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High Performance Column Store for PostgreSQL

Arul Shaji

Fujitsu Ltd.

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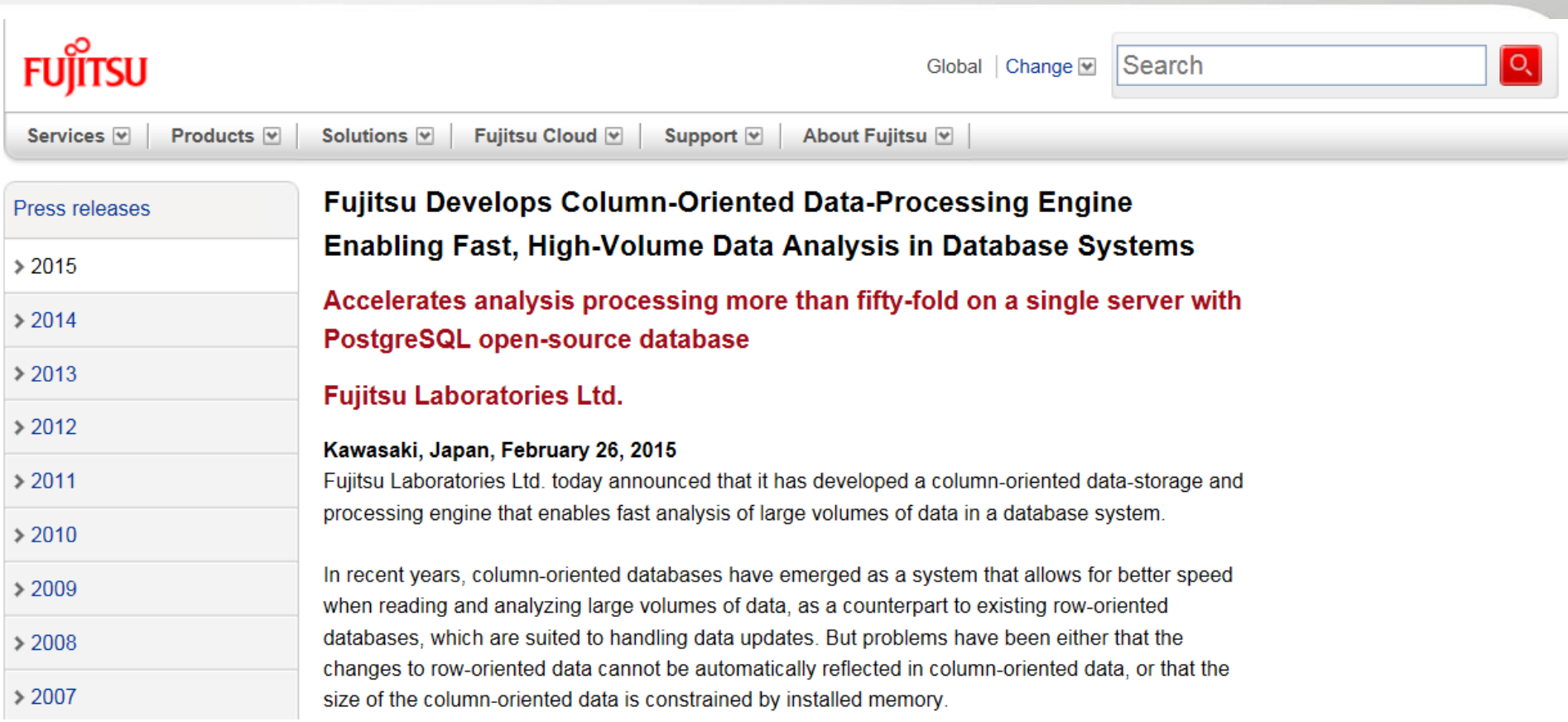
Early this Year ! ! ! !



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Fujitsu Develops Column-Oriented Data-Processing Engine Enabling Fast, High-Volume Data Analysis in Database Systems

Accelerates analysis processing more than fifty-fold on a single server with PostgreSQL open-source database

Fujitsu Laboratories Ltd.

Kawasaki, Japan, February 26, 2015

Fujitsu Laboratories Ltd. today announced that it has developed a column-oriented data-storage and processing engine that enables fast analysis of large volumes of data in a database system.

In recent years, column-oriented databases have emerged as a system that allows for better speed when reading and analyzing large volumes of data, as a counterpart to existing row-oriented databases, which are suited to handling data updates. But problems have been either that the changes to row-oriented data cannot be automatically reflected in column-oriented data, or that the size of the column-oriented data is constrained by installed memory.

- Minimum fifty fold increase for a query on DBT3 on select Hardware
- Thirteen-fold improvement on a single server with 16 CPU cores

Definition and Use Case

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OnLine miXed workload Processing (OLXP)

Requirements

- OLTP Performance
- Instant OLAP view of OLTP data
- Existing SQL interfaces
- Persistent OLAP records

Ad-hoc Queries

"Is there a regional variation for sales in the past six hours? "

Data Inputs

Real-Time Data

INSERT

Jason | New York | $10.00

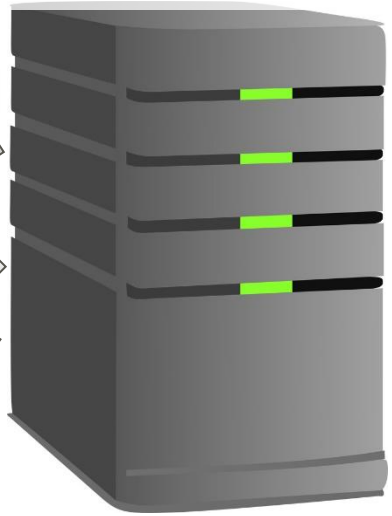
SELECT

Celia | Vancouver

DELETE

Linda | Toronto

OLXP Database



Column Store Index (CSI)

- In PostgreSQL
- Created as an extension

Others

- SAP HANA
- Oracle Database 12c
- Microsoft SQL server 2014

Column Store Architecture Overview

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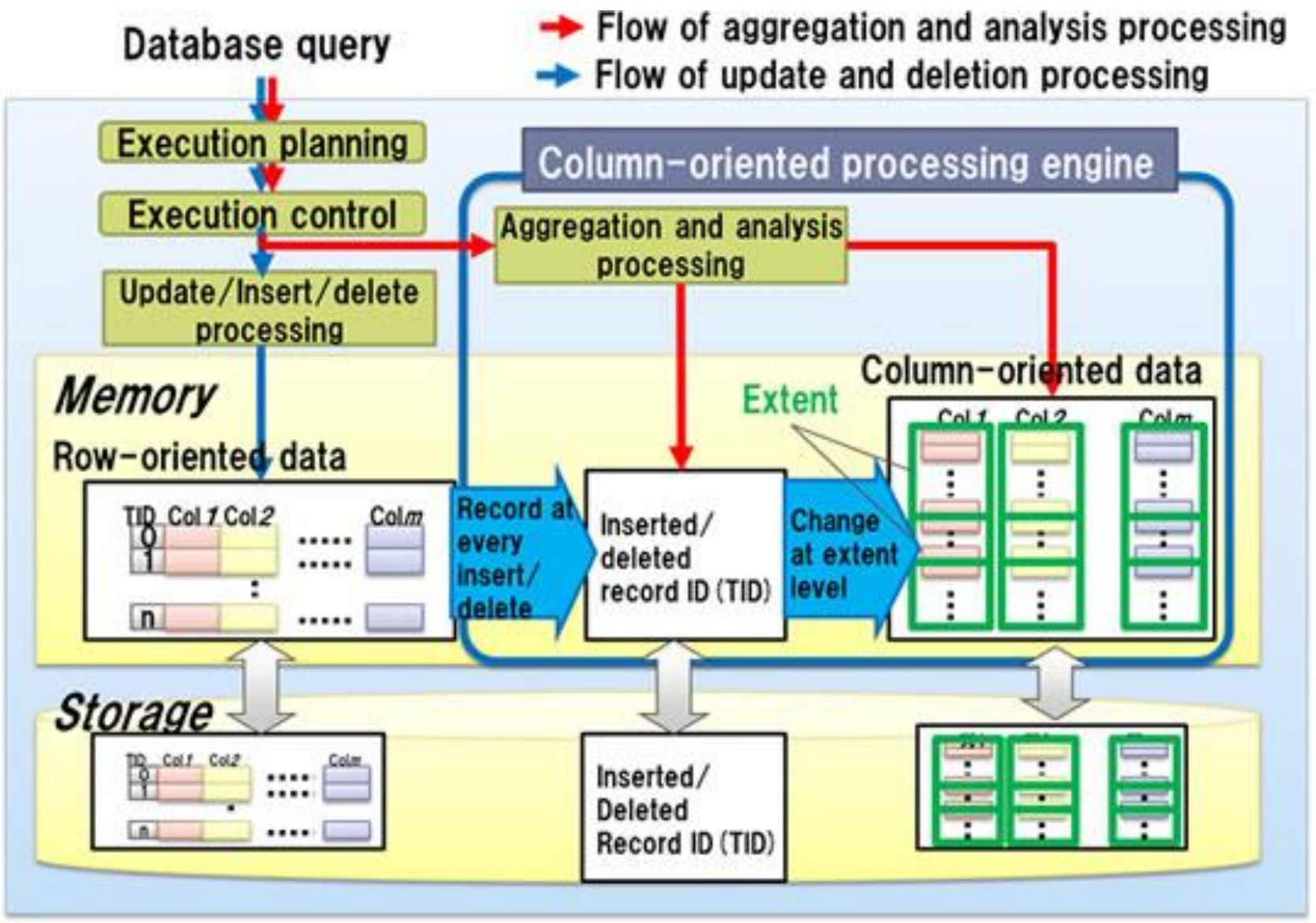

Components

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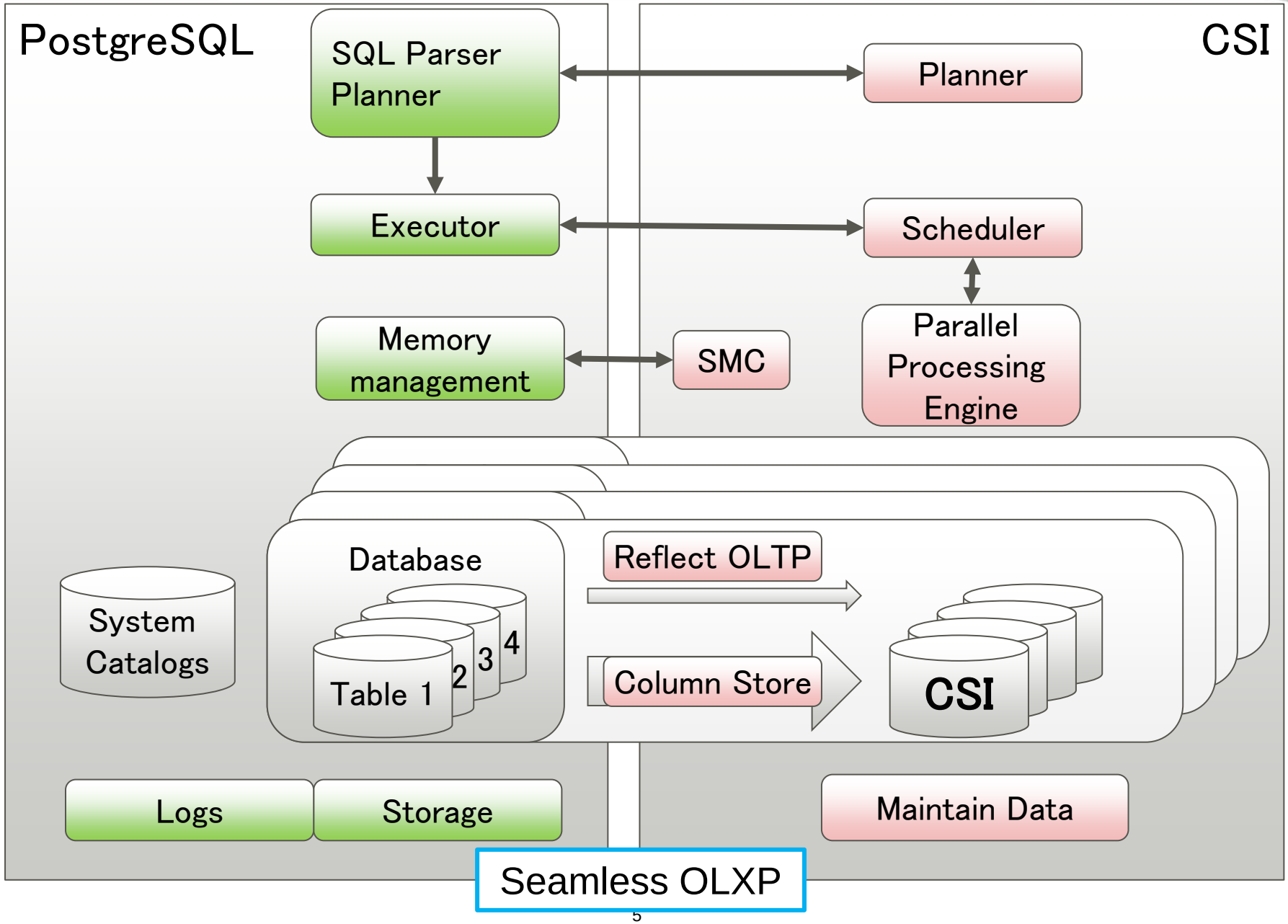

Creation of a Column Store Index

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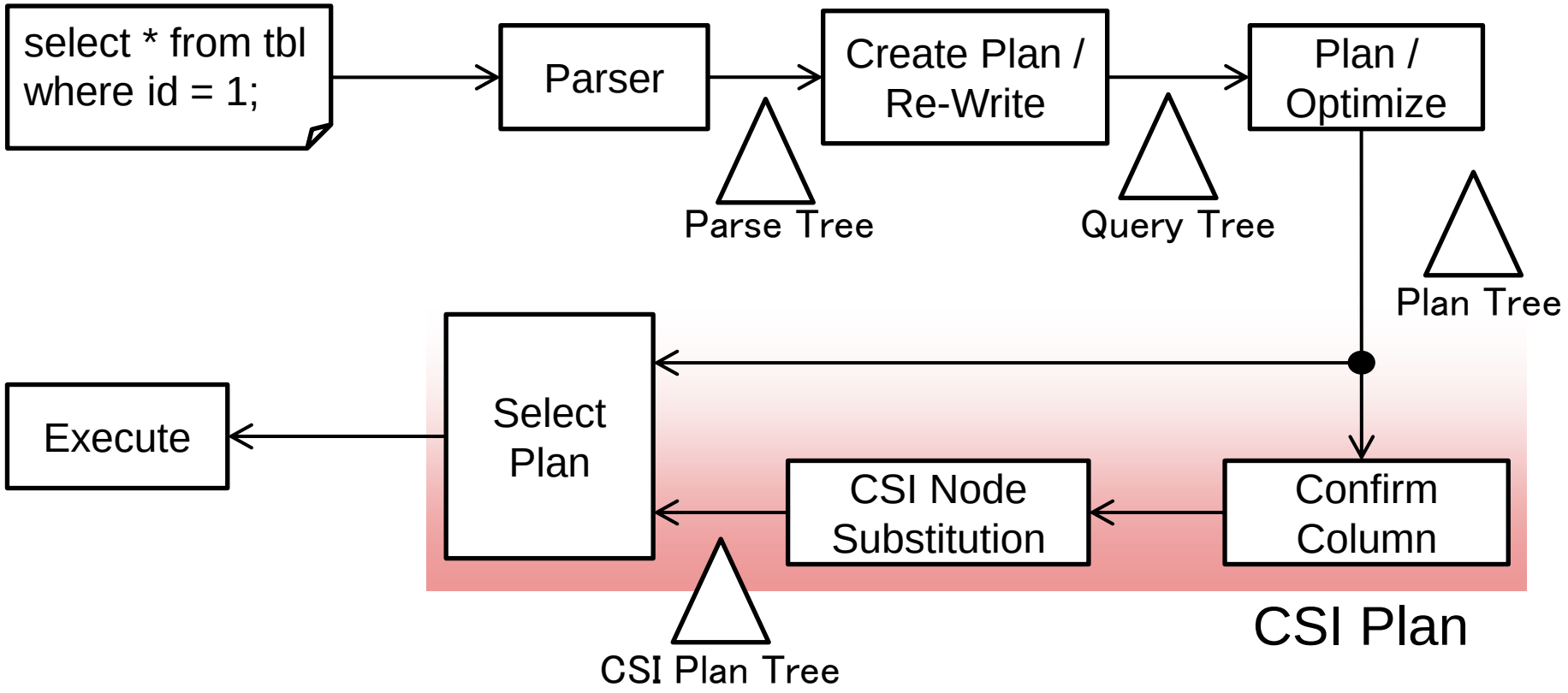
After a query plan is generated the normal way, a CSI Plan is also generated.



Column Store – How To

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- Setup Once. Create Extension.

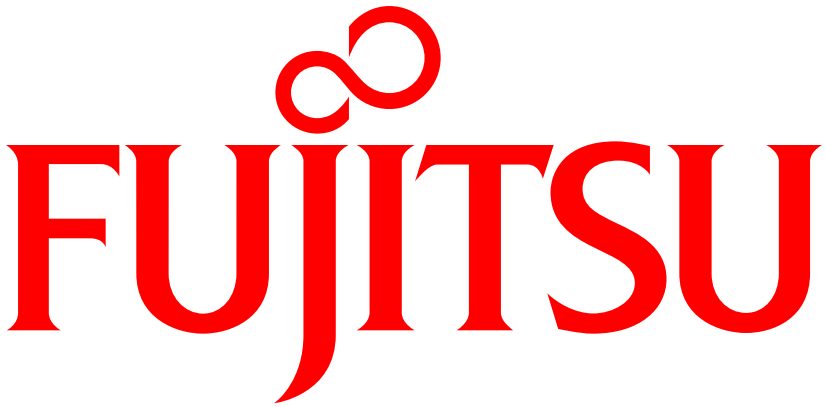
```
CREATE EXTENSION csi;
```

- Create Index. Once per table.

```
CREATE INDEX myCSIidx ON myTbl USING csi (Col1, Col2, ・・・);
```

- Issue Query. CSI used if eligible

```
SELECT cols FROM myTbl WHERE conditional expression ・・・;
```



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