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The World of Traces

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- **Tätigkeitsbereiche:**
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  - **Oracle Schulungen (SQL, PL/SQL, DBA, APEX, … - gerne auch Inhouse)**
  - **Software-Lösungen**
  - **Oracle Lizenzen**

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Agenda

- **Fascination of Traces**
  or: What Made Me Give this Presentation
- **World of Traces**
- **Real-Life Experience with Trace Files**

What NOT to Expect?

- **Tools:**
  - **trcsess, tkprof, SQLT, trca**
  - **orachk, exachk**
  - **TFA**
- **Complete List of Ways to Trace Something**
- **Details about Clusterware or OS Tracing**

Fascination of Trace Files

First Trace File

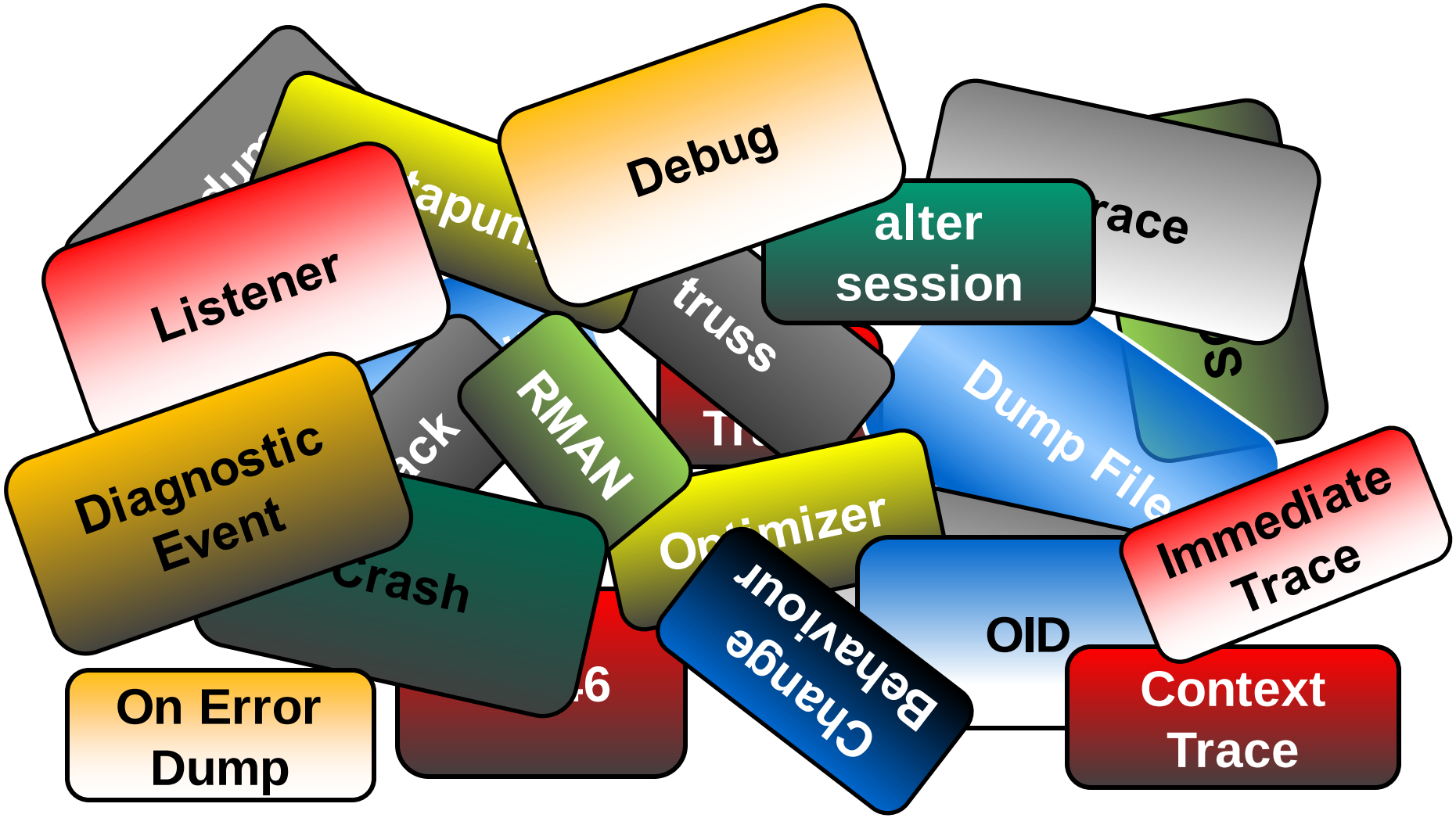
```
2016-11-01 10:16:05.372437 : nlstdts_trace_source:Attempted load of local pfile source /home/oracle/.sqlnet.ora
2016-11-01 10:16:05.372446 : nlstdts_trace_source:Parameter source was not loaded
2016-11-01 10:16:05.372455 : nlstdts_trace_source:
2016-11-01 10:16:05.372464 : nlstdtp_trace_pfile: -> PARAMETER TABLE LOAD RESULTS FOLLOW <-
2016-11-01 10:16:05.372475 : nlstdtp_trace_pfile:Successful parameter table load
2016-11-01 10:16:05.372485 : nlstddp_dump_ptable: -> PARAMETER TABLE HAS THE FOLLOWING CONTENTS <-
2016-11-01 10:16:05.372498 : nlstddp_dump_ptable:  TRACE_LEVEL_CLIENT = admin
2016-11-01 10:16:05.372508 : nlstddp_dump_ptable:  NAMES.DIRECTORY_PATH = (TNSNAMES, ONAMES, HOSTNAME)
2016-11-01 10:16:05.372518 : nlstdtp_trace_pfile:--- PARAMETER SOURCE INFORMATION ENDS ---
2016-11-01 10:16:05.372529 : nlstddl_do_alter_log:--- LOG CONFIGURATION INFORMATION FOLLOWS ---
2016-11-01 10:16:05.372559 : nlstddl_do_alter_log:Log stream will be "/u01/app/oracle/diag/clients/user_oracle/host_17
/alert/log.xml"
2016-11-01 10:16:05.372571 : nlstddl_do_alter_log:Log stream validation not requested
2016-11-01 10:16:05.372581 : nlstddl_do_alter_log:--- LOG CONFIGURATION INFORMATION ENDS ---

2016-11-01 10:16:05.372596 : nlstdipi:entry
2016-11-01 10:16:05.372670 : nlstdipi:exit
2016-11-01 10:16:05.372737 : nigini:entry
2016-11-01 10:16:05.372757 : nigini:Count in the NL global area is now 1
2016-11-01 10:16:05.372769 : nigini:Count in NI gbl area now: 1
2016-11-01 10:16:05.372783 : nrigbi:entry
2016-11-01 10:16:05.372796 : nrigbni:entry
2016-11-01 10:16:05.372837 : nrigbni:Unable to get data from navigation file tnsnav.ora
2016-11-01 10:16:05.372848 : nrigbni:exit
2016-11-01 10:16:05.372858 : nrigbi:exit
2016-11-01 10:16:05.372869 : nigini:exit
2016-11-01 10:16:05.374448 : nigsui:entry
2016-11-01 10:16:05.374503 : nigsui:Set User Interrupt: hdl=0, prc=0x11111aa0, ctx=0x258c050.
2016-11-01 10:16:06.625005 : nigini:entry
```

Reasons Not to Use Traces

- **No Knowledge**
- **Too Much Data**
- **No Time**

Traces Around the World



Its Time

- To an Overview about Trace Files
- To Understand the Huge Possibilities to Trace Something

World of Trace Files

When Should I Trace?

- I have already a guess what I‘m looking for
- The problem is reproducable

Trace Strategy

1.) What do I want to trace?

→ Component/Function which needs troubleshooting

2.) Which ways do I have to collect data/tracefiles?

→ Brainstorming

3.) Choose the Best

Analysis of Trace Files

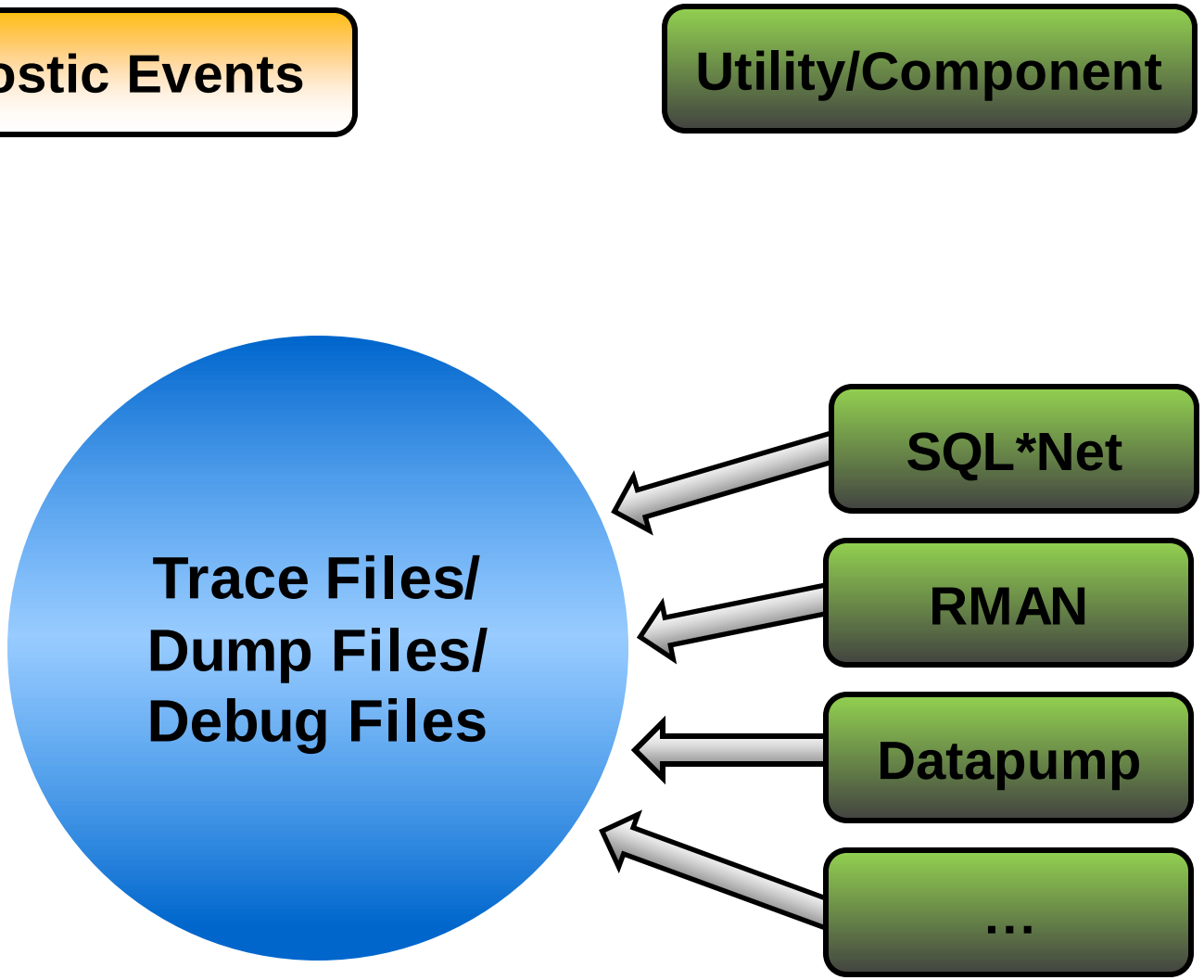
Main problem: huge amount of data

- **trace as focussed as you can – produce as less data as you can**

- **Have a look:**
  - **Try to understand the structure**
  - **Try to understand the need of Oracle developers**

- **`vi`, `grep` and `sdiff` are your friends**

Trace Files


Diagnostic Events
Utility/Component
Trace Files/
Dump Files/
Debug Files
SQL*Net
RMAN
Datapump
...

Activate Tracing

- **Set a parameter in a config file:**
  - **sqlnet.ora: trace_level_client**
  - **listener.ora: trace_level_*listener_name***
- **Set a parameter at command line:**
  - **Datapump: TRACE**
  - **RMAN: DEBUG**
- **Execute a package:**
  - **SQL Trace: DBMS_MONITOR**
- **Set an diagnostic event**

Diagnostic Events

Why Should I Care About Events?

- **Events are closely related to trace files**
- **Events help dumping/tracing information which might help in error analysis**

What is an Diagnostic Event?

- **Diagnostic Events:**

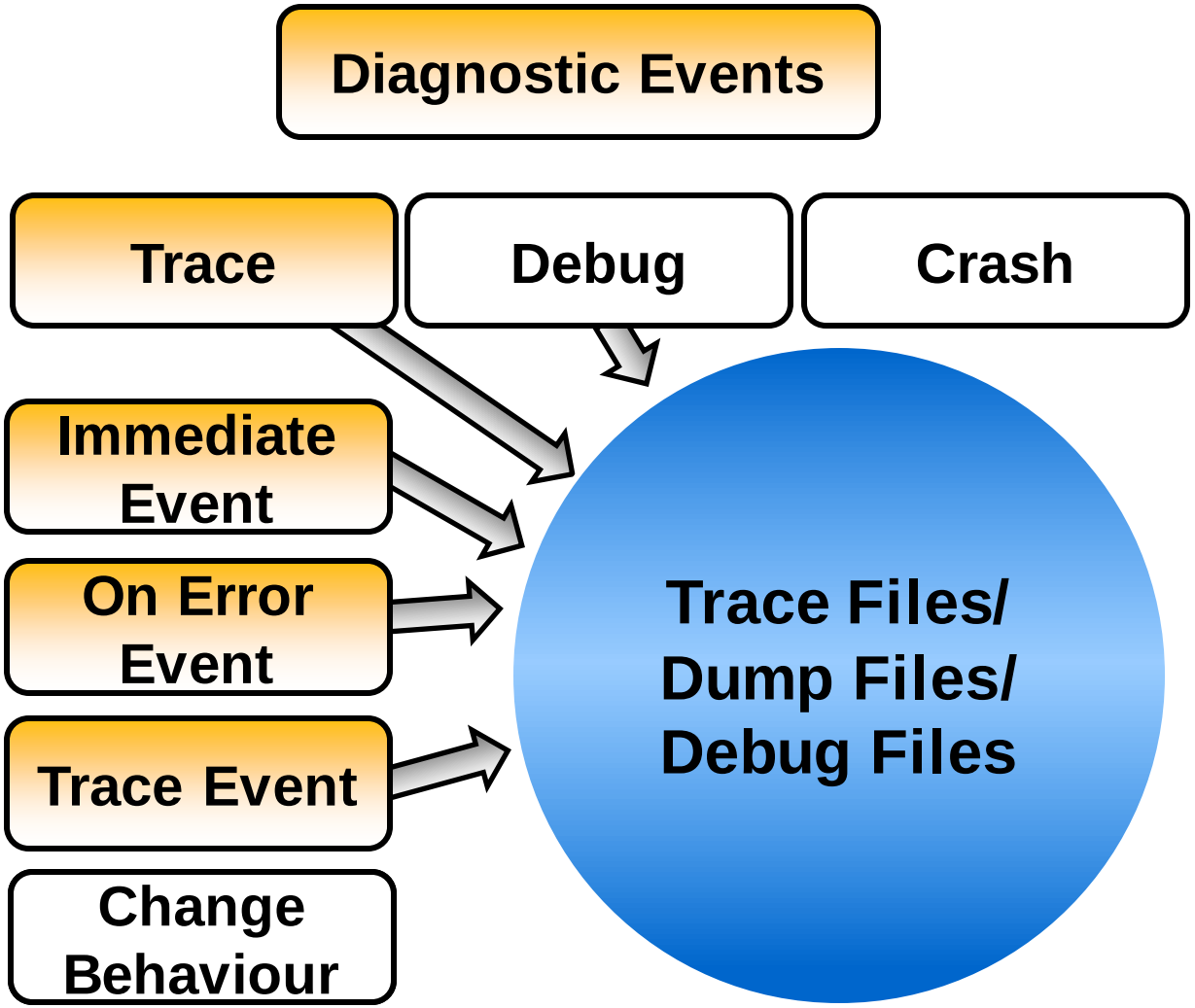
„trigger“ the kernel to do something it would not have done otherwise

„trigger“ the kernel to write more information

There are Diagnostic Events for

- Optimizer
- IO
- Network
- Cursor Cache
- RMAN
- Database Vault
- OID/LDAP-Connection
- Error messages, Systemstate, Errorstack, …
- Deadlocks

Trace Files


Diagnostic Events
Trace
Debug
Crash
Immediate Event
On Error Event
Trace Event
Change Behaviour
Trace Files/ Dump Files/ Debug Files

How to Set an Event

- **Immediate:**
```
alter session set events 'IMMEDIATE trace
name systemstate';
```
- **Error:**
```
alter session set events '942 trace name
errorstack';
```
- **Process Trace (Context Trace):**
```
alter session set events '10046 trace name
CONTEXT forever';
```
- **Change behaviour:**
```
alter system set events '10262 trace name
CONTEXT forever,level 90000';
```

How to Set an Event

- **sqlplus - session/system/database level**

```
alter session set events '942  trace name
errorstack';

alter system set events '942  trace name
errorstack';

alter system set event='942  trace name
errorstack' scope=spfile;
```

- **For another session:**
  - `oradebug`
  - `dbms_system.set_ev()`

How to Set an Event

- **Possibility to use event names instead of numbers**
- **Use `oradebug` instead of `alter session/system`**
- **Redesigned Diagnostics from 11g Onwards:**
  - **More granulated traces for special events like:**

```
alter system set events 'sql_trace {process
: pname = dw | pname = dm} level=12'; (<12c)
```

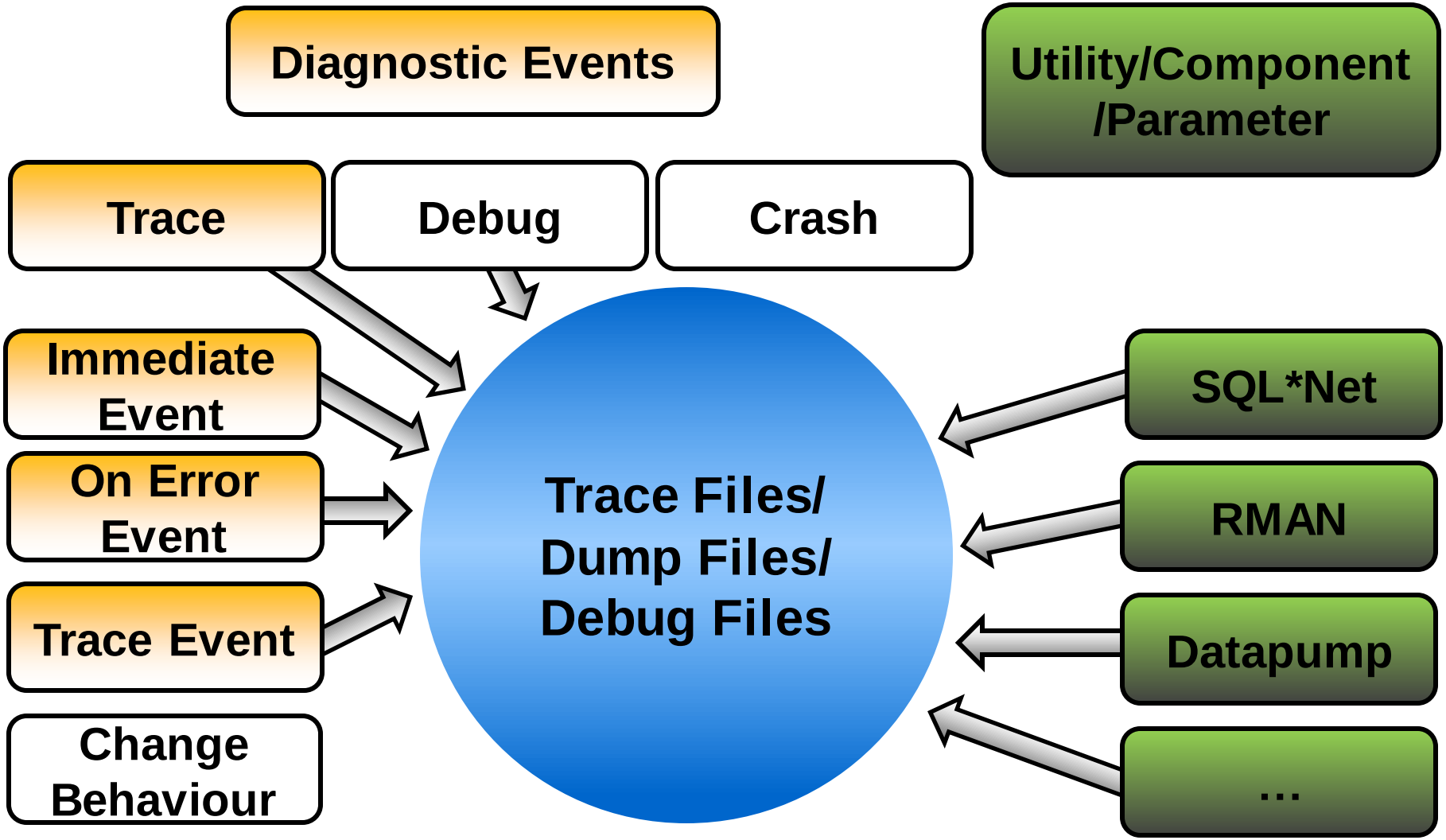
Forgot which events you had set?

- **oradebug setmypid|ospid xxx**
- **oradebug eventdump system|session|process;**
- **Output:**

```
SQL> oradebug setmypid
Statement processed.
SQL> oradebug eventdump system;
Statement processed.
SQL> oradebug eventdump session
942  trace name context
```

Trace Files – The Whole Picture

Trace Files


Diagnostic Events
Utility/Component /Parameter
Trace
Debug
Crash
Immediate Event
On Error Event
Trace Event
Change Behaviour
Trace Files/ Dump Files/ Debug Files
SQL*Net
RMAN
Datapump
...

SQL Trace (Session Trace, 10046)

- **Setting an Diagnostic Event:**

```
alter system
    set event='sql_trace [sql:a5ks9fhw2v9s1]
    level=12'
    scope=spfile;
```

- **DBMS_MONITOR:**

```
dbms_monitor.serv_mod_act_trace_enable
    ('SYS$USERS',
    'rman@vm11 (TNS V1-V3)',
    dbms_monitor.all_actions,
    TRUE,
    TRUE);
```

SQL Trace (Session Trace)

- **Outdated/Not Supported/Only of limited use:**
  - `sql_trace=TRUE`
  - `dbms_support.start_trace_in_session (sid,serial#,waits=>TRUE,binds=>true)`
  - `dbms_system.set_sql_trace_in_session (sid, serial#,true);`
  - `dbms_system.set_ev (sid, serial#,10046,4,'');`
  - `set autotrace on`

Optimizer Trace

```
begin
      dbms_sqldiag.dump_trace('19rhjqgjtmsyz');
end;

alter session set events
      '10053 trace name context forever';

alter session set events
      'trace[rdbms.SQL_Optimizer.*]';

alter session set event
      'trace[rdbms.SQL_Optimizer.*]
      [sql:19rhjqgjtmsyz]';
```

Datapump Trace

- **Parameter at Command Line:**

```
expdp userid=scott SCHEMAS=scott
TRACE=480300
```

- **Event (useful during initializing):**

```
alter system set events
'39089 trace name context forever,
level 0x300';
```

- **SQL-Trace:**

```
alter system set events
'sql_trace {process:pname=dw,pname=dm}
level=12';
```

RMAN Trace

- **RMAN-DEBUG:**
  - **DBGSQL, DBGRCVMAN, DBGRCVCAT, DBGMISC**

```
rman catalog rman/rman@dwh12 target /
debug trace=rman.trc
```

- **RMAN-Channels:**
  -

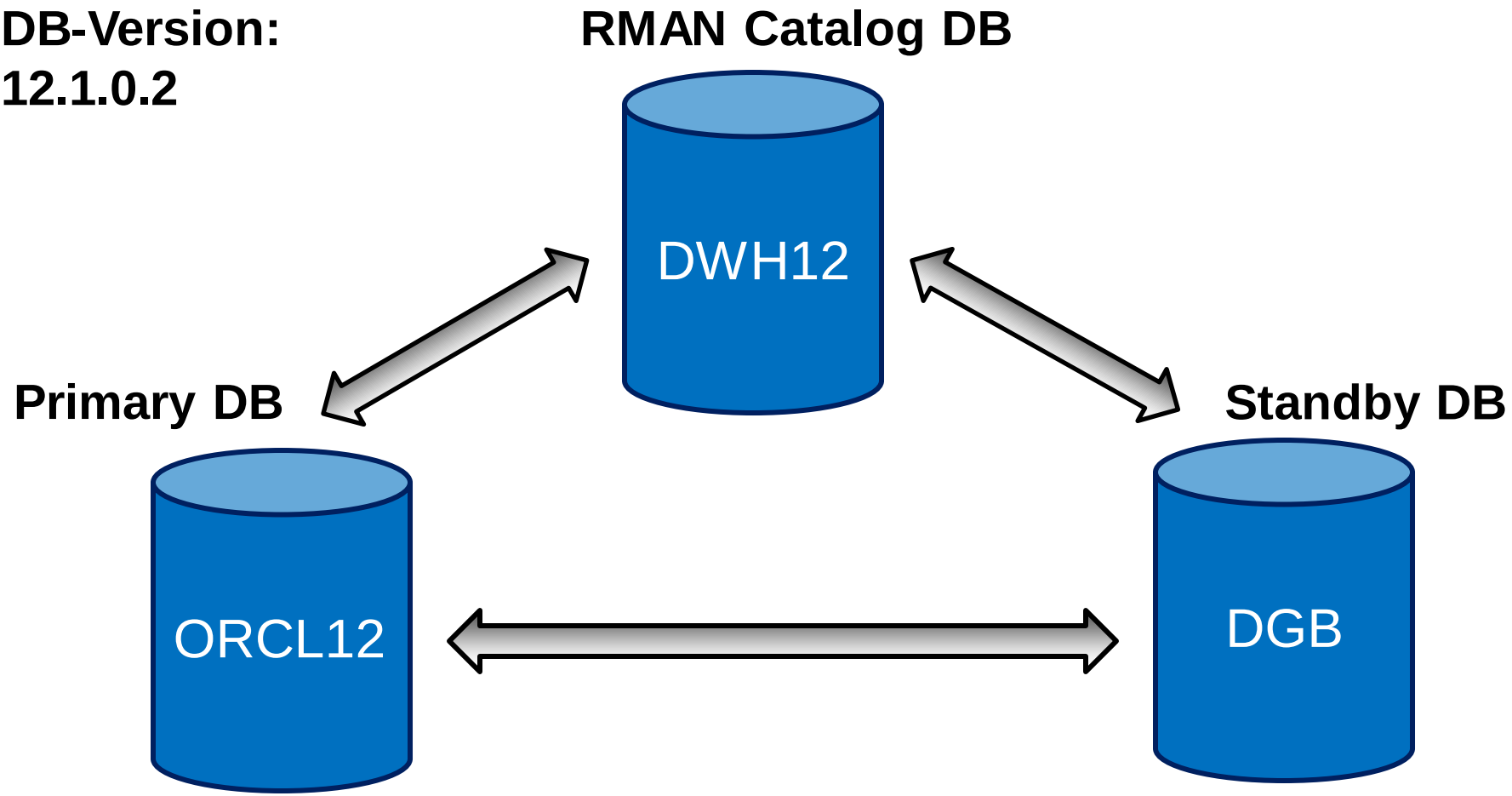
```
run {
allocate channel ch1 device type disk
debug "low";
backup database ;   }
```

- **Trace Event (SQL Trace + Debug):** `trace[krb.*]`
- **SQL_Trace**

Real-Life Experience with Trace Files

Data Guard Environment + RMAN Catalog

DB-Version:
12.1.0.2



Environment

- **v$database:**

DATABASE_ROLE	PRIMARY	PHYSICAL STANDBY
DB_UNIQUE_NAME	ORCL12	DGB
DBID	3503097912	3503097912
NAME	ORCL12	ORCL12

- **Databases created, catalog created, primary database registered**

Questions

- **What exactly happens when adding a Standby Database to the RMAN Catalog?**
- **What are the dependencies in RMAN Catalog between Standby and Primary?**

Used Diagnostic Tools

- **RMAN Debug**
- **SQL-Trace via dbms_monitor**

RMAN-Debug

- **Connect/Report Schema with RMAN Standby/Catalog**

```
rman target / catalog rman/rman@dwh12 debug
trace=RmanReportSchemaStby.trc

report schema;

exit;
```

RMAN-Debug – Analyze Trace File

- **Overview**
  - **How many lines**
  - **First lines**
  - **Structure of the trace file**
  - **Repeating patterns**

- **Look for interesting strings/patterns in the trace file and what is done before and after**

RMAN – SQL Trace

```
begin
      dbms_monitor.serv_mod_act_trace_enable
      ('SYS$USERS','rman@vm11 (TNS V1-V3)',
      dbms_monitor.all_actions,
      TRUE,
      TRUE);
end;
```

Auf Standby and Catalog this Services/Modules:

```
      ('SYS$USERS','rman@vm12 (TNS V1-V3)'
      ('DWH12','rman@vm11 (TNS V1-V3)'
      ('DWH12','rman@vm12 (TNS V1-V3)'
```

Answers

- What exactly happens when registering a Standby Database?
  - 2nd „node“ (site key) is added
  - during REPORT SCHEMA
- What are the dependencies in RMAN Catalog between Standby and Primary?
  - one DB (REG_DB_UNIQUE_NAME ORCL12), two nodes (site keys)

Conclusion

Lets Remember: Reasons not to use traces

- **No Knowledge**
  - **You‘ve got an overview about system of traces and possibilities.**
- **Too Much Data**
  - **Trace focussed.**
  - **Investigate the structure of the tracefile.**
- **No Time**
  - **Take you the time – its really interesting and helpful.**

With Tracing You can Achieve:

- **Deep understanding of Oracle internals**
- **Solve problems**

Have Fun

```
Trace file /u01/app/oracle/diag/clients/user_oracle/host_1775026241_82/trace/ora_3363_1
39784219813312.trc
2016-11-01 10:16:05.367552 : nlstddt_do_alter_trace:--- TRACE CONFIGURATION INFORMATION
 FOLLOWS ---
2016-11-01 10:16:05.372339 : nlstddt_do_alter_trace:New trace stream is /u01/app/oracle
/diag/clients/user_oracle/host_1775026241_82/trace/ora_3363_139784219813312.trc
2016-11-01 10:16:05.372366 : nlstddt_do_alter_trace:New trace level is 6
2016-11-01 10:16:05.372376 : nlstddt_do_alter_trace:--- TRACE CONFIGURATION INFORMATION
 ENDS ---
2016-11-01 10:16:05.372389 : nlstdtp_trace_pfile:--- PARAMETER SOURCE INFORMATION FOLLO
WS ---
2016-11-01 10:16:05.372404 : nlstdts_trace_source:Attempted load of system pfile source
 /u01/app/oracle/product/12.1.0.2/dbhome_1/network/admin/sqlnet.ora
2016-11-01 10:16:05.372414 : nlstdts_trace_source:Parameter source loaded successfully
2016-11-01 10:16:05.372426 : nlstdts_trace_source:
2016-11-01 10:16:05.372437 : nlstdts_trace_source:Attempted load of local pfile source
/home/oracle/.sqlnet.ora
2016-11-01 10:16:05.372446 : nlstdts_trace_source:Parameter source was not loaded
2016-11-01 10:16:05.372455 : nlstdts_trace_source:
2016-11-01 10:16:05.372464 : nlstdtp_trace_pfile: -> PARAMETER TABLE LOAD RESULTS FOLLO
W <-
2016-11-01 10:16:05.372475 : nlstdtp_trace_pfile:Successful parameter table load
2016-11-01 10:16:05.372485 : nlstddp_dump_ptable: -> PARAMETER TABLE HAS THE FOLLOWING
CONTENTS <-
2016-11-01 10:16:05.372498 : nlstddp_dump_ptable:  TRACE_LEVEL_CLIENT = admin
2016-11-01 10:16:05.372508 : nlstddp_dump_ptable:  NAMES.DIRECTORY_PATH = (TNSNAMES, ON
AMES, HOSTNAME)
2016-11-01 10:16:05.372518 : nlstdtp_trace_pfile:--- PARAMETER SOURCE INFORMATION ENDS
---
2016-11-01 10:16:05.372529 : nlstddl_do_alter_log:--- LOG CONFIGURATION INFORMATION FOL
LOWS ---
2016-11-01 10:16:05.372559 : nlstddl_do_alter_log:Log stream will be "/u01/app/oracle/d
iag/clients/user_oracle/host_1775026241_82/alert/log.xml"
2016-11-01 10:16:05.372571 : nlstddl_do_alter_log:Log stream validation not requested
2016-11-01 10:16:05.372581 : nlstddl_do_alter_log:--- LOG CONFIGURATION INFORMATION END
S ---

2016-11-01 10:16:05.372596 : nlstdipi:entry
2016-11-01 10:16:05.372670 : nlstdipi:exit
```

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Do you have questions?

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