Overall diagram accuracy is assessed at 80%.
Network

The primary concern with network specifications are bandwidth (volume) and latency (speed).

Recommend a 1 Gbit connection between the Database and the Application server. Essential is the speed of the connection, not the throughput.

1 Gbit LAN only defines the throughput. If the connection is heavily loaded, the elapsed time for each IP packet is high and the connection will be slow.

Note: To connect the Database Server do not use WAN. If database and application are on the same machine, the connection is faster than on separate machines.

Oracle DB Sizing

<table>
<thead>
<tr>
<th>Database Template</th>
<th>Number of concurrent Users</th>
<th>Table space in GB</th>
<th>Memory in GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xlarge</td>
<td>1000+</td>
<td>138+</td>
<td>20+</td>
</tr>
</tbody>
</table>

Note 1: Max memory values have to be increased if the expected number of concurrent sessions exceeds the number defined for the template, or if the dump size is higher. Memory allocation is determined by the init-parameters. To increase performance, recommend fitting the machines with more physical memory than necessary.

Server memory for Oracle database 12c:
1. 10 MB per connected user.
2. RAM - depend on DB size.

Note 2: Disk I/O reduces when more memory is allocated for the database. Some activities are buffered in the database memory.

Hard Disk

Intensive parts of the database (e.g. undo, redo log, temp) and system swap or page file have to be on separate disks.

Recommend different disks for the database and OS to avoid any DB impact. Each service (file service, swap, etc) which uses disk I/O can affect the database performance. As I/O is most critical to the database, recommend using four to six physically separated disks, or an equivalent performing controller bridge RAID 0/1 exclusively for the database. Add a separate disk for the operating system. RAID 5 has to be used for archived redo log files.

For the archive log, recommend to provide disk space six times the size of the dump. The database will stop when the disk space for the log is used up.

Note: Old archived logs have to be backed up once a week.

Recommend having the last database backup (both hot and cold) on the server machine, in order to reduce recovery time. If the database raises a media error (defect of file), recovery has to be performed using the cold backup that is kept on the server machine. If missing, restore copied files back to temporary disk location.

Calculate the size of two cold database backups to have enough disk space for the recovery process. Do not use the free space for file storage. In case of emergency, you will not be able to recover your database in time.

Recommend running the Oracle WebLogic Server on the same machine where the EDM server is running.


Tuning usually implies fixing a performance problem. However, tuning should be part of the life cycle of an application—through the analysis, design, coding, production, and maintenance stages. Often, the tuning phase is left until the database is in production, which then becomes a reactive process, where the most important bottleneck is identified and fixed. Note:

Oracle recommends using the Automatic Workload Repository to gather performance data. These tools have been designed to capture all of the data needed for performance analysis.

There are two main parts to a system’s architecture:
1. HW & SW components;
2. Configuring the Right System Architecture for Your Requirements

Note: Generating a system architecture is not a deterministic process. It requires careful consideration of business requirements, technology choices, existing infrastructure and systems, and actual physical resources, such as budget and manpower.

An infinite user population distributed on the Internet (Many users concurrently) For this type of app, extra engineering effort is required to ensure that no system component exceeds its design limits. This creates a bottleneck that halts or destabilizes the system. These apps require complex load balancing, stateless app servers, and efficient DB connection management. Use statistics and governors to ensure the user receives feedback if the DB cannot satisfy their requests because of system overload.

Top Ten [10] Mistakes Found in Oracle Systems:
1. Bad connection management – app connects/disconnects for each DB interaction.
2. Bad use of cursors and the shared pool – Not using cursors results in repeated parses.
3. Bad SQL – meaning uses more resources than appropriate for the app req. DSS runs for more than 24 hrs, or querying an online app too many times a day
4. Use of nonstandard initialization parameters – schemas, schema statistics, and optimizer settings should be managed as a group ensuring consistency of performance.
5. Getting database I/O wrong – DBs laid out poorly over the available disks or specifying incorrect number of disks, because disks configured by disk space and not I/O bandwidth.
6. Online redo log setup probs – running with too few online redo logs and files that are too small, which cause system checkpoints to continuously put a high load on the buffer cache and I/O system; if too few redo log files exist, the archive cannot keep up, so the DB must wait for the archiver to catch up.
7. Serialisation of data blocks in the buffer cache due to lack of free lists, free list groups, transaction slots (INNTRANS), or shortage of rollback segments – particularly common on INSERT-heavy apps, in apps that have raised the block size above 8K, or in apps with large numbers of physical tables.
8. Long full table scans – for high-volume or interactive online ops could indicate poor transaction design, missing indexes, or poor SQL optimization because long table scans, by nature, are I/O intensive and uncachable.
9. High amounts of recursive (SYS) SQL – executed by SYS, could indicate space management activities, such as buffer allocations that are taking place; Recursive SQL executed under another user ID is probably SQL and PL/SQL, and this is not a problem.
10. Deployment and migration errors – an app uses too many resources because the schema owning the tables has not been successfully migrated from DEV to or from an older implementation; Examples are missing indexes or incorrect statistics. These errors can lead to sub-optimal execution plans and poor interactive user performance.


Common Performance Problems Found in Databases which can be diagnosed by Automatic Database Performance Monitoring (ADPM), the Performance Advisor, the Memory Monitor, SQL Tuning Advisor, etc. These tools have been designed to:

Analyzer: 1) CPU bottlenecks.
2) Under sized memory structures – Are the Oracle memory structures such as the System Global Area (SGA), Program Global Area (PGA), and buffer cache adequately sized?
3) I/O capacity issues?
4) Suboptimal use of the DB – Problems such as archiving issues, DB performance tuning, or using SQL Performance Analyzer.
5) Configuration issues – Is there evidence of incorrect sizing of log files, archiving issues, too many checkpoints, or suboptimal parameter settings?
6) Slow DSS query runs – For more than 20 minutes.
7) Short-lived performance probs – Users complaining about short-lived or intermittent perf probs?
8) Degradation of DB performance over time:
9) DB is not performing as well as six (6) months ago?
10) Inefficient or high-load SQL statements using excessive system resources.
11) Object contention – Any DB objects the source of bottlenecks because they’re continuously accessed?


Oracle Clusterware Hardware Concepts and Requirements:

1. A cluster consists of one or more servers.
2. Access to an external network is the same for a server in a cluster (aka cluster member or node) as for a standalone server.
3. A node that is part of a cluster requires a second network. This second network is referred to as the interconnect. For this reason, cluster members require at least two network interface cards: one for a public network and one for a private network. The interconnect network is a private network using a switch (or multiple switches) that only the nodes in the cluster can access. The Clusterware supports up to 100 nodes in a cluster.

Note: Oracle does not support using crossover cables as Oracle Clusterware interconnects. If implementing a cluster for high availability, then configure redundancy for all of the components of the infrastructure with at least two (2) network interfaces for the public network, bonded to provide extra availability. At least two (2) network interfaces for the private interconnect network.

4. The cluster requires shared connection to storage for each server in the cluster. To provide redundancy for storage, generally provide at least two (2) connections from each server to the cluster-aware storage. There may be more connections depending on your I/O needs. It is important to consider I/O reqs of the entire cluster when choosing your storage subsystem.

Most servers have at least one local disk that is internal to the server. Often, this disk is used for OS binaries; so also use this disk for the Oracle SW binaries. Benefit of each server having its own copy of the Oracle binaries is HA increases, so that corruption of one binary does not affect all of the nodes in the cluster simultaneously. Also allows rolling upgrades, which reduce downtime.