List of Arguments

Separate Application and Database or run both on same Server?
(Application / DB split – yes or no?)

Version 1.0

distributed by

www.iT-Checklists.com
-Checklists·com
The e Book-Shop for iT-Professionals

http://www.iT-Checklists.com

Conventions

The following typographical conventions are used in this book:

```
Constant width
```
      Used for source code
`Constant width bold`
      user input

[ ]   optional elements
{ }   mandatory choice
 | separates choices

Table of Contents

Summary

There exists no general valid answer to the question if database and application should be separated on different physical servers or share the same physical server.

Trends as "S**erver Consolidation**" or "**Multi-Tier-Architecture**" provide arguments for each side – the best solution depends on the individual combination of several factors which are listed in tabular form.

In case that the per-CPU software license costs are magnitudes higher than the hardware costs, the the decision is very likely driven by costs rather than based on the companies standard / reference architecture.

In case that an old or not popular application software requires a specific operating system or an old version, the possibility to run the database on a separated server on your strategic operating system can be a strong argument for the separation. As database CPU-licenses are very expensive, the newest, fastest CPU's can reduce the number of required database CPU's and thus reduce the license costs; but the newest CPU's usually requires a very new operating system version which might still not be supported by your application vendor. Running the database on an separates server circumvents this limitation.

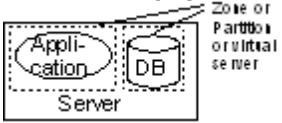The "virtualized architecture" will be somewhere between the two base architectures.

This table provides a high level overview, more specific tables in the main section drill down to a more detailed level.

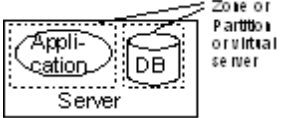| Architecture ➡ Topic ⬇	Application and Database sharing __same physical server__ _(not virtualized or partitioned)_	Application and Database on __separated physical servers__
License costs for database, application server / middle ware, application	In worst case you pay for all CPU's in the server the database license and the application (server) license.	In many cases big savings
Different operating systems	not possible	possible
Number of Servers (installation, maintenance, rack-space, energy, operating system licenses, backup licenses)	1	2
Total number of CPU's		equal or higher
Server Class		more likelihood to avoid the higher server classes
Connectivity between database and application	local interprocess communication or local TCP/IP communication	usually TCP/IP + network + switch

Details

License related Topics

Example: Single-Server configuration with 8 CPU's compared with Split-Architecture with 4 CPU's on the database server and 6 CPU's on the application server.

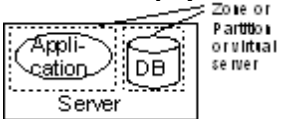| Topic	Application and Database sharing same physical server, not virtualized or partitioned.	Application and Database running on different virtual or in other way partitioned servers on same physical server	Application and Database on separated physical servers
Operating System License + Support	For 1 server (but might be more expensive because of more CPU's or higher server class)	For 1 server +	For 2 servers
Software for Virtualization, Partitioning or Zoning		dependent on operating system this might be a standard feature or feature at extra costs or an additional product	
Database Software Licenses Cost for CPU-Licenses and yearly repeating support and maintenance contracts for database server software	for all CPU's (example: 8) Note: Dependent on number of CPU's you might need to purchase more expensive "Enterprise" or "Data Centre"	depends on vendor's license policy	only for CPU's in database server (example: 4)
Application Software Licenses Cost for CPU-Licenses and yearly repeating support and maintenance contracts for Application and/or Application Server Software	(example: 8)	depends on vendor's license policy	only for CPU's in the application server (example: 6)
Total CPU-Licenses	16 (8 database + 8 application (-server)	depends on vendor's license policy	10 (4 database + 6 application (-server)
Advanced Filesystem Options	Might be more expensive on a server with more CPU's or in a higher server class.	depends on vendor's license policy	You might decide to reduce costs for additional licenses for advanced filesystem products / options by using those for the database server only.
License for Database Backup Agent (in addition to standard backup license)	Might be more expensive on a server with more CPU's or in a higher server class.	depends on vendor's license policy	Limited to database server

Technical Topics

Different Operating Systems

Topic	Application and Database sharing same physical server, not virtualized or partitioned.	Application and Database running on different virtual or in other way partitioned servers on same physical server	Application and Database on separated physical servers
Operating System Dependencies	The operating system and version must be supported by database vendor and application vendor.	The list of operating systems is limited to those supporting your hardware / CPU-type.	You might decide to use even different hardware / CPU types for application and database. **Even if your application vendor supports only one or very limited number of operating systems, you can continue to run the database on your favourite operating system.** Newest CPU's with highest clock speed require often a very new operating system version or patch level which is usually supported very soon by database server vendors but not by all application vendors. When using same operating system , you still can operate the database on a different version than the application.
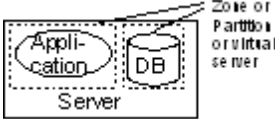
Network

A real load test is the most reliable method to identify the impact of the network between 2 different physical servers – in best case you might not see any performance difference on application level.

Topic	Application and Database sharing same physical server, not virtualized or partitioned.	Application and Database running on different virtual or in other way partitioned servers on same physical server	Application and Database on separated physical servers
Connectivity between Application and Database.	Local Interprocess-Communication possible.		Network Connection required (typical TCP/IP[1])

---

1   The processing of the TCP/IP stack is continuously improved and the CPU-overhead required is therefore decreasing.

Hardware

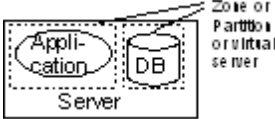| Topic	Application and Database sharing same physical server, not virtualized or partitioned.	Application and Database running on different virtual or in other way partitioned servers on same physical server	Application and Database on separated physical servers
Administration Overhead	1 Server	←	2 servers instead of 1
Total number of CPU's	8 CPU	→	can be higher 4 CPU's Database server + 6 CPU's Application Server 10 CPU's total
Server Class / Category	You might need to purchase a bigger model or server of a bigger class.	→	You might still remain in the smaller server category (e.g. "Work group" servers).
Hardware Costs			it depends – 2 small / medium servers of "Work group" class might be cheaper or more expensive than one server of "High-End" / "Enterprise" class.
High Availability (HA) considerations	8 CPU's Main Server + 8 CPU's Standby Server 16 CPU's Database server	8 CPU's Main Server + 8 CPU's Standby Server 16 CPU's Database server	4 CPU's Database server + 6 CPU's Application Server 6 CPU's Standby Server 16 CPU's total

Operations

Topic	Application and Database sharing same physical server, not virtualized or partitioned.	Application and Database running on different virtual or in other way partitioned servers on same physical server	Application and Database on separated physical servers
Application server needs to be rebooted.	Database will be shut down too. (And database cache will be lost too.)	← → depends on actual circumstances	You can keep the database running. This can be an advantage if you have direct database connections e.g. from interfaces and users connecting in client/server mode. You keep the database cache warm.
Administration Overhead	1 Server	←	2 servers instead of 1

Other
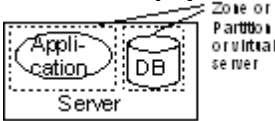
Topic	Application and Database sharing same physical server, not virtualized or partitioned.	Application and Database running on different virtual or in other way partitioned servers on same physical server	Application and Database on separated physical servers
The application or your customizations utilises a database feature to read from / write to non-database files (e.g. "utl_file") which need to be accessible by the application	not an issue.	←	You might require a NFS- or other shared filesystem for those directories
Kernel Parameters	cannot be optimized		Can be optimized for each server.

Scalability

Most servers allow adding of CPU up to a server-specific limit, e.g. 2, 4, 8 or 16 CPU's.

When your load increases over time and the last free CPU-sockets are filling up, you have following options:

	Advantage	*Disadvantage or other comments*
Replace the existing CPU's with newer, faster CPU's	In case of CPU-based licenses the number of CPU's stays constant	Newer CPU's might require newer operating system version.
Replace server with a bigger server which supports more CPU's	Simple	You need to purchase more licenses If the bigger server is classified in a higher server class, you should read Appendix A with some comments about server classes.
Add one more server. If you are currently running database and application on one server, the split should not be too difficult.	All advantages described before for the split-server architecture	The simple split from application and database on same server to 2 servers requires ome configuration changes, but those are usually well known and well documented. However, distributing the application across different servers, or the database across different servers isn't as simple as splitting application and database if the application was not explicitly designed for horizontal scalability.

Appendix A - Server Class / Category

High-End / Enterprise Servers offer many advantages, especially in the areas reliability, redundant components, scalability and flexibility.
If you are in the lucky situation of having experienced staff skilled in utilizing all the advantages and your standard architecture to use only partitions within enterprise server class hardware, you know the and benefit from those advantages and costs and you don't need to read this table.
But if you are considering to to introduce the first time a server of "Enterprise Computing" class, you should be aware about a few challenges of introducing this server class: In addition to the immediately visible costs (hardware and yearly maintenance) following factors should be considered:

Topic	
Internal Experience	• We are already using this high end server class and just need to add a partition / cell to it. • This would be our first installation of this server class. • We have <xx> employees with more than 2 / 5 years experience on this server type.
Experience of Service Provider hosting / operating the Servers	• The Service Provider employs <xx> employees with more than 2 years experience on this server type, and <yy> employees with more than 5 years experience on this server type. If the servers are in the customer's (your) data centre but operated by service provider: • From those employees above there are <z> employees working on those servers.
Vendor's Staff experience in your city / in your country	• The Vendor employs in your country / city <xx> employees with more than 2 years experience on this server type, and <yy> employees with more than 5 years experience on this server type. In case that your data centre is in a very remote / small country and you don't allow remote access then you might expect travel costs (and delay by visa procedures) for vendor's global support staff coming on site.
Costs for Experts	Are the costs for support- / consulting staff in the high end server class the same or higher? Even if vendor or service provider denies this, there is still the risk that for the high end server class all available staff is in a more senior job level and for this reason more expensive.
Employees	Trying to hire employees with hands on experience in the highest server class is more cumbersome, and those you find will apply for more senior positions.
Cheaper "Work group"-License types for operating system software are not available on high end servers.	
Cheaper "Work group"-License types for cluster software are not available on high end servers.	
Cheaper "Work group"-License types for database server software are not available on high end servers.	
Availability of spare parts for all components	. All spare parts are / will remain guaranteed on stock within the same city / within a region of <xxx> kilometres. ... Vendor promised overnight shipment (by air). ... Customs clearance usually takes <xx> days / <yy> weeks. ... All spare parts are within the country / customs union.

How Mercury Consulting Ltd. can help you

Mercury Consulting Limited (MCL) is a professional consultancy providing experience, support and training in IS/IT operations for companies during high-time-pressure startup phase and following consolidation phase, especially in the Telecom-market.

Our Services

All Services can be provided in German and English

http://www.mercury-consulting-ltd.com/services.htm

Database- and Application Capacity Management and Capacity Planning

Project Support: Requirements Definition, initial Sizing, Installation....

Service Level Management by ITIL ® Foundation certified expert

Systems Documentation

Writing your Operations Manual

Technology Selection for Disaster Recovery and Business Continuity

Database Administration

Database Tuning

Audit of Database Installations

Our Products

you can purchase online and immediately download at our eBook-Shop

Our Checklists and Templates will help you to ensure that good or best practice is not only known but consistently applied!

Database Independent Products

Product	*Benefit*
270 Non functional Requirements.	Requirements Template with 70 non functional requirements for selecting or developing robust, reliable, stable and manageable applications to meet the Service Level Agreements (SLA's). For external RFP's (Request for Proposal) and for internal development.
Checklist for Data Migration	65 important questions to identify and address or exclude typical migration pitfalls in an early phase of the project, thus ensuring the confidence for keeping the time plan.
Template: Systems- and Operations Handbook	Template to establish that documentation auditors like to see for each IT Application / IT-System.
Template "Data Centre Operations Manual"	Template to create an Operations Manual for a Data Centre, focusing on Data Centre Infrastructure.
Application & Server Inventory Template	This document assists in first step of gathering and classifying information about servers, applications and software.
Interface Checklist	Those questions which you need to ask before starting the development! Requirements, Checklist and Template for Planning, Defining and Documenting Application Interfaces.
Server Upgrade / Migration Checklist	This vendor- and operating system independent checklist deals with "big picture" and helps to evaluate all potential impact of upgrading a server, e.g. adding CPU's, replacing CPU's with faster CPU's , Operating System Upgrade, adding Storage or replacing a server with a newer, bigger model
Application Upgrade / Migration Checklist	Purpose of this document is to support • The decision making process of "should we upgrade now or later – or not at all?" • The impact analysis – identification of all internal and external dependencies. • The gathering of requirements for the upgrade. • The selection of the best upgrade approach ("In-Place Upgrade" or "New Installation"). • Providing input required for the Upgrade Planning.
Checklist for Production Release and System Handover	Checklist for small and medium projects focusing on non-functional aspects for operations team.

Product	Benefit
	Simple but effective!
Template for Outage Planning	This template with in-depth explanations of tasks required to plan outages on medium to large IT Systems will avoid that important steps are forgotten.
Application Retirement – Template and Checklist	Very often "Application Retirement" discusses the process of upgrading an application to a newer version or replacing by another similar product, emphasizing the benefits of upgrading and only minor focus on the decommissioning. This document deals solely with the "end of operations" / "decommissioning" of an obsolete IT application or old version of an upgraded / replaced application and addresses IT Organizations at maturity levels between 1 and 3, with highest benefit for those on level 2 striving to achieve level 3.
Backup SLA / OLA	Operations Level Agreement (OLA) with the Backup Team.
Decision Template for selecting Disaster Recovery (DR) Technology	This template helps you to define your individual DR-requirements and after explaining the four main technology groups to select the most suitable technology.
Business Requirements for Archiving and Purging	Template with Business Requirements for Archiving & Restore & Purging. Not removing old customer data can cause conflicts with privacy laws. **Business must act** and clearly specify what to purge and what to archive!
Application Health Check: Stability Assessment	Using this template to check your systems - and DOCUMENT the findings might show you even more potential issues beyond invalid objects.

Database Specific Products

Product	Benefit
Database SLA / OLA Template for Database Operations Level Agreement (OLA) / SLA	If a Service Level Manager needs to offer to Business a Service Level Agreement (SLA) for an End-to-End IS/IT-Service, he sign this SLA only after he arranged within IS/IT for each system or component used to provide this service an **Operations Level Agreement (OLA)** with the providing team or department. This document provides a template for such an Operations Level Agreement (OLA) for Oracle Databases containing the agreed values and for QA-purpose also the measures implemented to reduce the likelihood of violations of those agreed values. It does not only deal with availability, but contains also comprehensive service catalogue of advanced DBA services and a template for the Service Level Reporting (SLR).
Database Health Check - Part 1: Stability Assessment	Stability Assessment of your Oracle Database. Most Application- and Database-Crashes can be avoided when detecting early indicators and reacting to them. ***Be Proactive - Check Now!***
DBA and Application Support: Job Description and Self Assessment	Checklist to ensure that all 60 DBA-duties are assigned: System DBA, Development DBA and Application DBA versus Application Support If you have just a job role "DBA", but not a dedicated job role "Application DBA" those 19 duties must be explicitly assigned to either "Application Support" or to the "DBA" - otherwise they might not be executed! ***Detect unassigned tasks before an auditor reports them !*** This product addresses disputes between System DBA and Application Support (or, if existing, dedicated Application DBA) regarding the responsibility for the application's database objects.

Our free Whitepapers

http://www.mercury-consulting-ltd.com/wp/whitepapers.html

Whitepaper	Benefit and Description
The Importance of Application Level Monitoring.	Keeping your applications free from invalid objects is an important task, but does not guarantee error free operations. This free whitepaper explains the difference between "Application Level Monitoring" to "Database Monitoring" and "System/Server/OS"-Monitoring.
Important Facts about Redolog- and Archivelog in Oracle Databases for Change Managers and Application Support Staff	Understanding the topic "archivelog volume" can avoid unexpected troubles when applying changes or conducting upgrades. This awareness paper explains why Change Managers must ask questions about the archivelog volume created during changes and upgrades and why application support staff – and not only the DBA - must understand this topic.
The Danger of Invalid Database Objects	An awareness paper for Operations Managers and Application Support describing the problems and potential risks caused by invalid objects in an Oracle Database.
Private or Public Synonyms – or no Synonyms at all ?	A decision support paper visualizing the pro's and contras on a single page in tabular form and evaluating the arguments.
Transaction Log / Archive Log Volume	An "Awareness Paper" for Application Support / Application Operations, Operations Managers and Change Managers to avoid unplanned outages.
Split Database and Application on separate servers?	This white paper discusses several pro- and contra- arguments if you should separate application and database on different servers or not. Although this topic is not new you will be surprised about some of the arguments.

About the Author

The Author of this white paper is an

ORACLE®
Certified Professional

ORACLE®
10g Certified Professional

Foundation in IT Service Management

ISO 20000 certified Consultant and internal Auditor

ISEB certified IT-Architect

with 14 years experience as DBA and 7 years experience in projects with mobile telecommunication operators.