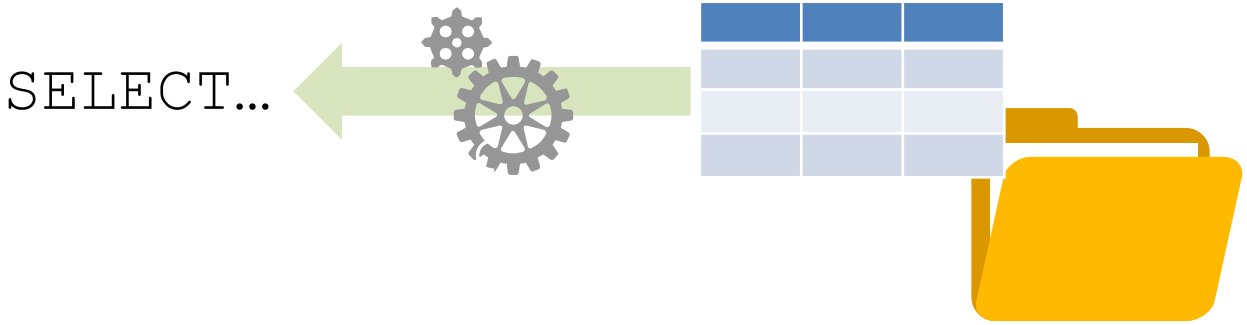
Processing Big Data with Hive

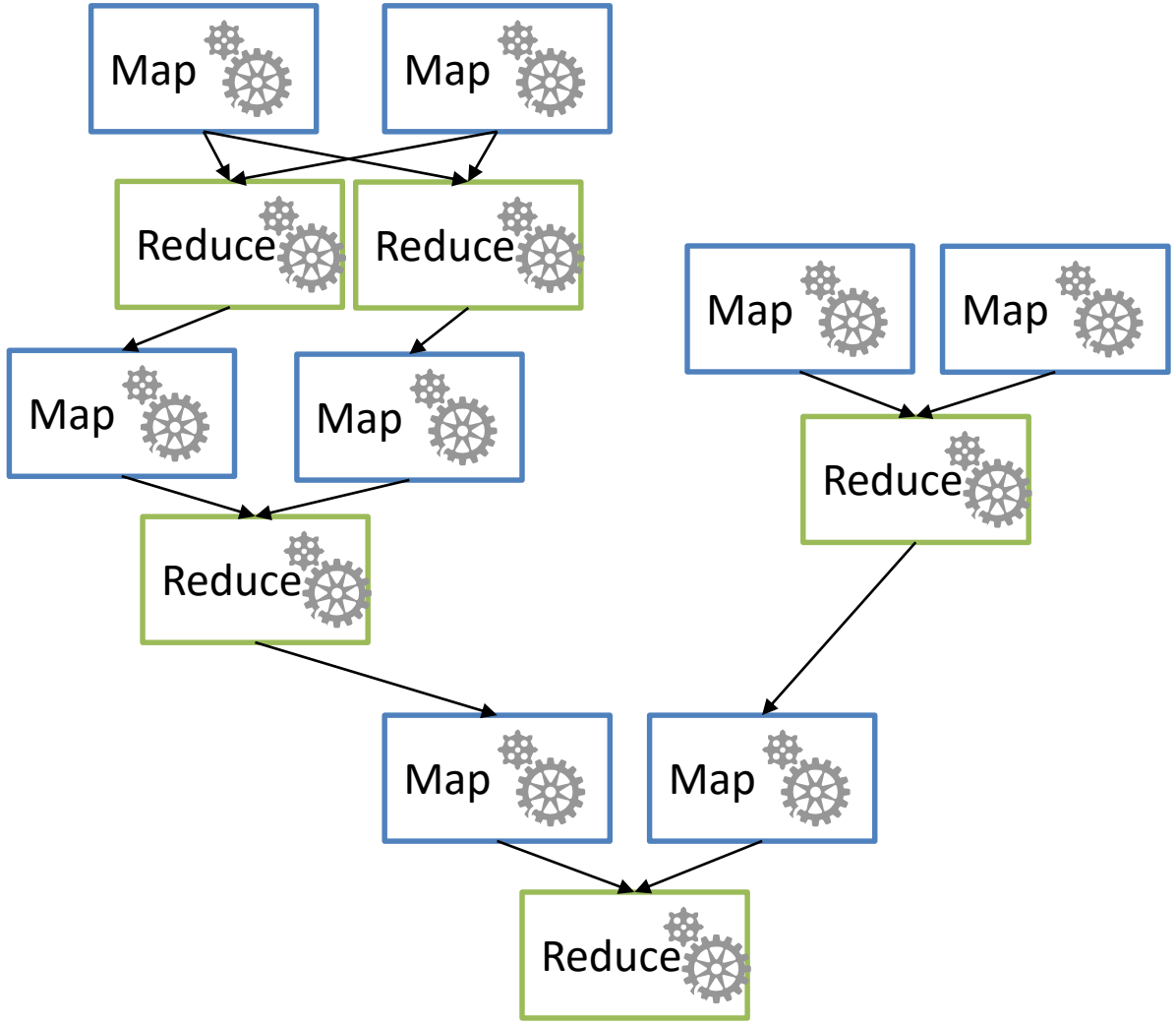
Microsoft

What is Hive?

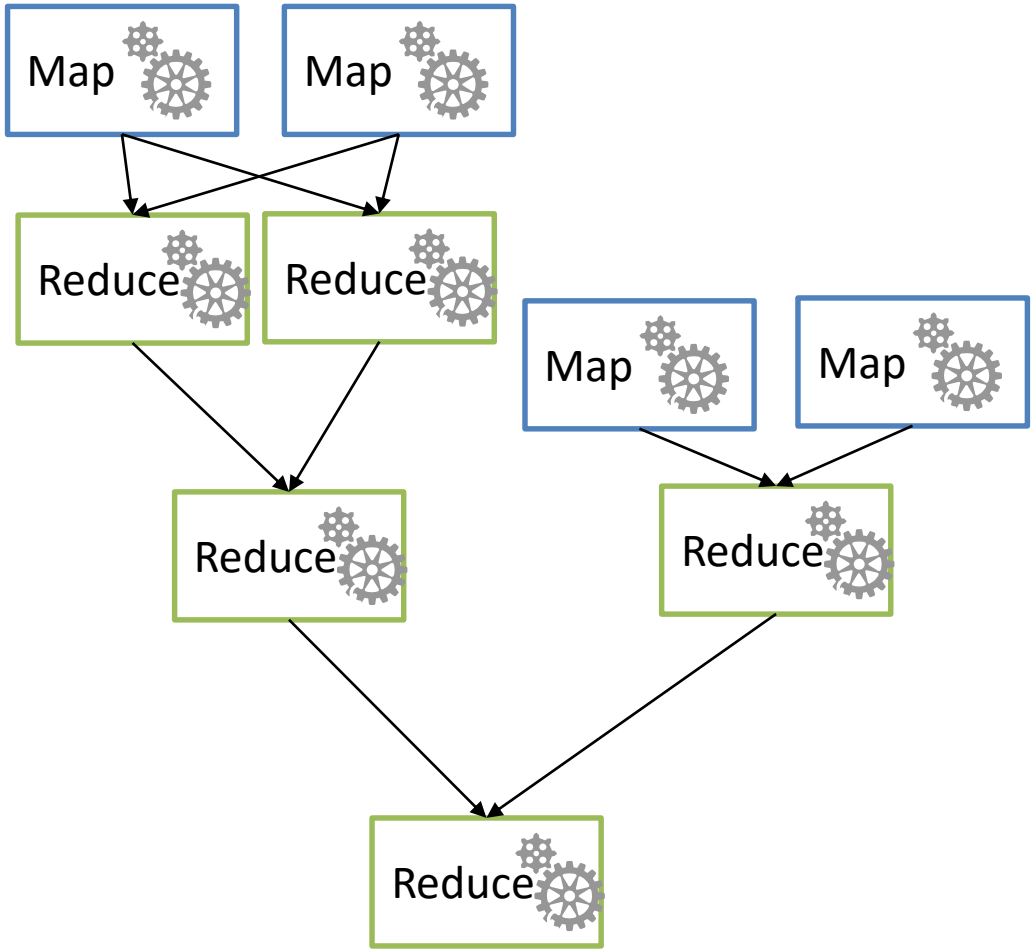


- A metadata service that projects tabular schemas over folders
- Enables the contents of folders to be queried as tables, using SQL-like query semantics
- Queries are translated into jobs
  - Execution engine can be Tez or MapReduce

```
set hive.execution.engine=mr;
SELECT…
```

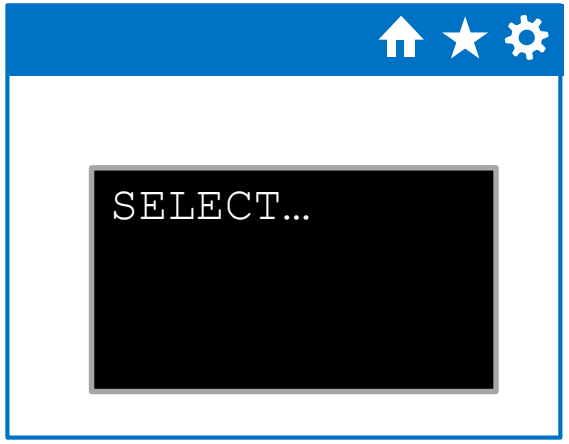



```
set hive.execution.engine=tez;
SELECT…
```

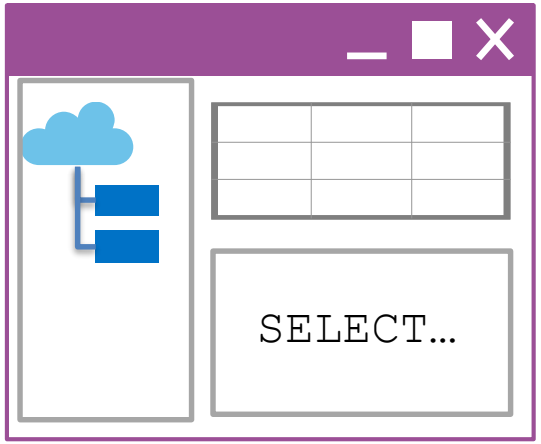


Hive client tools include…

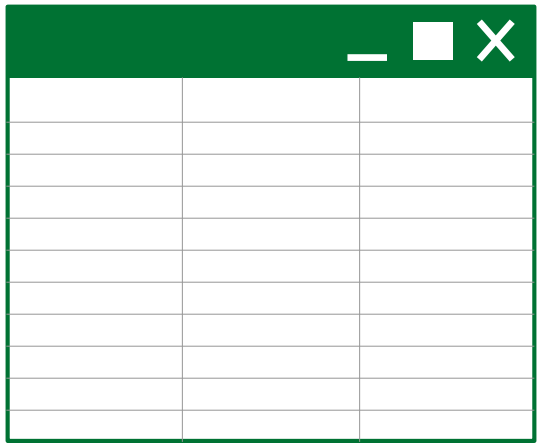
Hive Shell



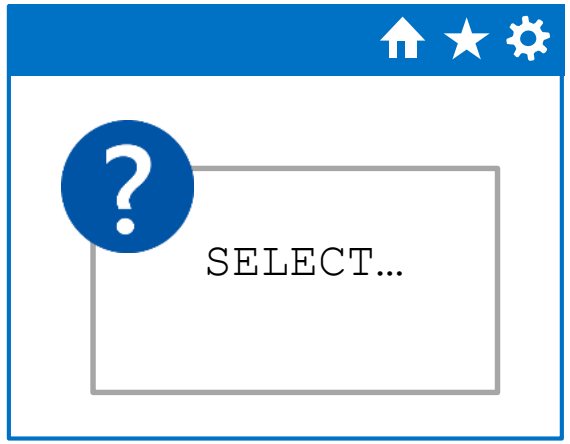
Visual Studio



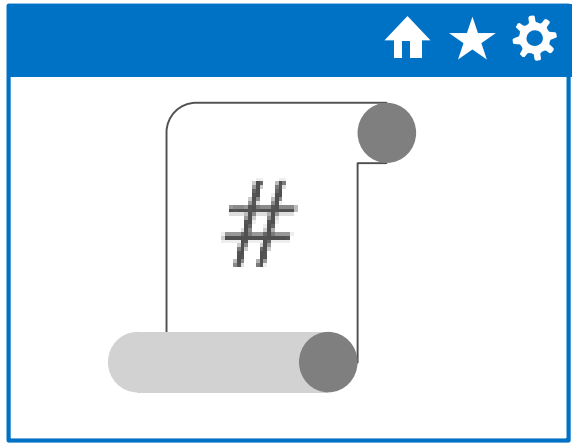
Any ODBC Client



Query Console (Hue)



PowerShell



How do I create and load Hive tables?

- Use the CREATE TABLE HiveQL statement
  - Defines schema metadata to be projected onto data in a folder when the table is queried (*not* when it is created)
- Specify file format and file location
  - Defaults to textfile format in the *<database>/<table_name>* folder
    - Default database is in **/hive/warehouse**
    - Create additional databases using CREATE DATABASE
- Create *internal* or *external* tables
  - Internal tables manage the lifetime of the underlying folders
  - External tables are managed independently from folders

```
CREATE TABLE table1
(col1 STRING,
 col2 INT)
ROW FORMAT DELIMITED FIELDS TERMINATED BY ' ';
```

Internal table (folders deleted when table is dropped)

Default location (/hive/warehouse/table1)

```
CREATE TABLE table2
(col1 STRING,
 col2 INT)
ROW FORMAT DELIMITED FIELDS TERMINATED BY ' '
STORED AS TEXTFILE LOCATION '/data/table2';
```

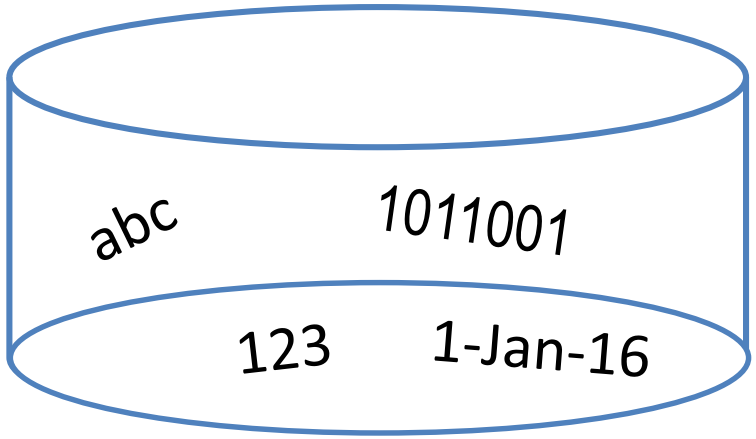
Stored in a custom folder (but still internal, so the folder is deleted when table is dropped)

```
CREATE EXTERNAL TABLE table3
(col1 STRING,
 col2 INT)
ROW FORMAT DELIMITED FIELDS TERMINATED BY ' '
STORED AS TEXTFILE LOCATION '/data/table3';
```

External table (folders and files are left intact in Azure Blob Store when the table is dropped)

Hive data types :

- Numeric
  - Integers: TINYINT, SMALLINT, INT, BIGINT
  - Fractional: FLOAT, DOUBLE, DECIMAL
- Character
  - STRING, VARCHAR, CHAR
- Date/Time
  - TIMESTAMP
  - DATE
- Special
  - BOOLEAN, BINARY, ARRAY, MAP, STRUCT, UNIONTYPE



- Save data files in table folders (or create table on existing files!)

```
PUT myfile.txt /data/table1
```

- Use the LOAD statement

```
LOAD DATA [LOCAL] INPATH '/data/source' INTO TABLE MyTable;
```

- Use the INSERT statement

```
INSERT INTO TABLE Table2
SELECT Col1, UPPER(Col2),
FROM Table1;
```

- Use a CREATE TABLE AS SELECT (CTAS) statement

```
CREATE TABLE Table3
ROW FORMAT DELIMITED FIELDS TERMINATED BY '\t'
STORED AS TEXTFILE LOCATION '/data/summarytable'
AS
SELECT Col1, SUM(Col2) As Total
FROM Table1
GROUP BY Col1;
```

How do I query Hive tables?

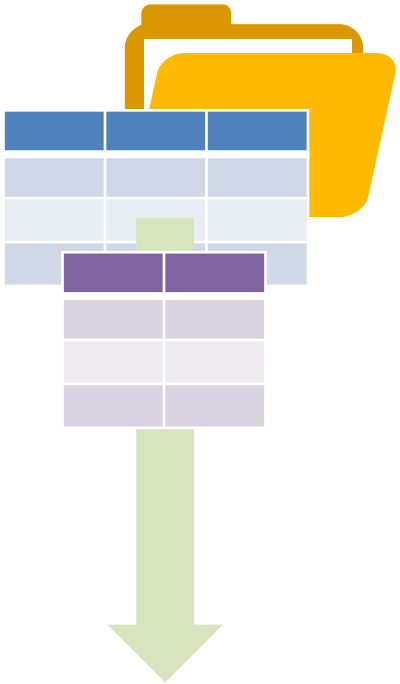
- Query data using the SELECT HiveQL statement

```
SELECT Col1, SUM(Col2) AS TotalCol2
FROM MyTable
WHERE Col3 = 'ABC' AND Col4 < 10
GROUP BY Col1
ORDER BY Col4;
```

- Hive translates the query into jobs and applies the table schema to the underlying data files

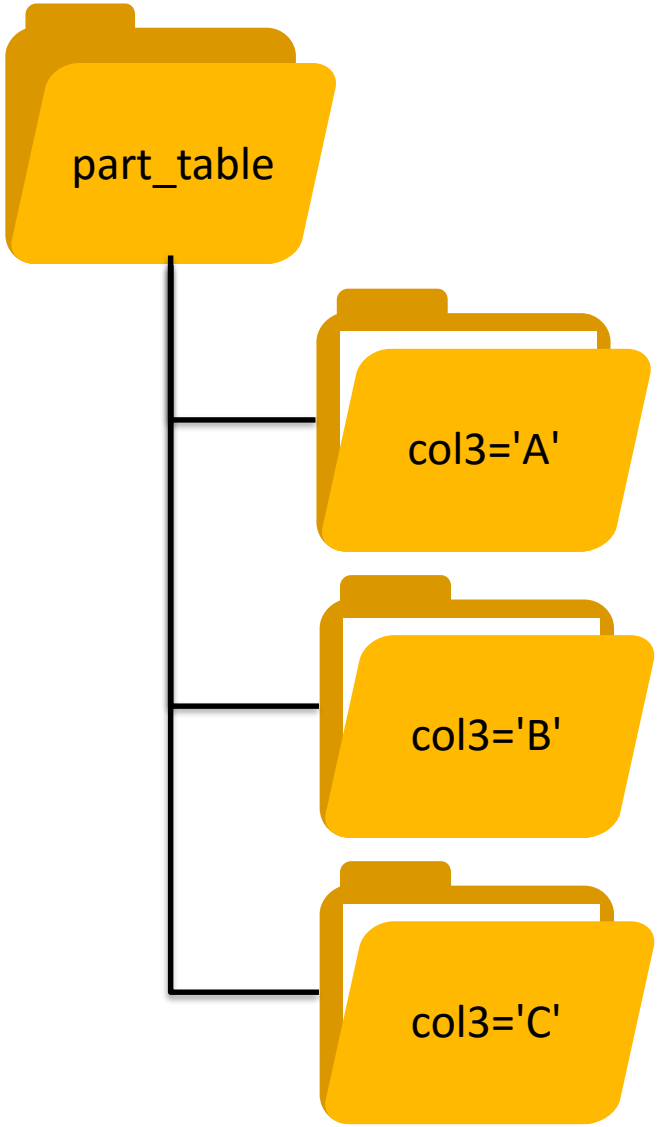
- Views are named queries that abstract underlying tables

```
CREATE VIEW v_SummarizedData
AS
SELECT col1, SUM(col2) AS TotalCol2
FROM mytable
GROUP BY col1;

SELECT col1, TotalCol2
FROM v_SummarizedData;
```

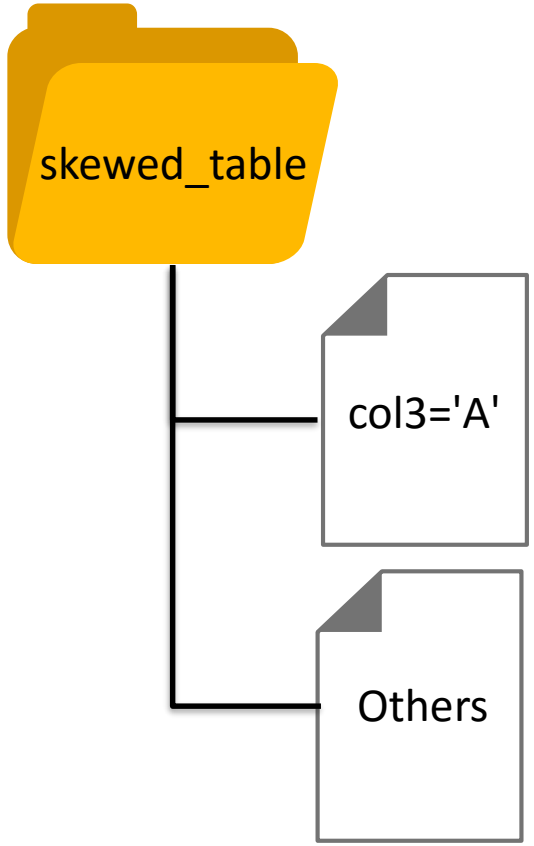


Partitioning, Skewing, and Clustering Tables

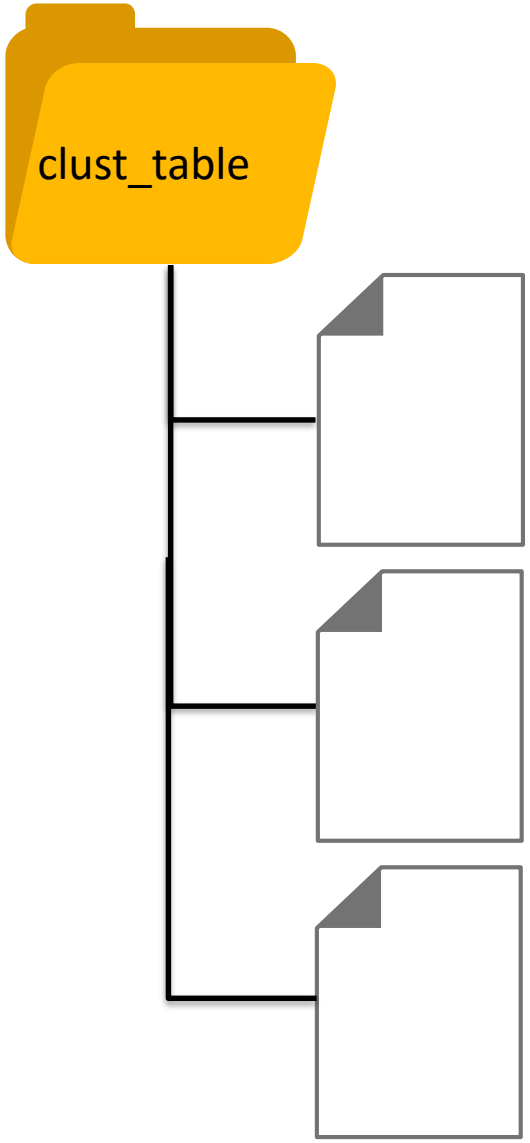
```
CREATE TABLE part_table
(col1 INT,
 col2 STRING)
PARTITIONED BY (col3 STRING);

INSERT INTO TABLE part_table PARTITION(col3='A')
SELECT col1, col2, col3
FROM stg_table
WHERE col3 = 'A';

SET hive.exec.dynamic.partition = true;
SET hive.exec.dynamic.partition.mode=nonstrict;

INSERT INTO TABLE part_table PARTITION(col3)
SELECT col1, col2, col3
FROM stg_table;
```



```
CREATE TABLE skewed_table
(col1 INT,
 col2 STRING,
 col3 STRING)
SKEWED BY (col3) ON ('A') [STORED AS DIRECTORIES];


INSERT INTO TABLE skewed_table
SELECT col1, col2, col3
FROM stg_table;
```



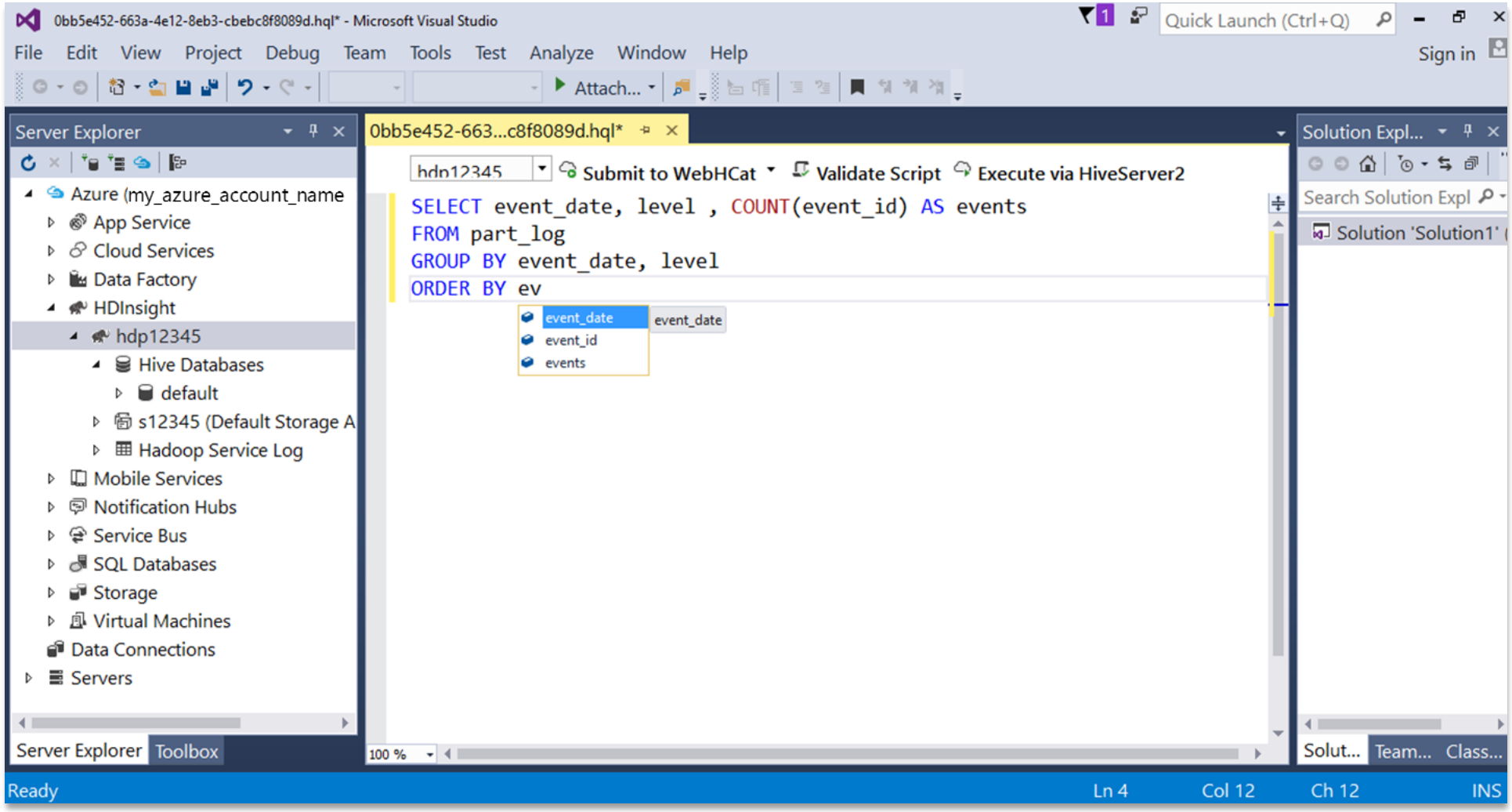
```
CREATE TABLE clust_table
(col1 INT,
 col2 STRING,
 col3 STRING)
CLUSTERED BY (col3) INTO 3 BUCKETS;


INSERT INTO TABLE clust_table
SELECT col1, col2, col3
FROM stg_table;
```



How do I use Hive in Visual Studio?

Azure SDK for .NET includes HDInsight tools for Visual Studio

- Visual Hive table designer
- Hive query editor



How do I access Hive via ODBC?

1. Download and install the Hive ODBC Driver for HDInsight
   - 32-bit and 64-bit versions
2. Optionally, create a data source name (DSN) for your HDInsight cluster
3. Use an ODBC connection to query Hive tables