**Key Differences Between SQL Server and PostgreSQL**

**1. Architecture**

**SQL Server:** Instance-based. Databases live inside an instance.

**PostgreSQL:** Cluster-based. A cluster contains multiple databases, shared roles, shared configuration.

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**2. Authentication & Security**

**SQL Server:** Windows authentication, SQL logins, server roles + database users.

**PostgreSQL:** Controlled by pg_hba.conf. Roles are cluster-wide. Authentication methods include SCRAM, MD5, SSPI, and certificate-based auth.

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**3. Concurrency Model**

**SQL Server:** Readers block writers unless RCSI/SI is enabled. Writers block readers.

**PostgreSQL:** MVCC always on. Readers never block writers. Writers only block writers.

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**4. Cleanup & Maintenance**

**SQL Server:** Ghost cleanup, index rebuild/reorganize, auto statistics.

**PostgreSQL:** VACUUM and autovacuum remove dead tuples. ANALYZE updates statistics. Table bloat possible if autovacuum is misconfigured.

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**5. Backup & Recovery**

**SQL Server:** Full, differential, and log backups. Native compression. PITR via log chain.

**PostgreSQL:** Logical backups (pg_dump) and physical backups (pg_basebackup). WAL archiving required for PITR.

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**6. Query Optimizer & Execution Plans**

**SQL Server:** Cached plans, parameter sniffing, rich graphical plans.

**PostgreSQL:** Plans generated per execution unless prepared. No parameter sniffing. EXPLAIN/ANALYZE produces text-based output.

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**7. Indexing**

**SQL Server:** B-tree, columnstore, filtered indexes, included columns.

**PostgreSQL:** B-tree, Hash, GIN, GiST, BRIN. No included columns. Index-only scans depend on visibility map accuracy.

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**8. Job Scheduling**

**SQL Server:** SQL Server Agent built-in.

**PostgreSQL:** No native scheduler. Use cron, pgAgent, or the pg_cron extension.

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**9. Roles & Permissions**

**SQL Server:** Server-level logins + database users.

**PostgreSQL:** Roles are cluster-wide. Permissions apply across the cluster.

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**10. Tools & Ecosystem**

**SQL Server:** SSMS, Azure Data Studio, SQLCMD.

**PostgreSQL:** psql, pgAdmin, DBeaver, DataGrip, plus powerful extensions such as PostGIS and pg_stat_statements.