

Creating Tables and Writing Query Results to External Systems

Apache Flink SQL Training

<https://github.com/ververica/sql-training>

Reading From and Writing to External Systems

- Apache Flink is not a data store
 - Table data is always read from or written to external systems
- Flink provides connectors for many storage systems and formats
 - Apache Kafka
 - JDBC, ElasticSearch, Apache HBase
 - Apache Hive
 - File systems (HDFS, S3, Azure, local/NFS)
 - Formats: Apache Avro, JSON, CSV

See also: <https://ci.apache.org/projects/flink/flink-docs-release-1.10/dev/table/connect.html>



Creating a Table

- Tables are created with familiar DDL syntax

Regular schema
definition

```
CREATE TABLE order (  
  order_id BIGINT,  
  order_amount DECIMAL,  
  order_time TIMESTAMP(3),  
  WATERMARK FOR order_time AS order_time - INTERVAL '10' SECOND)
```

Watermark
definition
(optional)

```
WITH (  
  'connector.type' = 'kafka',  
  'connector.version' = 'universal',  
  'connector.topic' = 'orders',  
  'connector.properties.bootstrap.servers' = 'localhost:9092',  
  'format.type' = 'json'  
);
```

Connector and
format properties



Supported DDL Syntax

- [CREATE | ALTER | DROP] TABLE
- [CREATE | ALTER | DROP] FUNCTION
- [CREATE | ALTER | DROP] DATABASE
- See documentation for details
<https://ci.apache.org/projects/flink/flink-docs-release-1.10/dev/table/sql/>
- DDL support is extended in future versions



Catalogs

- Flink's default catalog is not durable
 - Catalog metadata is only stored in memory
 - Tables, views, and functions must be recreated on startup
- Flink supports Hive Metastore as persistent, external catalog service



Writing Query Results to Tables

Writing Query Results to Tables

- Regular SQL syntax

```
INSERT INTO teenager  
SELECT name, age  
FROM people  
WHERE age BETWEEN 10 AND 20;
```

- Result schema of query must match sink table schema
- The sink table's storage system must support the query's result mode
 - INSERT-only, UPSERT, INSERT+DELETE



Hands On Exercises

Creating Tables and Writing Query Results to External Systems

Continue with the hands-on exercises in
"Creating Tables and
Writing Query Results to External Systems"

[https://github.com/ververica/sql-training/wiki/
Creating-Tables-and-Writing-Query-Results-to-External-Systems](https://github.com/ververica/sql-training/wiki/Creating-Tables-and-Writing-Query-Results-to-External-Systems)

We are here to help!





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