Nočna mora vsakega DBA je izguba podatkov.

Ni vedno proračun izgubo podatkov.

Abakus **ARBITER**

Boris Oblak

Abakus plus d.o.o.

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16. strokovno srečanje
SIOUG 2011

Zaupanja vredne sledi

Nekaj postopkov, ki bi jih vsak DBA moral narediti, a jih največkrat spregleda

O podjetju

Zgodovina:

- od 1992, 20 zaposlenih

- Oracle zbirka podatkov, GNU/linux (1995)

- Dobitniki srebrnega priznanja za inovacije – Aerodrom Ljubljana: Flight Information System

- Dobitniki srebrnega priznanja za inovacije – Arbiter

Razvoj in vzdrževanje:

- Razvoj visoko razpoložljivih sistemov z OS GNU/linux

- Sistemska podpora in uglaševanje sistemov z OS GNU/linux

- Uglaševanje in administracija zbirk podatkov Oracle

Pokvarjena redo log datoteka

```
SQL> startup;
ORACLE instance started.

Total System Global Area 1068937216 bytes
Fixed Size                   2233336 bytes
Variable Size              704646152 bytes
Database Buffers           356515840 bytes
Redo Buffers                 5541888 bytes
Database mounted.
ORA-00313: open failed for members of log group 1 of thread 1
ORA-00312: online log 1 thread 1:
'/oradata/SIOUG/onlinelog/o1_mf_1_76p8mo0o_.log'
ORA-27037: unable to obtain file status
Linux-x86_64 Error: 2: No such file or directory
Additional information: 3
```

Pokvarjena redo log datoteka

```
SQL> SELECT a.member, a.status FROM v$logfile a, v$log b WHERE a.GROUP#
= b.GROUP# and a.group# = 1;

MEMBER                                                     STATUS
--------------------------------------------------------- -------
/oradata/SIOUG/onlinelog/redo1_2.log                      INVALID
/oradata/SIOUG/onlinelog/o1_mf_1_76p8mo0o_.log
```

Pokvarjena redo log datoteka

```
alert log:

Errors in file
/oradmin/diag/rdbms/sioug/sioug/trace/sioug_lgwr_17944.trc:
ORA-00313: open failed for members of log group 1 of thread 1
ORA-00312: online log 1 thread 1: '/oradata/SIOUG/onlinelog/redo1_2.log'
ORA-27048: skgfifi: file header information is invalid
Additional information: 21
Errors in file
/oradmin/diag/rdbms/sioug/sioug/trace/sioug_lgwr_17944.trc:
ORA-00321: log 1 of thread 1, cannot update log file header
ORA-00312: online log 1 thread 1: '/oradata/SIOUG/onlinelog/redo1_2.log'
```

Izguba podatkov

- zakaj in kdaj lahko izgubimo podatke?
- osnove delovanja Oracle podatkovne zbirke

Transakcija

- preden se izvede commit, Oracle
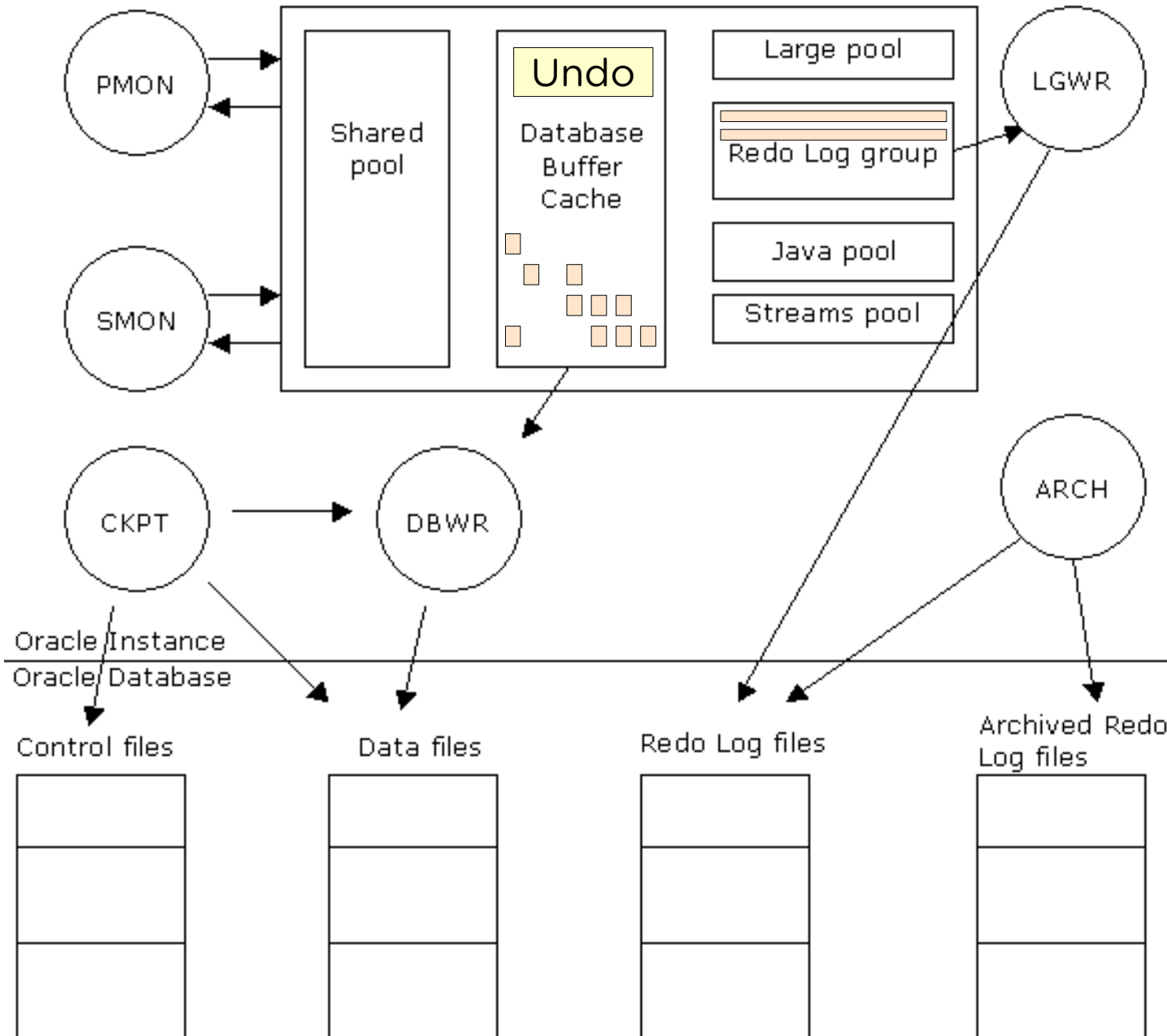   - generira undo informacijo
    - generira redo zapise v log bufferju
    - naredi spremembe v bufferjih, ki so v SGA

SGA

PMON

SMON

CKPT

DBWR

LGWR

ARCH

Shared pool

Undo

Database Buffer Cache

Large pool

Redo Log group

Java pool

Streams pool

Oracle Instance
Oracle Database

Control files

Data files

Redo Log files

Archived Redo Log files
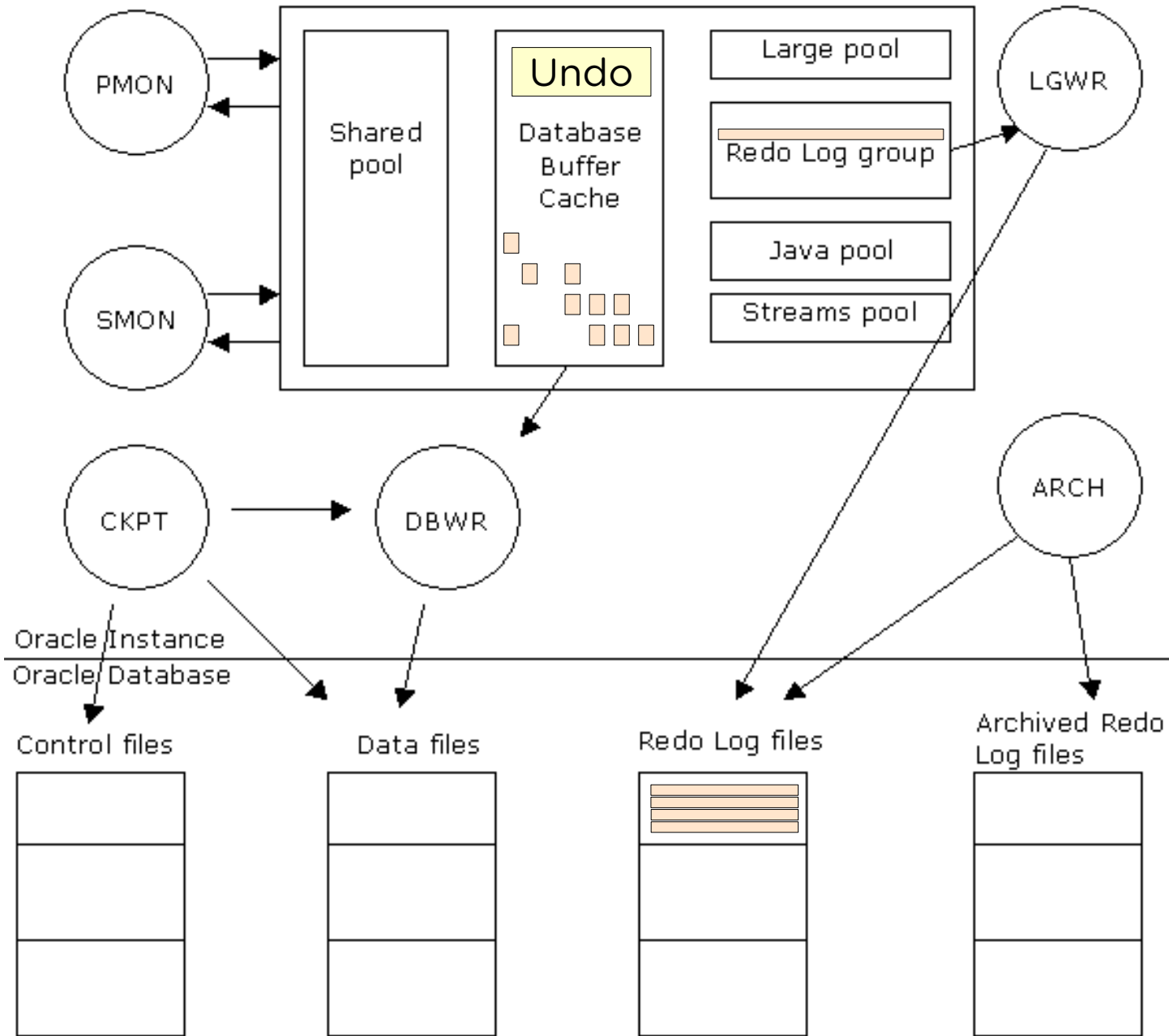
AS

Abakus

As na disku.

Commit

- Oracle ob commitu naredi:
    - generira SCN, ki se poveže s transakcijo
    - LGWR zapiše zapise iz log bufferja v redo log datoteko (to je konec commita)
    - odklene zaklenjene zapise
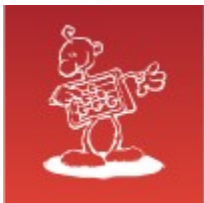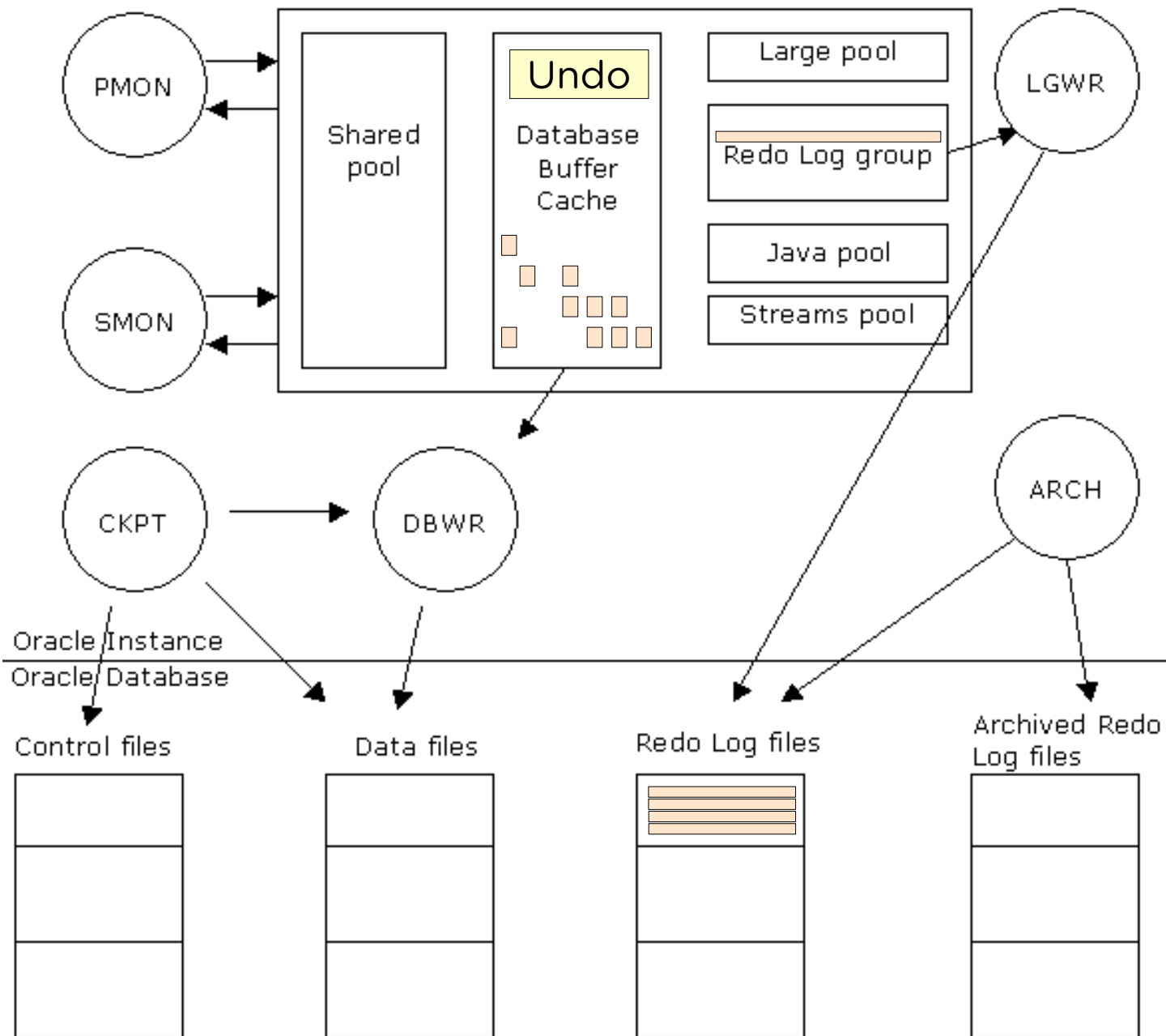   - označi, da je transakcija zaključena

SGA

Log Writter (LGWR)

- LGWR zapiše iz log predpomnilnika v redo log datoteke:
  - ob vsakem COMMIT ukazu
  - vsake tri sekunde
  - ko je REDO LOG predpomnilnik napolnjen do ene tretjine
  - ko mu signalizira DBW*n* proces
    - kadar REDO LOG predpomnilnik ni do konca zapisan, DBW*n* čaka, da LGWR konča z zapisovanjem

SGA – stanje po commitu

Log Writer

LGWR writes synchronously to the active mirrored group of redo log files. If one of the files in the group is damaged or unavailable, LGWR continues writing to other files in the group and logs an error in the LGWR trace file and in the system alert log. If all files in a group are damaged, or the group is unavailable because it has not been archived, LGWR cannot continue to function.

Log Writter

LGWR writes synchronously to the active mirrored group of redo log files. If one of the files in the group is

LGWR

in

because it has not been archived, LGWR cannot continue to function.

LGWR continues writing to other files in the group and logs an error in the LGWR trace file and in the system alert log.
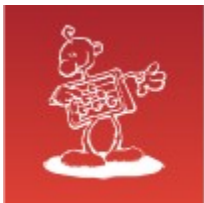
Pokvarjena redo log datoteka

- baza deluje, če nismo pozorni in ne ukrepamo, delamo samo z eno redo log datoteko

- če se ta pokvari, potem je konec!

- test

Pokvarjena redo log datoteka

```
SQL> SELECT b.thread#, a.GROUP#, a.member FROM v$logfile a, v$log b
WHERE a.GROUP# = b.GROUP#;

   THREAD#     GROUP# MEMBER
---------- ---------- ------------------------------------------------
         1          3 /oradata/SIOUG/onlinelog/o1_mf_3_7664dw3m_.log
         1          2 /oradata/SIOUG/onlinelog/o1_mf_2_7664dto3_.log
         1          1 /oradata/SIOUG/onlinelog/o1_mf_1_7664dsc6_.log

SQL> select group#, archived, status from v$log;

    GROUP# ARC STATUS
---------- --- ----------------
         1 YES INACTIVE
         2 YES INACTIVE
         3 NO  CURRENT
```

Pokvarjena redo log datoteka

```
SQL> alter database add logfile member
'/oradata/SIOUG/onlinelog/redo1_2.log' to group 1;

Database altered.

SQL> alter database switch logfile;
---
$ -- pokvarimo log datoteko
dd if=/dev/urandom bs=8192 count=50 of=redo1_2.log conv=notrunc

-- alert log pravi:
Errors in file
/oradmin/diag/rdbms/sioug/sioug/trace/erna_sioug_23065.trc:
ORA-00313: open failed for members of log group 1 of thread 1
ORA-00312: online log 1 thread 1: '/oradata/SIOUG/onlinelog/redo1_2.log'
ORA-27048: skgfifi: file header information is invalid
Additional information: 26
```
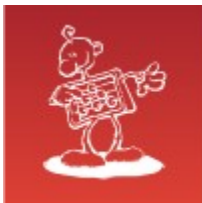
Pokvarjena redo log datoteka

```
SQL> alter system switch logfile; -- dokler 1. grupa ne bo CURRENT

SQL> select group#, archived, status from v$log;

    GROUP# ARC STATUS
---------- --- ----------------
         1 NO  CURRENT
         2 YES INACTIVE
         3 YES INACTIVE

SQL> SELECT b.thread#, a.GROUP#, a.member, a.status FROM v$logfile a, v$log b
WHERE a.GROUP# = b.GROUP#;

    THREAD#     GROUP# MEMBER                                                STATUS
---------- ---------- -------------------------------------------------- -------
         1          3 /oradata/SIOUG/onlinelog/o1_mf_3_7675lrbx_.log
         1          2 /oradata/SIOUG/onlinelog/o1_mf_2_7675lpvc_.log
         1          1 /oradata/SIOUG/onlinelog/o1_mf_1_7675lodr_.log
         1          1 /oradata/SIOUG/onlinelog/redo1_2.log                 INVALID
```
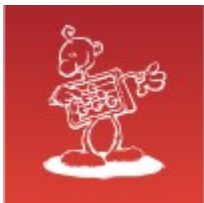
Pokvarjena redo log datoteka

```
-- naredimo insert, ki gre v log datoteko
SQL> insert into scott.dept values ('99', 'SIOUG', 'PORTOROZ');

1 row created.

SQL> commit;

Commit complete.

SQL> select * from scott.dept;

    DEPTNO DNAME          LOC
---------- -------------- -------------
        99 SIOUG          PORTOROZ
        10 ACCOUNTING     NEW YORK
        20 RESEARCH       DALLAS
        30 SALES          CHICAGO
        40 OPERATIONS     BOSTON
```

Pokvarjena redo log datoteka

```
-- simuliramo sesutje baze sistema
SQL> shutdown abort;

-- pokvarimo še drugo redo log datoteko

SQL> startup;

ERROR at line 1:
ORA-00313: open failed for members of log group 1 of thread 1
ORA-00312: online log 1 thread 1: '/oradata/SIOUG/onlinelog/redo1_2.log'
ORA-27048: skgfifi: file header information is invalid
Additional information: 14
ORA-00312: online log 1 thread 1:
'/oradata/SIOUG/onlinelog/o1_mf_1_7664dsc6_.log'
ORA-27048: skgfifi: file header information is invalid
Additional information: 14

-- edina možnost zdaj je restore, recover dokler gre in resetlogs

RMAN> connect target /
RMAN> restore database;
RMAN> recover database;
```
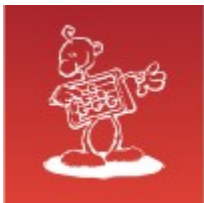
Pokvarjena redo log datoteka

```
sqlplus / as sysdba

SQL> recover database until cancel;
ORA-00279: change 1058924 generated at 09/04/2011 16:59:06 needed for thread 1
ORA-00289: suggestion : /oradmin/sioug/arch/1_16_760953017.arch
ORA-00280: change 1058924 for thread 1 is in sequence #16


Specify log: {<RET>=suggested | filename | AUTO | CANCEL}
cancel
Media recovery cancelled.
SQL> alter database open resetlogs;

Database altered.

SQL> select * from scott.dept;

    DEPTNO DNAME          LOC
---------- -------------- -------------
        10 ACCOUNTING     NEW YORK
        20 RESEARCH       DALLAS
        30 SALES          CHICAGO
        40 OPERATIONS     BOSTON
```

Pokvarjena redo log datoteka

```
SQL> alter database open resetlogs;
alter database open resetlogs
*
ERROR at line 1:
ORA-01194: file 1 needs more recovery to be consistent
ORA-01110: data file 1: '/oradata/SIOUG/datafile/o1_mf_system_76648xts_.dbf'
```

- restore database + kontrolna datoteka

- recover database until cancel

- kaj pa, če zbirka ni v „archivelog" načinu?

_allow_resetlogs_corruption

```
SQL> alter database open resetlogs;
alter database open resetlogs
*
ERROR at line 1:
ORA-01194: file 1 needs more recovery to be consistent
ORA-01110: data file 1: '/oradata/SIOUG/datafile/o1_mf_system_76648xts_.dbf'


SQL> alter system set "_allow_resetlogs_corruption" = true scope = spfile;

System altered.

SQL> startup force;
ORACLE instance started.
...
ORA-01589: must use RESETLOGS or NORESETLOGS option for database open
...
SQL> alter database open resetlogs;

Database altered.

SQL>
```

_allow_resetlogs_corruption

- Metalink ID 418476.1

  - Force open the database by setting the _ALLOW_RESETLOGS_CORRUPTION=TRUE in the init.ora. But there is no 100% guarantee that we can open the database. However, once the database is opened, then **you must immediately rebuild the database.** Database rebuild means doing the following, namely: (1) perform a full-database export, (2) create a new and separate database, and finally (3) import the recent export dump.

Pokvarjena redo log datoteka

- izgubili smo vse, kar je bilo v pokvarjeni redo log datoteki (teoretično bi lahko izgubili tudi vse, kar je bilo v naslednjih redo log datotekah)

- kaj, če smo že natisnili račun?

- kaj narediti v primeru distribuiranih transakcij?

  - edina rešitev bi bila uporaba standby zbirke s parametrom „MAXIMUM PROTECTION" (to pa podvoji verjetnost za izpad sistema)
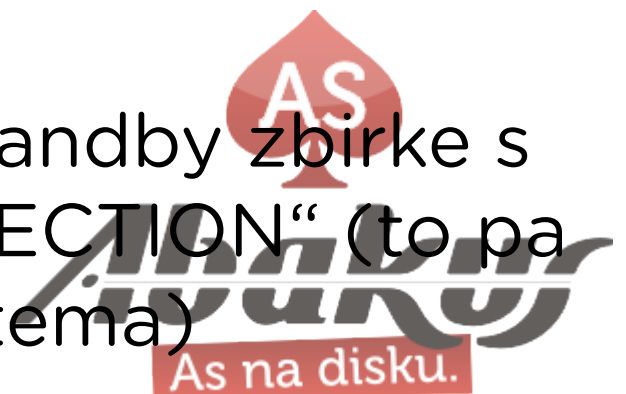
ORA-02002

- ORA-02002: error while writing to audit trail

- kje so moji audit podatki? (Metalink notice: ID 788530.1)

  - AUD: Audit Commit Delay exceeded, written a copy to OS Audit Trail

- v DBA_AUDIT_TRAIL ni vseh podatkov!

Poškodovani bloki pri standby bazi

- periodično preverjanje okvarjenih blokov

  - < 11g:
    select * from v$database_block_corruption

```
RMAN> backup validate check logical database;
...
List of Datafiles
=================
File Status Marked Corrupt Empty Blocks Blocks Examined High SCN
---- ------- -------------- ------------ ---------------- 
----------
1    OK      0                   15756        97337              1071261
    File Name: +DATA/erna12/datafile/system.6256.761042747
    Block Type Blocks Failing Blocks Processed
    ---------- -------------- ----------------
    Data       0              59716
    Index      0              12691
    Other      0              9117
```

Poškodovani bloki pri standby bazi

```
RMAN> backup validate check logical database;

channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current control file in backup set
including current SPFILE in backup set
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
List of Control File and SPFILE
=================================
File Type       Status Blocks Failing Blocks Examined
------------- ------ --------------- ----------------
SPFILE          OK     0               2
Control File OK        0               614
Finished backup at 05.09.2011 13:07:01
```

Backup

- RMAN backup

  - configure autobackup on

    - controlfile

    - spfile

- backup controlfile to trace as '...'

- create pfile='...' from spfile;

- hranimo datoteke za določen čas – primerjava pri spremembi parametrov

Backup

- password file, tnsnames.ora, sqlnet.ora, listener.ora, /etc/ora*, …

  - vse te datoteke rabimo, ko postavljamo zbirko v novem okolju

- periodično shraniti meta podatke (data pump)

  - možnost primerjave meta podatkov – kaj se je spremenilo od včeraj?
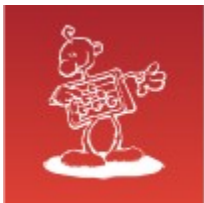
Ali je backup uspešen?

- backup - cron

```
SQL> select start_time, end_time, input_type, status
FROM v$rman_backup_job_details ORDER BY start_time DESC;

START_TI END_TIME INPUT_TYPE    STATUS
-------- -------- ------------- -------------------------
05.09.11 05.09.11 DB INCR       COMPLETED
04.09.11 04.09.11 DB INCR       COMPLETED
03.09.11 03.09.11 DB FULL       COMPLETED
03.09.11 03.09.11 DB INCR       COMPLETED
03.09.11          ARCHIVELOG    FAILED
02.09.11 02.09.11 DB INCR       COMPLETED
```

Uporabniki s privzetimi gesli

- ali obstajajo v zbirki odprti uporabniki s privzetimi gesli?

```
SELECT d.username, u.account_status
  FROM dba_users_with_defpwd d, dba_users u
 WHERE d.username = u.username
   AND account_status = 'OPEN'
 ORDER BY 2, 1;
```
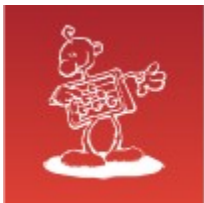
Sistemska statistika

- v Oracle dokumentaciji piše:
  „*Oracle Corporation highly recommends that you gather system statistics*.“

  - http://download.oracle.com/docs/cd/E18283_01/server.112/e16638/stats.htm#i41496

- ali je nastavljena „privzeta“ statistika?

Sistemska statistika

```
SELECT pname, pval1
  2   FROM sys.aux_stats$;

PNAME                                 PVAL1
--------------------------------- -----------
STATUS
DSTART
DSTOP
FLAGS                                     1
CPUSPEEDNW                             1239
IOSEEKTIM                                10
IOTFRSPEED                             4096
SREADTIM
MREADTIM
CPUSPEED
MBRC
MAXTHR
SLAVETHR
```

Sistemska statistika

- nonworkload

- workload (priporočeno)
  - zbirati enkrat
  - periodično preverjati odstopanja
  - ponovno zbiranje le ob HW spremembah
    - Christian Antognini

Sistemska statistika

- pazi: 11.2 – BUG 9842771 in 9701256 – popravljeno v 12.1 (obstaja patch)

  - visoke vrednosti v SREADTIM in MREADTIM

  - popraviti ročno!

    - dbms_stats.set_system_stats (
      pname =>'sreadtim', pvalue =>4);

    - dbms_stats.set_system_stats (
      pname =>'mreadtim', pvalue =>10);

As na disku.

Remote Diagnostic Agent

- If you do not have a current RDA you are at risk of wasting hours of your time

- If you have not downloaded the RDA tool you are at risk of having a prolonged outage

- If you have no idea what I'm talking about your job is at risk

ORA-03113: end-of-file on communication channel

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