Proven Practice

Guide to installing Oracle 11G rel2 Server (and creating databases) on Windows, for Controller 8.5.1

Product(s): IBM Cognos Controller

Area of Interest: Infrastructure
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1 Introduction

1.1 Purpose
Controller 8.5.1 is the first release that supports databases stored on an Oracle 11G server (see http://www-01.ibm.com/support/docview.wss?uid=swg27014433).

TIP: Oracle 11g R2 (release 2) is the actively supported/recommended version, so will be used throughout this document.

This document is intended to show:
- How to install Oracle 11G rel2 in a way that makes it compatible for hosting Controller databases
  - We shall also patch it to the latest Oracle server patch set available at the time of writing
- How to create the 2 initial databases that Controller requires
  - One for the Controller application’s data repository
  - The other is the “ContentStore” which stores some configuration data for the reporting server system.

WARNING: It is VITAL to note that the recommendation for the “application repository” database character set (i.e. the non-Unicode “WE8MSWIN1252”) is different from the (Unicode) character set required for the “contentstore” database.

- How to create the third extra database that (optionally) some customers may use for advanced functionality
  - For ‘normal’ use, Controller 8 requires 2 separate databases. There is an optional third that you may wish to create for a Data Mart publish repository.

In general, we shall mostly use the default settings for installing Oracle 11G rel2 (also known as “Oracle 11.2.0.1.0”) – on a Windows 2003 server.

TIP: Controller 8.5.1 works fine when using Oracle 11G hosted on non-Windows (for example UNIX / Linux) operating systems. However, for the sake of simplicity, this guide shall give advice/screenshots etc. only from the Windows version.

This document is intended to be utilised by IBM Cognos (and partners) technical consultants, to give to customer’s I.T. department’s Oracle administrators (DBAs). The Oracle DBAs can then read this document, and ensure that their Oracle 11G rel2 environment conforms to the settings/configuration that is described in this document.

By following these “best practices” the intention is to make Controller installation as easy as possible, with the minimum of possibility for errors/issues.
1.2 Further description of document

Please be aware that this is a Proven Practice guide, intended to:

- Give a quick/easy guidelines and advice to people already familiar with Oracle 11G (and Controller)
- Illustrate clearly (with screenshots) the ideas associated with Controller so that they can perform the same steps in their own unique Oracle environment
- Most importantly, the official documentation (e.g. “ctrl_inst.pdf” for Controller 8.5, plus IBM’s Supported environments website always take precedence over this Proven Practice document.
  - The reader should be familiar with the official documentation *before* reading/using this document

1.3 Using an existing Oracle 11G rel2 server

This document demonstrates how to create a **brand-new** Oracle 11G rel2 server, complete with suitable databases, ready for use by Controller 8.5.1

- For performance reasons, it is ideal if customers dedicated server hardware, just for Controller
  - In other words, use a dedicated (only for Controller) Oracle server
- However, we understand that most customers will have existing Oracle servers, and will probably want to share this server with other non-Controller databases
  - In this scenario, the customer should use this document purely for illustrative purposes only
  - Naturally, the customer’s Oracle DBA will have a clearer understanding of their needs than any document could.
- In other words, customers can read this documentation, to understand how a (theoretical) Oracle server (on Windows) was installed, so that they can ensure that their (existing) server has the same settings

**In other words:** Most customers will probably be using a different operating system (e.g. a flavour of UNIX) from the one that this guide has screenshots from (Windows 2003), to host their Oracle server. The idea of this guide, is that it can be used by the customer’s Oracle DBA to understand the general settings required. The customer’s Oracle DBAs can then use this document and “translate” the procedures into some that will work for their configuration of Oracle 11G (on whatever operating system they use)

1.4 Applicability

This document is based on installing Controller 8.5.1 RTM (released July 2010).

However, it is envisaged that the document should also be relevant for future versions of Controller which support Oracle 11G.
1.5 Exclusions and Exceptions

There are an infinite variety of possible customer I.T. environments/needs/specialist requirements. Therefore, IBM has intentionally made Controller flexible to give the customer many different ways to install/configure Controller 8.5.1. Therefore the advice in this document may have to be modified by the reader to fit in with their specific needs/environment.

Although this document demonstrates proven practices suitable for most environments, it is not necessarily perfect for all environments.

**Employing an experienced IBM Cognos technical consultant to upgrade your Controller server(s) is always the recommended & ideal scenario.**

This document is not intended to entirely replace the official ‘standard’ documentation (located on the install CDs) such as:

- `ctrl_arch.pdf` – Architecture and Deployment guide
- `ctrl_inst.pdf` – Installation and Configuration guide
- `qrc_ctrl_inst.pdf` – Getting Started Installation guide

Instead you can use this guide as a concise summary companion to the official documentation. In any event of overlap, the standard documentation takes precedence.

**NOTE: This document was last updated by the author September 6th 2010.**
2 Important Notes, Tips and WARNINGS

2.1 Do not ignore/skip any sections of this document, unless you understand the consequences!

It is perfectly possible to install Oracle/Controller and get it (initially) working without performing some of the steps that the author prescribes/recommends. However, customer feedback has confirmed that, unless you perform all of my recommended/extra steps, the customer’s Controller system will NOT work well in the long-term.

Therefore, throughout this document, there will be hints & tips in blue boxes such as this one:

**TIP:** Ignoring the tips may cause the Controller system to be slow, unreliable or have long-term issues.

In addition, there are will be VITAL information inside red boxes

**WARNING:** If the information in these boxes is ignored, the Controller system is likely not to work at all correctly.

Many of the author’s tips and recommendations refer to IBM’s excellent knowledgebase, which contain the IBM “Technotes” (previously known as “KB articles”). This can be found here:


It is absolutely VITAL that the reader uses this knowledgebase resource, since it is an invaluable help for almost all issues.

In addition, all public Proven Practice documents can be found here:
3 Initial Server Prerequisites

3.1 Server hardware recommendations

It is, of course, vital the customers deploy Controller on hardware that is sufficiently powerful to give the end users a good experience.

Please refer to the author’s companion Proven Practice document ‘Controller 8.5 Architecture and Server Sizing’ for my server hardware recommendations (based on customer success/feedback).

3.2 Best practices before proceeding

The author recommends:

- Enable ‘Terminal Services’ (remote connection) on all the servers (for ease of remote administration of them in the future)
- Ensure that your application server has a fast (a minimum of 100Mb Full Duplex) network connection to/from the database server
  - Ideally you should be using gigabit network connections

**IMPORTANT TIP**: Try copying a large folder (for example the 500Mb ‘i386’ folder, found on the Win2003 installation CD-ROM) from the Controller application server to the database server, across the network. How long does this take? 500Mb should only take 2 to 3 minutes to copy across a 100b Full Duplex network.

This is one of the best tests that you can perform, during the installation, since it is a fairly common problem to find out (afterwards) that there is poor network connectivity causing Controller performance problems.

- Double-check the Regional settings, before installing any software.
  - Typically, ensure that your server has been installed with the appropriate setting for your country (e.g. English (UK)) as default regional options/language/keyboard.
  - These regional settings choices should be consistent (the same) between the various servers (Database, Application server and Citrix servers) involved
    - Having a mixture of Regional Settings increases the likelihood of experiencing application issues
4 Installation of Oracle 11G R2 Server

4.1 Oracle 11G Server installation

TIP: At the time of writing, the latest versions of the software can be downloaded from here: http://www.oracle.com/technetwork/database/enterprise-edition/downloads/index.html

- Insert the Oracle CD, and run setup.exe
- Choose 'Create and configure a database'
- Choose 'Server Class'
- Choose 'Single instance database installation'
- Choose 'Advanced install'
- Ensure that the languages 'English' and 'English (United Kingdom)' are selected, and choose Next
- When prompted, choose 'Enterprise Edition'

- Insert the Oracle CD, and run setup.exe
- Choose 'Create and configure a database'
- Choose 'Single instance database installation'
- Choose 'Advanced install'
- Ensure that the languages 'English' and 'English (United Kingdom)' are selected, and choose Next
- When prompted, choose 'Enterprise Edition'

- Unless you have a preference, accept the recommended/default installation location:
Choose 'General Purpose / Transaction Processing'

Accept the defaults, to create an initial/test 'orcl' database:

- At the next screen, again accept the default options, and click 'Next'
- Inside the 'Database Storage Options' choose the location(s), then Next
- Inside the 'Recovery Options' screen, ensure you enable backups
- Inside the 'Specify Schema Passwords' screen, enter the relevant values

IMPORTANT: Remember these passwords!

- Next, Next, Finish.

The product will now start installing:
5 Creation of Controller databases

5.1 Overview

It is important to stress that the database that was created earlier (during the installation of Oracle server itself) shall not be used for Controller. [This database was purely created simply to get through the installation wizard].

Instead, we need to create at least 2 new databases for Controller to use. This is because Controller requires specific different settings to be chosen (during each database’s creation) to ensure that Controller works properly.

Controller 8 requires the following databases:

1. "Contentstore" which stores the configuration of the Cognos 8 BI 'report server' software components
   - In other words, the Content Store does NOT store any ‘financial’ data.
   - Instead, it stores Report Server settings such as:
     - User names / security subsystem configuration
     - Report packages
     - Etc.

2. "Application repository" database which stores the application data
   - In other words, the 'application repository' database stores ALL the 'financial' data and ‘financial’ settings of the Controller application
   - In the event of a catastrophic problem (for example complete server loss) it is this database that is absolutely crucial to recover.
   - To repeat, this is by far the most important database to keep backed up and ready to restore if necessary.

3. (Optional) "Data mart" database
   - Only used if you wish to publish data from Controller, so it can be reported from by a different application (for example Cognos 8 BI Report Studio).
5.2 Create Controller ‘ContentStore’ database

- From the Start Menu, launch “Database Configuration Assistant”
- Select “Create a database”, then Next
- Choose “General Purpose or Transaction Processing” then Next
- Choose a sensible name (for example ‘cs’) then Next:

- In the “Management options”, configure as desired (typically accept the defaults), and click Next
- Inside “Database Credentials”, choose a password (and remember the password!), then Next
- Inside “Database File Locations”, configure as desired (typically accept the defaults), and click Next
- Inside “Recovery Configuration” - typically click Next
- Inside “Database Content” - typically click Next

“Initialization Parameters”:
- In the “memory” tab, the remember that the ContentStore is typically small and relatively infrequently used
  - therefore there is no need to allocate a huge amount of memory
  - For example, I often choose 20%
- In the “sizing” tab, I shall leave the number of “processes” as the default 150
- In the “Character Set” tab, assuming using a Windows server:
  - Use “Unicode” and ”AL32UTF8” (you could use AL16UTF16, but the author does not recommend this as it is not the default standard)
  - Choose National Character Set AL16UTF16 (not UTF8, which is your only other option)

- Inside “Connection Mode” tab, choose the default (“Dedicated Server Mode”)
Typically, for Oracle 11G the values inside “All Initialization Parameters” are OK, so we will not make any changes
• Click “Next”
• At the “Database Storage” screen, choose your preferred values, then Next

TIP: Redo logs can have a large impact on performance. Therefore, please seriously consider not using redo logs, for maximum performance
• Inside “Creation Options” click “Finish”, then OK

This will start the Database creation process. When it is finished, click Exit.

5.3 Create Controller ‘Application Repository’ database

Now we shall create a database for the Controller 8 “Application” repository (where the important financial information is stored).

• Again, From the Start Menu, launch “Database Configuration Assistant”
• Select “Create a database”, then Next
• Choose “General Purpose or Transaction Processing” then Next
• Choose a sensible name (for example ‘ccr’) then Next:
  • In the “Management options”, configure as desired (typically accept the defaults), and click Next
  • Inside “Database Credentials”, choose a password (and remember the password!), then Next
  • Inside “Database File Locations”, configure as desired (typically accept the defaults), and click Next
  • Inside “Recovery Configuration” - typically click Next
  • Inside “Database Content” - typically click Next

“Initialization Parameters”:
• In the “memory” tab, allocate as much memory as possible to Controller
  o For example, I often choose 50%
• In the “sizing” tab, I shall leave the number of "processes" as the default 150
• In the “Character Set” tab, ensure that you choose WE8MSWIN1252:
  o Choose National Character Set AL16UTF16 (not UTF8, which is your only other option)
• Inside "Connection Mode" tab, choose the default ("Dedicated Server Mode")

Click on "All Initialization Parameters"

• Click "Show Advanced Parameters"

TIP:
• When inside the "all initialization parameters" screen, you can click on the "name" tab to sort alphabetically.
• If you do not remember to make these changes now, you can change them later by adjusting the values inside the "init.ora" file associated with the database (e.g. "D:\oracle\product\10.2.0\admin\ccr\pfile\init.ora.xxx")
The performance of your Oracle database can be increased by changing the default setting of the `optimizer_index_cost_adj` parameter.

- The official IBM Cognos install documentation recommends that you change the default setting (of 100) to a much smaller number, for example 5.

  TIP: This parameter works in conjunction with the Controller application 'server preference' IDX_COST_ADJ. This allows the possibility to tune Oracle server setting optimizer_index_cost_adj during the xdb query in report generator. The setting is reset to default value in current Oracle instance after xdb query. IBM Cognos recommends a setting between 4-20 but this must be evaluated carefully at each customer site.

- Also, change the value of `UTL_FILE_DIR` to fit the "Server Directory" value that you are going to use in the "Enhanced Reporting Optimisation" (ERO) section (used for "Optimise2") in the Cognos Controller Configuration Utility.
  - For example, here is my share:


- are OK, so we will not make any changes
- Click "Next"
- At the "Database Storage" screen, choose your preferred values, then Next

  TIP: Redo logs can have a large impact on performance. Therefore, please seriously consider not using redo logs, for maximum performance

- Inside "Creation Options" click "Finish", then OK

This will start the Database creation process
5.4 Optional - Create Controller ‘Data Mart’ database

If you intend to use the optional Controller feature ‘Publishing Data to a Data Mart’ then it is sensible to have a separate ‘dedicated’ database to store the data mart.

To do this, simply follow the exact same steps/process as described in the previous section ("Create Controller ‘Application Repository’ database") but call it a new name (for example "ccrdatamart" or whatever).

The only differences are:

- In the “memory” tab, you do not need to allocate as much memory
  - For example, choose 20%
- You do NOT need to create/alter the UTL_FILE_DIR value
6 Create Tablespaces

6.1 Install suitable SQL command line utility

The author prefers to use the built-in Oracle tool “SQL Developer”.

The first time you use this utility, you must configure it to connect to your database(s).

1. Click “Start” – “Programs” – “Oracle - OraDb11g_home1” – “Application Development” and launch “SQL Developer”
2. When prompted, browse to the location of JAVA.EXE
   
   For example: D:\app\Administrator\product\11.2.0\dbhome_1\jdk\jre\bin\java.exe

3. Choose ‘no’ to NOT migrate settings from a previous release
4. Typically, tick the box ‘SQL Source’ and then OK

5. Right-click on “Connections” and choose “New Connection”
6. Fill in the details as appropriate, for example:

![Database Connection Window]

7. Save
6.2 Create Controller default space (CONTROLLER_TABLE)

We need to create a single tablespace, because later we shall set it as the ‘default tablespace’ for exclusive use by the user account (schema) that accesses the Controller database.

**TIPS:**

- In theory you can name the table anything you desire.
  - However, IBM Support/ the author recommends that you use the table name "CONTROLLER_TABLE" to make it quicker/easier for us to support you
  - Whatever table name you choose, you *must* make a note of it, since you will need to tell IBM Cognos Support the table name if you want to receive quick support with sending them your database
- The new tablespace should ideally have ‘auto extend on’
  - However, you may get Oracle errors if the tablespace file exceeds 4Gb – check with your Oracle DBA for more info to see if this will be the case in your system
- It also may have extends autoallocate instead of using Uniform size (see examples).
- Unless you are using a controlled test environment, it is VITAL that you choose large estimates (for example at least 20Gb) for table sizes.
  - This is to avoid potential errors later
- It is recommended that the temporary tablespace for Controller is created using locally managed temp files with uniform extent sizes of 128K.
  - The 128K extent size is recommended because numerous modules such as consolidating make extensive use of global temporary tables, which also reside in the temporary tablespace. Since each user instantiates a temporary segment for these tables, large extent sizes may result in space allocation failures.
- If possible, place the tablespaces on separate disks from where the Oracle Home and the system tablespace are located.
  - Index tablespaces should be separated from data tablespaces.

For example:

- **Disk 0**: Operating System
- **Disk 1**: Oracle_home
- **Disk 2**: System tablespace, temp and Undo tablespace.
- **Disk 3**: Controller_table

- Again, I stress that the size of the tablespace(s) that we are creating are quite large. This is necessary! Please ensure that you do not restrict the sizes of the tablespace(s) unnecessarily, since the application probably will need large settings
- Also, monitor the size used/available periodically, to ensure there is enough left. This is especially relevant for the "TEMP" tablespace
• Launch ‘SQL Developer’ and highlight/select the relevant connection
  o In other words, ensure you are logged onto the Controller application repository database (for example ‘CCR’)
• Ensure that a white command/script window appears on the right:

    ![SQL Developer Interface](image)

• Copy and paste the following script in the white space:

    ```sql
    CREATE TABLESPACE CONTROLLER_TABLE
    DATAFILE 'D:\app\Administrator\oradata\ccr\CONTROLLER_TABLE.DBF'
    SIZE 20000M
    AUTOEXTEND ON NEXT 50M MAXSIZE 32000M
    NOLOGGING
    ONLINE
    PERMANENT
    EXTENT MANAGEMENT LOCAL AUTOALLOCATE
    BLOCKSIZE 8K
    SEGMENT SPACE MANAGEMENT MANUAL;
    ```

    **TIP:**
    • Naturally, modify the values (for example “CONTROLLER_TABLE” and the initial size of the files) if you want to
      o HOWEVER, again be aware of the advice that the author gave above, so do not modify the values above unless you have a specific need to do so

• Click on the button ‘Execute Statement (F9)’:

    ![Execute Statement](image)

    **NOTE:** It will take a few minutes (for example 5 mins) to create the large file that is mentioned, so be please be patient and **wait for the “tablespace created” message.**
6.3 Create Controller user/schema

Each separate Controller database connection will need a unique Oracle user/schema.

For example, imagine that you want to give users a choice of databases during logon called:

- default
- test
- training

In this case, you would create 3 Oracle users/schemas (for example called ‘controllerdefault’, ‘controllertest’ and ‘controllertraining’).

You create a new user/schema by running a modified version of the following script:

```
-- NOTE: Replace <user> and <password> with the user and password to be created.

create user <user>
  identified by <password>
  default tablespace controller_table;

grant create session, alter session, create table, create database
  link, create sequence, create trigger, create view, create procedure,
  create materialized view, create synonym, create job,
  select_catalog_role, unlimited tablespace to <user>;
grant execute on dbms_lock to <user>;
```

For example, run the following inside "SQL Developer":

```
create user controllerlive
  identified by c0ntroll3r
  default tablespace controller_table;

grant create session, alter session, create table, create database
  link, create sequence, create trigger, create view, create procedure,
  create materialized view, create synonym, create job,
  select_catalog_role, unlimited tablespace to controllerlive;
grant execute on dbms_lock to controllerlive;
```

Repeat for all Controller users/schemas that you wish to create.
6.4 Create Cognos 8 BI Report Server’s Content Store user/schema

The BI reporting engine requires a user/schema for its content store database. This requires different Oracle permissions.

Therefore, repeat the above but this time:

- Ensure you are logged onto the Content Store database (for example ‘CS’)
- Use a slightly different script such as:

```
CREATE USER "cognoscontentstore" PROFILE "DEFAULT" IDENTIFIED BY "mypassword"
DEFAULT TABLESPACE "USERS" ACCOUNT UNLOCK;
GRANT "CONNECT" TO "cognoscontentstore";
GRANT "RESOURCE" TO "cognoscontentstore";
GRANT CREATE ANY VIEW TO "cognoscontentstore";
GRANT DROP ANY VIEW TO "cognoscontentstore";
COMMIT;
```

In other words, something similar to:
7 Post-install performance tips and maintenance recommendations

7.1 Weekly scheduled optimise

The Finance department’s Controller super-user has the ability to “optimise” the database from within the Controller application itself. This is something that he/she should be doing fairly regularly.

In other words, the end-user should (fairly regularly) perform a database optimise (menu item in Controller) with the 'Analyze schema' option ticked, to ensure that performance is “tip-top”.

However, in addition, the Oracle DBA can play his/her part by regularly automatically running jobs to optimise the database.

Cognos 8 Controller provides an SQL procedure that analysis the schema in the Controller database and gathers the appropriate statistics, which Oracle requires for optimal performance.

It is recommend that you create a job (e.g. called “Analyze_Controller_Schema_week”) and schedule it to run automatically on a weekly basis.

An easy method to create this scheduled task is by running the following script:

```sql
DECLARE JOB BINARY_INTEGER;
BEGIN
  DBMS_SCHEDULER.create_job (job_name => 'Analyze_Controller_Schema_week', job_type => 'PLSQL_BLOCK', job_action => 'BEGIN
PRC_ANALYZE_SCHEMA; END;',
start_date => SYSTIMESTAMP,
repeat_interval => 'freq=weekly; byday=sat; byhour=9; byminute=0; bysecond=0;',
end_date => NULL,
enabled => TRUE,
comments => 'Analyze schema job to be run Saturdays 9:00 AM');
END;
```
7.2 Backups

The most important job that the customer’s I.T. department performs is to backup the user’s data.

Naturally, the Controller users/schemas must be backed up regularly (for example every night).

However, it is beyond the scope of this document to give advice on how best to backup Oracle databases / schemas.