

Mutable FST In Pinot

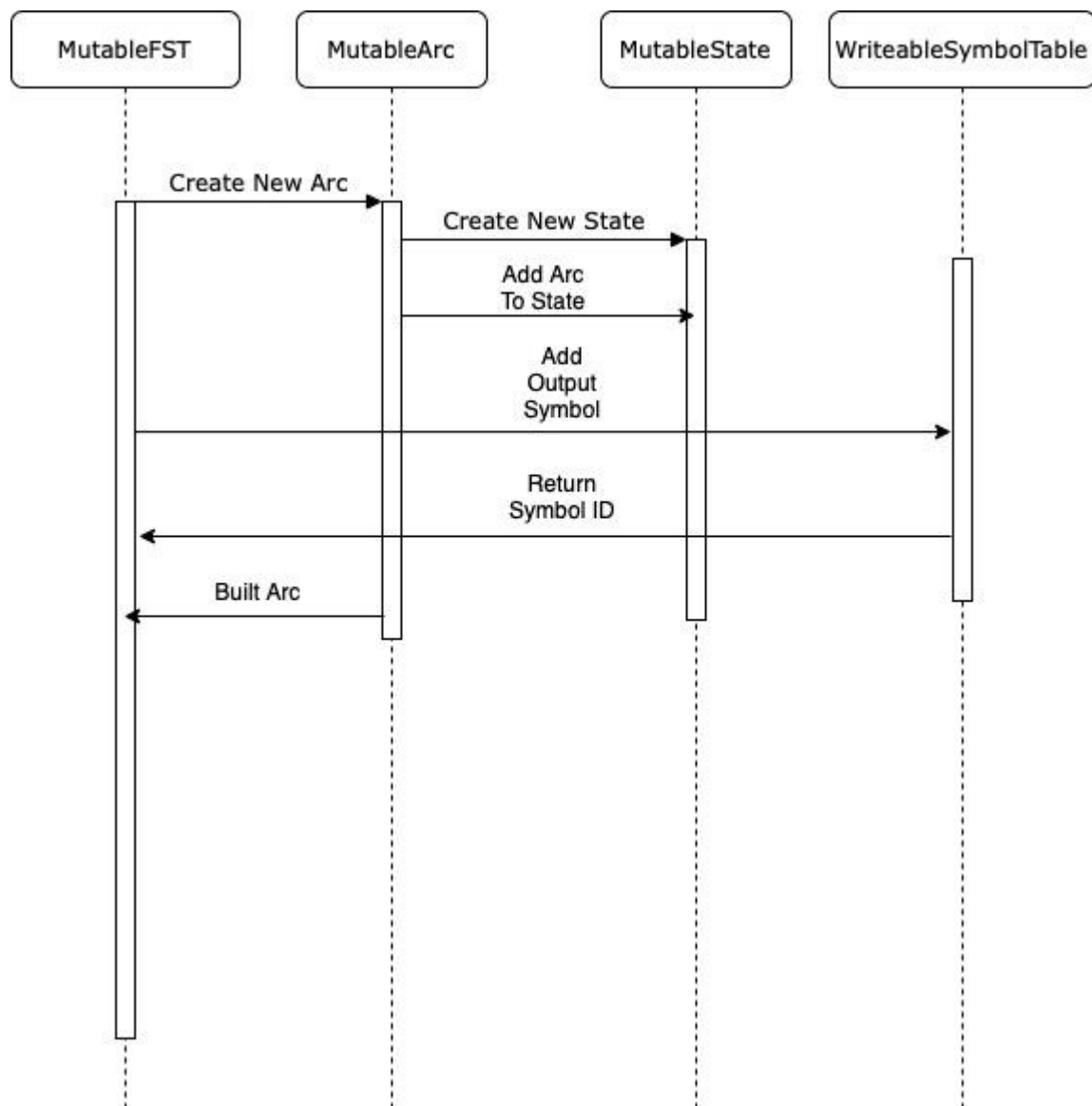
Summary

This document encapsulates the design for mutable finite state transducer support in the journey of native text indices in Pinot.

Mutable FST enables users to perform text searches on real time data without requiring the segment to be flushed to disk as is in the status quo. The FST is built in real time, and serves queries in real time on the data updated. **So, essentially, we will be able to support in-memory text search, using text indices.**

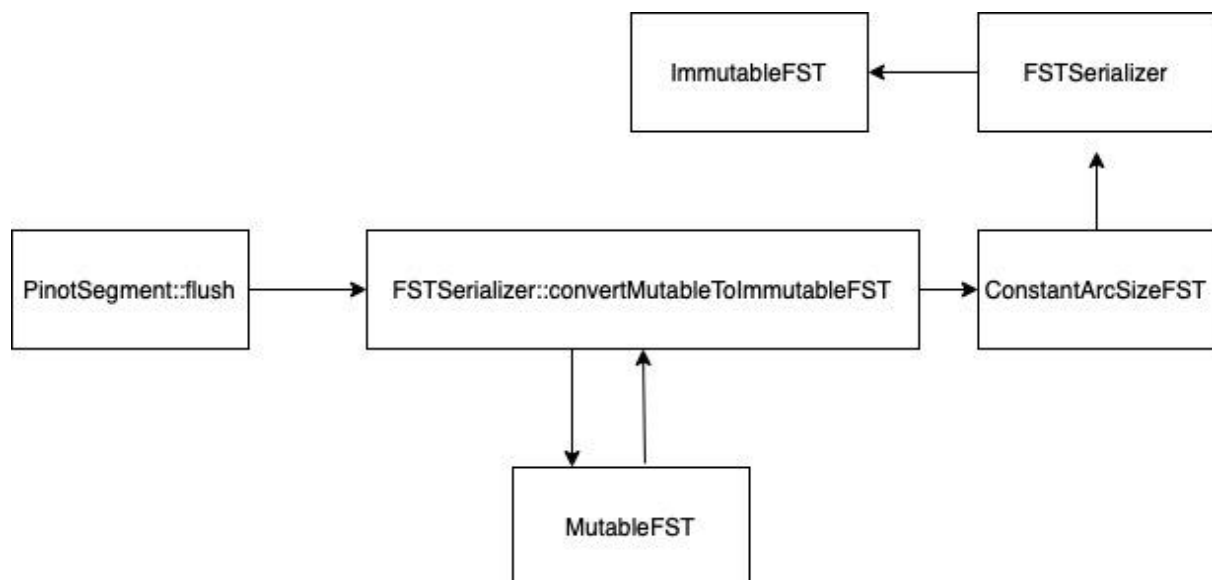
This feature is ground breaking because no existing database allows real time text search using indices. Pinot will be the pioneer in this field.

Mutable FST Creation Flow



Search will proceed in the same way as today.

Mutable To Immutable (Persisted) FST Transformation



New Components

MutableFST -- FST which can be added to and modified in real time, and allows searching on its data in real time as well.

MutableArc -- An arc in the FST which represents a mutable transition. The transition can be modified.

MutableState -- Represents a mutable state in the FST

WriteableSymbolTable -- A symbol table which can be modified and added to. This is an interface representing a mutable table.

MutableSymbolTable -- Default implementation of **WriteableSymbolTable**

FrozenMutableTable -- An implementation of **WriteableSymbolTable** which freezes the underlying storage, thus being shareable amongst multiple **MutableFSTs**.

Salient Features

- MutableFST does not follow the FST interface since the native FST interface is designed for immutable FSTs.
- A single instance of MutableFST supports one writer, multiple readers concurrently.
- No need to flush every 30 seconds.

Implementation Plan

Item	Status	Depends On
Mutable FST Implementation	In Progress	
Mutable FST Based Search Operator	TBD	1.
Integration of operator and support for flush and transform to Immutable FST	TBD	2

End To End Flow

