

The New AutoUpgrade for Oracle Database

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Slides and more | <https://MikeDietrichDE.com>

Upgrade your Database – NOW!

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



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June 19, 2018
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The new AutoUpgrade

Hands-Free Upgrades to Oracle Database 19c

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Yesterday ...

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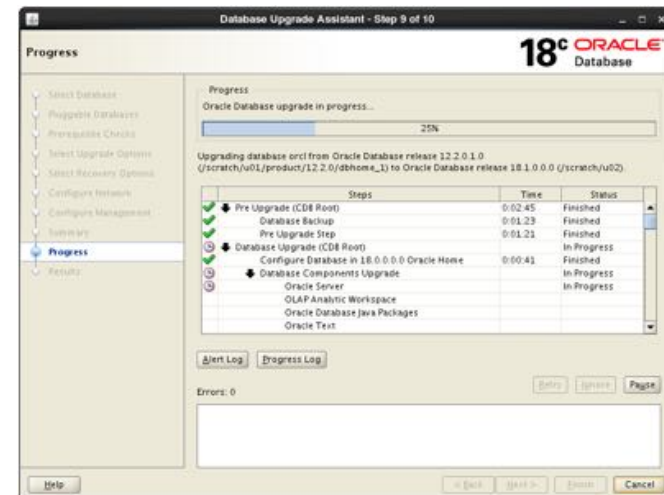
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AutoUpgrade Tool | Database Upgrade until 2018

- Command Line: dbupgrade

```
-----
Phases [0-108]          Start Time:[2018_07_26 08:37:32]
-----
***** Executing Change Scripts *****
Serial  Phase #:0      [UPGR] Files:1    Time: 105s
***** Catalog Core SQL *****
Serial  Phase #:1      [UPGR] Files:5    Time: 73s
Restart Phase #:2      [UPGR] Files:1    Time: 0s
***** Catalog Tables and Views *****
Parallel Phase #:3     [UPGR] Files:19   Time: 27s
Restart Phase #:4      [UPGR] Files:1    Time: 0s
***** Catalog Final Scripts *****
Serial  Phase #:5      [UPGR] Files:7    Time: 24s
***** Catproc Start *****
Serial  Phase #:6      [UPGR] Files:1    Time: 15s
***** Catproc Types *****
Serial  Phase #:7      [UPGR] Files:2
```

- Graphical Tool: DBUA





Tomorrow ...

Photo by [Wayne Lee-Sing](#) on [Unsplash](#)

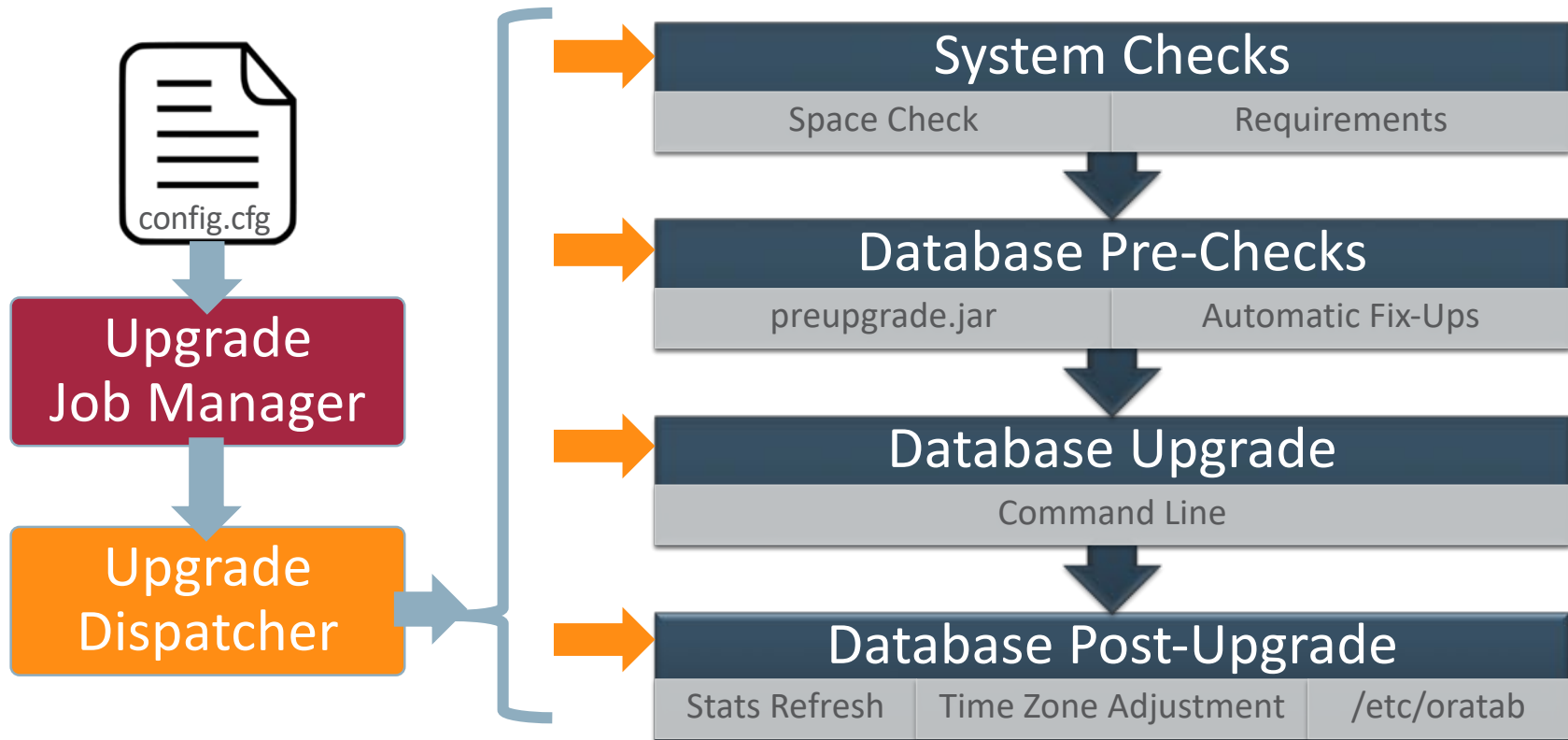
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The image shows a terminal window with a title bar that reads "autoupgrade.jar". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", "Tabs", and "Help". Below the menu bar, there are two tabs: "autoupgrade.jar" and "config.txt". The terminal content shows a command prompt "\$" followed by the command: `/u01/app/oracle/product/18/jdk/bin/java -jar autoupgrade.jar -config config.txt -mode deploy`. The cursor is at the end of the command.

AutoUpgrade Tool | Architecture



AutoUpgrade Tool | What do you need?

- Java 8 or newer
 - Default in your `$ORACLE_HOME` since 12.1.0.2
 - Check: `$ORACLE_HOME/jdk/bin/java -version`
- Oracle databases to upgrade
 - Minimum database version is 11.2.0.4
- The AutoUpgrade package
 - A `jar` file of <4 MB in size
- ARCHIVELOG mode ON

AutoUpgrade Tool | What we support

- Non-CDB and CDB upgrades
- All operating systems running Oracle Database servers
- Standard Edition 2 and Enterprise Edition
- Upgrades to version:
 - 12.2.0.1 with Jan 2019 Update or newer
 - 18.5.0 (includes Jan 2019 Update) or newer
 - 19.3.0 (includes April 2019 Update) or newer

AutoUpgrade Tool | Get the newest version of the tool

- [MOS Note: 2485457.1](#)

Benefits

AutoUpgrade enables customers to upgrade one or many Oracle databases at the command-line with a single command and a single configuration file. AutoUpgrade will run the preupgrade tasks, perform automated backups where necessary, perform the database upgrade, and finish by taking care of post-upgrade tasks. It includes automatic retry and fallback, the possibility to schedule upgrades for future points in time, and the ability to set, change or remove initialization parameters. AutoUpgrade saves time and money by upgrading hundreds of databases with one command and replacing bespoke high maintenance upgrade solutions.

As of the January 2019 Release updates (DBSANKG19RU) and beyond, AutoUpgrade Support is available for Oracle Database 12c Release 2 (12.2) and Oracle Database 18c (18.5) target homes. For both Oracle Database 12c Release 2 (12.2) and Oracle Database 18c (18.5) target homes, you must download the [AutoUpgrade Tool](#) and place it under \$ORACLE_HOME/utlms/admin.

In Oracle Database 19c (19.3) and later target Oracle homes, the autoupgrade.jar file exists by default. However, before you use AutoUpgrade, Oracle recommends that you download the [latest version](#) and replace the one already existing under \$ORACLE_HOME/utlms/admin.

Target versions supported

AutoUpgrade Tool can be used in upgrading to below Oracle Database releases:

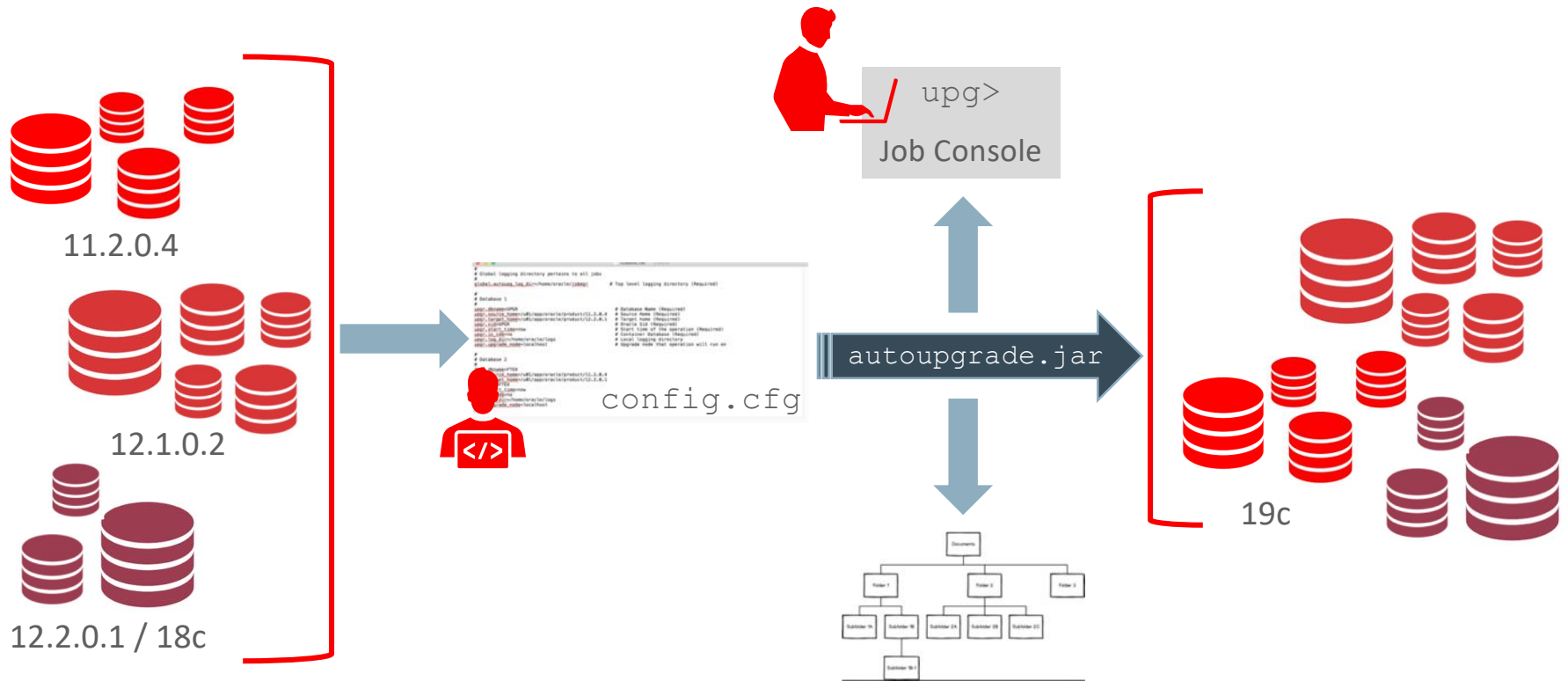
- Oracle Database 19c (19.3)
- Oracle Database 18c (18.5)
- Oracle Database 12c Release 2 (12.2 + DBSANKG19RU)

For supported source Oracle Databases releases to be upgraded to above target releases, refer to Database Server Upgrade/Downgrade Compatibility Matrix (Doc ID 551941.1)

AutoUpgrade documentation

Refer to [Oracle Upgrade Guide](#) for complete documentation about how to use AutoUpgrade tool.

AutoUpgrade Tool | What do you need to do?



AutoUpgrade Tool | What do you don't need?

- Agents
- EM Cloud Control
- Extra license

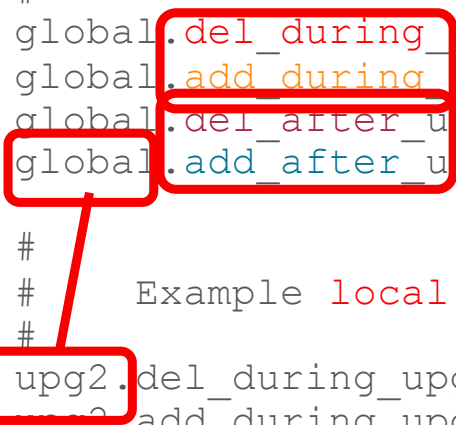
AutoUpgrade Tool | Create a configuration file

```
upg1.dbname=DB12
upg1.start_time=NOW
upg1.source_home=/u01/app/oracle/product/12.1.0.2
upg1.target_home=/u01/app/oracle/product/18.3.0
upg1.sid=DB12
upg1.log_dir=/home/oracle/aux/DB12
upg1.upgrade_node=localhost
upg1.target_version=18.3
```

```
upg2.dbname=UPGR
upg2.start_time=NOW
upg2.source_home=/u01/app/oracle/product/11.2.0.4
upg2.target_home=/u01/app/oracle/product/18.3.0
upg2.sid=UPGR
upg2.log_dir=/home/oracle/aux/UPGR
upg2.upgrade_node=localhost ...
```

AutoUpgrade Tool | But there are more options ...

```
#
#   Example global pfile configuration entries
#
global.del_during_upgrade_pfile=/database/pfiles/global_during_delinit.ora
global.add_during_upgrade_pfile=/database/pfiles/global_during_addinit.ora
global.del_after_upgrade_pfile=/database/pfiles/global_after_delinit.ora
global.add_after_upgrade_pfile=/database/pfiles/global_after_addinit.ora
#
#   Example local pfile configuration entries
#
upg2.del_during_upgrade_pfile=/database/pfiles/hr_during_delinit.ora
upg2.add_during_upgrade_pfile=/database/pfiles/hr_during_addinit.ora
upg2.del_after_upgrade_pfile=/database/pfiles/hr_after_delinit.ora
upg2.add_after_upgrade_pfile=/database/pfiles/hr_after_addinit.ora
```



AutoUpgrade Tool | Even more options ...

```
#  
#   Example global script execution  
#  
global.before_action=/database/scripts/run_this_before.sh  
global.after_action=/database/scripts/run_this_after.sh  
  
#  
#   Example local script execution  
#  
upg2.before_action=/database/scripts/run_this_on_UPG2_before.sh  
upg2.after_action=/database/scripts/run_this_on_UPG2_after.sh
```

- Permitted extension options:
 - Unix shell (.sh)
 - Microsoft Windows batch (.bat, .cmd)
 - Microsoft Windows PowerShell (.ps1)

AutoUpgrade Tool | Ok, there's still more ...

```
#  
#   Example global directive  
#  
global.remove_underscore_parameters  
  
#  
#   By default a GRP will be created. This option overwrites the default.  
#  
upgr2.restoration=no  
  
#  
#   If unset, utlrb.sql won't be run  
#  
upgr2.run_utlrb=no  
  
#  
#   If unset, time zone upgrade won't be performed  
#  
upgr2.timezone_upg=no
```

AutoUpgrade Tool | `START_TIME`

- VALID values

- now
- 30/12/2018 15:30:00
- 01/11/2019 01:30:15
- 2/5/2019 3:30:50

- INVALID values

- 30-12-2018 15:30:00
- 01/11/2019 3:30:15pm
- 2019/06/01 01:30:15

AutoUpgrade Tool | Before you start ...

```
sqlplus / as sysdba  
shutdown immediate;  
startup mount;  
alter system set db_recovery_file_dest_size=50G scope=both  
sid='*';  
alter system set db_recovery_file_dest='/u02/fra' scope=both  
sid='*';  
alter database archivelog;  
alter database open;  
alter pluggable database all open;
```


AutoUpgrade Tool | AutoUpgrade - 4 modes

`autoupgrade.jar`

`-analyze`

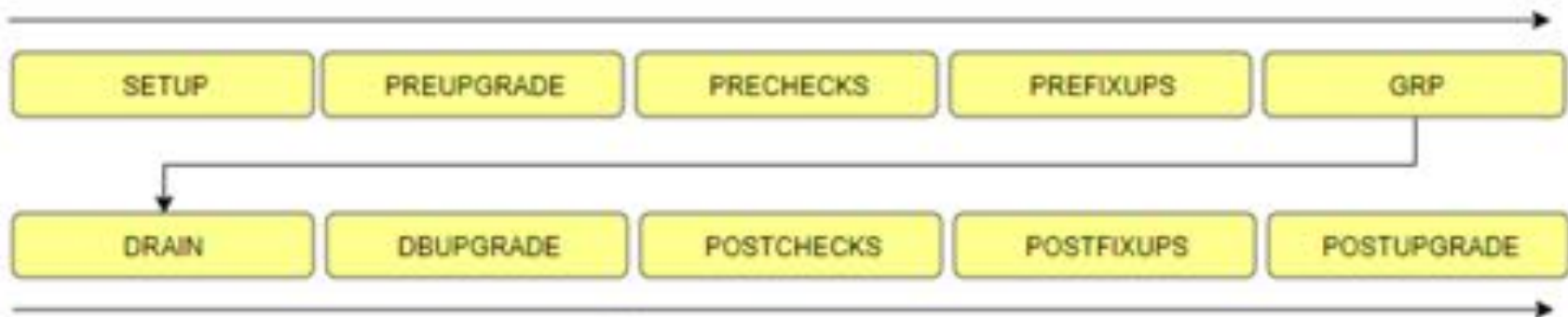
`-fixups`

`-upgrade`

`-deploy`

AutoUpgrade Tool | Deploy Mode

```
$ORACLE_HOME/jdk8/bin/java -jar autoupgrade.jar -config config.txt -mode deploy
```



AutoUpgrade Tool | Recommendation



autoupgrade.jar

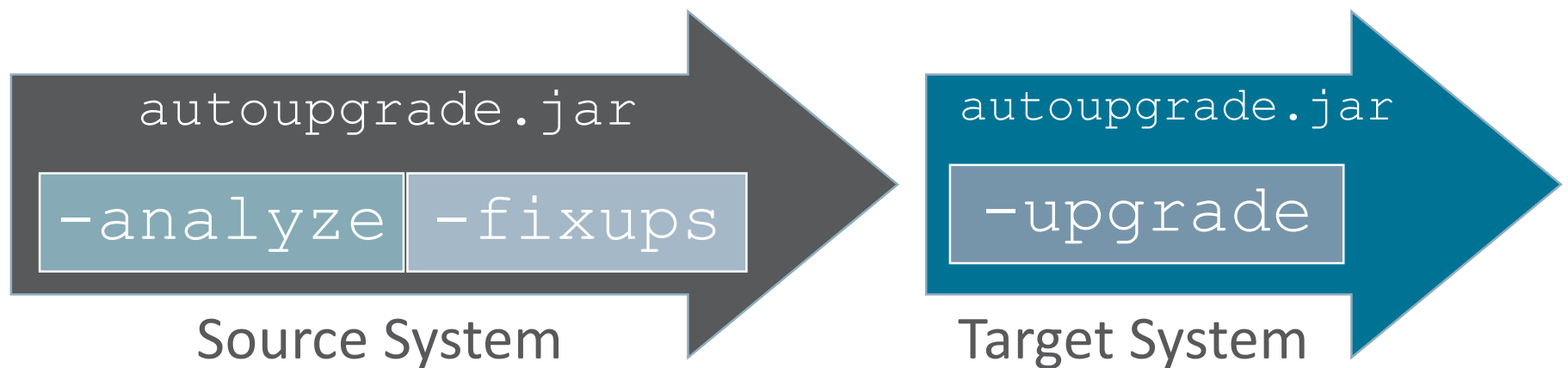
-analyze

-deploy

```
$ java -jar autoupgrade.jar -config config.cfg -mode analyze
```

```
$ java -jar autoupgrade.jar -config config.cfg -mode deploy
```

AutoUpgrade Tool | When you move to new hardware



```
$ java -jar autoupgrade.jar -config config.cfg -mode analyze
$ java -jar autoupgrade.jar -config config.cfg -mode fixups
$ java -jar autoupgrade.jar -config config.cfg -mode upgrade
```

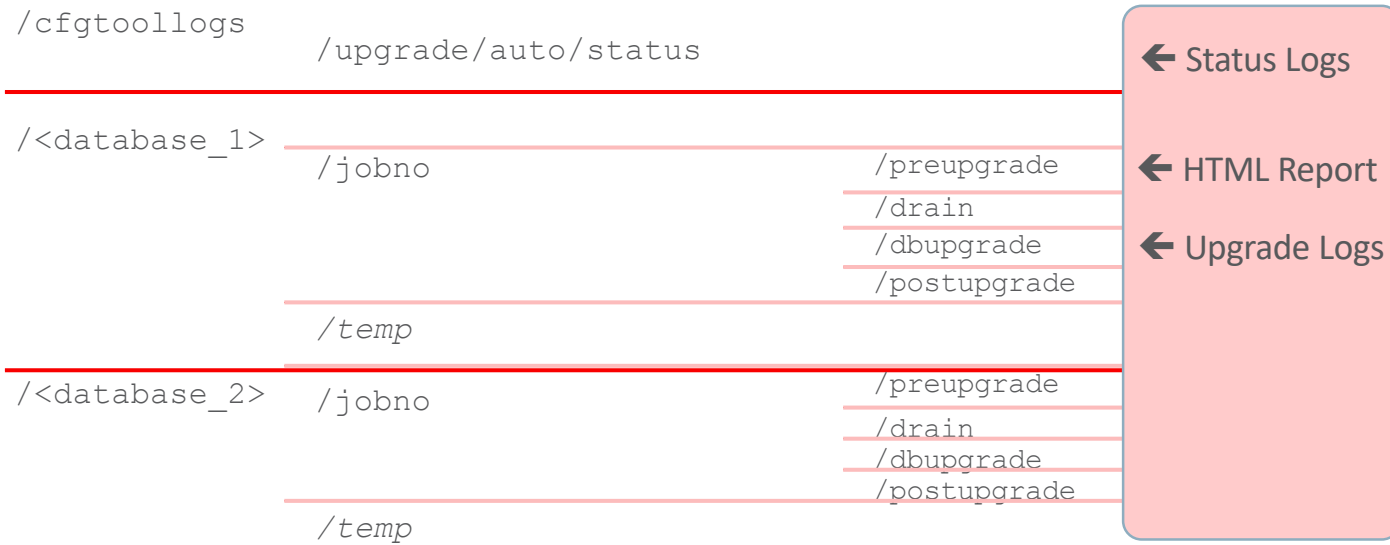

AutoUpgrade Tool | Job Control - Most Important Commands

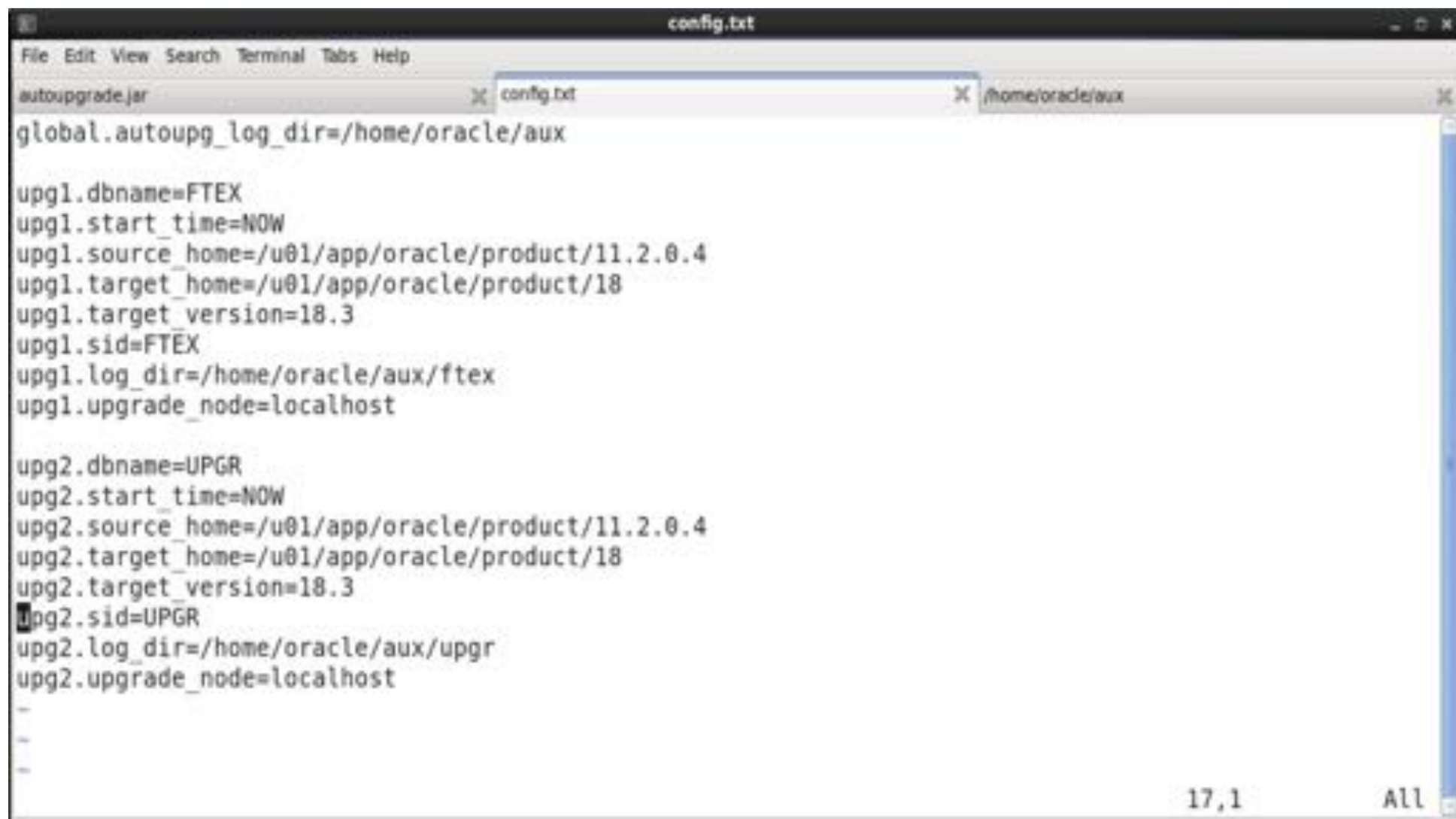
upg>

<code>lsj</code>		<code>// List jobs</code>
<code>resume</code>	<code>-job <number></code>	<code>// Restarts a job</code>
<code>status</code>	<code>[-job <number>]</code>	<code>// Show job status</code>
<code>restore</code>	<code>-job <number></code>	<code>// Restores database from GRP</code>
<code>abort</code>	<code>-job <number></code>	<code>// Aborts the specified job</code>

AutoUpgrade Tool | Logging

- Text and JSON format
- Directory structure





The image shows a text editor window titled "config.txt" with a menu bar (File, Edit, View, Search, Terminal, Tabs, Help) and three tabs: "autoupgrade.jar", "config.txt", and "/home/oracle/aux". The "config.txt" tab is active and contains the following configuration lines:

```
global.autoupg_log_dir=/home/oracle/aux

upg1.dbname=FTEx
upg1.start_time=NOW
upg1.source_home=/u01/app/oracle/product/11.2.0.4
upg1.target_home=/u01/app/oracle/product/18
upg1.target_version=18.3
upg1.sid=FTEx
upg1.log_dir=/home/oracle/aux/ftex
upg1.upgrade_node=localhost

upg2.dbname=UPGR
upg2.start_time=NOW
upg2.source_home=/u01/app/oracle/product/11.2.0.4
upg2.target_home=/u01/app/oracle/product/18
upg2.target_version=18.3
upg2.sid=UPGR
upg2.log_dir=/home/oracle/aux/upgr
upg2.upgrade_node=localhost

-
-
-
```

At the bottom right of the window, the text "17,1" and "All" are visible.

AutoUpgrade Tool | Preupgrade HTML Report

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Date: Thu Oct 11 23:22:01 CEST 2018 | DB Compatible: 11.2.0.4.0 | DB Version: 11.2.0.4.0 | Operating System: Linux


UPGR

Database

UPGR

UPGR

CheckName: OLS_SYS_MOVE	FixUp Available: YES	Severity: ERROR	Stage: PRECHECKS
<p>Logged in AS SYSDBA, run \$ORACLE_HOME/rdbms/admin/olspreupgrade.sql from the new Oracle Database 18.0.0.0.0 home.</p> <p>As part of the upgrade to 18.0.0.0.0, records in the 11.2.0.4.0 audit table SYSTEM.AUD\$ are moved to SYS.AUD\$. This step can be manually performed before the upgrade to reduce downtime. Refer to the 18.0.0.0.0 Oracle Label Security Administrator's Guide, or to Oracle Database Upgrade Guide for further details.</p> <p>olspreupgrade.sql has not been run on this database. To view the number of records that olspreupgrade.sql moves, use the following command:</p> <pre>SELECT count(*) FROM system.aud\$;</pre>			
<p>CheckName: POST_DICTIONARY FixUp Available: YES Severity: RECOMMEND Stage: POSTCHECKS</p> <p>Gather dictionary statistics after the upgrade using the command:</p> <pre>EXECUTE DBMS_STATS.GATHER_DICTIONARY_STATS;</pre> <p>Dictionary statistics provide essential information to the Oracle optimizer to help it find efficient SQL execution plans. After a database upgrade, statistics need to be re-gathered as there can now be tables that have</p>			



Sounds too good
to be true?

Picture sincerely by Emil Salzeder

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AUTO-UPGRADE

FIRST IMPRESSION

DANIEL OVERBY HANSEN, LEAD DEVELOPER

Presented at OOW 2018



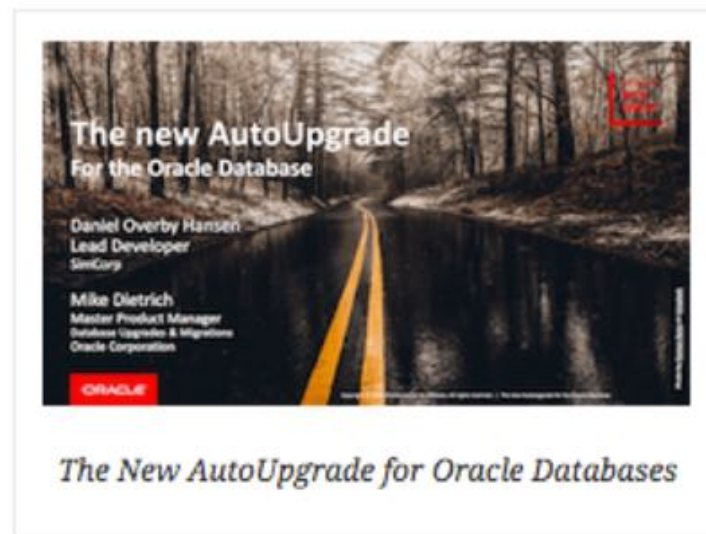
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AutoUpgrade Tool | Customer Experience

- For the full slides please see:
<https://mikedietchde.com/slides/#OOW18>



AutoUpgrade Tool | Customer Experience

Customer

Project

Constraints

Preparation

Upgrade

Success?

Remarks

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- Global provider of software and services to financial industry
- Established in 1971
- Headquartered in Copenhagen, Denmark
- Offices across Europe, North America and Asia-Pacific
- Flagship product, SimCorp Dimension®, built on-top of Oracle Database
- More than USD 20 trillion managed on SimCorp Dimension®

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AutoUpgrade Tool | Customer Experience

Customer

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Constraints

Preparation

Upgrade

Success?

Remarks

WHY AM I HERE WE DO A LOT OF UPGRADING



REFERENCE CUSTOMER
- For Oracle Database Upgrades



EARLY ADOPTER
- Adopt every release and every patch set



150 PRODUCTION DATABASES
- On Linux, Windows, and AIX



YEARLY UPGRADE CYCLE
- 150 production upgrades plus **at least** 150 test upgrades

AutoUpgrade Tool | Customer Experience

Customer

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REAL-WORLD EXAMPLE

18.3 REGULAR UPGRADE



PRODUCTION

Our first production upgrade on Oracle Linux

Completely automated process: DBA enters one command

Total down time:
26 minutes



FASTEST

Fastest out of:

11.2.0.3 - 12.1.0.1
12.1.0.1 - 12.1.0.2
12.1.0.2 - 12.2.0.1
12.2.0.1 - 18.3.0



STABLE

No major issues so far

Some annoyances from 12.2.0.1 are gone

Preupgrade.jar
better than ever

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AutoUpgrade Tool | Customer Experience

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Success?

Remarks

YEARLY RELEASES

NUMBERS DON'T ADD UP

150

Production databases
in **various flavours**
and **platforms**

300

Counting the test
upgrades we have to
schedule **at least 300**
upgrades a year

3

Our OPS team
currently have **three**
DBAs



New upgrade
every 2nd day

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AutoUpgrade Tool | Customer Experience

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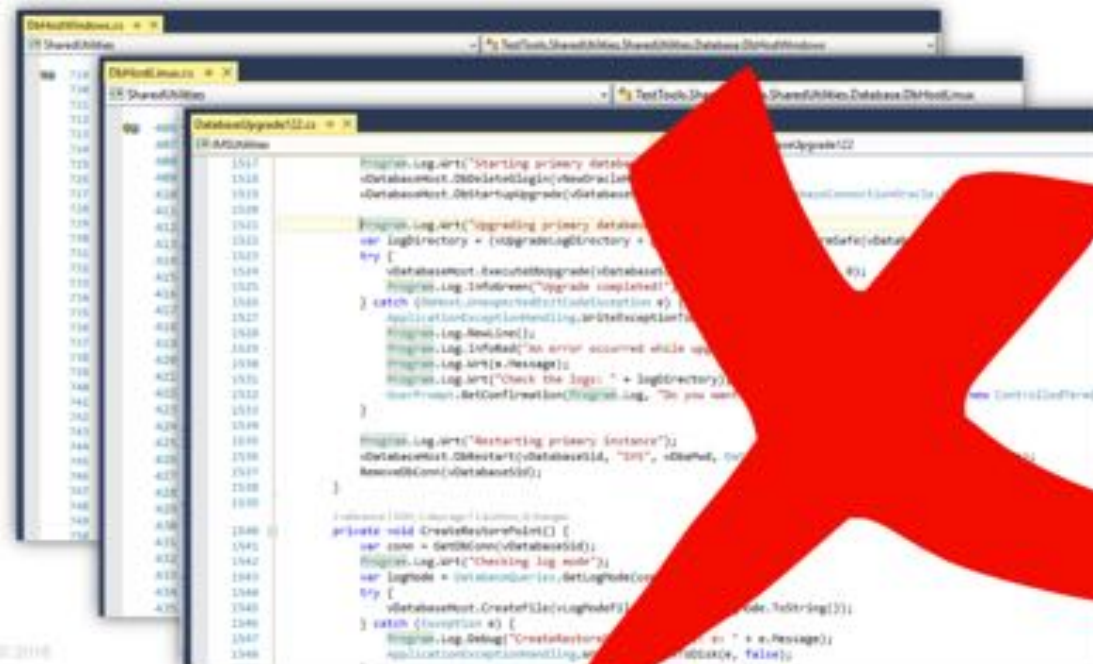
Preparation

Upgrade

Success?

Remarks

AUTO-UPGRADE
NO MORE HOME-COOKING



The screenshot displays the AutoUpgrade tool's code editor. A large, prominent red 'X' is overlaid on the code, signifying a failure or error. The code is written in C# and includes comments in Chinese. Key sections of the code include:

```
Program.Log.WriteLine("Starting primary database...");
DatabaseTest.DeleteAllLogins(vDatabaseId);
DatabaseTest.DeleteAllLogins(vDatabaseId);

Program.Log.WriteLine("Upgrading primary database...");
var logDirectory = (vUpgradeLogDirectory + vDatabaseId).Replace("\\", "/");
try {
    DatabaseTest.RecreateAllLogins(vDatabaseId);
    Program.Log.WriteLine("Upgrade completed!");
} catch (Exception ex) {
    ApplicationExceptionHandler.HandleException(ex);
}

Program.Log.WriteLine();
Program.Log.WriteLine("An error occurred while upgrading the database.");
Program.Log.WriteLine(ex.Message);
Program.Log.WriteLine("Check the logs: " + logDirectory);
Program.Log.WriteLine("Do you want to continue? (Y/N)");
var confirm = Console.ReadLine().Trim().ToUpper();
if (confirm != "Y") {
    Program.Log.WriteLine("Aborting primary instance.");
    DatabaseTest.DeleteAllLogins(vDatabaseId);
    DatabaseTest.DeleteAllLogins(vDatabaseId);
    return;
}

private void CreateRestorePoint() {
    var conn = GetConnection(vDatabaseId);
    Program.Log.WriteLine("Checking log mode");
    var logMode = conn.ExecuteScalar<int>("SELECT log_mode FROM v$database");
    try {
        DatabaseTest.CreateRestorePoint(vLogMode);
        Program.Log.WriteLine("Restore point created successfully.");
    } catch (Exception ex) {
        Program.Log.WriteLine("Error creating restore point: " + ex.Message);
        ApplicationExceptionHandler.HandleException(ex);
    }
}
```

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AutoUpgrade Tool | Customer Experience

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Upgrade

Success?

Remarks

REAL-WORLD EXAMPLE

18.3 REGULAR UPGRADE

```
DK01SU7017 x
DK01SU7017: $ cat upg_summary.log

Oracle Database Release 18 Post-Upgrade Status Tool      09-05-2018 13:57:3

Component                               Current      Full      Elapsed Time
Name                                   Status       Version   HH:MM:SS

Oracle Server                           UPGRADED     18.3.0.0.0 00:07:26
Oracle Workspace Manager                UPGRADED     18.3.0.0.0 00:00:35
Oracle Real Application Clusters        OPTION OFF   18.3.0.0.0 00:00:00
Oracle XML Database                     UPGRADED     18.3.0.0.0 00:00:53
Upgrade Datapatch                       00:00:54
Final Actions                           00:00:58
Post Upgrade                             00:00:04
Post Upgrade Datapatch                   00:00:07

Total Upgrade Time: 00:10:13

Database time zone version is 26. It is older than current release time
zone version 31. Time zone upgrade is needed using the DBMS_DST package.

Grand Total Upgrade Time: [0d:0h 12m:4s]
DK01SU7017: $
```

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Upgrade

Success?

Remarks

```
DK01SU7017 x
DK01SU7017: $ date
Thu Oct 18 15:20:59 CEST 2018
DK01SU7017: $ $ORACLE_HOME/jdk/bin/java -jar autoupgrade.jar -config /sar
Autoupgrade tool launched with default options
+-----+
| Starting AutoUpgrade execution |
+-----+
1 databases will be processed
Enter some command, type 'help' or 'exit' to quit
upg>
Job 101 for U7017209
DK01SU7017: $ date
Thu Oct 18 15:48:07 CEST 2018
DK01SU7017: $
```

AutoUpgrade Tool | Customer Experience

Customer

Project

Constraints

Preparation

Upgrade

Success?

Remarks

DBA-FREE UPGRADE BENEFITS



150 PRODUCTION
UPGRADES IN LESS
THAN A MONTH



80 % UPGRADED
WITHOUT DBA



REDUCE RISK OF
HUMAN ERRORS



SUPPORT AGILE
ORGANISATION

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48 10 2018

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Upgrade

Success?

Remarks

FAMOUS LAST WORD

A FEW TIPS AND TRICKS

1

Always get the latest preupgrade.jar
MOS Doc ID 884522.1

2

Explanation of the preupgrade checks
MOS Doc ID 2380601.1

3

Execute DBMS_STATS.GATHER_DICTIONARY_STATS
in advance to **save time** in analyze mode (preupgrade_fixups)

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48

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



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June 19, 2018
Upgrade Oracle 12.2.0.1 to Oracle
Database 18c on premises June 18,



More Information | www.oracle.com/goto/upgrade

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