MySQL: Combining SQL and NoSQL

Tomas Ulin, VP MySQL Engineering

ORACLE

MySQL

Safe Harbor Statement

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MySQL 5.7 is GA!

Performance & Scalability

- 3 X Faster than MySQL 5.6
- Enhanced InnoDB: faster online & bulk load operations
- Replication Improvements (incl. multi-source, multi-threaded slaves...)
- New Optimizer Cost Model: greater user control & better query performance

Manageability

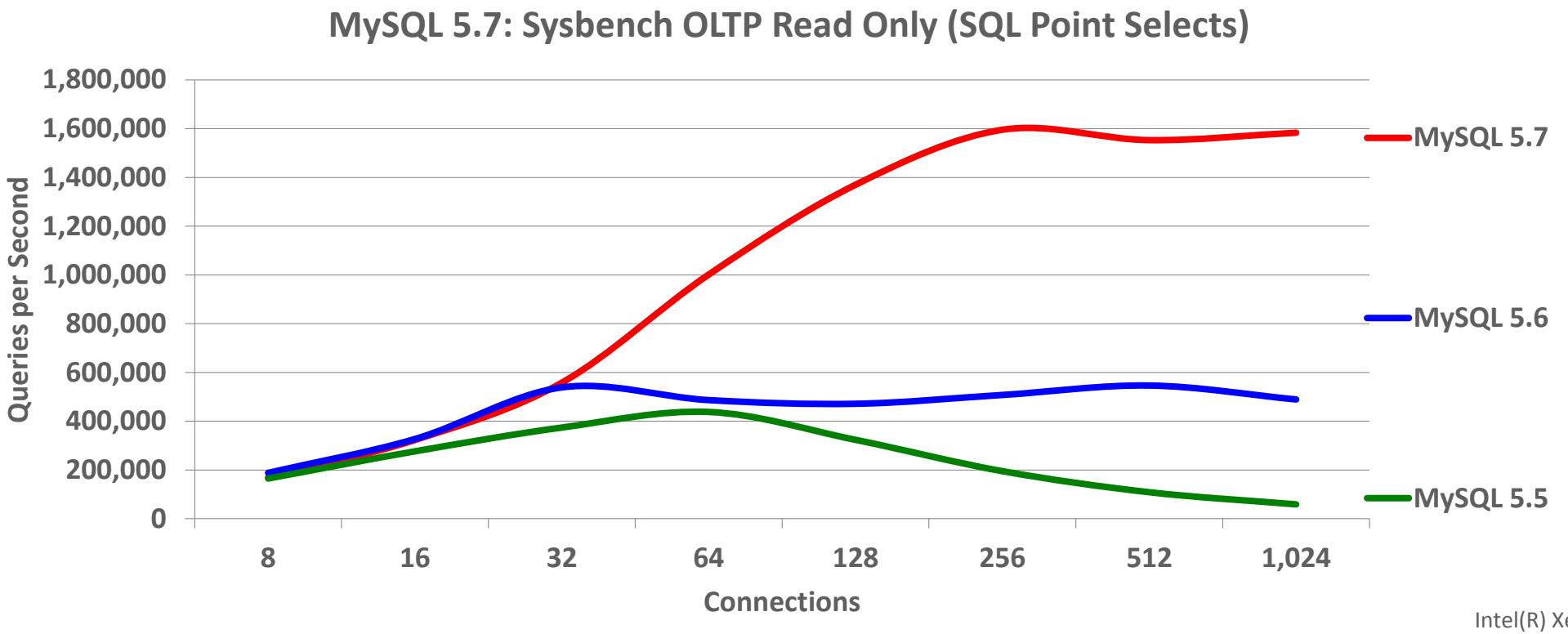
- Native JSON Support
- Improved Security: safer initialization, setup & management
- Performance Schema Improvements
- MySQL SYS Schema

And many more new features and enhancements. Learn more at: dev.mysql.com

MySQL 5.7 Sysbench Benchmark: SQL Point Selects

3x Faster than MySQL 5.6

1,600,000 QPS

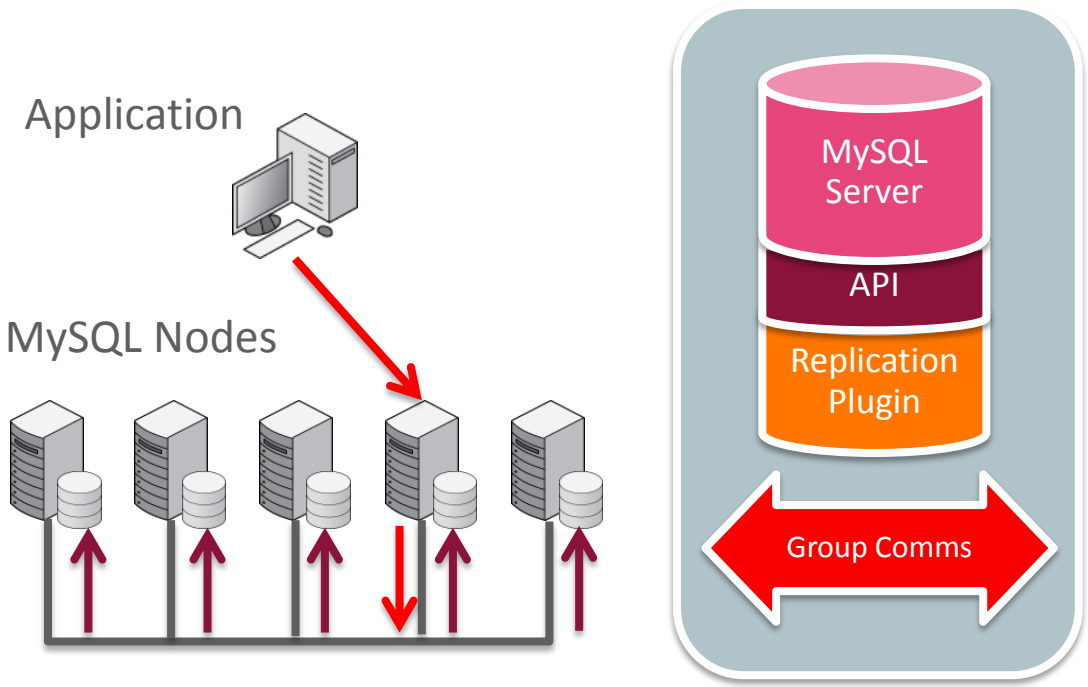


Intel(R) Xeon(R) CPU E7-8890 v3
4 sockets x 18 cores-HT (144 CPU threads)
2.5 Ghz, 512GB RAM
Linux kernel 3.16

MySQL 5.7: JSON

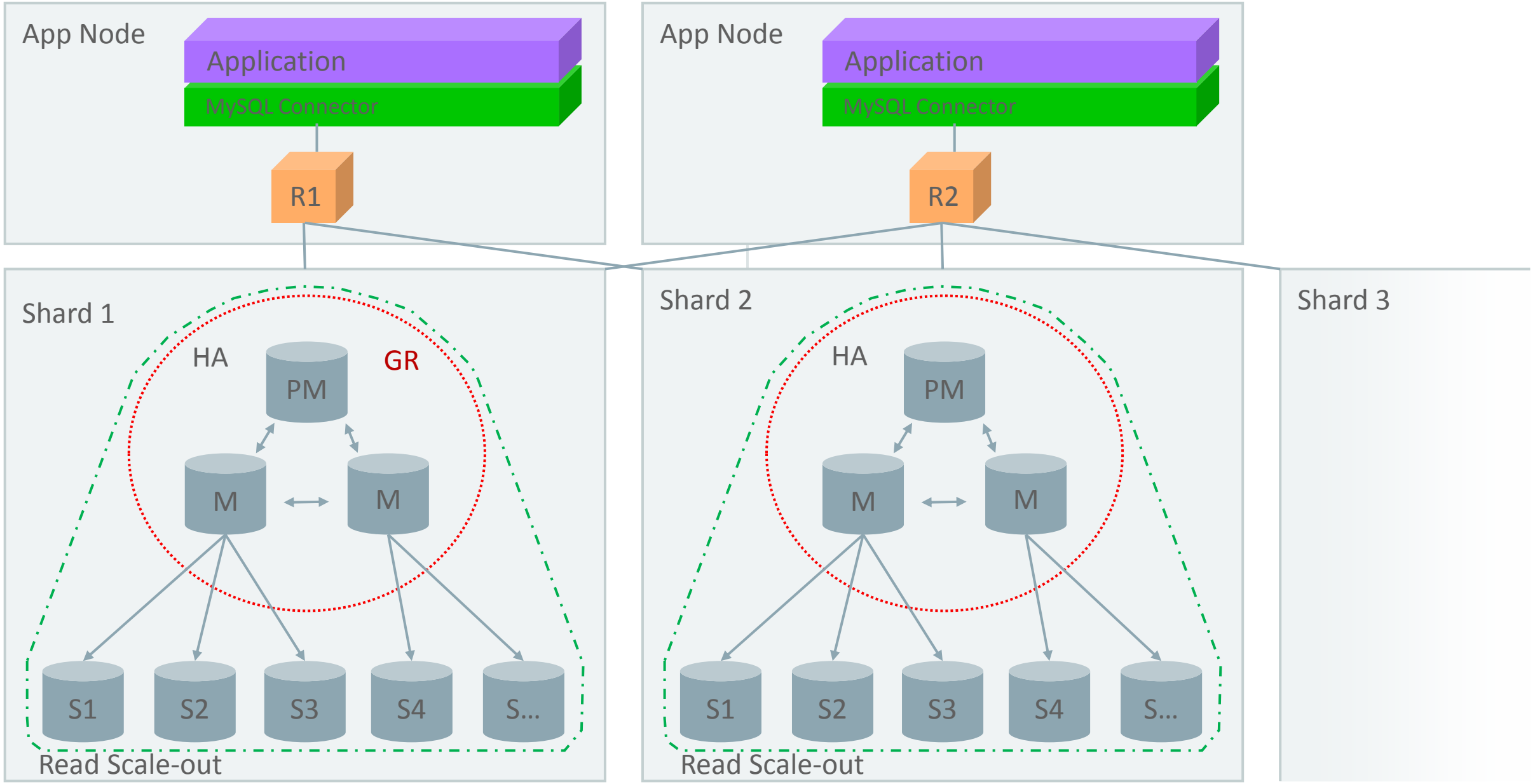
- Native JSON data type
  - Native internal binary format for efficient processing & storage
- Built-in JSON functions
  - Allowing you to efficiently store, search, update, and manipulate Documents
- JSON Comparator
  - Allows for easy integration of Document data within your SQL queries
- Indexing of Documents using Generated Columns
  - InnoDB supports indexes on both stored and virtual Generated Columns
  - New expression analyzer automatically uses the best “functional” index available
- New inline syntax for easy SQL integration

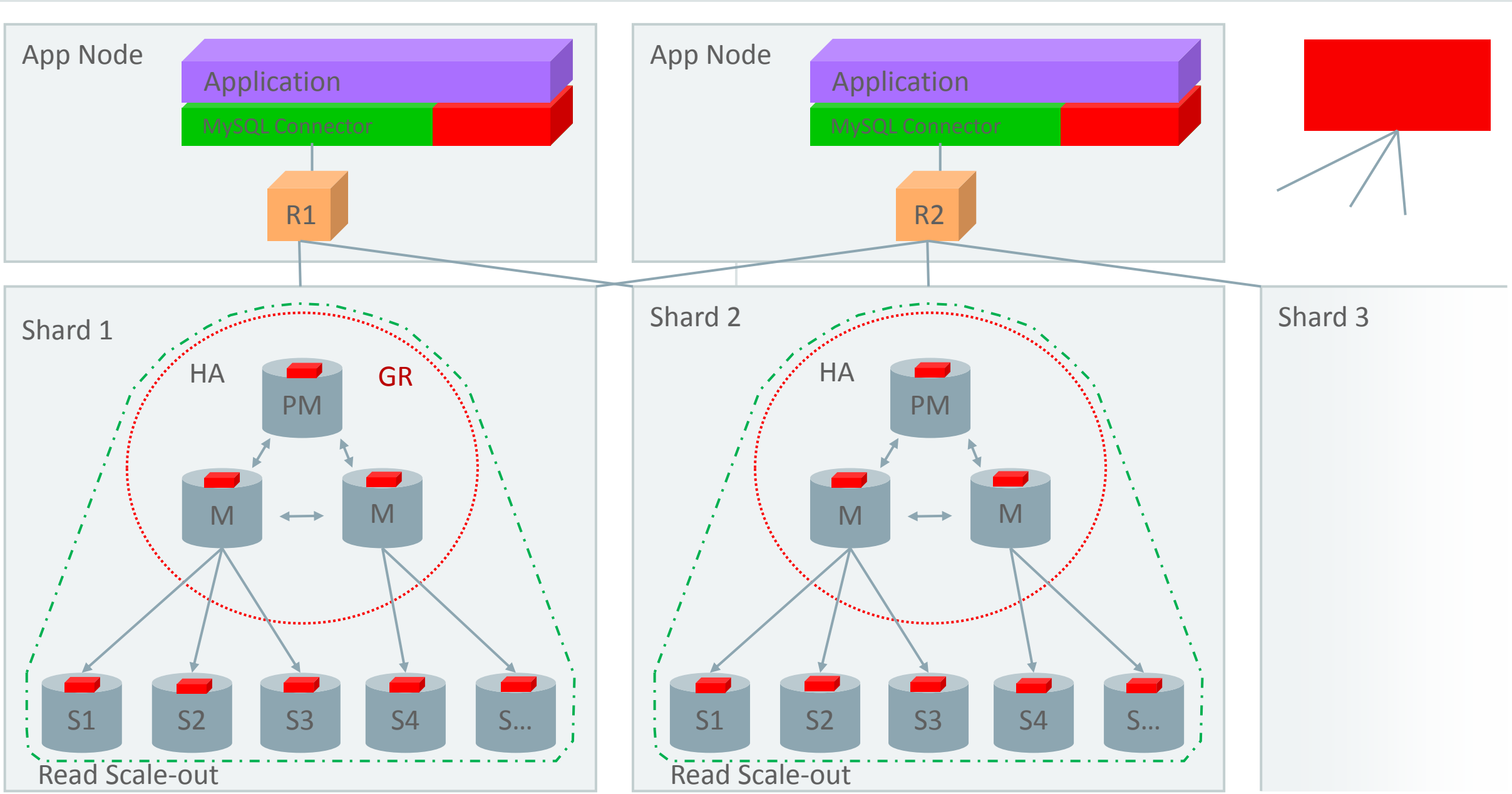
MySQL 5.7: Group Replication



- Active/Active Update Anywhere
  - Conflict detection and resolution (transaction rollback)
  - Optimistic State Machine Replication
- Automatic group membership management and failure detection
  - No need for server fail-over
  - Elastic scale out/in
  - No single point of failure
  - Automatic reconfiguration
- Well integrated
  - InnoDB
  - GTID-based replication
  - PERFORMANCE_SCHEMA

MySQL Document Store

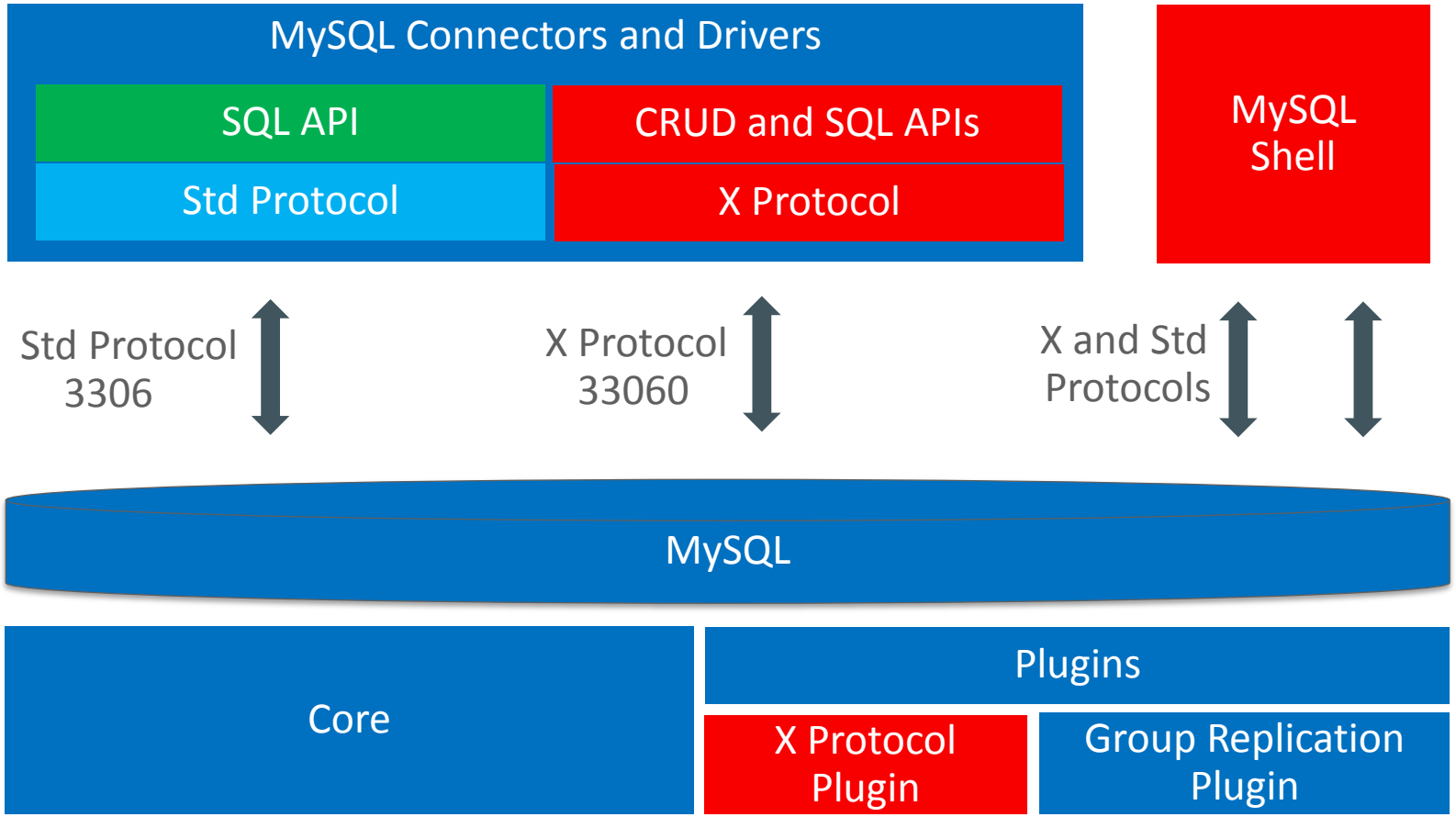




NEW! MySQL Document Store

- Native JSON Documents in MySQL 5.7
  - Schema-less Document Storage
- X Protocol
  - Implemented by X Plugin to Extend MySQL Server as a Document Store
- X Dev API
  - SQL and Document CRUD Operations
  - Implemented in Connector/Node.js, Connector/J, Connector/Net
- MySQL Shell
  - Javascript, Python, SQL modes

MySQL 5.7, Connectors, Drivers, and Protocols



New! X Protocol

- Asynchronous API support – Supporting Parallelism and Batching
  - Pipelining - Send multiple requests, Reduce Round Trips
  - Push Notifications - Beyond the Request/Response model
- Middleware Friendly
  - Routing, Sharding, Read Write Splitting
- Uses open standards: TLS, SASL, Protobuf etc
  - Proven, community friendly

New! MySQL X DevAPI

- Modern: fluent API, method chaining
- Stateless sessions enable transparent scaling to multi-server environments
- SQL support
- CRUD for Collections of Documents and Tables
  - Documents as simple basic domain objects
  - Search expressions match SQL SELECT expressions
- Implemented in MySQL Shell & MySQL Connectors
  - NEW! MySQL Connector/node.js
  - MySQL Connector/J
  - MySQL Connector/Net

New! MySQL Connectors include X Dev API

- Use SQL, CRUD APIs – Document and Relational, or “All of the Above”
  - All of this is in addition to the Classic APIs

Operation	Document	Relational
Create	Collection.add()	Table.insert()
Read	Collection.find()	Table.select()
Update	Collection.modify()	Table.update()
Delete	Collection.remove()	Table.delete()

New! MySQL Shell

- Integrated Development and Administration Shell
- Exposes New X DevAPI
- Multi-Language scripting
  - JavaScript, Python, and SQL
- Configurable results formats
  - Traditional Table, JSON, Tab Separated

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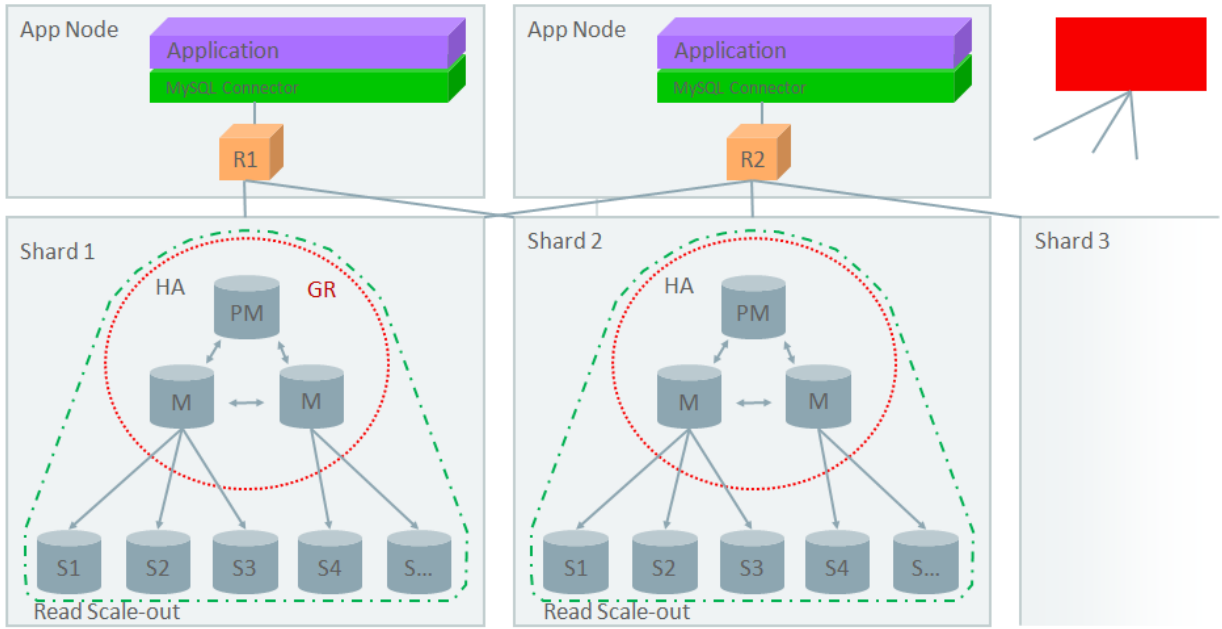
- Future – one tool to manage it all



```
tomas@localhost $ mysqlsh --uri root@localhost/test
Creating an X Session to root@localhost:33060/test
Enter password:
Default schema `test` accessible through db.
…
Currently in JavaScript mode. Use \sql to switch to SQL mode and execute queries.
mysql-js> db.createCollection("posts");
<Collection:posts>
mysql-js> db.posts.add({"title":"Hello World", "text":"First post!"})
Query OK, 1 item affected (0.03 sec)

mysql-js> db.posts.find("title = 'Hello World'").sort(["title"]);
[
    {
        "_id": "8202bda28206e611140b3229389b6526",
        "text": "First post!",
        "title": "Hello World"
    }
]
1 document in set (0.01 sec)
```

MySQL Document Store

- ✔ Built on Proven SQL/InnoDB/Replication
- ✔ Schema-less/Relational/Hybrid
- ✔ ACID/Transactions
- ✔ CRUD/JSON/Documents
- ✔ Modern Dev API
- ✔ Modern/Efficient Protocol
- ✔ SQL Queries/Analytics over JSON Documents
- ✔ Transparent and Easy HA/Scaling/Sharding

MySQL Innovation Day - Sessions

- Session 1: What's New in MySQL
- Session 2: The Exciting MySQL 5.7 Replication Enhancements
- Session 3: MySQL Enterprise Security
- Session 4: MySQL 5.7 & JSON: New Opportunities for Developers
- Session 5: Introducing the MySQL Document Store
- Session 6: MySQL Document Store: Under the Hood
- Session 7: MySQL Group Replication for High Availability
- Session 8: MySQL 5.7: Performance Improvements in Optimizer

Resources

Topic	Link(s)
MySQL as a Document Database	http://dev.mysql.com/doc/refman/5.7/en/document-database.html
MySQL Shell	http://dev.mysql.com/doc/refman/5.7/en/mysql-shell.html http://dev.mysql.com/doc/refman/5.7/en/mysqlx-shell-tutorial-javascript.html http://dev.mysql.com/doc/refman/5.7/en/mysqlx-shell-tutorial-python.html
X Dev API	http://dev.mysql.com/doc/x-devapi-userguide/en/
X Plugin	http://dev.mysql.com/doc/refman/5.7/en/x-plugin.html
MySQL JSON	http://mysqlserverteam.com/tag/json/ https://dev.mysql.com/doc/refman/5.7/en/json.html https://dev.mysql.com/doc/refman/5.7/en/json-functions.html
Blogs	http://mysqlserverteam.com/category/docstore/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