

Athena: Parquet vs Iceberg

Query Pruning • Schema Evolution • Data Versioning

Athena Query Comparison: Parquet vs Iceberg

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Plain Parquet Table

Query --> Partition Pruning
 --> Candidate Files
 --> Row Group Pruning (min/max from Parquet footer)
 --> Scan Rows --> Result

Notes:

- Only partitions and row group statistics are used.
- Schema changes: only add column works; others require new table/ETL.
- No time travel: always reads current files.

Iceberg Table

Query --> Iceberg Metadata (snapshot catalog)
 --> Candidate Snapshots
 --> Partition + File + Row Group Pruning (min/max stats)
 --> Schema Evolution Applied (add/rename/drop columns)
 --> Scan Only Relevant Rows --> Result

Notes:

Athena Querying Iceberg Snapshots

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Snapshot 1 (t0)

Columns: id, name, age

Files: f1, f2

Row Groups: rg1, rg2

Snapshot 2 (t1) – Add column "email"

Columns: id, name, age, email

Files: f3, f4

Row Groups: rg3, rg4

Snapshot 3 (t2) – Rename "name" -> "full_name"

Columns: id, full_name, age, email

Files: f5, f6

Row Groups: rg5, rg6

Query Example:

SELECT full_name, age, email

FROM iceberg_table

FOR TIMESTAMP AS OF t1

Schema Evolution Timeline: Parquet vs Iceberg

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t0 (Initial Schema)

Parquet: id, name, age

Iceberg: id, name, age

t1 (Add "email")

Parquet: id, name, age, email

- Old files missing 'email' return NULL
- No versioning

Iceberg: id, name, age, email

- Snapshot metadata tracks schema change
- Queries can time travel (old snapshots still valid)

t2 (Rename "name" -> "full_name")

Parquet: Requires new table/ETL

- Cannot rename in place
- Breaks backward compatibility

Iceberg: id, full name, age, email

Summary Table: Parquet vs Iceberg

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Feature	Parquet Table (Athena)	Iceberg Table (Athena)
Schema Evolution	Limited (add column only)	Full (add, rename, drop, type change)
Time Travel	Not supported	Snapshots + rollback + timestamp queries
Query Pruning	Partition + row group stats	Partition + file + snapshot-aware stats
Data Versioning	None	Automatic snapshots
ACID & Upserts	Not supported	ACID, MERGE INTO, deletes supported

