

Oracle Database Upgrade

Fallback Strategies In Action

Hector Vieyra
Software Development Manager
Database Upgrades
Oracle Corporation



01-AUG-2019

ORACLE

A little bit about us



Software Development Manager at Oracle

- An Oracle senior level DBA with more than 15 years of experience
- Contributing as software engineer for Database Upgrade & Installer and Assistants team (DBUA, DBCA, ASMCA)
- Broad range of experience in architecting, designing, implementing, managing and supporting complex business critical databases and related server infrastructure on transnational companies like Bank Of America Merrill Lynch, General Electric and Cadbury Adams.
- Ample experience in different Oracle database technologies like data guard, rac and Exadata



Principal Member of Technical Staff at Oracle, Database Upgrade Development Team


- From Guatemala
- 15+ years of experience as DBA and as a Software developer.
- OCP and OCE GI & RAC
- Software architect.
- Consultant for companies such as Banco Santander, InterAmerican Development Bank, Bank of America, etc.
- Upgrade/downgrade and migrations specialist, RAC, high availability and Exadata.
- SME Oracle on Windows.
- Preupgrade developer at Database Upgrade Development team

Slides Download and Resources

- <https://MikeDietrichDE.com/slides>

Upgrade your Database – NOW!

Mike Dietrich's Blog About Oracle Database Upgrades... Mostly



Blog Slides **Highlighted** Home Contact Us Events Papers Books News Scripts Blog Oracle Documentation Privacy Policy About

Slides Download Center

Share this:

*** Click on the pictures get to the download page for each slide deck **

- Current and Comprehensive Slide Decks
- AOUG – Austrian User Group Conference 2018
- RMOUG, DOUG, OUGN, Ireland OUG, Meetup Paris 2018

Recent Posts

- Patching Oracle Database 18.1.0 to 18.2.0 on premises June 21, 2018
- Installing Oracle Database 18c June 20, 2018
- Deinstalling Oracle Database 12.2.0.1 June 19, 2018
- Upgrade Oracle 12.2.0.1 to Oracle Database 18c on-premises June 18,



Considerations

Fallback Introduction

Photo by [asoggetti](#) on [Unsplash](#)

Considerations

- Service Level Agreements



- COMPATIBLE Change?



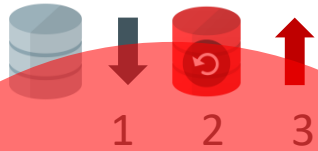
Fallback Strategy – COMPATIBLE



- Recommendation:
 - Update COMPATIBLE **7-10 days** after upgrade
- Why wait?
 - Allows fallback options: downgrade, flashback
- Why change?
 - Enable new features (e.g. online datafile move, sharding etc)
 - Minimum COMPATIBLE for 18c is 11.2.0
 - COMPATIBLE is independent of OPTIMIZER_FEATURES_ENABLE
- How?
 - `alter system set compatible='18.0.0' scope=spfile;`
 - **Restart = downtime!**

Fallback Strategy – Install and Patching

Update in Place



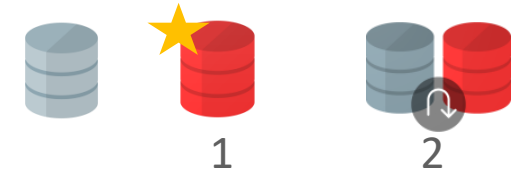
- Complex
- Error prone
- Longest down-time and maintenance window
- No fallback
- No standardization

Clone, Update and Switch



- Complex
- Error prone
- Shorter down-time and maintenance window
- Built-in Fallback
- No standardization

Deploy Gold Image, Switch



- Build gold image once, use everywhere
- Fewest steps, simplest process
- Shorter down-time and maintenance window
- Built-in Fallback
- Built-in standardization




Database Upgrade Blog - Fallback Exercises

▪ <https://MikeDietrichDE.com/hands-on-lab/hol-18c-fallback-strategies/>

Upgrade your Database – NOW!

Mike Dietrich's Blog About Oracle Database Upgrades... Mostly



Blog Slides **Hands-On Lab** Events Papers / Docs Videos Scripts Links Oracle Documentation Privacy Policy About

HOL 18c – Fallback Strategies

In the **Fallback Strategies** part of our Hands-On Lab you will explore different Fallback Strategies. For this exercise you will use the FTEx database, an Oracle 11.2.0.4 database.

We divide the **Fallback Strategies** for database upgrades basically in **two areas**:

- Protection for issues **during** upgrade
- Protection for issues **after** upgrade

In each section you will be able to try two different fallback techniques.

Generally it is very important to take some considerations.


Considerations

Blog Slides **Hands-On Lab** Events Papers / Docs Videos Scripts Links Oracle Documentation Privacy Policy About

HOL 18c – Fallback – Issues During Upgrade

Protection for issues during upgrade

In this part you'll use two techniques to protect your database for **issues happening during the upgrade**. Or simply, if you'd like to test multiple times.



You will evaluate two options: **Partial Offline Backups** and **Guaranteed Restore Points**.


- **Partial Offline Backup**
 - Solution:
 - Restore partial offline Backup
- **Guaranteed Restore Point**
 - Solution:
 - Flashback to GRP

Blog Slides **Hands-On Lab** Events Papers / Docs Videos Scripts Links Oracle Documentation Privacy Policy About

HOL 18c – Fallback – Issues After Upgrade

Protection for issues after upgrade

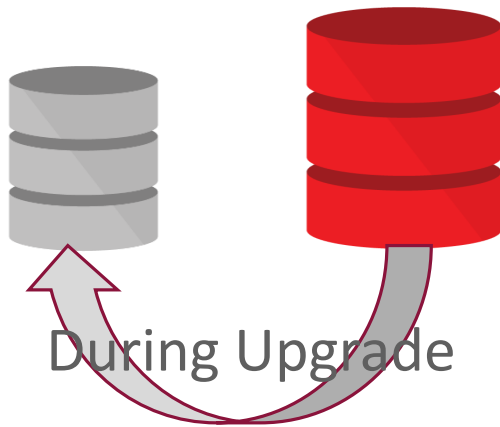
In this part you'll use again two techniques to protect your database, but this time for **issues happening after the upgrade**. You can call this also "Downgrade".



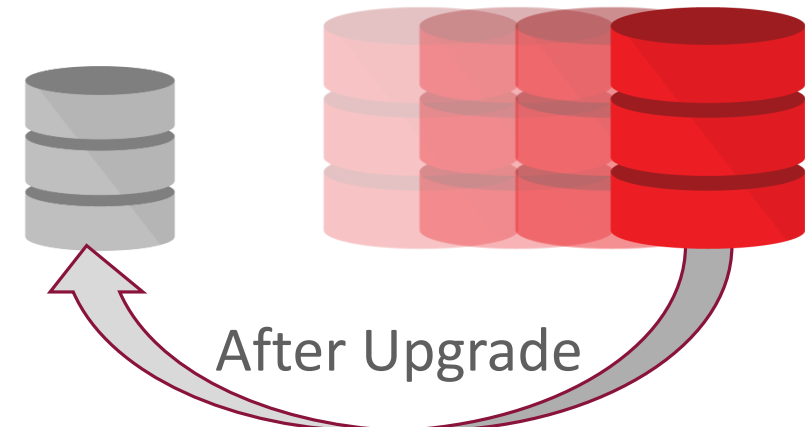
1. Downgrade with a Full Database Export and Import

Protection

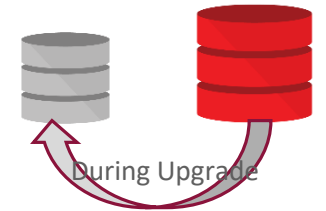
- Issues **during** upgrade



- Issues **after** upgrade



Fallback Strategy – Issues **during** upgrade



- **Online Backup**

- Solution:
 - Restore online backup
- Recommendation:
 - Mandatory strategy



- **Partial Offline Backup**

- Solution:
 - Restore partial offline Backup
- Recommendation:
 - Only for VLDBs and databases in NOARCHIVELOG mode
 - For Standard Edition DBs



- **Guaranteed Restore Point**

- Solution:
 - Flashback to GRP
- Recommendation:
 - Very fast, simply - but EE only



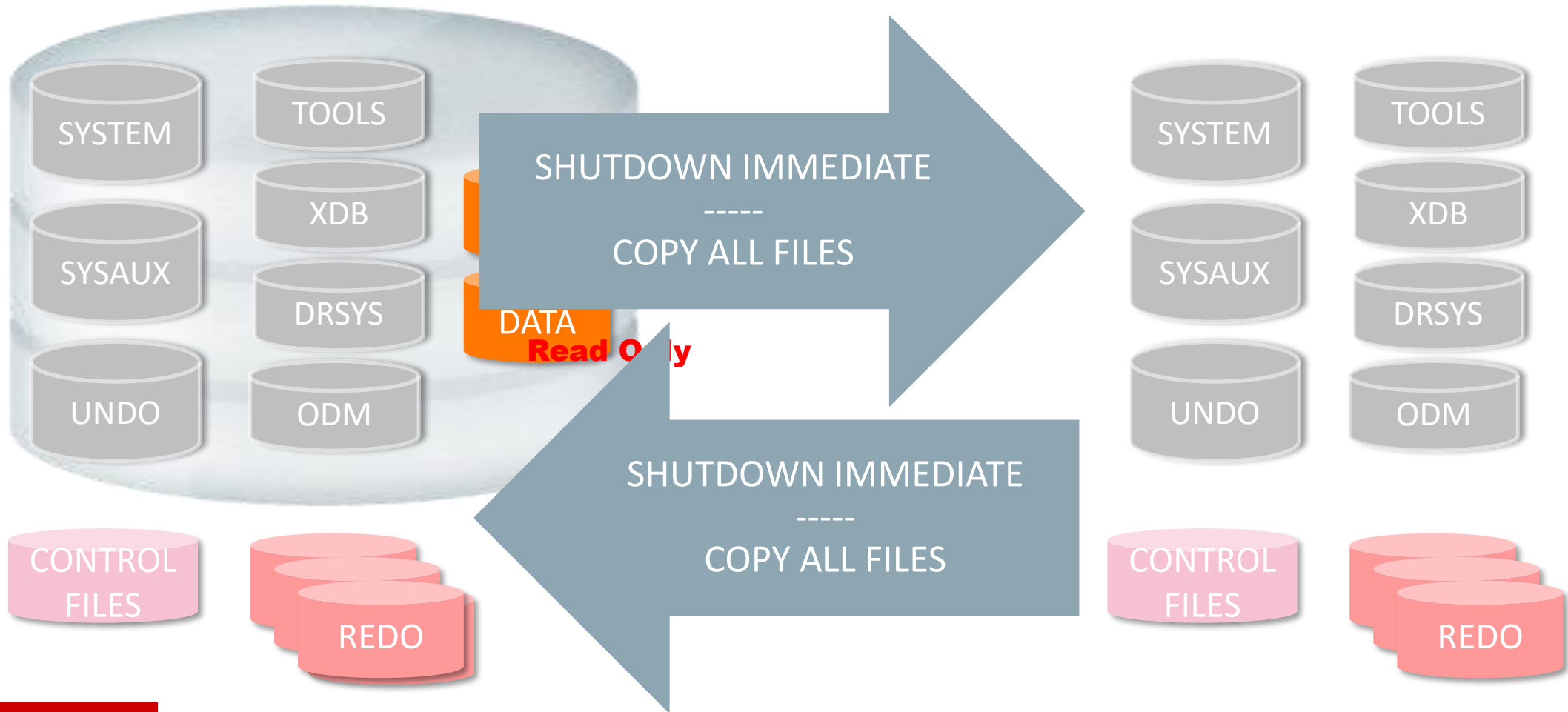
Fallback: **Online Backup**

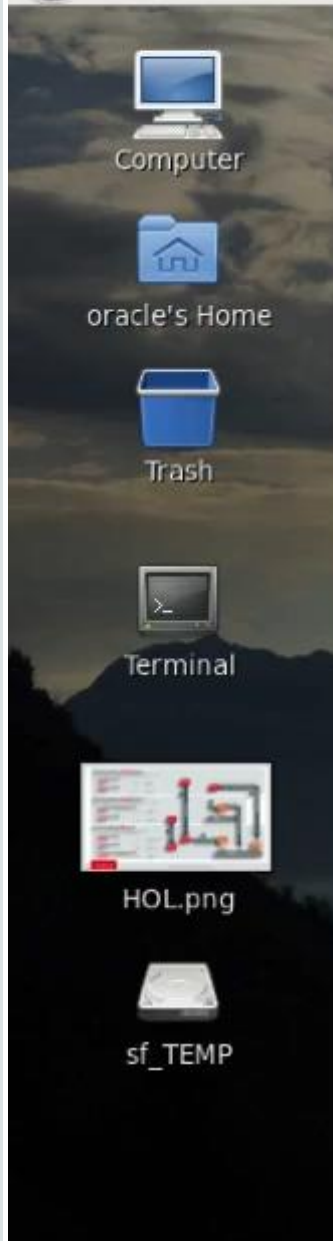
- Strategy: Restore a backup and recover
 - Complete online backup (RMAN)
 - Please verify:
 - Where is your backup located? Tapes, HD, off site...
 - Does the restore work?
 - How long will the restore take?
 - How long will the recovery take?
 - Recommendation:
 - Have a valid online backup in any case – **and test the restore/recovery!!!**



Fallback: Offline Backup

- Restore a **partial** offline backup





SQL*Plus - Partial Offline Backup

File Edit View Search Terminal Tabs Help

SQL*Plus - Partial Offline Backup Command Prompt

```
$ s
```

SQL*Plus: Release 11.2.0.4.0 Production on Thu Nov 29 10:14:42 2018

Copyright (c) 2003, 2011 Oracle Corporation
All rights reserved.


Connected to Oracle Database 11g Enterprise Edition (11.2.0.4.0) on Thu Nov 29 2018
With the current configuration there are three database roles for the user SYSDBA
and Real Application Clusters (RAC) options.

```
SQL> █
```

Demo:
Partial Offline Backup

Fallback: Guaranteed Restore Point

- `COMPATIBLE` must not be changed

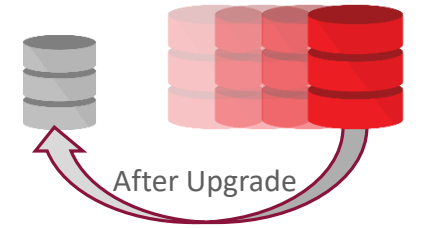
Pre Upgrade Environment	Post Upgrade Environment
<pre>CREATE RESTORE POINT grpt GUARANTEE FLASHBACK DATABASE;</pre>	
	
	<pre>SHUTDOWN IMMEDIATE</pre>
	<pre>STARTUP MOUNT;</pre>
	<pre>FLASHBACK DATABASE TO RESTORE POINT grpt;</pre>
	<pre>SHUTDOWN IMMEDIATE</pre>
<pre>STARTUP MOUNT;</pre>	
<pre>ALTER DATABASE OPEN RESETLOGS;</pre>	
<pre>DROP RESTORE POINT grpt;</pre>	

Computer
oracle's Home
Trash
Terminal
HOL.png
sf_TEMP

```
oracle@localhost:~  
File Edit View Search Terminal Help  
[FTEX] oracle@localhost:~  
$ █
```

Guaranteed Restore Point

Fallback Strategy – Issues **after** upgrade



▪ Data Pump

- Solution:
 - Reimport data
- Recommendation:
 - Simple but potentially slow



▪ Oracle GoldenGate

- Solution:
 - Apply changes to previous system
- Recommendation:
 - Fastest and best solution



▪ Downgrade

- COMPATIBLE change: **No**
- Solution:
 - Run the downgrade scripts
- Recommendation:
 - Fast and easy



Fallback: Data Pump

- Downgrade with `expdp/impdp`
- [MOS Note:553337.1](#)
 - Prepare an empty database for the import “just in case”
 - Then:
 - Run `expdp` from the 12.1 database home with the **VERSION** parameter equal to the target database `COMPATIBLE` setting
 - Import using `impdp` from the target database home
 - `NETWORK_LINK` can be used for downgrades as well

Overview of Data Pump dumpfile compatibility.

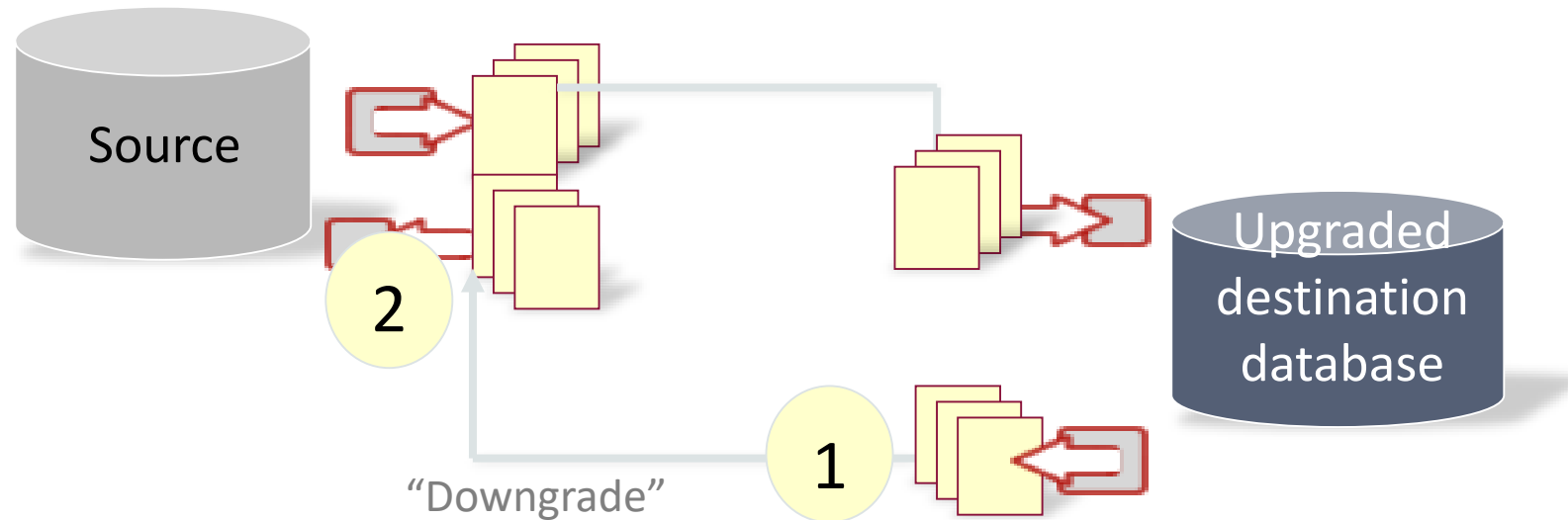
Export From Source Database With COMPATIBLE	Use Export Data Pump parameter VERSION=... if dumpfile needs to be imported into a Target Database with compatibility level (value of init.ora/spfile parameter COMPATIBLE):					
	10.1.0.x.y	10.2.0.x.y	11.1.0.x.y	11.2.0.x.y	12.1.0.x.y	12.2.0.x.y
10.1.0.x.y	-	-	-	-	-	-
10.2.0.x.y	VERSION=10.1	-	-	-	-	-
11.1.0.x.y	VERSION=10.1	VERSION=10.2	-	-	-	-
11.2.0.x.y	VERSION=10.1	VERSION=10.2	VERSION=11.1	-	-	-
12.1.0.x.y	VERSION=10.1	VERSION=10.2	VERSION=11.1	VERSION=11.2	-	-
12.2.0.x.y	VERSION=10.1	VERSION=10.2	VERSION=11.1	VERSION=11.2	VERSION=12.1	-

Fallback: Data Pump



Fallback: GoldenGate

- Downgrade with Oracle GoldenGate
 - Version/platform independent



Fallback: Downgrade

- Downgrade with `catdwgrd.sql`
- Resources:
 - Upgrade Guide – Downgrading a database to an earlier release:
<https://docs.oracle.com/en/database/oracle/oracle-database/18/upgrd/downgrading-oracle-db-after-upgrade.html>
 - MOS Notes about downgrade:
 - Oracle DB 18c - How to Downgrade a 18c Non CDB Database to Previous Release ([Doc ID 2416661.1](#))
 - Oracle 18c - How to Downgrade a Single Pluggable Oracle Database (PDB) from 18c Database to previous release ([Doc ID 2421060.1](#))
- Downgrade possible to:
 - Oracle 11.2.0.3 and up (non-CDB)
 - Oracle 12.1.0.2 and up (PDB)
- **Do not change** COMPATIBLE

Fallback: Downgrade

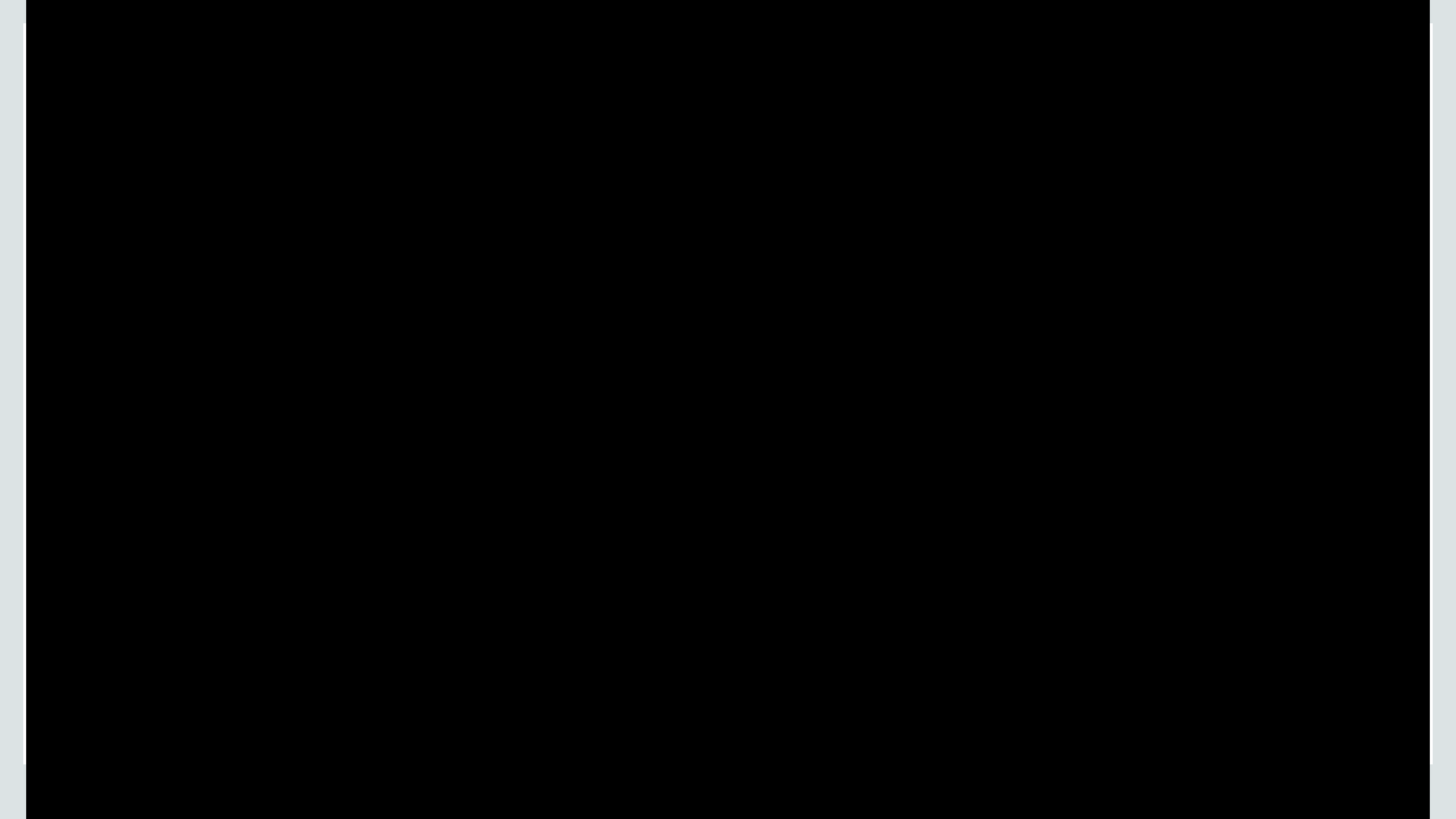
- Basic steps to downgrade with `catdwgrd.sql`

- In Oracle Database 18c environment:

```
SQL> SPOOL /tmp/downgrade.log
SQL> STARTUP DOWNGRADE
SQL> @catdwgrd.sql
SQL> SHUTDOWN IMMEDIATE
SQL> SPOOL OFF
```

- In Oracle Database 11.2.0.3 - 12.2.0.1 environment:

```
SQL> STARTUP UPGRADE
SQL> SPOOL /tmp/reload.log
SQL> @catrelod.sql
SQL> SPOOL OFF
```





Fallback is important

**Never approach an upgrade or migration
without testing your fallback options!**

Database Upgrade Blog

- <https://mikedietchde.com/category/fallback/>

Upgrade your Database – NOW!

Mike Dietrich's Blog About Oracle Database Upgrades... Mostly



Blog Slides Hands-On Lab Events Papers / Docs Videos Scripts Links Oracle Documentation Privacy Policy About

Category Archives: Fallback



Categories

Fallback (8)

Export – Import (1)

Fail Safe (1)

✓ Fallback (8)

Flaws and Pitfalls (50)

General (12)

GoldenGate (2)


Hands-On Lab (8)

Database Upgrade Blog - Slides Download

- <https://MikeDietrichDE.com/slides>

Upgrade your Database – NOW!

Mike Dietrich's Blog About Oracle Database Upgrades... Mostly



Blog Slides **Highlighted** Home Contact Us Privacy Policy About

Slides Download Center

Share this:

*** Click on the pictures get to the download page for each slide deck **

- Current and Comprehensive Slide Decks
- AOUG – Austrian User Group Conference 2018
- RMOUG, DOUG, OUGN, Ireland OUG, Meetup Paris 2018

Recent Posts

- Patching Oracle Database 18.1.0 to 18.2.0 on premises June 21, 2018
- Installing Oracle Database 18c June 20, 2018
- Deinstalling Oracle Database 12.2.0.1 June 19, 2018
- Upgrade Oracle 12.2.0.1 to Oracle Database 18c on-premises June 18,



Integrated Cloud

Applications & Platform Services

ORACLE®