

Output Modes

There are a few types of output modes.

- Append mode (default)** - This is the default mode, where only the new rows added to the Result Table since the last trigger will be outputted to the sink. This is supported for only those queries where rows added to the Result Table is never going to change. Hence, this mode guarantees that each row will be output only once (assuming fault-tolerant sink). For example, queries with only `select`, `where`, `map`, `flatMap`, `filter`, `join`, etc. will support Append mode.
- Complete mode** - The whole Result Table will be outputted to the sink after every trigger. This is supported for aggregation queries.
- Update mode** - (Available since Spark 2.1.1) Only the rows in the Result Table that were updated since the last trigger will be outputted to the sink. More information to be added in future releases.

Different types of streaming queries support different output modes. Here is the compatibility matrix.

Query Type	Supported Output Modes	Notes
Queries with aggregation	Aggregation on event-time with watermark	Append mode uses watermark to drop old aggregation state. But the output of a windowed aggregation is delayed the late threshold specified in <code>`withWatermark()`</code> as by the modes semantics, rows can be added to the Result Table only once after they are finalized (i.e. after watermark is crossed). See the Late Data section for more details. Update mode uses watermark to drop old aggregation state.
		Complete mode does not drop old aggregation state since by definition this mode preserves all data in the Result Table.
	Other aggregations	Since no watermark is defined (only defined in other category), old aggregation state is not dropped. Append mode is not supported as aggregates can update thus violating the semantics of this mode.

Queries with mapGroupsWithState		Update	
Queries with flatMapGroupsWithState	Append operation mode	Append	Aggregations are allowed after flatMapGroupsWithState.
	Update operation mode	Update	Aggregations not allowed after flatMapGroupsWithState.
Queries with joins		Append	Update and Complete mode not supported yet. See the support matrix in the Join Operations section for more details on what types of joins are supported.
Other queries		Append, Update	Complete mode not supported as it is infeasible to keep all unaggregated data in the Result Table.