# Backup & Recovery

WEEK 13

# We'll talk about:

- Flashback Technologies
- Standby/Replication Setups
- Crash scenarios.
- The backup&recovery strategy plan.

# Flashback Technologies

# Flashback Overview

May be used to revert the database or a part of it (e.g. a table) as it was in the past

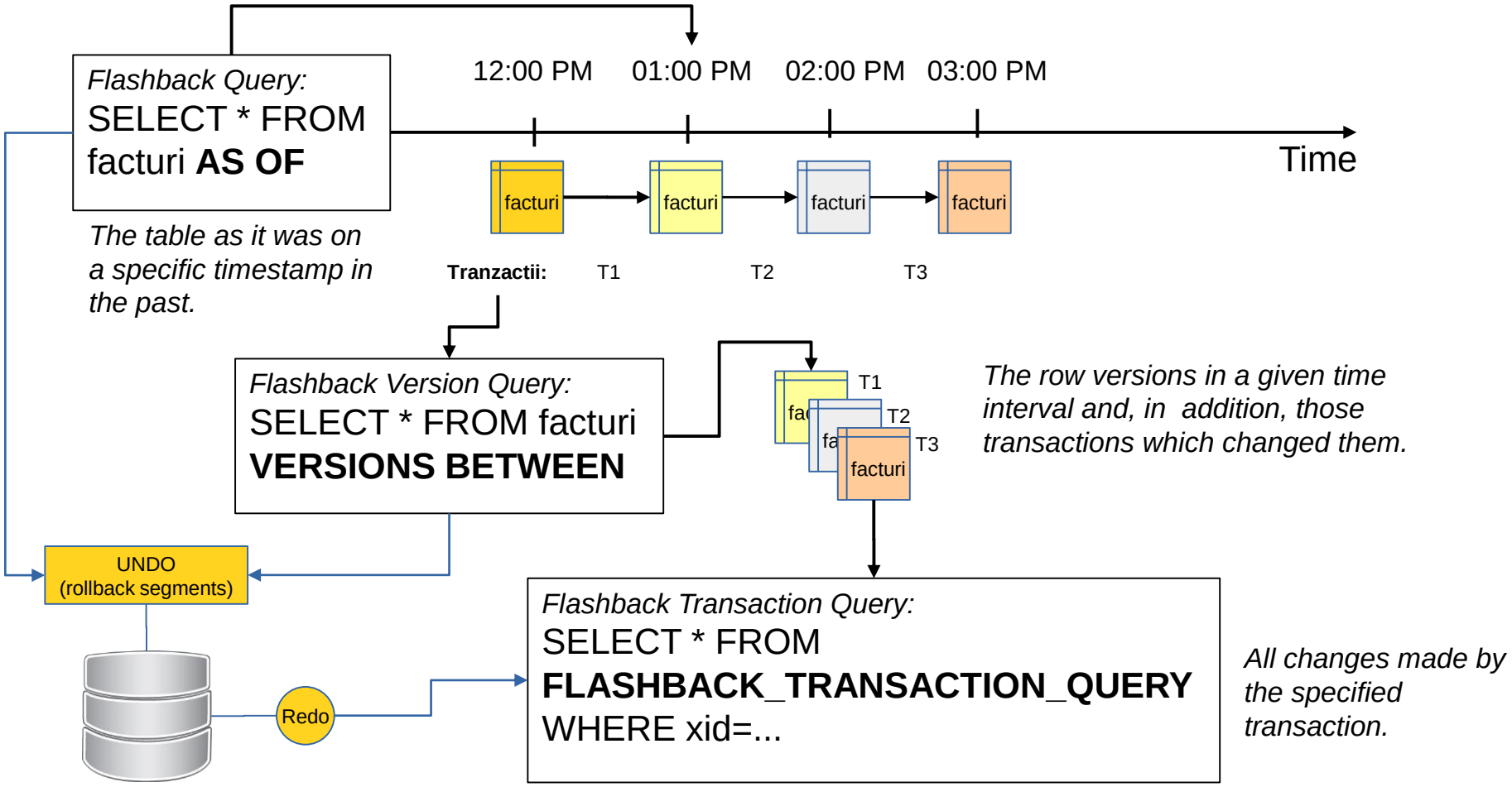
There's no need for a previous backup

They are (more or less) fast

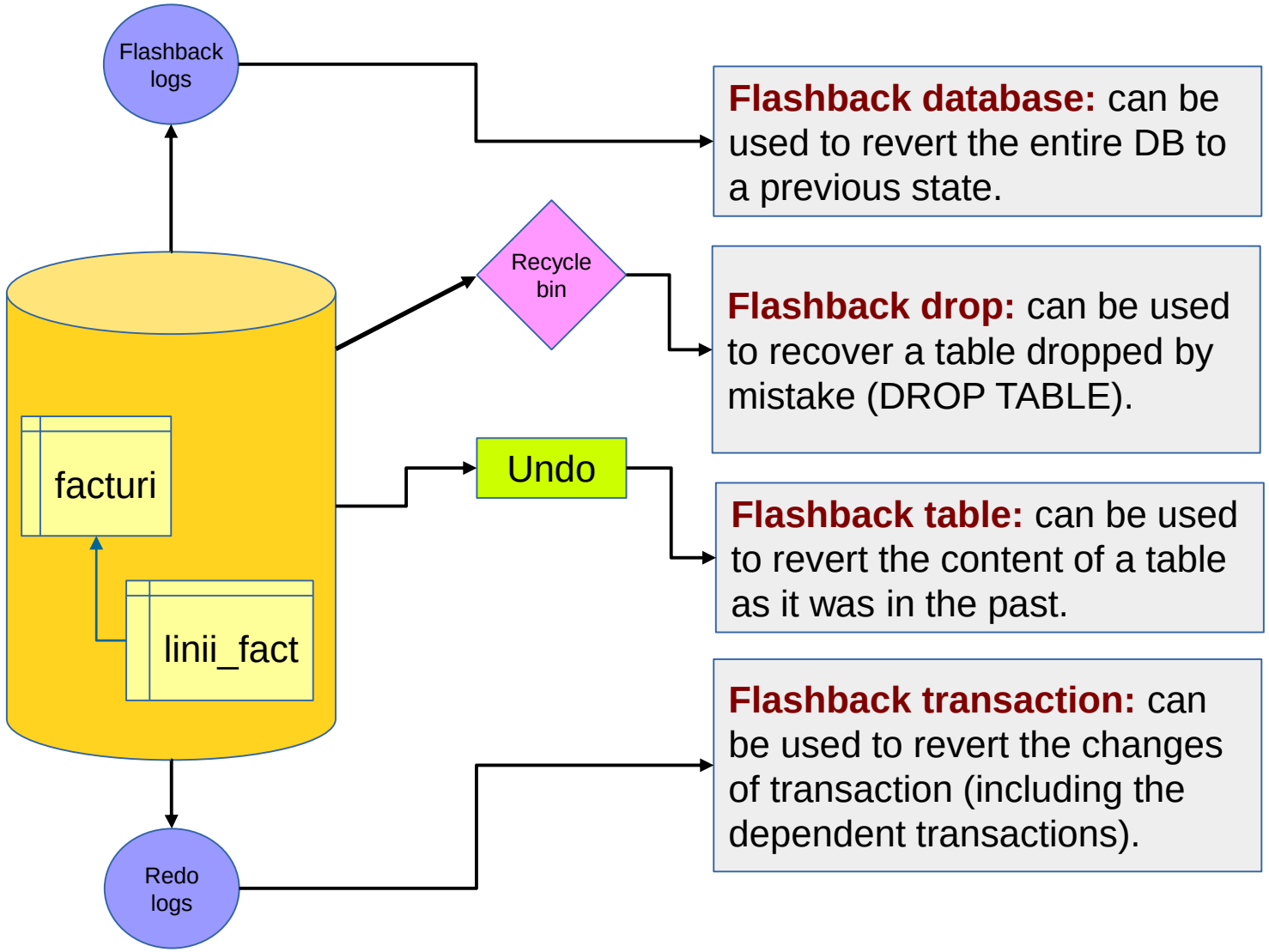
Especially good for human errors: a wrong UPDATE, dropping a table by accident

Can be used in QA/test databases to revert them to the initial state if, for example, a test suite has changed the database.

# View Data from the Past



# Recovering Data from the Past

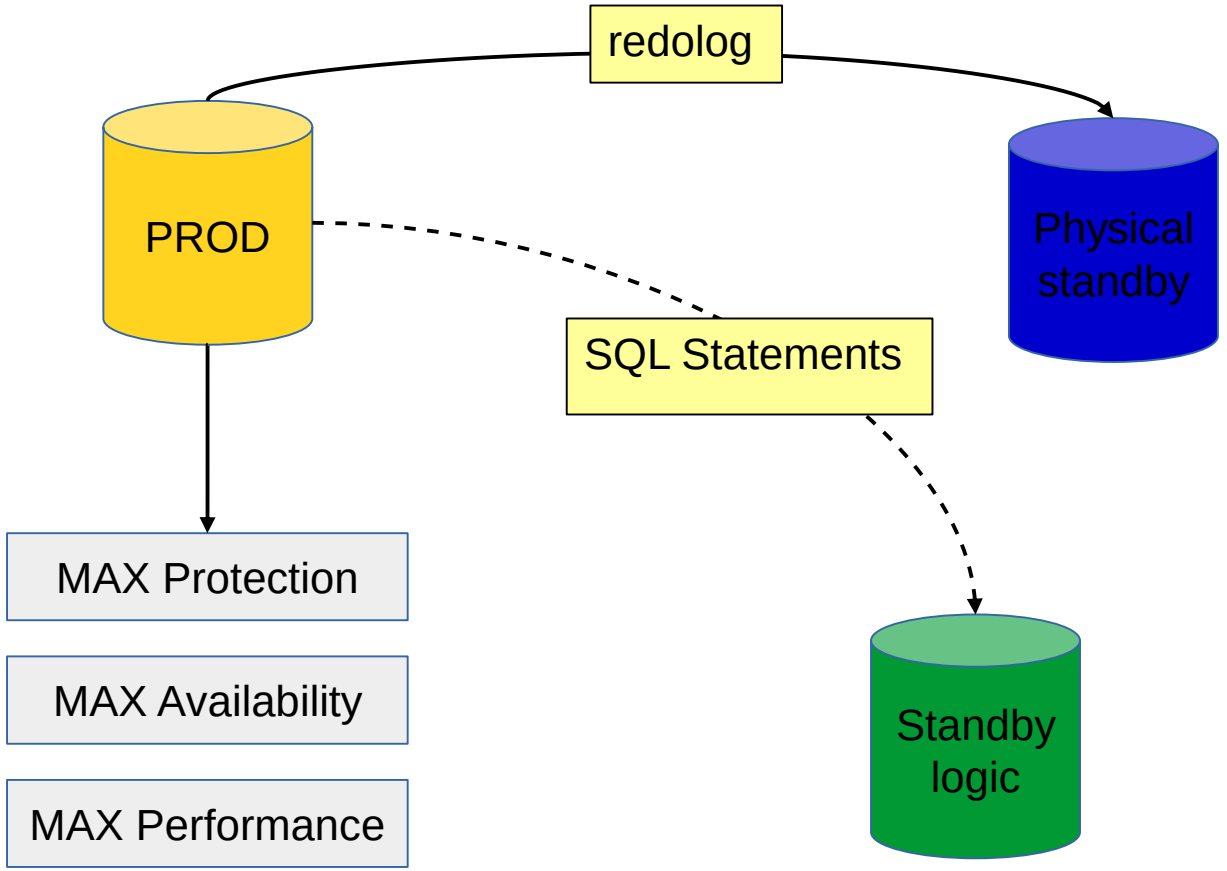


# Stanby / Replication Setups

# What are they and when to be used?

- The data is protected by replicating it to another location.
- The data can be recovered even an entire location is lost (wars, flood etc.)
- Usually, the standby database has a passive role and is activated only when the production site is lost.

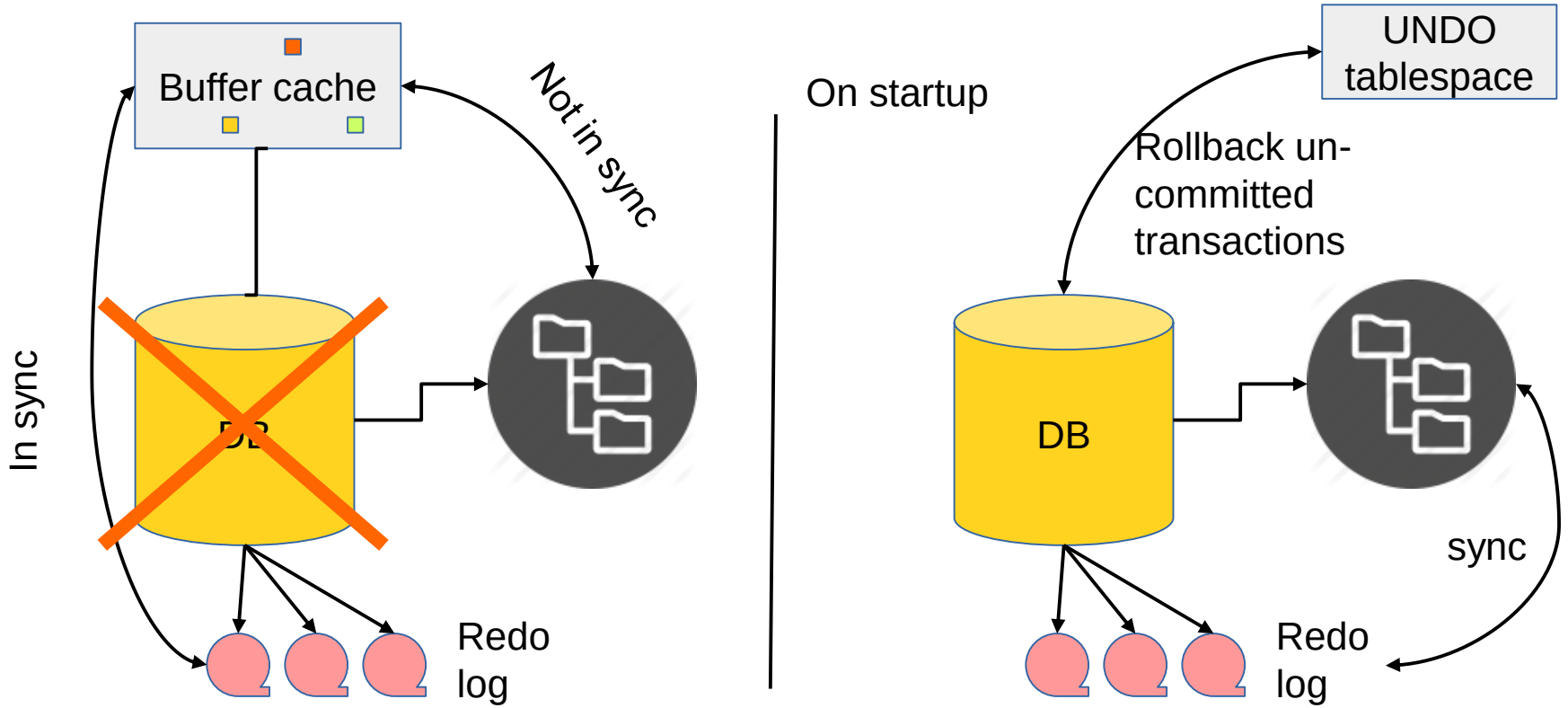
# Standby Database Types



# Crash Scenarios

# Oracle Instance Crash

**A likely cause:** Dorel has switched off the server.



# Recovering a Datafile

**A likely cause:** Dorel has removed the file by mistake.

**Simptom:**

```
SQL> startup
ORACLE instance started.

Total System Global Area  626327552 bytes
Fixed Size                  2283824 bytes
Variable Size             423626448 bytes
Database Buffers          197132288 bytes
Redo Buffers                3284992 bytes
Database mounted.
ORA-01157: cannot identify/lock data file 4 - see DBWR trace file
ORA-01110: data file 4: 'C:\ORA\SIA1\DISK3\USERS01.DBF'
```

Check also the **alert.log** file.
To find out the location of the alert file:
show parameter background_dump_dest

**Fix:**

```
rman target /
restore datafile 4;
recover datafile 4;
alter database open;
```

# Hands-on Practice

Simulate a crash scenario where one datafile is deleted by mistake!

# Loosing a Control-file

**A likely cause:** the disk where that controlfile was located has crashed.

**Simptom:**

```
SQL> startup
ORACLE instance started.

Total System Global Area  626327552 bytes
Fixed Size                  2283824 bytes
Variable Size             423626448 bytes
Database Buffers          197132288 bytes
Redo Buffers                3284992 bytes
ORA-00205: error in identifying control file, check alert log for more info

In alert.log:

ORA-00210: cannot open the specified control file
ORA-00202: control file: 'C:\ORA\SIA1\DISK2\CONTROL02.CTL'
ORA-27041: unable to open file
OSD-04002: unable to open file
O/S-Error: (OS 2) The system cannot find the file specified.
```

Fixed by

```
SQL> select name from v$controlfile;

NAME
-----------------------------------
C:\ORA\SIA1\DISK1\CONTROL01.CTL
C:\ORA\SIA1\DISK2\CONTROL02.CTL

copy C:\ORA\SIA1\DISK1\CONTROL01.CTL C:\ORA\SIA1\DISK2\CONTROL02.CTL

SQL> alter database mount;
SQL> alter database open;
```

# All Control-files are Lost

**A likely cause:** Dorel has deleted all control-files or the disks have crashed.

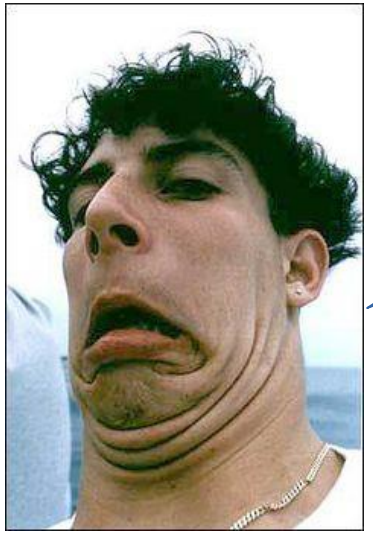
**From alert.log:**

```
ALTER DATABASE    MOUNT
ORA-00210: cannot open the specified control file
ORA-00202: control file: 'C:\ORA\SIA1\DISK2\CONTROL02.CTL'
ORA-27041: unable to open file
OSD-04002: unable to open file
O/S-Error: (OS 2) The system cannot find the file specified.
ORA-00210: cannot open the specified control file
ORA-00202: control file: 'C:\ORA\SIA1\DISK1\CONTROL01.CTL'
ORA-27041: unable to open file
OSD-04002: unable to open file
```


```
rman target /
set dbid 790291549;
restore controlfile from autobackup;
alter database mount;
alter database open resetlogs;
```

# A Table Has Been Dropped

**A likely cause:** Dorel was mad because his salary wasn't raised, therefore he dropped the ANGAJATI table.



Dorel

DROP TABLE ANGAJATI!

FLASHBACK TABLE ANGAJATI TO BEFORE DROP;

The DBA

# A New Password has been set, but for the Wrong User

**Scenario:**

- The DBA is requested to reset “ZOREL”’s password.
- By mistake, our DBA resets “DOREL”’s password instead of “ZOREL”’s.

alter user DOREL identified by "parola_noua";

Noooo!

```
SQL> select password from user$
as of timestamp sysdate-1/24
where name='DOREL';

PASSWORD
----------------
FB63AE2ACC4630F4

SQL> alter user dorel identified
by values 'FB63AE2ACC4630F4';

User altered.
```

alter user ZOREL identified by "parola_noua";

# Hands-on Practice

Marius Moga is complaining that he can’t access FB anymore. The DBA is engaged to reset Marius’ password. Unfortunately, by mistake, the DBA resets Marius Teicu’s password instead!

Give DBA a hand and help him recover from this error!

# The Backup & Recovery Strategy

# RPO – Recovery Point Objective

It defines the acceptable data loss tolerance

The data from the last X (minutes/hours/days) are acceptable to be lost.

Example: RPO = 15min, it means that the implemented backup and recovery strategy MUST ensure the recoverability of the data, at least as it was 15 minutes ago, before the database crashed.

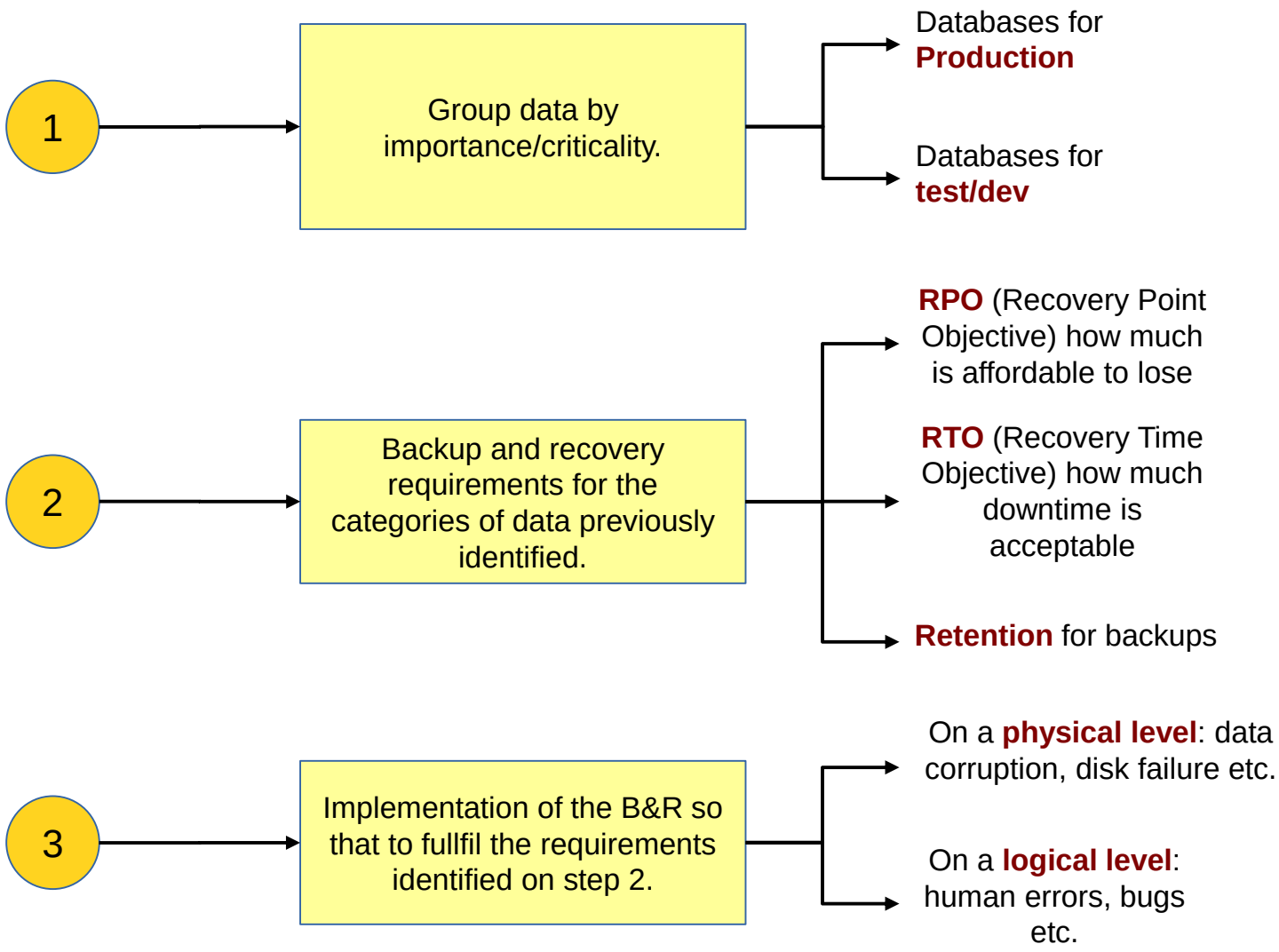
# RTO – Recovery Time Objective

It defines the downtime tolerance: how much time the database can remain inaccesible because of a major crash.

RTO = The time needed to identify the problem + The time to actually recover the database or to failover to the STANDBY database etc.)

RTO can be agreed on different levels: the entire database, on a tablespace level, a table or even on specific rows.

# Designing the B&R Strategy

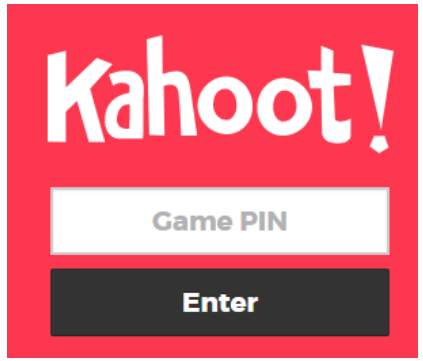


# B&R Strategy Example

| | Require-ment | Goal | Implementation |
|---|---|---|---|
| **PROD** | RPO | 30 minutes | ARCHIVE_LAG,<br>STANDBY database, A FULL daily backup + incremental backups on every 30 minutes. |
| | RTO | 2 hours | Restore/recovering from RMAN backups<br>Activate the STANDBY database<br>Flashback Table<br>Flashback Database |
| | Backups Retention | 7 days | A “recovery window” retention enforced on the RMAN level. |
| **TEST** | RPO | 7 days | A full RMAN backup once a week. |
| | RTO | 3 days | Restore/recover from RMAN backups<br>Flashback Database |
| | Backups Retention | One copy on disk | A “redundancy 1” RMAN retention policy. |

# Testing the Backup & Recovery Strategy

- Using BACKUP VALIDATE or RESTORE VALIDATE commands
- Testing the workflow (the steps) required to restore the database.
- Testing the failover to the standby database.
- The tests should take place on a regular basis (once a year, on every 6 months etc.)




# Quiz Time

KAHOOT.IT

# That’s all folks!

CONGRATULATIONS FOR COMPLETING THIS INTERESTING (I HOPE) ORACLE DBA JOURNEY!