Athena: Parquet vs Iceberg

Detailed Conversation Transcript

Schema Upgrades in Athena

Athena stores schema in Glue catalog.
- Add column: supported (old files return NULL).
- Rename / Drop / Type change: not supported directly, often need new table/ETL.
- Partition management is manual.
Unlike Iceberg, Athena Parquet tables have limited schema evolution.

Schema vs Parquet Field Names

- Case-insensitive, but preserves names.
- Mapping is name-based first, then by position.
- Extra Athena columns → NULL.
- Extra Parquet columns → ignored.
- Nested structures require name match.
- Column types must be compatible.

Parquet vs Iceberg Comparison

Parquet:
- Simple, cost-effective, append-only.
- Limited schema evolution.
- No ACID, no time travel, no versioning.

Iceberg:
- Full schema evolution (add, rename, drop, type change).
- ACID and concurrent writes.
- Snapshots, rollback, time travel.
- Metadata-driven pruning (partition + file + row group).

Parquet Statistics in Athena

- Athena can use Parquet footer statistics (min/max, null counts).
- Row group pruning supported for numeric, string, timestamp.
- Distinct values not used for pruning.
- Effectiveness depends on row group size and data sorting.
- Iceberg extends pruning with file-level metadata.

Visual Diagrams

The following diagrams were generated during the conversation:
1. Query Flow: Parquet vs Iceberg.
2. Iceberg Snapshots with schema evolution.

Query Flow: Parquet vs Iceberg

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Athena Query Comparison: Parquet vs Iceberg

Parquet: Partition + Row group pruning
Iceberg: Snapshot-aware pruning + Schema evolution + ACID
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Iceberg Snapshots with Schema Evolution

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Iceberg Snapshots Over Time

Snapshot t0: id, name, age
Snapshot t1: + email
Snapshot t2: name -> full_name
Snapshot t3: drop age
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Schema Evolution Timeline

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Schema Evolution Timeline

Parquet: Add only; rename/drop = new table
Iceberg: Add, rename, drop, type change via metadata
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Summary Comparison Table

Summary Table

Parquet: Simple, cheap, no ACID, no time travel
Iceberg: Schema evolution, ACID, snapshots, time travel