Indexes

Best Practices

S5

Indexes

- An index is an on-disk structure associated with a table or view that speeds retrieval of rows from the table or view.

- Great indexing → application fast & nimble
- Poor indexing → slows entire SQL Server

Index Characteristics

- Clustered versus nonclustered

- Unique versus nonunique

- Single column versus multicolumn

- Ascending or descending order on the columns in the index

- Full-table versus filtered for nonclustered indexes

Clustered vs NonClustered Index

- Clustered index: sorts and stores data rows in a table, based on search key values

```
CREATE CLUSTERED INDEX Index_Name
                    ON Schema.TableName(Column);
```

- NonClustered index: key values and a pointer to data in the heap/clustered index

```
CREATE INDEX Index_Name
                    ON Schema.TableName(Column);
```

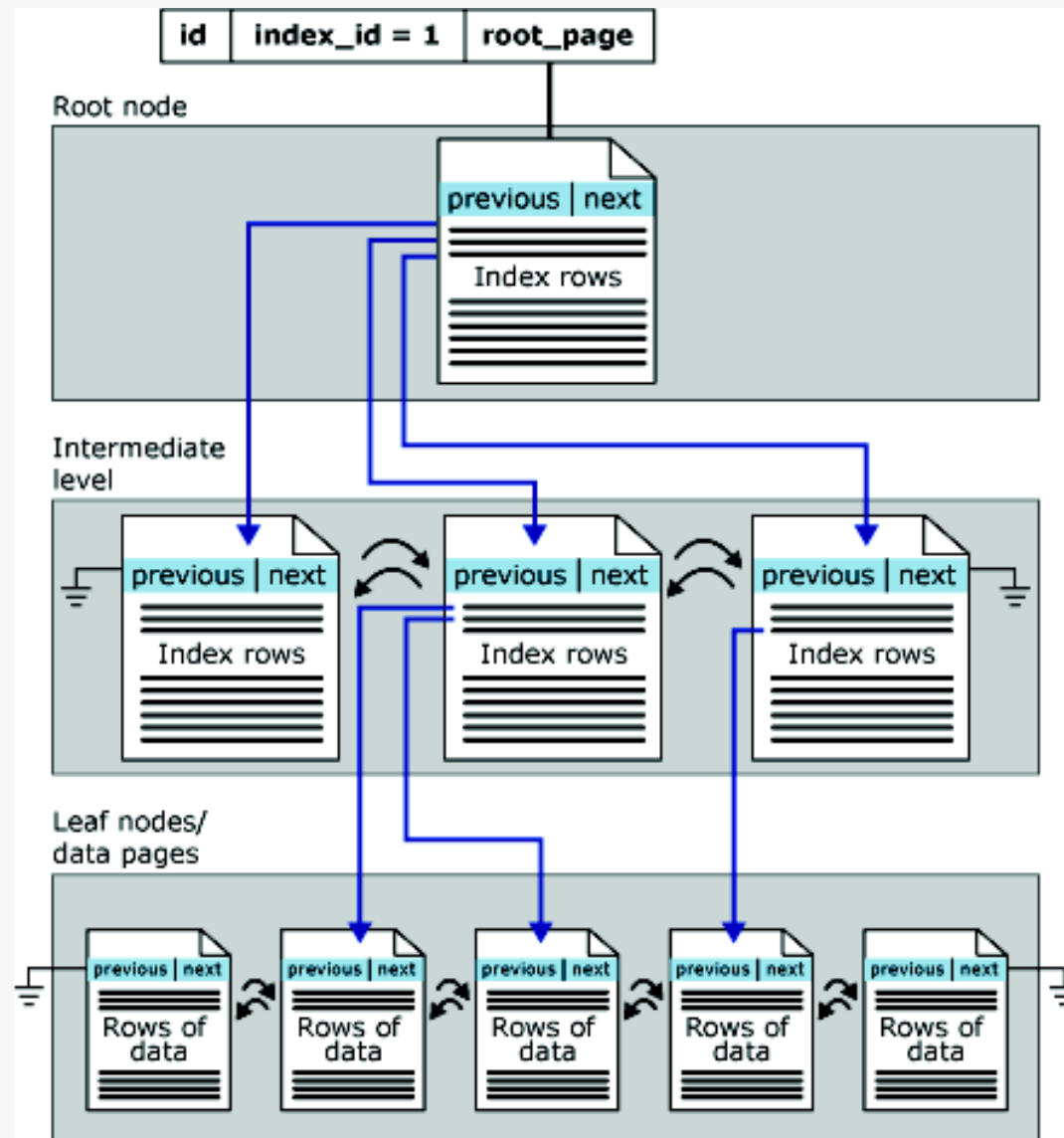# Clustered vs NonClustered Index

- The data pages of a clustered index will always include *all columns* in the table

- There is only one clustered index per table.

- SQL Server supports up to 999 nonclustered indexes per table.

- An index key – clustered or nonclustered – can be a maximum of 16 columns and 900 bytes.

Clustered Index

- Can be used for frequently used queries
- Provide a high degree of uniqueness
- Can be used in range queries

- Clustered indexes are not a good choice for the following attributes:
  - Columns that undergo frequent changes
  - Wide keys

Clustered Index

- indexes are organized as B-trees.

Clustered vs NonClustered Index

- When you create a primary key on a table
  - **+** if a clustered index is not defined
  - **+** a nonclustered index is not specified
  - → a unique clustered index is created

- If all columns returned in a query are in the index: covering index

Key vs NonKey Index Columns

- Key columns: the columns specified to create an index.
- Nonkey columns: columns added to the INCLUDE clause of a nonclustered index.

```
CREATE INDEX Index_Name
ON Schema.TableName(Column)
INCLUDE (ColumnA, ColumnB);
```

Key vs NonKey Index Columns

- Benefits to using non-key columns
  - Columns can be accessed with an index scan.
  - Data types not allowed in key columns are allowed in nonkey columns (including text, ntext, and image).
  - Included columns do not count against the 900 byte index key limit enforced by SQL Server.

Index Design Tasks

- Understand the characteristics of the database (OLTP vs OLAP)

- Understand the characteristics of the most frequently used queries

- Understand the characteristics of the columns used in the queries

- Determine the optimal storage location for the index.