Things to remember when working with Oracle... (for UDB specialists)

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Think about ...

- (1) Instances and Databases
- (2) Bufferpools
- (3) Tablespaces, Datafiles and extents
- (4) About UNDO
- (5) About physical row structures

- **(6) Tables and indexes**
- **(7) Nulls**
- **(8) Security**
- **(9) About Static and Dynamic SQL**
- **(10) Utilities**

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Instances and Databases

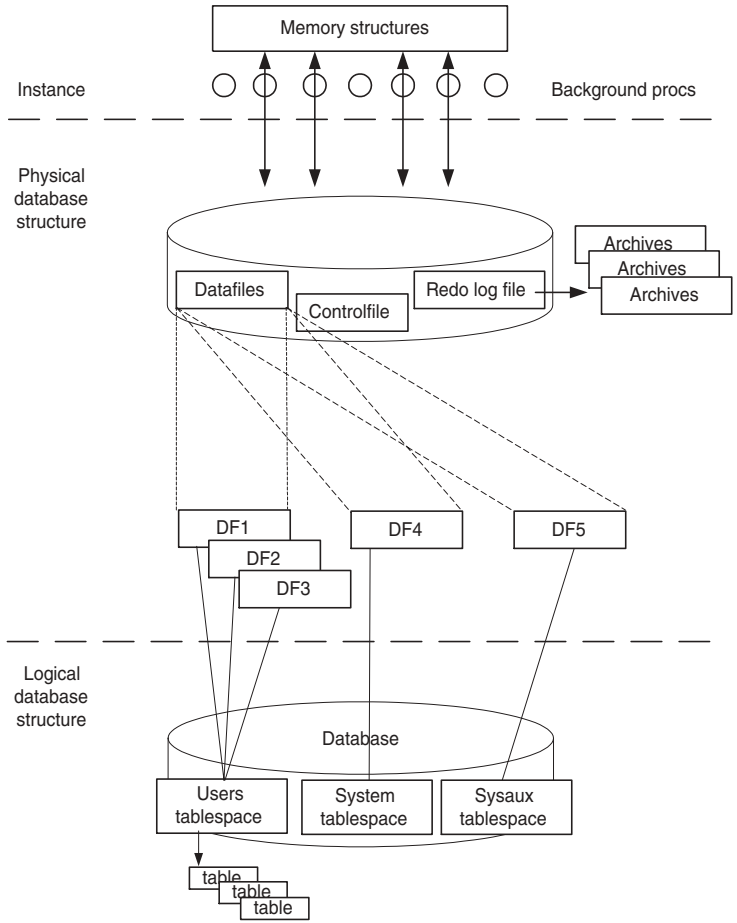
An instance is a database is an instance, right?

Basically, yes, ...

- an instance ‘contains’ - services - ONE database [ie. physical structure]

  [a database can be serviced by multiple instances in a RAC environment]
- the name of the database is *generally* of no importance, as the instance is the object to be managed
- you connect to the instance, not to the database
- if remote access is required, the instance should be locally ‘catalogued’ - added to local name resolution facilities
  (basic: tnsnames.ora)
- security by default implemented on an instance-by-instance (db by db) level

Think about ...



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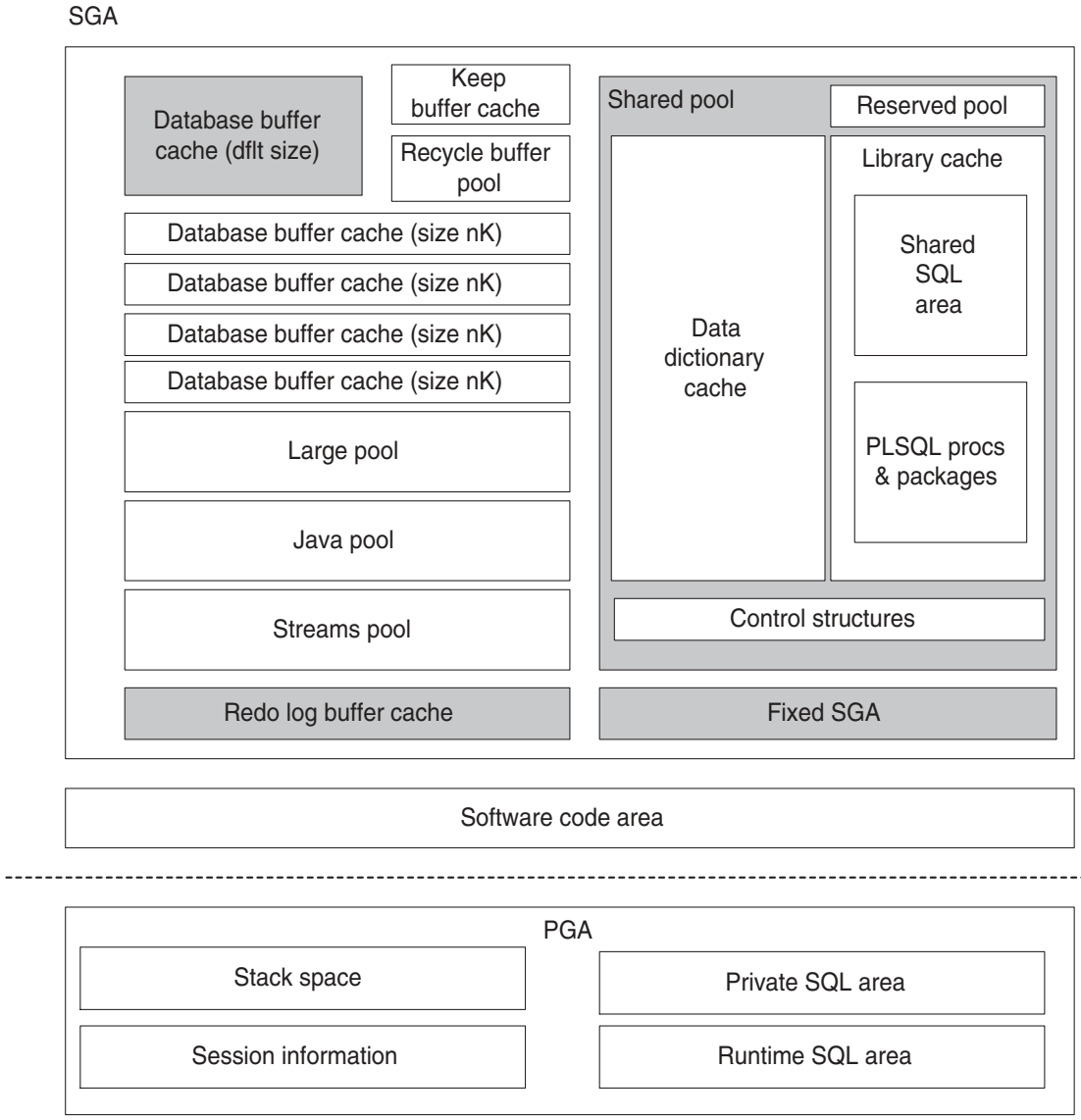

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Bufferpools

- **Basically the same idea - cache data!**
- **Implemented differently:**
  - not CREATEd, but ‘activated’ or ‘enabled’
  - not explicitely named (cfr. z/OS)
  - typically one per required page/block size type
    [4 k, 8 k, 16 k, 32 k]
    [subs: default, keep, recycle]
  - no prefetchers - SPs read-in big blocks if deemed helpful
    [scan, index scan]
    DBA can influence what stays in memory, and, for how long [access type, object definition]
  - link to storage object through tablespaces

Think about ...

Tablespaces, Datafiles, and Extents

or if you prefer: Tablespaces, Containers, and Extents

An Oracle tablespace:

- is an automatically managed DMS tablespace
- assigned [default ?] to a bufferpool
- in which NO Oracle managed extent balancing/striping occurs

  if striping is important:

  °) do it manually - based on sizing/DBA intervention

  °) rely on other Oracle (ASM) or third party software (SAN, NAS based solutions) <=> bigfile tablespaces
- [system, sysaux, temp, undo, users (?) - and application based tablespaces]
- there is no such thing as an indexspace!

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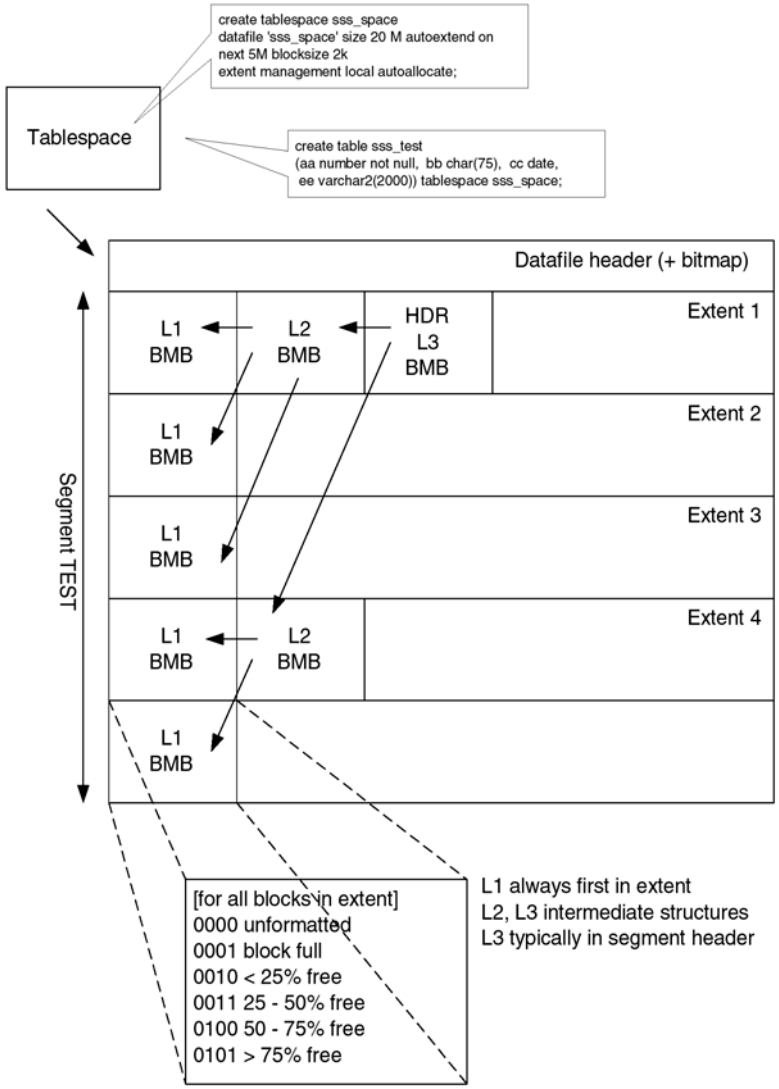

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UNDO - tablespaces, segments

- **store rollback or 'undo' information**
  [undo is a more correct **term]**
- **used for** locking and read consistency**,** transaction rollback**, and** recovery - ***versioning!***
- [created/activated/enabled] **undo segments are stored in undo tablespaces - ie. physical objects**
- **general idea:**
  - data change:

    -> after image (AI) to transaction log (redo log)

    -> before image (BI) to undo segment; this modifies the undo segment. Consequently:

    => AI undo modification is sent to the transaction log

    => BI undo modification is sent to the undo segment
    [one extra generation kept]

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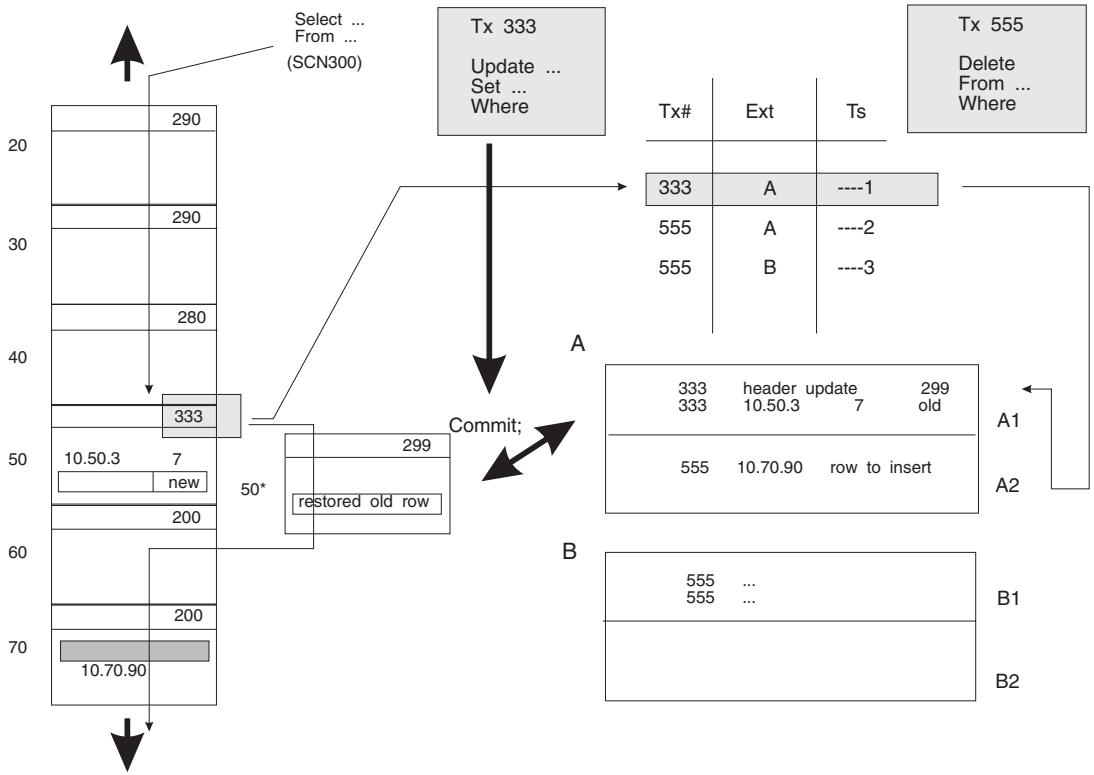

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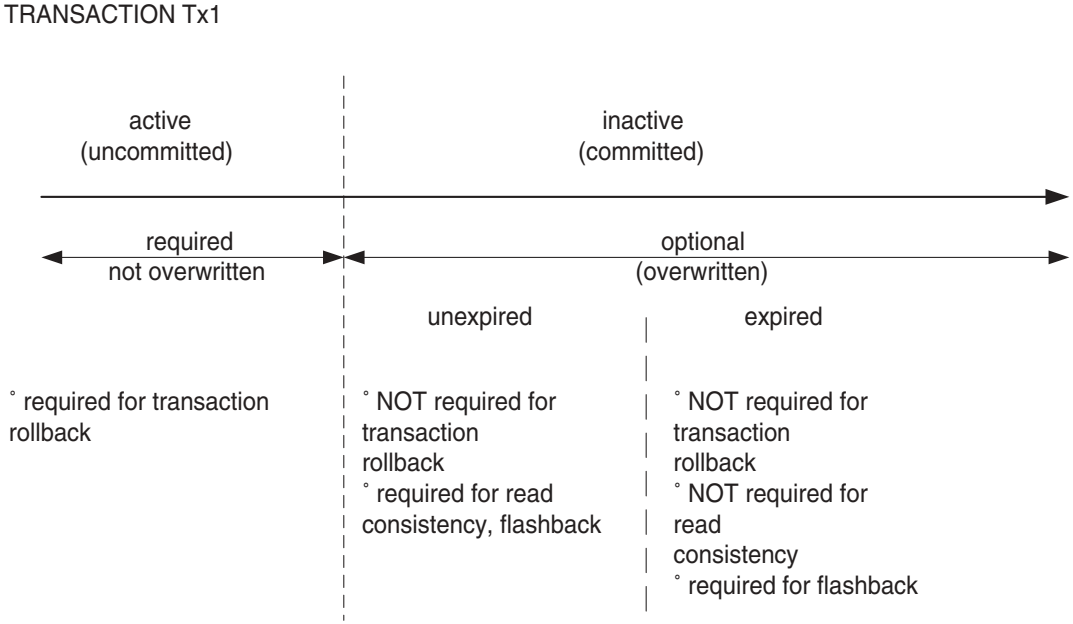

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UNDO - tablespaces, segments - cont.

Flashback and Rewind!

- **undo based:**
  - flashback query
  - flashback version query
  - flashback transaction query
  - flashback transaction backout
  - flashback table
- **not undo based:**
  - flashback drop (recycle bin)
  - flashback database (flashback logs)

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UNDO - tablespaces, segments - cont.

```
select count(*)
from test
as of timestamp(TO_TIMESTAMP('07-04-2005 06:30:00',
                             'DD-MM-YYYY HH24:MI:SS'));


declare
   CURSOR PrevVersion is
   SELECT * FROM test
   as of timestamp TO_TIMESTAMP('07-04-2005 06:25:00',
                                'DD-MM-YYYY HH24:MI:SS');
   Data     PrevVersion%ROWTYPE;
   RowExist number := 0;
begin
....
end;


execute dbms_flashback.enable_at_time(
        TO_TIMESTAMP('07-04-2005 06:30:00',
                     'DD-MM-YYYY HH24:MI:SS'));
```

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UNDO - tablespaces, segments - cont.

Remember!

- **versioning - and currently_committed for that matter - is an** ‘acquired taste’**!**

  advantages and disadvantages!

- **developping applications against a dbms enabled for versioning requires a distinct development skill set!**

  it will in all likelyhood require application changes!

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About physical row structures

- **row length is typically dynamic**
  - all columns are stored using ‘variable length’ semantics
  - numbers are typically stored ‘in decimal format’ (not binary)
  - nulls values are either implied or stored using placeholder

    [most accessed first, fixed first/variable last, null columns last]
- **no ‘max # rows per page’ concept; row length not limited to page size**
  - migration (growing below page size) - *moved to*
  - chaining (growing beyond page size) - *pieces*
- **rows are assigned to pages based on page free space,** not on any kind of ‘logical’, ie. value or key based, allocation scheme!
  [based on bitmaps - LHWM, HHWM]

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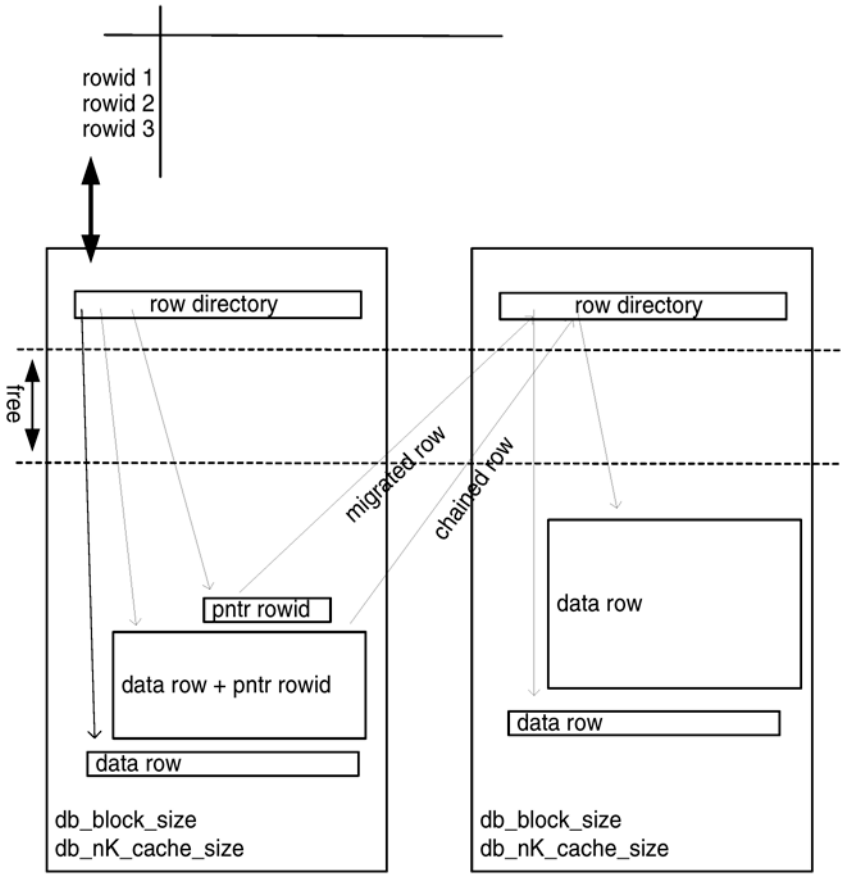

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Tables and Indexes

- **Basically the same**
- **Tables are divided in segments, to be assigned to a specific tablespace (or one, if so desired)**
  - column based [data type based]
  - row based - partitions [partitioned tables]
  - matrix structure [?]
  - different data types, LOBs stored in row OR out of row - your call

  Learn about/Read up on ... IOTs, [Hash] clusters, external tables, ... **and on the available partitioning options:** range, hash, list, interval, system, reference [ie. auto], ...
- **Indexes are created on tables, and stored independently**

  Learn about/Read up on ... reverse indexes, invisible indexes, function based indexes

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Nulls

- **null** is **an empty string** is **null**
- **nulls are:**
  - stored - or not!
  - never stored in traditional B*tree indexes [dense - sparse]

    stored in bitmap indexes
  - what about your where conditions? [not null with default?]

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Security

- **user** identification **and** validation **basically different!**
  - **Oracle managed -** eg. password reuse requirements, ...
  - **verified by Oracle or externally (by default 'not verified'** ie. trusted**)**
  - **no integration with default OS platform security**
- **Oracle uses privileges and roles:**

  Oracle roles <=> UDB authorisations
  Roles can however be added
- **'Advanced' features supported -** encryption, SSO, LDAP integration, ...

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About static and dynamic SQL

All Oracle SQL - both static and dynamic SQL - is DB2 UDB dynamic, that is: optimized at run time.

[optimized => parsed]

[QEP <=> plan; cached in pools cfr. dyn statement cache **(*)**]

- **hard parse:**
  - first time ever parse
- **soft parse**
  - reuse existing parse statement
- **softer-the-soft**
  - application sends 'parsed' statement to the server

(*) QEP stored in cursor area's - parent area, child area based on assumed and observed access path

stored outlines, profiles

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Utilities

Oracle: RMAN, Import/Export aka Dpump, Loader, Analyze (1), **db_verify, ??** (2), **??**(2)

DB2 UDB: Backup/Restore, Import/Export, Load, Runstats, ??, reorg, reorgchk

(1) dbms_stats.gather_<object>_stats
(2) use command sequences to verify multiple storage characteristics

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So what does Oracle compatibility mode do?

- **Datatypes:**
  - DATE data type based on TIMESTAMP(0)
    [supports oracle style computations, eg '+1']
  - NUMBER
    [decfloat(16), decimal(p,s)]
  - VARCHAR2 and NVARCHAR2 (*)
    [varchar, non-padded comparison semantics]
    (*) hardly ever used!
- **SQL data access level enforcement**
  [what to expect in a stored object - SQL, NoSQL, Write?]
- **Outer join operator ==> '+' (*)**
  (*) old school most Oracle apllis should use ansi SQL
  '+' refers to column where the missing values should be 'assumed present', to generate the outer rows
- **Hierarchical queries - connect by, start with, prior**
  [CTE in Oracle still have somewhat limited functionality]
- **INOUT** parameter used when creating Oracle stored procs

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So what does Oracle compatibility mode do? (II)

- **ROWNUM**
- **DUAL** table in Oracle is typically references with schema name [eg. old style coding requires sequence referencing using access to a table]
- **Oracle data dictionary-compatible views [sys.dba_... sys.all_... sys.user_...**
- **PL/SQL support**
- **truncate table**

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