

## ABSTRACT

This project seeks to create a dynamic range map function for Apache AsterixDB that would speed up query processing and automatically create indexes from datasets for interval join algorithms. Without the requirement for a SQL hint query, the function builds a range map for a specified interval, doing away with the need for manual dataset searches.

## INTRODUCTION

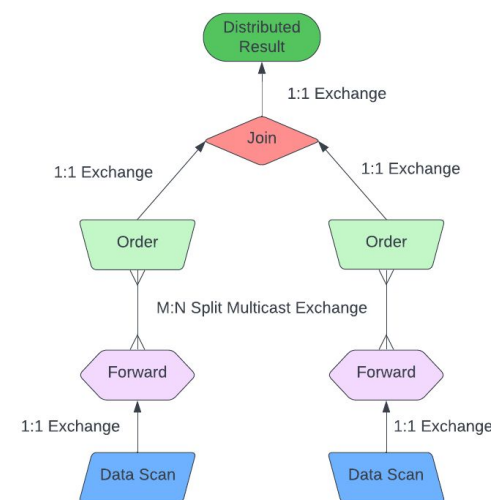
In the realm of database management systems, query processing efficiency and automatic index creation are vital for optimizing performance. This project focuses on addressing these challenges within Apache AsterixDB, a popular open-source database system. The main objective was to develop a dynamic range map function that significantly expedites query processing and automates index creation for interval join algorithms.

Traditional query processing often involves time-consuming manual dataset searches and the utilization of SQL hint queries to perform interval join algorithms. These manual interventions can be cumbersome and inefficient. To overcome these limitations, the project successfully created a range map function that eliminates the need for such manual interventions.

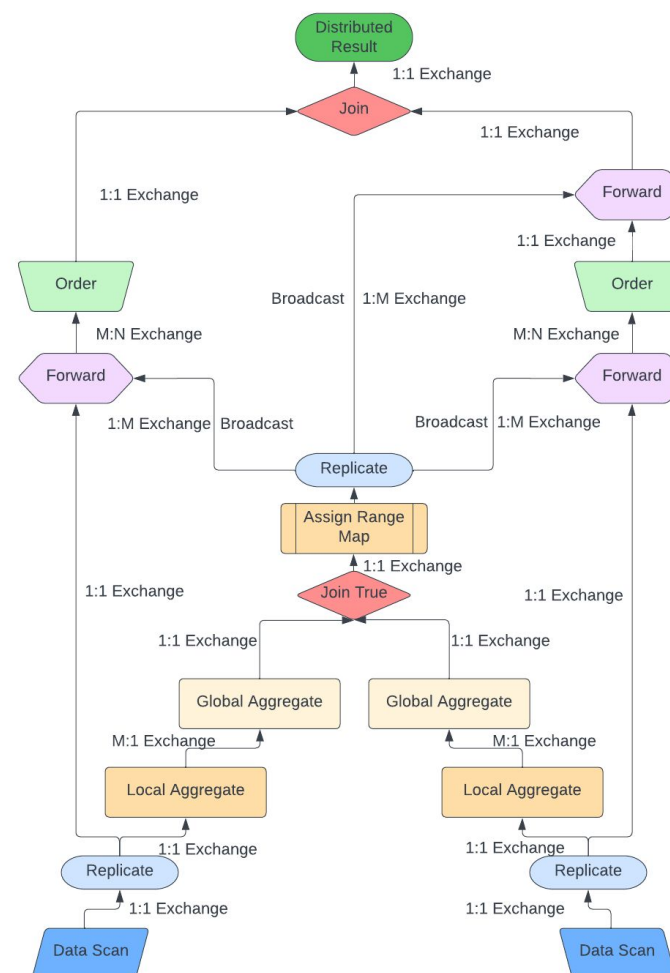
## RANGEMAP AND QUERY PLAN

The query plan for the interval join algorithm involves building a dynamic workflow to compute the range of intervals for both the left and right branches. An inner join operator identifies the overlaps between the ranges and stores them in a range map. The range map is replicated and distributed to forward operators. Partitioning exchange operators are then used to partition the intervals. Finally, an interval merge join physical operator is set to perform the join efficiently using the generated range map.

Interval Join With Static Hint



Interval Join With Dynamic Hint



## CHALLENGES

Undoubtedly, the most challenging aspect of the project revolved around formulating the logical and physical execution plan for the query. This intricate process entailed the implementation of exchange, replicate, and forward operators, all vital components necessary to successfully execute the query plan.

## SUMMARY

In conclusion, This project has successfully developed a dynamic range map function for Apache AsterixDB, addressing the challenges of query processing efficiency and automatic index creation. By eliminating manual dataset searches and SQL hint queries, the function expedites query processing and automates index creation for interval join algorithms. Its implementation has improved the overall performance and scalability of Apache AsterixDB, providing users with an enhanced database management experience.

## REFERENCES

- <https://asterixdb.apache.org>
- <https://github.com/apache/asterixdb/>
- <https://github.com/prestoncarman/asterixdb/tree/cherbel/dynamic-range-hint>