

# Creating Tables and Writing Query Results to External Systems

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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-1.11/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)  
WITH (  
  'connector.type' = 'kafka',  
  'connector.version' = 'universal',  
  'connector.topic' = 'orders',  
  'connector.properties.bootstrap.servers' = 'localhost:9092',  
  'format.type' = 'json'  
);
```

Watermark  
definition (optional)

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-1.11/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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