SQL Server Plan Cache & Batch Compilation

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Terminologies

1. Plan Cache
2. Compilation & Recompilation
3. Statement level Recompilation since SQL 2005
4. DBCC FREEPROCCACHE
5. DBCC FLUSHPROCINDB

Adhoc Query caching

✓ A batch that contains a SELECT/INSERT/UPDATE/DELETE statement
✓ Exact text match of the query is needed to be cached
✓ Query text should be both space and case sensitive

Parameterization

- ✓ What is Parameterization ?
- ✓ Parameterization types
- ✓ Simple Parameterization or
       Auto Parameterization
- ✓ Forced Parameterization

Auto Parameterization

✓ SQL Server treats the constants as parameters

✓ Thus SQL Server reuses the same plan reducing the need to compile and generate new plan

✓ Drawbacks due to change in data type

Forced Parameterization

✓ SQL will consider all the parameters as constants
✓ Thus it uses the same plan for all the parameters thereby reducing the need to compile and generate a new plan
✓ Alternative is to use plan guides

Prepared Queries

✓ Helps in plan reuse using sp_executesql
✓ Uses dynamic sql and hence needs to be used appropriately to avoid SQL injections

Parameter Sniffing

✓ SQL Server sniffs the query parameter during 1st invocation and generates plan based on them
✓ 1st Invocation is when the query is run the 1st time or if its run the 1st time since the cache is cleared
✓ Skewed plan cached due to atypical values causes a serious performance problem

Factors affecting plan reuse

✓ A batch with literal > 8KB
✓ Few SET options like Quoted Identifier, Ansi nulls, Ansi padding etc
✓ Batches with unqualified object names
✓ Create procedure with RECOMPILE
✓ EXEC proc with recompile

Recompilation Threshold
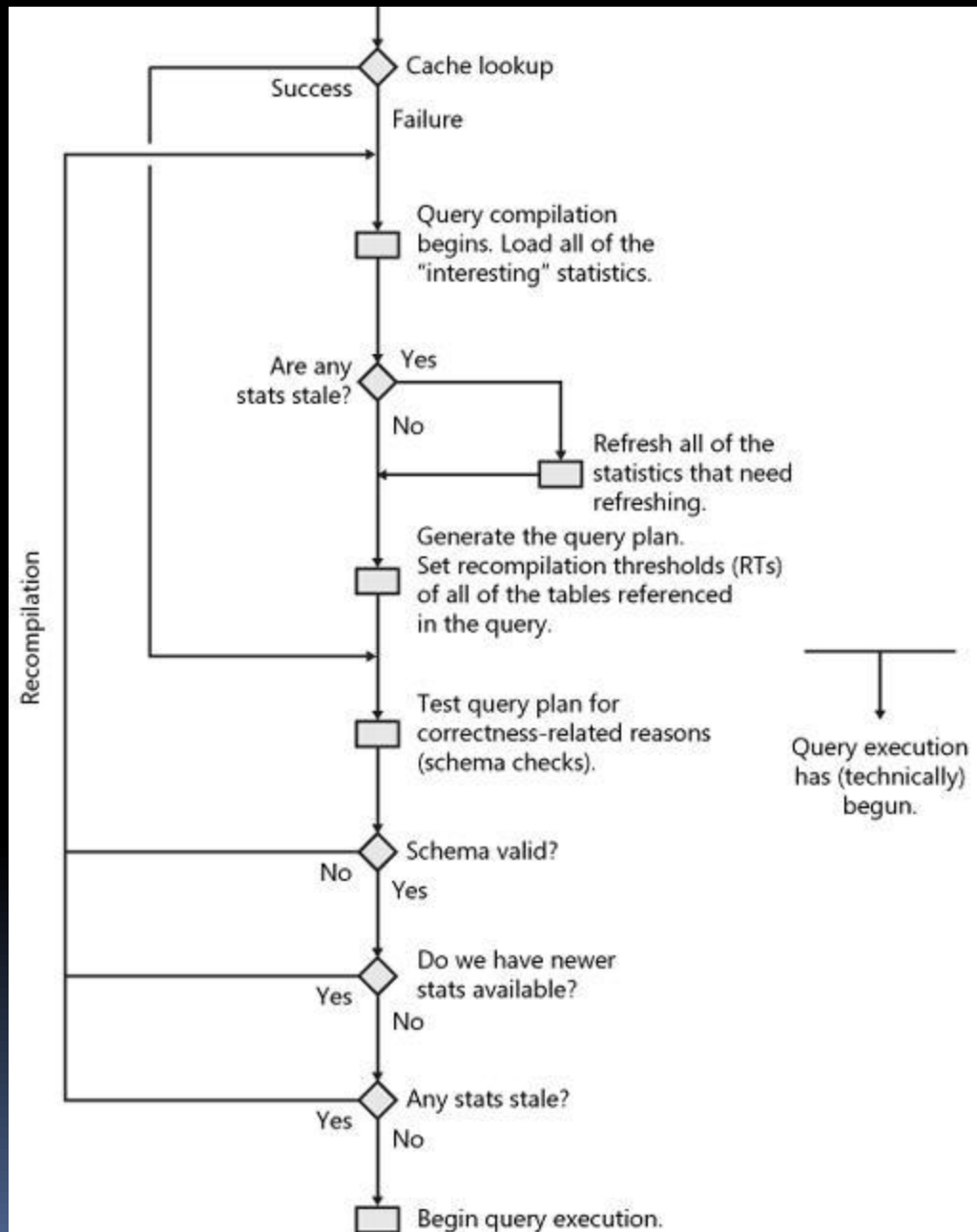
Permanent table – If n<=500 , RT=500
IF n>500 , RT=500 + 0.2 *n

Temporary table – If n<6 , RT=6
If 6<=n<=500, RT=500. If n>500, RT=500 + 0.2 * n

For table variables RT does not exists. Hence recompilation does not happen because of changes in cardinality of Table variables

| card(snapshot) – card(current) | >= RT

Cache lookup

Success

Failure

Query compilation begins. Load all of the "interesting" statistics.

Are any stats stale? — Yes

No

Refresh all of the statistics that need refreshing.

Generate the query plan. Set recompilation thresholds (RTs) of all of the tables referenced in the query.

Test query plan for correctness-related reasons (schema checks).

Query execution has (technically) begun.

Schema valid?

No

Yes

Do we have newer stats available?

Yes

No

Any stats stale?

Yes

No

Begin query execution.

Recompilation

Resources