INTELIGENTNO PROCESIRANJE U SQL SERVERU 2019

MILOŠ RADIVOJEVIĆ

DATA PLATFORM MVP

26. DECEMBAR 2020

ADAPTIVE JOIN

BATCH MODE ADAPTIVE JOIN

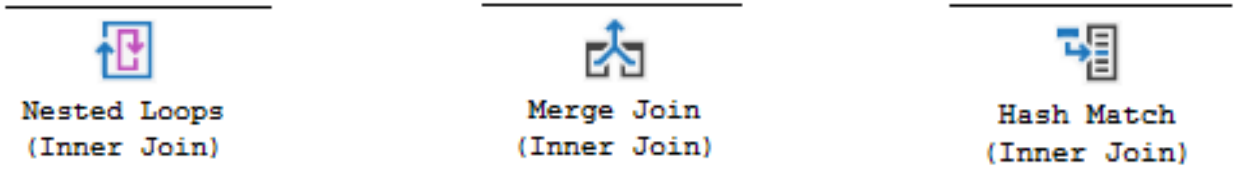
- Enterprise Edition Feature
- Improvement that enables the optimizer to delay the choice of the join method (hash join or nested loops) at runtime
- A new operator - Adaptive Join

JOIN IMPLEMENTATION

- Logical Operation

```
SELECT * FROM A INNER JOIN B ON
```

- Physical Operators



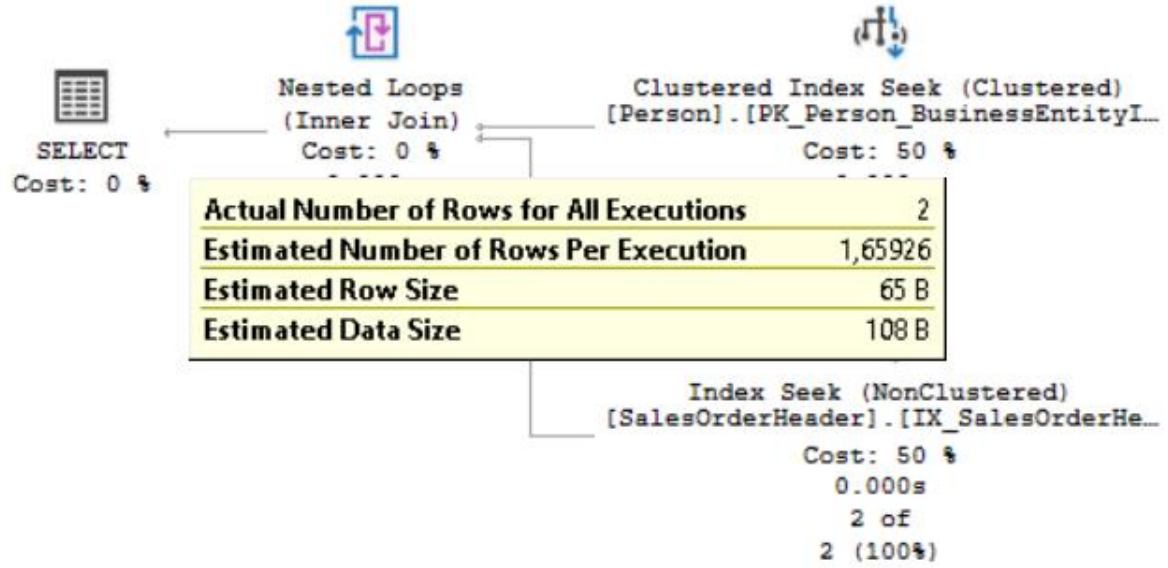
NESTED LOOPS JOIN

```sql
--Nested Loops Join
SELECT o.SalesOrderID, c.LastName
FROM Person.Person c
INNER JOIN Sales.SalesOrderHeader o ON o.CustomerID = c.BusinessEntityID
WHERE c.BusinessEntityID = 14501;
```

112 %

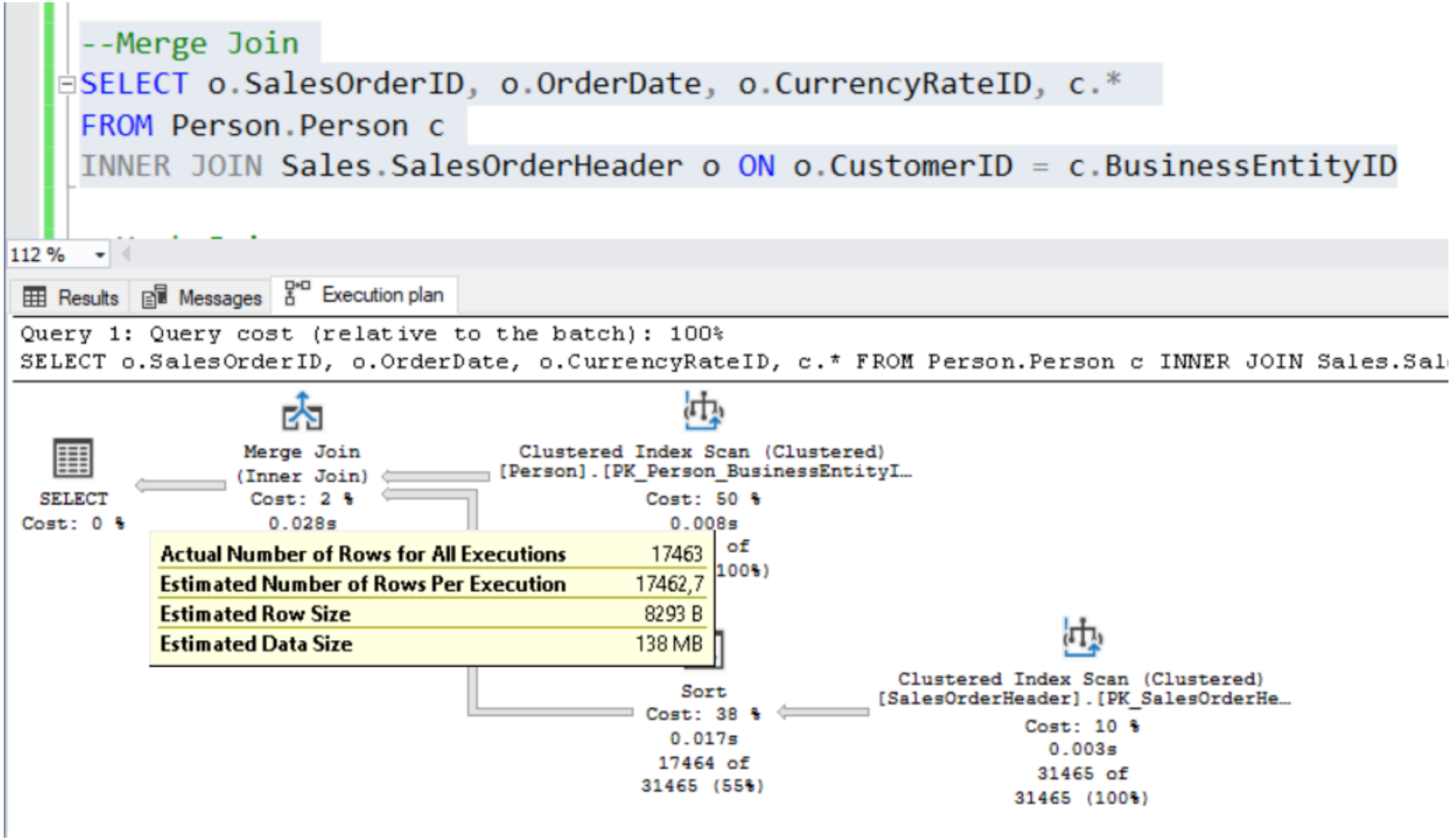
Results | Messages | Execution plan

Query 1: Query cost (relative to the batch): 100%
SELECT o.SalesOrderID, c.LastName FROM Person.Person c INNER JOIN Sales.SalesOrderHeader o ON o.C



MERGE JOIN

```
--Merge Join
SELECT o.SalesOrderID, o.OrderDate, o.CurrencyRateID, c.*
FROM Person.Person c
INNER JOIN Sales.SalesOrderHeader o ON o.CustomerID = c.BusinessEntityID
```



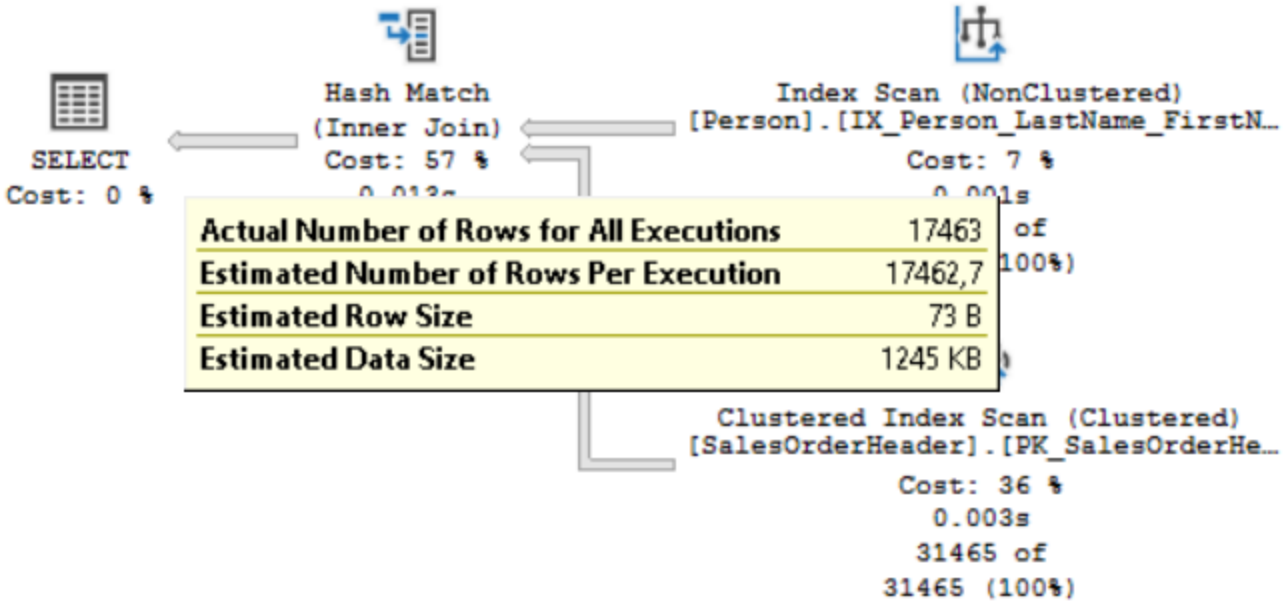
HASH JOIN

```sql
--Hash Join
SELECT o.SalesOrderID, o.OrderDate, c.LastName
FROM Person.Person c
INNER JOIN Sales.SalesOrderHeader o ON o.CustomerID = c.BusinessEntityID
```

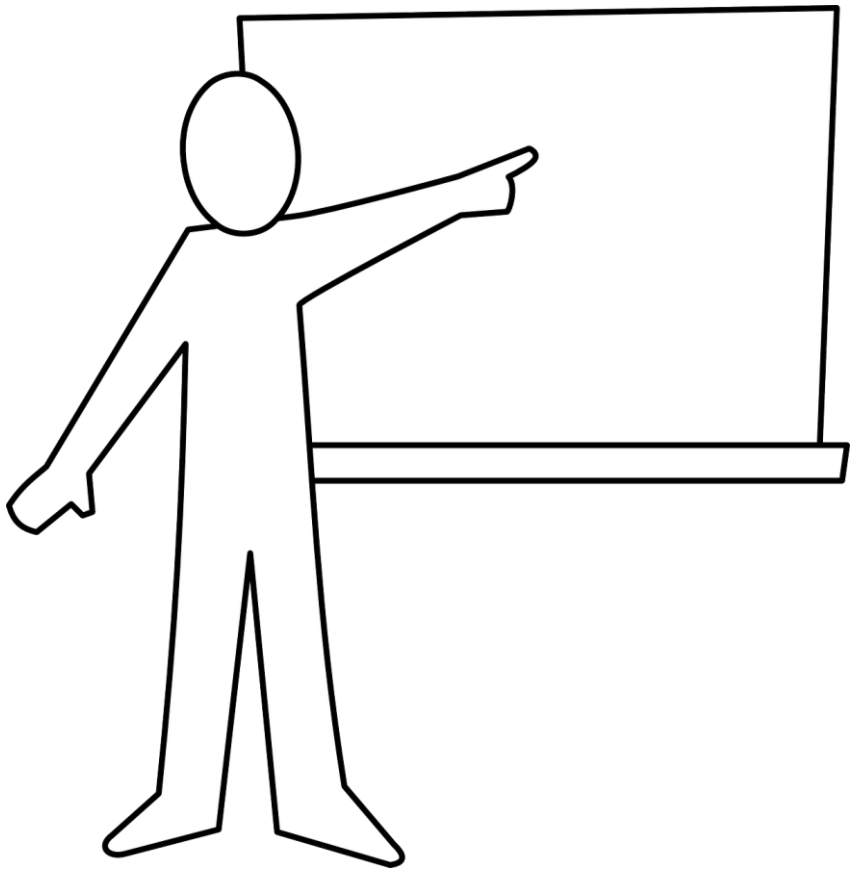
112 %

Results | Messages | Execution plan

Query 1: Query cost (relative to the batch): 100%
SELECT o.SalesOrderID, o.OrderDate, c.LastName FROM Person.Person c INNER JOIN Sales.SalesOrderHeade



JOIN AND PARAMETER SENSITIVE QUERIES

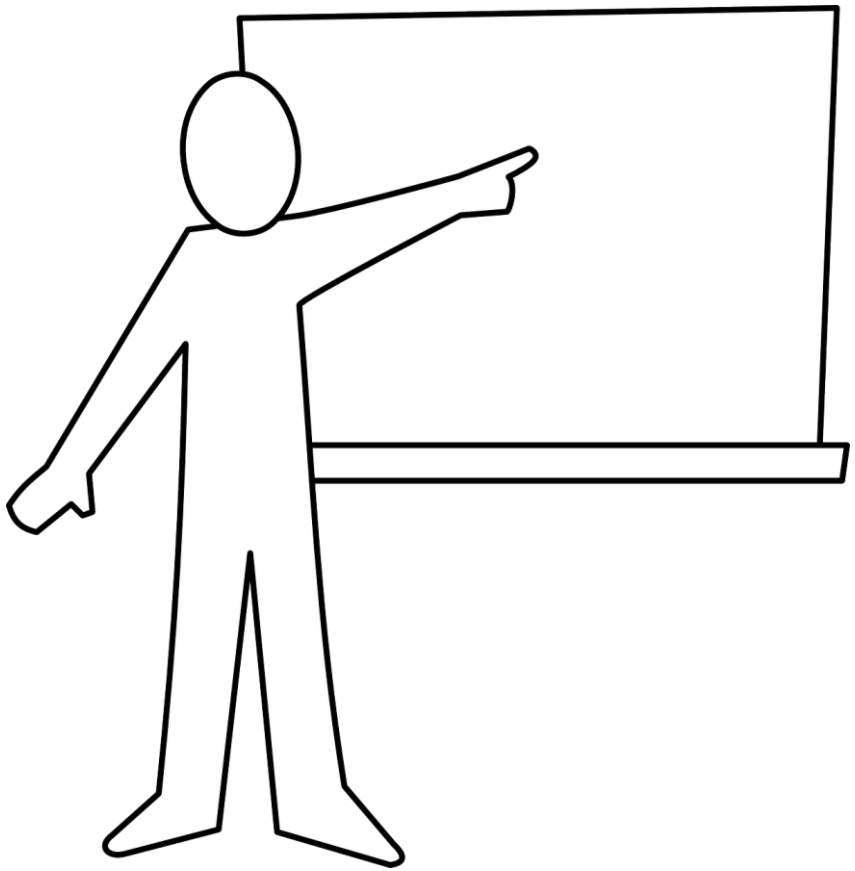


DEMO

BATCH MODE ADAPTIVE JOIN

- 4. Join operator - adaptive join
- Has both hash join and nested loops join - selection at runtime
- Starts as a hash join and scans the input
  - Estimated Number of Rows <Adaptive Threshold => changes to Nested Loop Join
  - Estimated Number of Rows> = Adaptive Threshold => continues as a hash join
- AJ handles parameter sensitive queries better, but cannot solve all problems where the wrong join operator is selected
- It only works in batch mode

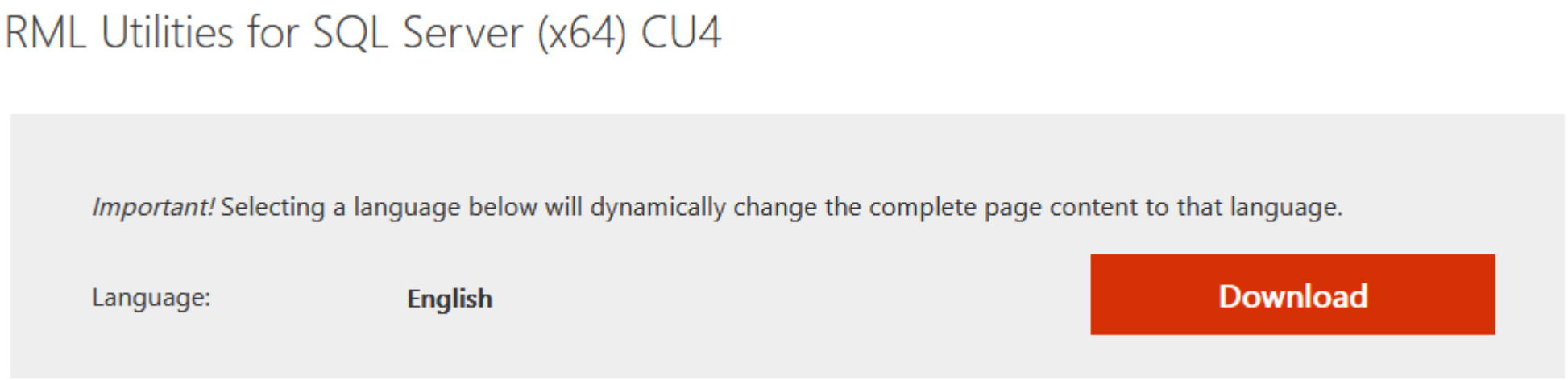
BATCH MODE ADAPTIVE JOIN



DEMO

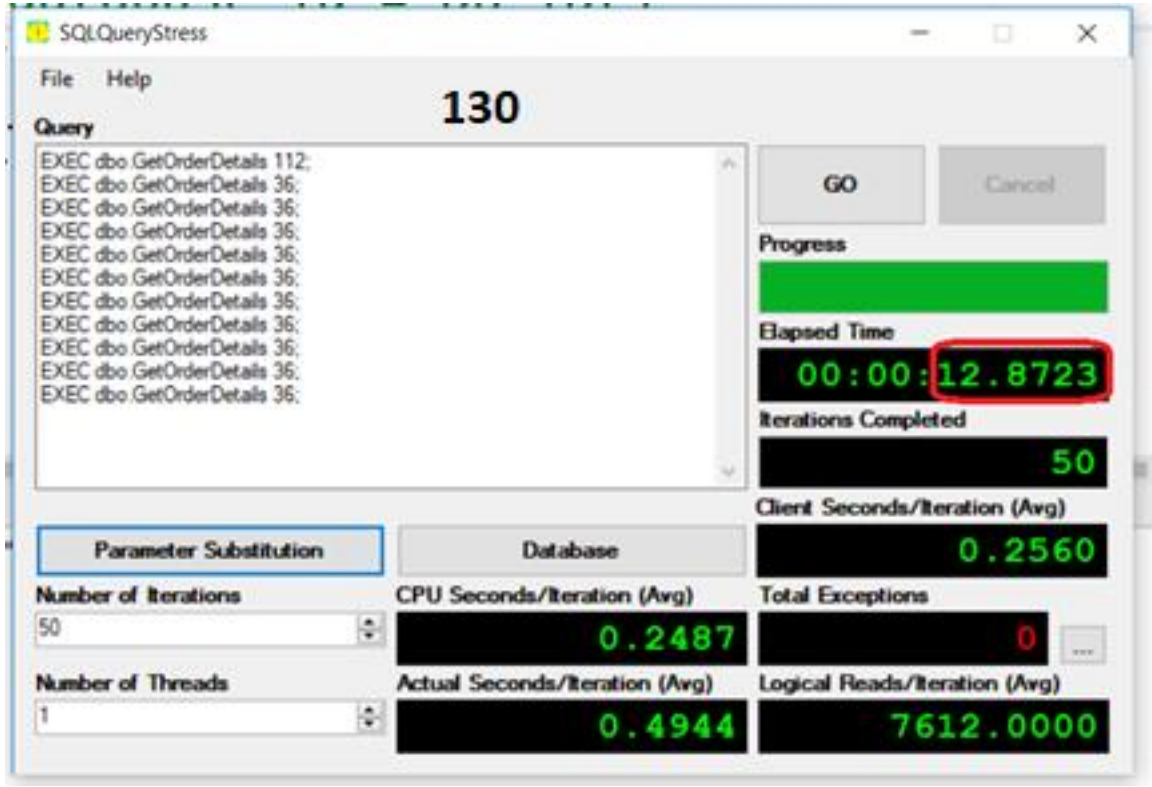
OSTRESS

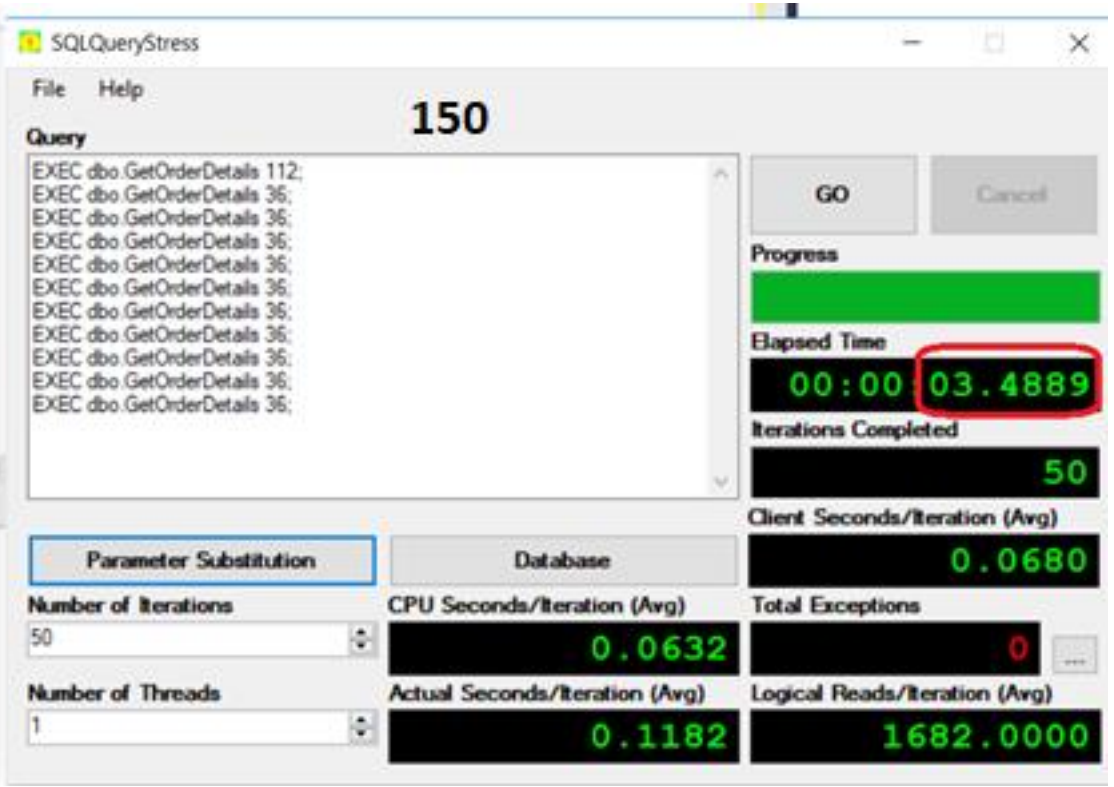
- RML Utilities (ostress tool)
- https://www.microsoft.com/en-us/download/details.aspx?id=4511



BATCH MODE ADAPTIVE JOIN

Q: Is it better with the new adaptive join operator?

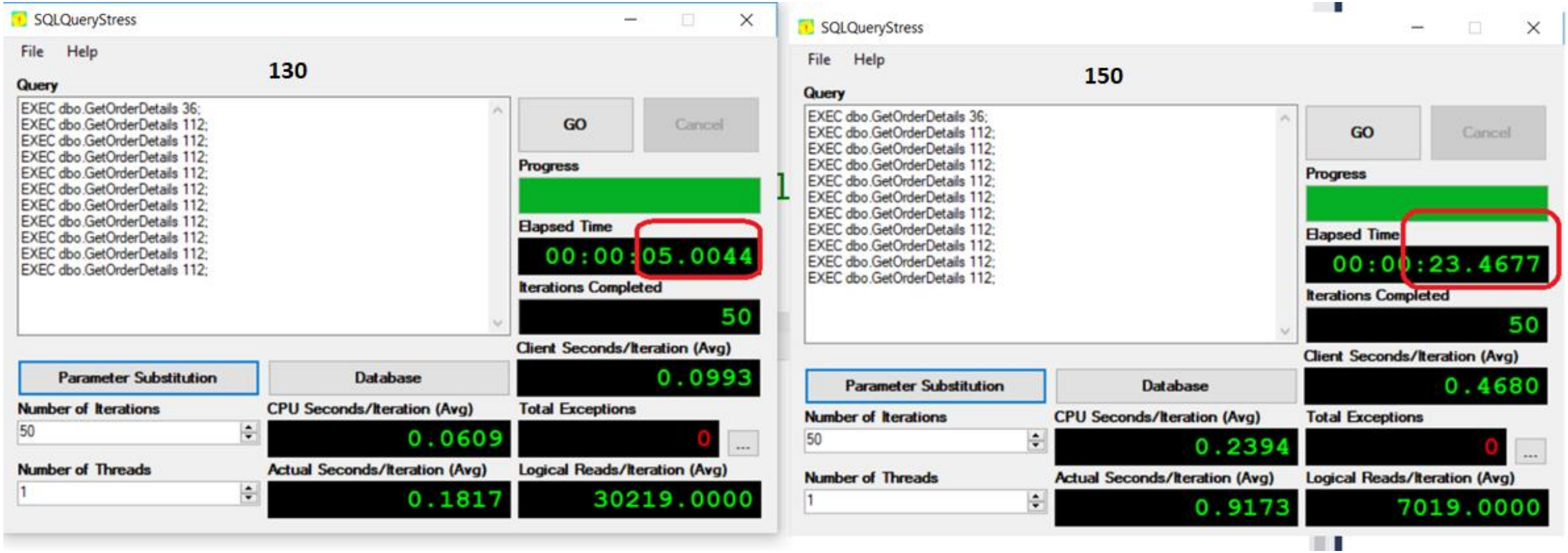




A: **YES!!! The query is 4x faster under the CL 150!**

BATCH MODE ADAPTIVE JOIN

Q: Is it better with the new adaptive join operator?



A: Actually NO - the query runs 5x slower under the CL 150!

AJ SETTINGS IN SQL SERVER 2017

- Default: OFF
- Enable :

```
ALTER DATABASE SCOPED CONFIGURATION SET
DISABLE_BATCH_MODE_ADAPTIVE_JOINS = OFF;
```

- Disable :
  - At the database level:

```
ALTER DATABASE SCOPED CONFIGURATION SET
DISABLE_BATCH_MODE_ADAPTIVE_JOINS = ON;
```

  - At the statement level:

```
OPTION(USE HINT('DISABLE_BATCH_MODE_ADAPTIVE_JOINS'));
```

AJ SETTINGS IN SQL SERVER 2019

- Default: OFF
- Enable:

```
ALTER DATABASE SCOPED CONFIGURATION SET BATCH_MODE_ADAPTIVE_JOINS = ON;
```

- Disable:
  - At the database level:

```
ALTER DATABASE SCOPED CONFIGURATION SET BATCH_MODE_ADAPTIVE_JOINS = OFF;
```

  - At the statement level

```
OPTION(USE HINT('DISABLE_BATCH_MODE_ADAPTIVE_JOINS'));
```

CONCLUSION

- 4. Join operator, can improve the performance of parameter-sensitive queries

- It can also cause regression
- Therefore - test, test, test!

- Enterprise Edition feature

- It only works in batch mode