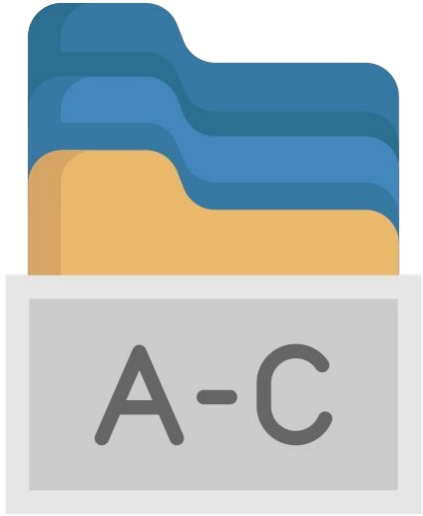

ondia

Relational DB
&
SQL

Session 13

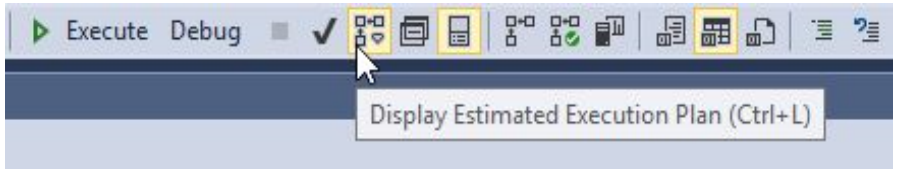
Database Indexes



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.

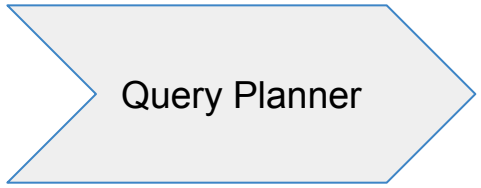
Full Table Scan

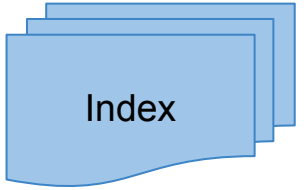
Not the fastest

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

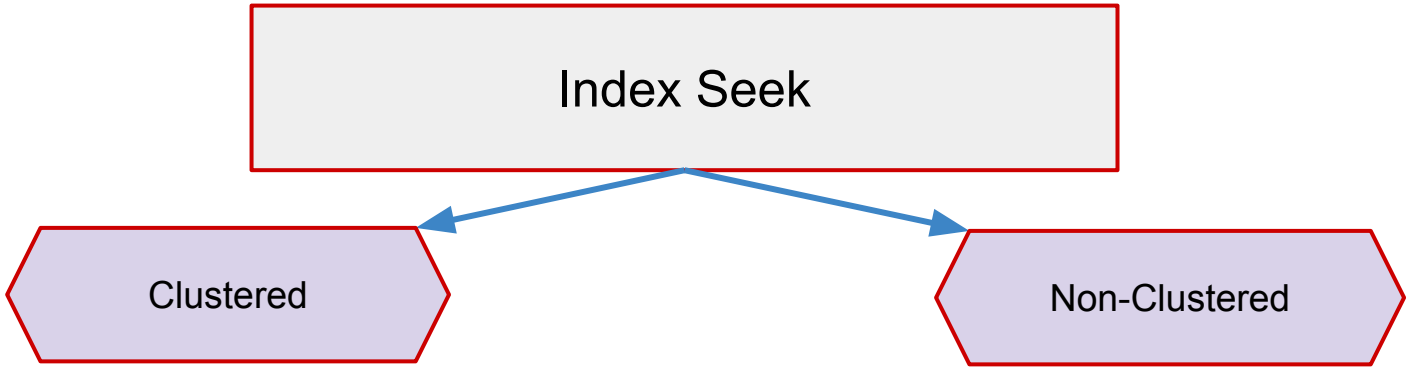




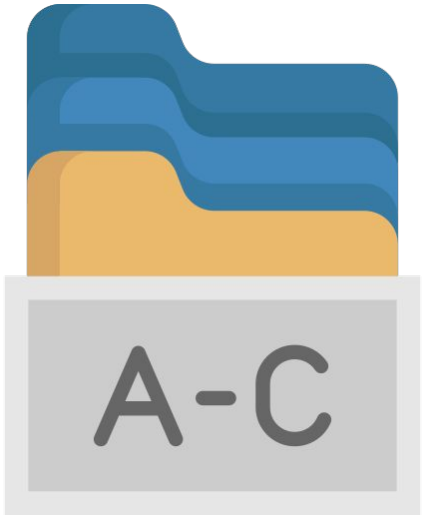
Just like the
text book index

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

When you search something in the database!



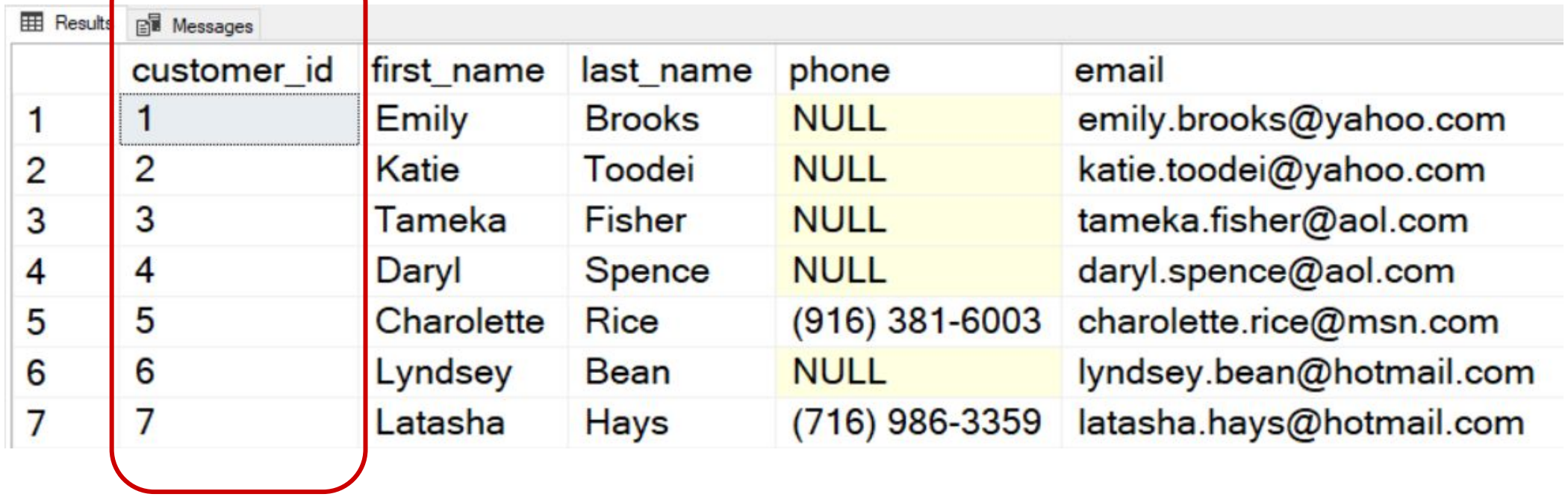
Clustered Index



Clustered Index

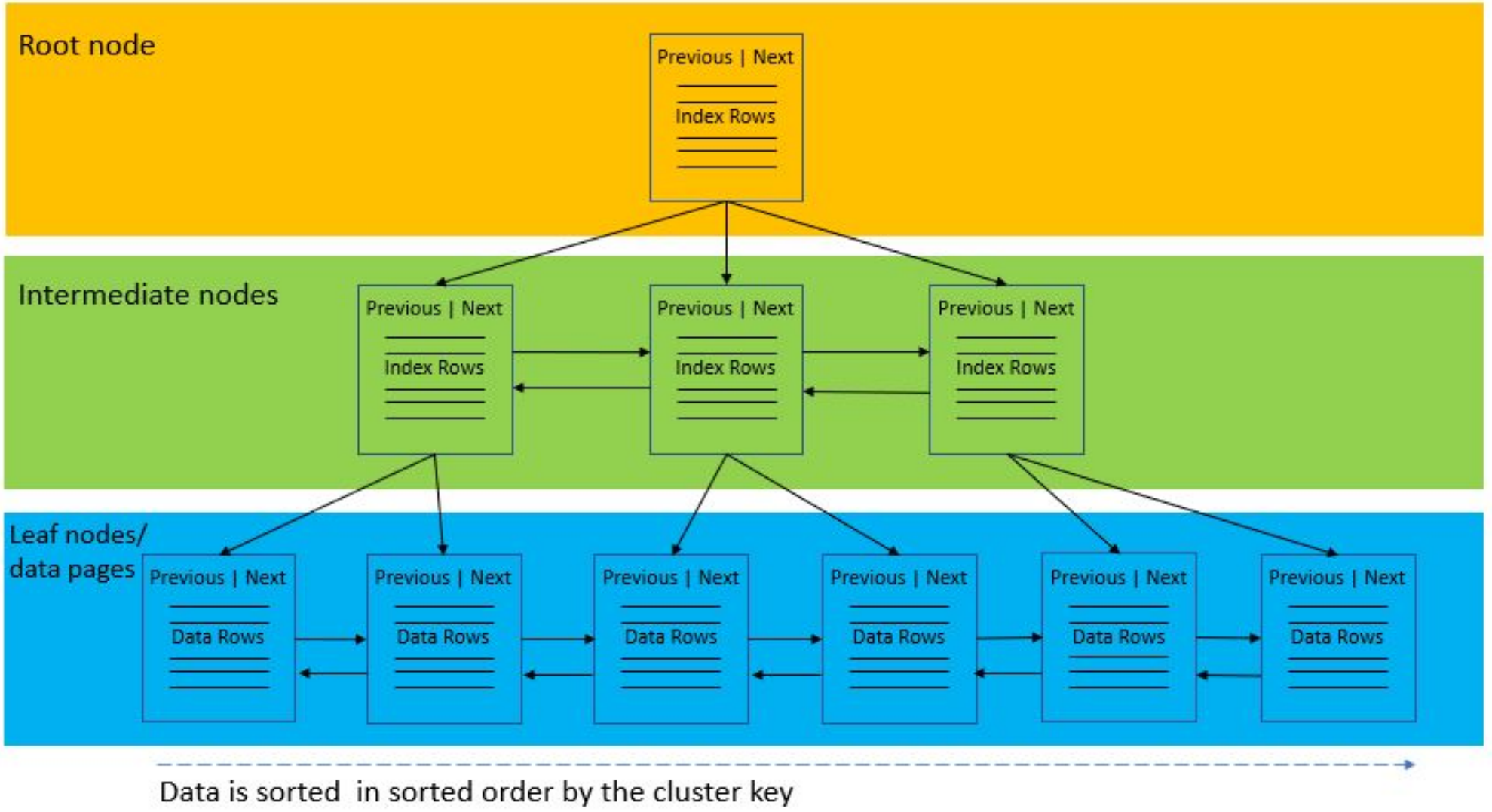
- Sorting based on key values.
- Each table has **only one** clustered index.
- Clustered index uses a special structured so-called **B-tree (or binary tree)** which enables searches, inserts, updates, and deletes in logarithmic amortized time.
- SQL Server automatically creates a corresponding clustered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

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

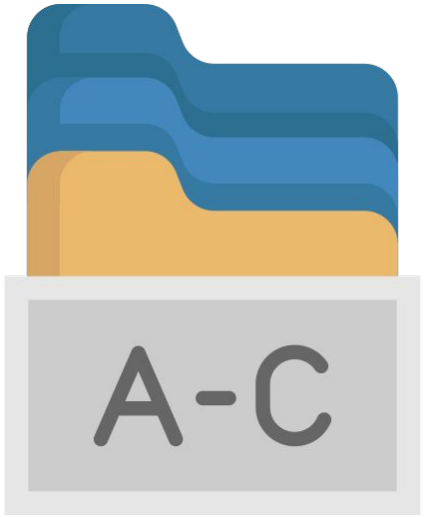

Results Messages

	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



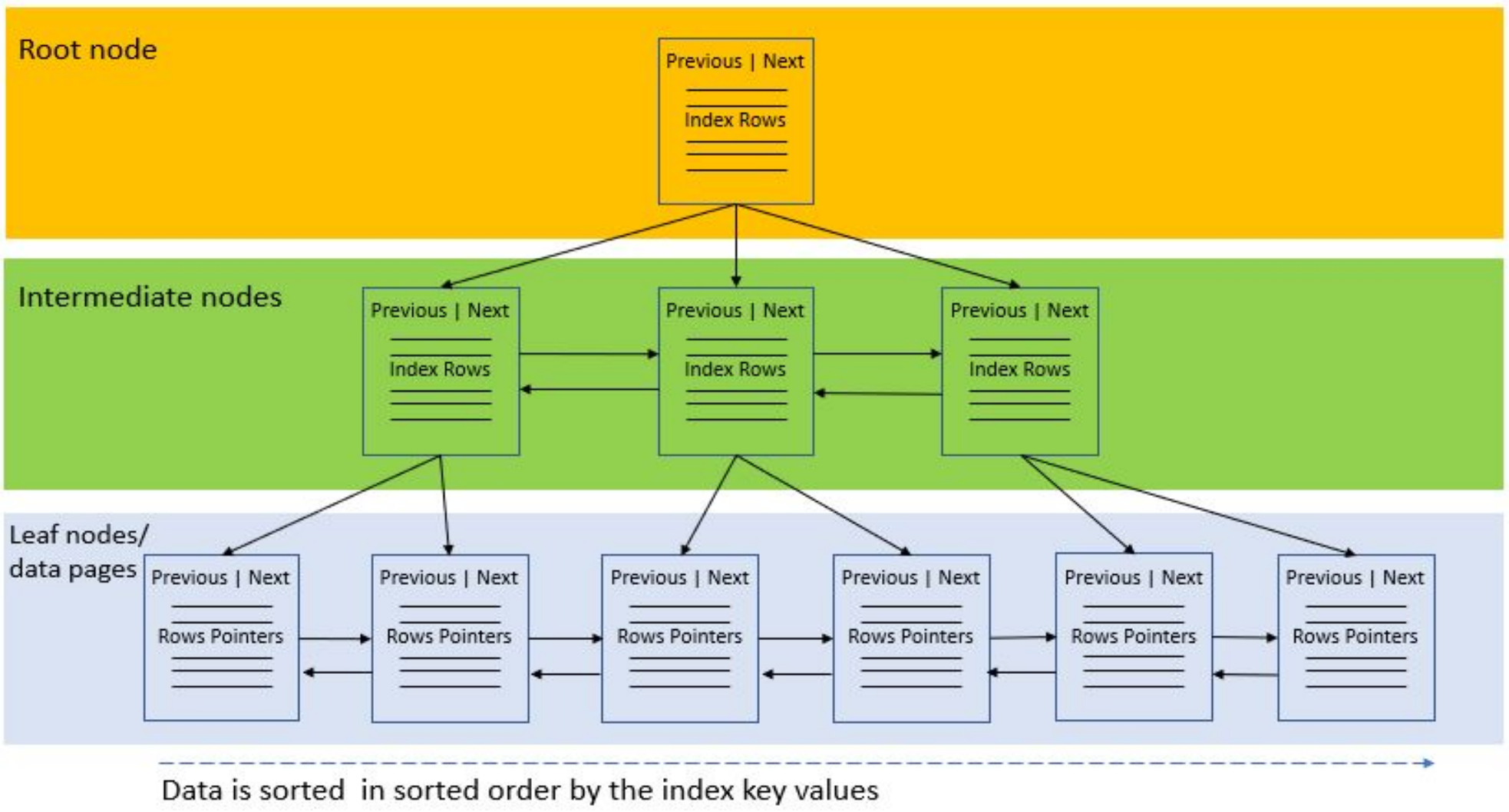
Non-Clustered Index

- 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

Non-Clustered Index



Clustered Index

Non-Clustered Index

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

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

Row Pointers

Advantages vs. Disadvantages of Indexes

Advantages of Indexes:

- ➔ Much better **SELECT** performance
- ➔ Quicky retrieve data

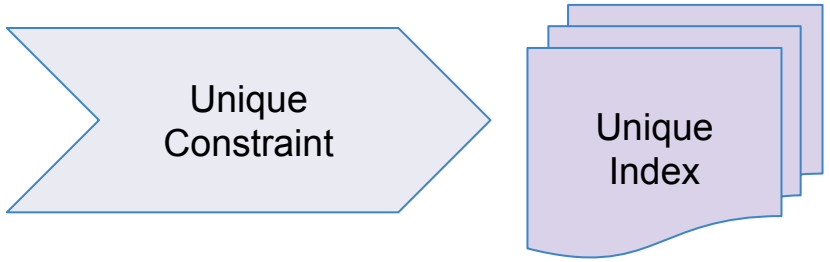
Disadvantages of Indexes:

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

Unique Index

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

One only **NULL** value in **nullable** column.



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
```

THANKS!

Any questions?

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