Practical 10: Concurrency scenario configuration and its impact on performance

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I. INTRODUCTION

Aim of this practical is to demonstrate any one concurrency scenario configuration and its impact on performance.

Table-level locks Available lock modes in PostgreSQL (used automatically; can also acquire explicitly)	
Lock	Context
ACCESS SHARE	The SELECT command acquires a lock of this mode on referenced tables. In general, any query that only reads a table and does not modify it will acquire this lock mode.
ROW SHARE	The SELECT FOR UPDATE and SELECT FOR SHARE commands acquire a lock of this mode on the target table(s) (in addition to ACCESS SHARE locks on any other tables that are referenced but not selected FOR UPDATE/FOR SHARE).
ROW EXCLUSIVE	The commands UPDATE, DELETE, and INSERT acquire this lock mode on the target table (in addition to ACCESS SHARE locks on any other referenced tables). In general, this lock mode will be acquired by any command that modifies data in a table.
SHARE UPDATE EXCLUSIVE	Acquired by VACUUM (without FULL), ANALYZE, CREATE INDEX CONCURRENTLY, CREATE STATISTICS and ALTER TABLE VALIDATE and other ALTER TABLE variants (for full details see ALTER TABLE).
SHARE	Acquired by CREATE INDEX (without CONCURRENTLY).
SHARE ROW EXCLUSIVE	Acquired by CREATE COLLATION, CREATE TRIGGER, and many forms of ALTER TABLE (see ALTER TABLE).
EXCLUSIVE	Acquired by REFRESH MATERIALIZED VIEW CONCURRENTLY.

ACCESS EXCLUSIVE[1]	Acquired by the DROP TABLE, TRUNCATE, REINDEX, CLUSTER, VACUUM FULL, and REFRESH MATERIALIZED VIEW (without CONCURRENTLY) commands. Many forms of ALTER TABLE also acquire a lock at this level. This is also the default lock mode for LOCK TABLE statements that do not specify a mode explicitly.

Once acquired, a lock is normally held till end of transaction. But if a lock is acquired after establishing a savepoint, the lock is released immediately if the savepoint is rolled back to. This is consistent with the principle that ROLLBACK cancels all effects of the commands since the savepoint. The same holds for locks acquired within a PL/pgSQL exception block: an error escape from the block releases locks acquired within it.

II. Summary

Requested Lock Mode	Current Lock Mode							
	ACCESS SHARE	ROW SHARE	ROW EXCLUSIVE	SHARE UPDATE EXCLUSIVE	SHARE	SHARE ROW EXCLUSIVE	EXCLUSIVE	ACCESS EXCLUSIVE
ACCESS SHARE								X
ROW SHARE							X	X
ROW EXCLUSIVE					X	X	X	X
SHARE UPDATE EXCLUSIVE				X	X	X	X	X
SHARE			X	X		X	X	X
SHARE ROW EXCLUSIVE			X	X	X	X	X	X
EXCLUSIVE		X	X	X	X	X	X	X
ACCESS EXCLUSIVE	X	X	X	X	X	X	X	X

PostgreSQL is an advanced RDBMS, with a solid foundation. The main service PostgreSQL implements to its users is a correct handling of concurrent operations. In the SQL model, that means handling both transactions and isolation levels.

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[1] Only an ACCESS EXCLUSIVE lock blocks a SELECT (without FOR UPDATE/SHARE) statement.