Exploring MySQL Best Practices for ORACLE DBA`s

baruch osoveskiy

baruch@brillix.co.il

About Me

Baruch osoveskiy

- Senior Consultant @ brillix.co.il
- Linux-Unix SYSADMIN form 1997
- DBA on Oracle and MySQL Since 2000
- Working with unstructured Data (“big data”) since 2000 like text and spatial images etc..
- Now Mostly Working with Elasticsearch , PostgreSQL , MySQL , Mongo dB

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- **In the end will be Q&A slide –**

  you can ask question I will try to answer

- The Demo will be in github :

https://github.com/barucho/

- My blog

https://github.com/barucho

- You can send me question :

baruch@brillix.com

You can find more presentations on

http://www.slideshare.net/baruchosoveskiy

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The History Of The Dolphin

The History Of The Dolphin

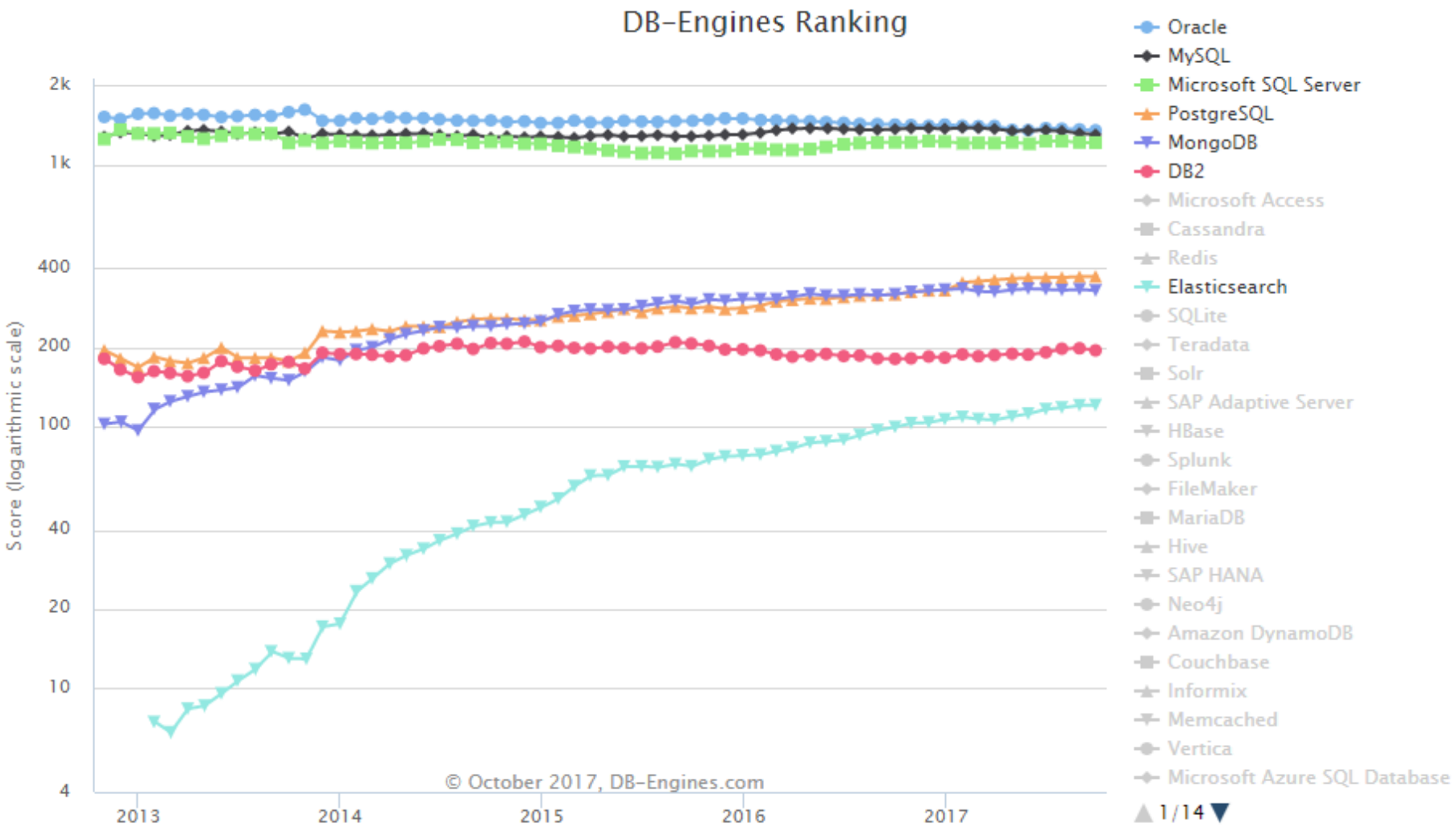
- 1979 Founded and developed by David Axmark, Allan Larsson, and Michael “Monty” Widenius
- Named after Monty's daughter, My
- Sun acquired **MySQL** AB in Jan 2008 for $1 billion dollars
- **Oracle** acquired Sun in 2010 for $5.6 billion dollars
- 4 December 2012 David Axmark, Allan Larsson, and Michael “Monty” Widenius announced **MariaDB**

The History Of The Dolphin

- 5.0 stored procedure, view, triggers, query optimizer
- 5.1 NDB, record replication InnoDB plugin default install
- 5.5 Oracle First Version Multi process support,

~300% performance improvement

- 5.6 - Performance_schema
- 5.7 Current GA Version – GTID replication,JSON
- 8.0 RC



https://db-engines.com/en/ranking_trend

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Who uses MySQL?

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US Navy carrier flight operations

MySQL Enterprise

Community:

- Freely downloadable version open source database. It is available under the GPL license and is supported by a huge and active community of open source developers.

Enterprise:

Paid subscription includes support and the following:

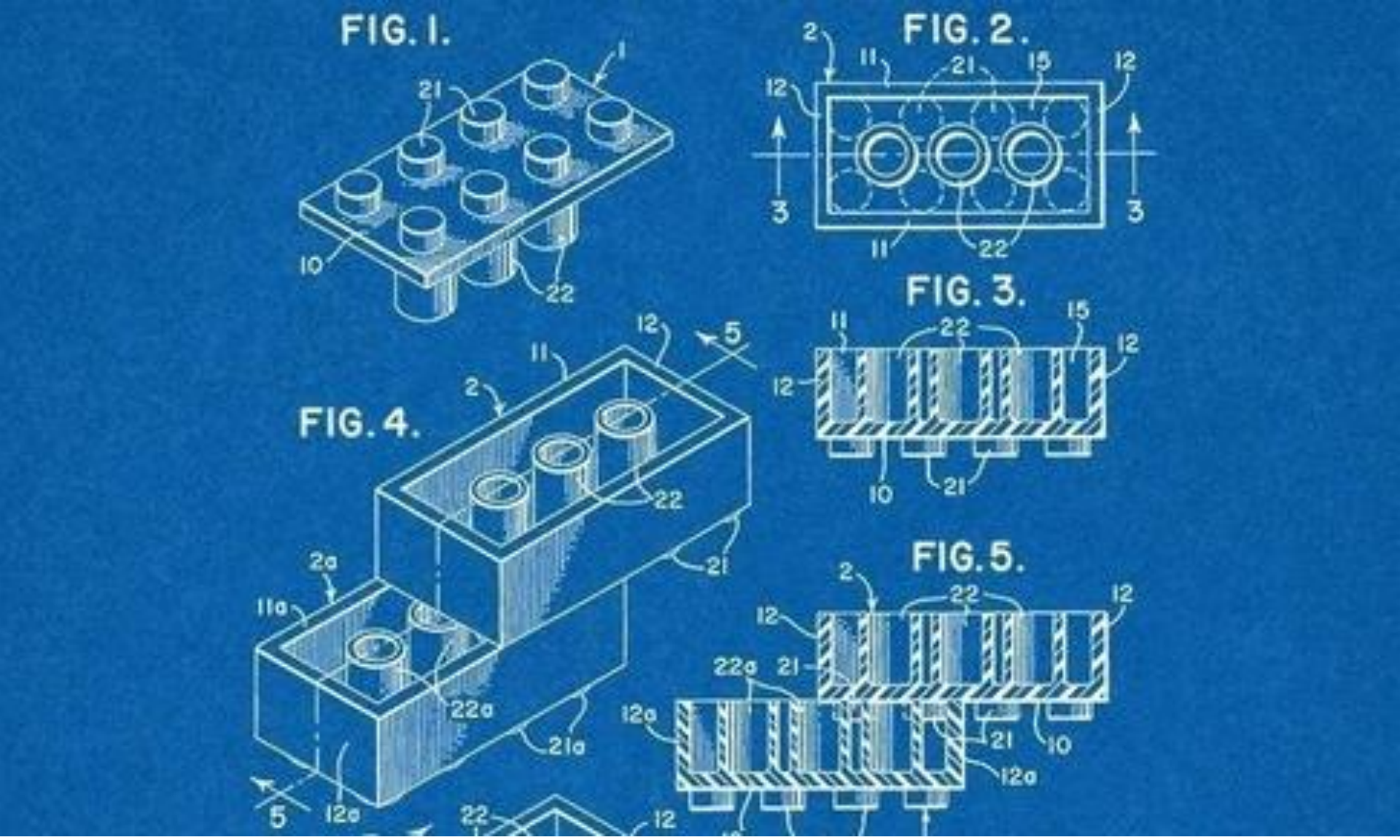
- MySQL Enterprise Backup (LIVE BACKUP tool)
- MySQL Enterprise Monitor ("GRID CONTROL" like tool)
- MySQL Query Analyzer
- MySQL Workbench (Free)
- Security – TDE ,Audit ,LDAP auth etc…

Is MySQL free?

- The community edition of MySQL can be downloaded (http://dev.mysql.com/downloads) and used for free, even for public-facing live systems.
- If you want support and extra tools MySQL Enterprise Backup hot backup tool and Security Features then you can purchase this

  Details are at http://www.mysql.com/products.
- Additionally if you embed MySQL in a product which you distribute you will need to purchase licenses.

  Details are at http://www.mysql.com/oem.

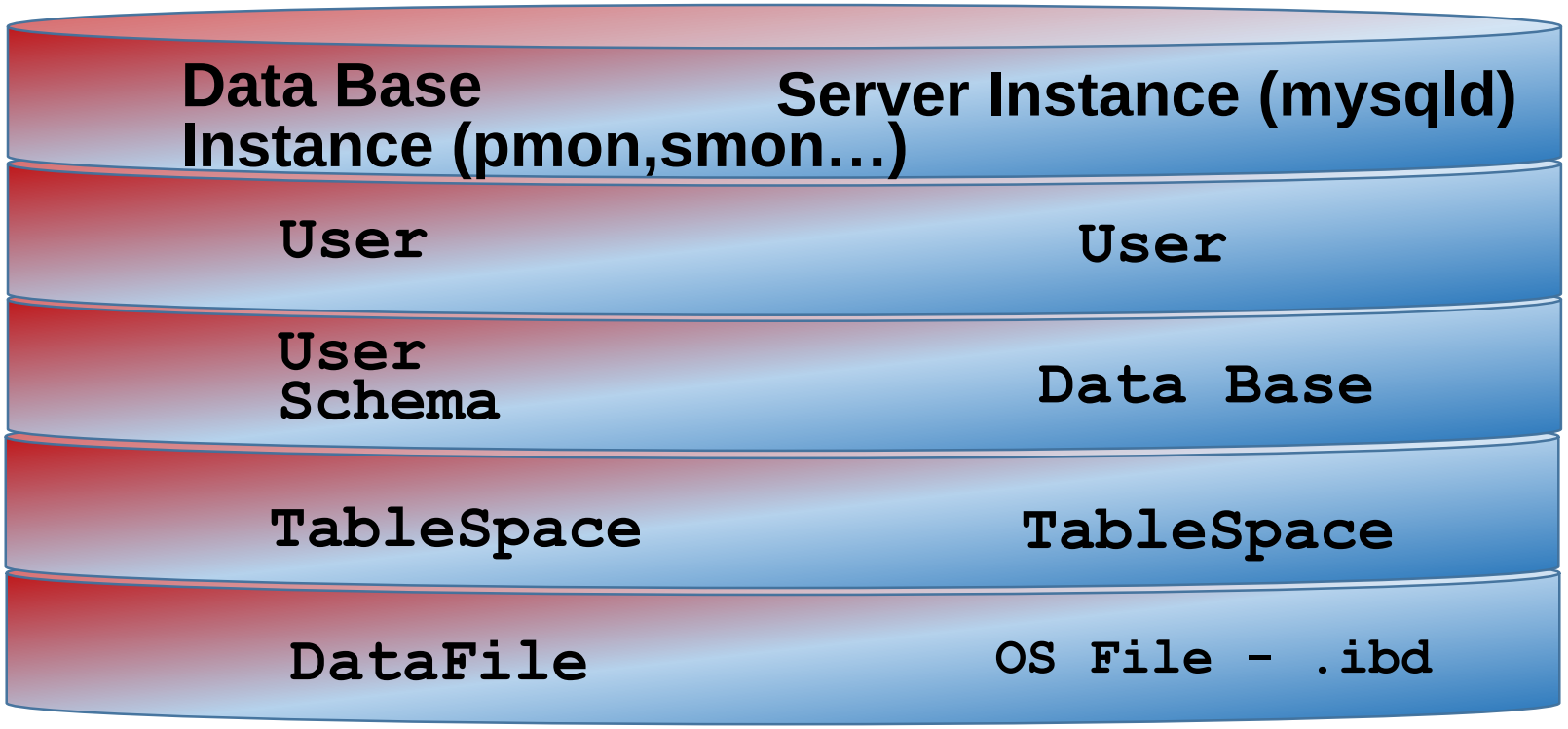


ARCHITECTURE

MySQL Architecture vs ORACLE Architecture

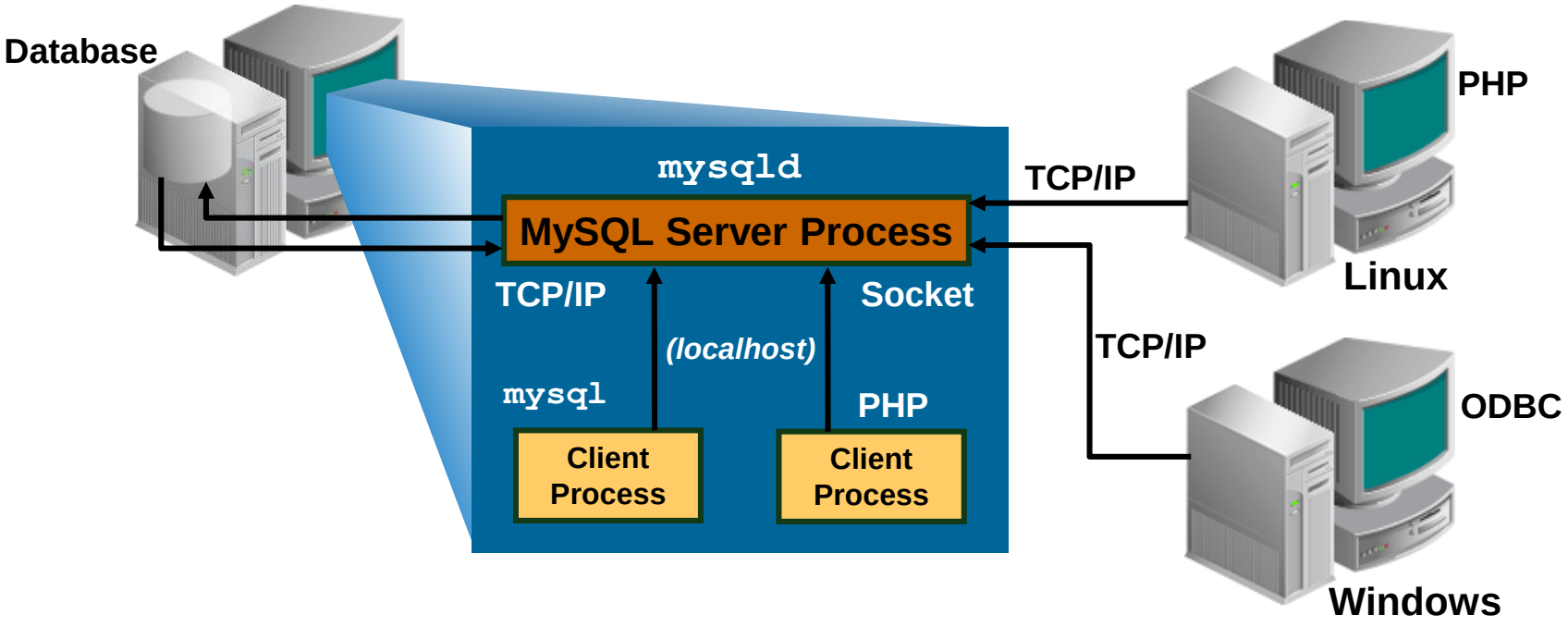
ORACLE®

MySQL®



MySQL Architecture

MySQL client/server model



Client Programs

- Connect to the MySQL server to retrieve, modify, add, or remove data.
- Use these client programs to perform the following actions:

  `mysql`: Issue queries and view results.
  `mysqladmin`: Administer the server.
  `mysqlcheck`: Check the integrity of database tables.
  `mysqldump`: Create logical backups.
  `mysqlimport`: Import text data files.
  `mysqlshow`: Show database, table, and column information.
  `mysqlslap`: Emulate client load.

- Use MySQL Workbench for database management.

STORAGE ENGINES

Storage Engines

- handles, and retrieves information from a table
- Each Storage Engine have its **Advantage** and **disadvantage**
- There is **no perfect Storage Engine**
- The recommended/default Storage Engine is **InnoDB**
- Storage engine setup is per table

Storage Engines

```
61
62
63  CREATE TABLE test.t1 (
64   `id` mediumint(9) NOT NULL AUTO_INCREMENT,
65   `name` varchar(255) NOT NULL,
66   PRIMARY KEY (`id`)
67  ) ENGINE=InnoDB ;
68
69
```

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* mariadb do not have INNODB

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Storage Engines

Advantage and **disadvantage**

Attribute	**MyISAM**	**HEAP (Memory)**	**InnoDB/*XtraDB**	**ARCHIVE (*Compressed st torage)**
Transaction	NO	NO	YES	No
Lock Granularity	Table	Table	Row	row
Storage	File pre table	In memory	TableSpace / file per table	Files
Isolation level	None	None	All	None
Referential Integrity (FK)	NO	NO	Yes	No
Cached Data	NO	YES	YES	No

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Installation

- Can be installed by OS via RPM,YUM,DEB,etc
- OS packages place files in many areas and varies paths

  /usr/lib, /var/lib, /var/log, /etc
- Recommended using the .tar
- Data location is **datadir** in my.cnf or default **/var/lib/mysql/**

MySQL Ports & Sockets

- Configured to listen on TCP/IP Port (default 3306)
- Additional Instances
  - Different Ports
  - Different IP's using default Port
- Local connection uses Socket
  - Even specifying Port, local client may use socket

MySQL Logs

- Error Log - error parmater in my.cnf like alert.log
- Binary Log - like archive logs - log-bin in my.cng
- Transaction logs – InnoDB "redo" - `ib_logfilen`
- Slow Query Log - log-slow-queries,slow-query-time,log-queries-not-using-indexes in my.cnf
- General Log - Trace all – not recommended

MySQL Client CLI

- Connecting using root user :

```
# mysql –u root –p
```

- Show list of databases in this instance:

```
> show databases;
```

- List all tables in database

```
> use test;
> show tables;
```

MySQL Client CLI

- Show indexes on table

```
>show index from table_name;
```

- Show DDL for table

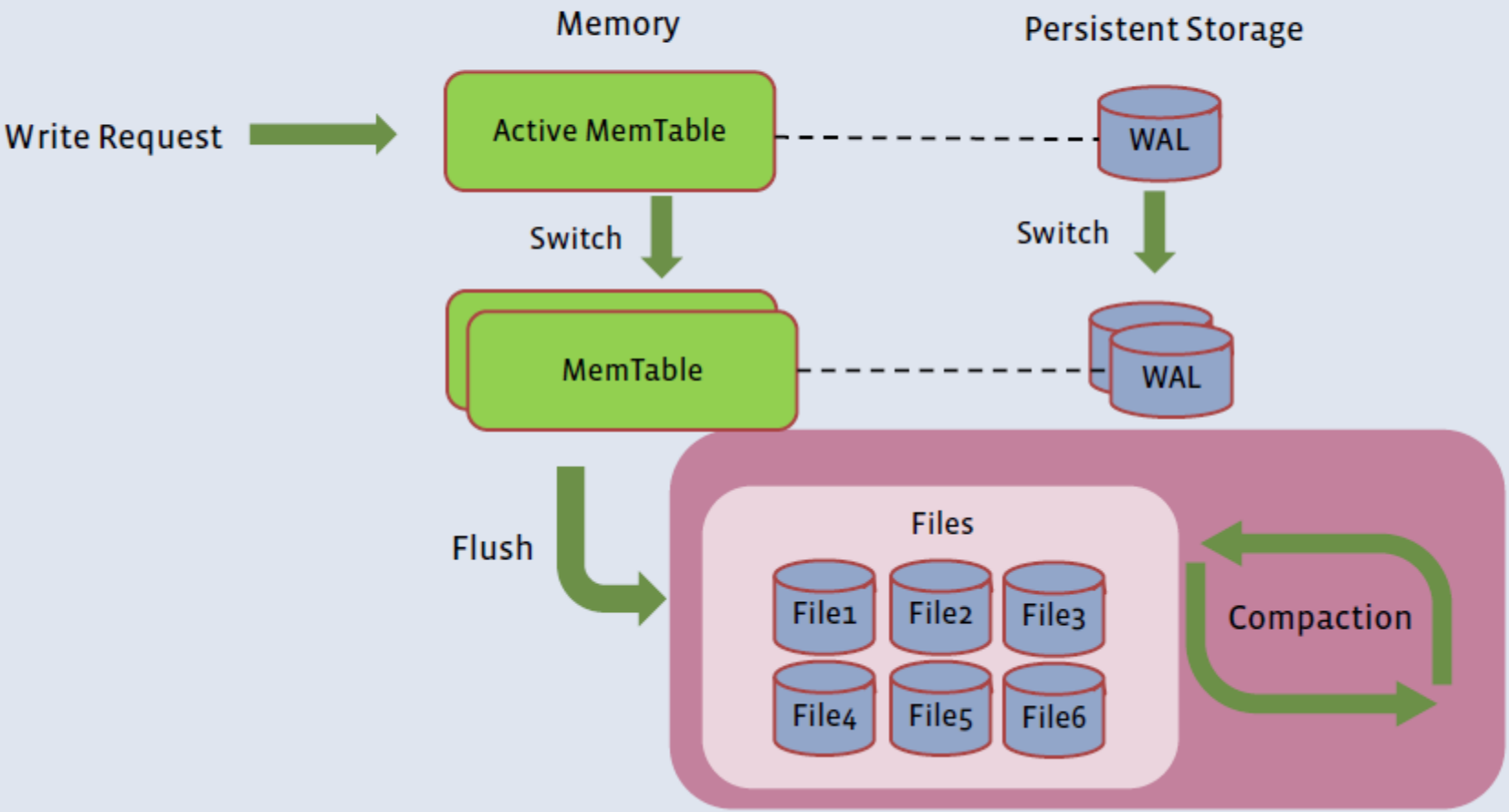
```
> show create table table_name;
```

MyRocks

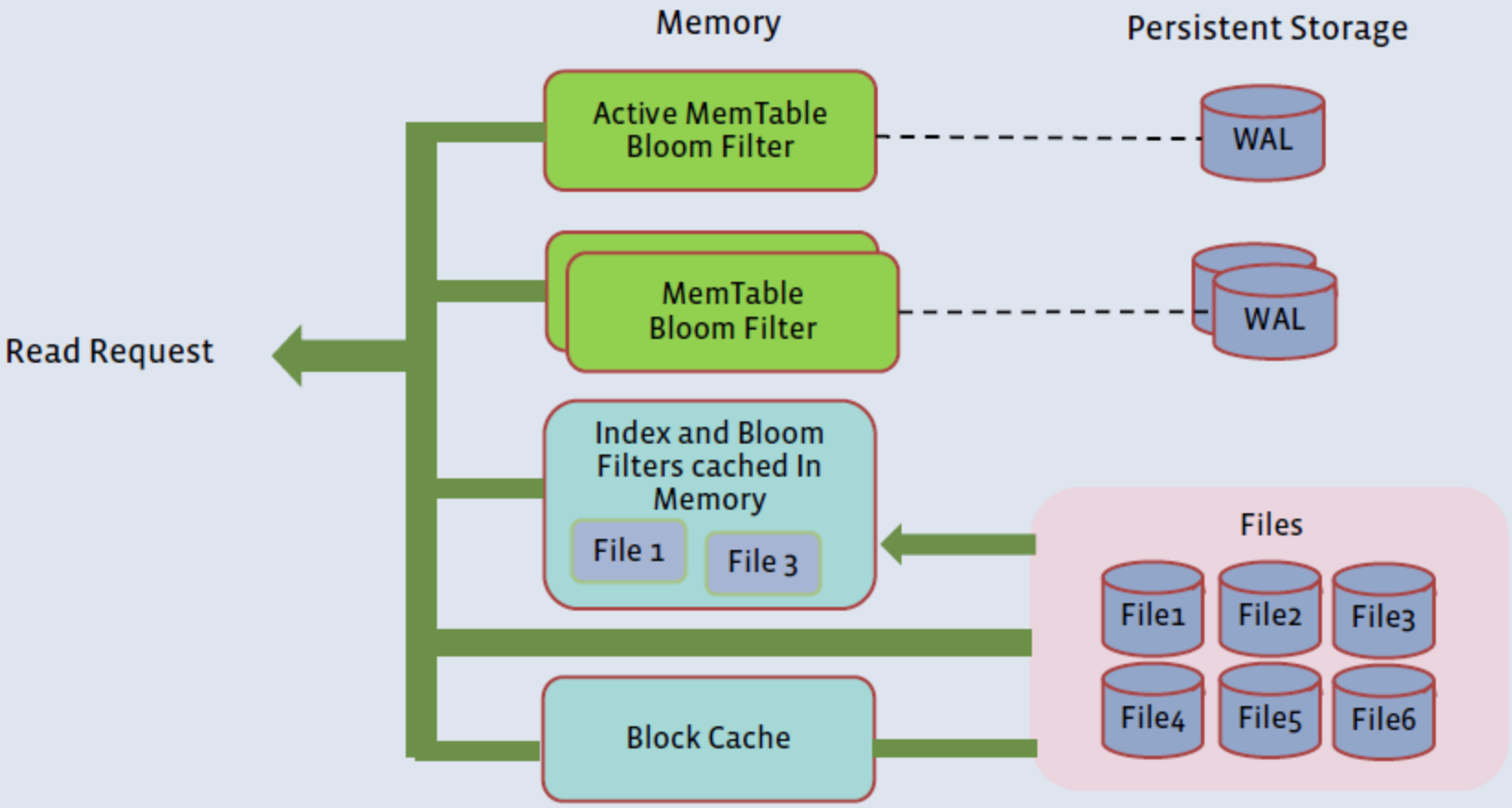
MyRocks (RocksDBstorage engine for MySQL)

- Taking both LSM advantages and MySQL features
- LSM advantage: Smaller space and lower write amplification
- MySQL features: SQL, Replication, Connectors and many tools
- Fully Open Source
- Working with MariaDB Company
- Currently RC stage (Prod in percona server)
- https://github.com/facebook/mysql-5.6/
- https://barucho.github.io/blog/2017/10/09/HowTo-Install-MyRocks

Write Path (4)


Memory
Persistent Storage
Write Request
Active MemTable
WAL
Switch
Switch
MemTable
WAL
Flush
Files
File1
File2
File3
File4
File5
File6
Compaction

Read Path


Memory
Persistent Storage
Active MemTable
Bloom Filter
WAL
MemTable
Bloom Filter
WAL
Read Request
Index and Bloom
Filters cached In
Memory
File 1
File 3
Files
File1
File2
File3
File4
File5
File6
Block Cache

Option Files
Where is the spfile ?

Option Files my.cnf

Table 4.2 Option Files Read on Unix and Unix-Like Systems

File Name	Purpose
`/etc/my.cnf`	Global options
`/etc/mysql/my.cnf`	Global options
`SYSCONFDIR``/my.cnf`	Global options
`$MYSQL_HOME/my.cnf`	Server-specific options (server only)
`defaults-extra-file`	The file specified with `--defaults-extra-file`, if any
`~/.my.cnf`	User-specific options
`~/.mylogin.cnf`	User-specific login path options (clients only)

Table 4.1 Option Files Read on Windows Systems

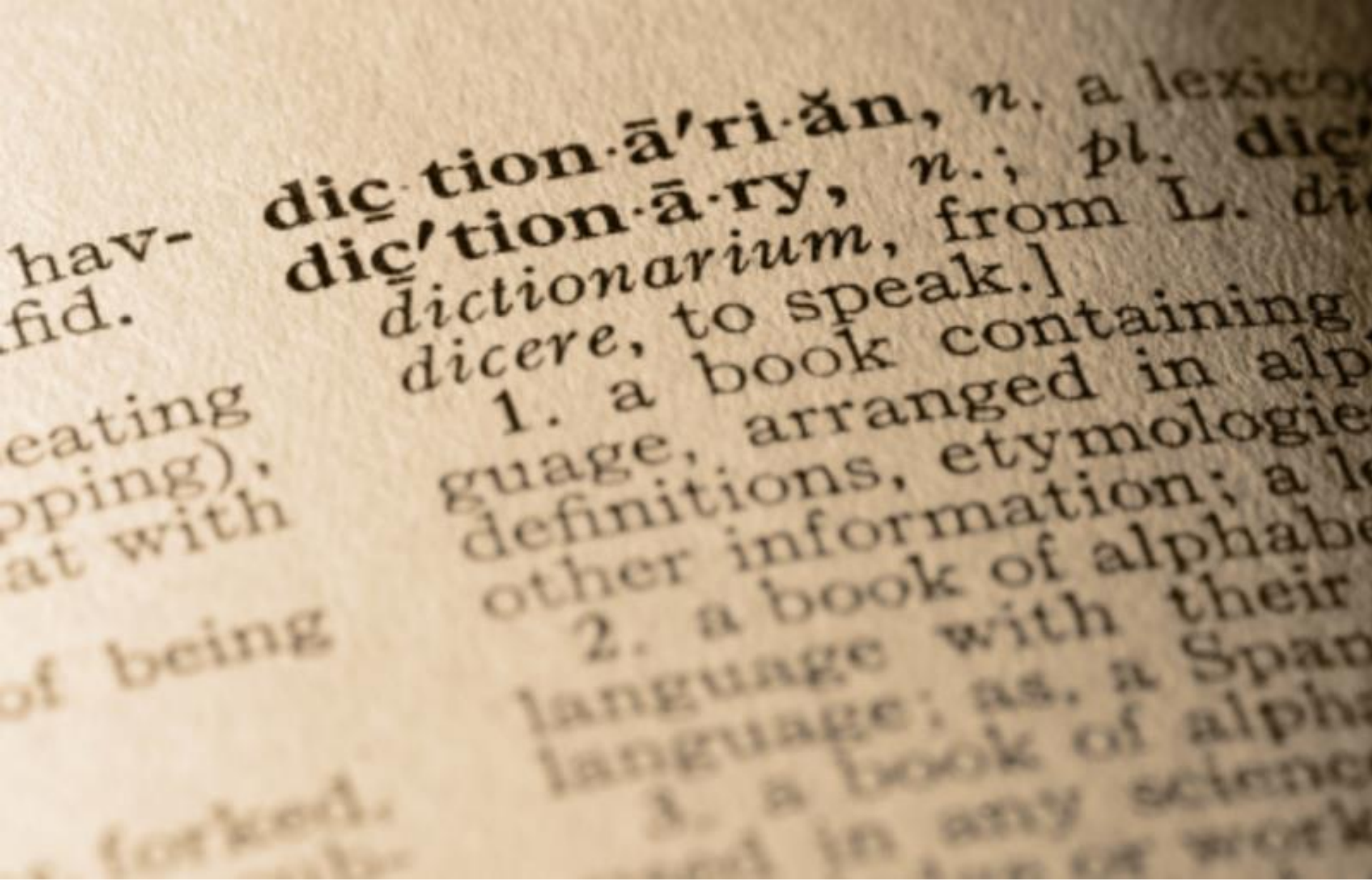
File Name	Purpose
`%PROGRAMDATA%\MySQL\MySQL Server 5.7\my.ini`, `%PROGRAMDATA%\MySQL\MySQL Server 5.7\my.cnf`	Global options
`%WINDIR%\my.ini`, `%WINDIR%\my.cnf`	Global options
`C:\my.ini`, `C:\my.cnf`	Global options
`BASEDIR``\my.ini`, *`BASEDIR`*`\my.cnf`	Global options
`defaults-extra-file`	The file specified with `--defaults-extra-file`, if any
`%APPDATA%\MySQL\.mylogin.cnf`	Login path options (clients only)

Option Files

```
[client]
port=3306
socket=/tmp/mysql.sock

[mysqld]
port=3306
socket=/tmp/mysql.sock
key_buffer_size=16M
max_allowed_packet=8M

[mysqldump]
quick
```



Data Dictionary

where are the v$ and DBA_ ?

The Data Dictionary
where is v$ and DBA_

- **INFORMATION_SCHEMA** – INFORMATION about the instance ,table, columns,views,privileges
- **PERFORMANCE_SCHEMA** – INFORMATION about instance performance ,top sql,top table IO
- **Show** command – get system variables information, oracle :show parameters

show process list	**select * from v$sessions ;**
show tables	**select table_name from user_tables;**
show variables like '%size%'	**show parameters size**

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The Data Dictionary
where is v$ and DBA_

SELECT TABLE_SCHEMA, SUM((DATA_LENGTH + INDEX_LENGTH) / (1024 * 1024)) AS SIZE_MB FROM **INFORMATION_SCHEMA.TABLES** GROUP BY TABLE_SCHEMA ORDER BY SIZE_MB DESC

SELECT ROUTINE_TYPE, ROUTINE_NAME FROM **INFORMATION_SCHEMA.ROUTINES** WHERE ROUTINE_SCHEMA='dbname';

SELECT EVENT_ID, EVENT_NAME, TIMER_WAIT
FROM **PERFORMANCE_SCHEMA.events_waits_history**
WHERE THREAD_ID = 13
ORDER BY EVENT_ID;

The Data Dictionary
where is v$ and DBA_

SELECT TABLE_SCHEMA, SUM((DATA_LENGTH + INDEX_LENGTH) / (1024 * 1024)) AS SIZE_MB FROM **INFORMATION_SCHEMA.TABLES** GROUP BY TABLE_SCHEMA ORDER BY SIZE_MB DESC

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WHERE THREAD_ID = 13
ORDER BY EVENT_ID;

User account

- MySQL user account is based on user name and hostname

For example :

select user,host from **mysql.user;**

```
+--------+-------------------+
| user   | host              |
+--------+-------------------+
| baruch | %                 |
| root   | 127.0.0.1         |
| root   | 192.168.10.40     |
| root   | ::1               |
| root   | localhost         |
+--------+-------------------+
```

- The user root@localhost is different from root@192.168.10.40
- The user “root” can not connect from 192.168.10.41
- The user baruch@% can connect from all clients

Document Store

MySQL 5.7.12+ document store

MySQL 5.7.12 MySQL contains document store:

- Document store and “MongoDB” like NoSQL interface to JSON storage
- Protocol X / X Plugin, which can be used for asynchronous queries
- New MySQL shell

MySQL 5.7.12+ document store

```
kojima@localhost ~$ mysqlsh -uroot test
Creating a X Session to root@localhost:33060/test
Enter password:
Default schema `test` accessible through db.

Welcome to MySQL Shell 1.0.3 Development Preview

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affiliates. Other names may be trademarks of their respective
owners.

Type '\help', '\h' or '\?' for help.

Currently in JavaScript mode. Use \sql to switch to SQL mode and execute queries.
mysql-js> coll = db.createCollection('shopping_list');
<Collection:shopping_list>
mysql-js> coll.add({"item":"flour", "amount":1});
Query OK, 1 item affected (0.03 sec)
mysql-js> coll.add({"item":"eggs", "amount":12});
Query OK, 1 item affected (0.02 sec)
mysql-js> coll.find('item = "eggs"');
[
{
"_id": "ae89bf0f7efce511ce30bb26883a8901",
"amount": 12,
"item": "eggs"
}
]
1 document in set (0.01 sec)
```

http://mysqlserverteam.com/mysql-5-7-12-part-4-a-new-mysql-command-line-shell/

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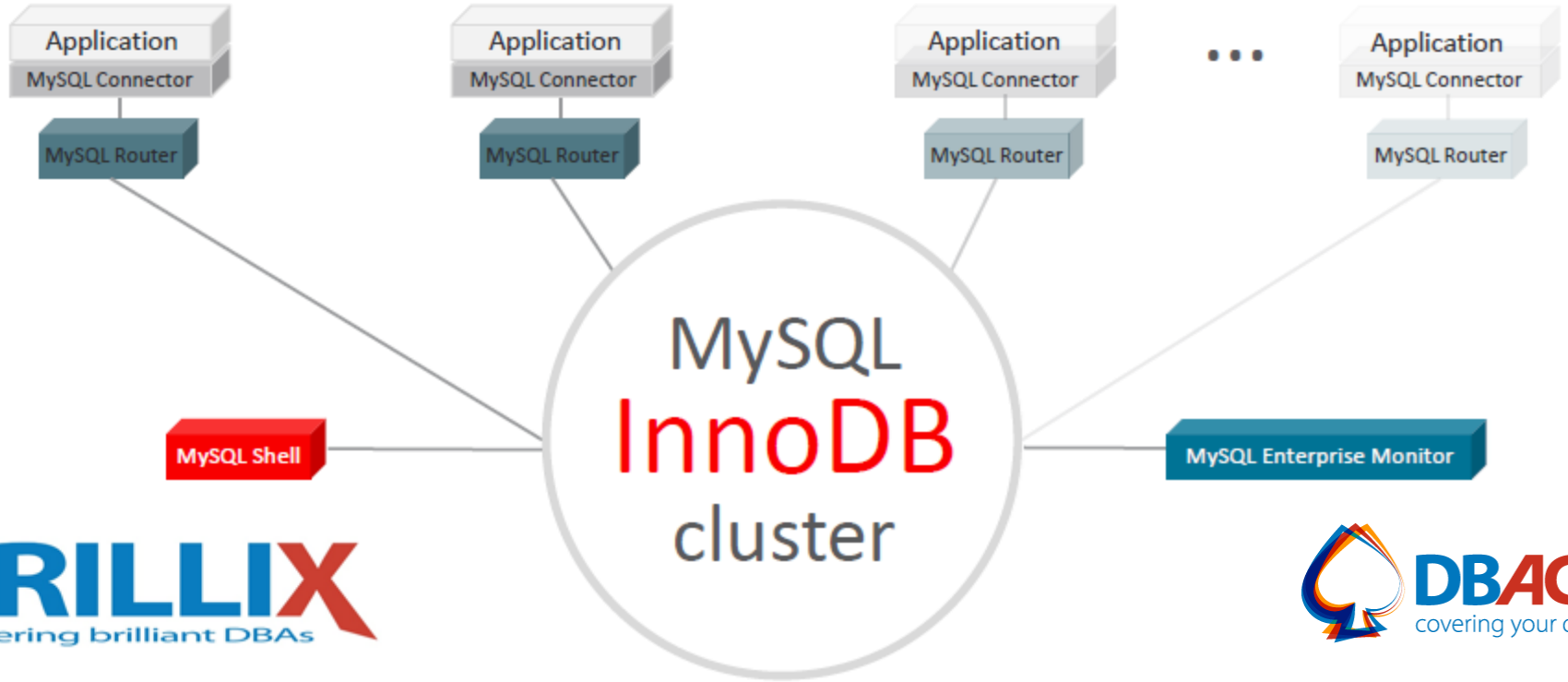
MySQL INNODB Cluster

Redundancy, High Availability, Scaling

MySQL InnoDB Cluster: Vision *"A single product — MySQL — with high availability and scaling features baked in; providing an integrated end-to-end solution that is easy to use."*



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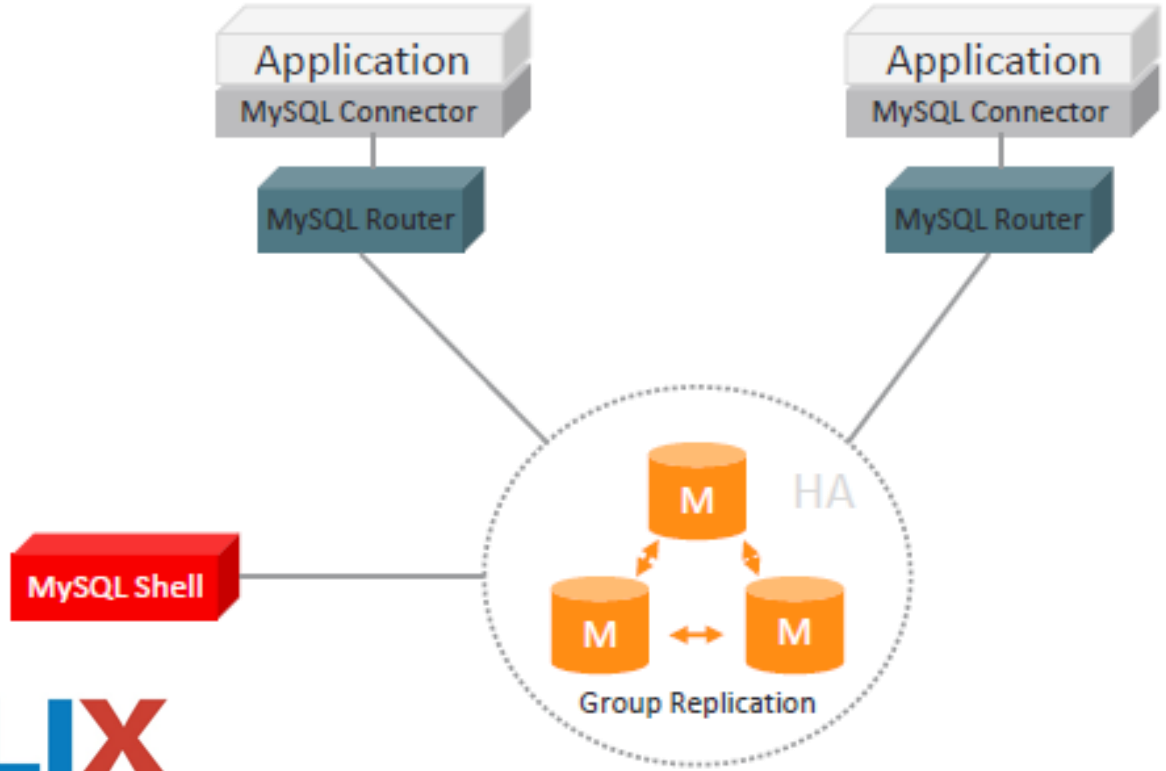
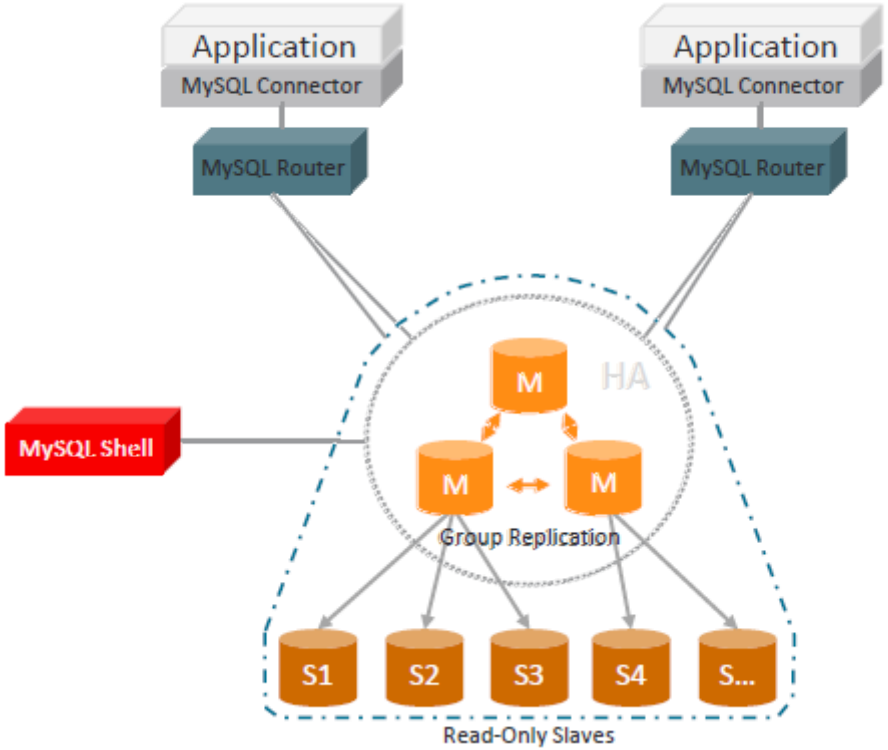
MySQL INNODB Cluster

A minimum of three instances are required to create an InnoDB cluster that is tolerant to the failure of one instance.



MySQL INNODB Cluster



Lets play

Thank You

baruch@brillix.co.il