



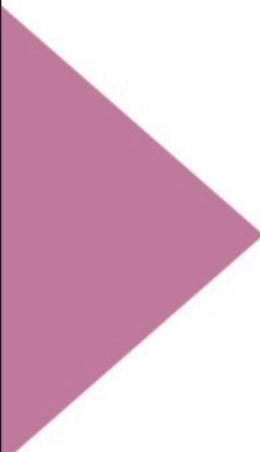
RDB & SQL

Session 13



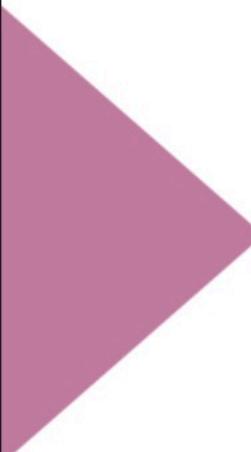
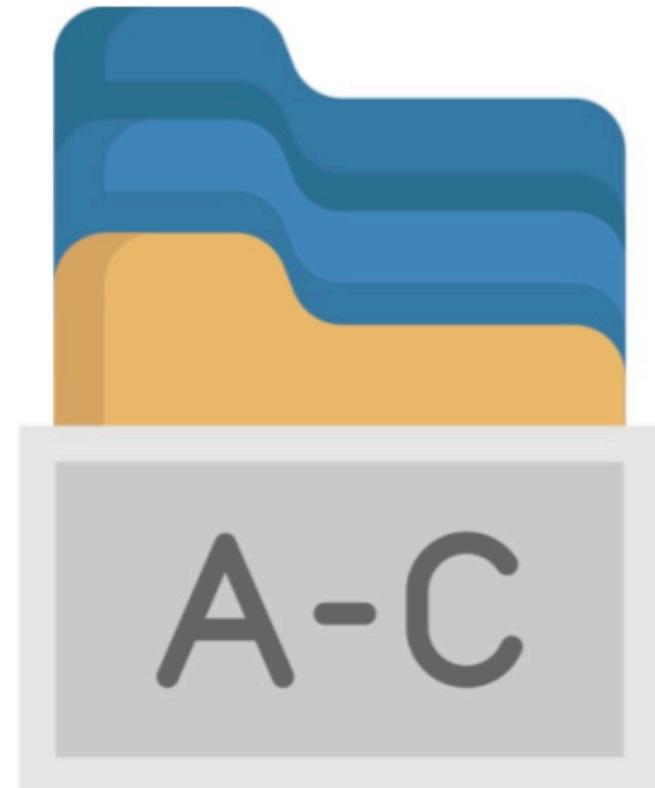


Database Indexes



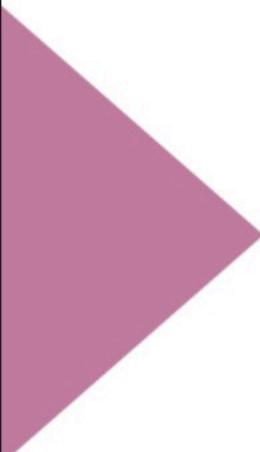
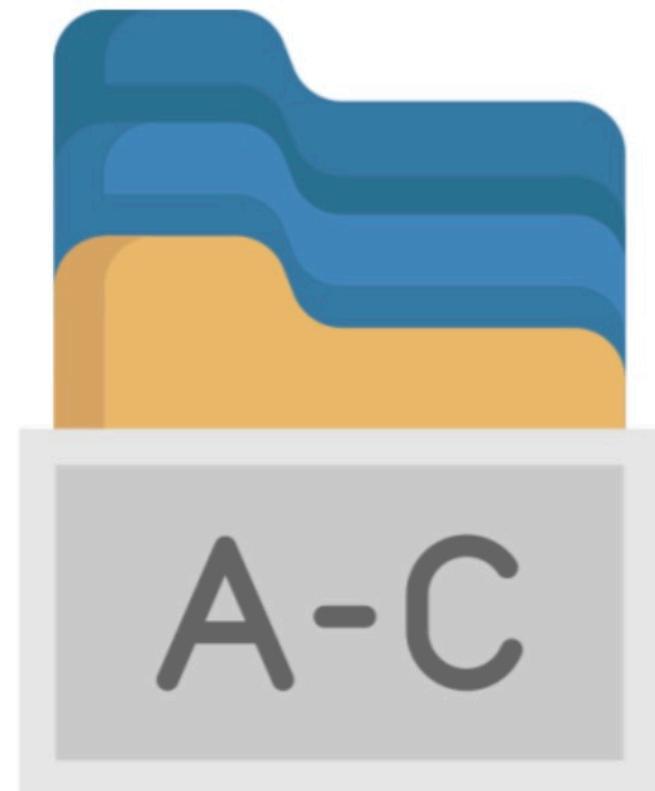


What is the Database Index?



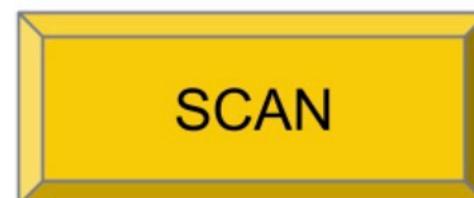


Why Indexes?

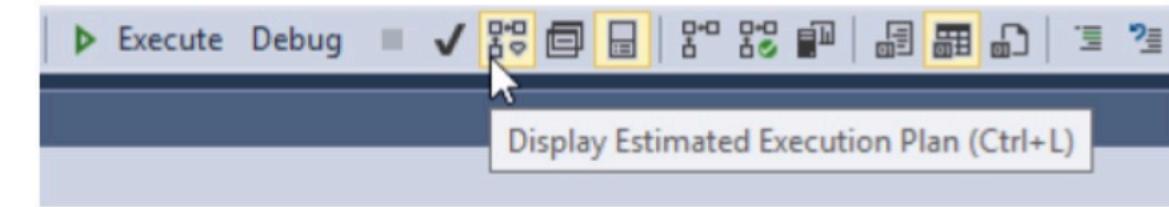


Database Scanning Methods

- ★ The right scan method to use is very much dependent on the use case and the state of the database at the time of scanning.



Query Planning



- ❖ The query planner optimizes a number of different variables within the request with the aim of reducing the overall execution time.
- ❖ Optimized parameters that correspond with the cost of sequential page fetches, CPU operations, and cache size.

It is important how to interpret the plan reported by the query planner.

Full Table Scan



Not the fastest

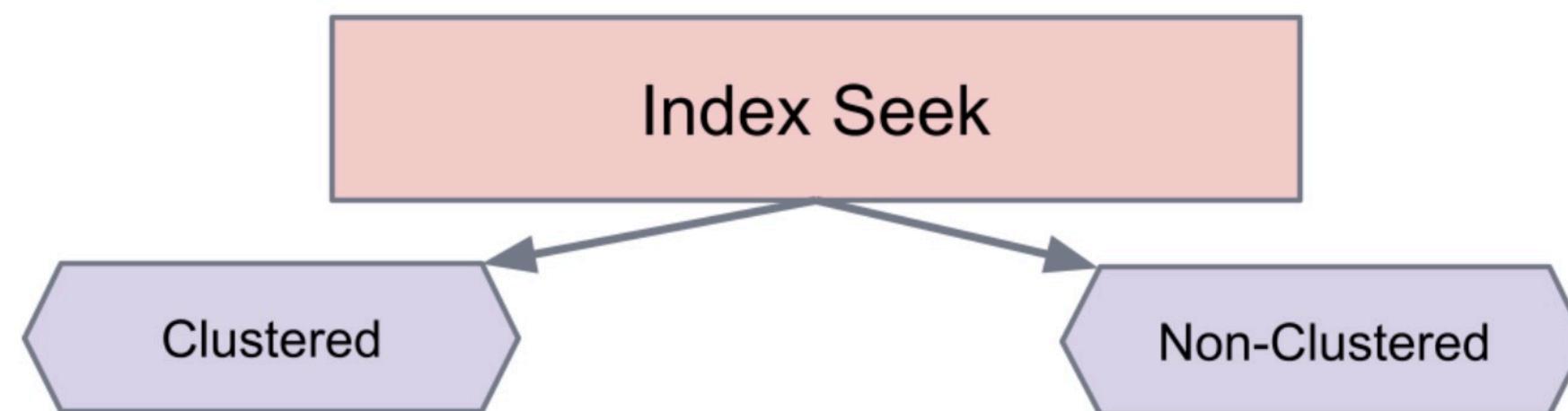
But always correct result

- ★ The table is quite small.
- ★ The field used in searching contains a large number of duplicates.
- ★ The planner determines that the sequential scan would be equally efficient or more efficient for the given criteria than any other scan.

Index Seek

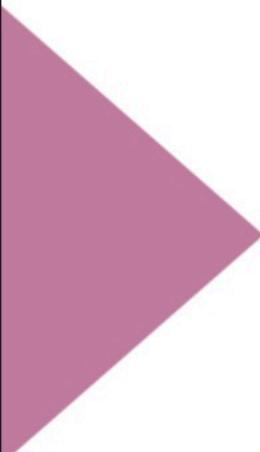


Index scans are provide improving the performance of our database queries.





Clustered Index



Clustered Index



- Sorting based on key values.
- Each table has **only one** clustered index.
- Clustered index uses a special structured so-called **B-tree** which enables searches, inserts, updates, and deletes in logarithmic amortized time.
- SQL Server automatically creates a corresponding clustered index based on columns included in the **primary key**.

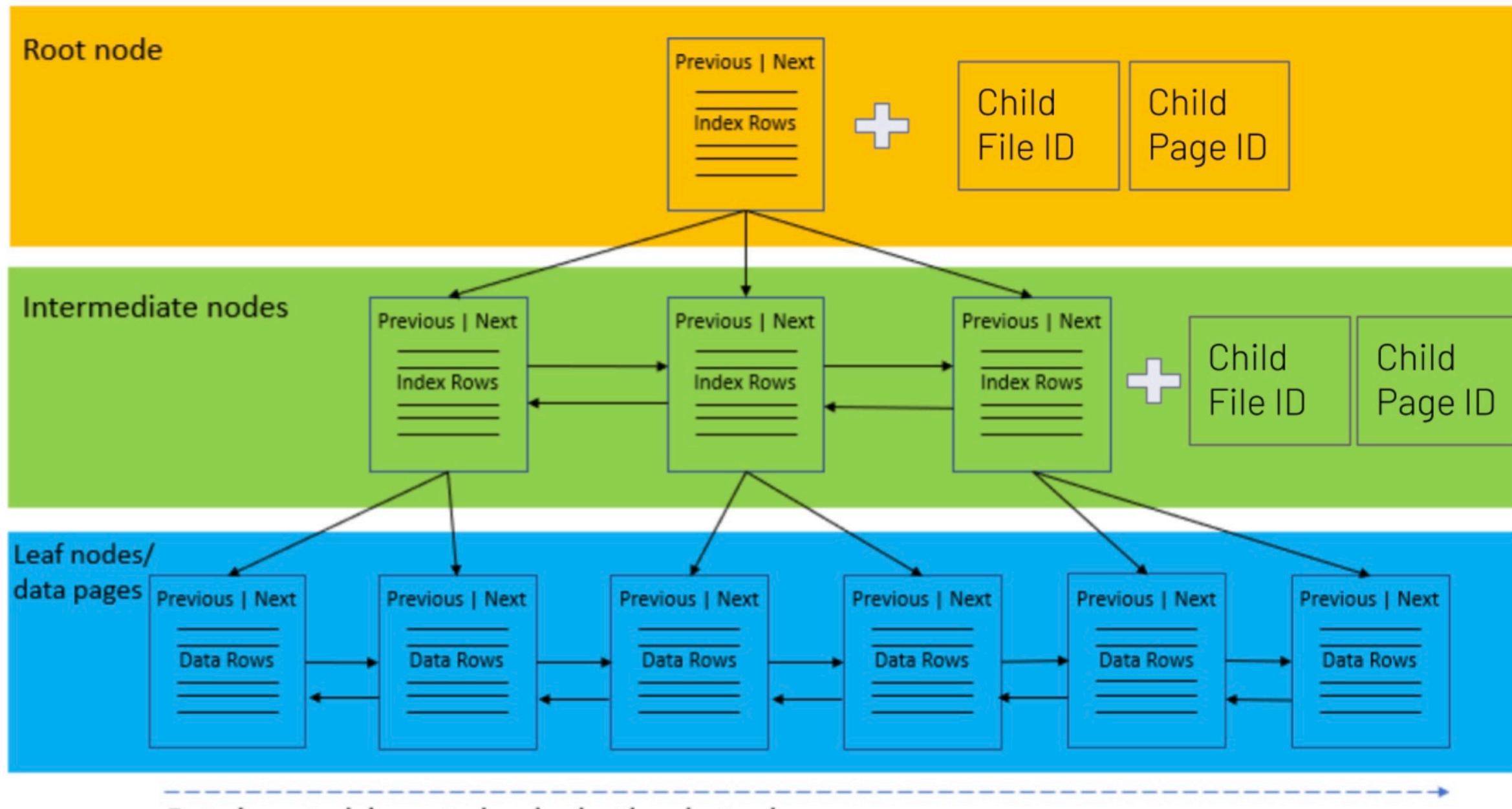
```
1 CREATE CLUSTERED INDEX index_name ON schema_name.table_name (column_list);  
2
```



Results Messages

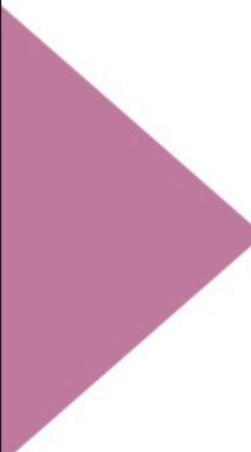
	customer_id	first_name	last_name	phone	email
1	1	Emily	Brooks	NULL	emily.brooks@yahoo.com
2	2	Katie	Toodei	NULL	katie.toodei@yahoo.com
3	3	Tameka	Fisher	NULL	tameka.fisher@aol.com
4	4	Daryl	Spence	NULL	daryl.spence@aol.com
5	5	Charolette	Rice	(916) 381-6003	charolette.rice@msn.com
6	6	Lyndsey	Bean	NULL	lyndsey.bean@hotmail.com
7	7	Latasha	Hays	(716) 986-3359	latasha.hays@hotmail.com

Clustered Index





NonClustered Index



Non-Clustered Index



- Sorts and stores data separately from the data rows in the table. It is a copy of selected columns.
- A table may have **one or more nonclustered indexes**.
- Each non-clustered index **may include one or more columns** of the table.
- Similar to a clustered index, a nonclustered index uses the **B-tree** structure to organize its data.
- Besides storing the index key values, the leaf nodes also store **row pointers**.



Non-Clustered Index

customer_id	first_name
1174	Aaron
338	Abbey
79	Abby
1224	Abram
673	Adam
1085	Adam
195	Addie
1261	Adelaida



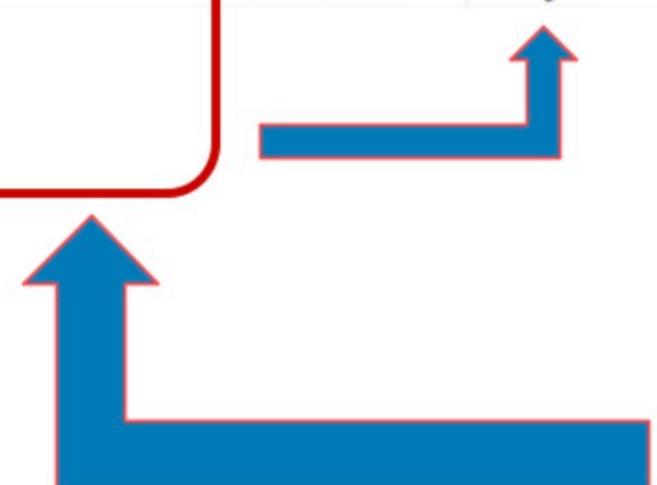
Clustered Index

	customer_id	first_name	last_name	phone	email
1	1	Emily	Brooks	NULL	emily.brooks@yahoo.com
2	2	Katie	Toodei	NULL	katie.toodei@yahoo.com
3	3	Tameka	Fisher	NULL	tameka.fisher@aol.com
4	4	Daryl	Spence	NULL	daryl.spence@aol.com
5	5	Charolette	Rice	(916) 381-6003	charolette.rice@msn.com
6	6	Lyndsey	Bean	NULL	lyndsey.bean@hotmail.com
7	7	Latasha	Hays	(716) 986-3359	latasha.hays@hotmail.com

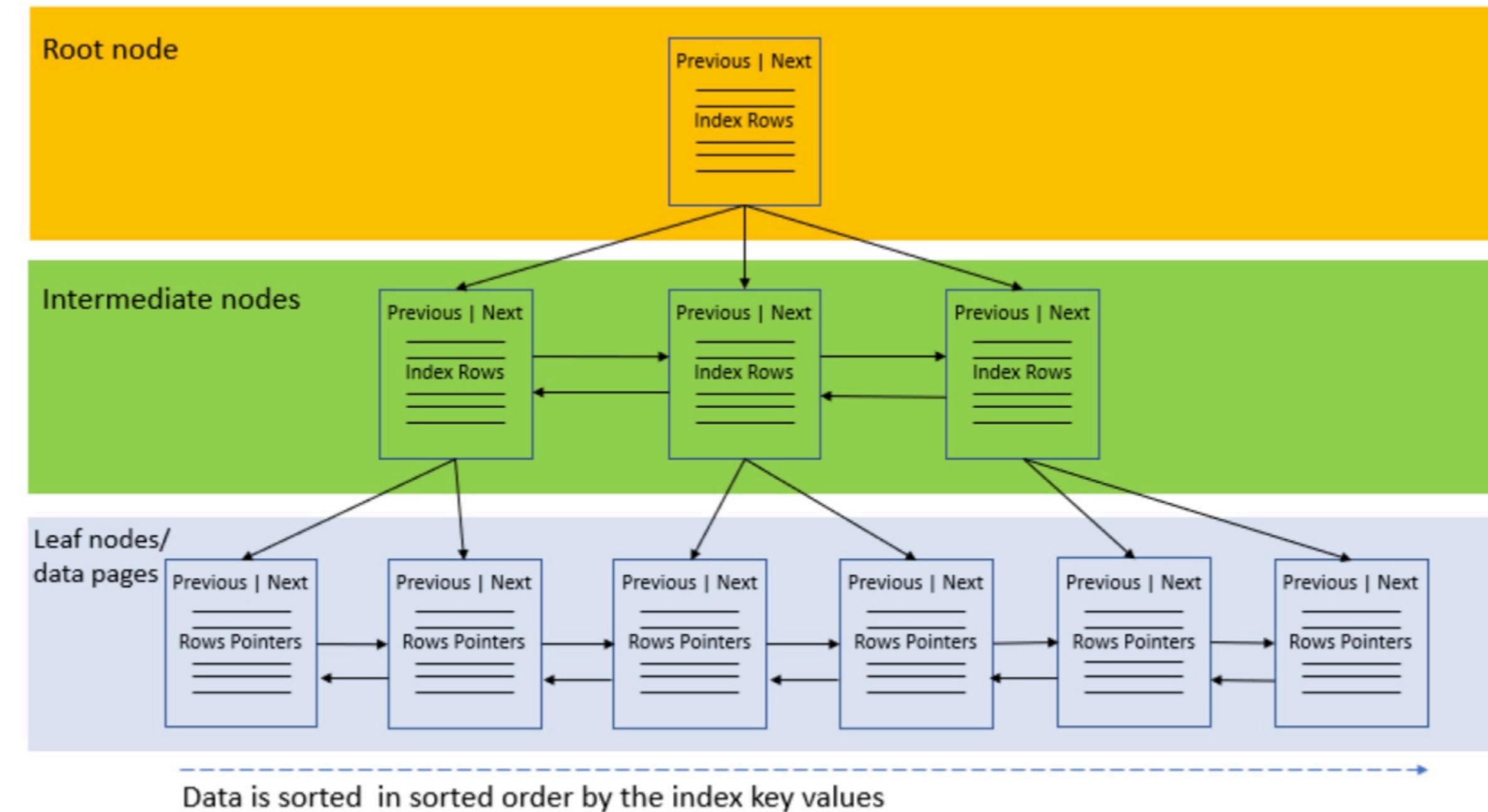
Non-Clustered Index

customer_id	first_name
1174	Aaron
338	Abbey
79	Abby
1224	Abram
673	Adam
1085	Adam
195	Addie
1261	Adelaida

Row Pointers



Non-Clustered Index



Advantages and Disadvantages of Indexes

Advantages of Indexes:

- Much better **SELECT** performance
- Quickly retrieve data

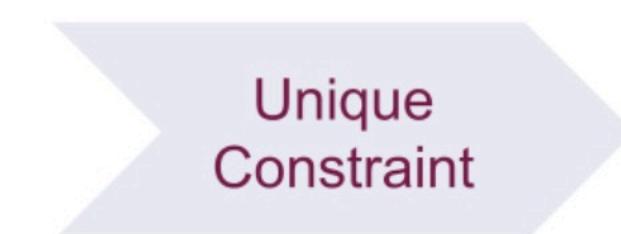
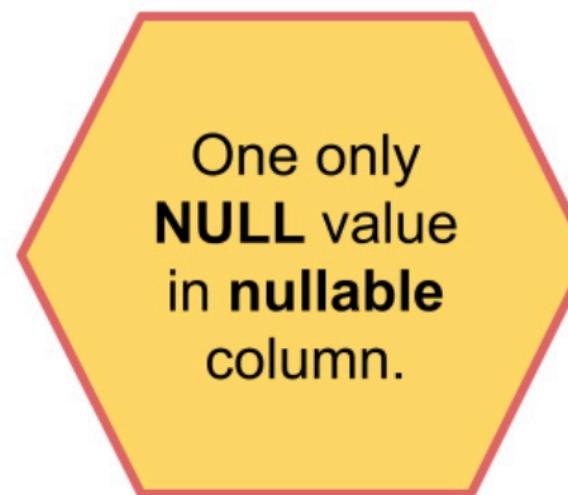
Disadvantages of Indexes:

- **INSERT, UPDATE** and **DELETE** becomes slower
- Take additional disk space

Unique Index



A unique index ensures the index key columns do not contain any duplicate values.



Disable - Enable - Drop Indexes

Disable Index

```
1 | ALTER INDEX index_name ON table_name DISABLE;  
2
```

Enable Index

```
1 | ALTER INDEX index_name ON table_name REBUILD;  
2
```

Drop Index
(Non-Clustered)

```
1 | DROP INDEX [IF EXISTS] index_name ON table_name;  
2
```

Is everything clear so far?



No Multiple Choice Response
You didn't answer this question



Students choose an option
REINVENT YOURSELF

Pear Deck Interactive Slide
Do not remove this bar

What is the database index? Why do we need nonclustered indexes?



No Text Response

You didn't answer this question



Students, write your response!

REINVENT YOURSELF

Pear Deck Interactive Slide
Do not remove this bar

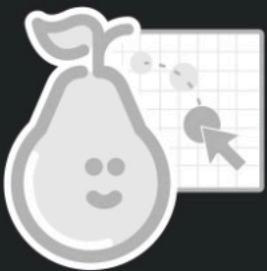
How well did you like this lesson?



Pear Deck
Interactive Slide
Do not remove this bar



Students, drag the icon!



No Draggable™ Response
You didn't answer this question