Exercise - Compare storage requirements between optimal and sub-optimal column data types

3 minutes

Perform the following steps to compare storage requirements between optimal and suboptimal column data types

1. Use the following query to create two tables (`Sale_Hash_Projection` and `Sale_Hash_Projection2`) which contain a subset of the columns from `Sale_Heap`:

```
SQL
```

```
CREATE TABLE [wwi_perf].[Sale_Hash_Projection]
WITH
(
    DISTRIBUTION = HASH ( [CustomerId] ),
    HEAP
)
AS
SELECT
    [CustomerId]
    ,[ProductId]
    ,[Quantity]
FROM
    [wwi_perf].[Sale_Heap]

CREATE TABLE [wwi_perf].[Sale_Hash_Projection2]
WITH
(
    DISTRIBUTION = HASH ( [CustomerId] ),
    CLUSTERED COLUMNSTORE INDEX
)
AS
SELECT
    [CustomerId]
    ,[ProductId]
    ,[Quantity]
FROM
    [wwi_perf].[Sale_Heap]
```

   The query should finish execution in a few minutes.

2. Use the following query to create two additional tables (`Sale_Hash_Projection_Big` and `Sale_Hash_Projection_Big2`) that have the same columns, but with different (sub_optimal) data types:

SQL

```
CREATE TABLE [wwi_perf].[Sale_Hash_Projection_Big]
WITH
(
    DISTRIBUTION = HASH ( [CustomerId] ),
    HEAP
)
AS
SELECT
    [CustomerId]
    ,CAST([ProductId] as bigint) as [ProductId]
    ,CAST([Quantity] as bigint) as [Quantity]
FROM
    [wwi_perf].[Sale_Heap]

CREATE TABLE [wwi_perf].[Sale_Hash_Projection_Big2]
WITH
(
    DISTRIBUTION = HASH ( [CustomerId] ),
    CLUSTERED COLUMNSTORE INDEX
)
AS
SELECT
    [CustomerId]
    ,CAST([ProductId] as bigint) as [ProductId]
    ,CAST([Quantity] as bigint) as [Quantity]
FROM
    [wwi_perf].[Sale_Heap]
```

3. Verify that the four tables have the same number of rows (there should be 339,507,246 rows in each):

SQL

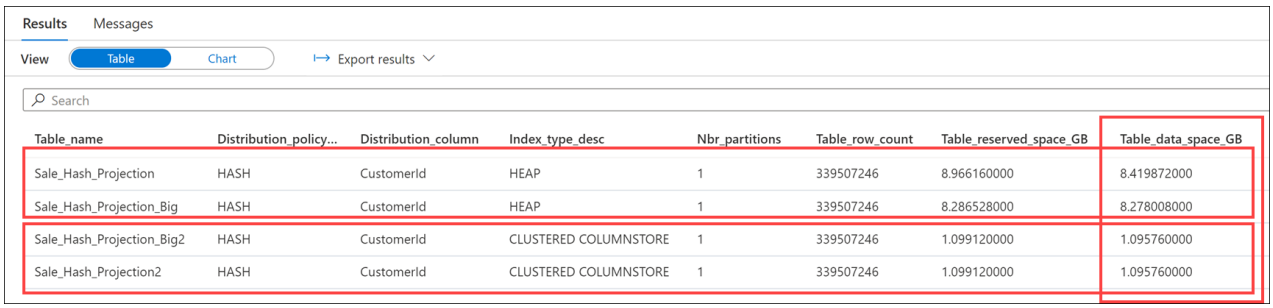
```
SELECT 'Sale_Hash_Projection', COUNT_BIG(*) FROM [wwi_perf].
[Sale_Hash_Projection]
UNION
SELECT 'Sale_Hash_Projection2', COUNT_BIG(*) FROM [wwi_perf].
[Sale_Hash_Projection2]
UNION
SELECT 'Sale_Hash_Projection_Big', COUNT_BIG(*) FROM [wwi_perf].
[Sale_Hash_Projection_Big]
UNION
SELECT 'Sale_Hash_Projection_Big2', COUNT_BIG(*) FROM [wwi_perf].
[Sale_Hash_Projection_Big2]
```

4. Run the following query to compare the storage requirements for the three tables:

SQL

```
SELECT
    database_name
,    schema_name
,    table_name
,    distribution_policy_name
,      distribution_column
,    index_type_desc
,    COUNT(distinct partition_nmbr) as nbr_partitions
,    SUM(row_count)                 as table_row_count
,    SUM(reserved_space_GB)         as table_reserved_space_GB
,    SUM(data_space_GB)             as table_data_space_GB
,    SUM(index_space_GB)            as table_index_space_GB
,    SUM(unused_space_GB)           as table_unused_space_GB
FROM
    [wwi_perf].[vTableSizes]
WHERE
    schema_name = 'wwi_perf'
    and table_name in ('Sale_Hash_Projection',
'Sale_Hash_Projection2',
        'Sale_Hash_Projection_Big', 'Sale_Hash_Projection_Big2')
GROUP BY
    database_name
,    schema_name
,    table_name
,    distribution_policy_name
,      distribution_column
,    index_type_desc
ORDER BY
    table_reserved_space_GB desc
```

5. Analyze the results:



Table_name	Distribution_policy...	Distribution_column	Index_type_desc	Nbr_partitions	Table_row_count	Table_reserved_space_GB	Table_data_space_GB
Sale_Hash_Projection	HASH	CustomerId	HEAP	1	339507246	8.966160000	8.419872000
Sale_Hash_Projection_Big	HASH	CustomerId	HEAP	1	339507246	8.286528000	8.278008000
Sale_Hash_Projection_Big2	HASH	CustomerId	CLUSTERED COLUMNSTORE	1	339507246	1.099120000	1.095760000
Sale_Hash_Projection2	HASH	CustomerId	CLUSTERED COLUMNSTORE	1	339507246	1.099120000	1.095760000

There are two important conclusions to draw here:

- In the case of `HEAP` tables, the storage impact of using `BIGINT` instead of `SMALLINT` (for `ProductId`) and `TINYINT` (for `QUANTITY`) is 0.141864 GB. We're talking here about only two columns and a moderate number of rows (2.9 billion).

- Even in the case of `CLUSTERED COLUMNSTORE` tables, where compression will offset some of the differences, there is still a difference of 12.7 MB.