others. In every situation, it is recommended that the RAID controller have a battery backed read/write cache.

For high volume deployments it might be necessary to utilize a storage system or two RAID controllers so that the loads for transaction databases are being separated from the reporting databases. If magnetic hard drives are used, it is that only SAS type hard disks with 10k or 15k rpm should be used; SATA type hard disks are currently not considered sufficient. Alternatively, some or all of the local storage can be retained on Solid State drives (SSD); these are significantly more expensive, but provide much higher I/O speeds.

Storage Area Networks

Some large scale customers may wish to implement a Storage Area Network (SAN) instead of using local hard drives. SANs are typically used with database servers to house the data files and logs.

This option, while more costly than local drives, becomes necessary as soon as high availability (HA) and database redundancy options are considered (Microsoft Clustering or Oracle RAC). A SAN also allows customers to have an option to put the data on an infrastructure that can be shared amongst other servers and can be expanded more easily than if the data were stored on local drives.

Simphony Customers that wish to use a SAN are required to configure their server hardware according to the size recommendations that are provided. Oracle Hospitality is not responsible for installing and setting up an on premise SAN.

Operating System Version Options

Simphony version 18.1 is supported on either Microsoft Windows Server 2008 R2 or Microsoft Windows Server 2012 R2. The specific Edition of Microsoft Windows Server selected depends on several factors. For more details on Microsoft Windows Server edition differences, please refer to the Microsoft website.

A Simphony database server is supported using the Oracle Linux operating system, however that option is not covered in this document.

3 Database Options

Simphony version 18.1 is supported on the following database platforms:

- Oracle Database 11g
- Oracle Database 12c
- Microsoft SQL Server 2008 R2
- Microsoft SQL Server 2012 R2

Oracle Hospitality recommends the use of Oracle Database 12c.

Customers upgrading from 9700 HMS to Simphony who are running earlier versions of either Microsoft SQL Server or Oracle Database must upgrade to a currently supported database platform.

Microsoft SQL Server

Depending upon the hardware and business requirements, the edition of Microsoft SQL Server varies for each implementation. Simphony is only supported on the Standard and Enterprise editions.

For more details on Microsoft SQL Server edition differences, refer to the Microsoft website.

Which version of Database should be used?

Each of the server configurations provided in the tables below includes a minimum version of Microsoft SQL Server or Oracle Database that needs to be used in order to make use of the hardware resources recommended for the server. A more recent version (up to the maximum listed above) may be used whenever desired. Also, when selecting a database platform and version, make certain not to waste hardware resources by selecting a version that cannot utilize all of the server's memory or CPU capabilities.

The majority of Simphony single property customers use Microsoft SQL Server Standard edition. For customers that have larger installations, the Enterprise or Datacenter editions should be used because they can handle a greater workload and provide features like Microsoft SQL Server Clustering.

Oracle Database

Common practices for the Oracle Database platform:

1. B-tree indexes are useful for queries that are highly selective, highly filtered on the column(s) that are indexed.
2. Do not use Oracle bitmap queries on Simphony or Reporting & Analytics. Bitmap queries are designed for nightly batch-loaded systems, not for either real-time operational systems or for real-time reporting.
3. Collect statistics each night.
4. Rebuild indexes monthly or perhaps even weekly.
5. As with any database, perform capacity planning based not on expected or average load, but on the once-a-year peak time.
6. It is crucial to keep your data correctly purged; failure to do so can slowly turn an operational transaction system into a multi-year historical reporting database.

Server Replication and Clustering

In addition to building servers that have hardware redundancy solutions for individual components, it may be desirable to also have multiple servers of the same type so if there is a complete server failure (not just a hard drive), the system can function on a backup server.

There are a number of different options available. Some of these options pertain to just the application or database servers, and some pertain to both.

Microsoft SQL Server Clustering / Mirroring

Microsoft SQL Server Clustering and Mirroring are available for customers who have experience implementing and managing Microsoft SQL Servers. It is expected the customer is able to install and configure these solutions and provide on-going management of the database if this configuration is used.

The Simphony installation media is not Microsoft SQL Server Cluster aware.

Oracle Real Application Cluster (RAC)

Oracle RAC is available for customers who have experience implementing and managing Oracle RAC configurations. It is expected that the customer is able to install and configure the Oracle RAC and provide on-going management of the database if this configuration is used.

The Simphony installation media is not Oracle RAC aware.

4 Network Load Balancing

In previous Oracle Hospitality POS products, solutions like Double Take and Legato were used to provide fault tolerance if the application server were to suffer a complete failure. For Simphony, these products are not be supported. Instead, network clustering and load balancing solutions can be used to achieve a degree of resiliency through redundancy, in addition to their primary function of improved throughput. There are two primary means to implement this solution.

The Microsoft Windows Server software contains a feature called Network Load Balancing (NLB) which may be used to cluster the application servers together. This option does not require any additional licensing costs.

Hardware solutions can also be used to handle this functionality. These solutions are more expensive than implementing the Microsoft Windows based solution, but can provide a higher degree of flexibility and configuration options.

Network load balancing detects server failure and seamlessly balance the load on the remaining configured application servers. Network load balancing does not detect failure of services (including IIS).

Large Configurations (1000+ Workstations)

Configurations larger than 1000 workstations are not supported on a shared server. This type of configuration must be split across a minimum of two servers, with application and database on dedicated servers. Additional servers may be added as necessary for resiliency purposes.

Reporting Application Servers

Implementing a dedicated reporting server or an additional application server should be considered when the number of users simultaneously running reports exceeds 25. By moving the Simphony Reports web server to different hardware than the transaction application servers, it is possible to isolate reporting activities from negatively impacting transaction performance.

If the dedicated reporting server is implemented, it should have the same RAM, CPU, and disk requirements as the application servers. When using dedicated reporting servers, the Simphony Reports web service is configured to only start up on the servers designated to be reporting servers. The other servers only run transaction web services.

Table 3 – Server Specifications

	Recommended settings	1-12 Workstations	13-20 Workstations	21-40 Workstations	41-100 Workstations
Shared Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Trans per Sec	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 12	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 20	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 40	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 80
Application Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Trans per Sec	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 1 12	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 1 20	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 1 40	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 1 80
Database Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Trans per Sec	Intel® Xeon® 5000 series (or similar) Dual Quad Core 4-16GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 12	Intel® Xeon® 5000 series (or similar) Dual Quad Core 4-16GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 20	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8-32 GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 40	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8-32GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 80
Reporting Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Rpt per Sec	N/A	N/A	N/A	Intel® Xeon® 5000 series (or similar) Dual Quad Core 6GB 4 x 146GB Server 2012 R2 Standard n/a 1 50

- Grey indicates redundancy options (alternative)
- Not Applicable (N/A) indicates that the option is not available
- SANs could be used instead of HDD for 500 workstations or more. Required storage space depends on the size, number of checks, and how long you store them.

Table 4 – Server Specifications

	Recommended settings	100-200 Workstations	200-500 Workstations	500-1000 Workstations	1000-2000 Workstations
Shared Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Trans per Sec	N/A	N/A	N/A	N/A
Application Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Trans per Sec	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 1 (2nd if no Rpt/S) 250	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 2 500	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 2 1200	Intel® Xeon® 5000 series (or similar) Dual Quad Core 8GB 4 x 146GB Server 2012 R2 Standard n/a 2 2100
Database Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Trans per Sec	Intel® Xeon® 5000 series (or similar) Dual Quad Core 16-32GB 4 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 250	Intel® Xeon® 5000 series (or similar) Quad Quad Core 16-32GB 6 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Standard 1 500	Intel® Xeon® 5000 series (or similar) Quad Quad Core 16-32 GB 6 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Enterprise 1 1200	Intel® Xeon® 5000 series (or similar) Quad Quad Core 32-64GB 8 x 500GB + Raid Cntl Server 2012 R2 Standard Oracle 12c / SQL Enterprise 1 2100
Reporting Server	CPU x Speed CPU count X Size Memory Drive Count x Size Operating System Database Version Number of Servers Peak Rpt per Sec	Intel® Xeon® 5000 series (or similar) Dual Quad Core 6GB 4 x 146GB Server 2012 R2 Standard n/a 1 50	Intel® Xeon® 5000 series (or similar) Dual Quad Core 6GB 4 x 146GB Server 2012 R2 Standard n/a 1 50	Intel® Xeon® 5000 series (or similar) Dual Quad Core 6GB 4 x 146GB Server 2012 R2 Standard n/a 1 50	Intel® Xeon® 5000 series (or similar) Dual Quad Core 6GB 4 x 146GB Server 2012 R2 Standard n/a 1 50

- Grey indicates redundancy options (alternative)
- Not Applicable (N/A) indicates that the option is not available
- SANs could be used instead of HDD for 500 workstations or more. Required storage space depends on the size, number of checks, and how long you store them.

Configurations Larger than 2000 Workstations

The sizing requirements for a system with more than 2000 workstations are more difficult to accurately recommend. The following guidelines should be understood

Database Server Size

When enterprises become larger than 2000 workstations, it is hard to predict just how much CPU, RAM and disk space is required. In many of these enterprises, there is a wide variance in the quantity of menu items, employees, and content stored in the database. Additionally, the volume of checks coming in and the average size of those checks vary greatly; only general guidance can be provided.

Minimally, a Dual Quad Core CPU based server is recommended as a baseline for really large systems. Depending upon how much farther over 2000 workstations the system is going to go, consideration should be given up front to purchasing server hardware with the ability to add up to four CPUs, even if only two are purchased initially. The option to add CPUs can be exercised over time, as the load dictates.

When it comes to RAM, beginning with a minimum of 64 GB and having room to grow is prudent. At a relatively low cost, it is possible to procure servers today that are capable of expanding to hundreds of gigabytes. The amount of RAM consumed by the database grows as an enterprise grows. Careful monitoring needs to take place to ensure that the database servers do not become memory starved. Customers should be prepared to add RAM as the system grows over time.

Disk space usage grows as new properties are brought on line and more transactions start flowing in. Expect to see the transaction database grow and plateau as a result of each property coming on line. When a property comes online, there is new configuration data stored in the database. The Simphony transaction database should be configured to only store 3-4 days' worth of transaction data.

The Simphony reporting database also continues to grow based on the same rules that apply to smaller systems. For very large reporting systems that keep many years of historical transactional data, perhaps taking as much as 10-20TB of disk space; it may be advisable that customers persist their Simphony data onto a SAN, where additional resources can be added if necessary. Installing the Simphony database files onto local hard drives limits the systems growth potential.

Database Server Quantity

In large environments, a Microsoft SQL Server Cluster or Oracle Real Application Cluster (RAC) should be used to provide failover functionality and the best possible performance. It is not advisable to run large systems without one of these failover solutions in place.

With Microsoft SQL Server, since clustering technology only provides failover capabilities, consideration should be given to running the servers in what is being termed an ACTIVE/ACTIVE configuration.

In this configuration, the active Simphony Transaction and Reporting databases are running in separate instances on different Microsoft SQL Server hardware. These instances are clustered with a backup instance running on the other server. Thus, the active Simphony Transaction database is clustered with a passive Simphony Transaction database running on the Simphony Reporting database server. In the event of a server failure on the Transaction database hardware, the passive instance starts up on the Simphony Reporting database server and handles the work load until the Simphony Transaction database hardware has been restored. The Simphony Reporting database should be configured to failover in the other direction – onto the Simphony Transaction database server.

Using this configuration gives customers the opportunity to utilize both database servers instead of just having one sitting idle waiting for a failure. The biggest detriment to this configuration is that customers need to purchase Microsoft SQL Server licenses for both servers since they are both actively processing requests. If the system is configured in the standard ACTIVE/PASSIVE manner, then only the active server would require licensing.

The Oracle HA database solution for fault tolerance and load balancing is called RAC. This technology is used by the Oracle hosting center today. One of the advantages that RAC has over Microsoft SQL Server is that it provides load balancing. Both servers' process database requests against the same database and there is no down time as a passive instance is brought on line if the primary server fails. If the load on the database servers increases over time, more servers can be added to the cluster to gain computing power. With Microsoft SQL Server, it is necessary to either add resources to the existing hardware (RAM or CPU) or replace the hardware with machines that have more resources.

With the current version of Simphony, the application is database agnostic and the decision to pick one database technology over the other rests with the customer. However, when the very best data persistence solution is required for the success of the business, the Oracle database with its many high-performance and HA features is strongly recommended.

Application Server Sizing

Application servers do not typically consume a large amount of server resources in the Simphony platform. Database servers are where most of the I/O and CPU/RAM usage occurs. That being said, application servers still need to be configured with the proper resources to handle the workload they are handling, primarily through IIS and various other Simphony web services. Oracle Hospitality recommends that customers operate all of the web services which are capable of being load balanced on every application server and to place a load balancer (either Microsoft Windows NLB or a hardware device) in front of the application servers to distribute the load. It is also possible to dedicate individual servers to do some, or even individual jobs needed by the application. For example, a single server, or even multiple servers that only run the Direct Posting Service. Servers that run only the EGateway service and no other services. This all depends on the requirements of the enterprise and how the customer wants to distribute the application load. The inherent extensibility and both the horizontal and vertical scalability of the architecture allows infinite combinations of services to meet the needs of an enterprise only limited by the hardware available (both real and virtual).

As for disk sizing, the only growth items on an application server are the log files when it comes to the Simphony application. The Simphony application itself is not very I/O intensive on the disk side of the hardware. The size of the enterprise does not impact the disk usage to the point where different recommendations must be made for larger customers.

The CPU recommendation for application servers in really large environments is a single, Quad Core processor. To date, there has not been a need to specify a speed on this front, as CPUs have been able to keep up with the workload.

RAM is a crucial resource. RAM requirements for large enterprises are where the application servers can greatly vary, based primarily upon the number of menu items and employees configured in the system. The application server caches data for use by the EMC and Database Download Handlers. The cached data is used to speed up the performance of the system in those applications. Other processes such as the posting handler, Data Transfer Service (DTS) and Direct Posting Service (DPS) also require RAM.

Since application servers are load balanced, it is possible for a request for any of the processes to come to an application server, it is necessary to load the servers with enough RAM to handle everything on all of the servers; or as mentioned above, to split the application servers even further into even more specialized servers that handle specific tasks within the enterprise. When deciding upon how much memory to put into an application server, it is important to consider what the operating system is actually capable of supporting.

For all customers the best guidance for large customers is to start with no less than 8 GB of RAM and add to that amount if the system requires it.

Application Server Quantity

The application server count recommendation is driven by the total number of services that connect to the enterprise. It is recommended that the total number of application servers be equivalent to the total number of services divided by 2000.

The following services need to be counted when making this determination:

- Simphony Clients
- Check and Posting Service (CAPS)
- Kitchen Display System (KDS) Controller Services

Technically, the EMC and reporting user counts also impact server performance. Unless those counts are very high, there is no need to factor them into the equation. If there is concern over the impact that these items may have on the system, then they should be counted like the services when making the recommendation for application servers.

For example, if a system has 3000 workstations and 1000 properties, all of which have KDS, and a dozen EMC users, then the total number of items is 5012. Using the value of 2000 as the break point, this customer requires three application servers just to handle the load. An additional application server – which brings the total to four servers – is recommended to provide resilience in the event a server fails.

Additional Assistance

For additional assistance with large configurations, please liaise with your Oracle Hospitality Account Manager, and share the following information:

- Number of Workstations by Types (WS5A, WS6, 2015, Tablets, etc.)
- Total Number of Properties
- Total Number of Revenue Centers
- Total Number of Employees
- Total Number of Employees running reports
- Total Number of Menu Items
- Average Checks per Day (indicating peak business throughput)