CTI Group, Inc.

Pre-Installation Guide

Analysis 7 1.10 Core

Product	Analysis 7
Product version	1.10
Doc Ref	MMA7PR
Doc Version	1.1
Doc Status	Published
Circulation	Commercial in confidence
Doc Size	68 pages

A trusted partner to an enviable tier 1 and tier 2 client base – including many of the world's leading telecommunications providers and billing system developers – *CTIG* has a long history of providing *Call recording, eBilling* and *Analytics solutions*.

© 2013 CTI Billing Solutions Limited ®

Trademarks and intellectual property rights

The *Analysis7 (A7)* solution utilises *Liferay*®, which is the intellectual property of Liferay Inc.® and is licensed from them in accordance with the standard ***GNU LGPL 2.1 licence agreement.*** [1]

A7's web service utilises *Apache™ Tomcat™* and *httpd* ® licensed under the terms described in ***Apache Licence (version 2.0).*** [2]

Microsoft® and *Windows*® are the registered trademarks of *Microsoft Corporation*.

Oracle® is a registered trademark of *Oracle*®.

The *A7* database requires an *Oracle Database*® (a registered trademark of *Oracle*) database management system.

Where *Single sign*-on *option (SSO)* operation is not in use, the *Lightweight Directory Access Protocol (LDAP)* directory server of choice is *OpenDS*®, which is a registered trademark of *Oracle*.

CTI hereby acknowledge all trademarks, intellectual property rights and copyrights associated with the pre-requisite technology upon which it is built; a full list of which is distributed with the *A7* software.

The support and maintenance of any pre-requisite technology remains the responsibility of the customer and should be conducted in accordance with the relevant supplier's recommendations and industry best practise. Explicit support and guidance will be provided only where specific provision must be made for *A7* functionality; as specified in the *A7* licence agreement.

All other product or service names mentioned in this document are the trademark or service mark of their respective companies or organisations.

External references

CTI is not responsible for the availability of any third-party references (for example, URL) contained within this document; it neither endorses – nor is liable for – any content, advertising or other material available via the supplied references. *CTI* is not liable for any loss or damage incurred – or alleged to have been incurred – by recourse to these references.

[1] See text version of the license at http://www.gnu.org/licenses/lgpl-2.1.txt
[2] See a text version of the Apache licence at http://www.apache.org/licenses/LICENSE-2.0.txt

Our contact address:
CTI Billing Solutions Limited
Daisyfield Business Centre
Appleby Street
Blackburn
United Kingdom
BB1 3BL

Tel: +44 0 1254 291500
Fax: +44 0 1254 291504
Email: info@ctigroup.com

Feedback on this document

We are always looking for ways to improve the support we provide to our customers. Your feedback is invaluable in enabling us to do so.

Comment on this document via the following email address:

documentation@ctigroup.com

Version	Status	Date	Author	Reason
1.1	Published	09/09/2014	Ian Bridge	Amended following feedback from A7 demo install.
1.0	Published	23/01/2014	Ian Bridge	Documents Analysis 7 v1.10 release

Preface

Document definition

Objectives

This document describes the requirements and pre-requisite actions that must be verified and completed before the installation of *Analysis 7 (A7)*can begin.

> Failure to complete these prerequisites may result in web service, application, or database errors.

A7 is typically deployed across three tiers, each of which has specific hardware and software requirements. Each tier is dependent on the other and we recommended that you build them in following sequence:

- Database
- Application
- Web tier

Audience

The installation of *A7* is necessarily a technical task and as such this document is aimed at systems engineers (for example, Database administrator (DBA) and technical support operatives).

> Further information on the required skill set is given in *A7 Pre-Installation Guide* (*Prerequisite knowledge and skill set*).

It is assumed therefore that you are proficient in using the concepts and features of:

- the operating system (*Linux* and/or *Microsoft Windows*);
- the database (*Oracle*);
- web architecture;
- network server configuration and management.

Things you'll need before you start:

- An understanding of the minimum software and hardware specifications – as described in *Minimum system requirements* (on page 6);
- Suitable file and database storage locations with sufficient free space – as described in *Disk storage requirements* (on page 8);
- The *CTI Group* software release – as used in *Deploy the software distribution ((Chapter 7, on page 12)*;
- The path to your *Oracle* database files – as used in Create the database *(Topic 8.2.3, on page 15)*;
- A download of *Oracle Database Client* – as described in *Download Oracle Database Client ((Chapter 8.2.2, on page 15)*; and – as used in Install Oracle Database Client *(Topic 9.2.5, on page 25)*.

Related documents

This document is part of the ***A7 documentation set***, which comprises:

Document title	Reference
Analysis 7 v1.10 Admin user guide	MMA7AUG
Analysis 7 v1.10 Data Limits Document	MMA7DLC
Analysis 7 v1.10 Data Description Document	MMA7DDD
Analysis 7 v1.10 Help desk guide	MMA7HDG
Analysis 7 v1.10 Installation Guide	MMA7INS
Analysis 7 v1.10 Operations guide	MMA7OPS
Analysis 7 v1.10 Pre-Installation Guide	MMA7PRE
Analysis 7 v1.10 Product Specification Core Back-office	MMA7BOPS
Analysis 7 v1.10 Product Specification Core Front-office	MMA7FOPS
Analysis 7 v1.10 Subscriber user guide	MMA7SUG

External resources

The section, Further reading, provides a list of links to reference information and external resources that you may find useful during the installation of *A7*.

Always use the document version applicable to your specific release of the software.

Document conventions

The following typographical conventions are used throughout this document.

Special notices

This symbol followed by green text enclosed in horizontal rules	Hints and tips on the process being described.
This symbol followed by red text enclosed in horizontal rules.	A warning about the process being described.
This symbol followed by blue text enclosed in horizontal rules.	Important note or supplementary information about the process being described.

Contextual indicators

Serif italics	Used to indicate a *cross-reference* to another CTI Group document or to another section of part of this document
Strong serif italics	Used to cite a reference to an ***external document,*** that is a non-CTI Group document
Sans-serif italic emphasis	Used to indicate a reference to an *entity name* within the application being described (that is, the name of a *panel*, a *screen*, or a *data* field). For example: The *Scheduled reports* tab, the *Main Menu*
`<Monospace in angled brackets>`	Used to indicate a `<token>`, for which you should substitute an actual value.

	For example `<profileName>` should be replaced by your profile name (`acme`) as allocated by CTI Group.
`Monospace text`	Used for the name of computer entities, such as a `filename` or a `/directory/path` name Also used to indicate `text` and `commands to be` entered. For example, 1. Input `My descriptive text` as **Description** 2. Input `sysadmin` as **Username**

`Monospace text on grey`	Used to show portions of code, scripts, or configuration files; and also multiple command line entries.
	For example:
	`cd /usr/`
	`mv myDirectory/ theirDirectory/`

Arial Narrow Italic - Grey	Used for table and figure caption text.
This symbol and bold text	This is used as a procedure header, which introduces a set of numbered instructions.
1. Numbered lists	Numbered lists are used exclusively for sequential instruction sets. They will usually be preceded by a procedure header.
Strong emphasis	Used to indicate one of the following on-screen elements, depending upon the context in which it appears: ▪ A **button** or **option** to be selected For example, click the button labelled Next to go to the next dialogue panel is simply: **Next** to continue ▪ Text to be typed For example: Type **This** ▪ A data field **Name** into which information is to be typed For example Input a **Description**
[Strong emphasis in square brackets]	Used to indicate a physical key (or button) to be pressed; for example the **[Enter]** key.

Standard tokens used throughout this document

Token Name	Description	Example value
`<API_aliasName>`	The alias name given to your *IIS* virtual directory.	`api-acme`
`<API_hostIP>`	Host IP address.	
`<API_hostName>`	The hosts resolved domain name (including port).	`api-acme:80`
`<API_hostPort>`	Host port number.	`80`
`<API_svcUserName>`	Login user name for the A7 *Windows* service.	
`<API_svcUserPassword>`	Login password for the A7 *Windows* service.	

Token Name	Description	Example value
<API_tomcat_installPath>	The *Apache tomcat* install path on the application server.	
<App_installPath>	The path to the directory in which the application software has been installed (extracted).	d:\acme-analysis-live
<App_poolName>	The name of the application pool created for API use.	AppPool_acme
<App_tablespace>	The name of the permanent tablespace created for *A7*.	
<App_tabSpcPath>	The path to the tablespace.	
<DB_GlobalName>	A global name refers to the full name of a database (including its domain) which uniquely identifies it from any other database; created by setting both the DB_NAME and DB_DOMAIN initialisation parameters.	DB-TNS-NAME AS SYSDBA
<DB_HOST>	The database host IP address or server name.	**localhost**
<DB_installPath>	Database binaries install path.	
<DB_SID>	The *Oracle* system identifier. SID automatically defaults to the database name portion of the global database name (acmeA7 in the example acmeA7.dbDomain.com); up to eight characters.	acmeA7
<DB_SID>	The *Oracle* system identifier. SID automatically defaults to the database name portion of the global database name (acmeA7 in the example acmeA7.dbDomain.com); up to eight characters.	acmeA7
<DBA_userName>	Database administrator (DBA) user name.	dba1
<DBA_userPassword>	DBA password.	dba1pass
<deployPath>	The path to the directory in which the distributed software files have been temporarily stored prior to deployment.	holdingArea
<liferay_tabSpcNm>	The name of the permanent tablespace created for *liferay*.	
<liferay_tmpSpcNm>	The name of the temporary tablespace created for *liferay*.	
<liferay_userName>	Login user name for the *Windows* service.	
<liferay_userPassword>	Login password for the *Windows* service	
<profileName>	Your profile name as allocated by *CTI Group*.	acme
<serviceName>	The name you give to your *A7* service.	A7acme
<tomcat_installPath>	The *Apache tomcat* install path on the web server.	<web_installPath>tomcat-5.5.27
<web_installPath>	The path to the directory in which the web UI software is (to be) installed (extracted).	/usr/local/liferay-portal-acme/
<web_serviceUser>	Linux user name for the *Apache tomcat* user.	A7acmeUser

LDAP related tokens [3]

Token Name	Description	Example value
<LDAP_Base_DN>	The top level of the LDAP directory tree is the base, which is referred to as the base DN. Typically this will be set to your <profileName>.	o=acme
<LDAP_GROUPS_DN>	Required LDAP group names	ou=Groups,ou=<profileName>,ou=Profiles,o=<profileName>
<LDAP_HOST_NAME>	Name or IP address of the LDAP host	LDAP://<LDAP_HOST_NAME>
<LDAP_listenerPort>	LDAP listening port	10389
<LDAP_PRINCIPAL_DN>	The User Principal DN (UPN), system user id .	**uid=analysis-ldap,cn=Administrators,cn=admin data**
<LDAP_USERS_DN>	Required LDAP user names	ou=Users,ou=<profileName>,ou=Profiles,o=<profileName>
<OpenDS_installPath>	*OpenDS* install path	

System variables

Token Name	Description	Example value
JAVA_HOME	Standard variable name giving the path to the Java base directory.	
JRE_HOME	Standard variable name giving the path to the Java run time environment directory.	c:\Program Files\Java\jrel_6.0
ORACLE_HOME	Standard variable name giving the path to the *Oracle* base directory.	

[3] Required only where a LDAP solution is being implemented.

Contents

Table of Contents

Table of Figures

Table of Tables

Part one

Pre-requisites

1. Prerequisite knowledge and skill set

In order to install *A7* and integrate it within your operational environment you and/or your chosen service provider will require access to technical knowledge and expertise covering all of following areas.

Computer operating systems

Proficiency in installing and configuring software, databases and networks in each of the following environments is needed.

- *Linux (for example, Red Hat Enterprise Linux 5.3 64-bit)*
- *Windows Server 2008 R2 Standard (x64)*

Databases

You will need to be proficient with the terminologies and methods used in the management and administration of *Oracle Database*; including capacity management, performance tuning and data security. During the installation you will use the following tools:

- *Oracle Database Client*
- *Oracle Database Configuration Assistant*
- *Oracle Universal Installer*
- *Oracle Net Configuration Assistant*

Networks

- Firewall configuration on both *Linux* (`iptables`) and *Windows* platforms.
- Network service administration and management including the ability to :
  - Configure middleware such as *Apache web server* and *Apache tomcat*;
  - Create, configure and manage *IIS* services for both web and *SMTP* traffic;
  - Configure and administer proxy servers.

Applications

- Liferay Portal 5.2.3 portal

  You will need a basic knowledge of the role this plays in the end-to-end process and the ability to install and configure web software.
- **[Optionally]** A *Lightweight Directory Access Protocol (LDAP)* directory service such as *OpenDS 1.2* [4].

  Unless you are using a *Single sign-on option (SSO)* solution, you will need to know how to install and manage a *LDAP* server; or (if you are an existing *LDAP* user) how to integrate a new service with your *LDAP* server.

Throughout this document mention is made to installing *OpenDS*. You need only do this if you do not currently use *LDAP* and are not implementing *A7* with a *SSO* solution.

Other technologies or methodologies

- *Automatic Storage Management (ASM)*;
- *Logical Volume Manager (LVM)*;

[4] This is not necessary if you plan to use an existing LDAP service or a SSO solution.

- *Storage Area Network (SAN)*;
- *Oracle Optimal Flexible Architecture ® (OFA)*;
- Cross-platform operations, methods and tools (for example, Telnet, SSH, Remote terminal, SFTP, SCP).

Tasks that will need to be undertaken in this phase include

- Size, plan and procure the appropriate network servers;
- Build, configure and commission each server appropriate to their designated role;
  - On the database server:
    - If not already an *Oracle Database* user then install and commission an operational *Oracle Database* environment;
    - Prepare and initialise the database for *A7* as described in *Creating and configuring your Oracle Database* (on page 13) including creation of tablespace and users;
    - Test that the database server is operational and resolve any issues;
    - Implement an ongoing operational process of database administration and management to ensure optimal performance of the *A7* database.
  - On the application server:
    - Use `inetmgr` to create an *IIS 6* server for outgoing emails;
    - Install and configure *Oracle Database Client*;
    - Install and configure *OpenDS* [5];
    - Install and configure the A7 software, integrating with Oracle Database, *OpenDS* and *IIS*;
    - Install and configure *Apache tomcat* (if using *A7 Scheduled Reports*);
    - Test application server is operational and resolve any issues.
  - On the web server:
    - Ensure *httpd 2.2* and *Sun JAVA JRE 1.5* are available and configured;
    - Configure *httpd* and proxy servers;
    - Install and configure the *Liferay Portal* and *A7* software;
    - Configure *Apache tomcat* for *A7*;
    - Define and configure web service daemon;
    - Test web server is operational and resolve any issues.

[5] This is not necessary if you plan to use an existing LDAP service or a SSO solution.

2. Design and Planning Considerations

This section introduces the elements you should be considering when designing and planning the server configuration to deliver an operational *A7* solution.

2.1. Performance and Resilience

System resilience is a core design criteria, with components often requiring more than one physical piece of equipment to deliver the required performance and resilience levels.

2.1.1. Database tier considerations

To build-in N+1 redundancy the database tier should consist of two physical servers running *Oracle Database* Enterprise edition. The first being the dedicated operational DB server, and the second being a warm standby server [6].

2.1.2. Application tier considerations

The standard application tier consists of one physical server running *Windows Server 2008 R2 Standard (x64)* and .NET framework.

2.1.3. Web tier considerations

The web tier comprises one or more physical servers. Each server runs one or more sets of the following software:

- *Linux (for example, Red Hat Enterprise Linux 5.3 64-bit)*
- *Apache tomcat 5.5.27 64-bit*
- Liferay Portal 5.2.3.

Each set is capable of supporting around 125 concurrent users.

Therefore to support 1,000 concurrent users would require eight sets spread across one or more physical servers.

2.1.4. Network considerations

Ensure that the application server and database server are separated by no more than a single network hop.

To service 1,000 concurrent users *CTI Group* recommend that four *Megabit* uncontended bandwidth is provided for the system, which will also require two firewall segments:

- a DMZ segment, which will cater for the web tier;
- a data segment, which will cater for the remainder of the system traffic.

Provision and maintenance of the firewall is the responsibility of the hosting service-provider. So, for example, if you have opted for the managed service solution then this will be within the remit of *CTI Group*.

[6] Powered on, but not connected to the data store.

2.2. Estimating Oracle Database storage requirements

The main elements to consider when sizing your solution are:

- The number of subscriptions to be serviced;
- The expected number of *Call Detail Record (CDR)* to be processed monthly;
- The number of organisational-units (for example, Groups) to be used in *A7* reporting.

When estimating how much disc space is required for the *Oracle* database to hold a year's worth of data:

- Allow 2 KB per *CDR*;
- Allow 480 KB per subscription [7];
- Allow 20 MB per reporting group [8].

Other requirements

You will also need to allow disc space for:

- Logging, data backup and archiving functions, in accordance with corporate policies on business continuity, data security and data retention;
- Software and application workspace as described in *Disk storage requirements* (on page 8);
- Test environments.

Example calculation

Company-A estimate that during the next 12-month period they will have one million subscriptions, generate 100 million *CDR* per month and have an organisational structure with up to 1,000 groups. The results of their sizing calculations are shown in *Table 1 (below)*.

Table 1: Sizing calculation results

Sizing element	Volume	Storage Constant	Space Required (GB)
CDR usage	1,200,000,000	2 KB	2,400
subscription usage	1,000,000	480 KB	480
Group usage	10,000	20 MB	200
Oracle contingency		25%	770
Total space required (GB)			3850 ***(3.85 TB)***

[7] This figure is for zero or one multi-play channels. Each additional multi-play channel will require a further 240 KB disk space per associated subscription.

[8] This figure is for zero or one multi-play channels. Each additional multi-play channel will require a further 10 MB disk space per associated reporting group.

3. Minimum system requirements

Hardware

Table 2: Hardware requirements per server

	Database server	Application server	Web server
Processor	Intel Dual Quad core Xeon	Intel Dual Quad Core Xeon, .	Intel Quad-Core
Memory	64 GB	32 GB	16 GB
Storage	2x 300 GB SAS RAID 1 Plus external storage to meet data needs.	2x 300 GB SAS RAID 1 Plus external storage to meet data needs.	2x 146 GB SAS RAID 1
Operating System	Linux 64-bit server, for example, *Red Hat Enterprise Linux 5.3 64-bit*	Windows 64-bit server, for example, *Windows Server 2008 R2 Standard (x64)*	Linux 64-bit server, for example, *Red Hat Enterprise Linux 5.3 64-bit*
Additional	Dual-channel Fibre HBA	Dual-channel Fibre HBA	

Software

Support for Oracle 10G is revoked at this release

All software must be installed and operational

Table 3: Software dependencies per server

Database server	▪ Linux 64-bit server, for example, *Red Hat Enterprise Linux 5.3 64-bit* ▪ *Oracle Database (11G R2)* with Unicode (AL32UTF8) Unicode 3.1 UTF-8 Universal character set
Application server	▪ *Windows Server 2008 R2 Standard (x64)* ▪ *Oracle Database Client 11G R2* The Oracle Database client used to connect to Oracle 11G R2 has a dependency upon Visual C++ 2010 runtime DLLs. If you do not have them then install the *Microsoft Visual C++ 2010 Redistributable Package* (`vcredist_x64.exe`) which can be downloaded from http://www.microsoft.com ▪ {*Oracle Data Provider for .NET 2.0 11G R2*} ▪ *IIS* 7.0 & *ASP.NET* ▪ *IIS* 6.0 (for *SMTP*) ▪ *Microsoft* .NET Framework 3.5 service pack 1 ▪ *jqPlot – see:* ***http://www.jqplot.com/*** ▪ *Java runtime version 6.0 64-bit*
Web server	▪ *Linux (for example, Red Hat Enterprise Linux 5.3 64-bit)* ▪ *Apache web server httpd 2.2* with mod_proxy ▪ Apache Tomcat 5.5.27 64-bit ▪ Liferay Portal 5.2.3 ▪ *Sun JAVA JRE 1.5*

	▪ *Sun JDK* 1.15 ▪ *.netCHARTING v7.0* [9]
LDAP server [10]	▪ *Windows Server 2008 R2 Standard (x64)* or *Linux (for example, Red Hat Enterprise Linux 5.3 64-bit)* ▪ *Java runtime version 6.0 64-bit* ▪ *OpenDS 2.2.1*

[9] Only if old charting tool to be used
[10] Required only where a LDAP solution is being implemented.

4. Disk storage requirements

A *Storage Area Network (SAN)* is recommended for data storage when deploying *A7* ; for resilience and performance purposes.

The *SAN* must be tuned for *Oracle* performance, including the use of *Automatic Storage Management* ® *(ASM)*. A fibre channel architecture is also recommended.

4.1. Database server disk space

Configure the two physical disks as a RAID-1 mirror providing 300 GB of storage.

It is assumed that all *Oracle* data files are stored on external storage in a configuration compatible with *Oracle Optimal Flexible Architecture* ® *(OFA)* guidelines (that is, under mount points named for example `/U01`, `/U02`, `/redo`, or `/arc) and that` *Oracle* binaries are stored under `/usr/app/oracle`.

Table 4: Web server disk storage requirements

Pn	Mount	FS	Size
0	/	UFS	15 GB
1	Swap	Swap	2 x RAM
2	Backup	n/a	n/a
3	/var	UFS	15 GB
4	Unassigned	UFS	
5	/opt	UFS	20 GB
6	/usr	UFS	25 GB
7	/export/home	UFS	25 GB

4.2. Application server disk space

Configure two physical disks as a RAID-1 mirror providing 300 GB of storage.

Longer term data archiving will require additional external storage.

Table 5: API server disk storage requirements

Pn	Type	Purpose	Size
0	Primary	System	300 MB
1	Primary	*Windows*	60 GB
2	Extended Logical	Application	40 GB
3	Extended Logical	Data	200 GB (whole disk)

4.3. Web server server disk space

Configure the two physical disks as a RAID-1 mirror providing 146 GB of storage.

The majority of space is assigned to the `/usr` partition. This is where the portal application files are stored and the log files are currently written, so it is sized to allow for upgrades or additional portal instances.

Table 6: Web server disk storage requirements

Volume	Mount	FS	Size
0	/		10 GB
LogVol01	`/tmp`	ext3	4 GB / 4,096 MB
LogVol02	`/var`	ext3	10 GB / 10,240 MB
LogVol03	`/home`		15 GB / 15,360 MB
LogVol04	`/usr`		55 GB / 56,320 MB
LogVol05	`/boot`		250 MB
LogVol06	`swap`	swap	2 x RAM

Use of *Logical Volume Manager* is optional; it can be implemented when required

To store all log files in `/var` partition, increase the size of `/var` accordingly.

5. Physical Architecture

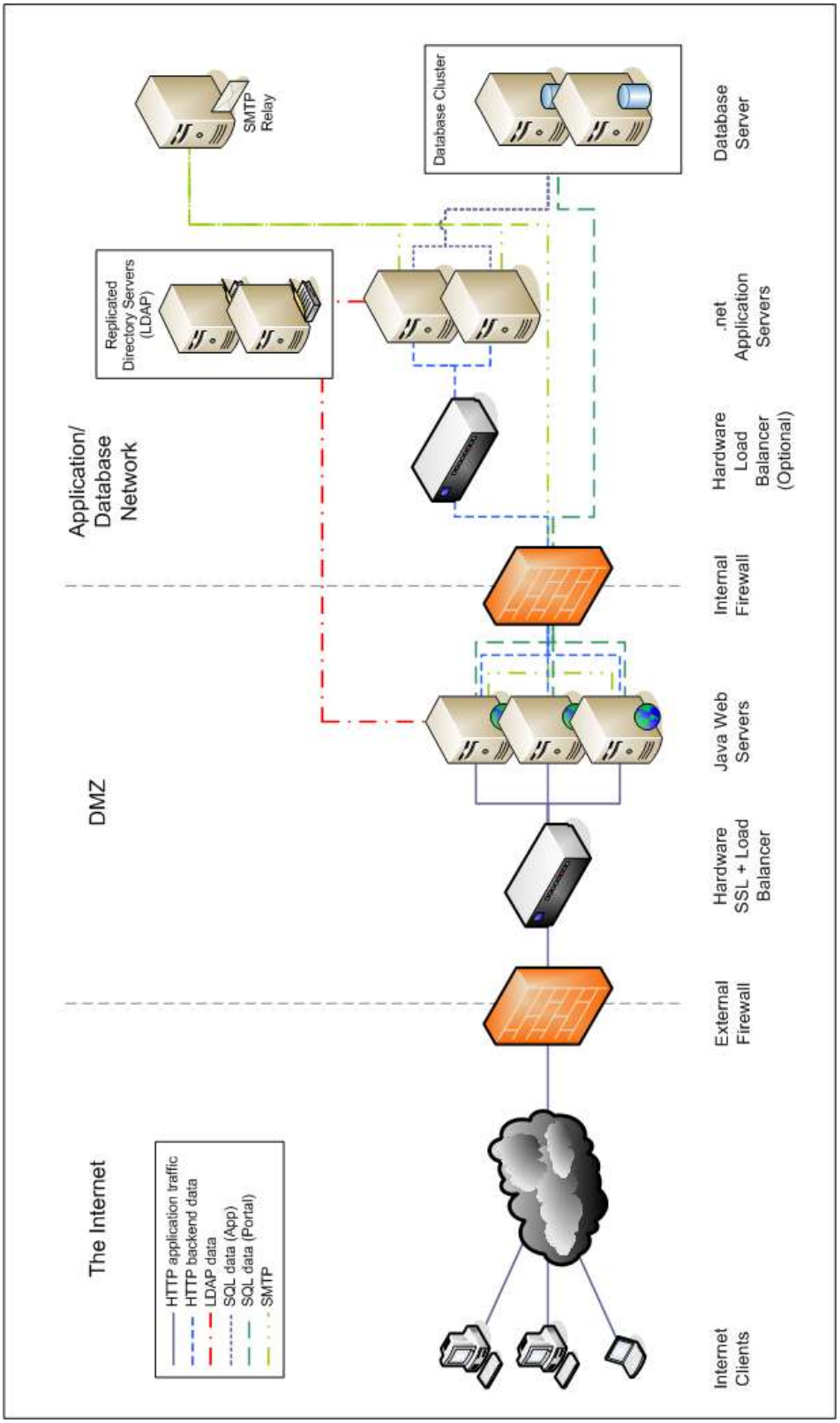


Figure 1: An example of a typical physical architecture for A7

6. Logical architecture

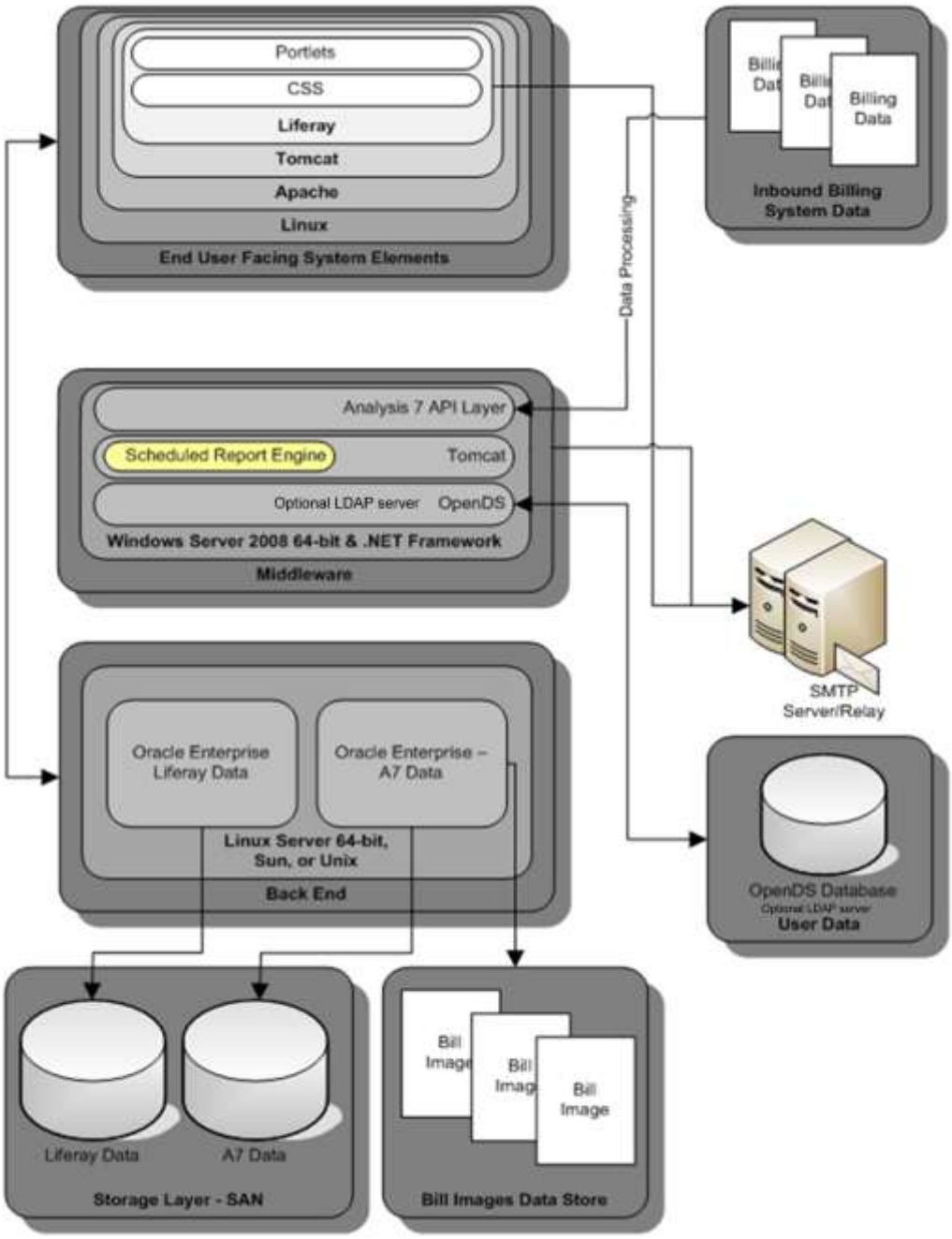


Figure 2: A7 logical architecture

Part two

Preparatory work

7. Deploy the software distribution

The *A7* deployment typically comprises three `zip` files shipped securely to a designated customer server via *Secure File Transfer Protocol (SFTP)*. The deployment consists of core *A7* software, plus customer specific branding and configuration settings.

Installation is supported on 64-bit machines running *Linux (for example, Red Hat Enterprise Linux 5.3 64-bit)*, *Windows Server 2008 R2 Standard (x64)* and *Oracle Database (11G R2)* or above).

Table 7: A7 deployment files

File name	Contents	Server
`Analysis-<profileName>-API.zip`	*A7* API and data processor	*Windows*
`liferay-<profileName>.zip`	*Liferay Portal* and *A7* branding	Web
`tomcat-<profileName>.zip`	Batch scheduled reporting engine	*Windows*

Save the distributed files in a temporary location that is easily accessible to all servers during the installation process. Throughout this document you will see this location referred to as the `<deployPath>`.

If you do not have an existing *LDAP* [11] server then download a copy of *OpenDS* from the *OpenDS* web site [12] and store it in the same `<deployPath>` location.

The *LDAP* server commonly shares the same physical server platform as the API server.

[11] Required only where a LDAP solution is being implemented.
[12] http://www.opends.org/promoted-builds/2.2.1/

8. Preparing the database server

8.1. About this chapter

8.1.1. Objectives

This chapter outlines the configuration actions necessary to get your *A7* and *Liferay Portal* databases ready for use in your *Oracle* database environment, which must already exist.

Further reading:

- Oracle Database – release notes for Linux
- Oracle Database 11G – documentation library
- Oracle Database – 2 day DBA Guide (11G)
- Oracle Database – managing DBCA templates
- Oracle Database – creating a database with DBCA
- Oracle Database – Administrator's Guide
- Oracle Database – backup and recovery guide

8.1.2. Considerations

The instructions below show the configuration parameters to be provided to the *Linux* version of *Oracle Database DBCA*, (which is normally located in `ORACLE_HOME/bin`).

Installation of the *Oracle* binaries and the *Oracle Database* environment is outside the scope of this document. You should consult the manufacturer's documentation for installation instructions relevant to the version of *Oracle* you are using.

Proceed to the next step in the installation only when you have created an operational *Oracle Database* environment ready for *A7*

Refer to the guide *Oracle Database – 2 day DBA Guide (11G)* referenced in *Further Reading* above for details on how to use *DBCA* for your specific release and operating environment.

The supplied *A7 DBCA* template [13] pre-configures many of the options that can be set during this database creation stage, however you will need to check and where necessary adjust them during the process. This applies particularly to the database file locations as they are likely to differ on your specific *Oracle* installation.

Once the database configuration is complete use the *SQL* script examples in *Create A7 tablespace* (on page 17) to:

- Create tablespaces for *A7* and *Liferay Portal*;
- Create a *liferay* database user with appropriate database access permissions.

You should run the scripts via an appropriate database connection tool (for example, *Oracle SQL Developer* ®, *Oracle SQL*Plus* ®, or *Oracle Enterprise Manager* ®).

8.1.3. Prerequisite tasks

Before continuing with the instructions in this chapter you should ensure that you have:

- Satisfied the minimum system requirements.
- Access to an operational *Oracle Database* environment with sufficient monitored free space for the *A7* data;

[13] This may not be supplied, depending upon the release number of Analysis7 being installed. If it is not you should enter the default DBCA values indicated in this document.

- Configured the database listener using, for example, *Oracle Net Configuration Assistant* (*NetCA*).

8.1.4. Prerequisite knowledge

Token Name	Description	Example value
<App_tablespace>	The name of the permanent tablespace created for *A7*.	
<App_tabSpcPath>	The path to the tablespace.	
<DB_GlobalName>	A global name refers to the full name of a database (including its domain) which uniquely identifies it from any other database; created by setting both the DB_NAME and DB_DOMAIN initialisation parameters.	DB-TNS-NAME AS SYSDBA
<DB_HOST>	The database host IP address or server name.	**localhost**
<DB_installPath>	Database binaries install path.	
<DB_SID>	The *Oracle* system identifier. SID automatically defaults to the database name portion of the global database name (acmeA7 in the example acmeA7.dbDomain.com); up to eight characters.	acmeA7
<DB_SID>	The *Oracle* system identifier. SID automatically defaults to the database name portion of the global database name (acmeA7 in the example acmeA7.dbDomain.com); up to eight characters.	acmeA7
<DBA_userName>	Database administrator (DBA) user name.	dba1
<DBA_userPassword>	DBA password.	dba1pass
<deployPath>	The path to the directory in which the distributed software files have been temporarily stored prior to deployment.	holdingArea
<liferay_tabSpcNm>	The name of the permanent tablespace created for *liferay*.	
<liferay_tmpSpcNm>	The name of the temporary tablespace created for *liferay*.	
<liferay_userName>	Login user name for the *Windows* service.	
<liferay_userPassword>	Login password for the *Windows* service	
<profileName>	Your profile name as allocated by *CTI Group*.	acme

8.2. Creating and configuring an Oracle Database

8.2.1. Configure firewall ports

You must ensure the following firewall ports are open prior to commencing the installation of *A7*.

Table 8: Database server file wall configuration

Source	Dest.	Port	Desc.	Purpose
Java server	DB server	1521	Oracle	*Liferay Portal* DB Java access

Load balancing and clustering may require additional port configuration.

8.2.2. Download Oracle Database Client

You will need to locate and download the appropriate version of *Oracle Database Client* for your site. This will be used in *Install Oracle Database Client* (on page 25).

Release	Version	URL
11G Release 2	Oracle Database (*11G R2*) 10204_vista_w2k8_x64_production_client.zip	http://www.Oracle.com/technetwork/database/10204-winx64-vista-win2k8-082253.html
11g Release 2	Oracle Database (*11G R2*) for Microsoft *Windows Server 2008 R2 Standard (x64)* Win64_11gR2_client.zip	http://www.Oracle.com/technetwork/database/enterprise-edition/downloads/112010-win64soft-094461.html

Store the download in `<deployPath>` for now .

8.2.3. Create the database

1. Extract the file `A7_`tempate from within the `zip` file `<deployPath>/Analysis-<profileName>-API.zip`
2. Copy the extracted file to the directory:
   `ORACLE_HOME/Assistants/dbca/Templates`
3. At the *Linux* command line, input the following command:
   `dbca` [Enter]
   The panel *Welcome* is displayed.
4. Work through each *DBCA* option in turn providing the information described below:

Option	Actions
Welcome	**Next** to continue
Operation	Select **Create a Database** **Next** to continue
Database template	Select the template **A7_template** from the list presented. *[Alternatively]* If no *A7* specific option is available, select the 'General purpose or transaction processing' template. **Next** to continue
Database identity	Input `<DB_GlobalName>` name (for example, `<DB_SID>.dbDomain.com`) as **Global Database Name** **Next** to continue

Option	Actions
Management options	From the tab *Oracle Enterprise Manager*: 1. Select **Configure Enterprise Manager** 2. Select **Configure Database Control for Local Management** 3. *[Optionally]* Configure email details to receive notification of database alerts: ▪ Select **Enable alert notifications** ▪ Input IP address of the mail server as **Outgoing mail (SMTP) server** ▪ Input email address to be notified as **Recipient email address** 4. *[Optionally]* Configure a daily backup of the database: ▪ Select **Enable daily disk backup to recovery area** ▪ Select **Backup start time** ▪ Input the login details of the user to run the backup job as **05 Username** and **06 Password** 5. **Next** to continue
Database credentials	1. Select **Use the Same Administrative Password for All Accounts** *[Alternatively]* Select **Use Different Passwords** and the user `<DBA_userName>` 2. Input `<DBA_userPassword>` as **Password** and **Confirm Password** for user `<DBA_userName>`. 3. **Next** to continue
Storage options	Select one of the following options in line with your *Oracle* database environment: ▪ **File System** — This default option creates database files that are managed by the operating system's file system. ▪ *Automatic Storage Management* — Enables you to define disk groups to be automatically managed by *Oracle Database*. ▪ **Raw Devices** — Enables you to manage your storage devices outside of the operating system file system using unformatted physical disk space; primarily used in *Oracle RAC* (*Real Application Clusters*) environments. If you are not certain about which option to use, select **File System**. **Next** to continue
Database file locations	Select one of the following options: ▪ **Use Database File Locations from Template** This option tells *DBCA* to use the file location specified in the template. ▪ **Use Common Location for All Database Files** This option requires you to specify a new directory for the `ORACLE_HOME`. All the database files are created in this location. ▪ **Use Oracle Managed Files** This option instructs *Oracle Database* to directly manage the files that make-up the *Oracle* database. ▪ You specify a default location, called a database area, for all your files and thereafter *Oracle Database* automatically creates and deletes files in this location, as required. ▪ Selecting this option enables you to delegate the complete management of database files to the *Oracle* database; you no longer have to specify the file names, their location, or their sizes. **Next** to continue
Recovery configuration	**Check** the location of the **archive files** and where necessary amend to match your installation of *Oracle*. *[Optionally]* Specify flash recovery if required. **Next** to continue
Database content	**Next** to continue

Option	Actions
Initialisation parameters	If necessary adjust the site specific initialisation parameters. **Next** to continue
Security	Select the default option **Keep enhanced security settings** **Next** to continue
Automatic maintenance tasks	*[Optionally]* select to automatically run: ▪ Automatic Optimizer Statistics Collection ▪ Automatic Segment Advisor ▪ Automatic SQL Tuning Advisor ℹ See *Oracle Administrators Guide* for further details. **Next** to continue
Database storage	Ensure the specified file locations match your installation of *Oracle*; amend as necessary. ✪ If you selected a preconfigured template you will not be able to add or remove files. You will be restricted to amending their location details. **Next** to continue
Create	1. Select **Create Database** *[Alternatively]* Select **Generate Database Creation Scripts** to speed-up any rebuild process. 2. **Finish** to exit the option selection phase. 3. Review the *Create Database Summary information* and **OK** to continue.
Completion	ℹ The panel is updated to show the progress of the database creation process. **Exit** to leave *DBCA* once the setup is complete.

8.2.4. Create the tablespace

✪ Use SMALLFILE as your `<dbFileType>` unless explicitly advised otherwise by *CTI Group*.

1. Create *A7* tablespace:

```
CREATE <dbFileType> TABLESPACE <App_tablespace>
DATAFILE <App_tabSpcPath> SIZE 1024M REUSE
AUTOEXTEND ON
NEXT 1024M
EXTENT MANAGEMENT LOCAL
SEGMENT SPACE MANAGEMENT AUTO;
```

2. Create *liferay* tablespace

```
CREATE TABLESPACE <liferay_tabSpcNm>
DATAFILE <liferay_tabspcPath> SIZE 1024M REUSE
AUTOEXTEND ON
NEXT 1024M
EXTENT MANAGEMENT LOCAL
SEGMENT SPACE MANAGEMENT AUTO;
```

3. Create *liferay* temporary tablespace

```
CREATE TEMPORARY TABLESPACE <liferay_tmpSpcNm> TEMPFILE
<liferay_tmpspcPath> SIZE 1024M
AUTOEXTEND ON
NEXT 100M MAXSIZE 22528M;
```

4. Create a *liferay* database user

```
CREATE USER <liferay_userName> IDENTIFIED BY <liferay_userPassword>
DEFAULT TABLESPACE <liferay_tabSpcNm>
TEMPORARY TABLESPACE <liferay_tmpSpcNm>
PROFILE DEFAULT;
```

5. Grant *liferay* database access permissions:

```
GRANT CONNECT,RESOURCE TO &<liferay_userName>;
```

8.3. Ongoing database management

The installation, management and ongoing maintenance of the *Oracle* system and database is the responsibility of the service-provider hosting *A7* and must be conducted in accordance with the manufacturer's instructions and industry best practise.

As a minimum this means implementing a basic operational policy that ensures:

- regular backups are taken and secured;
- the system is run in `Archivelog` mode;
- performance is monitored and optimised;
- the ongoing availability of free space is monitored and managed to avoid exceeding the 80% full threshold.

9. Preparing the API server

9.1. About this chapter

Further reading:
- IIS 7, configuring
- SMTP, configuring relays
- *Oracle Database Client Quick Installation Guide*

9.1.1. Objectives

This chapter describes the tasks to be completed on the application server before installing the *A7* API tier.

9.1.2. Considerations

In order to use *A7* you will need to:

- Configure roles, features, and role services for *IIS* 7.0 with *ASP.NET*, which is done via *Windows Server Manager;*
- Configure the application event log;
- Configure *IIS* 6.0 for the *SMTP* relay;
- Install and configure the *Oracle Database Client*;
- Install and configure *Java runtime version 6.0 64-bit* (if necessary);
- Install and configure a *LDAP* server [14].

9.1.3. Prerequisite tasks

Before continuing with the instructions in this chapter you should ensure that you have:

- Granted all of your *A7* application servers relay permissions to the upstream external email server;
- Obtained and read the specific release notes and instructions for installing *Oracle Database Client* for your Oracle version;
- Downloaded the appropriate version of *Oracle Database Client* for your Oracle version.

9.1.4. Prerequisite knowledge

Before working through instructions in this chapter ensure that you know the following information:

Token Name	Description	Example value
<DB_GlobalName>	A global name refers to the full name of a database (including its domain) which uniquely identifies it from any other database; created by setting both the DB_NAME and DB_DOMAIN initialisation parameters.	DB-TNS-NAME AS SYSDBA
<DB_HOST>	The database host IP address or server name.	**localhost**

[14] Required only where a LDAP solution is being implemented.

Token Name	Description	Example value
<DB_SID>	The *Oracle* system identifier. SID automatically defaults to the database name portion of the global database name (acmeA7 in the example acmeA7.dbDomain.com); up to eight characters.	acmeA7
<OracleClient_Installpath>	The install path of the *Oracle Database Client* software.	
<SMTPhostIP>	The IP address of your SMTP mail server.	[192.168.10.28]
<SMTPhostName>	The domain name of the SMTP mail server to be used.	smtp.acme.com
<SMTPport>	The port number to be used for SMTP traffic.	25

In addition you need to know the TCP port number to be used; by default this is 1521.

If you are installing *OpenDS* then you will also need to know:

Token Name	Description	Example value
<LDAP_Base_DN>	The top level of the LDAP directory tree is the base, which is referred to as the base DN. Typically this will be set to your <profileName>.	o=acme
<LDAP_GROUPS_DN>	Required LDAP group names	ou=Groups,ou=<profileName>,ou=Profiles,o=<profileName>
<LDAP_HOST_NAME>	Name or IP address of the LDAP host	LDAP://<LDAP_HOST_NAME>
<LDAP_listenerPort>	LDAP listening port	10389
<LDAP_PRINCIPAL_DN>	The User Principal DN (UPN), system user id .	**uid=analysis-ldap,cn=Administrators,cn=admin data**
<LDAP_USERS_DN>	Required LDAP user names	ou=Users,ou=<profileName>,ou=Profiles,o=<profileName>
<OpenDS_installPath>	*OpenDS* install path	

9.2. Installing and configuring API prerequisites

9.2.1. Configure firewall ports

Open the following firewall ports prior to commencing the installation of *A7*.

Load balancing and clustering may require additional port configuration.

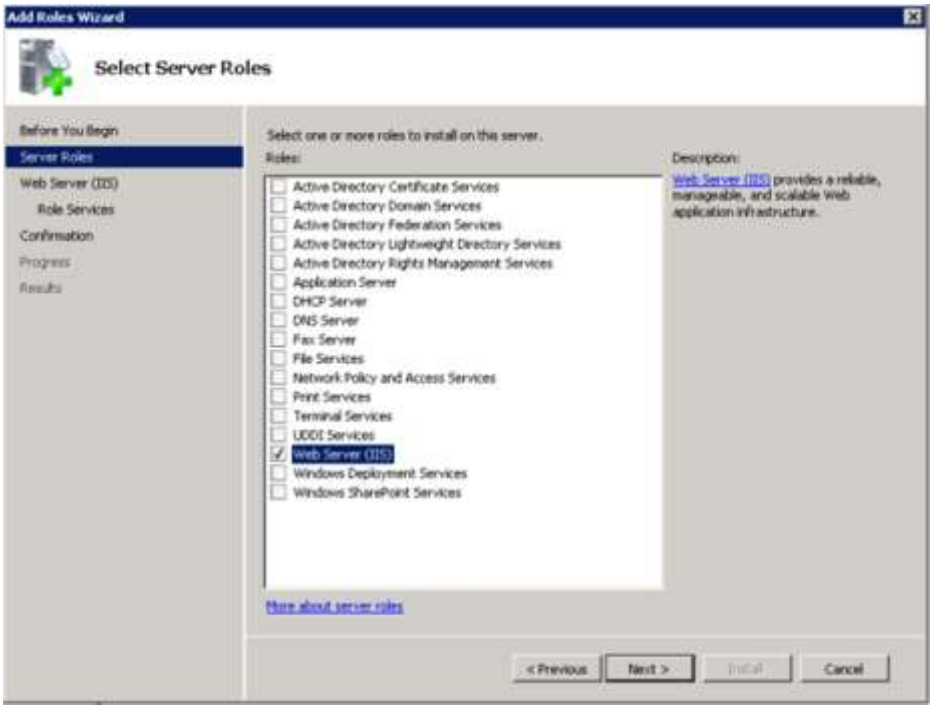
Table 9: API firewall configuration

Source	Dest. Srvr	Port	Desc.	Purpose
Java server	App	25	*SMTP*	Mail relay (in)
App server	*SMTP*	25	*SMTP*	Mail relay (out)
App server	*LDAP* [15]	10389	*LDAP*	liferay *LDAP* access

9.2.2. Define IIS roles and role services

1. Within *Windows > Start Menu*, navigate to *All Programs > Administrative Tools > Server Manager*, select **Roles**
2. Select **Add Roles**
3. **Next** to continue

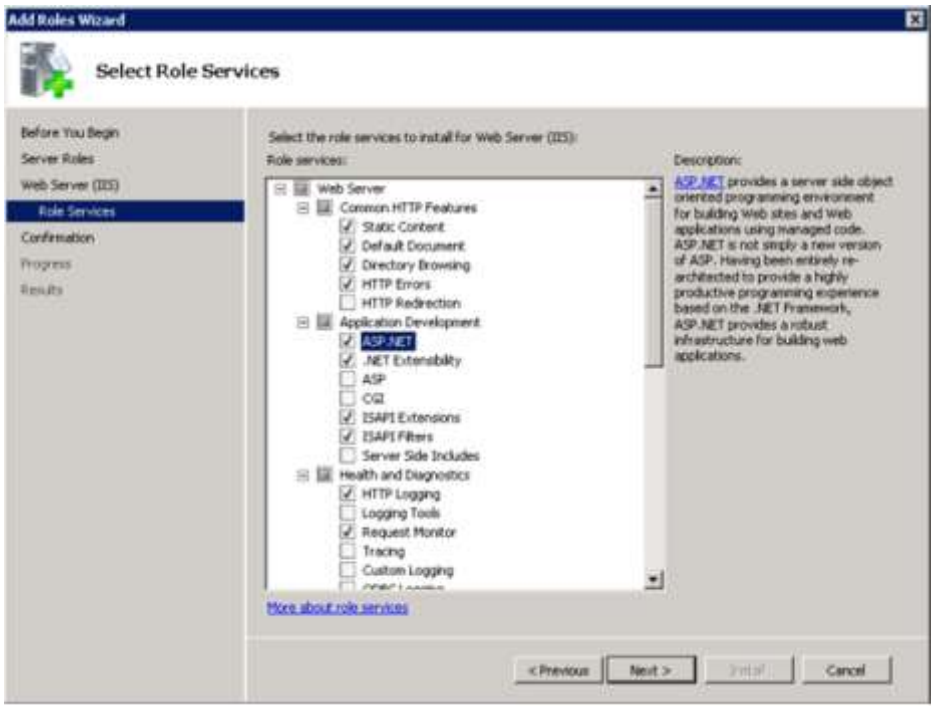
   The panel *Select Server Roles* is displayed



4. Within *Server Roles*, select **Web Server (IIS)**
5. **Next** to continue

[15] Required only where a LDAP solution is being implemented.

The panel *Select Role Services* is displayed.



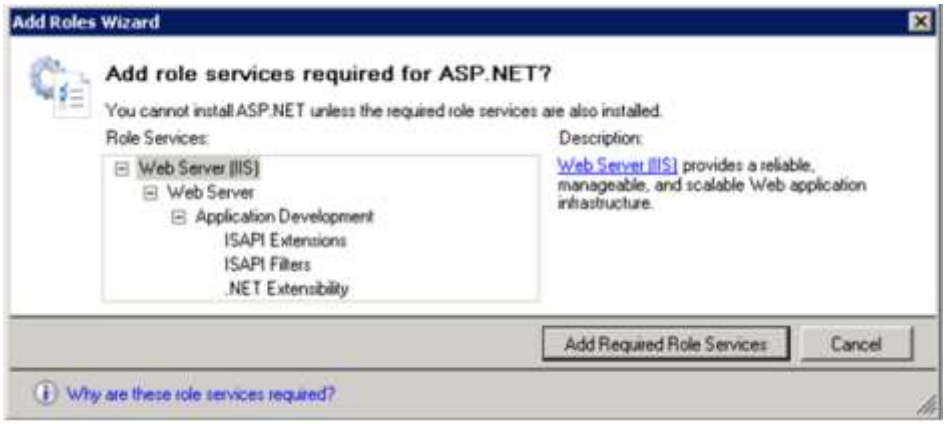
6. Within the panel *Select Role Services*, select the following role services:

> You may be prompted to install additional required services when making the selection; this will occur only where dependent services are not already installed.

Option	Value or selection
Common HTTP Features	▪ **Static Content** ▪ **Default Document** ▪ **HTTP Errors**
Application Development	▪ *ASP* ▪ **.NET Extensibility** ▪ **ISAPI Extensions** ▪ **ISAPI Filters**
Health and Diagnostics	▪ **HTTP Logging** ▪ **Request Monitor** ▪ **ODBC Logging**
Security	**Request Filtering**
Management Tools	▪ **IIS Management Console** ▪ **IIS 6 Management Compatibility** ▪ **IIS 6 Metabase Compatibility** ▪ **IIS 6 Management Console**

7. **Next** to continue

The panel *Add role services required for ASP.NET* is displayed



8. Select **Web Server (IIS)**
9. **Add Required Role Services** to continue

   The panel *Select Features* is displayed

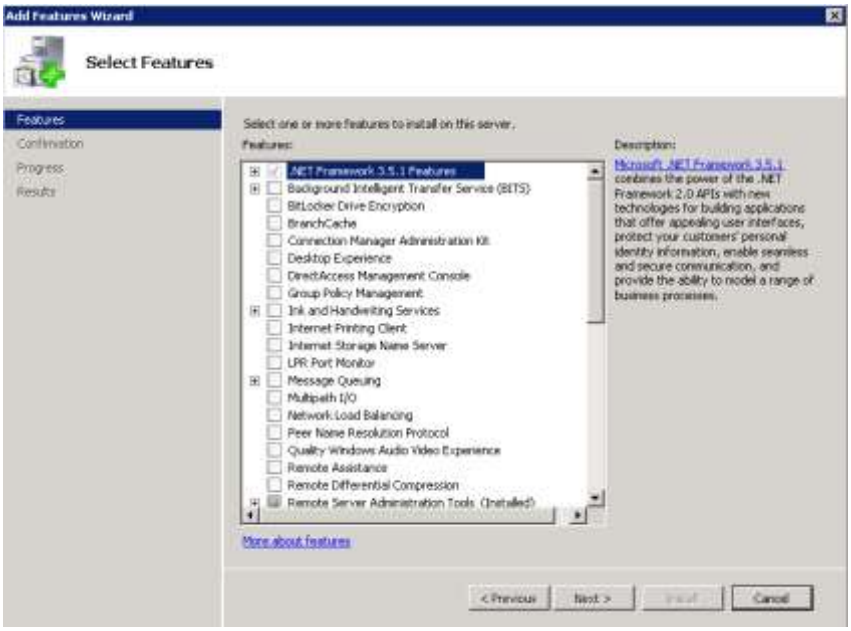


Figure 3: IIS - Add Features Wizard > Select Features

10. Select **.NET Framework**

    .Net Framework 4.5 is required
11. **Next** to continue

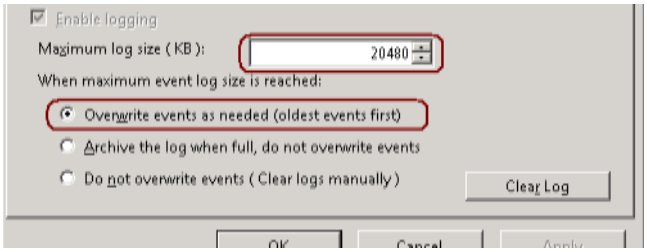
    The panel *Confirm Installation Selections* is displayed.
12. Verify your selections
13. **Install** to continue.

    The *IIS* 7 installation is completed, with a default configuration for hosting *ASP.NET* on *Windows Server 2008 R2 Standard (x64)*.
14. **Close** to end.

9.2.3. Configure the Windows application event log

A7 uses the *Windows* Event log to record data load and application failures.

1. Within *Windows Start Menu*, navigate to **Administrative Tools»Event Viewer**
2. Select **Windows Logs»Application**
3. **[right click] Properties** and select **General Tab**
   The *General Tab* is displayed



4. Check the settings are as above (defaults) and correct if necessary:
   i. Input `20480` as **Maximum log size (KB)**
   ii. Select **Overwrite events as needed (oldest events first)**
5. **Ok** to save changes and exit

9.2.4. Configure the SMTP relay

The local *SMTP* virtual server delivers email through an external email server. You will now configure the *SMTP* virtual server to relay email to this upstream server.

CTI Group recommend relaying email from the web server to the external email server via the application server (rather than configuring it to connect directly to the external email server).

You must grant all of your *A7* application servers relay permissions to the upstream external email server.

1. Within *Windows Start Menu*, navigate to **Administrative Tools»Internet Information Services (IIS) Manager**
2. **[right click] SMTP Virtual Server** and select **Properties**
3. Within the tab *Delivery*, select **Advanced**
4. Input `<SMTPhostName>` (for example, `smtp.acme.com`) as **Smart host**
   [Alternatively] Input IP address [`<SMTPhostIP>`] as **Smart host** [16].

   Do this if, for example, DNS name resolution is unavailable.
5. Within the *General Tab,* select **Enable Logging**
6. Within the *Properties -> Advanced Tab*, set **Extended logging** options as follows:
   - Date
   - Method
   - Protocol Sub status

[16] Note the use of [ ] around the IP address.

- Time
- Client IP Address
- URL Stem
- Protocol Status
- Win32 Status

9.2.5. Install Oracle Database Client

You must be logged-in as an administrator to do this.

Consult the specific installation instructions for your release of *Oracle Database Client*; these instructions are based on those for 11G R2.

1. From a *Windows command prompt*, input the following commands:

```
cd <deployPath>\Database
setup.exe [Enter]
```

<deployPath> being the location of the Oracle Database Client file downloaded in *Deploy the software distribution (Chapter 7, on page 12)*.

The *Oracle Universal Installer* is launched, prompting for the information required to continue the install.

2. Select the following options

Panel name	Value or selection
Select a product to install	Select **Oracle Database Client** **Next** to continue
Select Installation Type	Select **Custom** **Next** to continue
Install location	This must be a new ORACLE_HOME. Input the name of your ORACLE_HOME directory as **Name** Input the path to your ORACLE_HOME as **Path** **Next** to continue
Available Product Components	Select the following components: ▪ *Oracle Database Utilities* ▪ *SQL*Plus* ® ▪ *Oracle Admin Assistance for Windows* ▪ *Oracle Data Provider for .NET* ▪ *Oracle Net Configuration Assistant* ▪ *Oracle Net/Oracle Connection Manager*
Product-specific Prerequisite Checks	Correct any errors highlighted by *Oracle Universal Installer*
Summary	Verify the displayed options are as required. **Install** to continue.

The set up process continues to completion.

The installation of *Oracle Net Configuration Assistant* commences.

9.2.6. Install Oracle Net Configuration Assistant

This process is started automatically once *Install Oracle Database Client* (on page 25) is completed.

1. Select the following options for each panel as presented:

panel	Value or selection
Welcome	Select **Listener Configuration** **Next** to continue
Listener	Select **Add** **Next** to continue
Listener Name	This must be a new `ORACLE_HOME`. Input a name for your listener as **Listener name:** **Next** to continue
Select Protocols	Select **TCP** **Next** to continue
TCP/IP Protocol	Select **Use standard port number** By default this will be port 1521 *[Alternatively]* input a site specific port number. **Next** to continue
Done	**Next** to continue The configuration is completed.

2. Verify the *Transparent Network Substrate (TNS)* alias is correctly configured.in file:
   `ORACLE_HOME\NETWORK\ADMIN\tnsnames.ora`
   For example:

```
<DB_GlobalName> =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = <DB_HOST>)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = <DB_SID>)
```

   The values of `<DB_GlobalName>`, `<DB_HOST>` and `<DB_SID>` must match those used when the *A7* database was created.
3. Edit the file to correct any discrepancies if necessary.

9.2.7. Configure Environment variables

Java Home

Ensure that the application server has *Java runtime version 6.0 64-bit* (or higher) installed and if necessary do a fresh installation in accordance with the manufacturer's installation procedure.

`JAVA_HOME=c:\Program Files\Java\jre6.0`

Use the shortened path name in the system variable if your path name contains a space character (for example, C:\Progra~1\Java\jre6.0).

TNS_Admin

Set the environment variable `TNS_ADMIN` to the folder path of the module `tnsnames.ora`

9.2.8. Prepare LDAP server

Optional step: Not required if you are implementing a *SSO* solution or are integrating with an existing *LDAP* server; in either of these cases refer to your release notes for specific integration instructions

If you are planning to use the *OpenDS LDAP* server refer to *Installing OpenDS (Appendix C, (on page IV)*.

10. Preparing the web server

10.1. Configure firewall ports

Open the following firewall ports prior to commencing the installation of *A7*.

Further reading:
- Apache – about configuration files
- Apache – about mod-proxy module

Load balancing and clustering may require additional port configuration.

Table 10: Web server firewall configuration

Source	Dest.	Port	Desc.	Purpose
Any	Web server	80	HTTP	Web in (NAT'd)
Any	Web server	443	HTTPS	SSL in (NAT'd)
Web server	Java server	8009	AJP	Proxy - Web to Java
Java server	App server	80	HTTP	REST API access -Java to .Net
Java server	App server	25	*SMTP*	Mail relay
Java server	*LDAP* server [17]	10389	*LDAP*	liferay *LDAP* access

10.2. Configuring Apache web server

The typical Apache web server environment comprises the following:

Table 11: Directory environment for Apache web server

Description	Path
Base Directory:	`/etc/httpd/`
Main Web server config file httpd.conf	`/etc/httpd/conf/`
Custom Config file(s)	`/etc/httpd/conf.d/`

You should put any additional site-specific configuration directives in the `/etc/httpd/conf.d/` directory as this location is generally upgrade safe.

Remember to use the `.conf` suffix on your site specific configuration file.

Any changes that impair the operation of the web server can also be easily revoked by renaming the file and restarting the service.

Apache as Reverse Proxy

In order to better manage inbound *httpd* connections *CTI Group* recommend configuring a local copy of *Apache web server* to act as a reverse proxy to the local *Liferay Portal*.

Since *Liferay Portal* is running in an *Apache tomcat* servlet container, *Tomcat* provides a local *AJP* (*Apache JServ Protocol*) connection for fast binary proxy access.

[17] Required only where a LDAP solution is being implemented.

See *Example proxy_ajp.conf file (Appendix D, on page IX)* for a sample *AJP* configuration file.

An example virtual host configuration file is created by default during installation and saved as `vhosts.conf` in the `/etc/httpd/conf.d/` directory.

```
<VirtualHost *:80>
  DocumentRoot /var/www/html
  ServerName [SERVER_NAME]
  ErrorLog /var/log/httpd/[SERVER_NAME]-Error_Log
  CustomLog /var/log/httpd/[SERVER_NAME]-Access_Log common
  ProxyRequests Off
  ProxyPass / ajp://localhost:8009/
  ProxyPassReverse / ajp://localhost:8009/
</VirtualHost>
```

Configure a virtual host

1. Edit the file `vhosts.conf`, setting the following values:

Option	Value or selection
ServerName	The web server host name.
ErrorLog	The name of your error log file (for example, `/var/log/httpd/[SERVER_NAME]-Error_Log`.
CustomLog	The name of your error log file (for example, `/var/log/httpd/[SERVER_NAME]-Access_Log`).

   Log files are located in the directory `/var/log/httpd/` by default.

   To identify the name of the host, input hostname **[Enter]** at *Linux* prompt.

2. To check the settings are correct, start the *Apache web server*:
   `service httpd start` **[Enter]**
3. If the service starts without errors, stop the web server with:
   `service httpd stop` **[Enter]**
4. If there are any errors, check the syntax of the file `vhosts.conf` for any typing errors. Correct any mistakes found and retry starting the *Apache web server*.

10.3. Configuring JDK 1.5

Before configuring the JDK make a note of your system `Path` variable's current value.

Liferay Portal requires *Sun JDK* 1.15 to be installed and the following system variables to be set:

Variable	Setting
`JAVA_HOME`	`c:\Program Files\Java\jdk1.15`
`JDK_HOME`	`c:\Program Files\Java\jdk1.15`
`<originalPath>`	`c:\Program Files\Java\jdk1.15\bin;<originalPath>`

Where `<originalPath>` is your system `Path` setting from before Java was configured.

- `echo %path%` **[Enter]** to display the `Path` value;
  `set <originalPath>=%Path%` **[Enter]** to store it.

Appendices

List of appendices …

Appendix A Firewall configurations

Configure firewall ports

Open the following firewall ports prior to commencing the installation of *A7*.

Load balancing and clustering may require additional port configuration.

Database Server

Source	Dest.	Port	Desc.	Purpose
Java server	DB server	1521	Oracle	*Liferay Portal* DB Java access

Application server

Source	Dest. Srvr	Port	Desc.	Purpose
Java server	App	25	*SMTP*	Mail relay (in)
App server	*SMTP*	25	*SMTP*	Mail relay (out)
App server	*LDAP* [18]	10389	*LDAP*	liferay *LDAP* access

Web server

Source	Dest.	Port	Desc.	Purpose
Any	Web server	80	HTTP	Web in (NAT'd)
Any	Web server	443	HTTPS	SSL in (NAT'd)
Web server	Java server	8009	AJP	Proxy - Web to Java
Java server	App server	80	HTTP	REST API access -Java to .Net
Java server	App server	25	*SMTP*	Mail relay
Java server	*LDAP* server [19]	10389	*LDAP*	liferay *LDAP* access

[18] Required only where a LDAP solution is being implemented.
[19] Required only where a LDAP solution is being implemented.

Appendix B Installing Apache web server

If Apache web server or any of its dependencies are not installed in your *Linux* distribution then you can add them as follows:

1. For each `.rpm <packageName>` in the Apache web server dependencies table.
   i. Check whether the package has already been installed:
   `rpm -q <packageName>` **[Enter]**
   ii. Install the package if necessary:
   `rpm -ivh <packageName>` **[Enter]**

   Use `-Uvh` if the package exists but needs to be updated.

Kernelllibrary file	Associated RPM package
libapr-1.so.0()	apr-1.2.7-11.x86_64.rpm
libaprutil-1.so.0()	apr-util-1.2.7-7.el5.x86_64.rpm
postgresql-libs	postgresql-libs-8.1.11-1.el5_1.1.x86_64.rpm

Table 12: List of packages required by Apache web server

2. Install Apache web server
   `rpm -ivh httpd-2.2.3-22.el5.x86_64.rpm` **[Enter]**

   Any errors encountered during installation of the *Apache web server* must be corrected before the installation can proceed.

   The service is not set to automatically run by default.
3. Check the integrity of the installation by running the command:
   `service httpd start` **[Enter]**

   Ignore any error message about *Apache* being unable to qualify the *Fully Qualified Domain Name (FQDN)*; this will not impact the install of *A7*.

   Setting *FQDN* is the responsibility of the customer and is outside the scope of this document.
4. As an additional check that *Apache web server* is running, browse to:
   `http://localhost/`
   [Alternatively] From a remote client which has access to the web server, point the URL to the physical IP address of the web server (if DNS is not setup or configured).
   `http://192.168.1.1`
   In either case; the default *Apache* web page is displayed, which confirms the web server configuration is working.

Appendix C Installing OpenDS

Further reading:

OpenDS documentation wiki
OpenDS installation guide

1. Download and extract the file:
   `opends-2.2.1.zip` to
   `<OpenDS_installPath>`

   Where `<OpenDS_installPath>` is an install path of your choice.

2. Initiate the setup by entering the following command:
   `<OpenDS_installPath>\setup.bat` **[Enter]**
   OpenDS's Java-based *Quick Setup UI* is invoked.

   This may take a couple of minutes.

3. **Next** to continue
   The panel *Server Settings* is displayed.

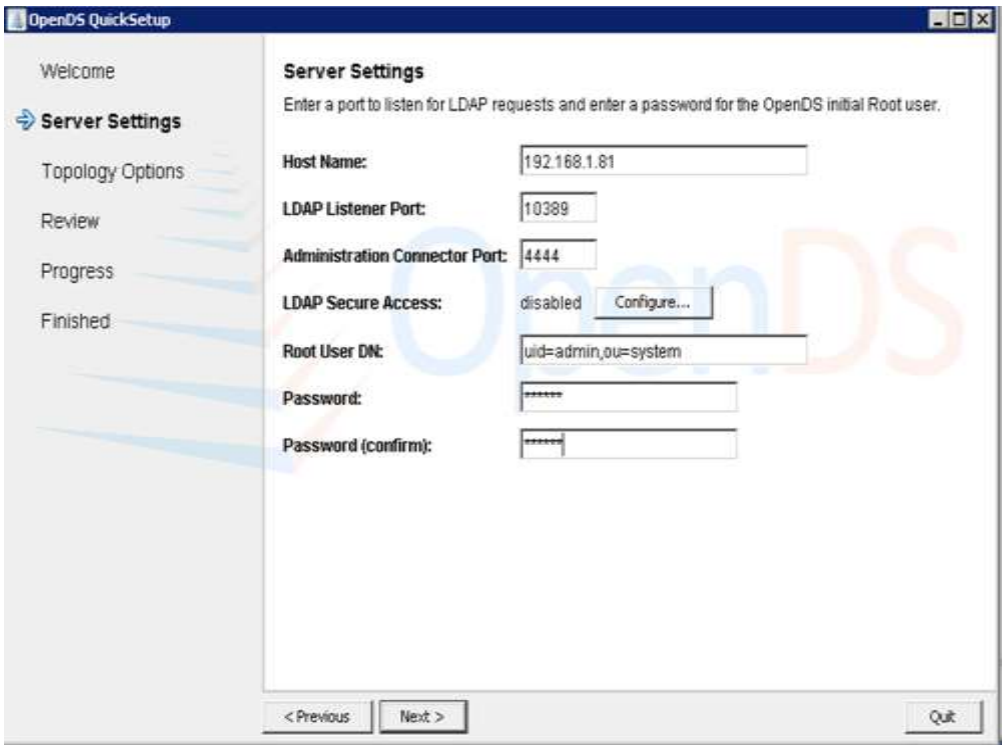


Figure 4: OpenDS Quick Setup: server settings panel

4. Set the following values, leaving everything else to default.

Option	Value or selection
Host Name	**default**
LDAP Listener Port	`<LDAP_listenerPort>` for example, `10389`
Administration Connector Port	**4444**
LDAP Secure Access	**disabled**
Root User DN	`<LDAP_PRINCIPAL_DN>` for example **uid=analysis-ldap,cn=Administrators,cn=admin data**
Password	`OpenDS` (for example)

Table 13: OpenDS server settings

5. **Next** to continue
   The panel *Topology Options* is displayed.

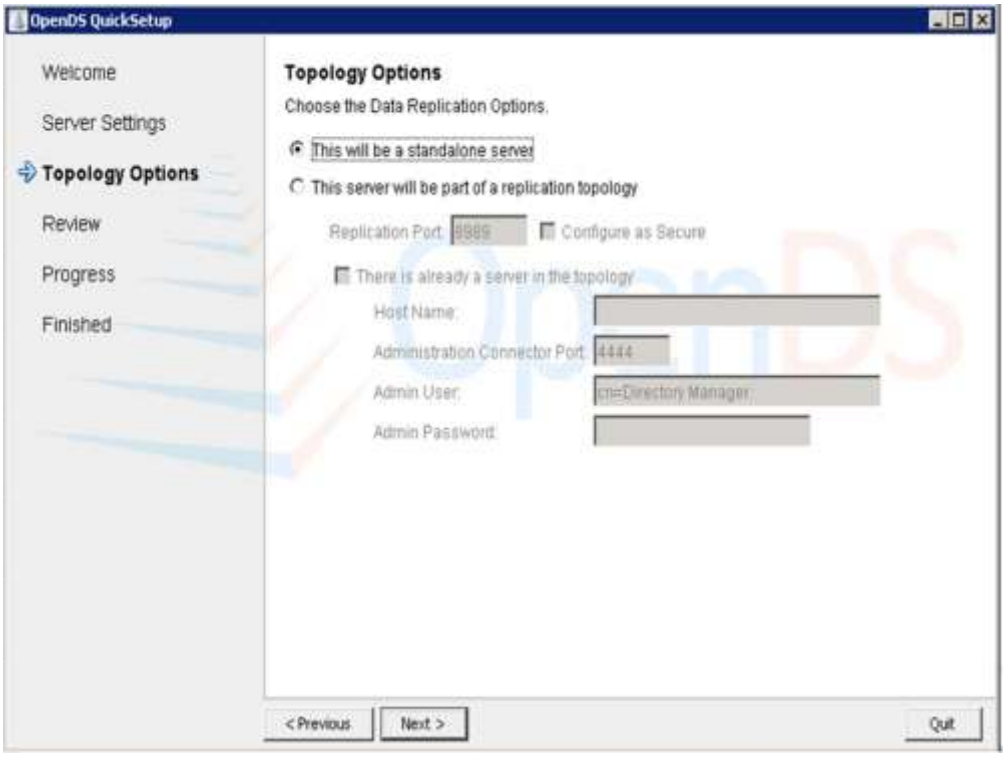
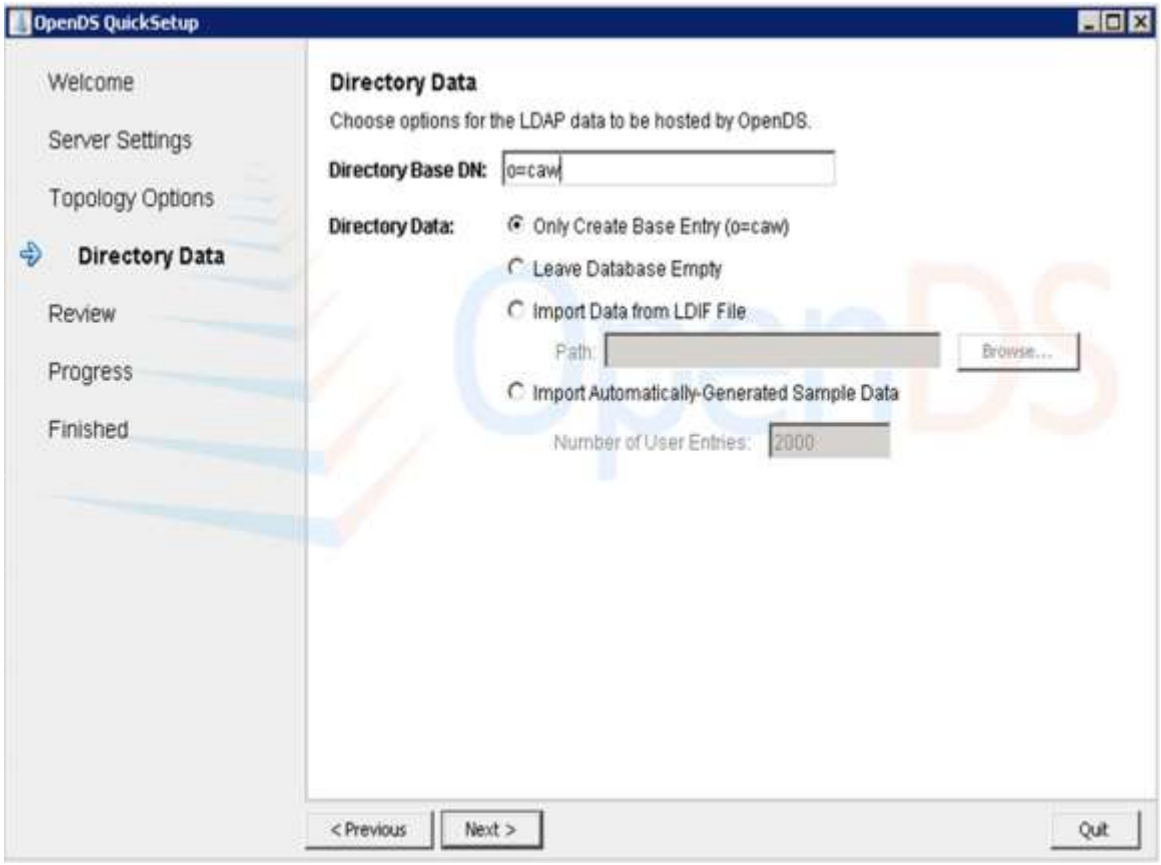


Figure 5: OpenDS Quick Setup: topology options panel

6. Select a **Data Replication Option** from:
   - This will be a standalone server.
   - This server will be part of a replication topology.
     Configure the sub-options appropriately for your topology.
7. **Next** to continue
   The panel *Directory Data* is displayed.



-

8. Select the following options

Option	Value or selection
Directory Base DN	`<LDAP_Base_DN>`, for example `o=acme`
Directory Data	**Leave database empty**

The *A7* installation stage populates *LDAP* server.

9. **Next** to continue

The panel *Review settings* is displayed.

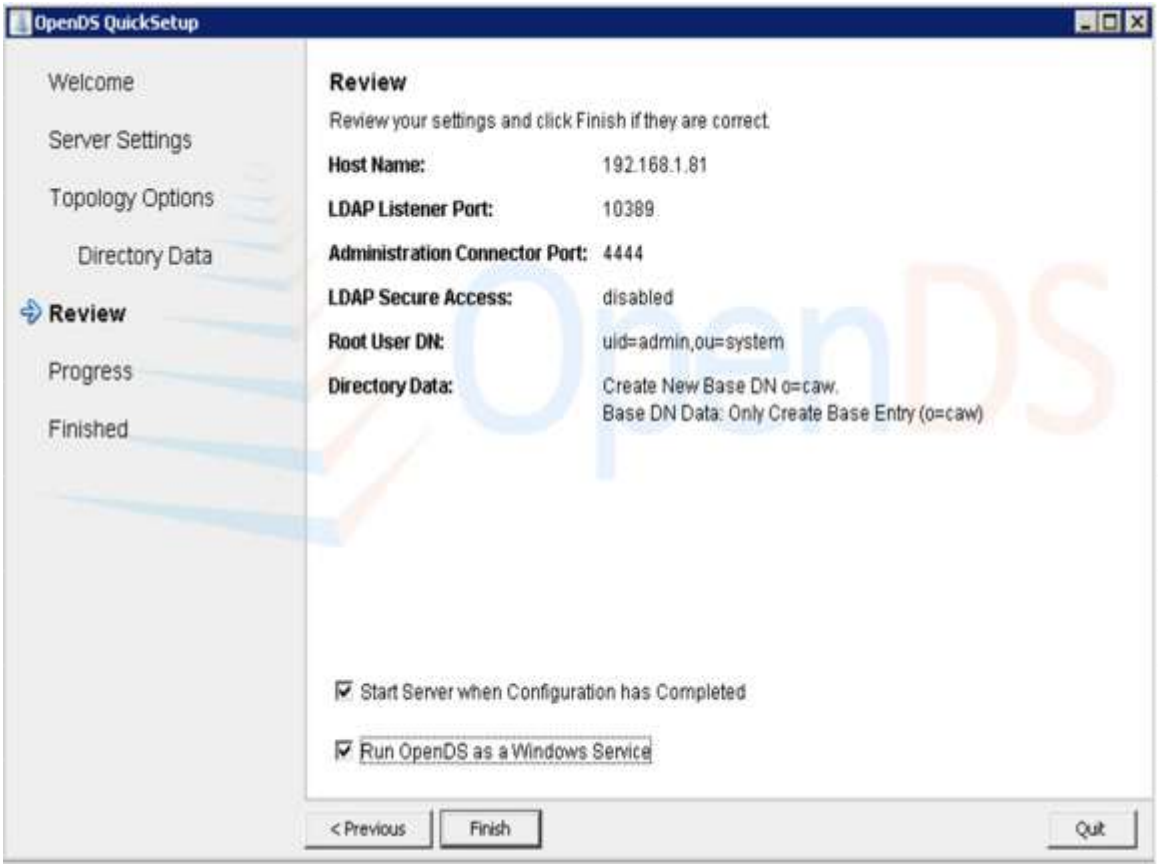
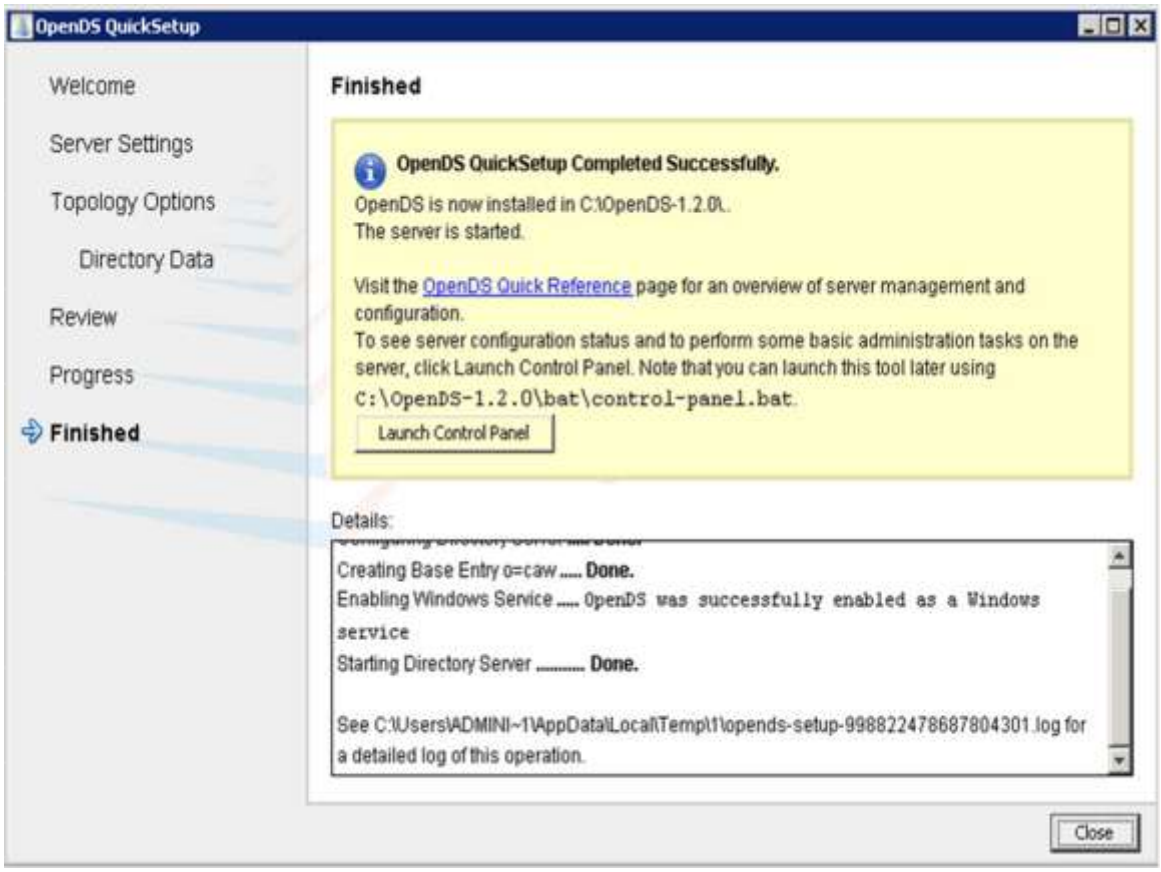


Figure 6: OpenDS Quick Setup - Review panel

10. Review the settings.
11. Select **Run OpenDS as a Windows Service**
12. **Finish** to continue
    [Alternatively] Use **Previous** to go back and make any necessary changes.

The setup tool builds the *LDAP* database and starts the server.



13. **Close** to exit

    The *OpenDS* setup process is complete.

Appendix D Example proxy_ajp.conf file

Usually found in `/etc/httpd/conf.d/`

```
# Ensure the following line is uncommented to allow Apache to proxy reqeuests.
LoadModule proxy_ajp_module modules/mod_proxy_ajp.so
#
# When loaded, the mod_proxy_ajp module adds support for
# proxying to an AJP/1.3 backend server (such as tomcat).
# To proxy to an AJP backend, use the "ajp://" URI scheme;
# tomcat is configured to listen on port 8009 for AJP requests
# by default.
#
#
# Uncomment the following lines to serve the ROOT webapp
# under the /tomcat/ location, and the jsp-examples webapp
# under the /examples/ location.
#
```

Appendix E Sample bash_environment file

```
# .bash_profile
# Get the aliases and functions
if [ -f ~/.bashrc ]; then
        . ~/.bashrc
fi

# User specific environment and startup programs
PATH=$PATH:$HOME/bin
export PATH

# The following lines are needed to support A7 application.
CATALINA_HOME=<web_installPath>/liferay-portal/tomcat-5.5.27
JAVA_HOME=jre1.5
export CATALINA_HOME JAVA_HOME
```

Appendix F Example init.d script

```
#!/bin/bash
# lportal523
# chkconfig: 345 70 30
# description:     Start up the Liferay Service.
# Source function library.
. /etc/init.d/functions

RETVAL=$?
export CATALINA_HOME=<web_installPath>/liferay-portal/tomcat-5.5.27
export JAVA_HOME=jre1.5

#set this to blank to use root (not recommended)
export SERVICE_USER=<web_serviceUser>
export SERVICE_HOME=${CATALINA_HOME}
export PID_FILE=${CATALINA_HOME}/bin/lportal.pid

SERVICE_NAME=Analysis Liferay
START_CMD=$SERVICE_HOME/bin/startup.sh
#blank restart cmd = stop, then start
RESTART_CMD=
STOP_CMD=$SERVICE_HOME/bin/shutdown.sh
#blank status cmd will check if pid is an active process
STATUS_CMD=

checkrunning() {
     IS_RUNNING=false
     if [ -f $PID_FILE ]; then
          PID=$(cat $PID_FILE)
          if ps -p $PID > /dev/null; then
               IS_RUNNING=true
          fi
     fi
}

start() {
     if $IS_RUNNING; then
          echo $"$SERVICE_NAME is already running"
     else
          removepidfile
          echo $"Starting $SERVICE_NAME"
          if [ "$SERVICE_USER" = "" ]; then
               $START_CMD
          else
               /bin/su $SERVICE_USER -c "$START_CMD"
          fi
     fi
}

stop() {

     if $IS_RUNNING; then
          echo $"Stopping $SERVICE_NAME"
          if [ "$SERVICE_USER" = "" ]; then
               $STOP_CMD
          else
               /bin/su $SERVICE_USER -c "$STOP_CMD"
          fi
```

```
          counter=0
          while ps -p $PID > /dev/null
          do
               if [ $counter -eq 5 ]; then
                    echo $"Done waiting, killing PID $PID"
                    kill $PID
                    $counter=0
               else
                    echo $"Waiting for $SERVICE_NAME to exit [$counter]"
                    # wait for shutdown
                    let counter=counter+1
               fi
               sleep 10
          done
          removepidfile
     else
          echo $"$SERVICE_NAME not running"
     fi
}

restart() {

     if [ "$RESTART_CMD" == "" ]; then
          stop
          checkrunning
          start
     else
          echo $"Restarting $SERVICE_NAME"
          if [ "$SERVICE_USER" = "" ]; then
               "$RESTART_CMD"
          else
               /bin/su $SERVICE_USER  -c "$RESTART_CMD"
          fi
     fi
}

status() {
     if [ "$STATUS_CMD" == "" ]; then
          echo -n "$SERVICE_NAME"
          status -p $PID_FILE
     else
          if [ "$SERVICE_USER" = "" ]; then
               $STATUS_CMD
          else
               /bin/su $SERVICE_USER  -c "$STATUS_CMD"
          fi
     fi
}

removepidfile() {
     rm -f $PID_FILE
}


checkrunning

     case "$1" in
      start)
           start
           ;;
```

```
      stop)
           stop
           ;;
      restart)
           restart
           ;;
      status)
           status
           ;;
      *)
           echo $"Usage: $0 {start|stop|restart|status}"
           exit 1
           ;;
     esac
exit $RETVAL
```

Appendix G Integrate service into framework

1. To add the service `<serviceName>` script to the service management framework:

   `chkconfig -- add <serviceName>`

2. To check the service has been added correctly, run the command:

   `chkconfig --list <serviceName>`

   The system should respond with:

   `<serviceName>  0:off 1:off 2:off 3:off 4:off 5:off 6:off`

   This indicates the `<serviceName>` script has been added to the service framework.

   > Note that the script is not currently set to run in any run level; as indicated by the `off` settings.

3. To enable the service for run level 5, use the command:

   `chkconfig --levels 5 <serviceName> on`

4. To check the service `<serviceName>` script has been enabled for run level 5:

   `chkconfig -- list <serviceName>`

   The system will respond with:

   `<serviceName>  0:off 1:off 2:off 3:off 4:off **5:on** 6:off`

   > This shows the service `<serviceName>` is enabled for run level 5, but the service is not yet actually running.

5. To start the service use:

   `service <serviceName> start`

   The application will be started under the control of the service management framework.

6. To check the service has started without error(s), check the `catalina.log` file located in:

   `<web_installPath>/tomcat-5.5.27/logs/catalina.out`

   If there are any error(s), correct them before trying to start the service again.

7. A started service can be stopped using the command:

   `service <serviceName> stop`

8. To run in a shell console (for testing only)

   `<web_installPath>/liferay-portal/tomcat-5.5.27/bin/startup.sh`

   If *Tomcat* and the *Liferay Portal* start without error(s), shutdown the application using the script:

   `shutdown.sh`

   This is located in the directory
   `<web_installPath>/liferay-portal/tomcat-5.5.27/bin/`

> Give `<serviceName>` a name meaningful to the service instance which it runs.

Appendix H Troubleshooting

System version not recognised

This can occur when trying to install *Oracle Database (11G R2)* on *Windows Server 2008 R2 Standard (x64)*.

To avoid this error do the following:

1. Within *Windows File Explorer*, browse to `<DB_installPath>`
2. **[right click]** the file `oraparam.ini` and select **Edit**
3. Within the editor, locate the **Certified Versions** section
4. Edit the Windows string to include **6.1**
5. **Save** the changes and exit.

Bibliography

Oracle Database, High Availability Best Practices

Oracle Database, Topic=***5.1.8 Set LOG_BUFFER Initialization Parameter***, Section=***5. Configuring Oracle Database***, Title=***Oracle® Database High Availability Best Practices 11g Release 2 (11.2) Part Number E10803-01***, Retrieved=Dec 2011,
URL=http://docs.oracle.com/cd/E11882_01/server.112/e10803.pdf

Oracle Database – backup and recovery guide

Title="***Oracle® Database Backup and Recovery User's Guide 11g Release 2 (11.2) E10642-05***",
Retrieved=Nov 2011, URL=*http://download.oracle.com/docs/cd/E11882_01/backup.112/e10642.pdf*

Oracle Database Client Quick Installation Guide

Oracle,Title="***Oracle Database Client Quick Installation Guide 11g Release 2 (11.2) for Microsoft Windows x64 (64-Bit) E24284-01***", Retrieved=Nov 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/install.112/e24284.pd*f

Oracle Database Performance Tuning

Title="***Oracle® Database Performance Tuning Guide 11g Release 2 (11.2) E16638-06***",
Retrieved=Nov 2011, URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e16638.pdf*

Oracle Database Overview of the Automatic Workload Repository

Oracle Database, Topic=***5.2 Overview of the Automatic Workload Repository***, Section=***5. Automatic Performance Statistics***,
Title="***Oracle® Database Performance Tuning Guide 11g Release 2 (11.2) E16638-06***",
Retrieved=Nov 2011, URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e16638.pdf*

Oracle Database 11G documentation library

Oracle,Title="***Oracle Database Documentation Library 11G Release 2*** ", Retrieved=Nov 2011,
URL=*http://www.oracle.com/pls/db102/homepage*

Oracle Database 11G – documentation library

Oracle,Title="***Oracle® Database Documentation Library 11g Release 2*** ", Retrieved=Nov 2011,
URL=*http://www.oracle.com/pls/db112/homepage*

Oracle Database – 2 day DBA Guide (11G)

Oracle,Title="***Oracle® Database,2 Day DBA, 11g Release 2 (11.2) E10897-07***", Retrieved November 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e10897.pdf*

Oracle Database–Automatic Storage Management

Oracle Database, Title="***Oracle® Automatic Storage Management Administrator's Guide 11g Release 2 (11.2) E18951-02"***, Retrieved=Nov 2011,
URL=*http://docs.oracle.com/cd/E11882_01/server.112/e18951.pdf*

Oracle Database, Configuring and Using the Redo Log Buffer

Oracle Database, Topic=***7.4 Configuring and Using the Redo Log Buffer***,Section=7. ***Configuring and Using Memory***,
Title="***Oracle® Database Performance Tuning Guide 11g Release 2 (11.2) E16638-06***",
Retrieved=Nov 2011, URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e16638.pdf*

Oracle, Configuring automated maintenance tasks

Oracle Database, Topic=***Configuring Automated Maintenance Tasks***, Section=***Managing Automated Database Maintenance Tasks***,
Oracle Database, Title="***Oracle® Database Administrator's Guide 11g Release 2 (11.2) E25494-01"***,
Retrieved=Nov 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e25494.pdf*

Oracle Database – creating a database with DBCA

Oracle,Doc="***Oracle® Database 2 Day DBA 11g Release 2 (11.2) E10897-07***", Section="***2 Installing Oracle Database and Creating a Database***",
Chapter="***Creating and Managing Database with DBCA***", Title="***Creating a Database Using DBCA***"
Retrieved November 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e10897.pdf*

Oracle Database–Initialisation parameter reference guide

Oracle Database, Title="***Oracle Database initialisation parameter reference guide***", Retrieved=Nov 2011,
URL=*http://www.oracle.com/pls/db112/initora*

Oracle Database – managing DBCA templates

Oracle,Doc="***http://download.oracle.com/docs/cd/E11882_01/se***rver.112/e10897/install.htm#ADMQS0235***E10897-07***", Section="***2 Installing Oracle Database and Creating a Database***",
Chapter="***Creating and Managing Database with DBCA***", Title="***Managing Templates with DBCA***"
Retrieved November 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e10897/install.htm#ADMQS0235*

Oracle Database – Administrator's Guide

Oracle Database, Title="***Oracle® Database Administrator's Guide 11g Release 2 (11.2) E25494-01"***,
Retrieved=Nov 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e25494.pdf*

Oracle Database – release notes for Linux

Oracle,Title="***Oracle® Database Release Notes 11g Release 2 (11.2) for Linux E23558-04***",
Retrieved=Nov 2011, URL=*http://download.oracle.com/docs/cd/E11882_01/relnotes.112/e23558.pdf*

Oracle Database, sizing Redo log groups

Oracle Database, Topic=***Sizing Redo Log Files***,Section=***4 Configuring a Database for Performance***,
Title="***Oracle® Database Performance Tuning Guide 11g Release 2 (11.2) E16638-06***",
Retrieved=Nov 2011, URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e16638.pdf*

Oracle Database–Specifying initialisation parameters

Oracle Database, Topic="***Specifying Initialization Parameters***", Section="***2. Creating and Configuring an <Oracle database***",
Oracle Database, Title="***Oracle® Database Administrator's Guide 11g Release 2 (11.2) E25494-01"***,
Retrieved=Nov 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e25494.pdf*

Oracle Database–Using Automatic Memory Management

Oracle Database, Topic="***Using Automatic Memory Management***", Section="***6. Managing Memory***",
Oracle Database, Title="***Oracle® Database Administrator's Guide 11g Release 2 (11.2) E25494-01"***,
Retrieved=Nov 2011,
URL=*http://download.oracle.com/docs/cd/E11882_01/server.112/e25494.pdf*

Oracle Database - using RMAN to backup and restore files

Oracle,Doc="***Oracle® Data Guard Concepts and Administration 11g Release 2 (11.2) E17022-03***", Section="***I. Concepts and Administration***", Title="***11. Using RMAN to Back Up and Restore Files***", Retrieved November 2011, URL=*http://docs.oracle.com/cd/E18283_01/server.112/e17022.pdf*

Index

P

S

T

W

[Inside back cover page]

Our contact address:

CTI Billing Solutions Limited

Daisyfield Business Centre
Appleby Street
Blackburn
United Kingdom
BB1 3BL

Tel: +44 0 1254 291500
Fax: +44 0 1254 291504

Email: info@ctigroup.com

Feedback on this document

We are always looking for ways to improve the support we provide to our customers . Your feedback is invaluable in enabling us to do so.

Comment on this document via the following email address:

A7documentation@ctigroup.com