Apache Ignite™ SQL Grid
Hot Blend of Traditional SQL and IMDG

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#apacheignite
Agenda

• Apache Ignite SQL Grid
• Distributed Queries
• Distributed DML
• Management & Visualization
• Demo
• Roadmap
Apache Ignite SQL Grid
In-Memory Data Fabric: More Than Data Grid
Distributed Queries
Apache Ignite SQL Grid

• ANSI-99 SQL Compliant
  – Aggregations, group by, sorting
  – Cross-cache joins, unions, etc.

• Distributed
  – Always consistent
  – Fault tolerant

• Advanced Indexing Support
Collocated SQL Queries

- Collocated Mode
  - Any kind of JOINs (ANSI-99)
  - Data has to be collocated in advance*

- Recommended mode
  - Avoids data movement
  - Enabled by default
Non-Collocated SQL Queries

- **Non-Collocated Mode**
  - No need to collocate data
  - Data movement on joins

- **Use case**
  - No feasible to achieve collocation
  - To support 100% of all SQL queries

- **Disabled by default**
Apache Ignite SQL Grid: Indexes

• Single Field and Group Indexes
  – Annotate in code
  – Predefine in the configuration
• On-Heap Indexes
  – AVL tree with fast cloning
  – Concurrent skip list (default)
• Off-Heap Indexes
  – AVL tree with fast cloning

```java
public class Person implements Serializable {
    /** Will be indexed in ascending order. */
    @QuerySqlField(index = true)
    private long id;

    /** Will be visible in SQL, but not indexed. */
    @QuerySqlField
    private String name;

    /** Will be indexed in descending order. */
    @QuerySqlField(index = true, descending = true)
    private int age;
}
```
Distributed DML
Distributed DML

- ANSI-99 Compliant
  - INSERT
  - UPDATE
  - DELETE
  - MERGE
- APIs
  - Java, .NET, C++
  - ODBC & JDBC

```c
void AdjustSalary(SQLHDBC dbc, int64_t key, double salary)
{
    SQLHSTMT stmt;

    // Allocate a statement handle
    SQLAllocHandle(SQL_HANDLE_STMT, dbc, &stmt);

    SQLCHAR query[] = "UPDATE Person SET salary=? WHERE _key=?";

    SQLBindParameter(stmt, 1, SQL_PARAM_INPUT,
                     SQL_C_DOUBLE, SQL_DOUBLE, 0, 0, &salary, 0, 0);

    SQLBindParameter(stmt, 2, SQL_PARAM_INPUT, SQL_C_SLONG,
                     SQL_BIGINT, 0, 0, &key, 0, 0);

    SQLExecDirect(stmt, query, static_cast<SQLSMALLINT>(sizeof(query)));

    // Releasing statement handle.
    SQLFreeHandle(SQL_HANDLE_STMT, stmt);
}
```
Management & Visualization
Apache Ignite Web Console

- Configuration Wizard
- Management and Monitoring
- Benefits
  - No Connectivity Issues
  - HA and Fault-Tolerance
  - Multiple Deployment Modes
  - Lightweight Web Application
Apache Ignite Web Console: RDBMS Schema Import

- **Connect to Existing RDBMS**
  - JDBC compliant
- **Import Relational Scheme**
  - Relational Tables to Caches
  - Indexes
- **Benefit From Cache POJO Store**
  - Read-through and write-through
  - Automatic data preloading

```
<table>
<thead>
<tr>
<th>Schema</th>
<th>Table name</th>
<th>Cache</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARS</td>
<td>CAR</td>
<td>Create CarCache (PARTITIONED)</td>
</tr>
<tr>
<td>CARS</td>
<td>PARKING</td>
<td>Create ParkingCache (PARTITIONED)</td>
</tr>
<tr>
<td>PUBLIC</td>
<td>COUNTRY</td>
<td>Create CountryCache (PARTITIONED)</td>
</tr>
<tr>
<td>PUBLIC</td>
<td>DEPARTMENT</td>
<td>Create DepartmentCache (PARTITIONED)</td>
</tr>
</tbody>
</table>
```

Defaults to be applied for filtered tables

- Create new cache by template
  - PARTITIONED

Select tables to import as domain model

- Prev
- Next
Apache Ignite Web Console: Queries Execution

- **SQL Queries**
  - SELECTs and DML
  - Execution plan
- **Flexible Output**
  - Tabular Form
  - Streaming Charts
  - Graphs
Apache Ignite Web Console: Queries Monitoring

- Queries Monitoring
  - Queries Execution History
  - Running Queries Overview
- Management
  - Long Running Queries Termination
Interactive SQL with Apache Zeppelin
Data Analysis with Tableau
Roadmap
Apache Ignite SQL Grid: Roadmap

- Dynamic Indexes
- Distributed DDL
  - CREATE/DROP
  - ALTER
- Performance, performance!
  - OLTP & OLAP
ANY QUESTIONS?

Thank you for joining us. Follow the conversation.

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