

ORACLE®



**Mike Dietrich**  
Principal Sales Consultant

ORACLE Deutschland GmbH

ORACLE

# Datenbank-Migration

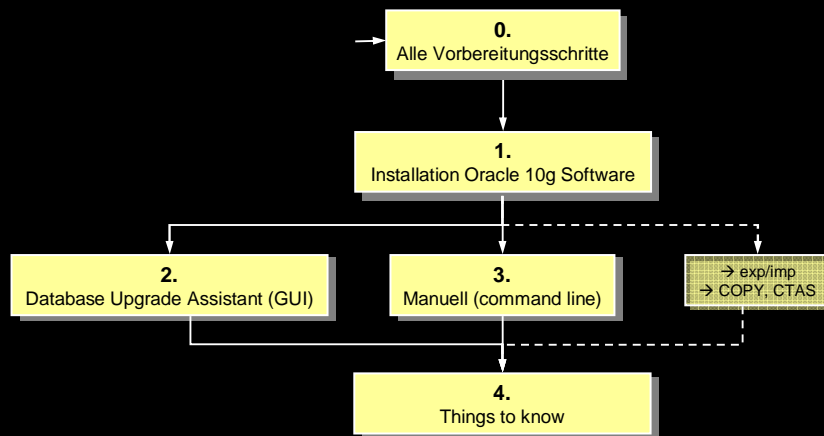


Von 8 nach 10

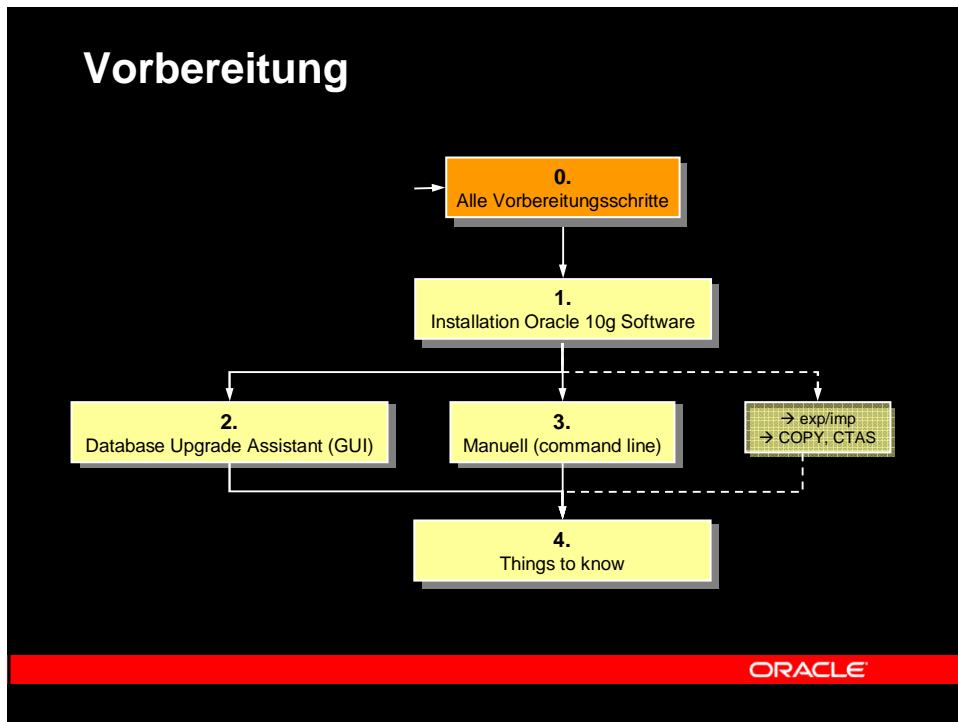


ORACLE

## Agenda



ORACLE

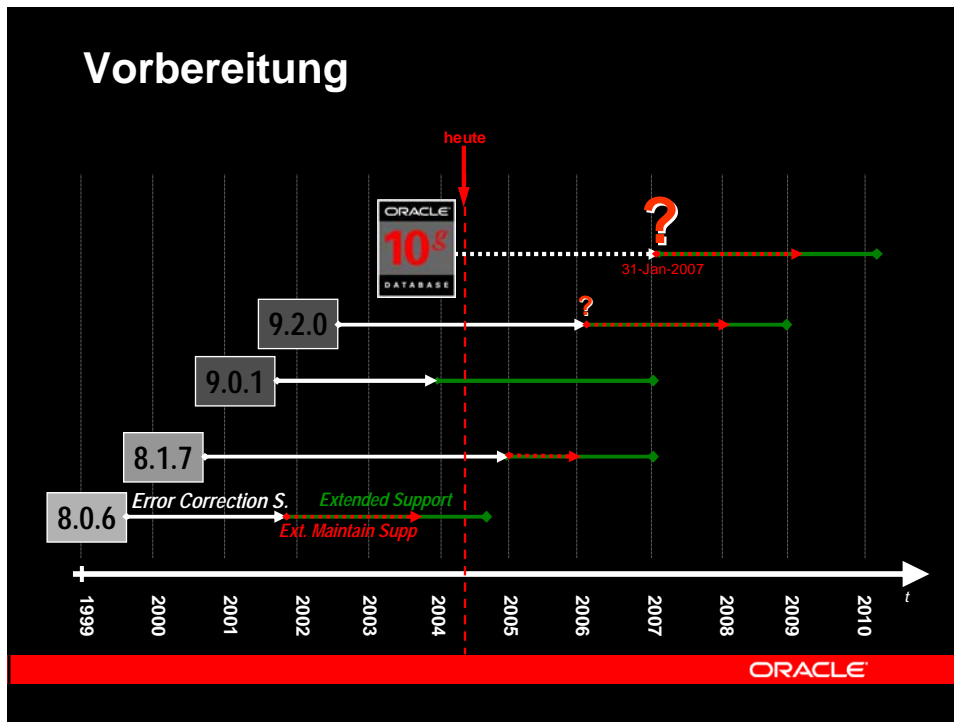


## Vorbereitung

# Vorbereitung ist 90% des Erfolgs ...

... und 90% der fehlgeschlagenen Upgrades  
scheitern aufgrund mangelhafter Tests !!!

The cartoon shows a woman with a crown and a large nose, holding a computer monitor. She is standing next to a computer monitor and keyboard. The Oracle logo is visible in the bottom right corner.



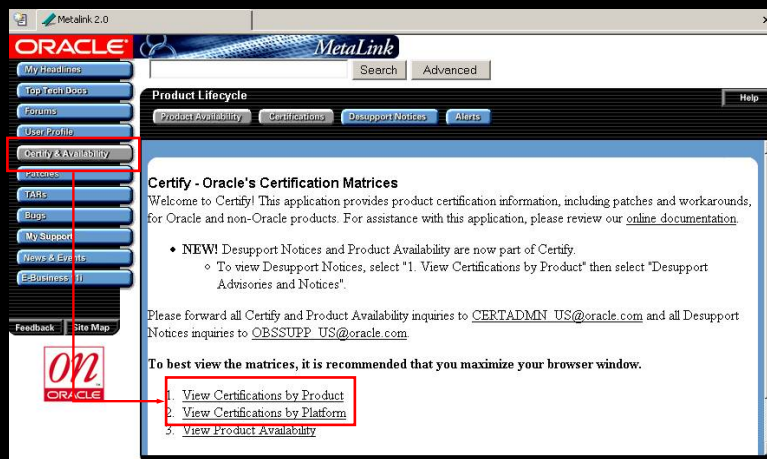
### Vorbereitung

- Das Patchlevel der Ausgangs-Datenbank ist für das Upgrade irrelevant
- Für die Ziel-Datenbank ist immer das aktuellste Patchset zu installieren
- Evtl. Einzelfixes (Interim Patches) beachten
- Error Correction Support Policy:  
**Note 209768.1**  
*In diesem Dokument werden alle Fragen bzgl. Patches, Patchsets und Terminologie beantwortet*
- OS Patches nicht vergessen !

ORACLE

## Vorbereitung

- Oracle-Zertifizierung:



ORACLE

## Vorbereitung

- Das Upgrade nach Oracle Database 10g ist einfacher durchzuführen als Upgrades in vorherigen Releases
- Umfang der Upgrade (Ex-Migration) Guides:
  - **8.1.7** - 512 Seiten
  - **9.0.1** - 484 Seiten – 111 Schritte f. RDBMS mit 9 Komponenten
  - **9.2.0** - 344 Seiten
  - **10.1.0** - 170 Seiten - **6 Schritte!!!**

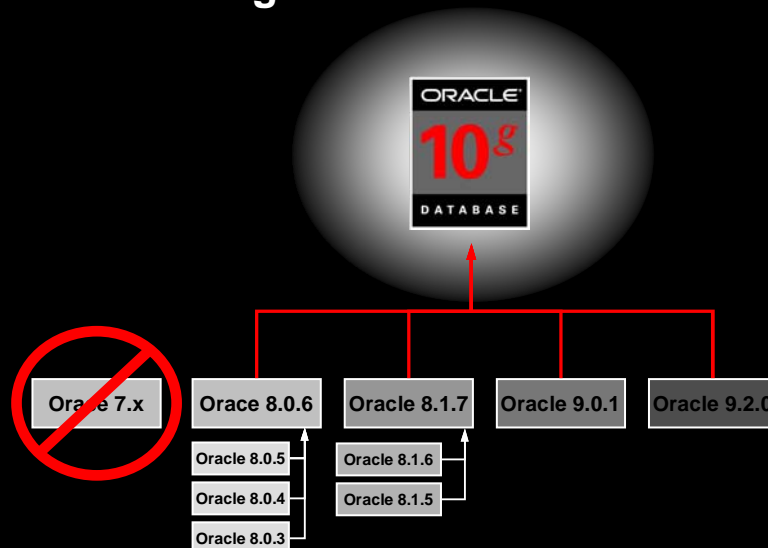
ORACLE

## Vorbereitung

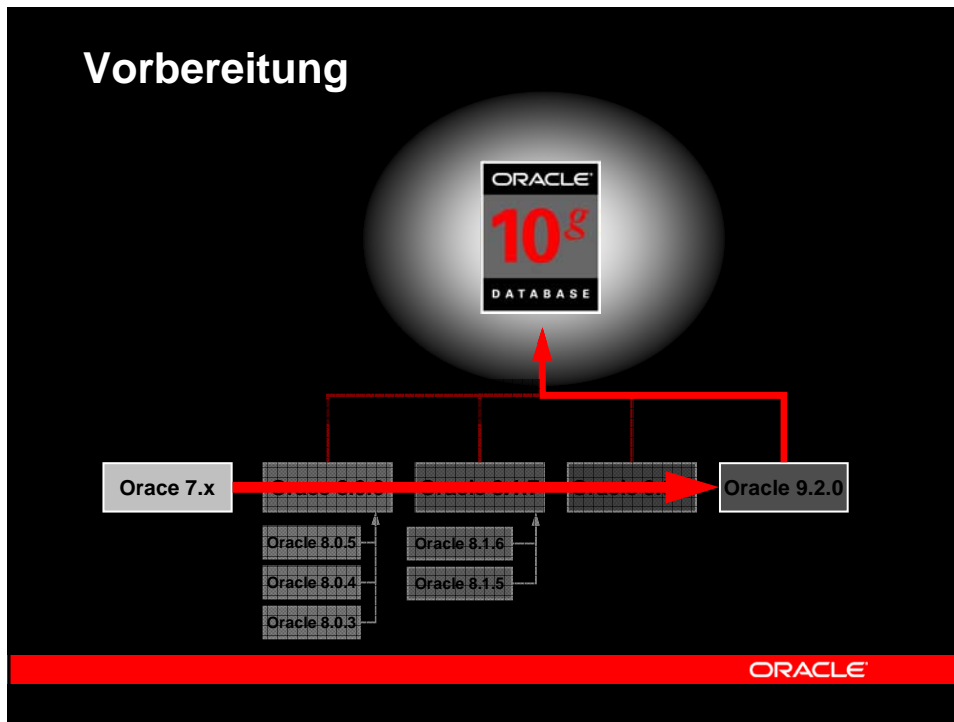
- Welche Dokumente sollte man gelesen haben ?
  - Oracle® Database Upgrade Guide 10g Release 1 (10.1) Part No. B10763-01
  - **Note:263809.1** Complete checklist for manual upgrades to 10g (momentan UNDER EDIT)

ORACLE


## Vorbereitung



ORACLE



## Vorbereitung

	(+) Vorteile	(-) Nachteile
<b>Oracle Database Upgrade Assistant (GUI)</b> 	<ul style="list-style-type: none"> <li>• Einfach und übersichtlich</li> <li>• Automatisches Upgrade</li> <li>• Resource/Space-Checks</li> <li>• Backup-Möglichkeit</li> <li>• Parameter-Anpassungen</li> <li>• Fehler-Protokoll</li> <li>• Interaktiv</li> </ul>	<ul style="list-style-type: none"> <li>• Bei unvorhergesehenen Problemen (bspw. Listener-Absturz während des Upgrades) ist komplettes Neuaufsetzen notwendig</li> <li>• wenig Eingriffsmöglichkeiten</li> <li>• kein OS-Wechsel möglich</li> </ul>
<b>Manuelles Upgrade (CLI)</b>	<ul style="list-style-type: none"> <li>• Kontrolle und Sichtbarkeit</li> <li>• Bei Problemen: Skript-Neustart</li> </ul>	<ul style="list-style-type: none"> <li>• etwas Tipparbeit</li> <li>• Interpretation Fehlermeldungen</li> <li>• kein OS-Wechsel möglich</li> </ul>
<b>Full Export/Import</b>	<ul style="list-style-type: none"> <li>• Reorganisation</li> <li>• OS-Wechsel möglich</li> <li>• Auch für Oracle 5/6 möglich</li> </ul>	<ul style="list-style-type: none"> <li>• Zeitdauer, vor allem bei großen Datenbanken</li> <li>• Platzbedarf</li> </ul>
<b>SQL*Plus-COPY, CTAS und Skripte</b>	<ul style="list-style-type: none"> <li>• Plattformunabhängig</li> </ul>	<ul style="list-style-type: none"> <li>• Nur Tabellenstruktur und Daten – alles weitere nur über Skripten</li> </ul>

**ORACLE**

## Vorbereitung

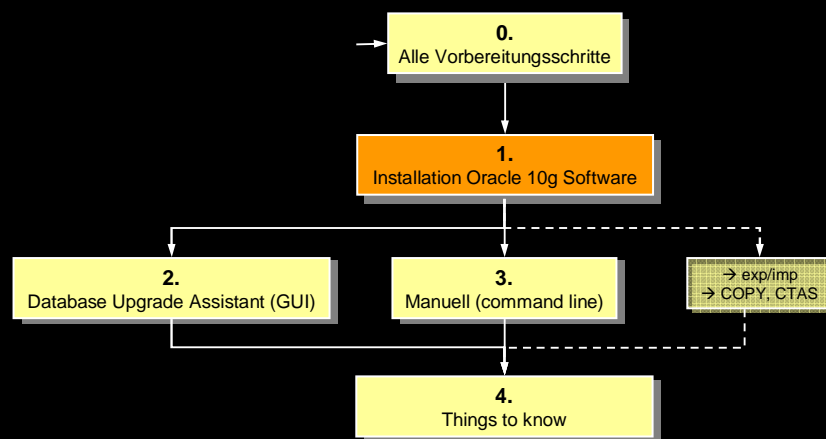
- INVALID Objects vermerken:

```
SQL> SELECT UNIQUE object_name, object_type, owner  
FROM dba_objects WHERE status='INVALID';
```

- Performance-Statistiken sammeln (STATS Pack !)
  - Vergleich: vorher ↔ nachher
  - spezielle Queries und Batchläufe  
*... auch zur eigenen Absicherung ...*
- Datenbank testweise migrieren:
  - Funktionale Test
  - Performance-Test unter Last !!!

ORACLE

## Installation



ORACLE



## Installation

- Ressourcenanforderungen
  - Softwareinstallation:  $\geq 1,1$  GB
  - Datenbank:  $\geq 1$  GB
  - RAM:  $\geq 256$  MB (Empfehlung: 1 GB)
  - EM Grid Control:  $\geq 512$  MB (Empfehlung: 1 GB)

ORACLE

## Installation

- Wo kommt die Software her ?
  - Download von OTN:  
<http://otn.oracle.com/software/index.html>
  - Metalink:

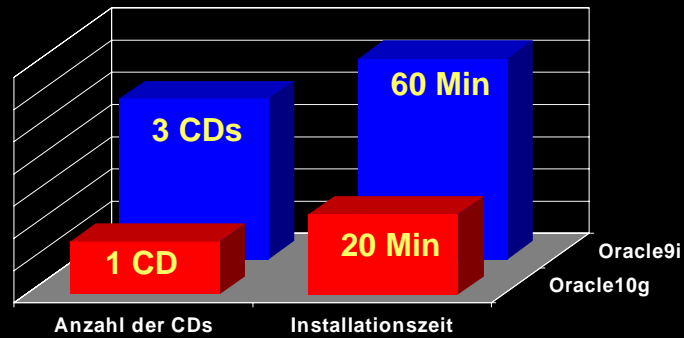


- Update-Service:  
☎ 0800 - 100 20 44 → 9 → 2

ORACLE

## Installation

- Wieviele CDs und Zeitbedarf ?



ORACLE

## Installation

- Welche CDs wozu ?
  - Datenbank-CD
    - Enterprise Edition
    - Standard Edition
    - Personal Edition (Windows)
  - Client-CD
  - Companion-CD
    - Demos/Examples
    - Legato
    - Workflow
    - diverse Accelerators
    - HTML DB
    - Oracle HTTP-Server (Apache)

ORACLE

## Installation

- Pre-Install Checks:

```
xterm
$ ls
doc          install      runInstaller
index.htm   response    stage
$ ./runInstaller
Starting Oracle Universal Installer ...

Checking requirements...
Checking operating system version: must be 5.8 or 5.9.  Actual 5.8
                                     Passed
Checking swap space: must be greater than 150 MB.  Actual 887MB  Passed
All requirements met.

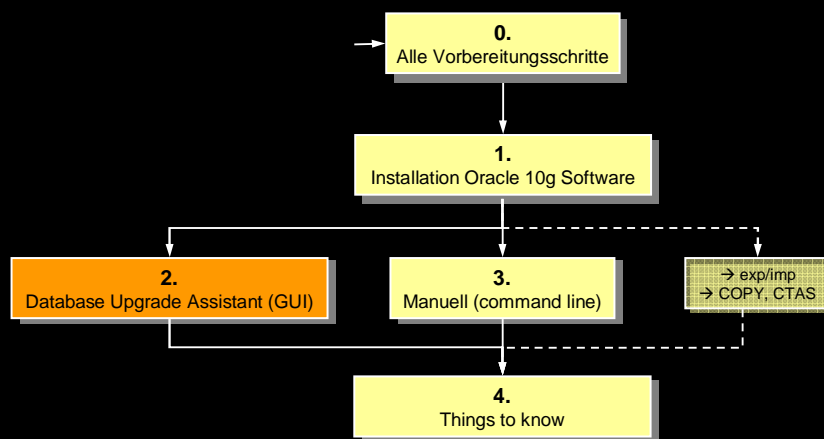
Checking monitor: must be configured to display at least 256 colors.  Actual 2
56  Passed
Preparing to launch Oracle Universal Installer from /tmp/OraInstall12003-11-05_02
-51-17PM. Please wait ...$ Oracle Universal Installer, Version 2.3.0.7.0
Copyright (C) 1999, 2003, Oracle. All rights reserved.
```

- Abschalten mit:

```
./runInstaller -ignoreSysPrereqs
```

ORACLE

## Database Upgrade Assistant (GUI)



ORACLE

## Database Upgrade Assistant (GUI)



- Features:

- grafisch geführte Migration/Upgrade
- viele Checks
- `spfile` wird angelegt
- RAC aware mit Einbeziehung aller Knoten
- Restore möglich
  
- kann auch mit angepassten Migrationsskripten ablaufen
- Silent Mode:  
`dbua -silent -sid V920 [-backup <location>]`

ORACLE

## Database Upgrade Assistant (GUI)

- Silent Mode:

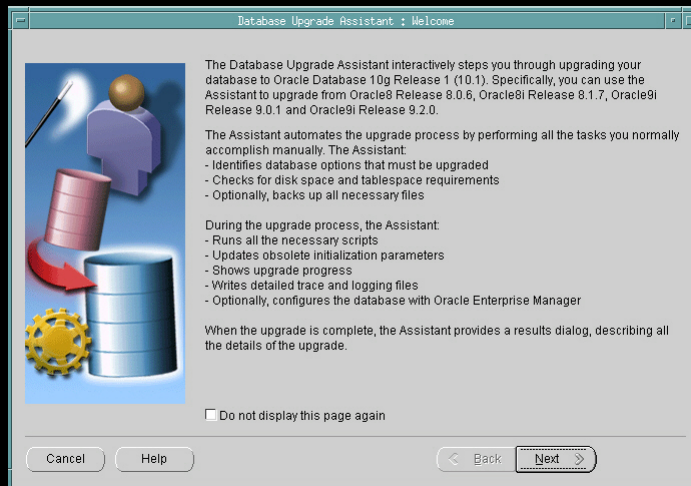
```
mucssu4_PROD.stw
dbua [-silent] [<command> [options] ]*
Refer to the Oracle Database 10g Upgrade Guide for Release 1 (10.1) for details.
Following are the possible commands:

[-dbName <Specify System Identifier> ]
[-disableUpgradeScriptLogging {This command disables the detailed log gener}
[-backupLocation <Specify directory to back up your database before upgrade]
[-postUpgradeScripts <Specify a comma separated list of SQL scripts. Please]
[-initParam <Specify a comma separated list of initialization parameter val]
[-emConfiguration <CENTRAL|LOCAL|ALL|NOBACKUP|NOEMAIL|NONE>
  -dbsnmpPassword <DBSNMP user password>
  -sysmanPassword <SYSMAN user password>
[-hostUserName <Host user name for EM backup job>
  -hostUserPassword <Host user password for EM backup job>
  -backupSchedule <Daily backup schedule in the form of hh:mm>]
[-smtpServer <Outgoing mail (SMTP) server for email notifications>
  -emailAddress <Email address for email notifications>]
[-centralAgent <Enterprise Manager central agent location>]]
[-recoveryAreaDestination <destination directory for all recovery f]
[-h | -help {Shows this usage help.}]

For example, the following command selects "orcl" database for upgrade:
dbua -dbName orcl
```

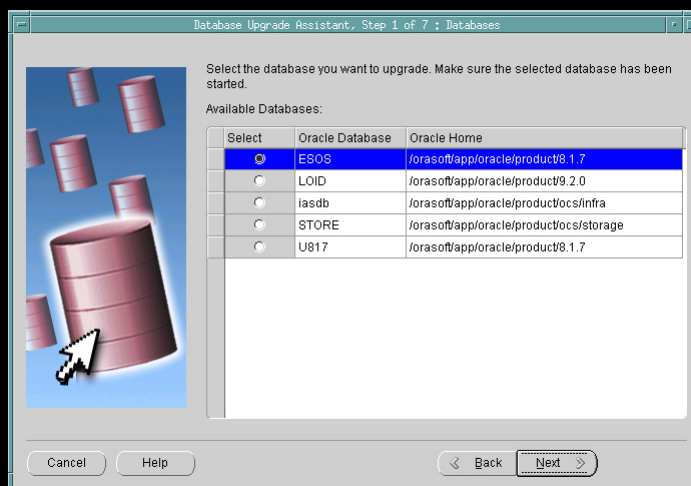
ORACLE

## Database Upgrade Assistant (GUI)



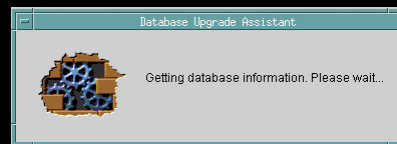
ORACLE

## Database Upgrade Assistant (GUI)



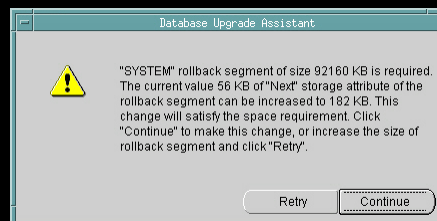
ORACLE

## Database Upgrade Assistant (GUI)



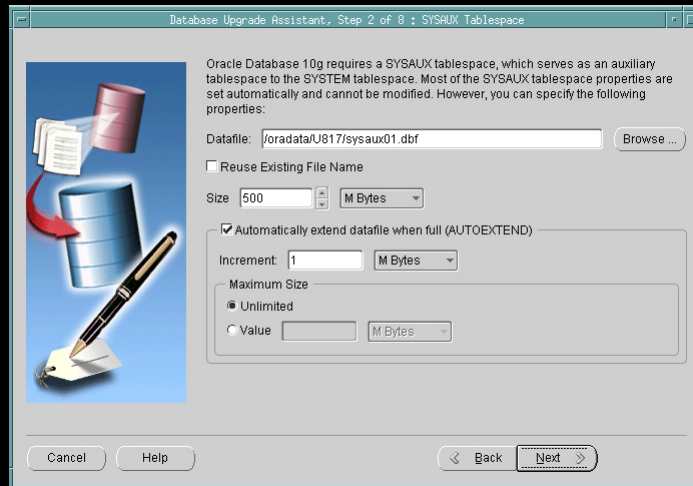
ORACLE

## Database Upgrade Assistant (GUI)



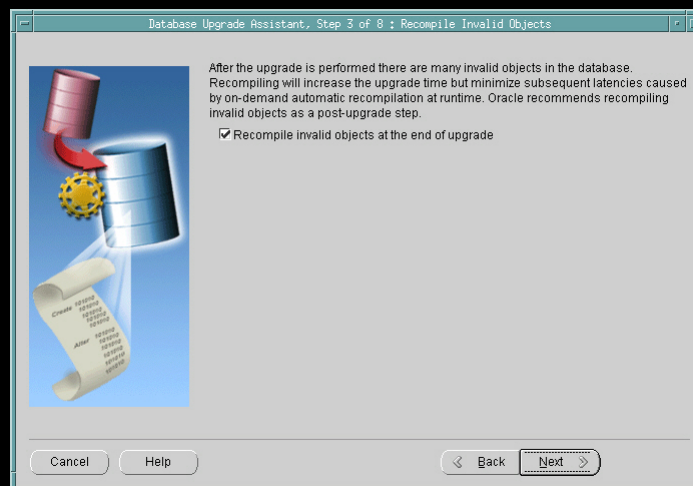
ORACLE

## Database Upgrade Assistant (GUI)



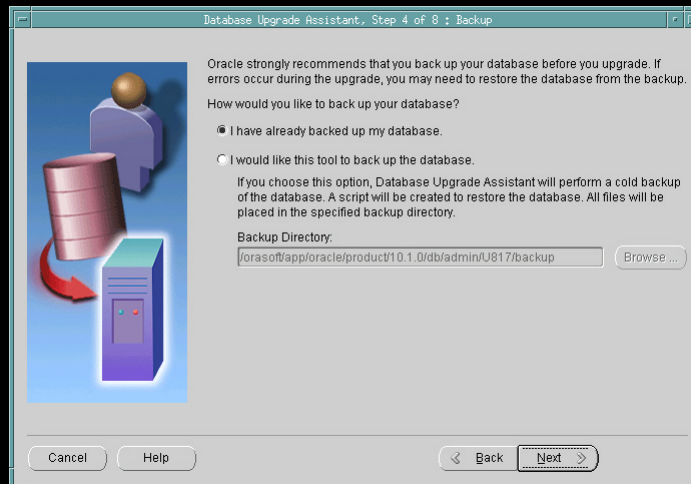
ORACLE

## Database Upgrade Assistant (GUI)



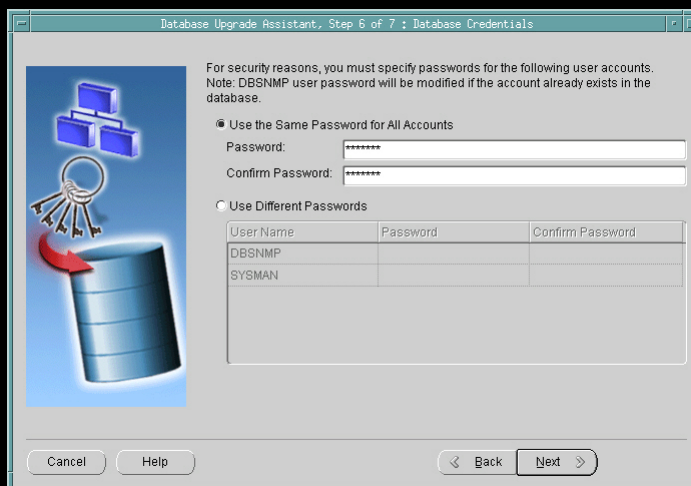
ORACLE

## Database Upgrade Assistant (GUI)



ORACLE

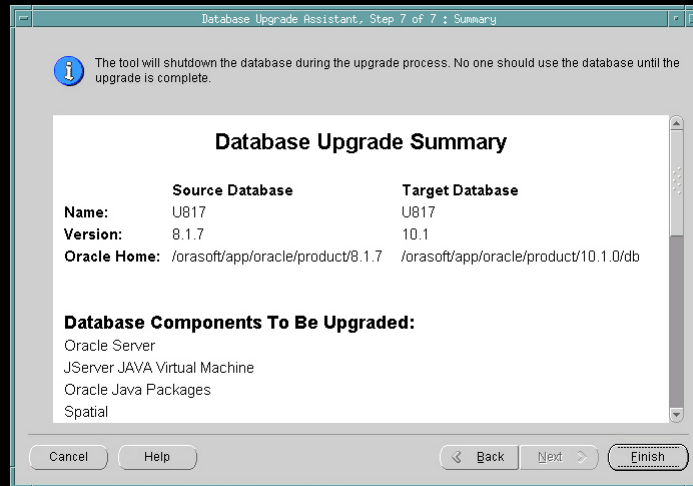
## Database Upgrade Assistant (GUI)



ORACLE

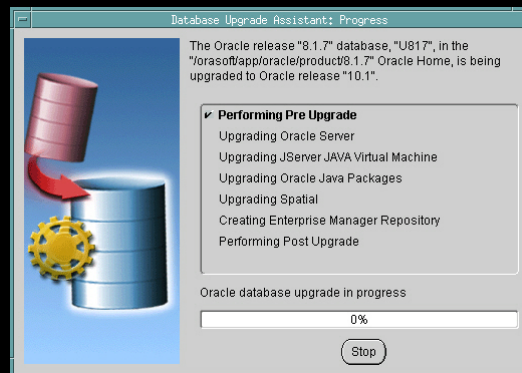


## Database Upgrade Assistant (GUI)



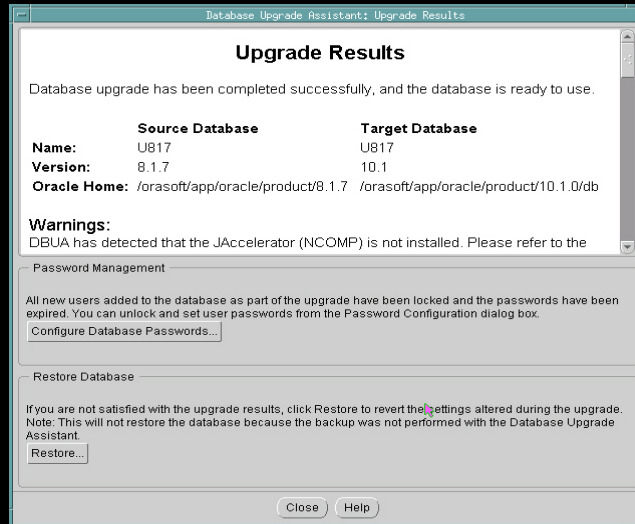
ORACLE

## Database Upgrade Assistant (GUI)



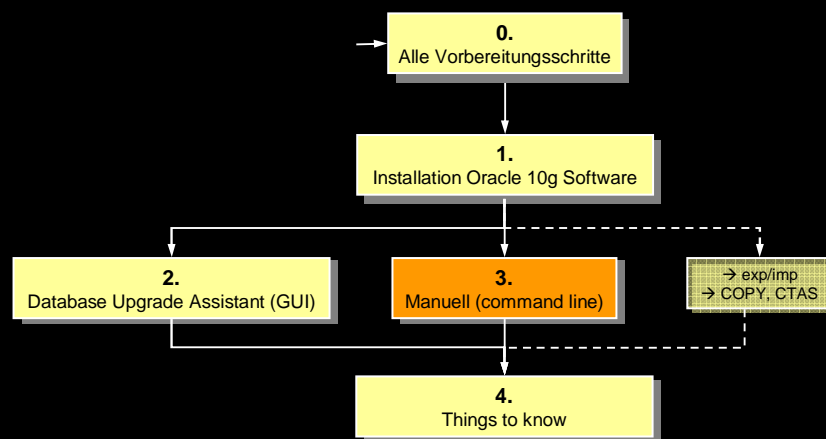
ORACLE

## Database Upgrade Assistant (GUI)



ORACLE

## Durchführung manuell (CLI)



ORACLE

## Durchführung manuell (CLI)

- Migration auf der Kommandozeile:  
nur 6 Schritte
  1. Backup der Datenbank
  2. Installation der 10g-Oracle-Software
  3. Analyse/Anpassung der Datenbank mit `utlu101i.sql`
  4. Switch zu neuem Home, Anpassen der init-Parameter und Anlegen des `SYSAUX`-Tablespace
  5. Upgrade-Skript (z.B. `u0902000.sql`) und ReCompile (`utl1rp.sql`)
  6. Post-Upgrade-Status-Tool: `utlu101s.sql`

ORACLE

## Durchführung manuell (CLI)

- Pre-Upgrade-Tool: `utlu101i.sql`
  - läuft im "alten" Datenbank-Kontext ab
  - überprüft Initialisierungsparameter und gibt Warnungen aus (auch obsoletere oder umbenannte Parameter)
  - überprüft
    - installierte Optionen
    - Komponenten
    - Tablespace SYSAUX
    - Characterset
  - Cluster-Check
  - wird aus SQL\*Plus gestartet
  - *Die Ausführung macht nur Sinn, wenn die Alt-Installation vorhanden ist - im aktuellen Release gestartet gibt es reihenweise ORA-600 [17069]*

ORACLE

## Durchführung manuell (CLI)

- Pre-Upgrade-Tool: `utlu101i.sql` mit 8.1.7:

```
dkusunh1.de.oracle.com /orasoft/app/oracle/product/8.1.7 :sqlplus "/ as sysdb>
SQL*Plus: Release 8.1.7.0.0 - Production on Tue Apr 13 11:45:20 2004
(c) Copyright 2000 Oracle Corporation. All rights reserved.
Connected to an idle instance.
SQL> startup
ORACLE instance started.

Total System Global Area 264904864 bytes
Fixed Size 73888 bytes
Variable Size 221691904 bytes
Database Buffers 42958848 bytes
Redo Buffers 180224 bytes
Database mounted.
Database opened.
SQL> @utlu101i.sql
SP2-0614: Server version too low for this feature
PL/SQL procedure successfully completed.
SQL>
```

ORACLE

## Durchführung manuell (CLI)

- Pre-Upgrade-Tool `utlu101i.sql` mit 8.1.7:

```
dkusunh1.de.oracle.com /orasoft/app/oracle/product/8.1.7 :svrmgrl
Oracle Server Manager Release 3,1,7,0,0 - Production
Copyright (c) 1997, 1999, Oracle Corporation. All Rights Reserved.

Oracle8i Enterprise Edition Release 8,1,7,0,0 - Production
With the Partitioning option
JServer Release 8,1,7,0,0 - Production

SVRMGR> connect internal
Connected.
SVRMGR> spool info2.log
SVRMGR> @utlu101i.sql
```

ORACLE

## Durchführung manuell (CLI)

- Output: `utlu101i.sql`:

```

Server Output                                ON
Statement processed.
Oracle Database 10.1 Upgrade Information Tool  04-13-2004 11:46:46
*****
Database:
-----
1. --> name: U817
   --> version: 8.1.7.0.0
   --> compatibility: 8.1.0
   WARNING: Database compatibility must be set to 9.2.0 prior to upgrade.
*****
Logfiles: [make adjustments in the current environment]
-----
-- The existing log files are adequate. No changes are required.
*****
2. Tablespaces: [make adjustments in the current environment]
-----
   --> SYSTEM tablespace is adequate for the upgrade.
   .... owner: SYS
   .... minimum required size: 252 MB
   --> TOOLS tablespace is adequate for the upgrade.
   .... owner: SYSTEM
   .... minimum required size: 6 MB
*****

```

ORACLE

## Durchführung manuell (CLI)

- Output: `utlu101i.sql`:

```

3. Options: [present in existing database]
-----
   --> Partitioning
   --> Spatial
   WARNING: Listed option(s) must be installed with Oracle Database 10.1
*****
4. Update Parameters: [Update Oracle Database 10.1 init.ora or spfile]
-----
   --> "shared_pool_size" is already at "167772160" calculated new value is "167772160"
   WARNING: --> "pga_aggregate_target" is not currently defined and needs a value of at least "25165824"
   --> "large_pool_size" is already at "8388608" calculated new value is "8388608"
   --> "java_pool_size" is already at "50331648" calculated new value is "50331648"
*****
   Deprecated Parameters: [Update Oracle Database 10.1 init.ora or spfile]
-----
   -- No deprecated parameters found. No changes are required.
*****
5. Obsolete Parameters: [Update Oracle Database 10.1 init.ora or spfile]
-----
   --> "max_enabled_roles"
*****

```

ORACLE

## Durchführung manuell (CLI)

- Output: `utlu101i.sql`:

6.

```

*****
Components: [The following database components will be upgraded or installed]
-----
--> Oracle Catalog Views      [upgrade]
--> Oracle Packages and Types [upgrade]
--> JServer JAVA Virtual Machine [install]
...The 'JServer JAVA Virtual Machine' JAccelerator (NCOMP)
...is required to be installed from the 10g Companion CD.
...
--> Oracle Java Packages      [install]
--> Spatial                    [upgrade]
    
```

7.

```

*****
WARNING: --> Your database is using an obsolete NCHAR character set.
In Oracle Database 10g, the NCHAR data types (NCHAR, NVARCHAR2, and NCLOB)
are limited to the Unicode character set encoding (UTF8 and AL16UTF16), only.
See "Database Character Sets" in chapter 5 of the Oracle 10g Database Upgrade
Guide for further information.
    
```

8.

```

*****
SYSaux Tablespace: [Create tablespace in Oracle Database 10.1 environment.]
-----
--> New "SYSaux" tablespace
... minimum required size for database upgrade: 500 MB
Please create the new SYSaux Tablespace AFTER the Oracle Database
10.1 server is started and BEFORE you invoke the upgrade script.
    
```

ORACLE

## Durchführung manuell (CLI)



- Besonderheit Windows:
  - Neuen Service anlegen:
 

```

>oradim -NEW
  -SID v920
  -INTPWD password
  -MAXUSERS 17
  -STARTMODE m
  -PFILE file
                    
```

*Achtung: oradim schreibt momentan kein Logfile*

ORACLE

## Durchführung manuell (CLI)

- Initialisierungsparameter beachten:
  - COMPATIBLE ≥ 9.2.0
  - SHARED\_POOL\_SIZE ≥ 96MB  
*sonst drohen ORA-4031*
  - PGA\_AGGREGATE\_TARGET ≥ 25MB
  - JAVA\_POOL\_SIZE ≥ 50MB
  - LARGE\_POOL\_SIZE ≥ 8MB
- Zu neuem \$ORACLE\_HOME switchen

ORACLE

## Durchführung manuell (CLI)

```
SQL> STARTUP UPGRADE;
```

```
Database Characterset is WE8ISO8859P9
Updating 8.1.7.4.0 NLS parameters in sys.props$
-- adding 10.1.0.2.0 NLS parameters.
ALTER SYSTEM SET _system_trig_enabled=FALSE SCOPE=MEMORY;
ALTER SYSTEM SET job_queue_processes=0 SCOPE=MEMORY;
ALTER SYSTEM SET aq_tm_processes=0 SCOPE=MEMORY;
ALTER SYSTEM SET resource_manager_plan='' SCOPE=MEMORY;
replication_dependency_tracking turned off
(no async multimaster replication found)
Starting background process MMNL
MMNL started with pid=13, OS id=1820
Completed: ALTER DATABASE OPEN MIGRATE
```

- unterdrückt überflüssige Fehlermeldungen, wie bspw. ORA-00942: table or view does not exist - dadurch werden die Logfiles wesentlich übersichtlicher

ORACLE

## Durchführung manuell (CLI)

- Tablespace SYSAUX anlegen:

```
CREATE TABLESPACE sysaux DATAFILE 'file'  
SIZE 500M REUSE  
EXTENT MANAGEMENT LOCAL  
SEGMENT SPACE MANAGEMENT AUTO  
ONLINE;
```

ORACLE

## Durchführung manuell (CLI)

- Upgrade-Skripte

Database Release	Upgrade Script
8.0.6	u0800060.sql
8.1.7	u0801070.sql
9.0.1	u0900010.sql
9.2	u0902000.sql

ORACLE



## Durchführung manuell (CLI)

- Post-Upgrade-Tool: `utlu101s.sql`
  - Läuft im "neuen" Datenbank-Kontext ab
  - Überprüft Upgrade-Erfolg mit `DBA_REGISTRY`
  - Liefert Infos bei fehlgeschlagenen Komponenten-Upgrades
  - Gibt Skriptnamen aus, die erneut gestartet werden müssen

ORACLE

## Durchführung manuell (CLI)

- Post-Upgrade-Tool: `utlu101s.sql`

```
COMP_TIMESTAMP DBUPG_END 2004-04-13 16:00:55
1 row selected.
SQL> SQL>
SQL> spool off
SQL> @?/rdms/admin/utlu101s.sql TEXT
PL/SQL procedure successfully completed.
Oracle Database 10.1 Upgrade Status Tool 13-APR-2004 04:41:30
--> Oracle Database Catalog Views      Normal successful completion
--> Oracle Database Packages and Types Normal successful completion
--> JServer JAVA Virtual Machine      Normal successful completion
--> Spatial                            Normal successful completion
No problems detected during upgrade
PL/SQL procedure successfully completed.
SQL> █
```

ORACLE

## Durchführung manuell (CLI)

- Post-Upgrade-Tool: `utlu101s.sql`

```
DOS-Prompt - sqlplus "/ as sysdba"
Oracle Database 10.1 Upgrade Status Tool 13-APR-2004 06:21:01
--> Oracle Database Catalog Views      Normal successful completion
--> Oracle Database Packages and Types Normal successful completion
--> JServer JAVA Virtual Machine       Problem(s) detected
WARNING: ----> component status is not valid
WARNING: ----> component version mismatch: 9.2.0.1.0
----> check upgrade log file for JAVAVM upgrade errors
----> script="~/javavm/install/jvmdbmig.sql"
--> Oracle XDK                          Normal successful completion
--> Oracle Database Java Packages       Problem(s) detected
WARNING: ----> component status is not valid
WARNING: ----> component version mismatch: 9.2.0.1.0
----> check upgrade log for errors
----> script="~/rdbms/admin/catdbmig.sql"
--> Oracle XML Database                 Normal successful completion
--> Oracle Workspace Manager           Normal successful completion
--> Oracle Data Mining                 Normal successful completion
--> OLAP Analytic Workspace            Normal successful completion
--> OLAP Catalog                       Normal successful completion
--> Oracle OLAP API                    Normal successful completion
--> Oracle interMedia                  Normal successful completion
--> Spatial                             Normal successful completion
--> Oracle Text                         Normal successful completion
--> Oracle Ultra Search                 Normal successful completion
```

ORACLE

## Durchführung manuell (CLI)

- National Characterset anpassen
  - Notwendig, wenn ein nicht-unterstützter National Characterset (wie bspw. AL24UTFFSS) verwendet wurde
  - `utlnchar.sql`

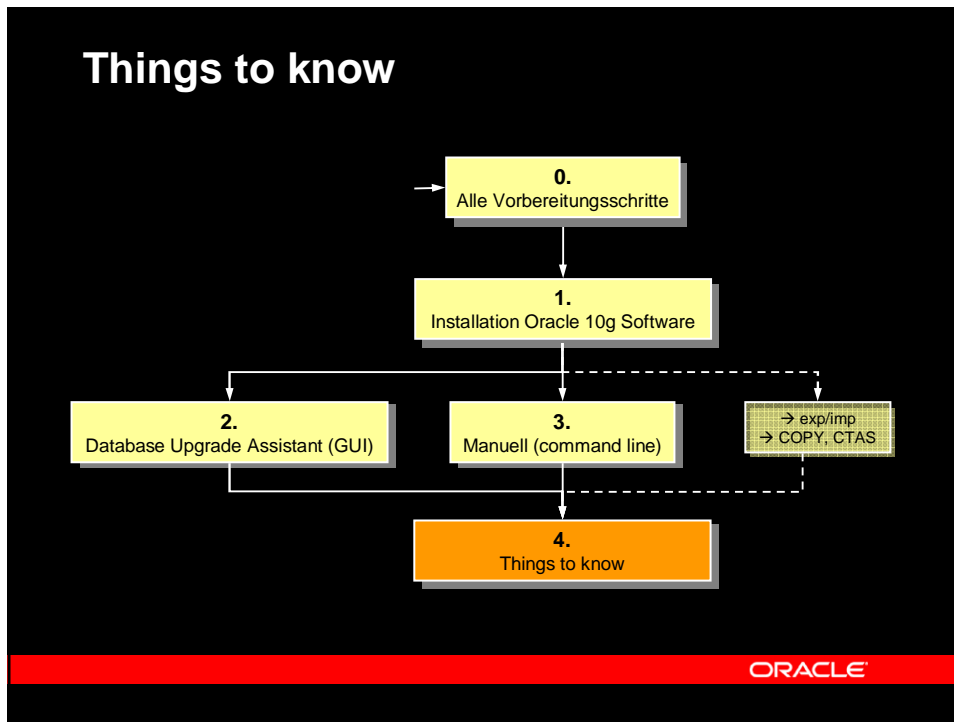
```
SQL> @~/rdbms/admin/utlnchar

Warning:
The script is to migrate NCHAR data, including nchar
nvarchar2 and nlob, from 8i to 9i.
Once it runs, it can not undo what have been done.


To run it, 1) use SQLPLUS and 2) connect AS SYSDBA

Press ctrl-C, then return to quit or any other key to continue;
```

ORACLE



## Things to know



- PL/SQL-Probleme von 7/8 nach 10g ?
  - `PLSQL_V2_COMPATIBILITY = TRUE`,  
wenn sich PL/SQL-Checker wie in Version 8i verhalten soll
- Identische Datenbank-Optionen installieren
- Wordsize-Change 32/64-Bit implizit (automatisch) bei Upgrade/Downgrade wenn notwendig
- LONG Datentyp wird noch weiter unterstützt, aber:

```
SQL> ALTER TABLE xy MODIFY (long_column CLOB);
```

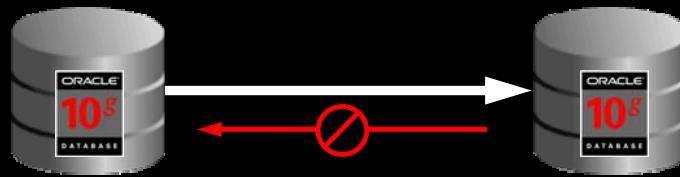
ORACLE

## Things to know



- Parameter **COMPATIBLE**

- mindestens: 9.2.0 in einer 10g-Datenbank
- kein Weg zurück, wenn 10.0 gesetzt wurde
- Downgrade nur bis 9.2.0.3 supported



COMPATIBLE ≥ 9.2.0

COMPATIBLE = 10.0.0

ORACLE

## Things to know



- Rule Based Optimizer

- Desupported ab Oracle Database 10g
- Code noch vorhanden, aber bei Fehlern mit RBO keine Support-Unterstützung mehr
- Oracle behält sich vor, die RBO-Teil aus dem Datenbankcode zu entfernen
- RBO Desupport  
[Note: 189702.1](#)
- Migration to the CBO  
[Note: 222627.1](#)

ORACLE

## Things to know



- Migration per Exp/Imp mit Charactersetwechsel auf Unicode
  - Problematik:
    - Å in WE8ISO... = 1 Byte
    - Å in UTF8 = 2 Byte
  - Characterset-Scan-Utility CSscan
    - Changing the Database Character Set  
Note: 225912.1
    - Use Scanner Utility CSscan before altering the Database Character Set  
Note: 123670.1
    - UTF8 Database Character Set Implications  
Note: 119119.1

ORACLE

## Things to know



- Dictionary ⇔ Locally Managed Tablespaces

```
SQL> select TABLESPACE_NAME, EXTENT_MANAGEMENT from DBA_TABLESPACES;
```

- Migration mit der Prozedur:

```
SQL> EXECUTE DBMS_SPACE_ADMIN.  
TABLESPACE_MIGRATE_TO_LOCAL('tbs_1');  
  
SQL> EXECUTE DBMS_SPACE_ADMIN.  
TABLESPACE_MIGRATE_TO_LOCAL('SYSTEM');
```

- Vorteile:
  - Keine Contention im DD auf UET\$/FET\$
  - Kein COALESCE von freien Extents mehr notwendig
  - Veränderungen generieren keine Rollback-Information
  - Weniger Fragmentierung

ORACLE

## Things to know



- SYSAUX-Tablespace

- mind. 240MB groß
- Anlegen:

```
CREATE TABLESPACE sysaux DATAFILE 'file'
SIZE 500M REUSE EXTENT MANAGEMENT LOCAL
SEGMENT SPACE MANAGEMENT AUTO ONLINE;
```

- Inhalt:

Analytical Workspace Object Tab.	Oracle Ultra Search
Enterprise Manager Repository	Oracle interMedia
Logminer	Oracle Text
Logical Standby	Statspack Repository
OLAP API History Tables	Unified Job Scheduler
Oracle Data Mining	Workspace Manager
Oracle Spatial	Server Manageability Comp.

ORACLE

## Things to know



- ORA-336 beim Upgrade von 8.1.7
- macht sich durch ORA-3113 beim Hochfahren bemerkbar

```
Error: ORA 336
Text: log file size <num> blocks is less than minimum <num> blocks
-----
Cause: The redo log file size specified in the CREATE DATABASE
statement is too small.
Action: Increase the redo log file size and re-enter the statement
```

- Workaround:  
Vorher Logfiles größer 4MB anlegen

ORACLE

## Things to know



- Öffnen einer V9.2.0 Datenbank mit dem neuen Oracle Database 10g Executable mit `COMPATIBLE=9.2.0`:
  - `ORA-00704`:  
Bootstrap-Prozess nicht erfolgreich
  - `ORA-39700`:  
Datenbank muss mit `UPGRADE`-Option geöffnet werden

ORACLE

## Things to know - Fertig !!!



ORACLE

