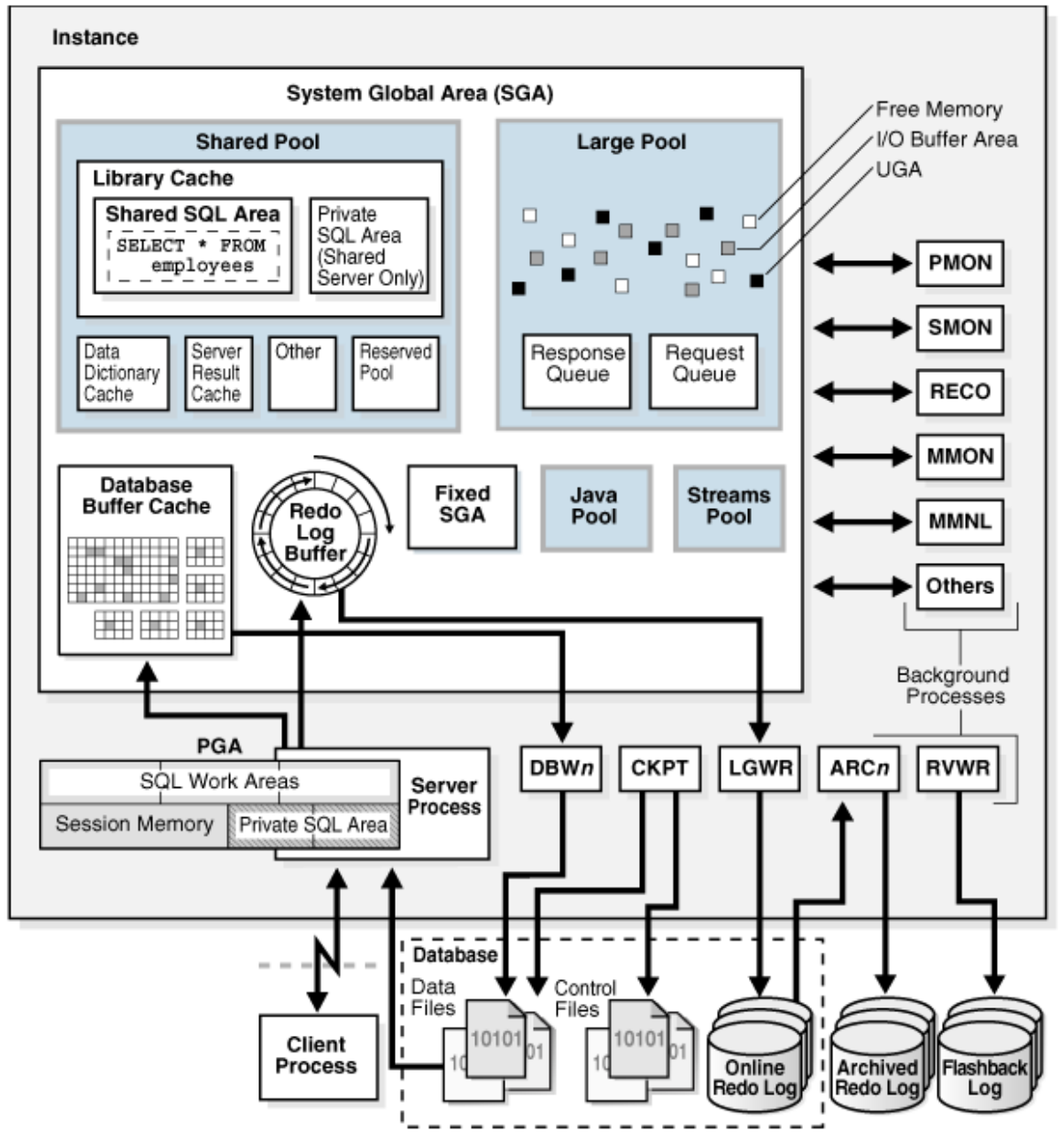
Fachhochschule Nordwestschweiz
Hochschule für Technik

# DATENBANK-ARCHITEKTUR FÜR FORTGESCHRITTENE

## Architektur von Datenbanksystemen

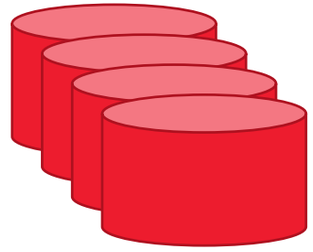
**Dani Schnider**

# Oracle-Architektur

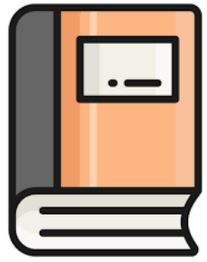



1. **Oracle in Action**

2. **Tablespaces & Data Files**

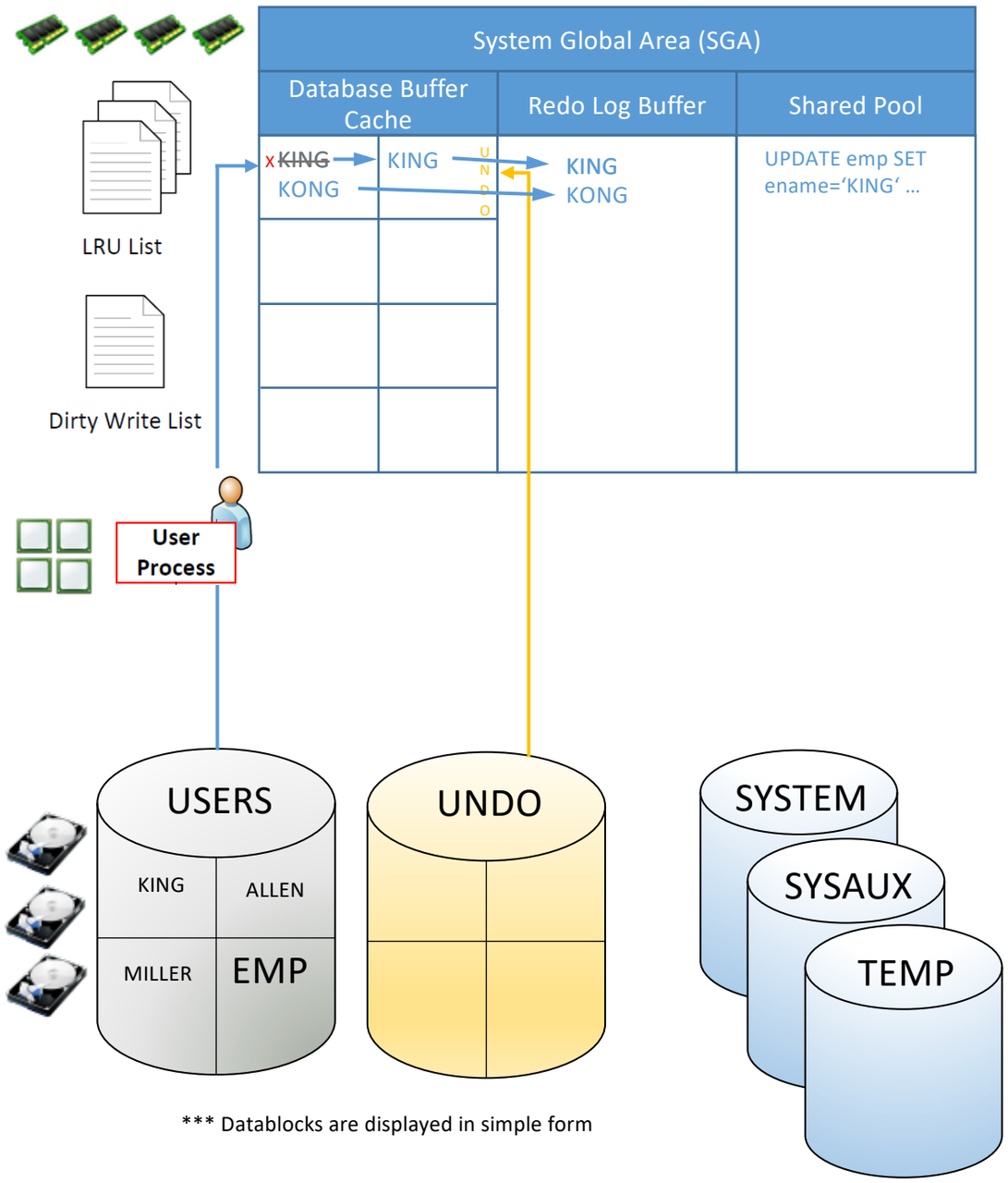


3. **Data Dictionary**



Parsing: Syntax & Semantic

SQL> UPDATE emp SET ename='KONG' WHERE ename = 'KING';




*** Datablocks are displayed in simple form

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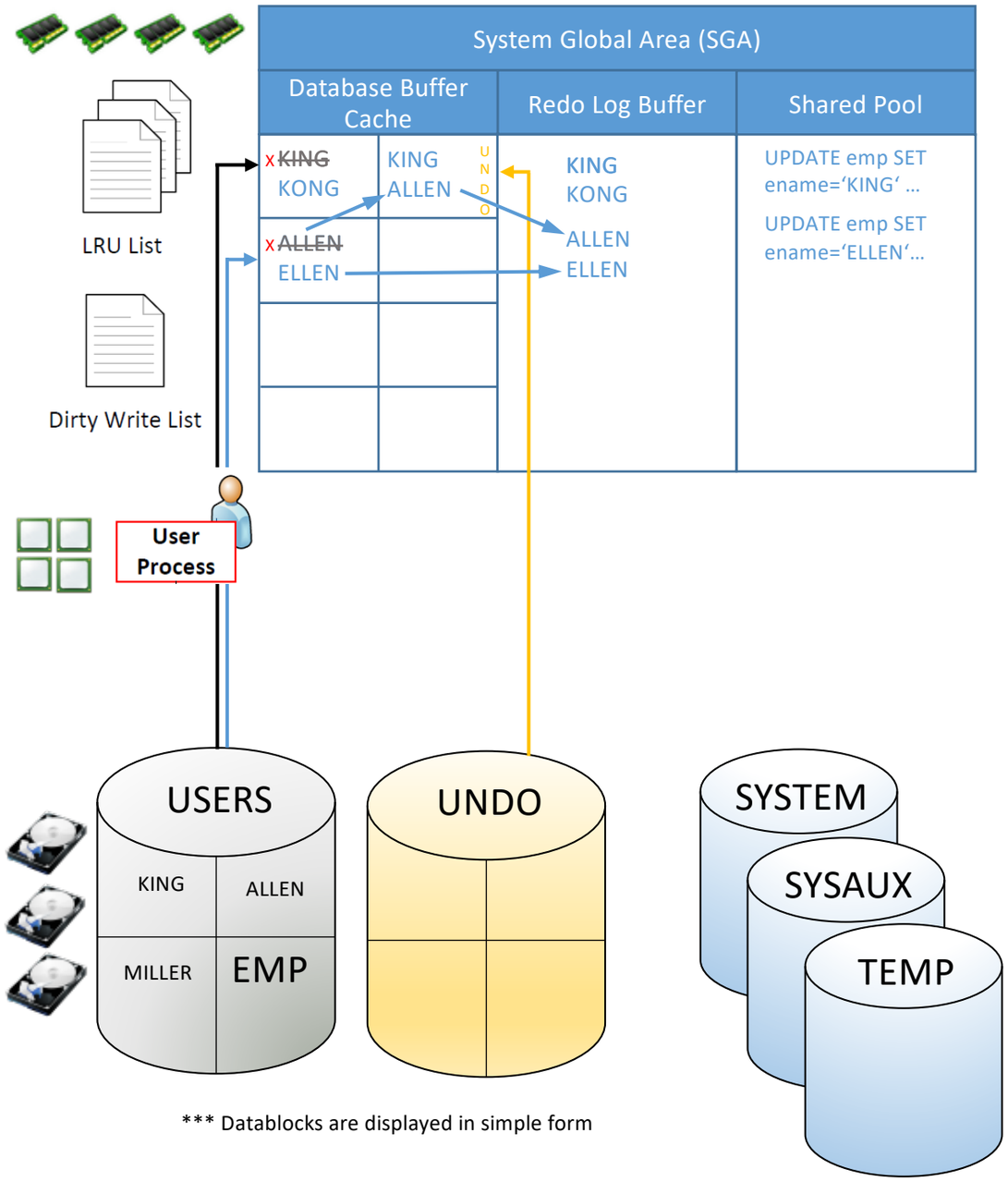


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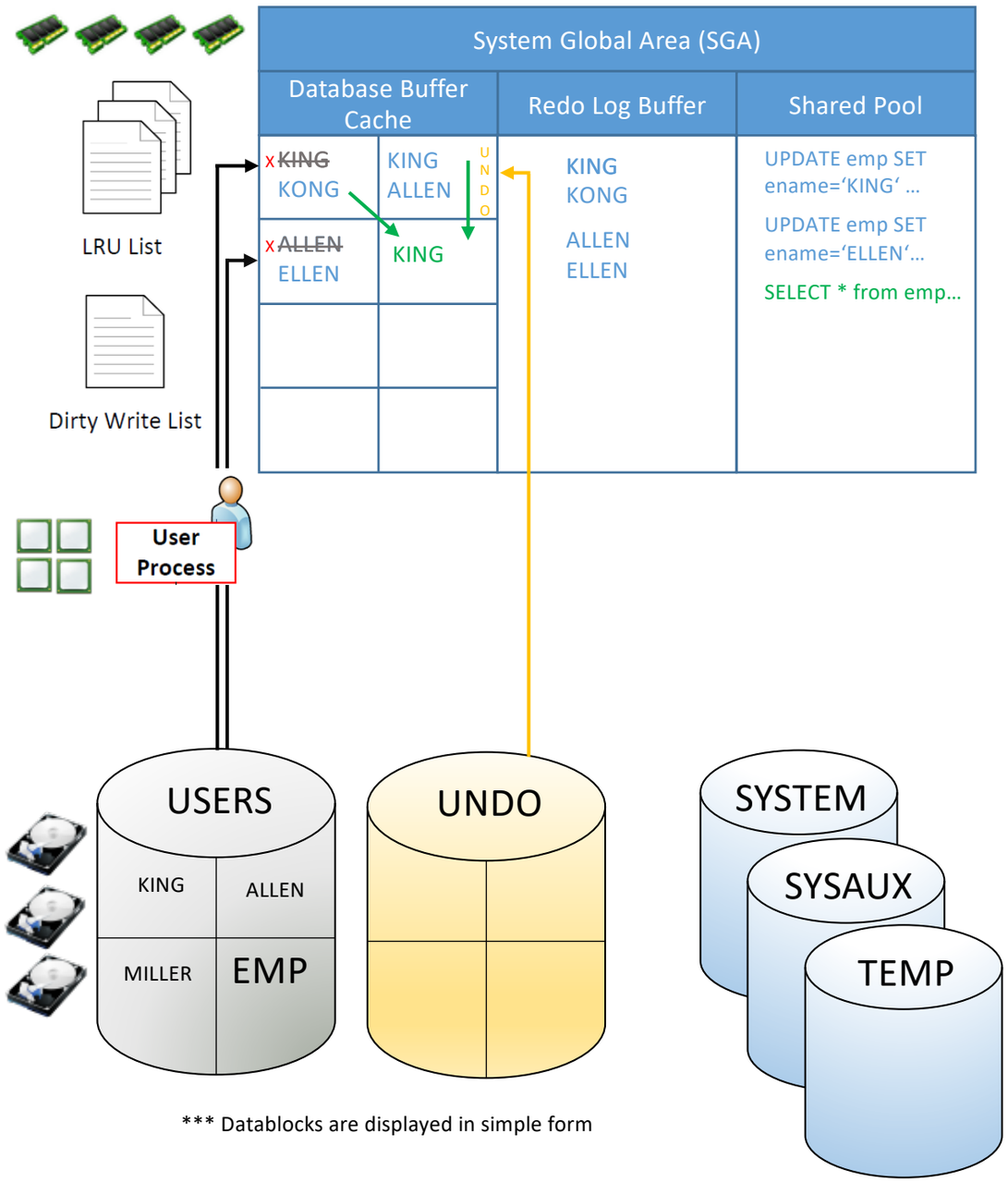


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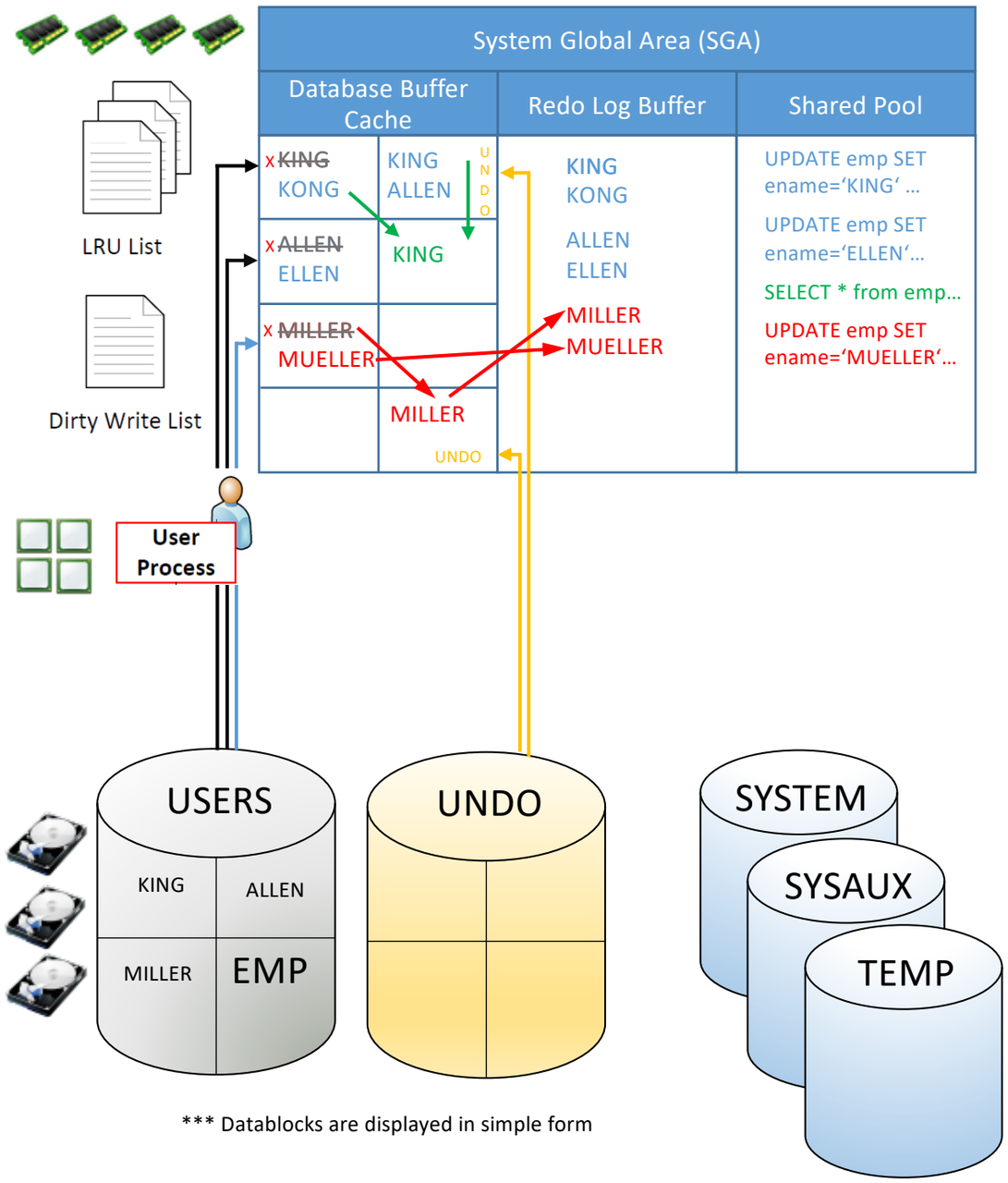


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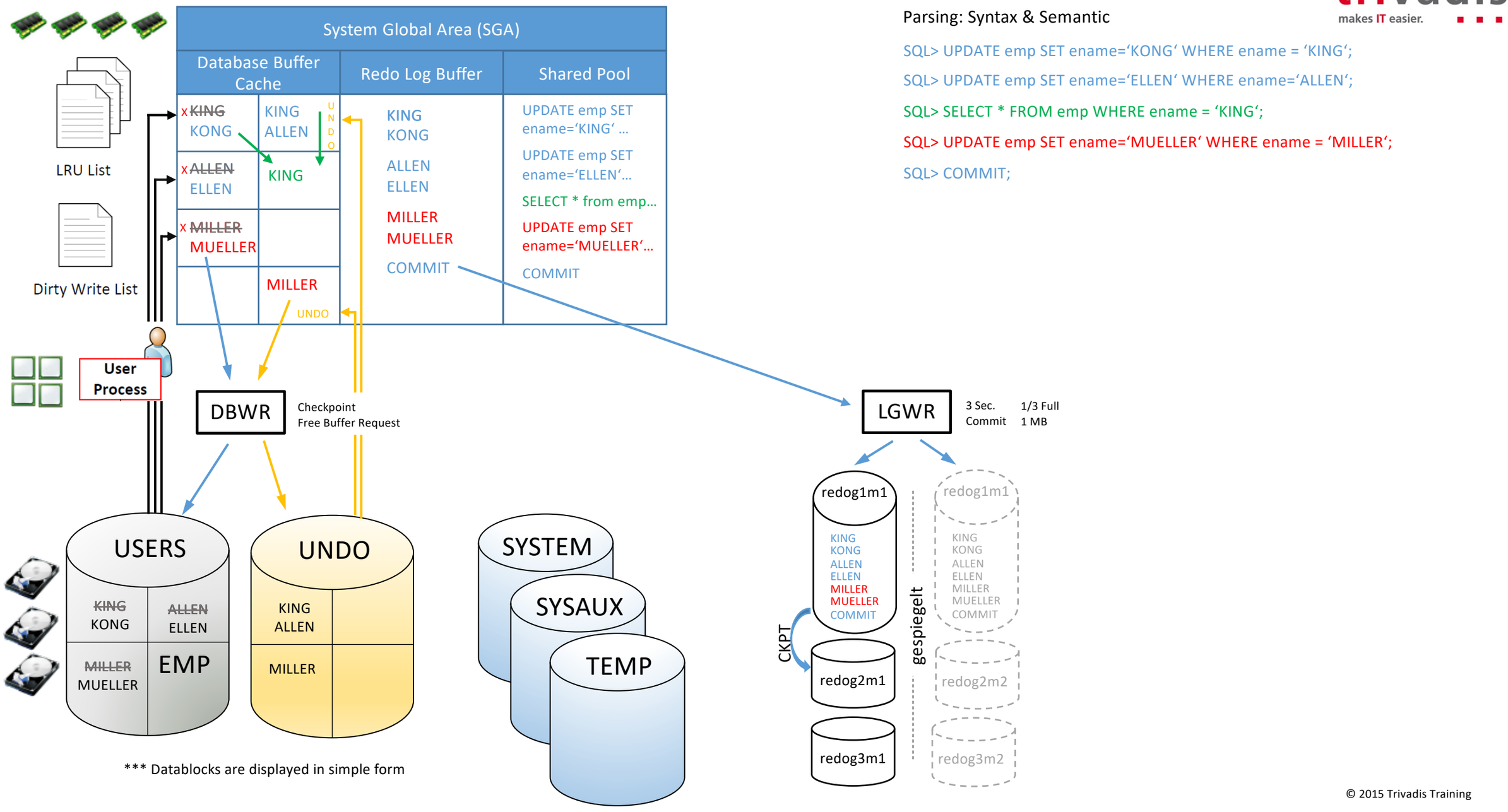


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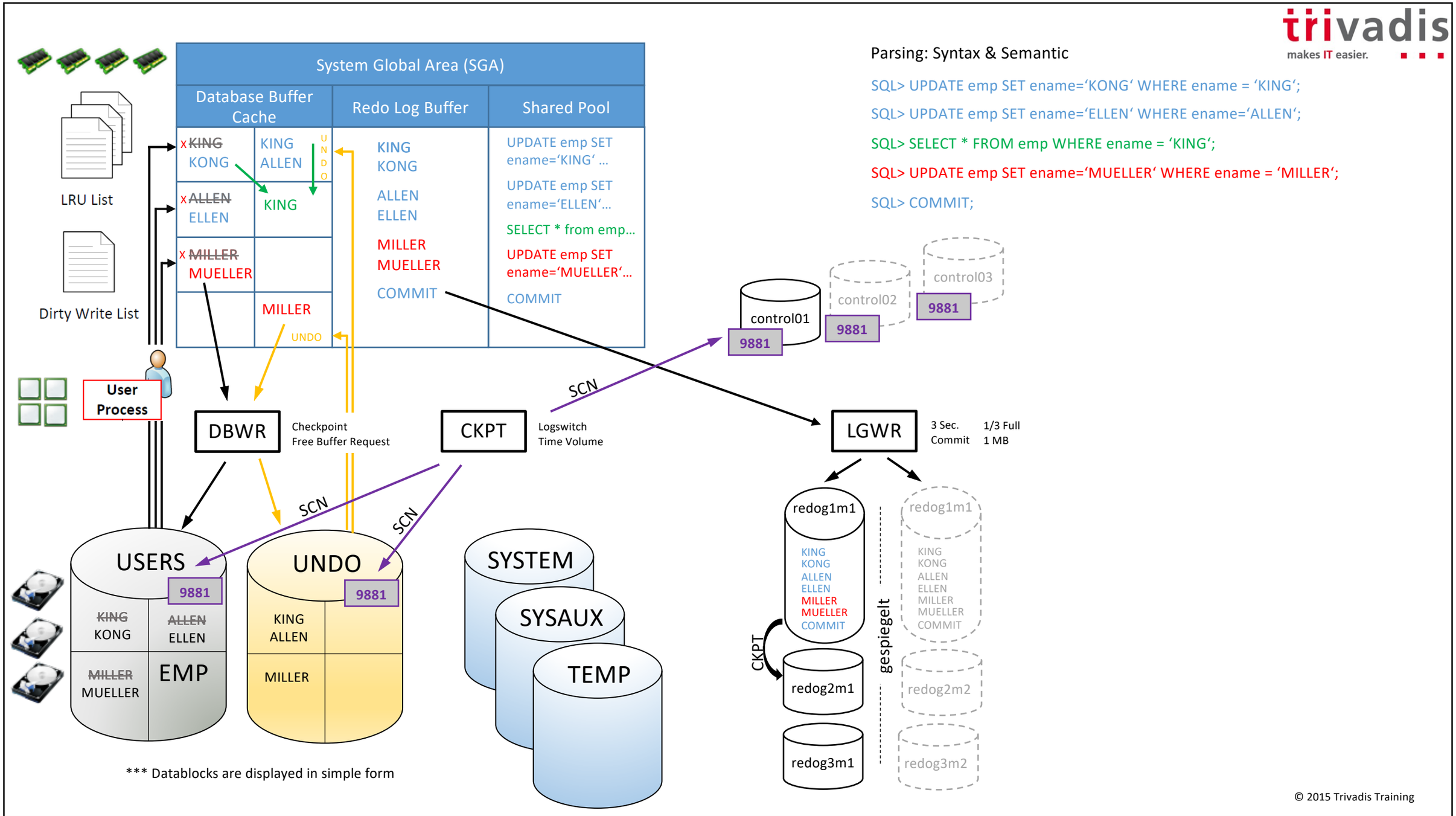


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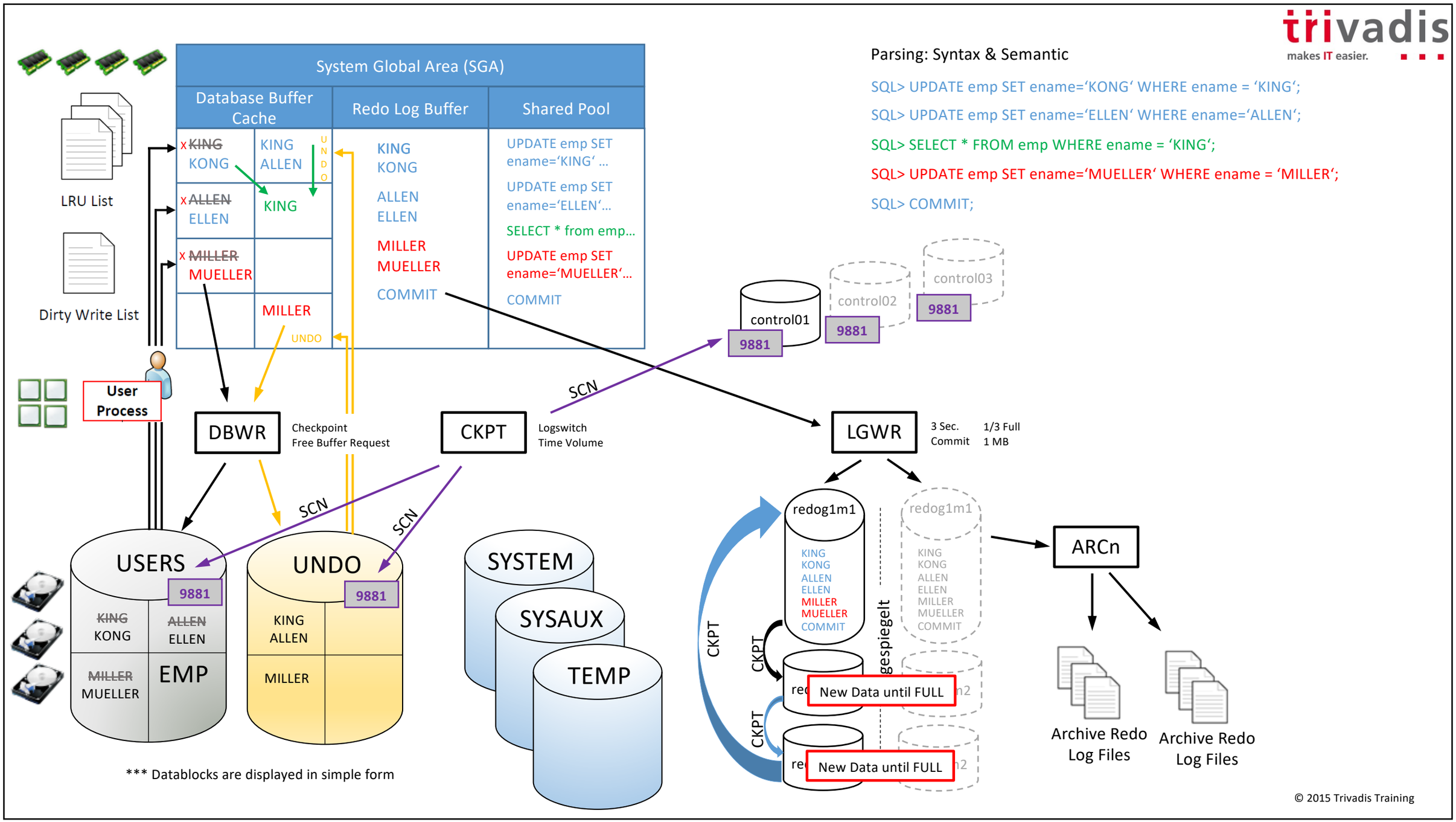


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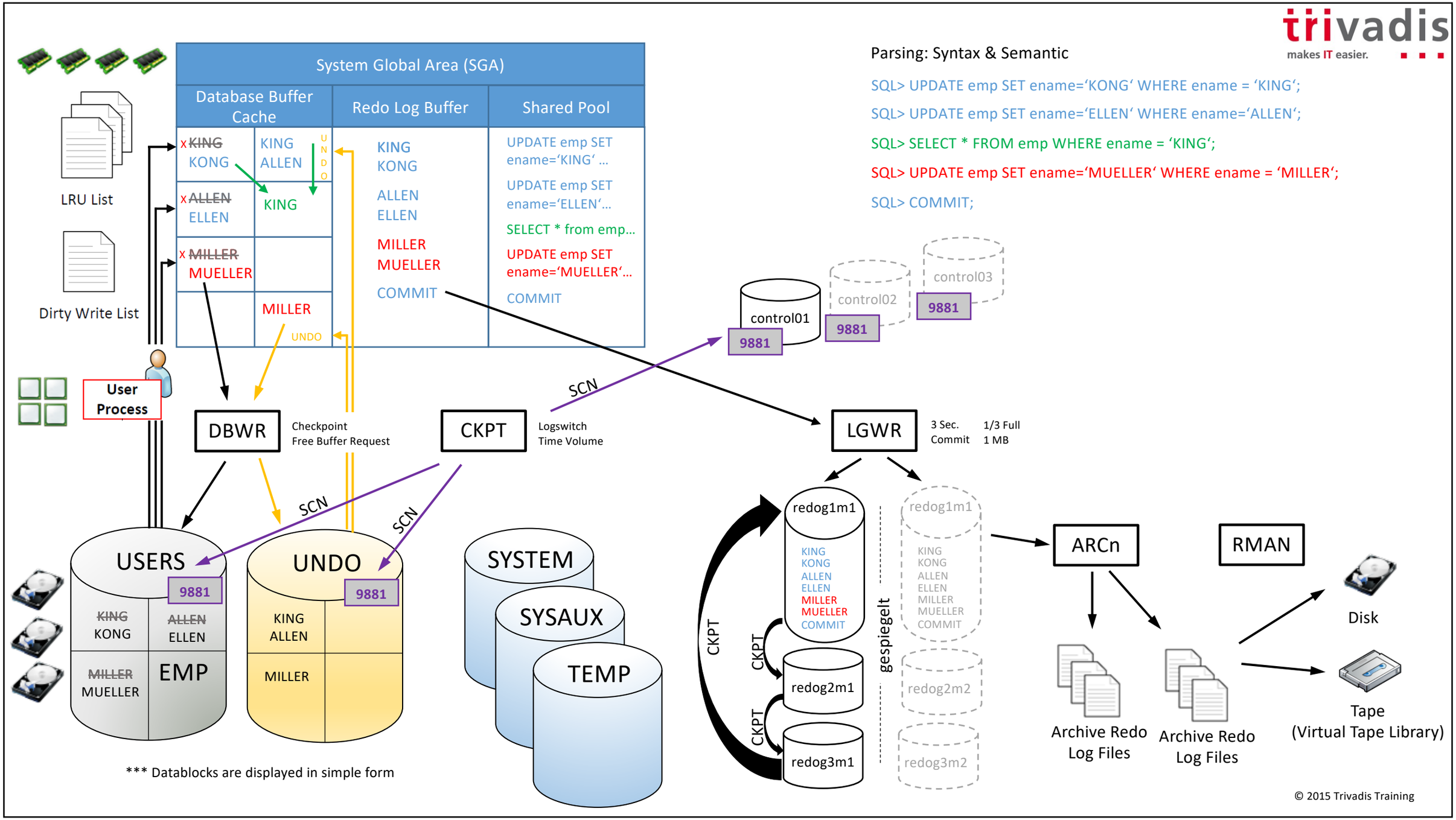
trivadis
makes IT easier.
Parsing: Syntax & Semantic
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SQL> UPDATE emp SET ename='ELLEN' WHERE ename='ALLEN';
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SQL> UPDATE emp SET ename='MUELLER' WHERE ename = 'MILLER';
SQL> COMMIT;
System Global Area (SGA)
Database Buffer Cache
Redo Log Buffer
Shared Pool
x KING
KONG
KING
ALLEN
UNDO
x ALLEN
ELLEN
KING
x MILLER
MUELLER
MILLER
UNDO
KING
KONG
ALLEN
ELLEN
MILLER
MUELLER
COMMIT
UPDATE emp SET ename='KING' ...
UPDATE emp SET ename='ELLEN'...
SELECT * from emp...
UPDATE emp SET ename='MUELLER'...
COMMIT
LRU List
Dirty Write List
User Process
DBWR
Checkpoint
Free Buffer Request
CKPT
Logswitch
Time Volume
SCN
LGWR
3 Sec.
Commit
1/3 Full
1 MB
control01
control02
control03
9881
USERS
UNDO
EMP
KING
KONG
ALLEN
ELLEN
MILLER
MUELLER
SYSTEM
SYSAUX
TEMP
redog1m1
redog2m1
redog3m1
redog2m2
redog3m2
gespiegelt
CKPT
ARCn
RMAN
Disk
Tape
(Virtual Tape Library)
Archive Redo Log Files
*** Datablocks are displayed in simple form
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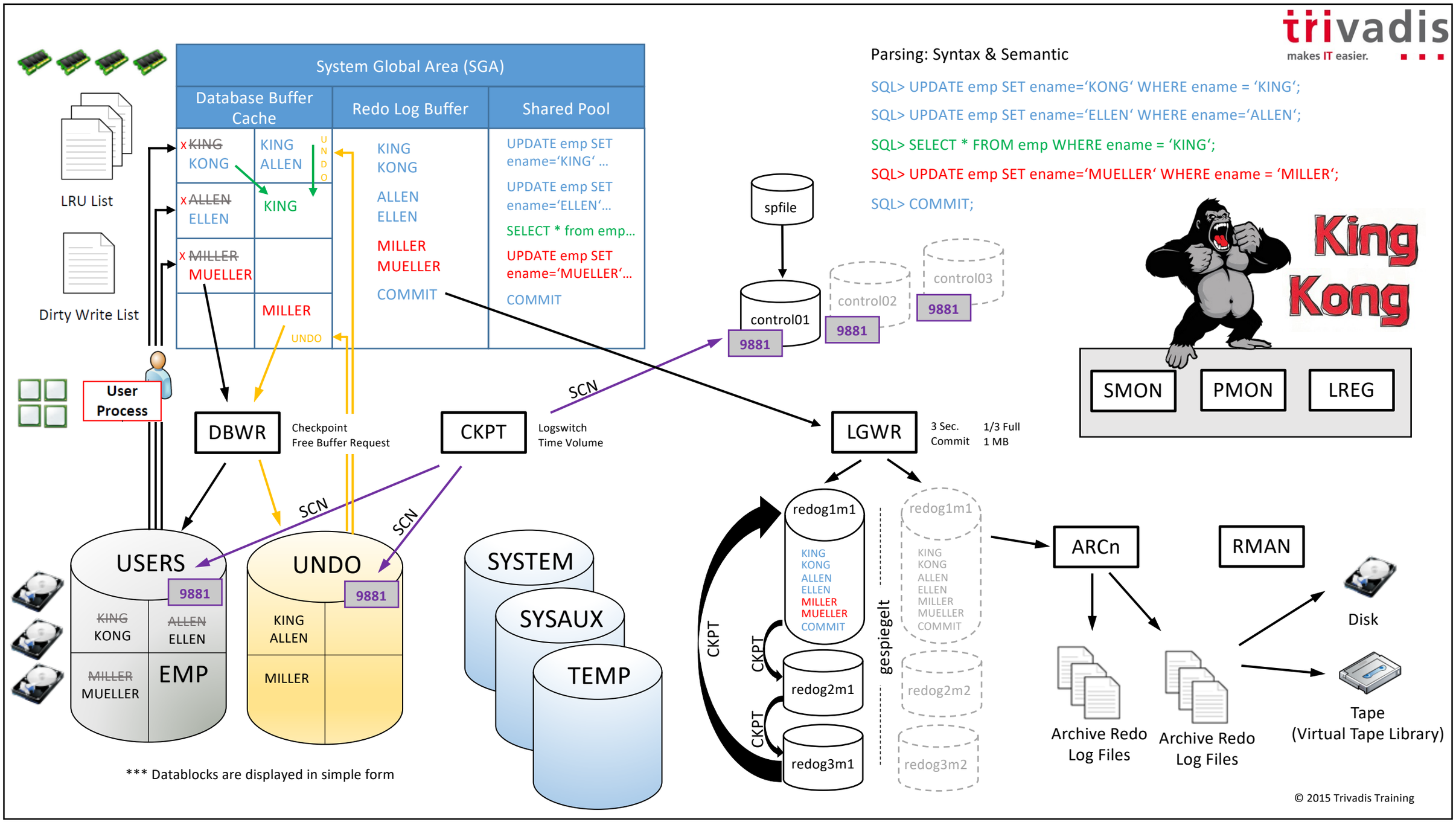
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COMMIT
User Process
DBWR
Checkpoint
Free Buffer Request
CKPT
Logswitch
Time Volume
SCN
LGWR
3 Sec.
Commit
1/3 Full
1 MB
spfile
control01
control02
control03
9881
SMON
PMON
LREG
King
Kong
USERS
UNDO
SYSTEM
SYSAUX
TEMP
EMP
KING
KONG
ALLEN
ELLEN
MILLER
MUELLER
redog1m1
redog2m1
redog3m1
redog2m2
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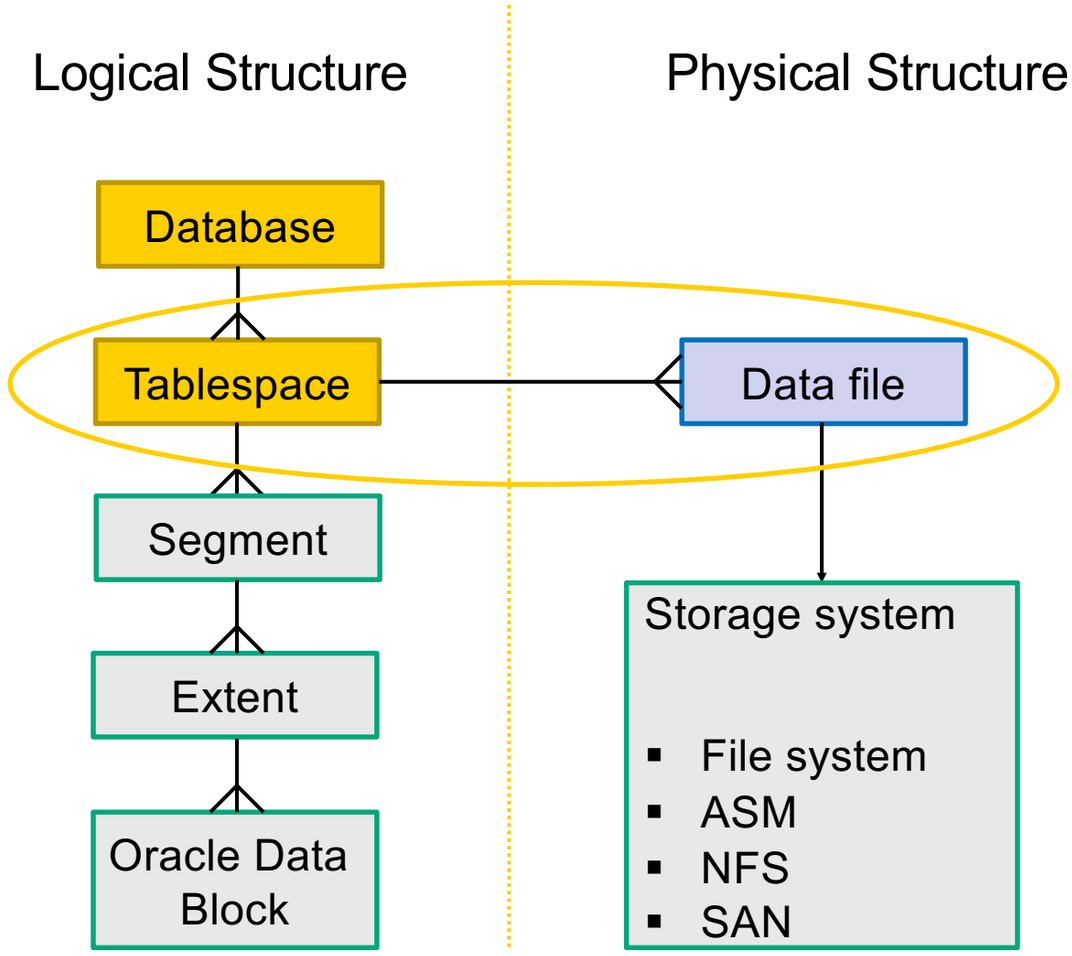
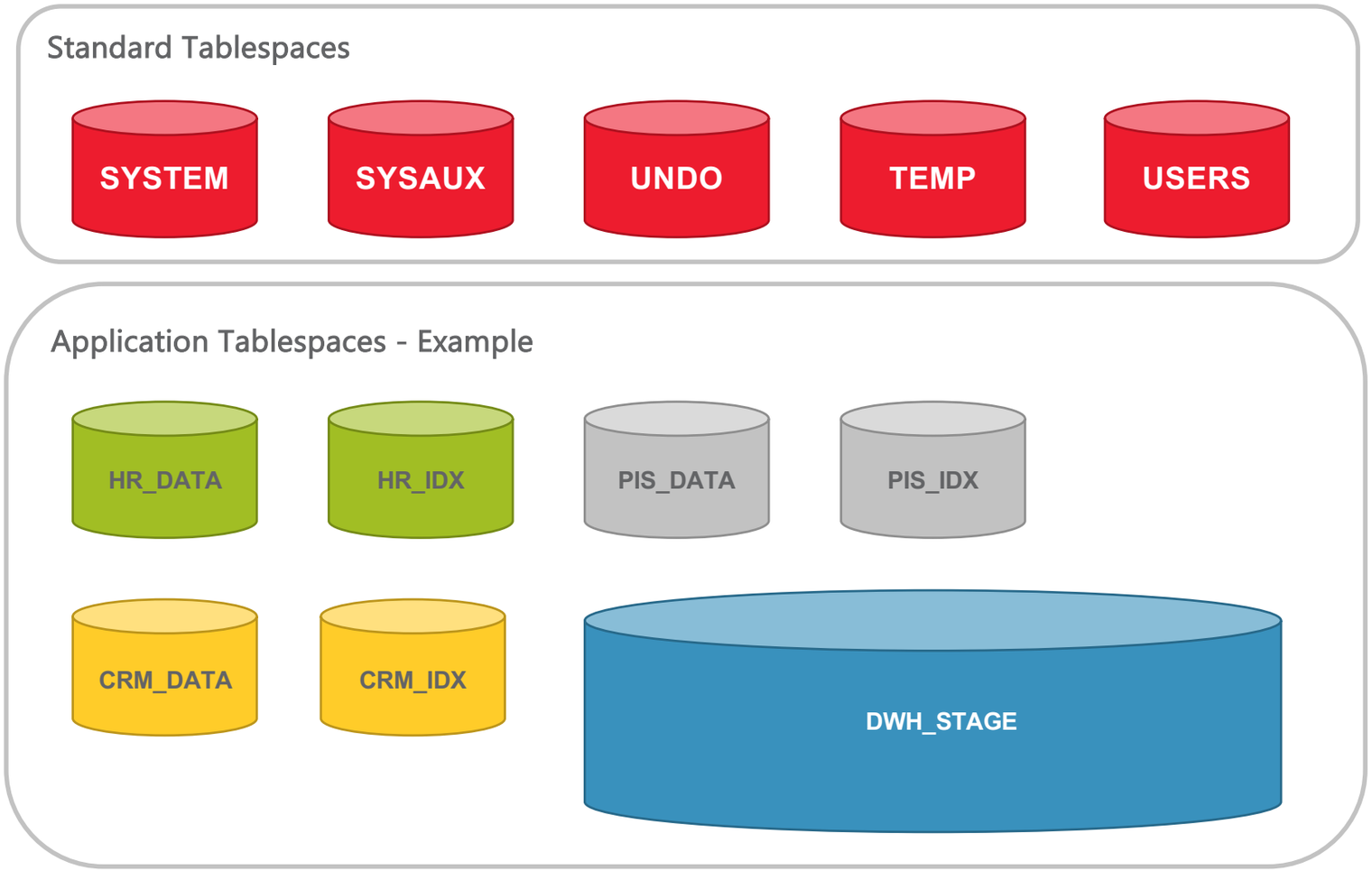
# TABLESPACES & DATA FILES

## Architektur von Datenbanksystemen

# Database Files



# Example: Tablespace Layout



# Creating Tablespaces

**Examples:**

- Create tablespace with fixed size

```
CREATE TABLESPACE hr_data
DATAFILE '/u01/oradata/TVD12/hr_data01TVD121.dbf' SIZE 4G;
```

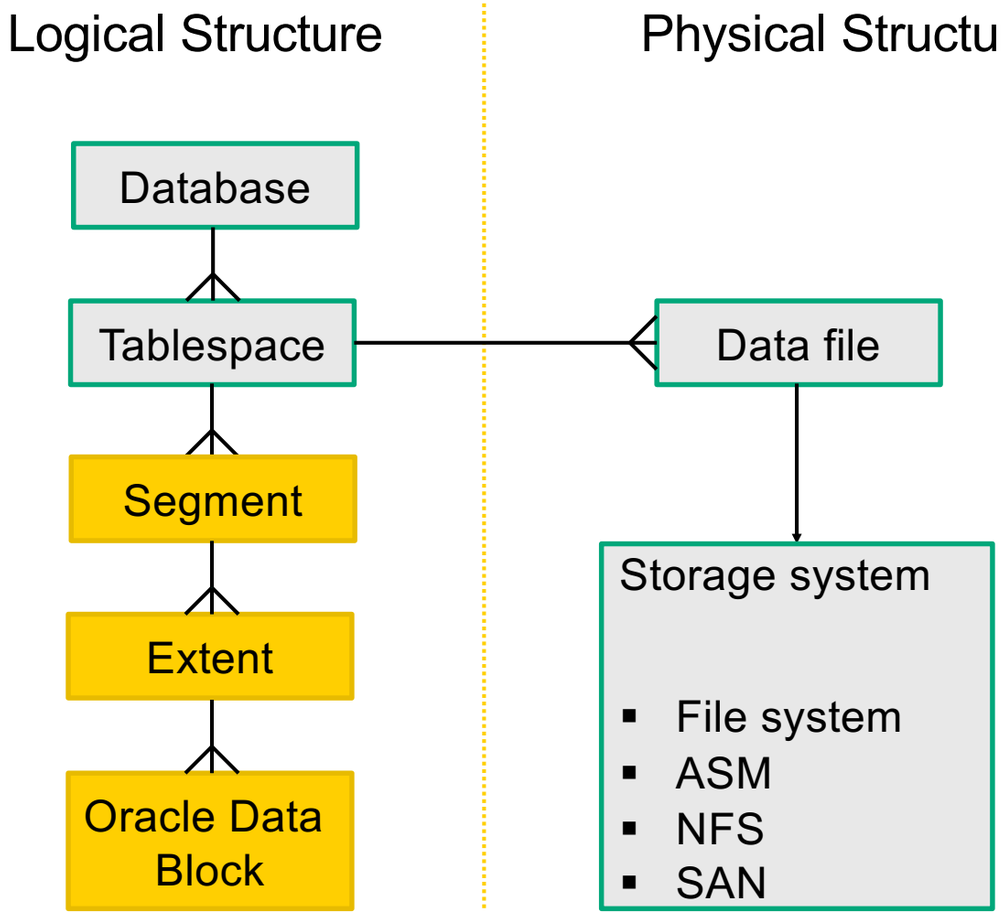
- Create tablespace with extendable size (AUTOEXTEND)

```
CREATE TABLESPACE crm_data
DATAFILE '/u01/oradata/TVD12/crm_data01TVD121.dbf'
SIZE 500M AUOTEXTEND ON NEXT 100M MAXSIZE 4G;
```

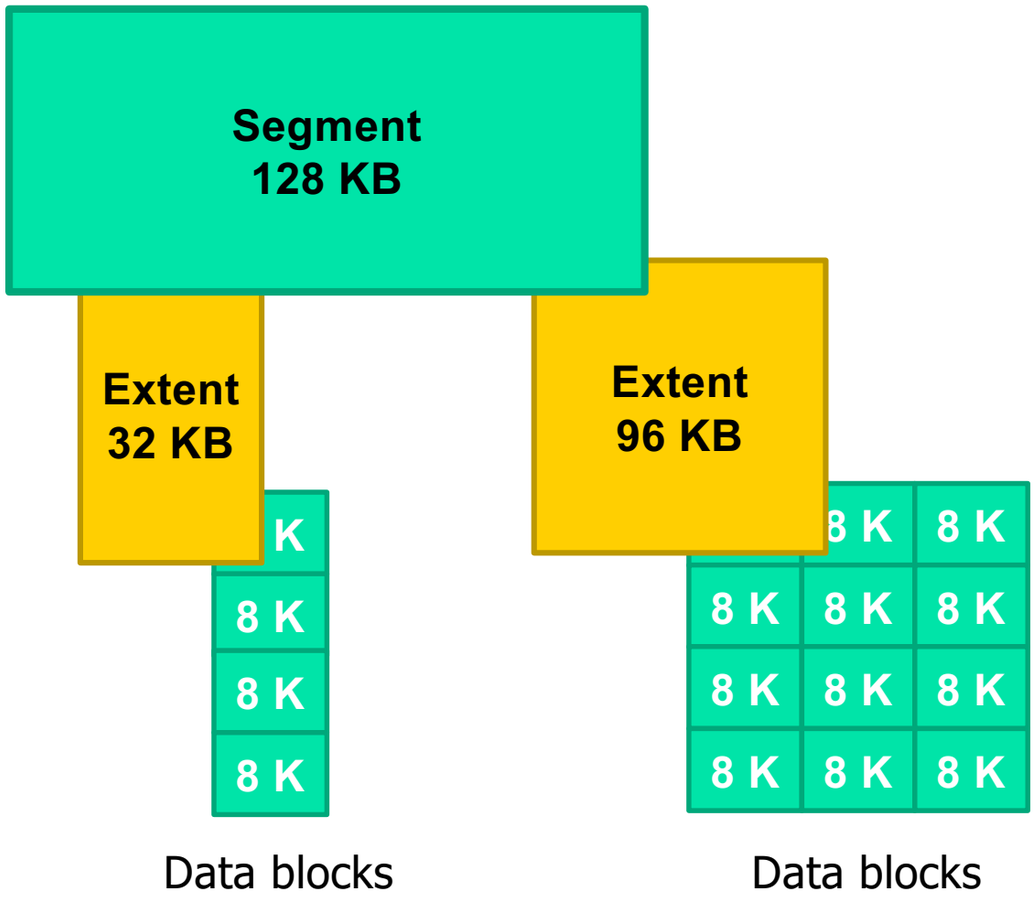
- Create tablespace with Oracle Managed Files (OMF)

```
CREATE TABLESPACE dbarc_data;
```

# Segments, Extents, Blocks

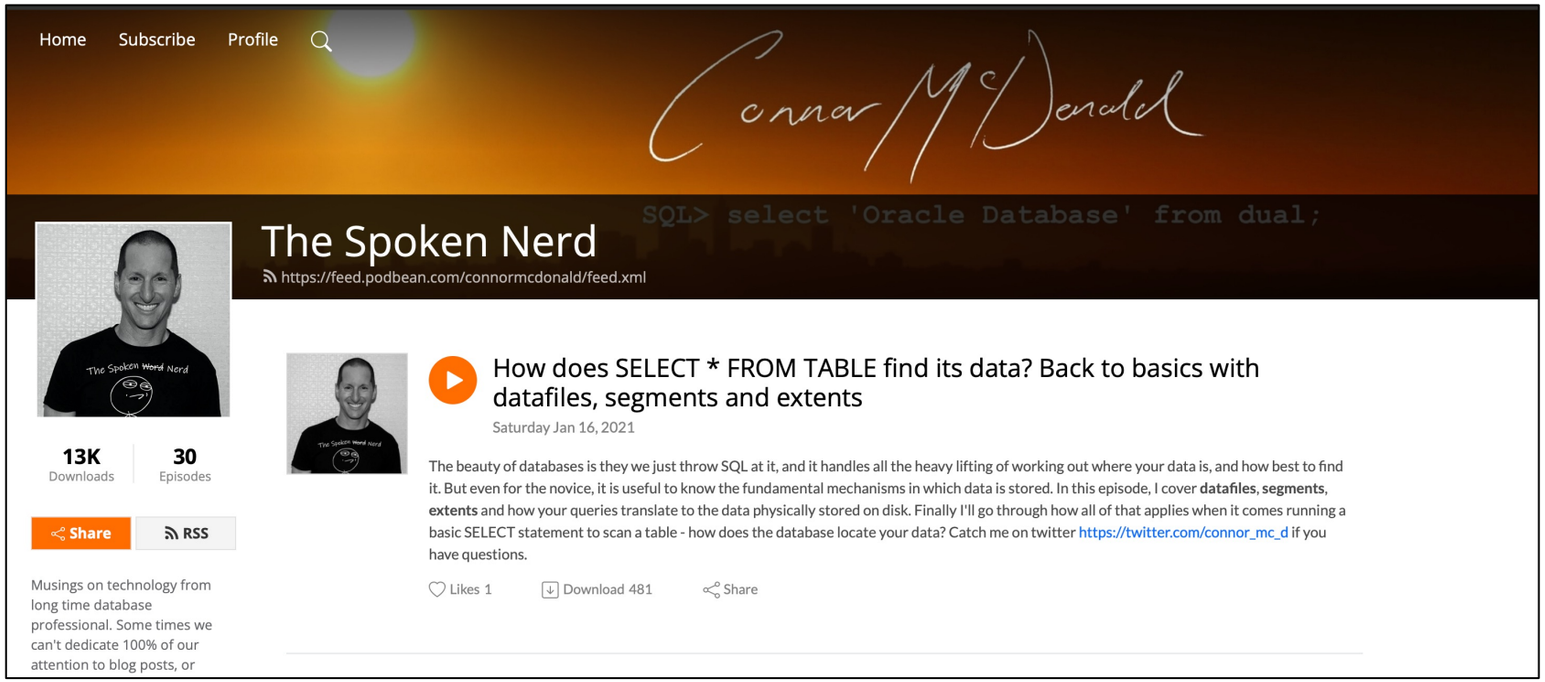


# Segments, Extents, Blocks

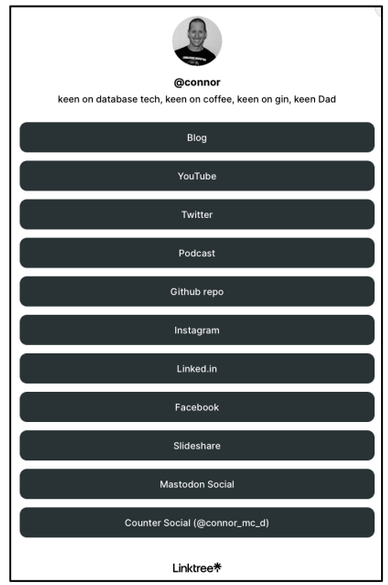



**Segment:**

- Table
- Index
- Table Partitions
- Index Partitions
- Materialized View
- LOB Index
- LOB Segment
- etc.




https://linktr.ee/connor



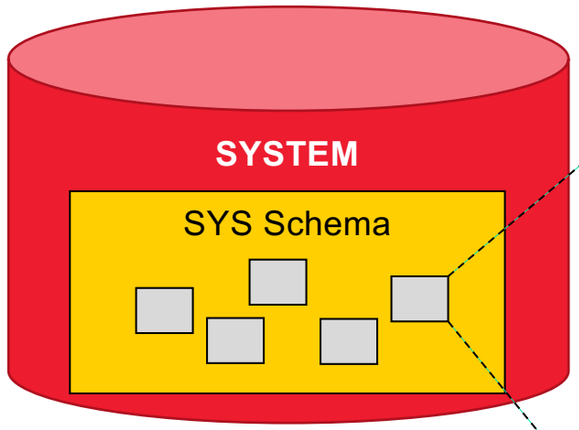

**“The Spoken Nerd” Podcast of Connor McDonald (https://connormcdonald.podbean.com)**

- How does SELECT * FROM TABLE find its data? Back to basics with datafiles, segments and extents
  https://connormcdonald.podbean.com/e/datafiles-segments-extents/
- Back to basics: The evolution of tablespaces
  https://connormcdonald.podbean.com/e/tablespaces/
- Back to basics: Once around the block! A look at block internals
  https://connormcdonald.podbean.com/e/back-to-basics-once-around-the-block-a-look-at-block-internals/

# DATA DICTIONARY

## Architektur von Datenbanksystemen

# Oracle Data Dictionary




## View SYS.**USER_TABLES**

```
Name                          Null?    Type
----------------------------- -------- --------------
TABLE_NAME                    NOT NULL VARCHAR2(128)
TABLESPACE_NAME                        VARCHAR2(30)
CLUSTER_NAME                           VARCHAR2(128)
IOT_NAME                               VARCHAR2(128)
STATUS                                 VARCHAR2(8)
PCT_FREE                               NUMBER
PCT_USED                               NUMBER
INI_TRANS                              NUMBER
MAX_TRANS                              NUMBER
INITIAL_EXTENT                         NUMBER
NEXT_EXTENT                            NUMBER
MIN_EXTENTS                            NUMBER
MAX_EXTENTS                            NUMBER
PCT_INCREASE                           NUMBER
FREELISTS                              NUMBER
FREELIST_GROUPS                        NUMBER
LOGGING                                VARCHAR2(3)
BACKED_UP                              VARCHAR2(1)
NUM_ROWS                               NUMBER
BLOCKS                                 NUMBER
EMPTY_BLOCKS                           NUMBER
AVG_SPACE                              NUMBER
CHAIN_CNT                              NUMBER
…
```

# Data Dictionary Views

**Database Reference, Part II Static Data Dictionary Views**
https://docs.oracle.com/en/database/oracle/oracle-database/21/refrn/static-data-dictionary-views.html

- USER_*
  - View of the objects that the user owns
  - Example: USER_TABLES
- ALL_*
  - View of objects that a user owns, i.e. has access to
  - Example: ALL_TABLES
- DBA_*
  - View of all database objects of all users (incl. SYS)
  - Example: DBA_TABLES
- CDB_*
  - All objects in the root container and all PDBs, relevant for multi-tenant only