Practice

Automating RMAN Backup Jobs

Practice Target

In this practice you will create automatic scheduled jobs that implement a sample database backup strategy.

Assumptions

- This practice assumes that you have `srv1` up and running from the **non-CDB** snapshot.
- It also assumed that the Windows `winsrv vm` is available.

A. Creating an Automatic Backup Job in Linux

Regardless of the backup strategy that you implement in any environment, it ends up with scheduling a backup job to run frequently in winsrv.

In the following steps you will create backup jobs in crontab to implement the following strategy:

- Backup policy is set to recovery window of 8 days. This means when an issue is raised, we can recover back to maximum 8 days.
- Every Friday night, an level zero incremental backup is created for the database at 10:00 pm.
- Every weekday, an incremental backup level 1 is taken for the database at 1:00 pm and at 8:00 pm.
- No backup is taken on Saturday and Sunday
- The archived log files are backed up with every database backup taken. They are deleted from their destination after being backed up.
- Obsolete backups are deleted after every backup job is finished.
- The backup job logs must be checked every day to make sure jobs ran successfully over night.

Note

The target of this practice section is to demonstrate how to automate a backup job in Linux. This strategy is only a sample strategy. Do not blindly consider it for a production system. Any backup strategy should be agreed with the business.

Q: Based on this strategy, can we estimate how much is the RTO and RBO?

We cannot estimate the RTO from the information provided in the plan. RTO depends on the database size, the storage bandwidth, and the recovery scenario.

For the RBO, we can estimate is by assuming that an failure happened right away before taking the incremental backup. In our case, we plan to take an incremental backup level 1 every week day at 1:00 pm and at 8:00 pm.

So, if we assume a failure happened at 12:50 pm, we may lose the data changes from the failure point-in-time all the way up to 8:00 pm in the previous day. This is equivalent to nearly 17-hours worth of data. If we need to enhance this RBO, we could simply take the incremental backup more often.

1. Open RMAN and connect to the local database as target.

```
rman target /
```

2. Issue the following command to configure the retention policy to 8 days.

   Based on this policy, any backup files older than 8 days will be considered as obsolete.

```
CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 8 DAYS;
```

3. Configure the archived redo log file deletion policy to backup at least once.

   This policy assures that no archived redo log files are deleted by the DELETE ARCHIVELOG command until they are backed up at least once.

```
CONFIGURE ARCHIVELOG DELETION POLICY TO BACKED UP 1 TIMES TO DEVICE TYPE DISK;
```

4. Display the CONTROLFILE AUTOBACKUP configuration.

   CONTROLFILE AUTOBACKUP is enabled by default (in 12c and above). It is by default saved in the FRA. We are not going to change this configuration in our practice because we will already include manually backing up the control files and SPFILE in the automatic backup scripts.

   ```
   show CONTROLFILE AUTOBACKUP;
   show CONTROLFILE AUTOBACKUP FORMAT;
   ```

5. Exit from RMAN.

   ```
   exit
   ```

6. As oracle user, create a directory to save the script files in it.

   ```
   cd
   mkdir scripts
   ```

7. Create a directory to save the backup files in it.

   ```
   mkdir -p /media/sf_staging/backups/oradb
   ```

8. Create a script that calls RMAN and executes the incremental backup level zero, as follows:

   ```
   vi ~/scripts/rman_script0.sh
   ```

   ```
   #!/bin/bash
   ORACLE_SID=oradb; export ORACLE_SID
   ORACLE_HOME=/u01/app/oracle/product/19.0.0/db_1; export ORACLE_HOME

   $ORACLE_HOME/bin/rman log=/media/sf_staging/backups/oradb/rman0.log append <<EOF
   connect target '/ AS SYSBACKUP';
   set echo on;
   run {
    BACKUP DEVICE TYPE disk
    INCREMENTAL LEVEL 0 FORMAT '/media/sf_staging/backups/oradb/DB0%U.bk' DATABASE TAG
   'DBLVL0' ;
   DELETE NOPROMPT OBSOLETE device type disk ;
   BACKUP DEVICE TYPE disk
     CURRENT CONTROLFILE TAG 'ORADBCTL' FORMAT '/media/sf_staging/backups/oradb/CTL%U.bk'
     SPFILE TAG 'ORADBSPFILE' FORMAT '/media/sf_staging/backups/oradb/SPFILE%U.bk';
   BACKUP DEVICE TYPE disk ARCHIVELOG ALL TAG 'ORADBARCH' FORMAT
   '/media/sf_staging/backups/oradb/ARC%U.bk' DELETE ALL INPUT;
   }
   exit;
   ```

9. Set the execution permission on the file.

   ```
   chmod 774 /home/oracle/scripts/rman_script0.sh
   ```

10. Create a script that calls RMAN and executes the incremental backup level 1, as follows:

```
vi ~/scripts/rman_script1.sh
```

```
#!/bin/bash
ORACLE_SID=oradb; export ORACLE_SID
ORACLE_HOME=/u01/app/oracle/product/19.0.0/db_1; export ORACLE_HOME

$ORACLE_HOME/bin/rman log=/media/sf_staging/backups/oradb/rman1.log append <<EOF
connect target '/ AS SYSBACKUP';
set echo on;
run {
BACKUP DEVICE TYPE disk
 INCREMENTAL LEVEL 1 FORMAT '/media/sf_staging/backups/oradb/DB0%U.bk' DATABASE TAG
'DBLVL1' ;
DELETE NOPROMPT OBSOLETE device type disk ;
BACKUP DEVICE TYPE disk
  CURRENT CONTROLFILE TAG 'ORADBCTL' FORMAT '/media/sf_staging/backups/oradb/CTL%U.bk'
  SPFILE TAG 'ORADBSPFILE' FORMAT '/media/sf_staging/backups/oradb/SPFILE%U.bk';
BACKUP DEVICE TYPE disk ARCHIVELOG ALL TAG 'ORADBARCH' FORMAT
'/media/sf_staging/backups/oradb/ARC%U.bk' DELETE ALL INPUT;
}
exit;
```

11. Set the execution permission on the file.

```
chmod 774 /home/oracle/scripts/rman_script1.sh
```

12. Open the oracle account crontab file and add the line that follows to it.

This schedule is the implementation of the required backup strategy.

After inserting the code, you can exit the same way you exit from vi.

```
# execute the following command then press on [i] button to enter into the INSERT mode:
crontab -e
```

```
# add the following two lines to it:
00 22 * * FRI  /bin/sh /home/oracle/scripts/rman_script0.sh
>>/home/oracle/scripts/rman_lvl0.log 2>&1
00 13,20 * * 1,2,3,4 /bin/sh /home/oracle/scripts/rman_script1.sh
>>/home/oracle/scripts/rman_lvl1.log 2>&1
```

In some recovery scenarios, DBID value is required. Therefore, it is recommended that we save its value in the backup destination directory.

13. Invoke RMAN and login to the local DB as target. Highlight the DBID to copy it to the clipboard, then exit from RMAN.

```
rman target /
exit
```

14. Save the DBID in a file in the backup destination.

```
vi /media/sf_staging/backups/oradb/DBID.txt
```

It is also recommended that we have a text copy of the control file.

15. Invoke SQL*Plus and login to the database as sysdba.

```
sqlplus / as sysdba
```

16. Submit the following statement to create a text copy of the control file into the backup destination directory. Then exit from SQL*Plus

This statement produces SQL statements that can later be used to re-create your control file.

```
ALTER DATABASE BACKUP CONTROLFILE TO TRACE;

exit
```

17. View the alert log to determine the name and location of the trace file.

```
tail /u01/app/oracle/diag/rdbms/oradb/oradb/trace/alert_oradb.log
```

18. Copy the generated trace file to the backup directory.

```
cp /u01/app/oracle/diag/rdbms/oradb/oradb/trace/oradb_ora_<***>.trc
/media/sf_staging/backups/oradb/
```

19. View the generated trace file to have an idea about its contents.

```
vi /u01/app/oracle/diag/rdbms/oradb/oradb/trace/oradb_ora_<***>.trc
```

Now the scripts are ready, let's test them.

20. Execute the command added to the crontab. Wait till the command finishes.

```
/home/oracle/scripts/rman_script0.sh >>/home/oracle/scripts/rman_lvl0.log 2>&1
```

21. Check out the contents of the log file. If there is any error reported in the log file, fix it and perform the previous step again.

In a production system, you need to check the contents of the log file every time a backup is made. Consider automating sending it to your email.

```
vi /media/sf_staging/backups/oradb/rman0.log
```

22. Invoke RMAN and login to the local database as target.

```
rman target /
```

23. List the backupsets taken by running the script.

```
LIST BACKUPSET ;

quit
```

Clean up

24. Delete backups folder from the sharing folder.

```
rm -rf /media/sf_staging/backups
```

25. Shut down srv1 and restore it from the "**oradb non-CDB database**" snapshot.

B. Creating an Automatic Backup Job in Windows Platform

In the following steps you will create a job that takes a full backup to the database every midnight in winsrv.

Note

The target of this practice section is to demonstrate how to automate a backup job in Windows platform. In a production system, depending on the backup strategy, we may need to change the job batch file contents or create multiple jobs (as we did in the previous practice section).

Note

In Oracle VirtualBox, make sure a snapshot is taken for winsrv. If there is not snapshot for it, take a snapshot for it before starting this section.

26. Login as oracle user to winsrv.

27. Open a command-line window, invoke SQL*Plus and login to the database as SYS.

```
sqlplus / as sysdba
```

28. Retrieve the FRA destination.

The FRA is pointed to D:\oracle\app\oraclesvc\fast_recovery_area\ORAWINDB

```
show parameter DB_RECOVERY_FILE_DEST
```

29. Open the file browser and change its current folder to the following folder.

D:\oracle\app\oraclesvc\fast_recovery_area\ORAWINDB

30. Create a new folder in it and name it as scripts

31. Change the settings of the File Explorer to show file extensions.

32. Create a file in the new file and name it as rman.bat

33. Open the file with notepad (right-click on the file -> edit) and add the following code to it:

```
set ORACLE_SID=ORAWINDB
set ORACLE_HOME=D:\oracle\product\19.0.0\db_1

%ORACLE_HOME%\bin\rman
cmdfile=D:\oracle\app\oraclesvc\fast_recovery_area\ORAWINDB\scripts\rman.ora
log=D:\oracle\app\oraclesvc\fast_recovery_area\ORAWINDB\scripts\rman.log append
```

34. Create a new file and name it as `rman.ora`

35. Open the file with notepad and add the following code to it.

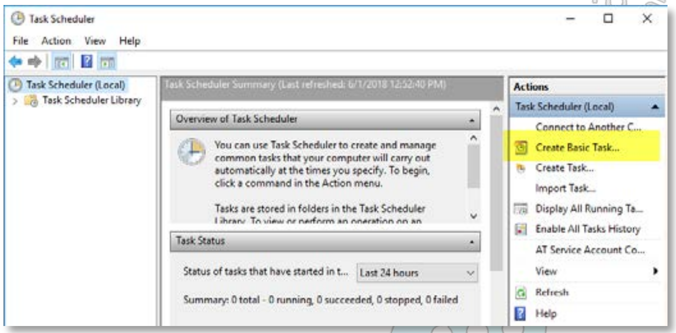
Because the database is running in NOARCHIVELOG mode, we must mount the database before taking backup of it.

```
connect target '/ AS SYSBACKUP';
SET ECHO ON;
shutdown immediate
startup mount
run {
  BACKUP DATABASE TAG 'FULL_DB';
}
ALTER DATABASE OPEN ;
Exit;
```

36. Open "**Task Scheduler**".

In `winsrv`, press on [Windows] button on the keyboard then type "task". Windows should display the "Task Scheduler" shortcut for you.

37. In "Task Scheduler", perform the steps as demonstrated in the following screenshots:



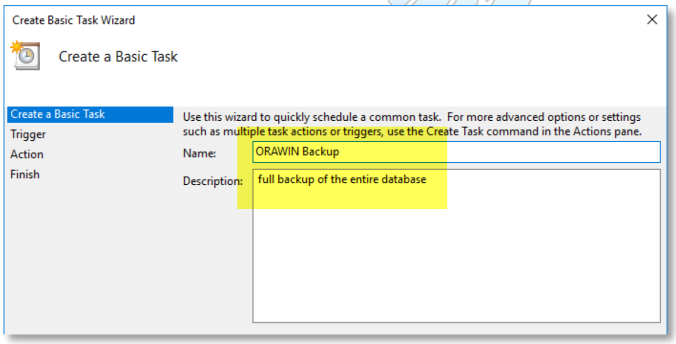
Task Scheduler Summary (Last refreshed: 6/1/2018 12:52:40 PM)

You can use Task Scheduler to create and manage common tasks that your computer will carry out automatically at the times you specify. To begin, click a command in the Action menu.

Tasks are stored in folders in the Task Scheduler Library. To view or perform an operation on an

Status of tasks that have started in t... Last 24 hours

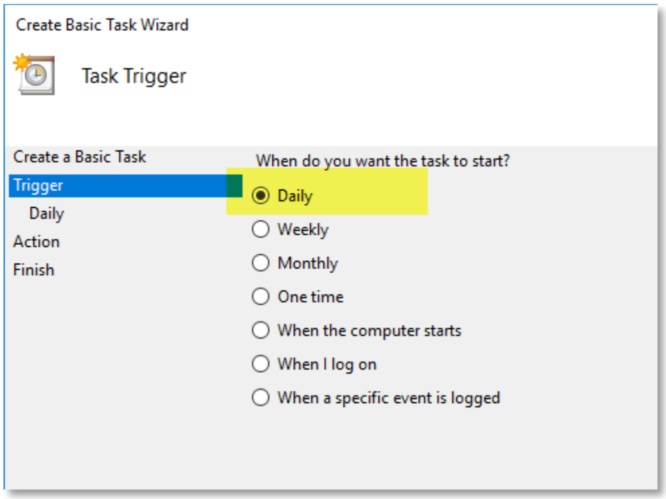
Summary: 0 total - 0 running, 0 succeeded, 0 stopped, 0 failed



Use this wizard to quickly schedule a common task. For more advanced options or settings such as multiple task actions or triggers, use the Create Task command in the Actions pane.

Name: ORAWIN Backup

Description: full backup of the entire database

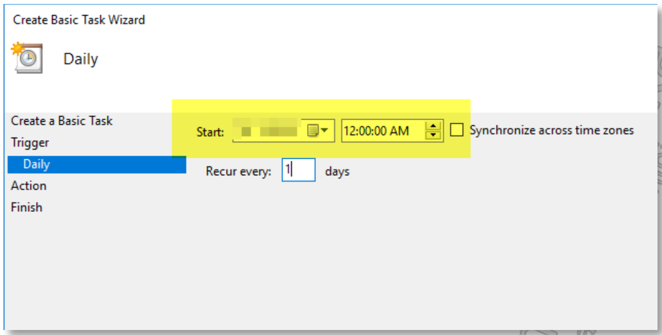


Create Basic Task Wizard

Task Trigger

When do you want the task to start?

- ● Daily
- ○ Weekly
- ○ Monthly
- ○ One time
- ○ When the computer starts
- ○ When I log on
- ○ When a specific event is logged

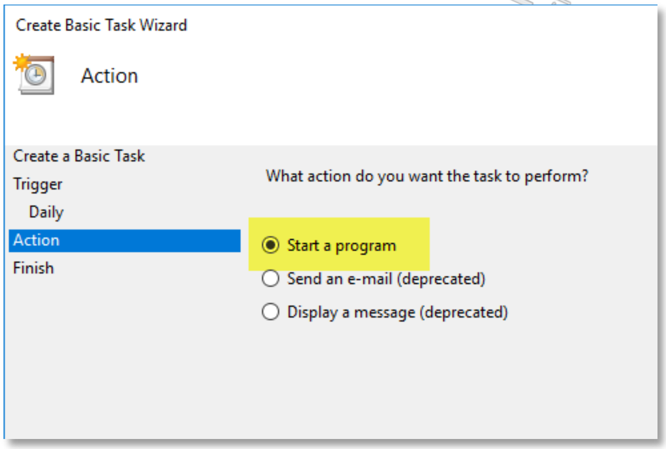


Create Basic Task Wizard

Daily

Start: [redacted] 12:00:00 AM □ Synchronize across time zones

Recur every: 1 days



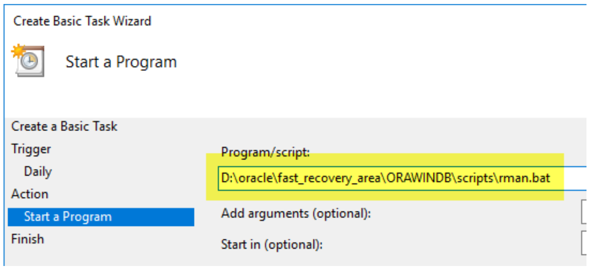
Create Basic Task Wizard

Action

What action do you want the task to perform?

- ● Start a program
- ○ Send an e-mail (deprecated)
- ○ Display a message (deprecated)

```
D:\oracle\fast_recovery_area\ORAWINDB\scripts\rman.bat
```



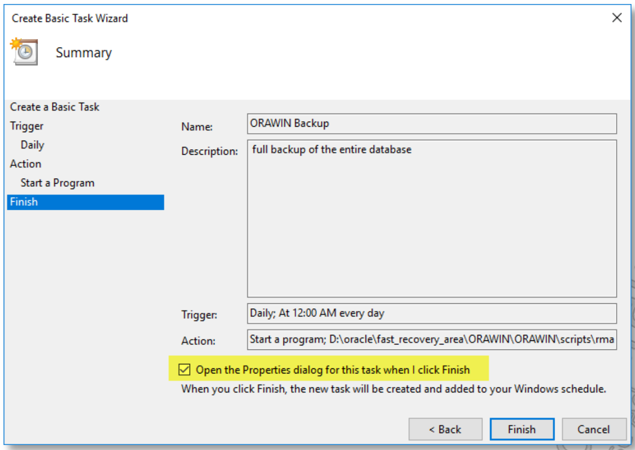
Create Basic Task Wizard

Start a Program

Program/script: D:\oracle\fast_recovery_area\ORAWINDB\scripts\rman.bat

Add arguments (optional):

Start in (optional):



Create Basic Task Wizard

Summary

Name: ORAWIN Backup

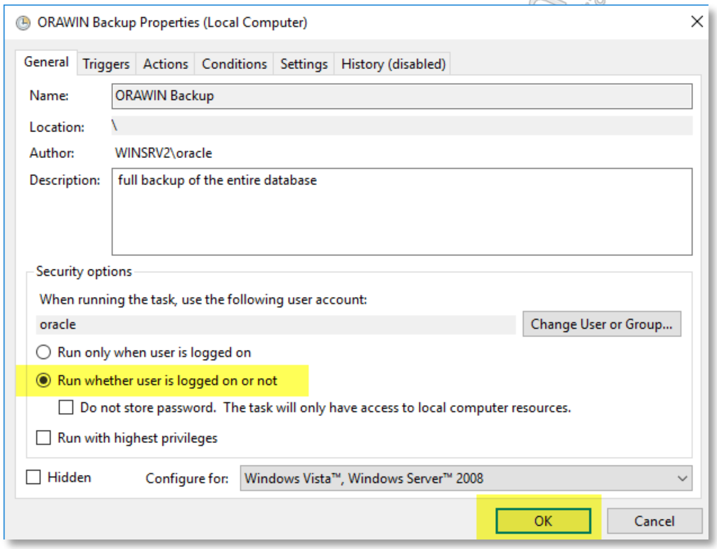
Description: full backup of the entire database

Trigger: Daily; At 12:00 AM every day

Action: Start a program; D:\oracle\fast_recovery_area\ORAWIN\ORAWIN\scripts\rma

☑ Open the Properties dialog for this task when I click Finish

When you click Finish, the new task will be created and added to your Windows schedule.



ORAWIN Backup Properties (Local Computer)

Name: ORAWIN Backup

Location: \

Author: WINSRV2\oracle

Description: full backup of the entire database

Security options

When running the task, use the following user account:

oracle

○ Run only when user is logged on

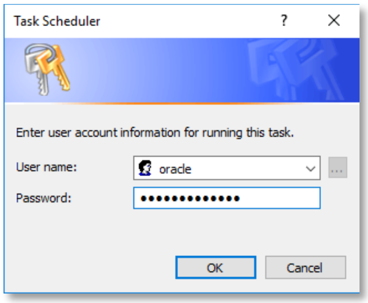
● Run whether user is logged on or not

□ Do not store password. The task will only have access to local computer resources.

□ Run with highest privileges

□ Hidden

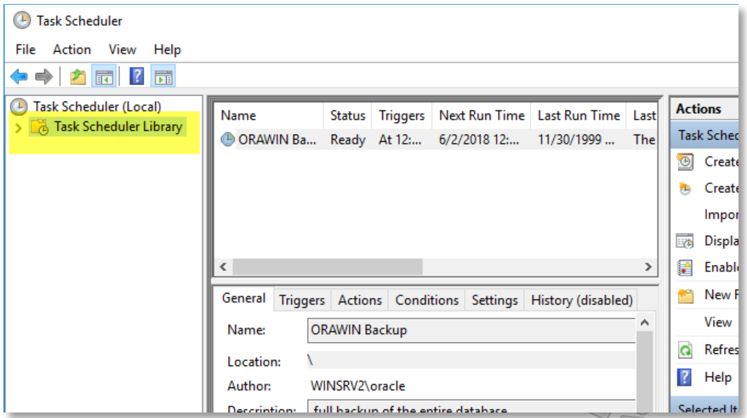
Configure for: Windows Vista™, Windows Server™ 2008



Enter user account information for running this task.

User name: oracle

Password: •••••••••••••



Name	Status	Triggers	Next Run Time	Last Run Time	Last
ORAWIN Ba...	Ready	At 12:...	6/2/2018 12:...	11/30/1999 ...	The

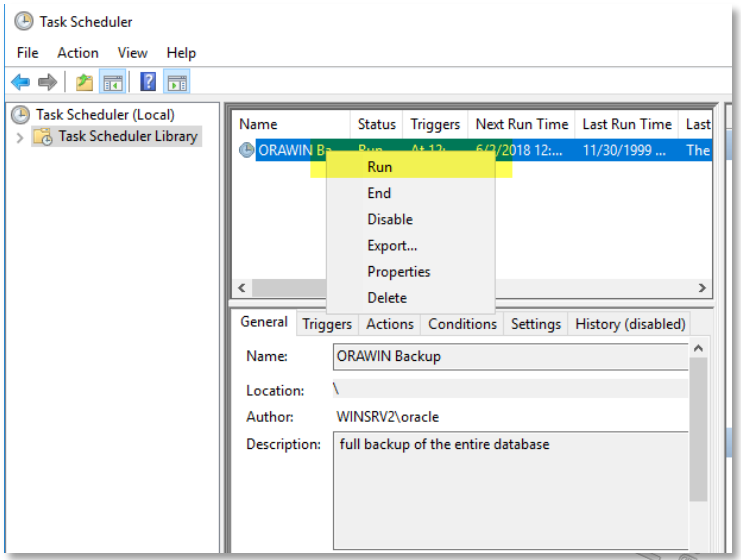
Name: ORAWIN Backup

Location: \

Author: WINSRV2\oracle

Description: full backup of the entire database

38. Test the task. Right-click on it and select "**Run**" from the display drop-down list. The status of the Job should turn into "Running".



Name	Status	Triggers	Next Run Time	Last Run Time	Last
ORAWIN Ba	Run	At 12:	6/2/2018 12:...	11/30/1999 ...	The

Name: ORAWIN Backup

Location: \

Author: WINSRV2\oracle

Description: full backup of the entire database

39. Check out the FRA folder. You should see the following sub-folders created by RMAN in it. Check out their contents.

BACKUPSET

AUTOBACKUP

40. Check out the contents of `rman.log` file. It should contain output of the job execution.

Clean up

41. Shutdown `winsrv` and restore it from its snapshot.

Summary

In this practice, you gained practical experience on performing the following tasks:

- Automate RMAN backup jobs in Linux using crontab
- Automate RMAN backup jobs in Windows platform using Task Scheduler