Week 3 Unit 3: Create an SQLScript Procedure with Calculation Engine (CE) Functions
Create an SQLScript Procedure with CE Functions
Calculation Engine

The calculation engine is the execution engine for SQLScript.

SQLScript statements are parsed into the calculation model as much as possible. The calculation engine instantiates a calculation model at the time of query execution.
Create an SQLScript Procedure with CE Functions
Different Engines, Different Responsibilities

Calc views

SQL Optimizer

Calculation engine

OLAP engine

Join engine

Attribute views

Row store engine

Column store

Row store

Analytic views
BEGIN

    po = CE_CALC_VIEW("EPM_PROCUREMENT", [
        "NET_AMOUNT", "COUNTRY" "CREATION_DATE"]); ----- Query 1

    c_time_dimension = CE_COLUMN_TABLE (_SYS_BI."M_TIME_DIMENSION");
    ----- Query 2

    c_time = CE_PROJECTION(:c_time_dimension, [
        "DATE_SQL" AS "CREATION_DATE", "QUARTER"]);
    ----- Query 3

    result = CE_JOIN(:po, :c_time, ["CREATION_DATE"]);
    ----- Query 4

    OUTPUT = select COUNTRY, QUARTER,
             SUM(NET_AMOUNT) as procurement_amount FROM :result
             GROUP BY COUNTRY, quarter;
    ----- Query 5

END;
Create an SQLScript Procedure with CE Functions
Calculation Engine Plan Operators

The calculation engine plan operators encapsulate data transformation functionality.

Alternatively, you can use SQL statements; their logic is directly implemented in the calculation engine or the execution environment of SQLScript.

Operators are categorized as Data Source Access and Relational.
Create an SQLScript Procedure with CE Functions
Semantic Equivalents CE/SQL 1

CE_COLUMN_TABLE ("table_name"{, ["attrib_name", …]})

Example:

```
ot_books1 = CE_COLUMN_TABLE("BOOKS");
ot_books2 = CE_COLUMN_TABLE("BOOKS", ["TITLE","PRICE","CRCY"]);

This example only works on a column table and does not invoke the SQL processor. It is semantically equivalent to the following:

```

ot_books3 = SELECT * FROM books;
ot_books4 = SELECT title, price, crcy FROM books;
```
Create an SQLScript Procedure with CE Functions
Semantic Equivalents CE/SQL 3

CE_JOIN (:var1_table, :var2_table, [join_attr, …]{, [attrib_name, …]})

Example:

```sql
ot_pubs_books1 = CE_JOIN (:It_pubs, :it_books,["PUBLISHER"]);
ot_pubs_books2 = CE_JOIN (:It_pubs, :it_books,["PUBLISHER"],
                        ["TITLE","NAME","PUBLISHER","YEAR"]);
```

This example is semantically equivalent to the following SQL procedure,
but does not invoke the SQL processor.

```sql
ot_pubs_books3 = SELECT P.publisher AS publisher, name, street,
          post_code, city, country, isbn, title, edition, year, price, crcy
       FROM :It_pubs AS P, :it_books AS B
WHERE P.publisher = B.publisher;
```

```sql
ot_pubs_books4 = SELECT title, name, P.publisher AS publisher, year
       FROM :It_pubs AS P, :it_books AS B
WHERE P.publisher = B.publisher;
```
Create an SQLScript Procedure with CE Functions
Semantic Equivalents CE/SQL 4

CE_PROJECTION (:var_table, [param_name [AS new_param_name],…]{,[Filter]})

Example:

```
ot_books1 = CE_PROJECTION (:it_books, ["TITLE", "PRICE", "CRCY" AS "CURRENCY"], 
                         "PRICE" > 50);
```

Semantically equivalent to the following SQL procedure:

```
ot_books2 = SELECT titel, price, crcy AS currency 
            FROM :it_books WHERE price > 50;
```

h. Next, use the CE_PROJECTION to filter the data. The below statement will further filter the data based on the PARTNERROLE column and the input parameter IM_PARTNERROLE. Because the names of the fields in the database table are mixed case, and the names of those fields in the output parameter are all uppercase, you must use aliases to map the fields. Enter the following statement.

```
lt_bp_proj = CE_PROJECTION (:lt-bp, 
                 ["PartnerId", "PartnerRole", "EmailAddress", "CompanyName", "AddressID" ], 
                 "PartnerRole" = :partnerrole' );
```
## SQLScript
### CE (Calculation Engine) Built-In Functions

<table>
<thead>
<tr>
<th>SQL</th>
<th>CE Built-In Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SELECT on column table</strong></td>
<td><code>out = CE_COLUMN_TABLE(&quot;COLUMN_TABLE&quot;, [A, B, C])</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, C from &quot;COLUMN_TABLE&quot;</code></td>
<td></td>
</tr>
<tr>
<td><strong>SELECT on attribute view</strong></td>
<td><code>out = CE_JOIN_VIEW(&quot;ATTRIBUTE_VIEW&quot;, [A, B, C])</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, C from &quot;ATTRIBUTE_VIEW&quot;</code></td>
<td></td>
</tr>
<tr>
<td><strong>SELECT on olap view</strong></td>
<td><code>col_tab = CE_COLUMN_TABLE(&quot;COLUMN_TABLE&quot;); out = CE_AGGREGATION((col_tab, SUM(D), [A, B, C]);</code></td>
</tr>
<tr>
<td>`out = SELECT A, B, C, SUM(D) from &quot;ANALYTIC_VIEW&quot; GROUP BY A, B, C</td>
<td></td>
</tr>
<tr>
<td><strong>WHERE HAVING</strong></td>
<td><code>col_tab = CE_COLUMN_TABLE(&quot;COLUMN_TABLE&quot;); out = CE_PROJECTION(col_tab, [A, B, C], ' &quot;B&quot; = 'value' AND &quot;C&quot; = 'value' ');</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, C, SUM(D) from &quot;ANALYTIC_VIEW&quot; WHERE B = 'value' AND C = 'value'</code></td>
<td></td>
</tr>
<tr>
<td><strong>GROUP BY</strong></td>
<td><code>col_tab = CE_COLUMN_TABLE(&quot;COLUMN_TABLE&quot;); out = CE_AGGREGATION((col_tab, SUM(D), [A, B, C]);</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, C, SUM(D) FROM &quot;COLUMN_TABLE&quot; GROUP BY A, B, C</code></td>
<td></td>
</tr>
<tr>
<td><strong>INNER JOIN</strong></td>
<td><code>out = CE_JOIN(&quot;COLTAB1&quot;,&quot;COLTAB2&quot;, [KEY1, KEY2], [A, B, Y, D])</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, Y, SUM(D) from &quot;COLTAB1&quot; INNER JOIN &quot;COLTAB2&quot; WHERE &quot;COLTAB1&quot;.&quot;KEY1&quot; = &quot;COLTAB2&quot;.&quot;KEY1&quot; AND &quot;COLTAB1&quot;.&quot;KEY2&quot; = &quot;COLTAB2&quot;.&quot;KEY2&quot;</code></td>
<td></td>
</tr>
<tr>
<td><strong>LEFT OUTER JOIN</strong></td>
<td><code>out = CE_LEFT_OUTER_JOIN(&quot;COLTAB1&quot;,&quot;COLTAB2&quot;, [KEY1, KEY2], [A, B, Y, D])</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, Y, SUM(D) from &quot;COLTAB1&quot; LEFT OUTER JOIN &quot;COLTAB2&quot; WHERE &quot;COLTAB1&quot;.&quot;KEY1&quot; = &quot;COLTAB2&quot;.&quot;KEY1&quot; AND &quot;COLTAB1&quot;.&quot;KEY2&quot; = &quot;COLTAB2&quot;.&quot;KEY2&quot;</code></td>
<td></td>
</tr>
<tr>
<td><strong>SQL Expressions</strong></td>
<td><code>proj_tab = CE_COLUMN_TABLE(&quot;COLUMN_TABLE&quot;); out = CE_PROJECTION( :proj_tab, [&quot;A&quot;, &quot;B&quot;, &quot;C&quot;, CE_CALC('midstr(&quot;D&quot;,2,5)', string) ]);</code></td>
</tr>
<tr>
<td><code>out = SELECT A, B, C, SUBSTRING(D,2,5) FROM &quot;COLUMN_TABLE&quot;</code></td>
<td></td>
</tr>
<tr>
<td><strong>UNION ALL</strong></td>
<td><code>col_tab1 = CE_COLUMN_TABLE(&quot;COLUMN_TABLE1&quot;,[A,B,C,D]); col_tab2 = CE_COLUMN_TABLE(&quot;COLUMN_TABLE2&quot;,[A,B,C,D]); out = CE_UNION_ALL(:col_tab1,:col_tab2);</code></td>
</tr>
<tr>
<td><code>col_tab1 = SELECT A, B, C, D FROM &quot;COLUMN_TABLE1&quot;; col_tab2 = SELECT A, B, C, D FROM &quot;COLUMN_TABLE2&quot;; out = SELECT * FROM :col_tab1 UNION ALL SELECT * FROM :col_tab2;</code></td>
<td></td>
</tr>
</tbody>
</table>
Thank you

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