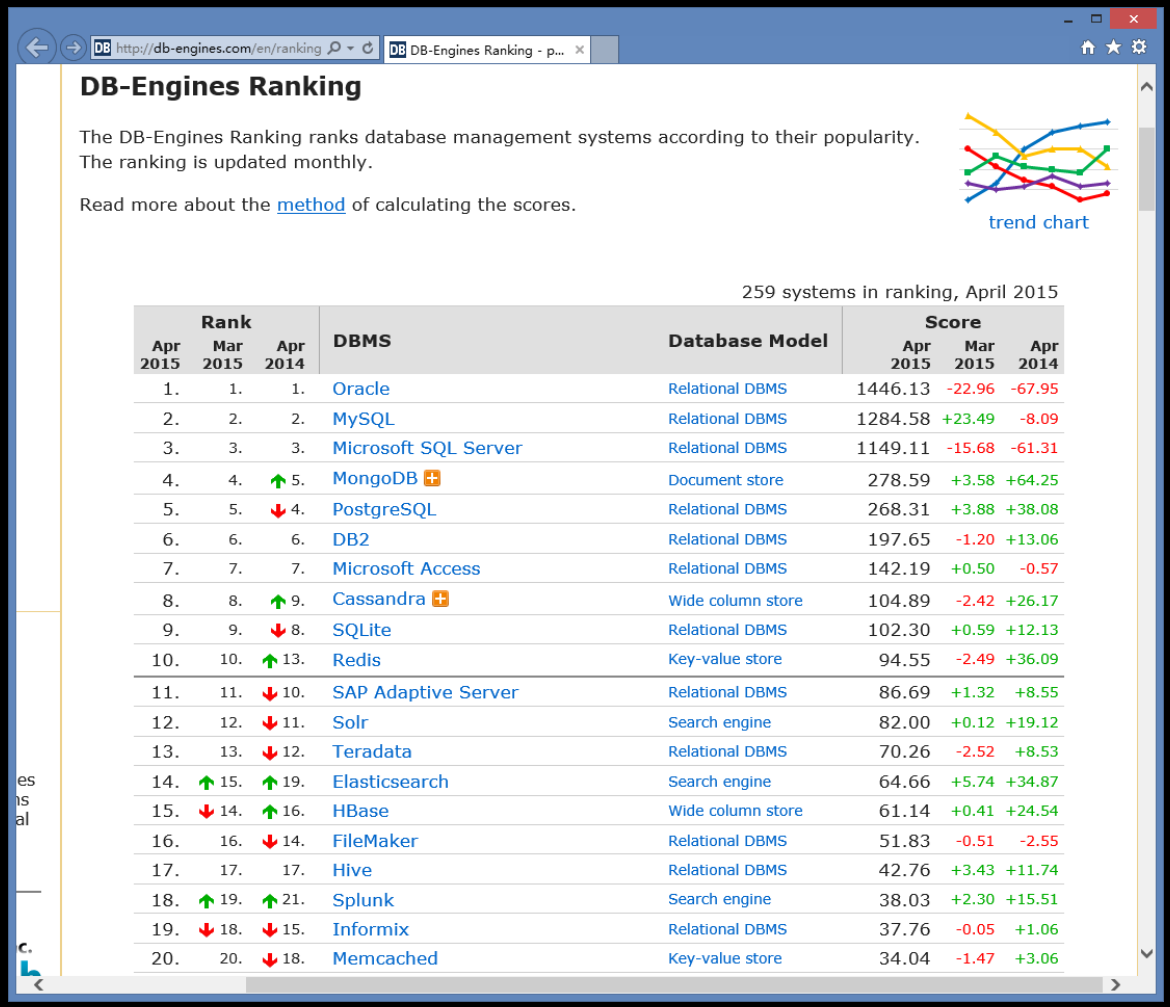
The Pilot Of Oracle RDBMS

DB-Engines Ranking



http://db-engines.com/en/ranking — DB-Engines Ranking - p...

DB-Engines Ranking

The DB-Engines Ranking ranks database management systems according to their popularity. The ranking is updated monthly.

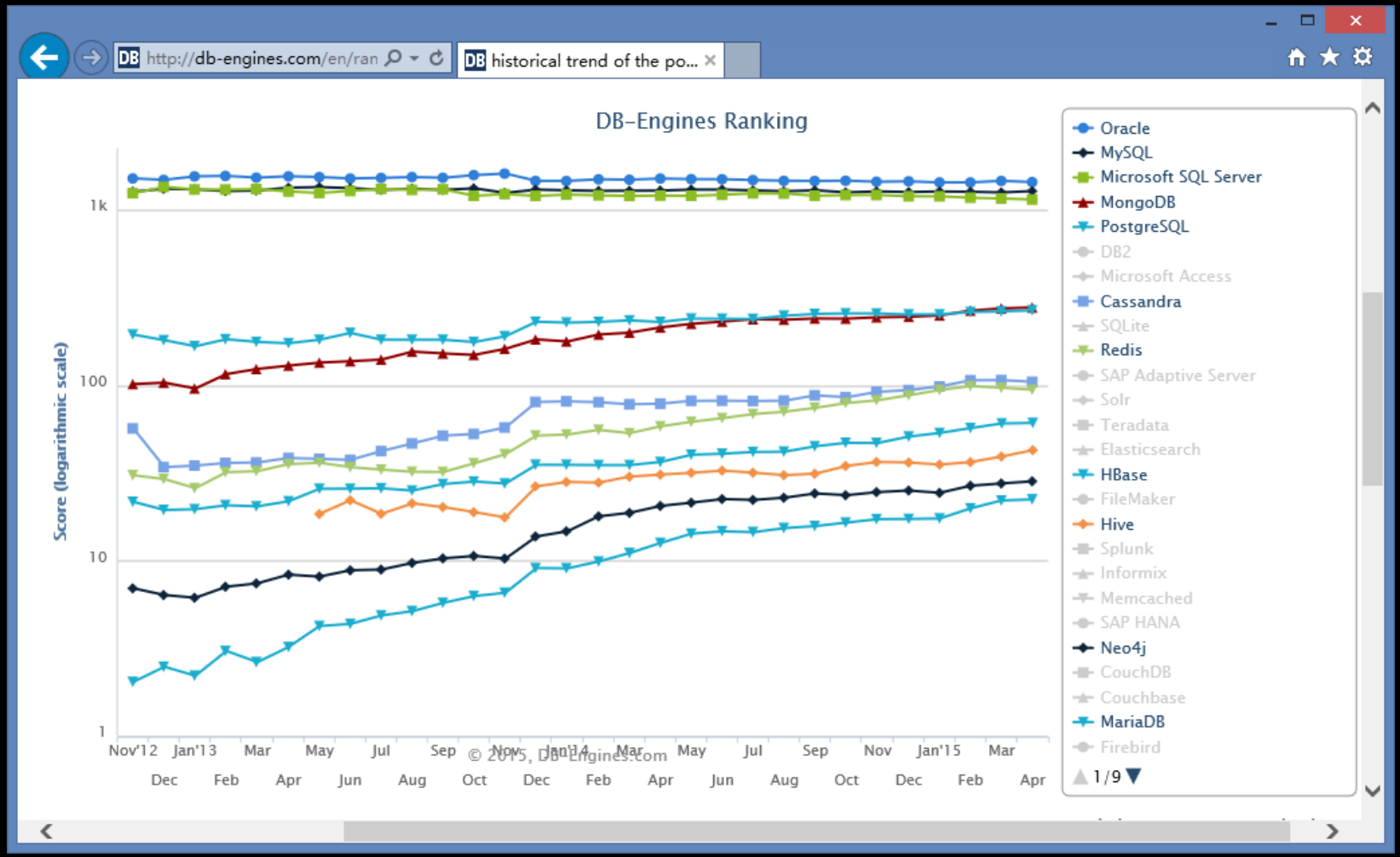
Read more about the method of calculating the scores.

trend chart

259 systems in ranking, April 2015

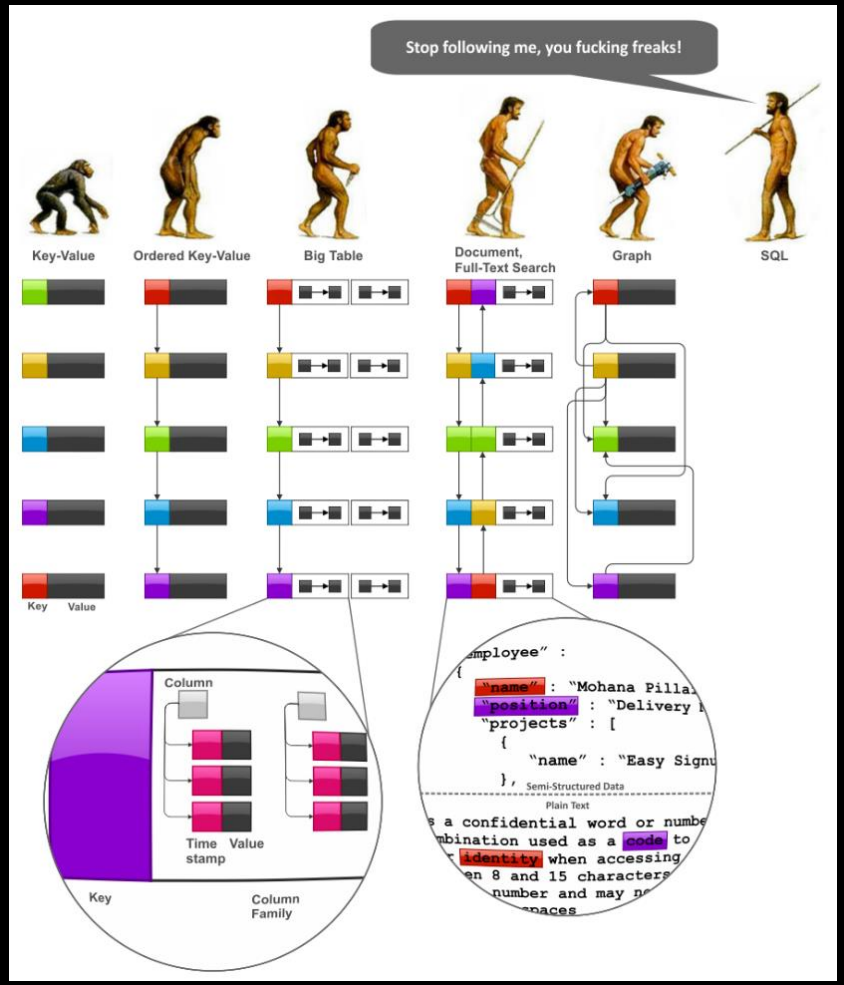
Rank Apr 2015	Rank Mar 2015	Rank Apr 2014	DBMS	Database Model	Score Apr 2015	Score Mar 2015	Score Apr 2014
1.	1.	1.	Oracle	Relational DBMS	1446.13	-22.96	-67.95
2.	2.	2.	MySQL	Relational DBMS	1284.58	+23.49	-8.09
3.	3.	3.	Microsoft SQL Server	Relational DBMS	1149.11	-15.68	-61.31
4.	4.	↑ 5.	MongoDB +	Document store	278.59	+3.58	+64.25
5.	5.	↓ 4.	PostgreSQL	Relational DBMS	268.31	+3.88	+38.08
6.	6.	6.	DB2	Relational DBMS	197.65	-1.20	+13.06
7.	7.	7.	Microsoft Access	Relational DBMS	142.19	+0.50	-0.57
8.	8.	↑ 9.	Cassandra +	Wide column store	104.89	-2.42	+26.17
9.	9.	↓ 8.	SQLite	Relational DBMS	102.30	+0.59	+12.13
10.	10.	↑ 13.	Redis	Key-value store	94.55	-2.49	+36.09
11.	11.	↓ 10.	SAP Adaptive Server	Relational DBMS	86.69	+1.32	+8.55
12.	12.	↓ 11.	Solr	Search engine	82.00	+0.12	+19.12
13.	13.	↓ 12.	Teradata	Relational DBMS	70.26	-2.52	+8.53
14.	↑ 15.	↑ 19.	Elasticsearch	Search engine	64.66	+5.74	+34.87
15.	↓ 14.	↑ 16.	HBase	Wide column store	61.14	+0.41	+24.54
16.	16.	↓ 14.	FileMaker	Relational DBMS	51.83	-0.51	-2.55
17.	17.	17.	Hive	Relational DBMS	42.76	+3.43	+11.74
18.	↑ 19.	↑ 21.	Splunk	Search engine	38.03	+2.30	+15.51
19.	↓ 18.	↓ 15.	Informix	Relational DBMS	37.76	-0.05	+1.06
20.	20.	↓ 18.	Memcached	Key-value store	34.04	-1.47	+3.06

DB-Engines Ranking

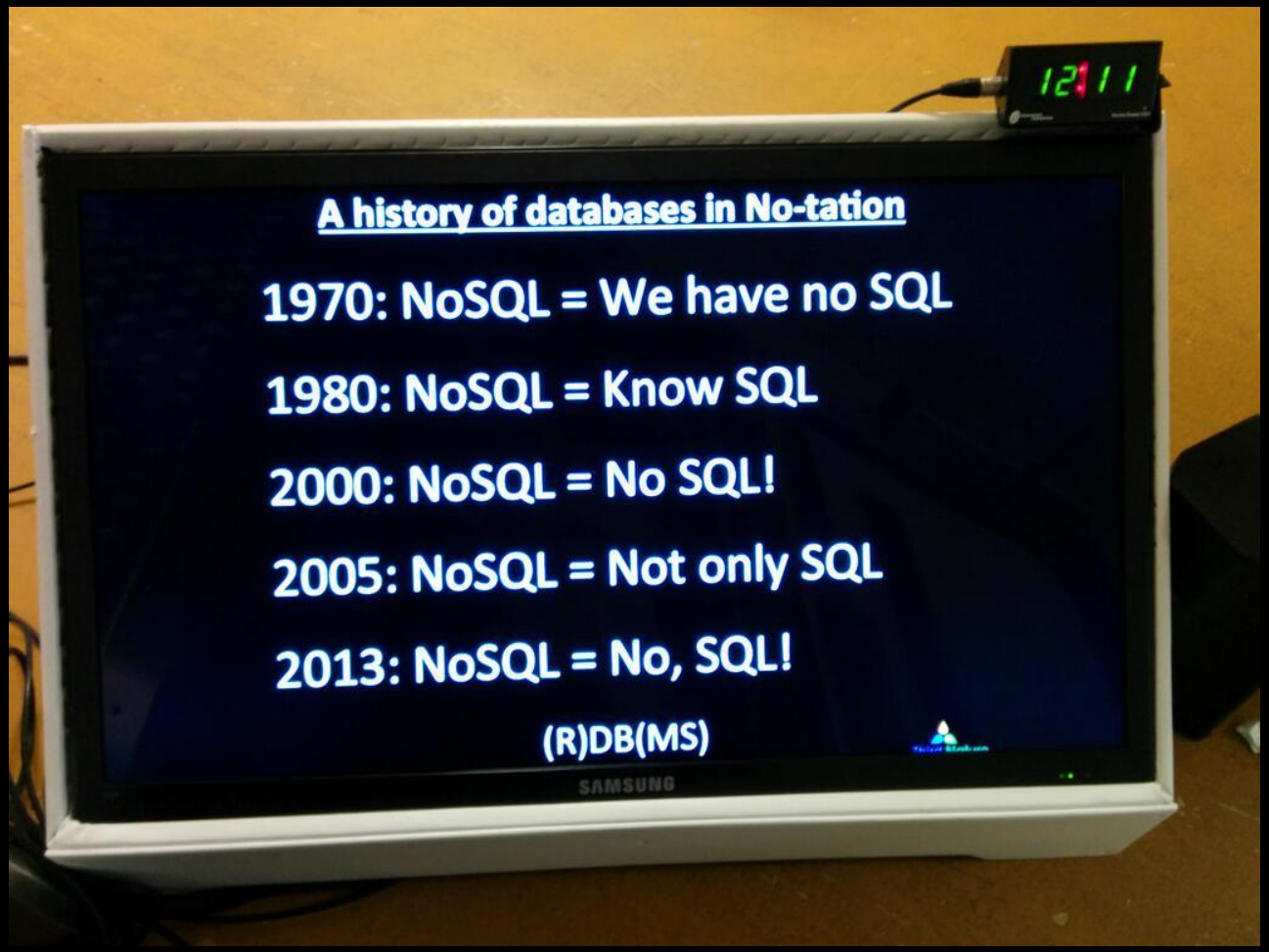


The status of SQL

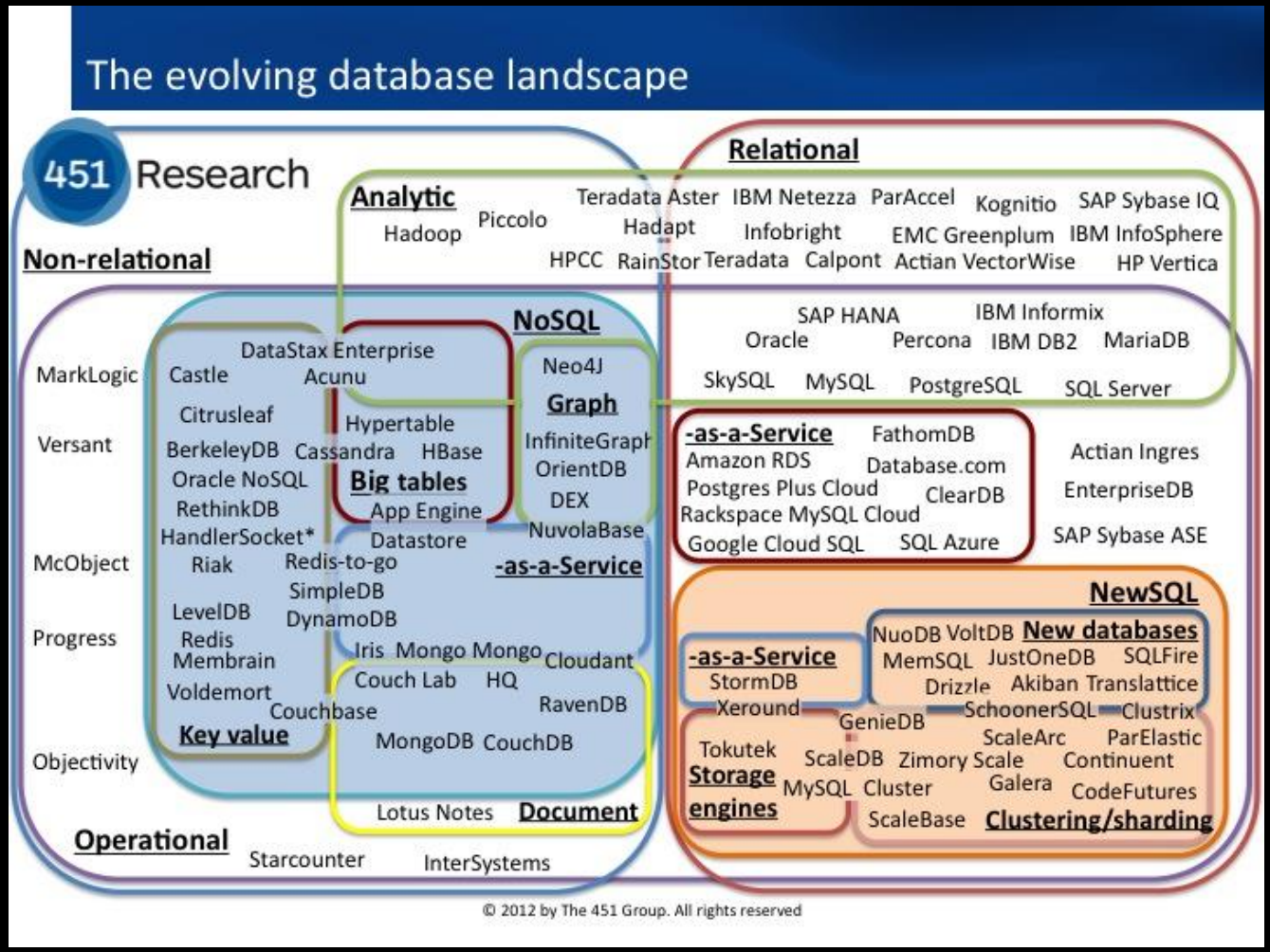
Structured
Query
Language



The History of SQL



SQL vs. NoSQL


The evolving database landscape
451 Research
Non-relational
Analytic
Hadoop
Piccolo
Teradata Aster
Hadapt
HPCC
RainStor
IBM Netezza
Infobright
Teradata
ParAccel
EMC Greenplum
Calpont
Kognitio
Actian VectorWise
SAP Sybase IQ
IBM InfoSphere
HP Vertica
Relational
NoSQL
MarkLogic
Versant
McObject
Progress
Objectivity
Castle
DataStax Enterprise
Acunu
Citrusleaf
BerkeleyDB
Cassandra
HBase
Oracle NoSQL
RethinkDB
HandlerSocket*
Riak
Redis-to-go
SimpleDB
LevelDB
DynamoDB
Redis
Membrain
Voldemort
Couchbase
Key value
Hypertable
Big tables
App Engine
Datastore
Iris
Mongo
Mongo
Cloudant
Couch Lab
HQ
RavenDB
MongoDB
CouchDB
Document
Neo4J
Graph
InfiniteGraph
OrientDB
DEX
NuvolaBase
-as-a-Service
Lotus Notes
Operational
Starcounter
InterSystems
SAP HANA
Oracle
Percona
IBM Informix
IBM DB2
MariaDB
SkySQL
MySQL
PostgreSQL
SQL Server
-as-a-Service
Amazon RDS
Postgres Plus Cloud
Rackspace MySQL Cloud
Google Cloud SQL
FathomDB
Database.com
ClearDB
SQL Azure
Actian Ingres
EnterpriseDB
SAP Sybase ASE
NewSQL
-as-a-Service
StormDB
Xeround
NuoDB
VoltDB
New databases
MemSQL
JustOneDB
SQLFire
Drizzle
Akiban
Translattice
SchoonerSQL
Clustrix
GenieDB
ScaleArc
ParElastic
Tokutek
ScaleDB
Zimory Scale
Continuent
Storage engines
MySQL Cluster
Galera
CodeFutures
ScaleBase
Clustering/sharding
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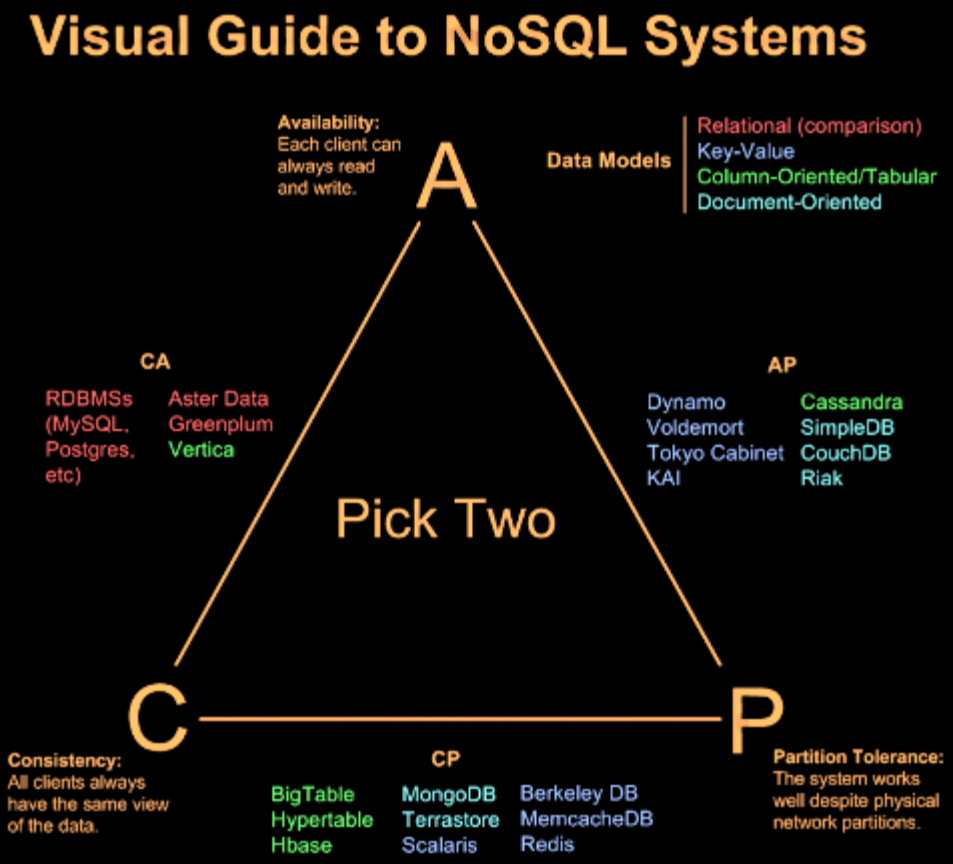
CAP Theorem

Professor
Eric A. Brewer
University of
California
at Berkeley

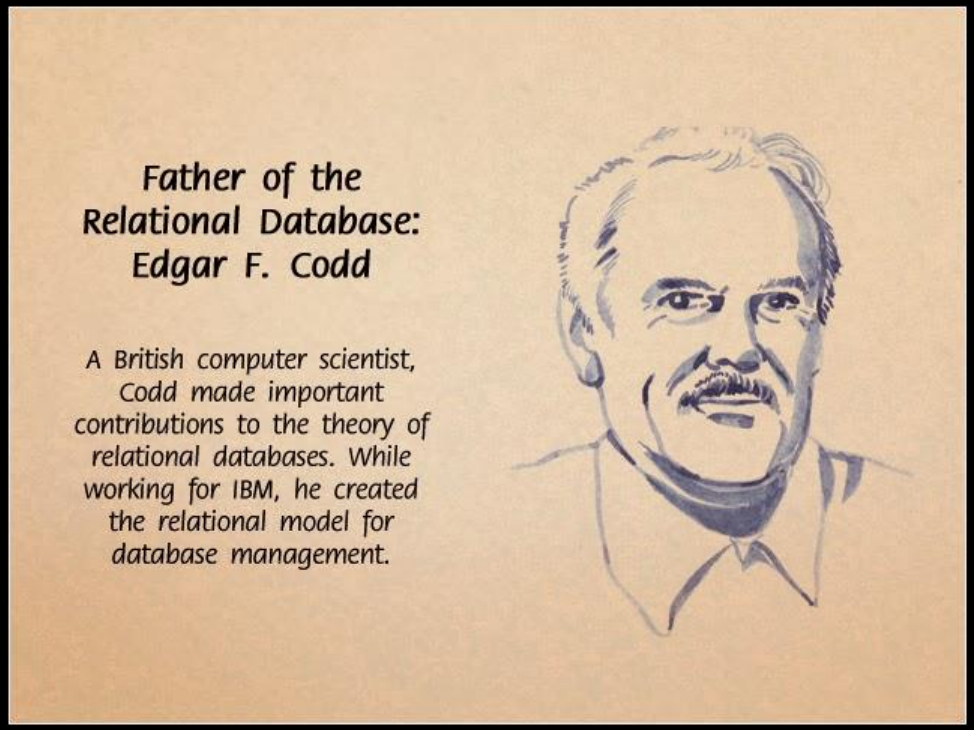


The difference between SQL and NoSQL

- IT systems
  - OLAP=On-Line Analytical Processing
  - OLTP=On-Line Transaction Processing
- NoSQL
  - Key-value stores
  - Column-oriented databases
  - Document-based stores

RDBMS

- Relational Database Management System
- E. F. Codd



The Normal Form

- 1NF
- 2NF
- 3NF
- BCNF
- 4NF
- 5NF

First Normal Form (1NF)

- Every attribute must have value.
  - It should not be empty.
  - In RDBMS a column without value has NULL value that can be manipulated or accesses like a normal value.
- Every attribute must have atomic value that cannot be shorten further.
  - For example: Name is non-atomic attribute as it can be broken into First Name, Middle Name and Surname.

First Normal Form (1NF)

- Student Table :

Student	Age	Subject
Adam	15	Biology, Maths
Alex	14	Maths
Stuart	17	Maths

- Student Table following 1NF will be :

Student	Age	Subject
Adam	15	Biology
Adam	15	Maths
Alex	14	Maths
Stuart	17	Maths

Second Normal Form (2NF)

- An entity must be in First Normal Form
- Entity must have a Primary Key or Composite Primary Key
- Every attribute must be fully and functionally dependent upon Primary Key

Second Normal Form (2NF)

- **SelectCourse Table :**

StudentId	Name	Age	CourseName	CourseScore	Credit

- **New Student Table :**

StudentId	Name	Age	CourseScore

- **New Course Table :**

CourseName	Credit

Third Normal Form (3NF)

- An entity must be Second Normal Form.
- There must not be any dependency among non-key attributes (other that Primary Key)

Third Normal Form (3NF)

- **Student_Detail Table :**

Student_id	Student_name	DOB	Street	city	State	Zip

- **New Student_Detail Table :**

Student_id	Student_name	DOB	Zip

- **Address Table :**

Zip	Street	city	state

Boyce-Codd Normal Form (BCNF)

- An entity must be in Third Normal Form.
- If the entity has a Composite Primary Key & Alternate Primary Key with one or more attribute common to both, in such case entity must be broken into three entities.

Boyce-Codd Normal Form (BCNF)

- **StorehouseManage Table :**

StorehouseID	EmpID	ProductID	StockQuantity

- **StorehouseStock Table :**

StorehouseID	ProductID	StockQuantity

- **StorehouseHR Table :**

StorehouseID	EmpID

Fouth Normal Form(4NF)

- An entity must be in Boyce-Codd Normal Form.
- If an attribute is based on Value List must be taken out as a separate entity.

- **Student Table :**

College	Professor	Student

Frith Normal Form(5NF)

- An entity must be in Fourth Normal Form.
- If an attribute is multi-valued attribute then it must be taken out as a separate entity.

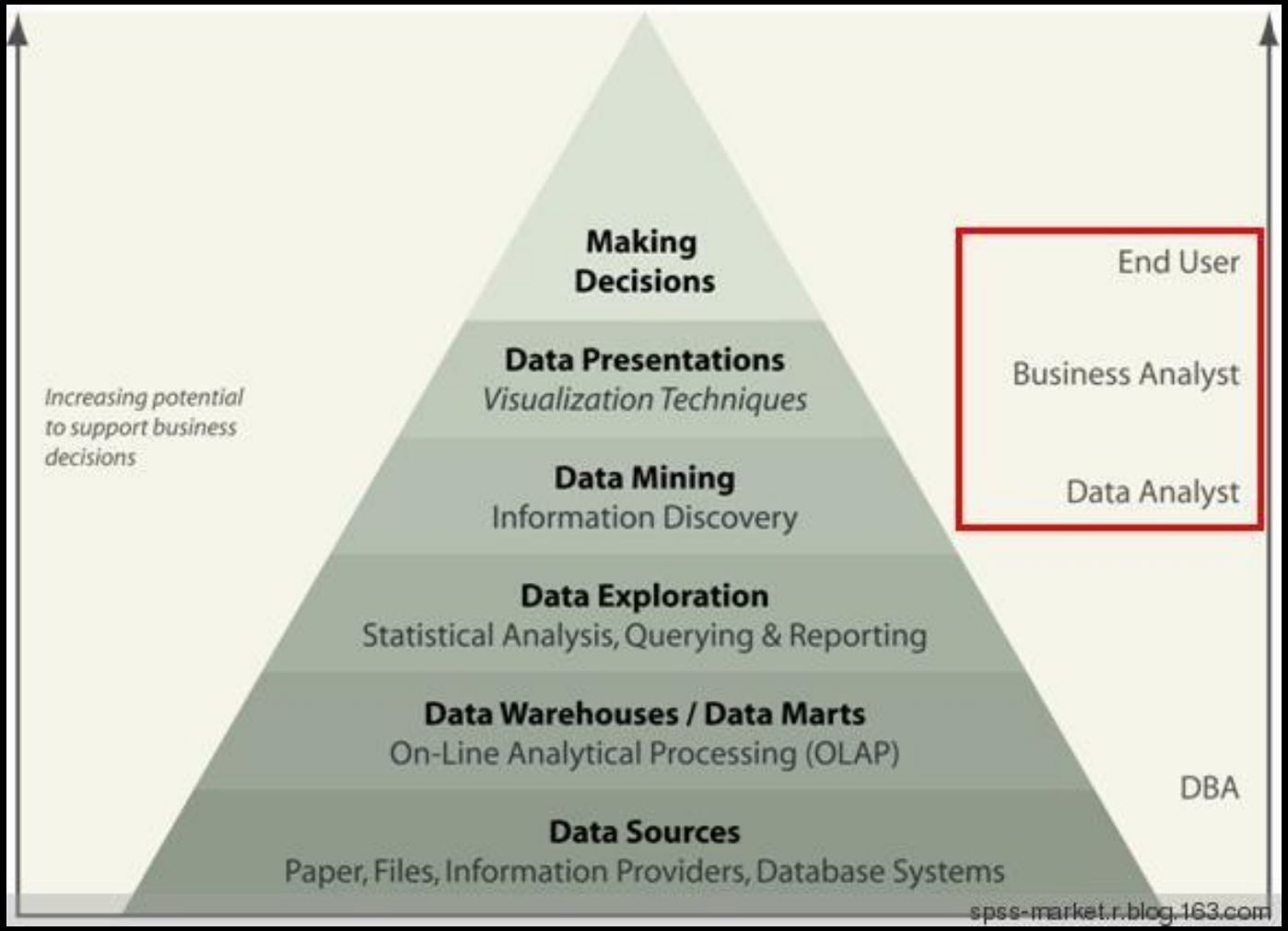
- **Sales Table :**

Businessman	Vendor	Product

ACID

- Atomicity
- Consistency
- Isolation
- Durability

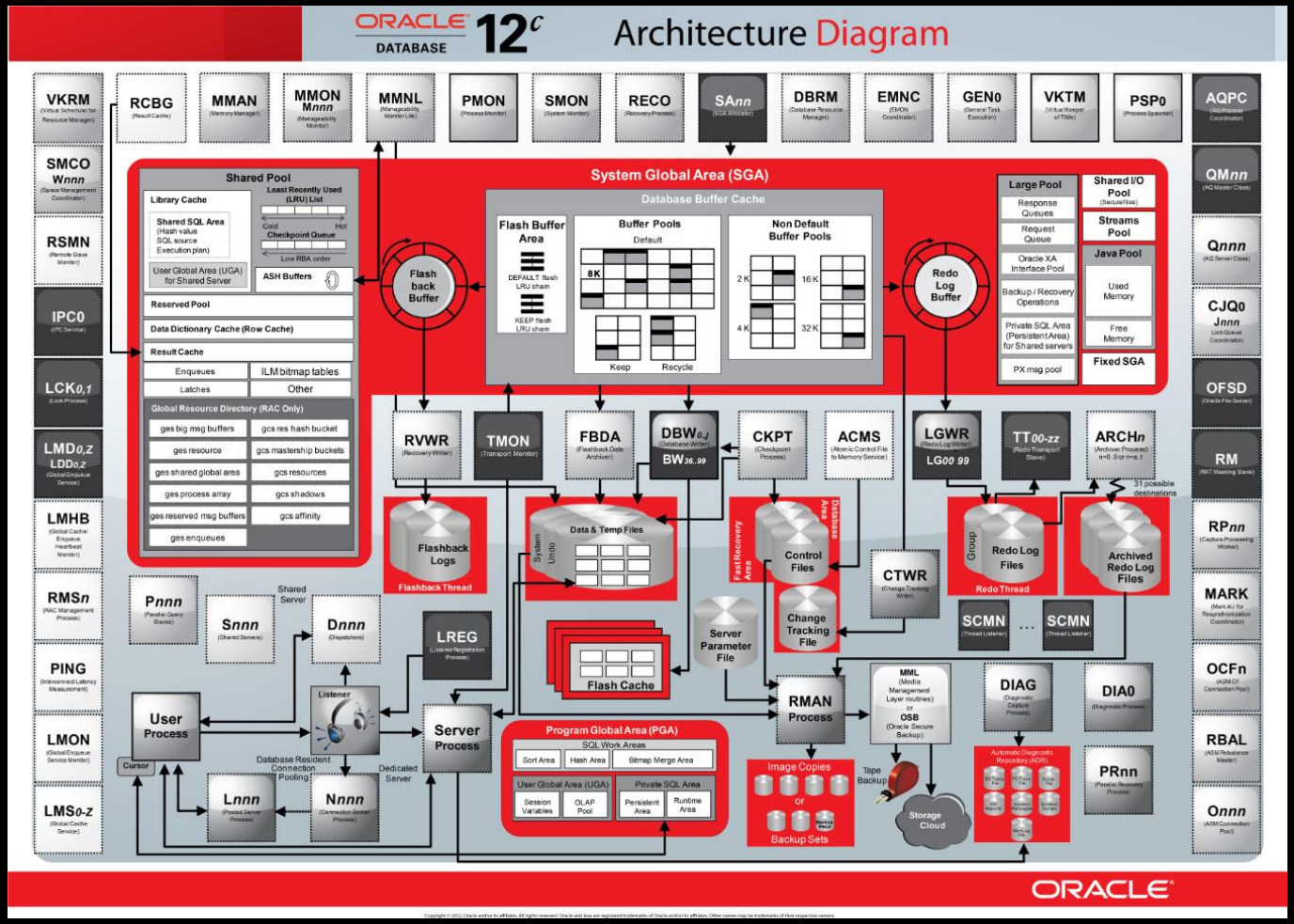
The data analytical modal



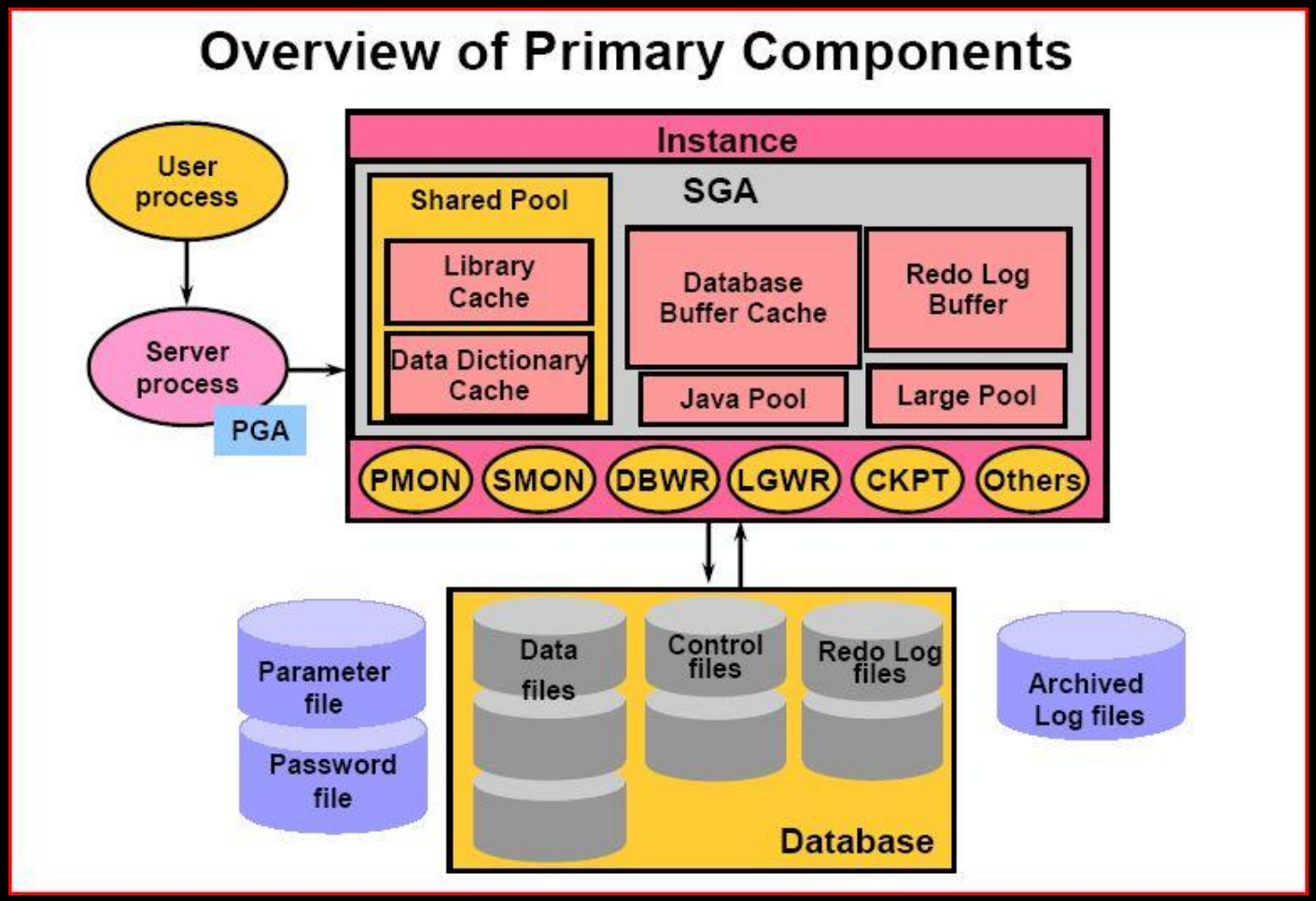
Oracle Company

Oracle Company

memory structure



memory structure



data block

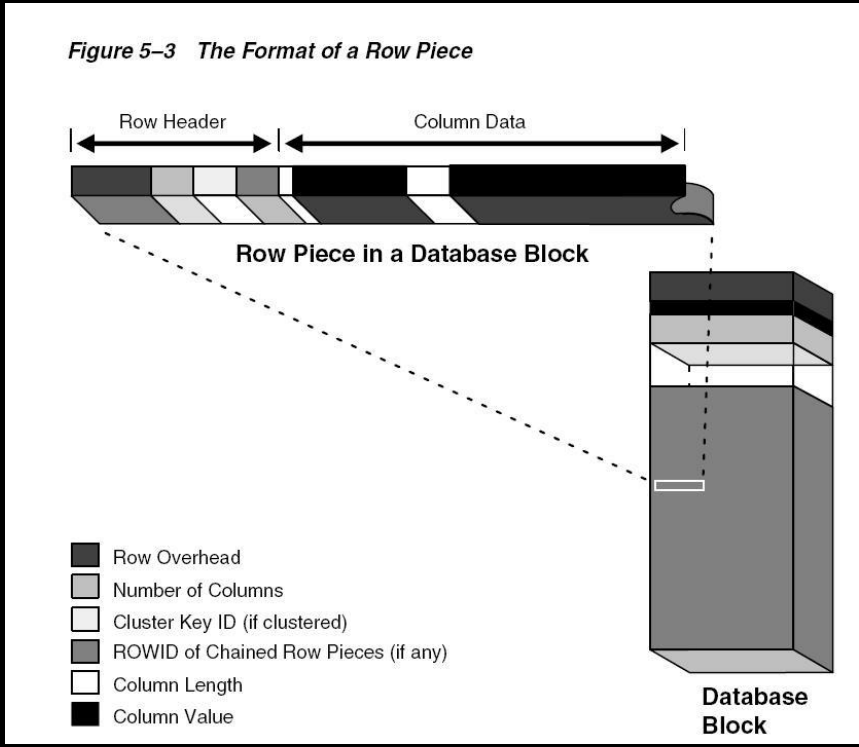
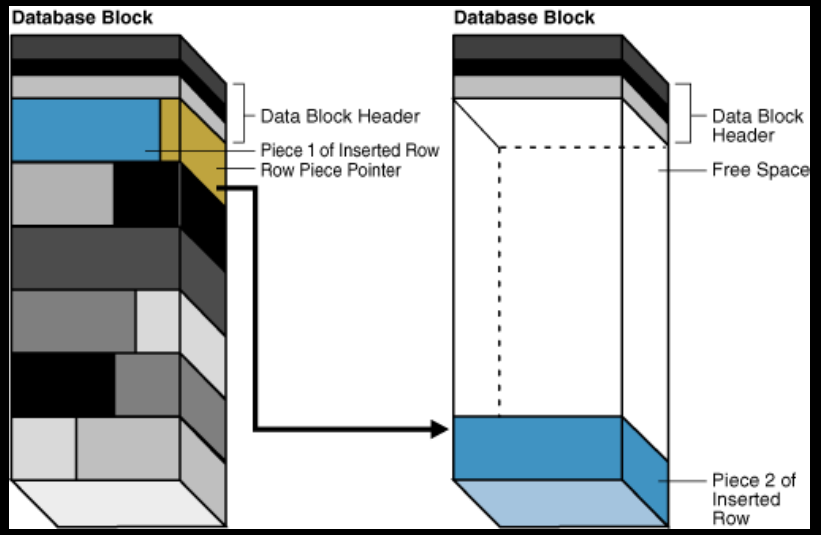
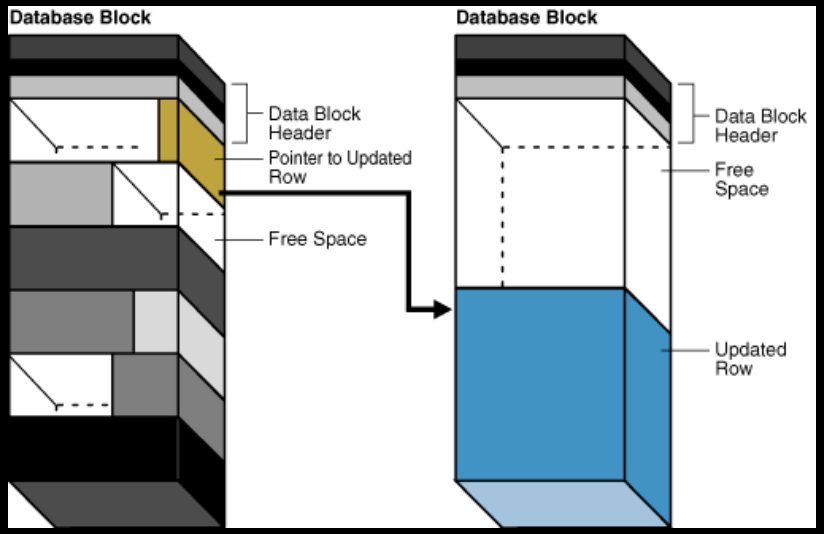
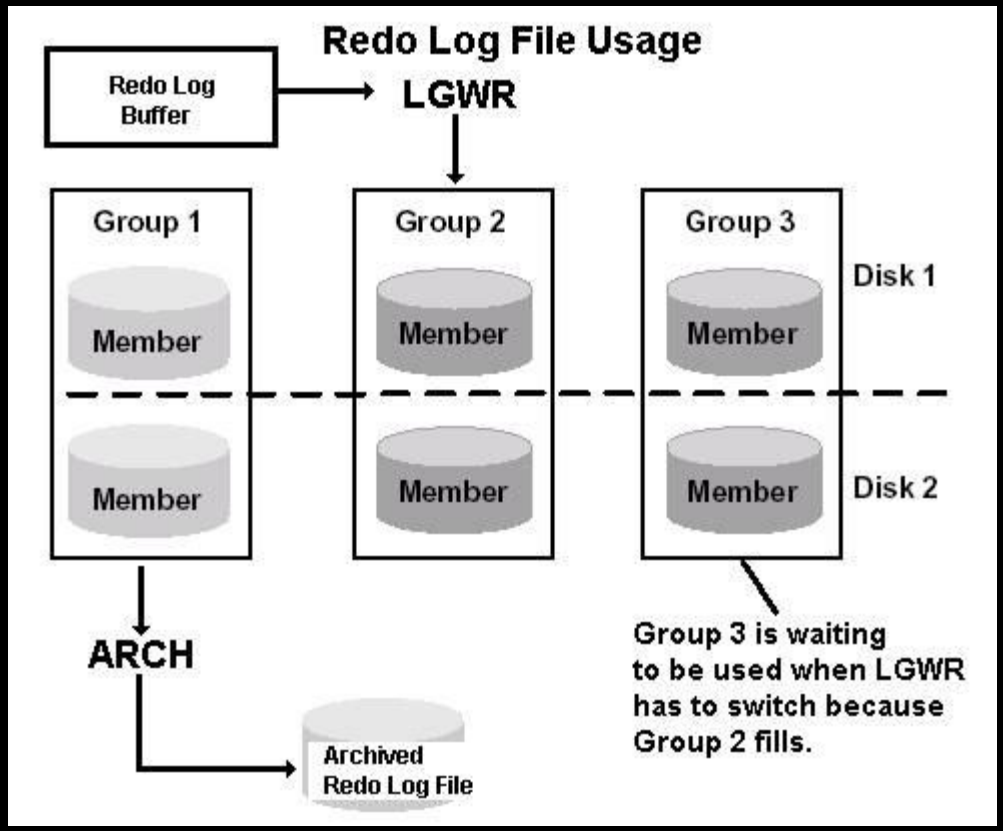


Figure 5–3 The Format of a Row Piece
Row Header
Column Data
Row Piece in a Database Block
Row Overhead
Number of Columns
Cluster Key ID (if clustered)
ROWID of Chained Row Pieces (if any)
Column Length
Column Value
Database Block

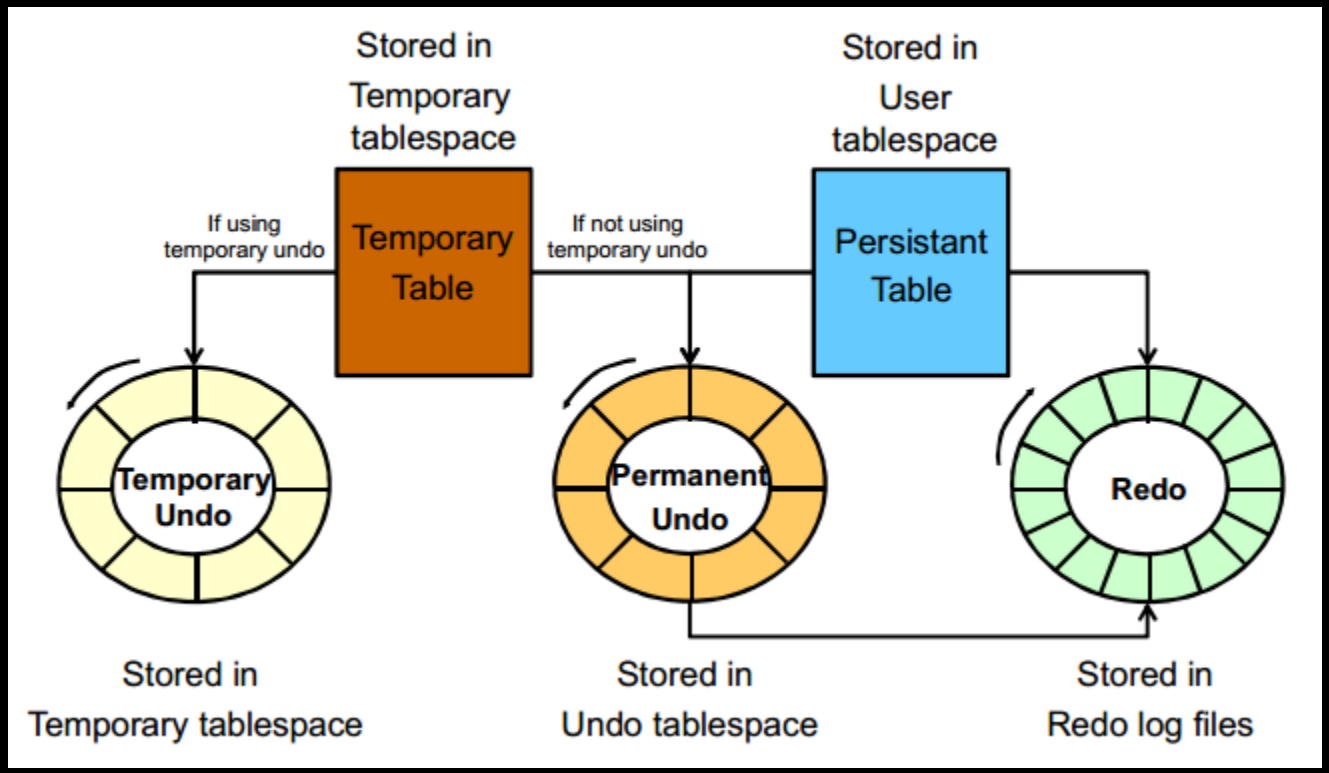

Database Block
Database Block
Data Block Header
Piece 1 of Inserted Row
Row Piece Pointer
Data Block Header
Free Space
Piece 2 of Inserted Row


Database Block
Database Block
Data Block Header
Pointer to Updated Row
Free Space
Data Block Header
Free Space
Updated Row

Redo Log

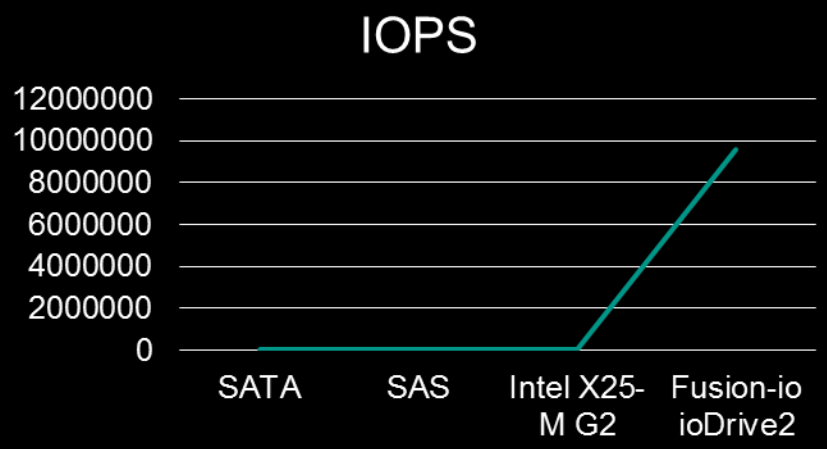

Redo Log File Usage
Redo Log Buffer
LGWR
Group 1
Group 2
Group 3
Disk 1
Member
Member
Member
Member
Member
Member
Disk 2
ARCH
Archived Redo Log File
Group 3 is waiting to be used when LGWR has to switch because Group 2 fills.

Undo


Stored in
Temporary
tablespace
Stored in
User
tablespace
If using
temporary undo
Temporary
Table
If not using
temporary undo
Persistant
Table
Temporary
Undo
Permanent
Undo
Redo
Stored in
Temporary tablespace
Stored in
Undo tablespace
Stored in
Redo log files

Hard Disk IOPS

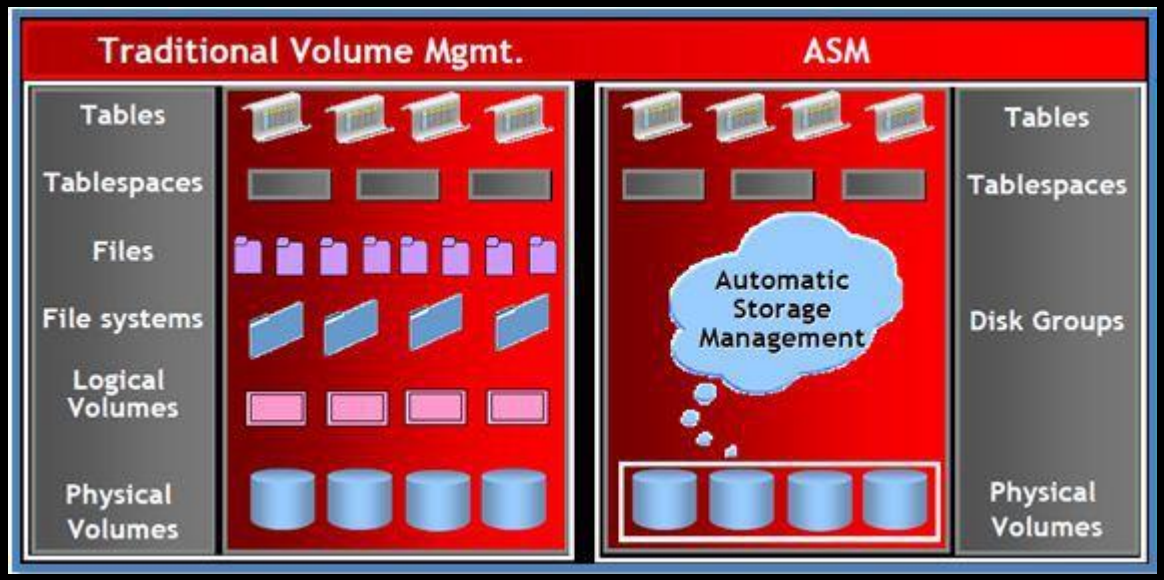
- Total IOPS
  - Random Read IOPS
  - Random Write IOPS
  - Sequential Read IOPS
  - Sequential Write IOPS



source of information
http://en.wikipedia.org/wiki/IOPS

ASM

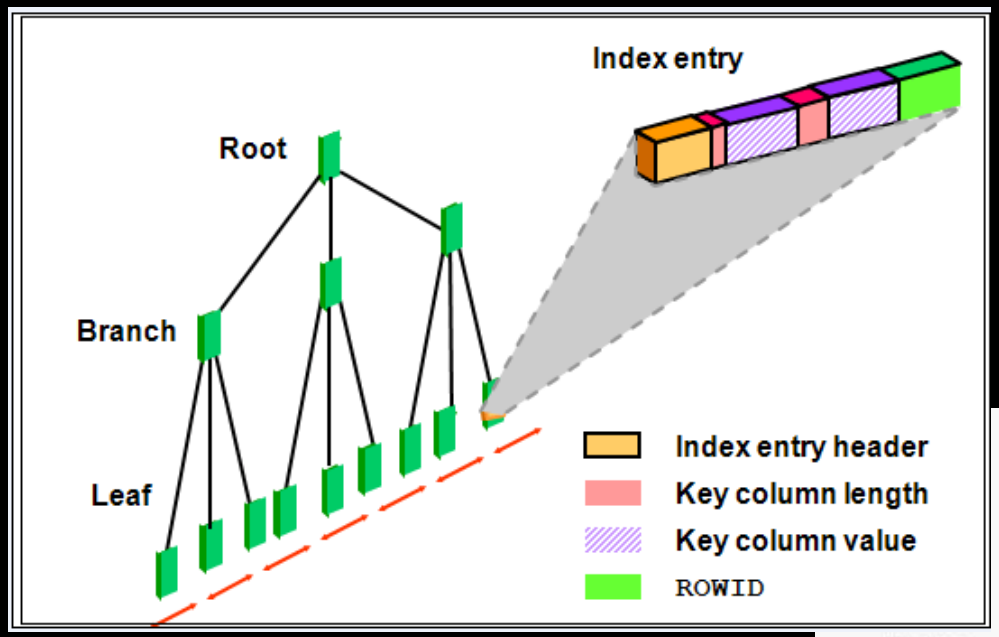
- ASM = Automatic Storage Management



Backup and Restore

- Copy, Paste
- Export, Import
- Expdp, Impdp
- Rman

Index


Index entry
Root
Branch
Leaf
Index entry header
Key column length
Key column value
ROWID

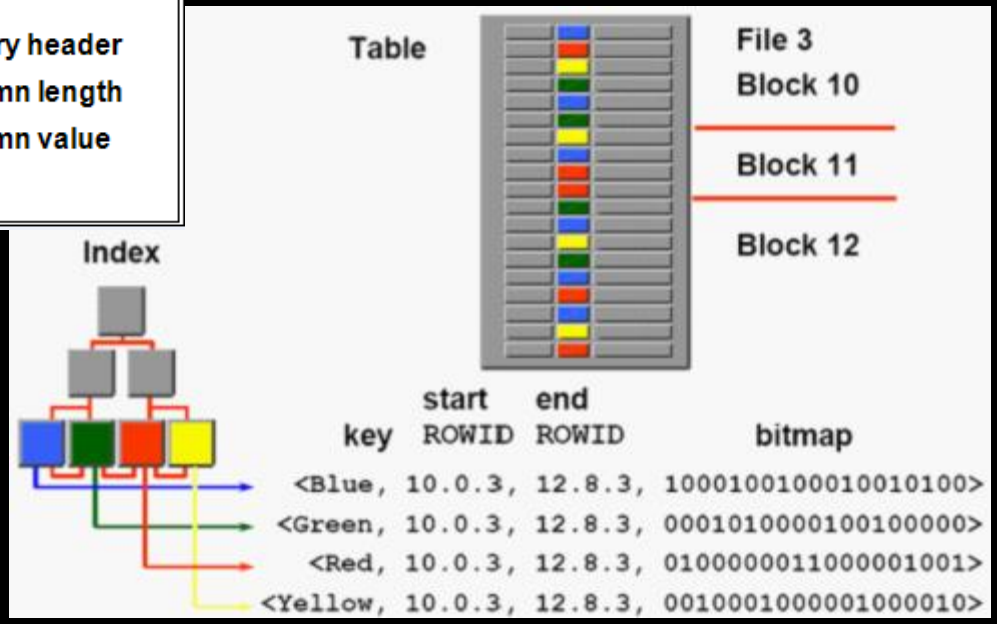
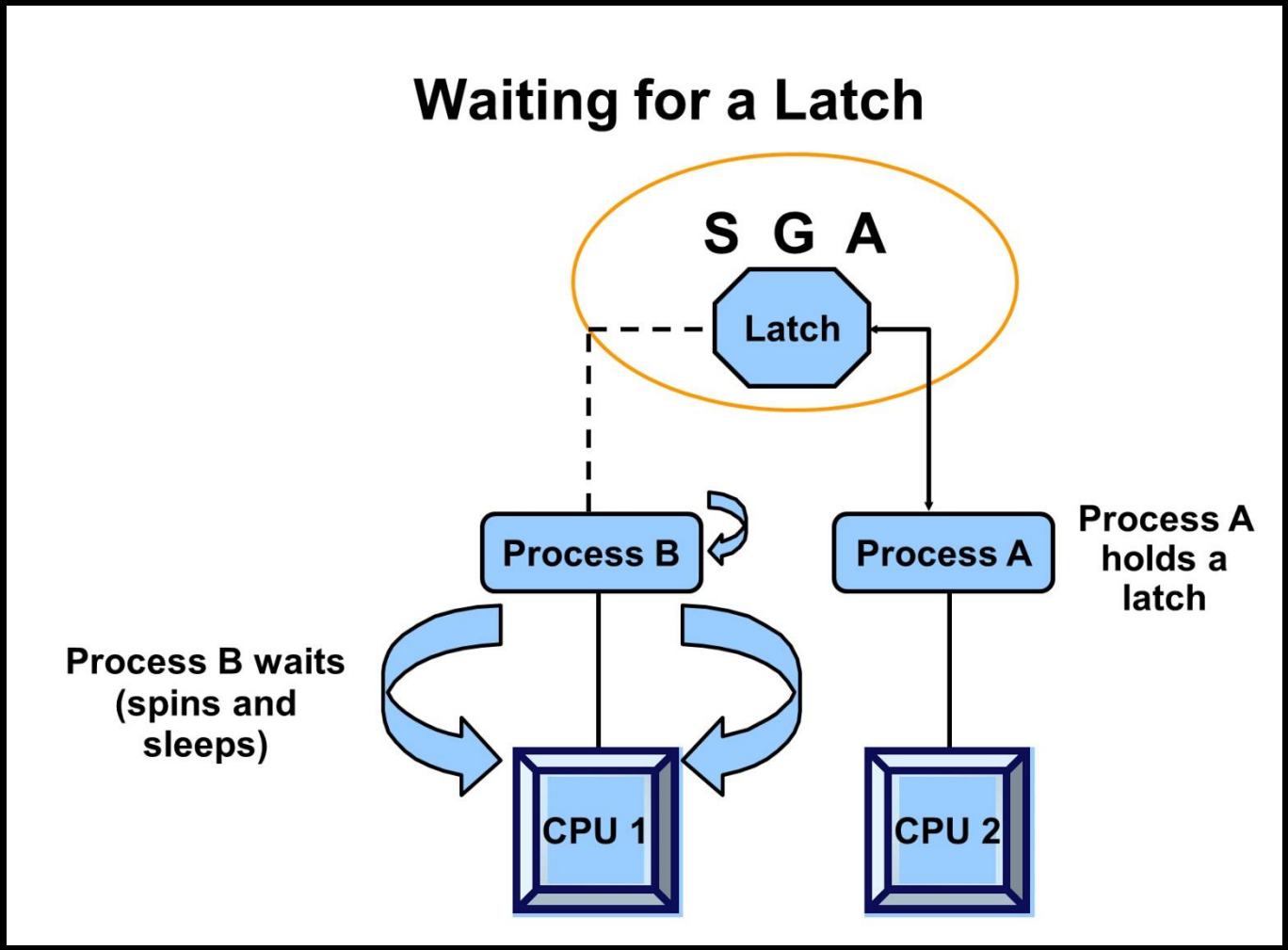


Table
File 3
Block 10
Block 11
Block 12
Index
key
start ROWID
end ROWID
bitmap
<Blue, 10.0.3, 12.8.3, 1000100100010010100>
<Green, 10.0.3, 12.8.3, 0001010000100100000>
<Red, 10.0.3, 12.8.3, 0100000011000001001>
<Yellow, 10.0.3, 12.8.3, 0010001000001000010>

SQL Optimization

- CBO = Cost-Based Optimization
- RBO = Rule-Based Optimization
- Hints
- Explain plan

Lock & Latch


Waiting for a Latch
S G A
Latch
Process B
Process A
Process A holds a latch
Process B waits (spins and sleeps)
CPU 1
CPU 2

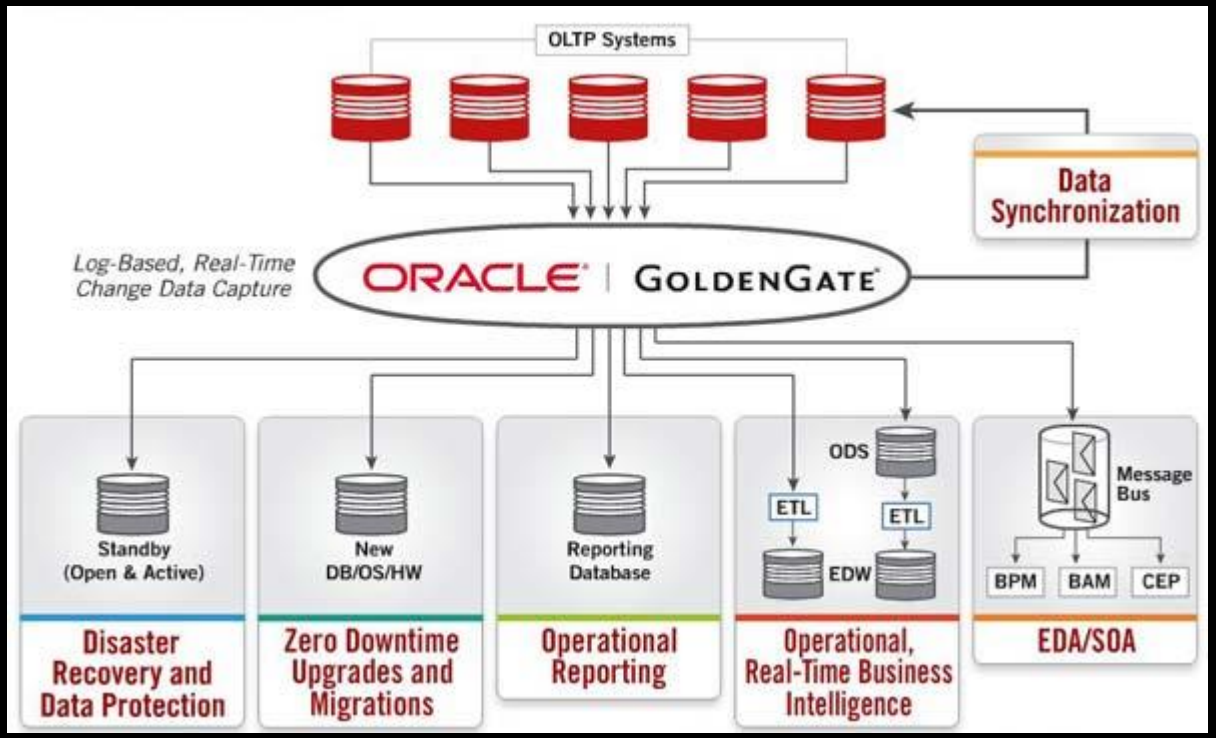
HA

- HA = High Availability

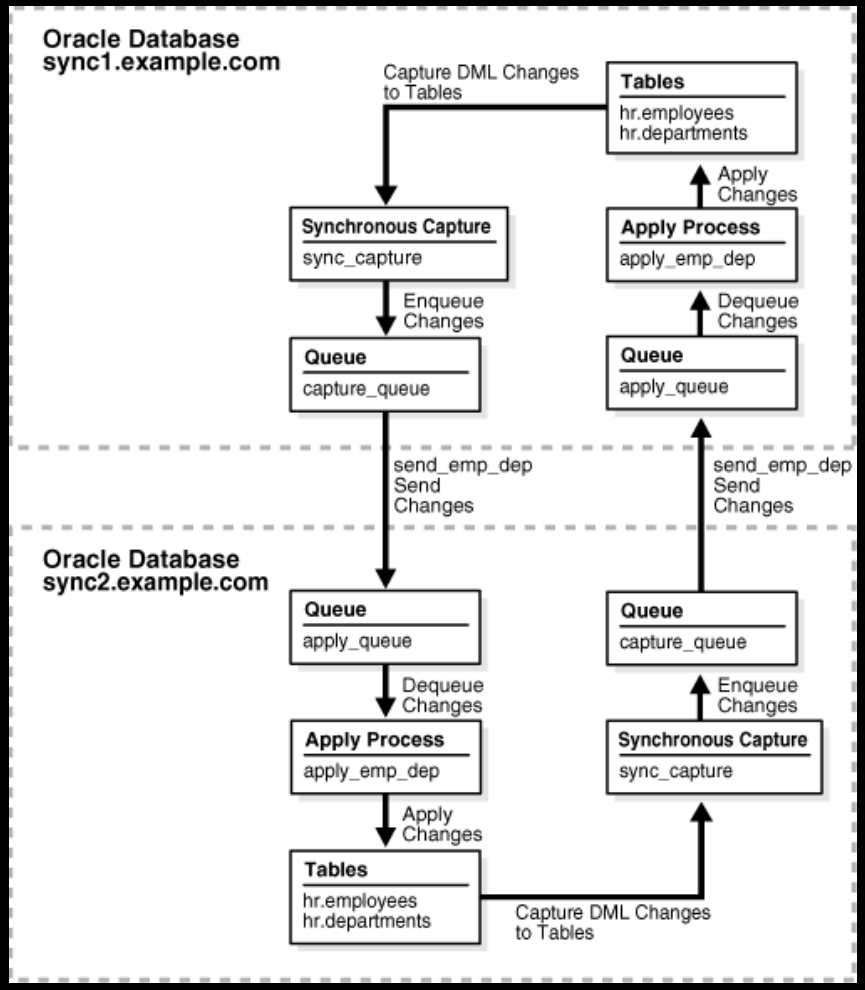
- RAC = Real Application Clusters
- Data Guard
- MAA = Maximum Availability Architecture

GoldenGate

- Real-Time Data Integration and Heterogeneous Database Replication

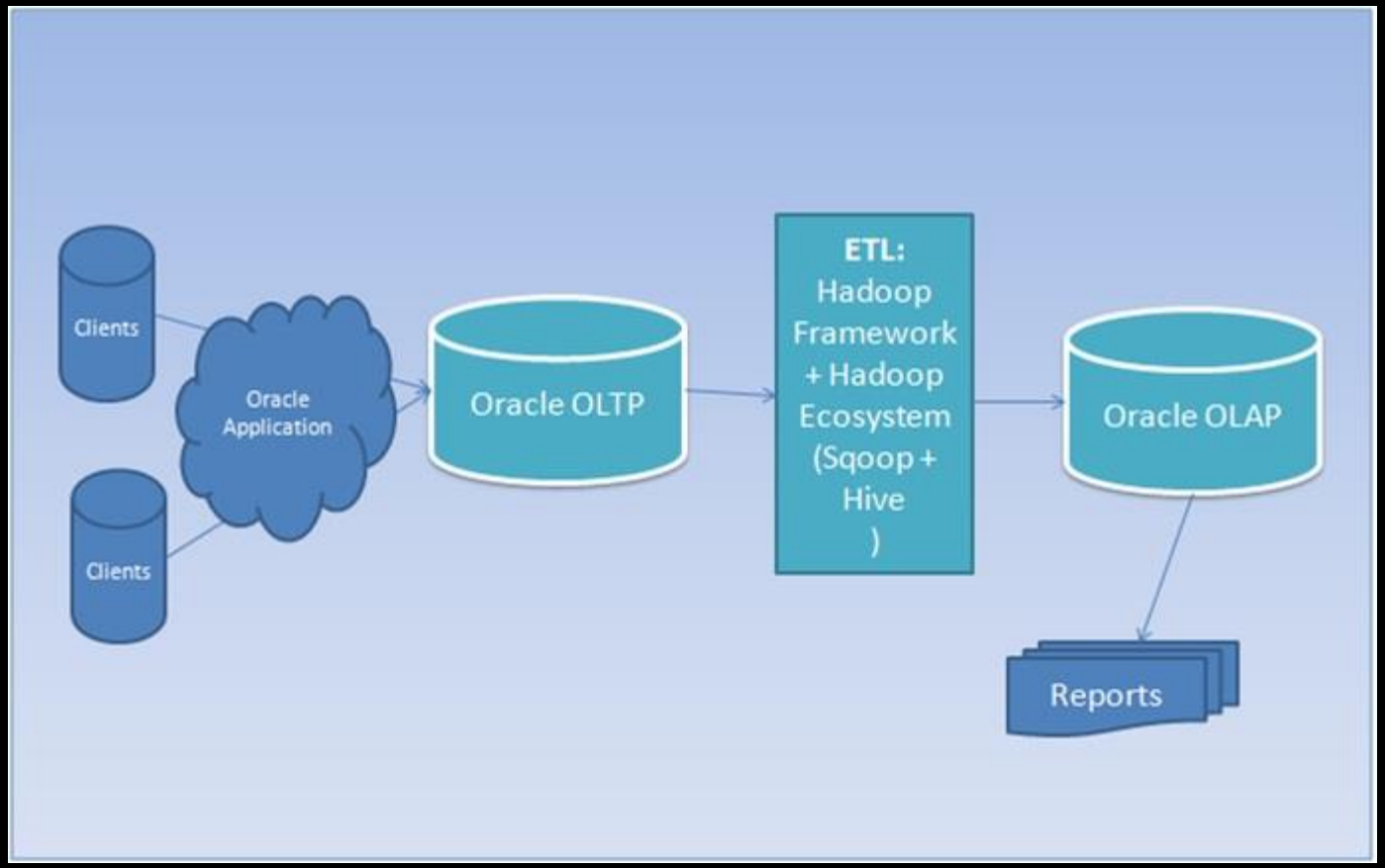


Streams


Oracle Database
sync1.example.com
Capture DML Changes to Tables
Tables
hr.employees
hr.departments
Apply Changes
Synchronous Capture
sync_capture
Apply Process
apply_emp_dep
Enqueue Changes
Dequeue Changes
Queue
capture_queue
Queue
apply_queue
send_emp_dep Send Changes
send_emp_dep Send Changes
Oracle Database
sync2.example.com
Queue
apply_queue
Queue
capture_queue
Dequeue Changes
Enqueue Changes
Apply Process
apply_emp_dep
Synchronous Capture
sync_capture
Apply Changes
Tables
hr.employees
hr.departments
Capture DML Changes to Tables

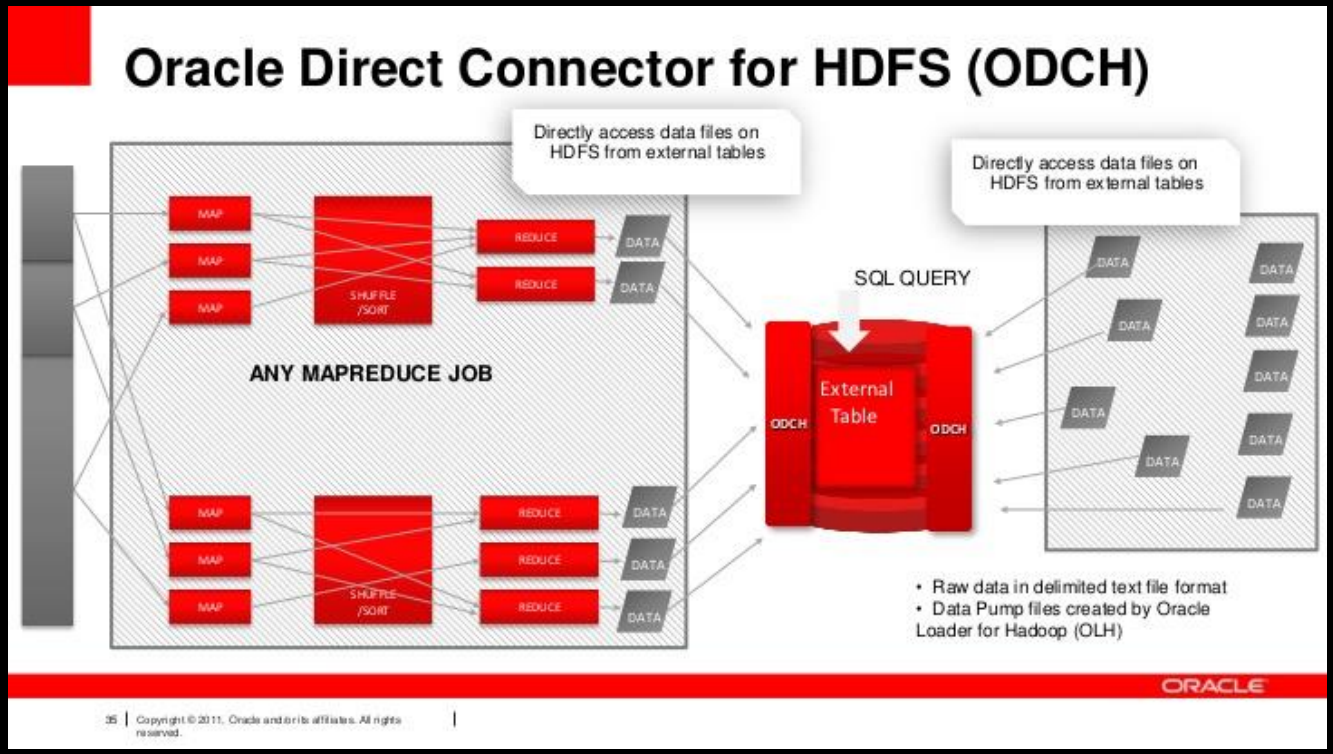
Exadata

BigData


Clients
Clients
Oracle Application
Oracle OLTP
ETL:
Hadoop Framework + Hadoop Ecosystem (Sqoop + Hive)
Oracle OLAP
Reports

Hadoop

- ODCH
- OLH




QUESTIONS
&
ANSWERS

The End