Oracle Physical Structures

WEEK 04

The Database on Disk

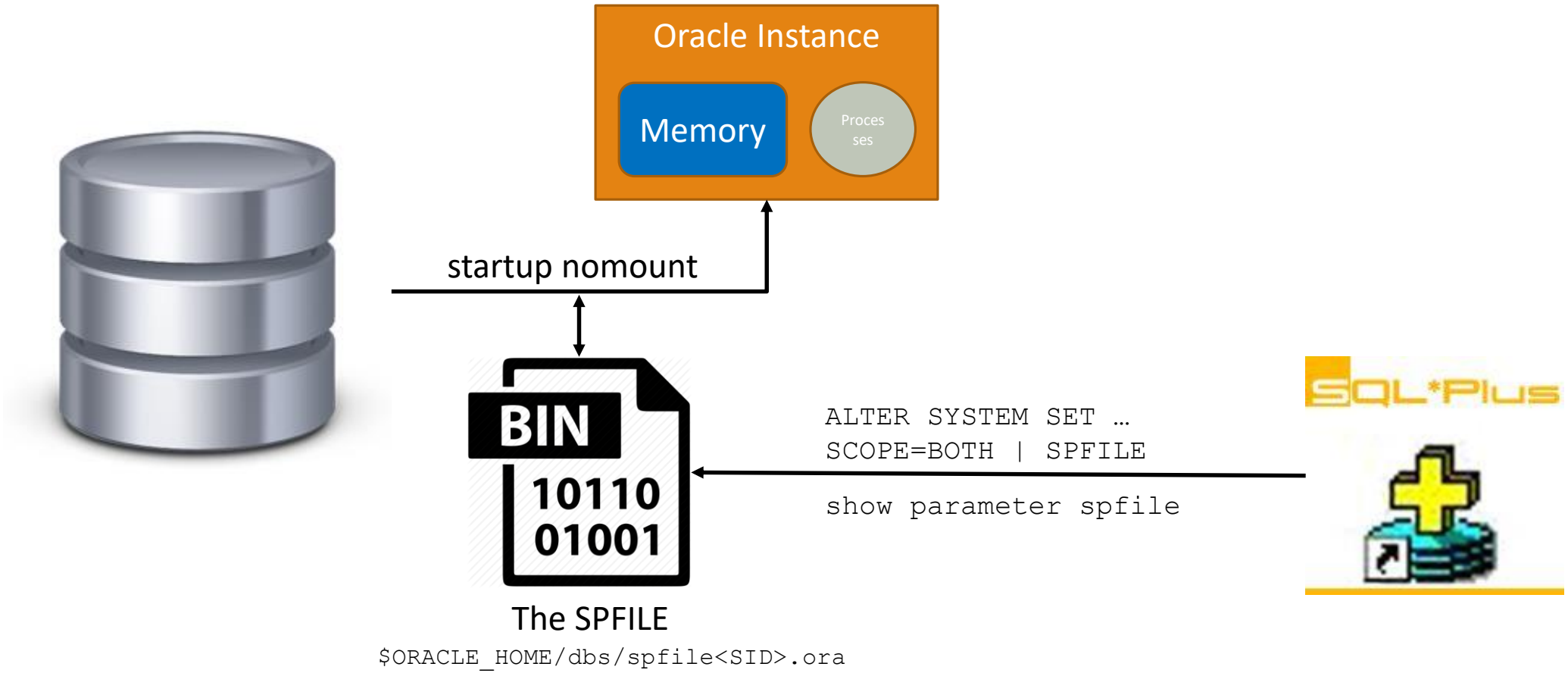
SP File ← Instance Settings (including the location of the CFs)

Control Files ← DB File locations, encoding, checkpoint data, backups meta-data etc.

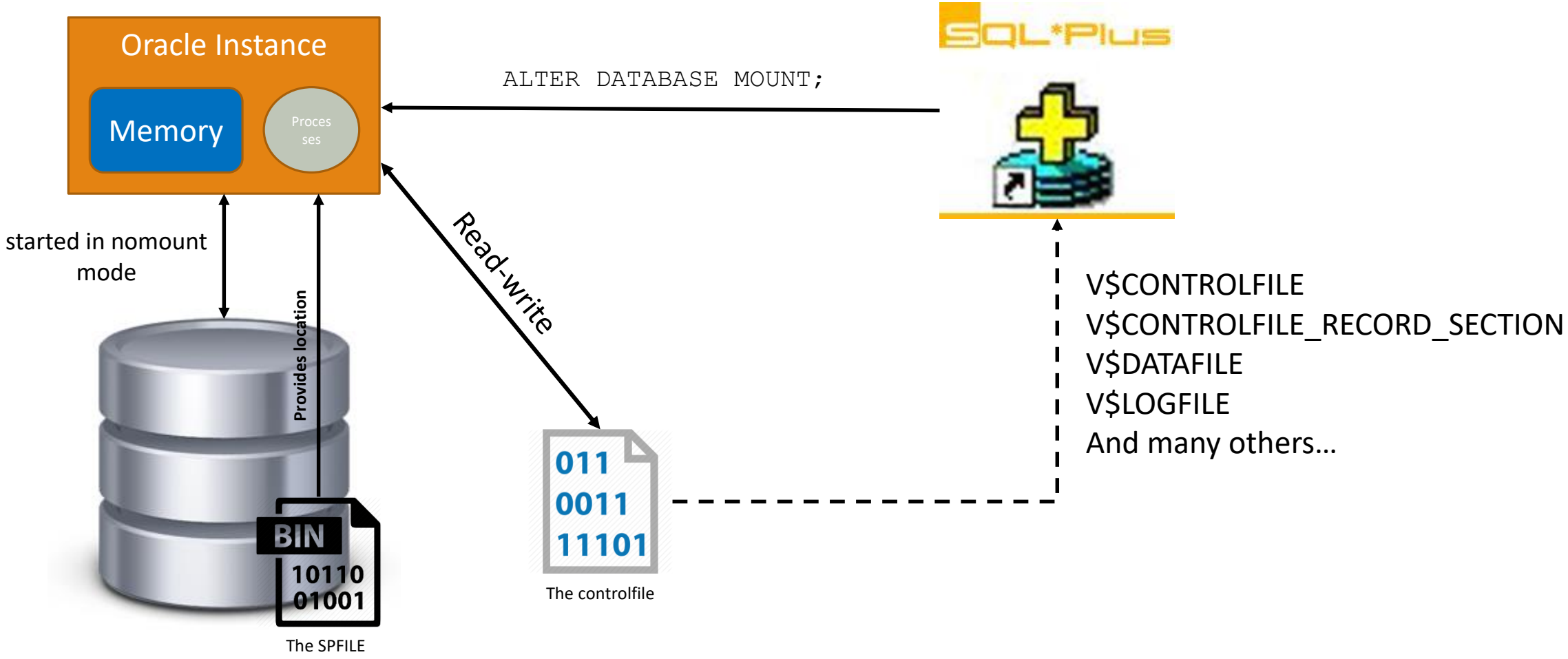
Redo-log Files ← Recoverability, change vectors, written by LGWR

Database Files ← Applications data, dictionary persistent data, UNDO data, temporary data.

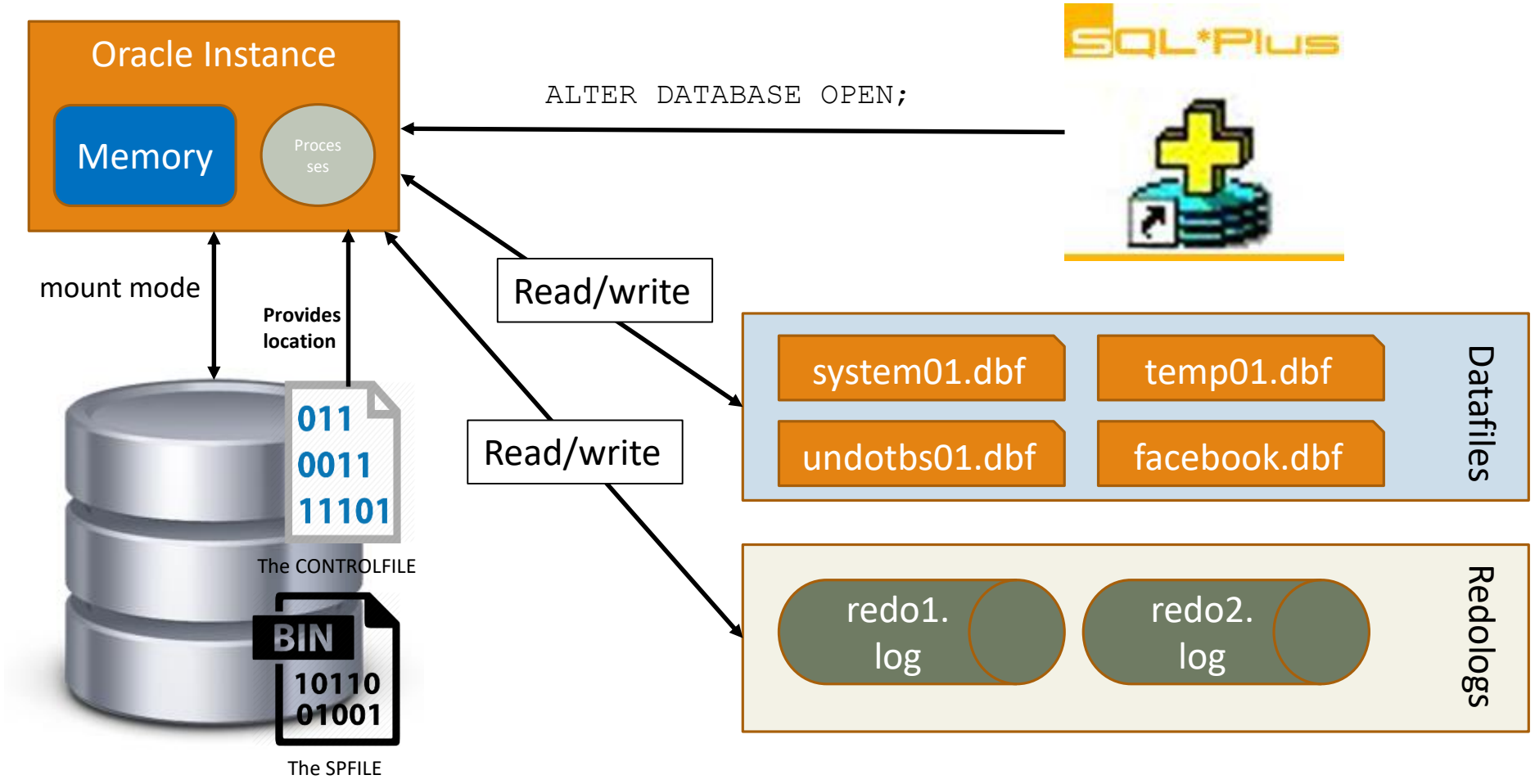
SPFILE Basics



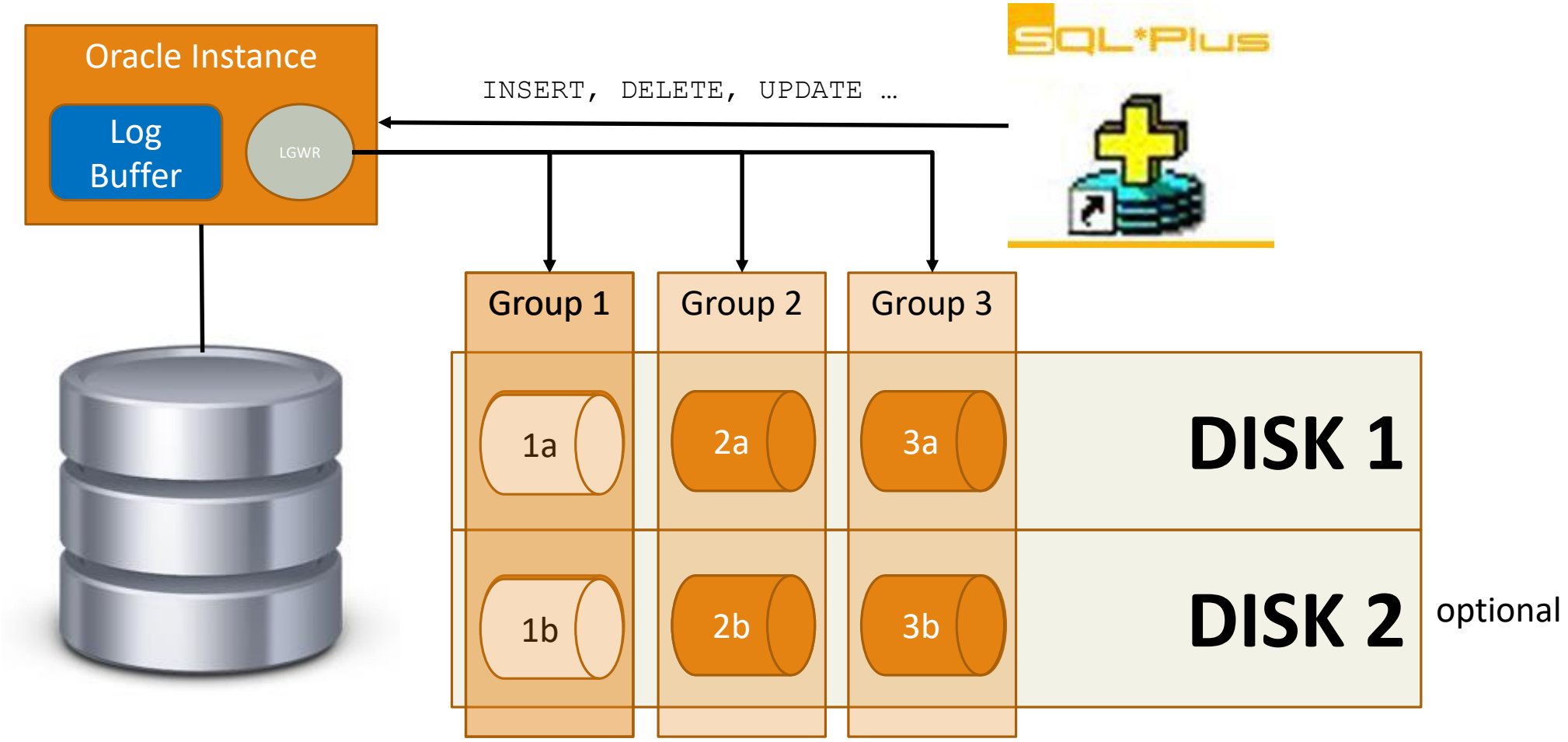
Controlfile Basics



What happens when the DB is opened?



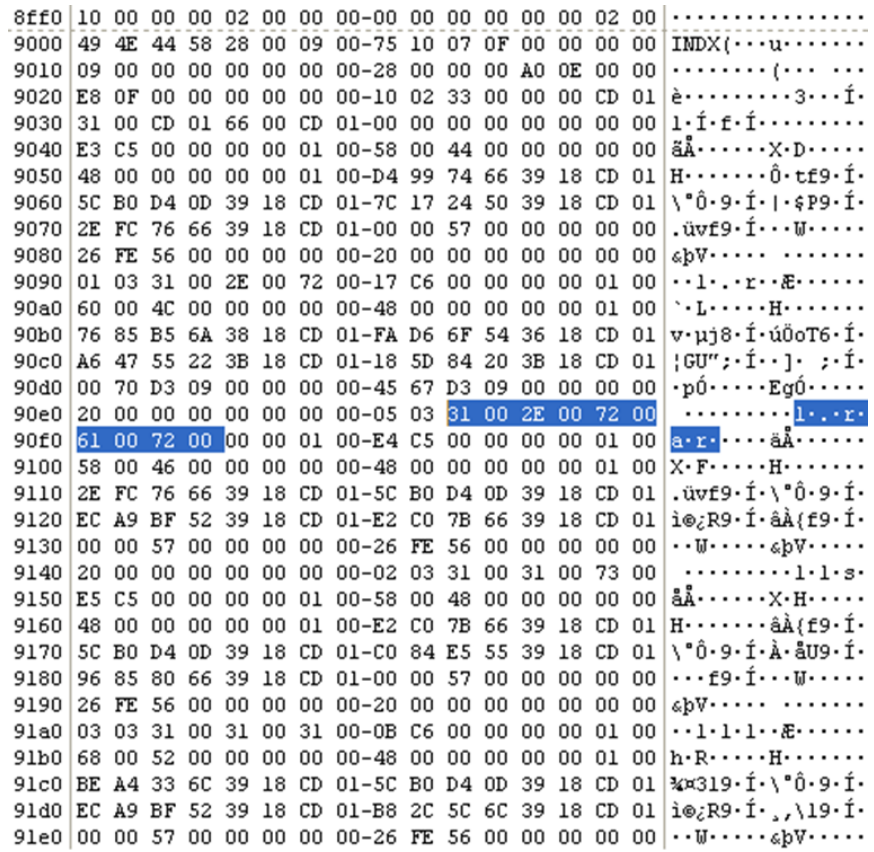
Redologs Anatomy



Space Allocation

DB FILES, SEGMENTS, EXTENTS, BLOCKS…

DB Files – From a Distance



8ff0	10	00	00	00	02	00	00	00	00	00	00	00	00	00	02	00	····
9000	49	4E	44	58	28	00	09	00	75	10	07	0F	00	00	00	00	INDX(···u····
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9020	E8	0F	00	00	00	00	00	00	10	02	33	00	00	00	CD	01	è·····3···Í·
9030	31	00	CD	01	66	00	CD	01	00	00	00	00	00	00	00	00	1·Í·f·Í·····
9040	E3	C5	00	00	00	00	01	00	58	00	44	00	00	00	00	00	ãÅ····X·D·····
9050	48	00	00	00	00	00	01	00	D4	99	74	66	39	18	CD	01	H·····Ô·tf9·Í·
9060	5C	B0	D4	0D	39	18	CD	01	7C	17	24	50	39	18	CD	01	\°Ô·9·Í·|·$P9·Í·
9070	2E	FC	76	66	39	18	CD	01	00	00	57	00	00	00	00	00	.üvf9·Í···W·····
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90a0	60	00	4C	00	00	00	00	00	48	00	00	00	00	00	01	00	`·L·····H·····
90b0	76	85	B5	6A	38	18	CD	01	FA	D6	6F	54	36	18	CD	01	v·µj8·Í·úÖoT6·Í·
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90d0	00	70	D3	09	00	00	00	00	45	67	D3	09	00	00	00	00	·pÓ·····EgÓ·····
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90f0	61	00	72	00	00	00	01	00	E4	C5	00	00	00	00	01	00	a·r·····äÅ·····
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9110	2E	FC	76	66	39	18	CD	01	5C	B0	D4	0D	39	18	CD	01	.üvf9·Í·\°Ô·9·Í·
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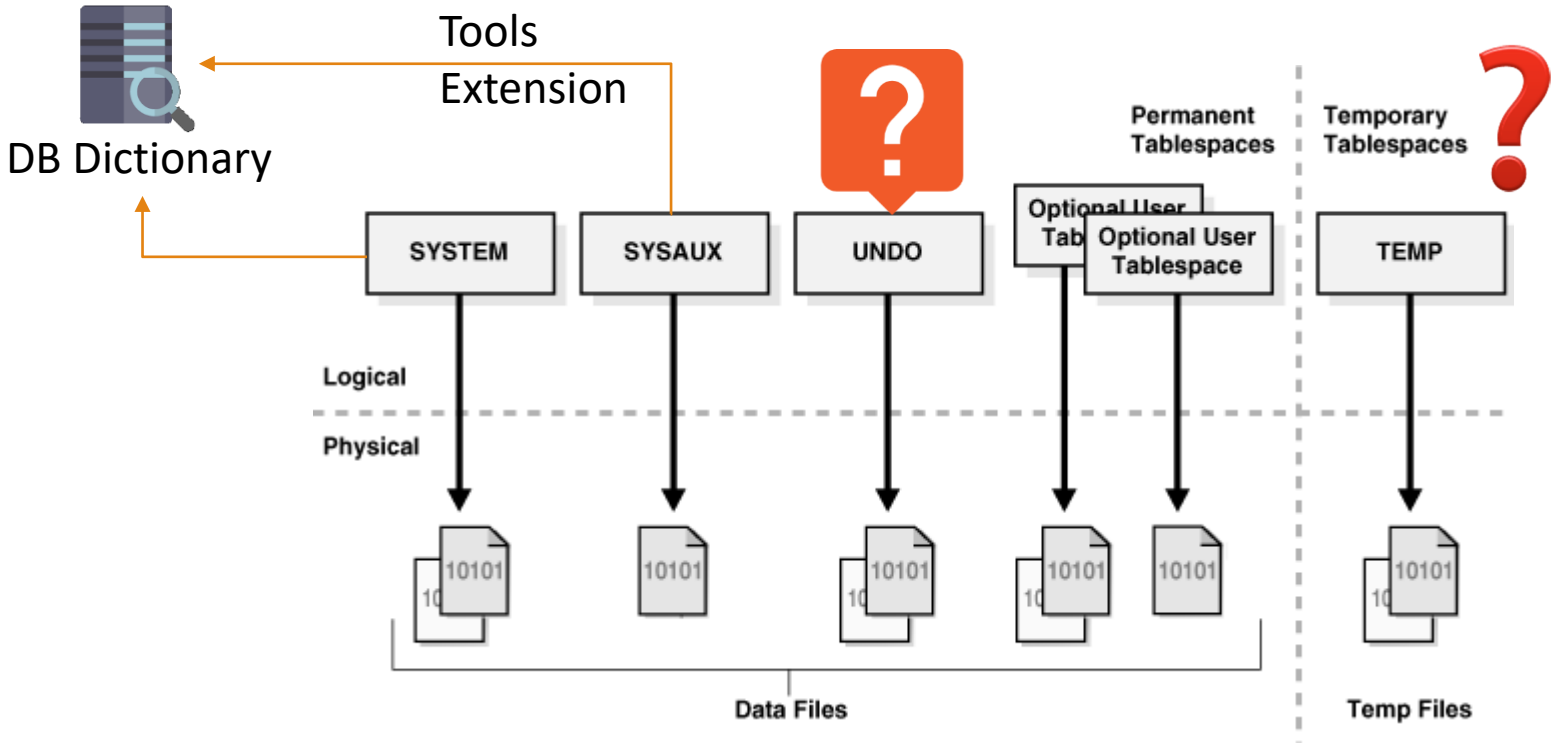
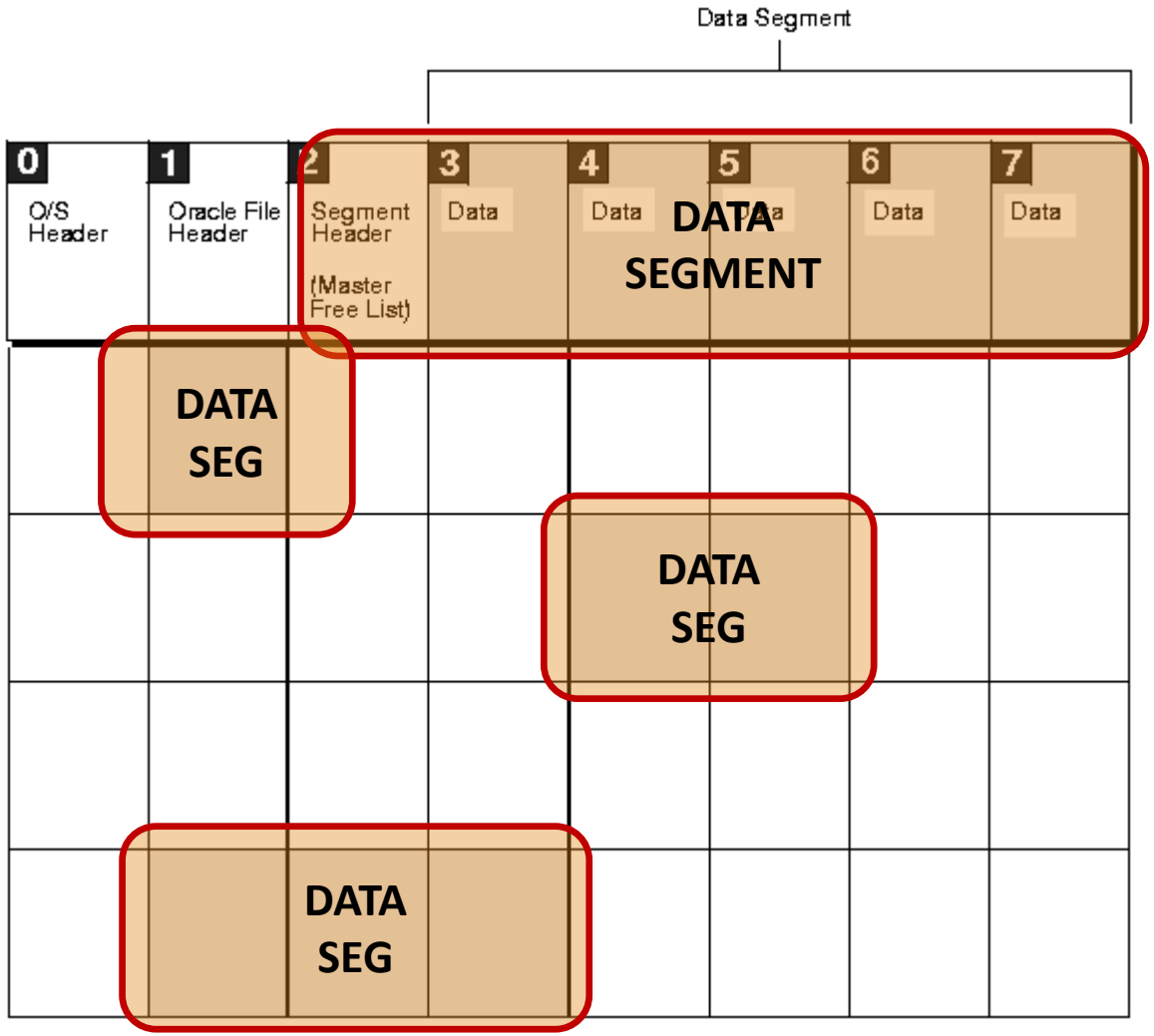
9130	00	00	57	00	00	00	00	00	26	FE	56	00	00	00	00	00	··W·····&þV·····
9140	20	00	00	00	00	00	00	00	02	03	31	00	31	00	73	00	·····1·1·s·
9150	E5	C5	00	00	00	00	01	00	58	00	48	00	00	00	00	00	åÅ····X·H·····
9160	48	00	00	00	00	00	01	00	E2	C0	7B	66	39	18	CD	01	H·····âÀ{f9·Í·
9170	5C	B0	D4	0D	39	18	CD	01	C0	84	E5	55	39	18	CD	01	\°Ô·9·Í·À·åU9·Í·
9180	96	85	80	66	39	18	CD	01	00	00	57	00	00	00	00	00	···f9·Í···W·····
9190	26	FE	56	00	00	00	00	00	20	00	00	00	00	00	00	00	&þV····· ·····
91a0	03	03	31	00	31	00	31	00	0B	C6	00	00	00	00	01	00	··1·1·1··Æ·····
91b0	68	00	52	00	00	00	00	00	48	00	00	00	00	00	01	00	h·R·····H·····
91c0	BE	A4	33	6C	39	18	CD	01	5C	B0	D4	0D	39	18	CD	01	¾¤319·Í·\°Ô·9·Í·
91d0	EC	A9	BF	52	39	18	CD	01	B8	2C	5C	6C	39	18	CD	01	ì©¿R9·Í·¸,\l9·Í·
91e0	00	00	57	00	00	00	00	00	26	FE	56	00	00	00	00	00	··W·····&þV·····

Dictionary Data
Users Data
UNDO

Tablespaces – From Physical to Logical

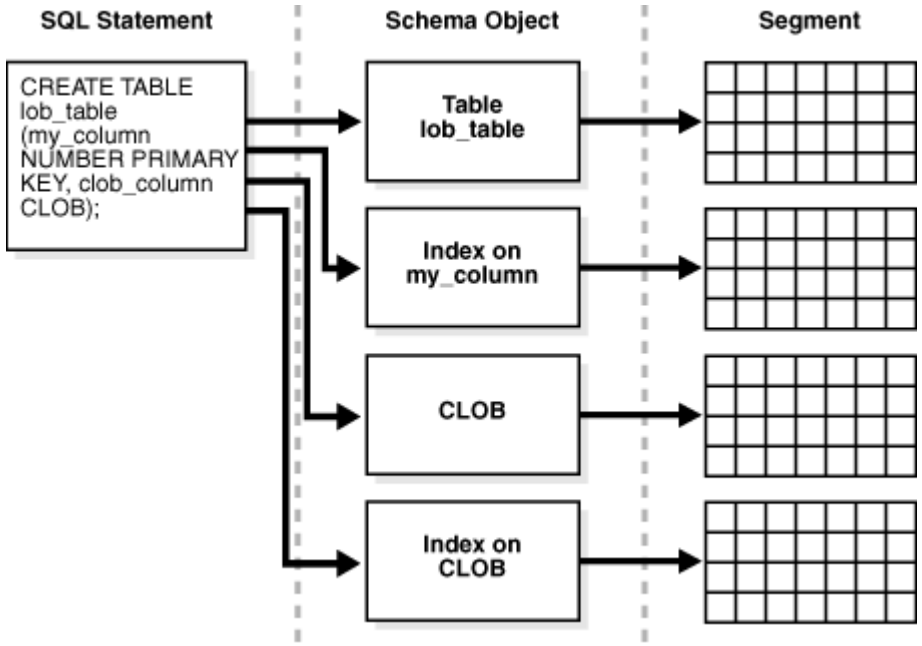


Source: https://goo.gl/ziZjKi

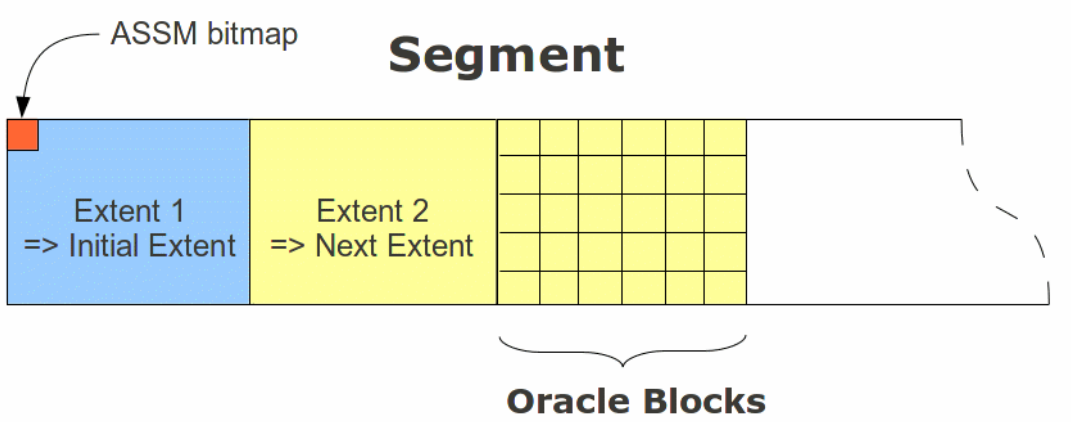


DB Files
10x Zoom In

Segments – 100x Zoom In

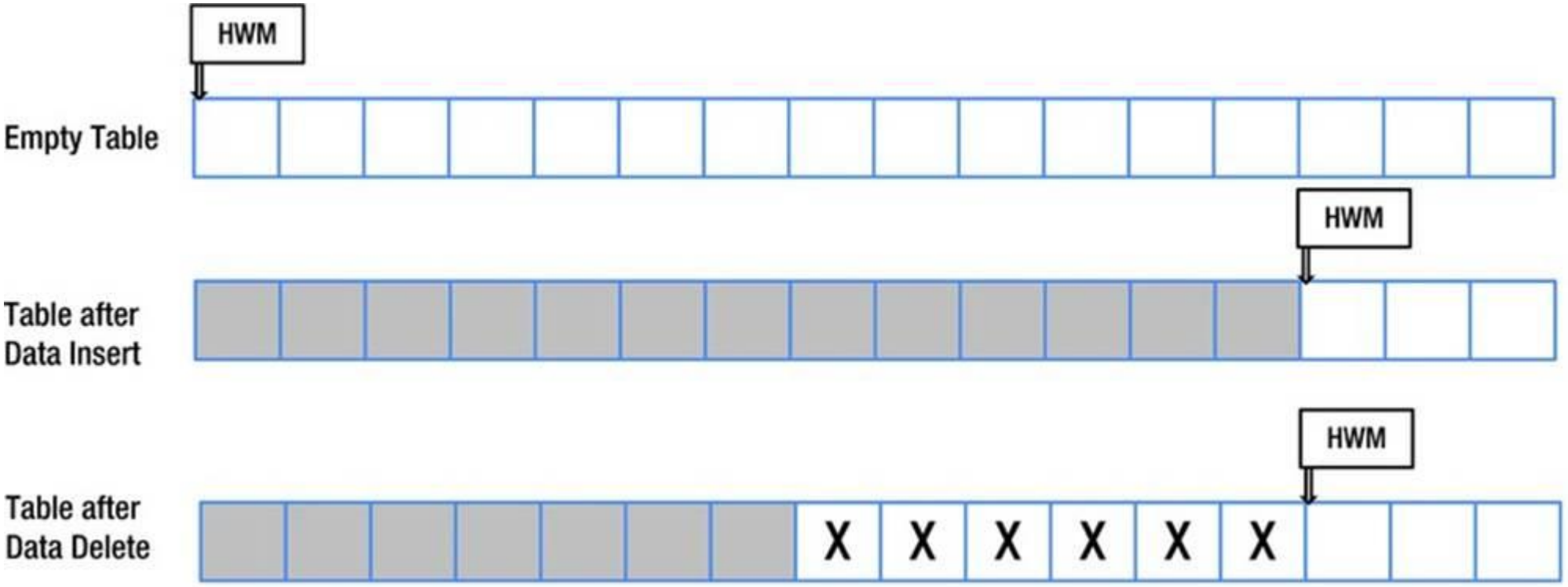


Source: https://goo.gl/EnzgCC

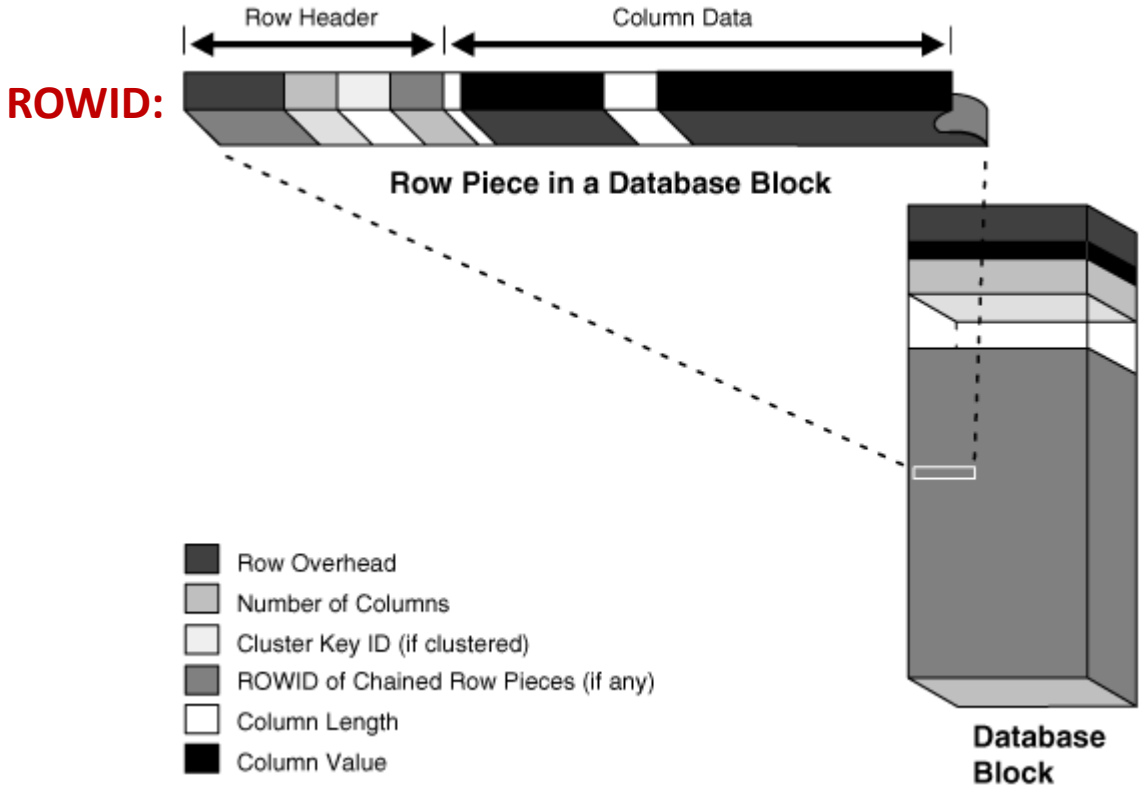


Source: https://goo.gl/hsbh2c

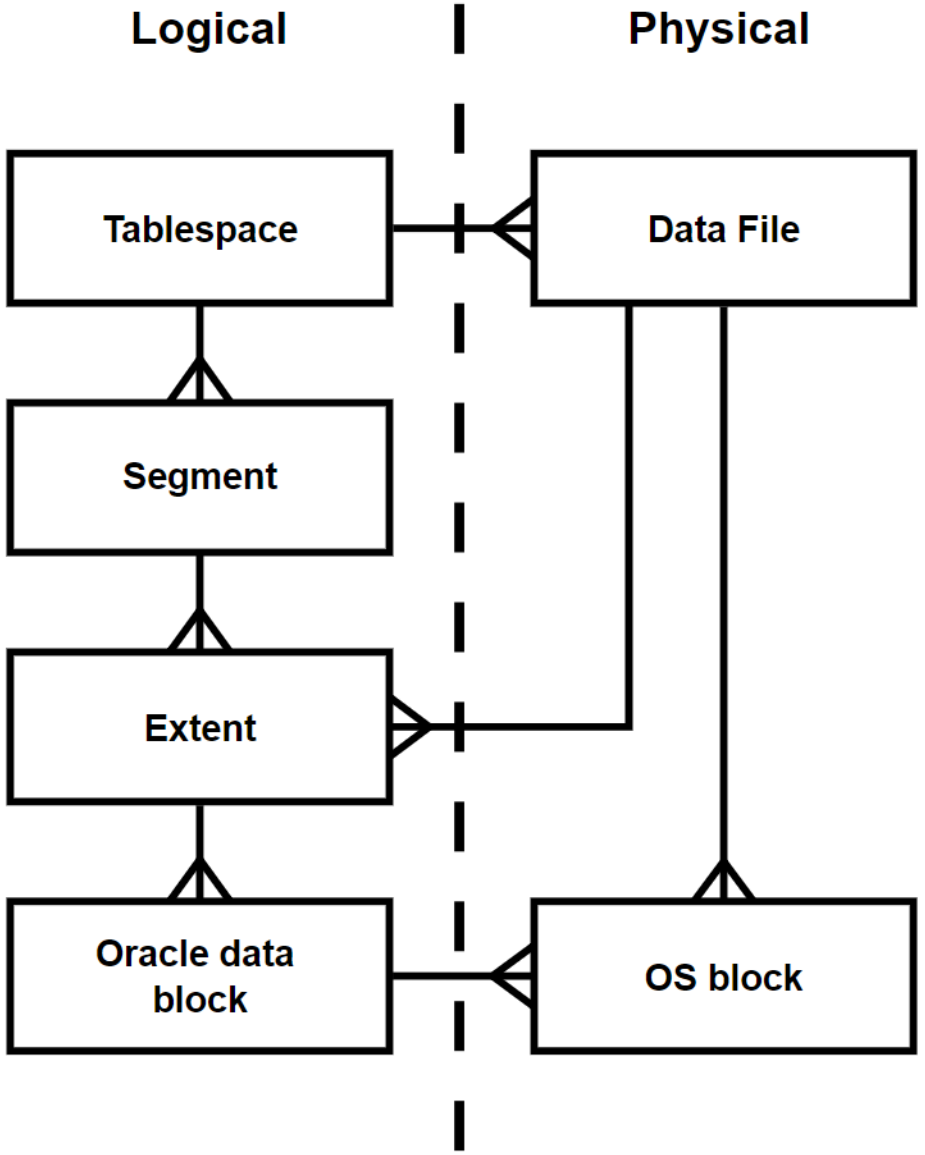
Segment Content Dynamic



DB Blocks
1000x Zoom In



Source: https://goo.gl/GBgncB



Source: https://goo.gl/Ktsszj

Putting All Together

Querying the Dictionary

DBA_DATA_FILES

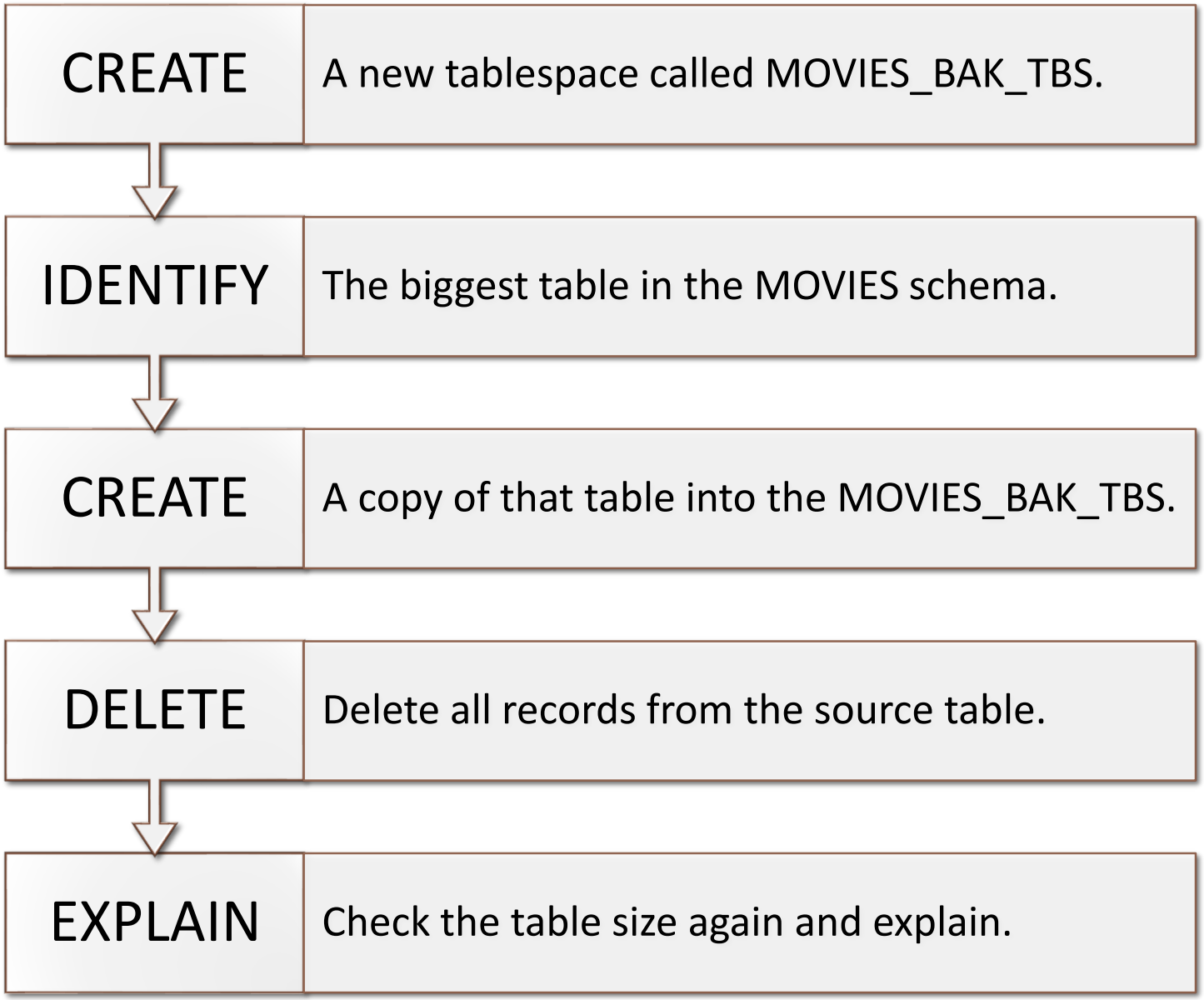
DBA_TABLESPACES

DBA_SEGMENTS

DBA_EXTENTS (seldom)

DBA_FREE_SPACE

Challenge


CREATE
A new tablespace called MOVIES_BAK_TBS.
IDENTIFY
The biggest table in the MOVIES schema.
CREATE
A copy of that table into the MOVIES_BAK_TBS.
DELETE
Delete all records from the source table.
EXPLAIN
Check the table size again and explain.

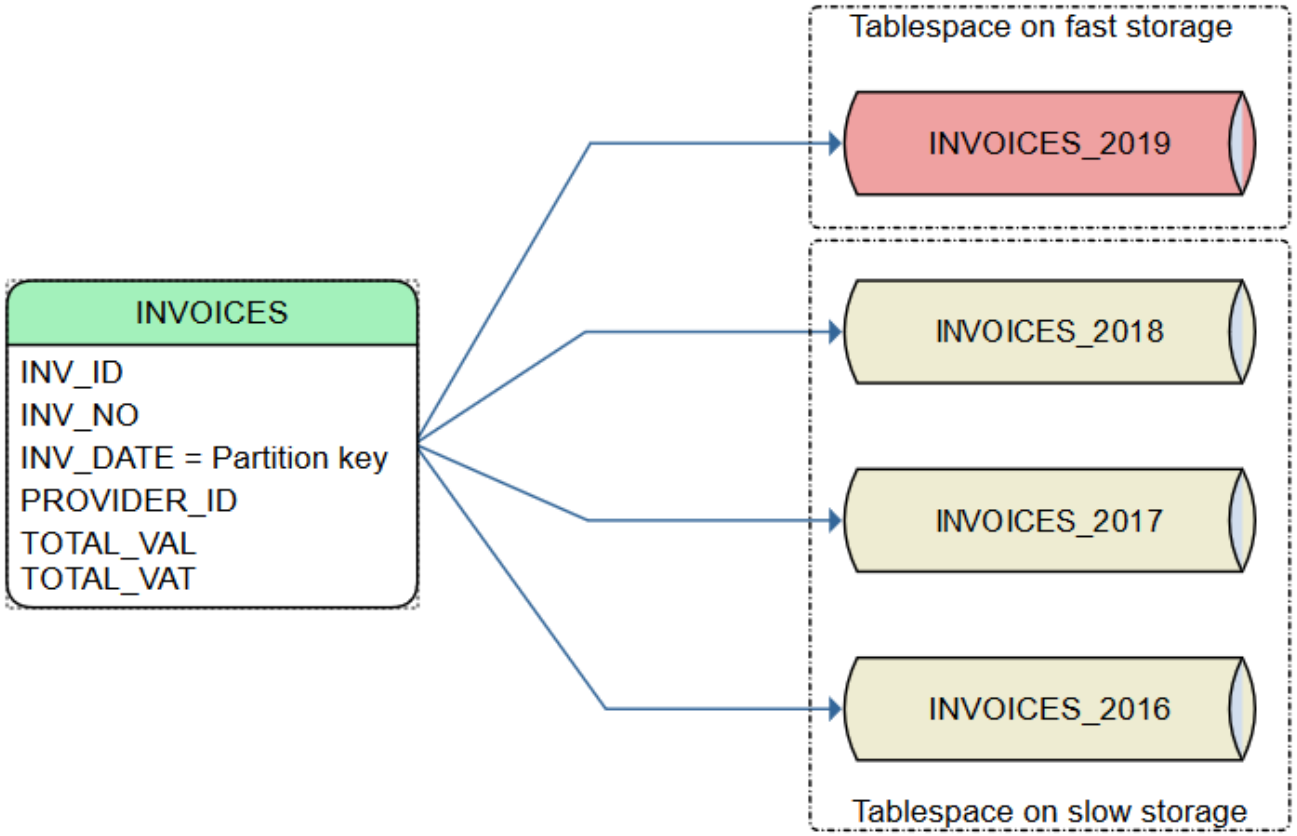
Tuning Physical Schema

COMMON TECHNIQUES

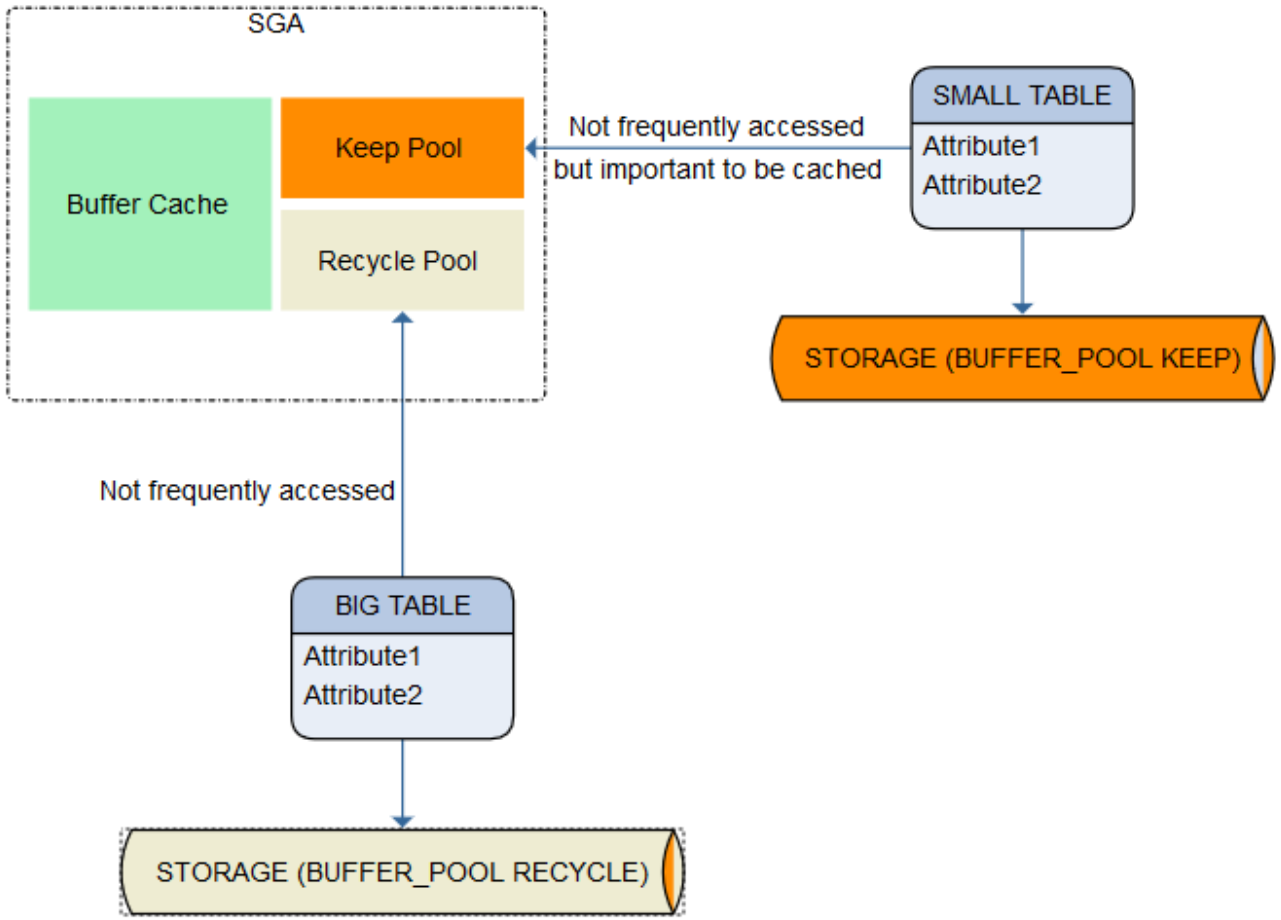
Dedicated Tablespaces

Hot data should reside on fast storage systems

For high availability reasons only, it’s a good practice to have indexes in a separate tablespace

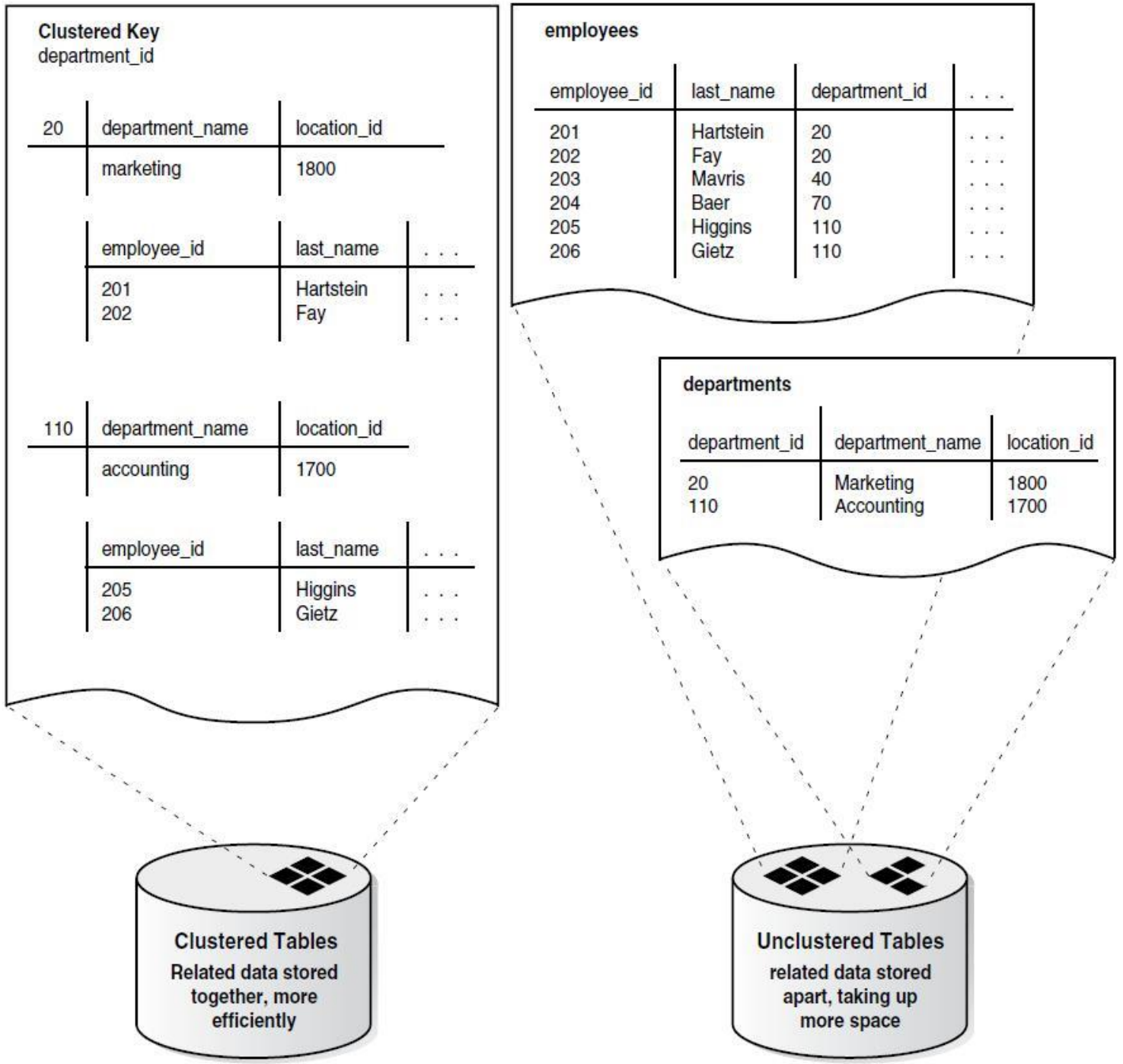


Tables Partitioning


SGA
Buffer Cache
Keep Pool
Recycle Pool
Not frequently accessed
but important to be cached
SMALL TABLE
Attribute1
Attribute2
STORAGE (BUFFER_POOL KEEP)
Not frequently accessed
BIG TABLE
Attribute1
Attribute2
STORAGE (BUFFER_POOL RECYCLE)

Caching

Oracle Clusters



Source:
https://amitstechblog.files.wordpress.com/2011/09/clusteredtables.jpg

Allocating More Space

COMMON SCENARIOS

Challenge

Our very "successful" Facebook application is running out of space. Users are very active and they post like crazy! Your mission is to:

1. Find out in which tablespace Facebook tables are located
2. Compute the size of all segments in that tablespace
3. Suggest a method to add more space to that tablespace

Resize an Existing Datafile

It's just a matter of executing:

```
ALTER DATABASE DATAFILE … RESIZE <new_size>;
```

Downsizing has some limitations.

Use the AUTOEXTEND Feature

A datafile can be auto-extensible or not.

When auto-extend is enabled the datafile will grow as needed to accommodate new allocations.

The incremental size can be configured.

A maximum growth size can be enforced.

Example:

```
 ALTER DATABASE DATAFILE
<db_file>    AUTOEXTEND ON NEXT 5M
MAXSIZE 1G;
```

Add a New Datafile

A new datafile can be added to an existing tablespace:

```
ALTER TABLESPACE <tbs> ADD DATAFILE
<new_dbf> SIZE ...
```

Challenge

Oracle Quizz: http://kahoot.it

That’s all folks!

THANK YOU AND SEE YOU NEXT WEEK…