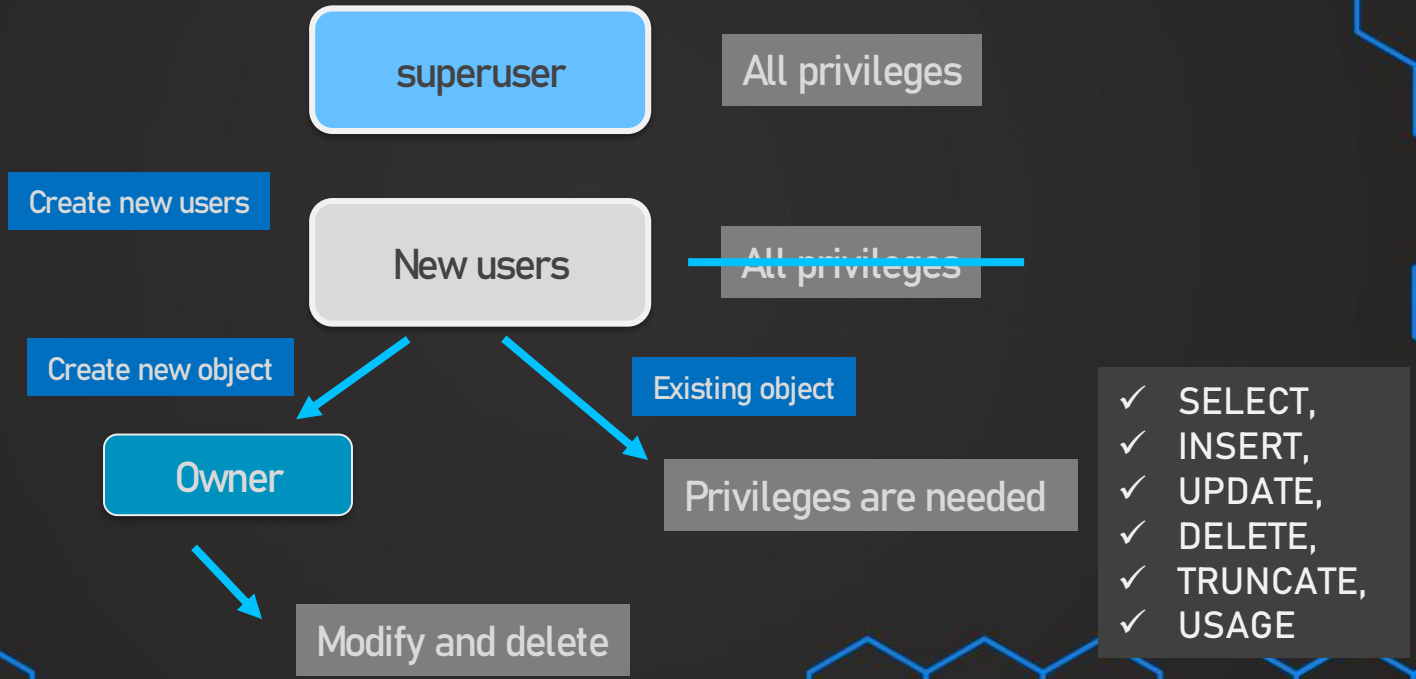
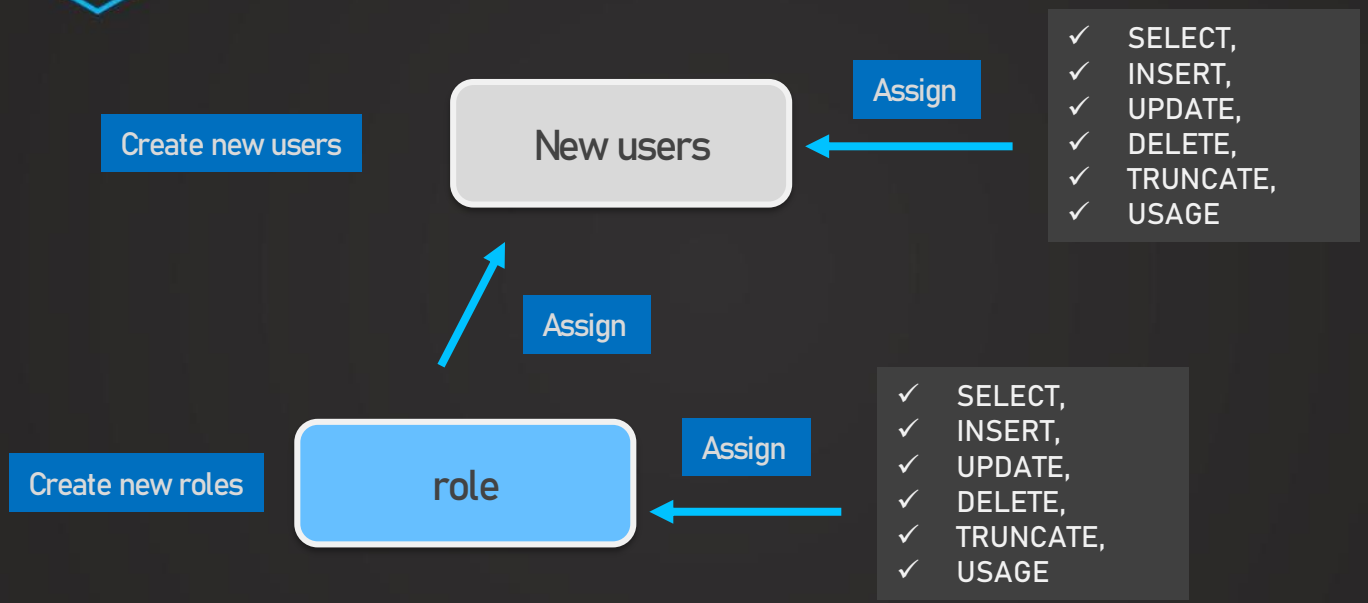
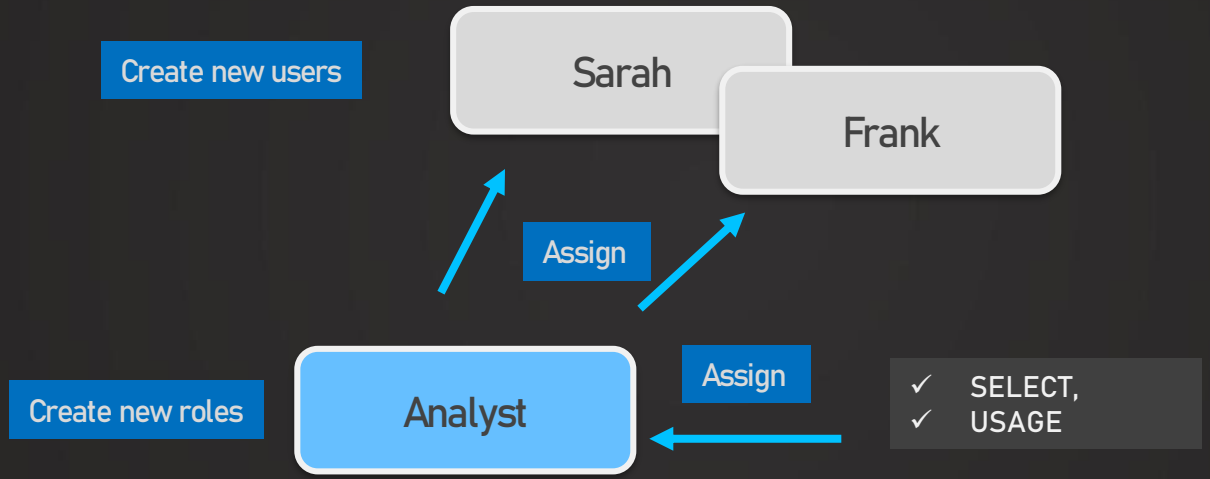
User management



User management

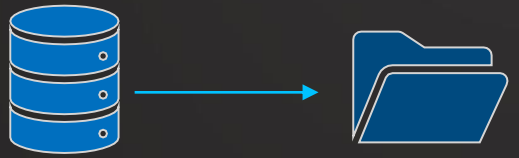


User management



CREATE USER

```
CREATE USER <user_name>
WITH PASSWORD 'pwd123'
```



Create database

public

- ✓ Create objects
- ✓ Use objects

Create new users

CREATE USER

```
CREATE USER <user_name>
WITH PASSWORD 'pwd123'
```

Data Output | Explain | Messages | Notifications

```
CREATE ROLE

Query returned successfully in 67 msec.
```

Role = User + Login

CREATE USER

```
CREATE USER <user_name>
WITH PASSWORD 'pwd123'
```

```
CREATE ROLE <role_name>
WITH LOGIN PASSWORD 'pwd123'
```

Data Output | Explain | Messages | Notifications

```
CREATE ROLE

Query returned successfully in 67 msec.
```

Role = User + Login

CREATE USER

```
DROP USER <user_name>
```

```
DROP ROLE <role_name>
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

```
GRANT privilege
ON database_object
TO USER | ROLE | PUBLIC
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

```
GRANT SELECT
ON customer
TO nikolai
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

TABLES

```
GRANT SELECT
ON customer
TO nikolai
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

TABLES

```
GRANT SELECT
ON ALL TABLES IN SCHEMA schema_name
TO nikolai
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

TABLES

```
GRANT ALL
ON ALL TABLES IN SCHEMA schema_name
TO nikolai
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

TABLES

superuser

owner

```
GRANT ALL
ON ALL TABLES IN SCHEMA schema_name
TO nikolai
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

TABLES

superuser

owner

```
GRANT SELECT
ON ALL TABLES IN SCHEMA schema_name
TO nikolai WITH GRANT OPTION
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

```
REVOKE privilege
ON database_object
FROM USER | ROLE | PUBLIC
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

```
REVOKE privilege
ON database_object
FROM USER | ROLE | PUBLIC
GRANTED BY USER | ROLE
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

```
REVOKE GRANT OPTION FOR privilege
ON database_object
FROM USER | ROLE | PUBLIC
GRANTED BY USER | ROLE
```

Privileges

Privilege	Applicable Object Types
SELECT	TABLE (and table-like objects), table column
INSERT	TABLE, table column
UPDATE	TABLE, table column
DELETE	TABLE
TRUNCATE	TABLE
CREATE	DATABASE, SCHEMA
CONNECT	DATABASE
EXECUTE	FUNCTION, PROCEDURE
USAGE	SCHEMA

Privileges

How to grant acces?
Typical statements

CREATE USER

```
CREATE USER amar
WITH PASSWORD 'amar1234';
```

GRANT USAGE on schema

```
GRANT USAGE
ON SCHEMA name
TO amar;
```

GRANT SELECT & UPDATE

```
GRANT SELECT, UPDATE
ON customer
TO amar;
```

Privileges

How to grant acces?

Typical statements

`GRANT all privileges on schema`

```
GRANT ALL
ON ALL TABLES IN SCHEMA public
TO amar ;
```

`GRANT all privileges on database`

```
GRANT ALL
ON DATABASE greencycles
TO amar ;
```

Privileges

How to grant acces?
Typical statements

GRANT createdb

```
ALTER USER amar CREATEDB;
```

GRANT roles to user

```
GRANT sarah TO amar;
```

GRANT roles to user

```
GRANT analyst TO amar;
```

Privileges

How to grant acces?
Typical statements

REVOKE INSERT

```
REVOKE INSERT ON customer FROM amar;
```

REVOKE ALL PRIVILEGES

```
REVOKE ALL PRIVILEGES ON customer FROM PUBLIC ;
```

REVOKE ROLE

```
REVOKE analyst FROM amar;
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

```
REVOKE GRANT OPTION FOR privilege
ON database_object
FROM USER | ROLE | PUBLIC
GRANTED BY USER | ROLE
```

Privileges

- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE,
- ✓ ALL

Priviliges

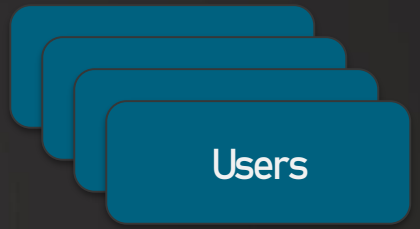
```
GRANT SELECT
ON ALL TABLES IN SCHEMA
<schema_name>
TO nikolai
```

Privileges

Priveleges

USAGE

Roles



- ✓ SELECT,
- ✓ INSERT,
- ✓ UPDATE,
- ✓ DELETE,
- ✓ TRUNCATE,
- ✓ USAGE

```
CREATE ROLE <user_name>
WITH LOGIN PASSWORD 'pwd123'
```

Using indexes

Read operations

Write operations

Using indexes

Read operations

Write operations

Understanding indexes

Types of indexes

Guidelines

Demo

Using indexes

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

```
SELECT
product_id
FROM sales
WHERE customer_id = 5
```

3, P0625, 5, visa

4, P0432, 8, mastercard

1, P0494, 4, visa

6, P0058, 5, mastercard

2, P0221, 5, visa

Table scan

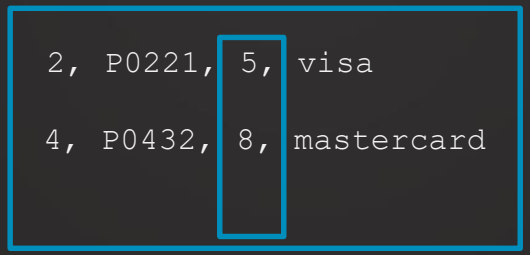
Read-inefficient

Data is stored without a particular order

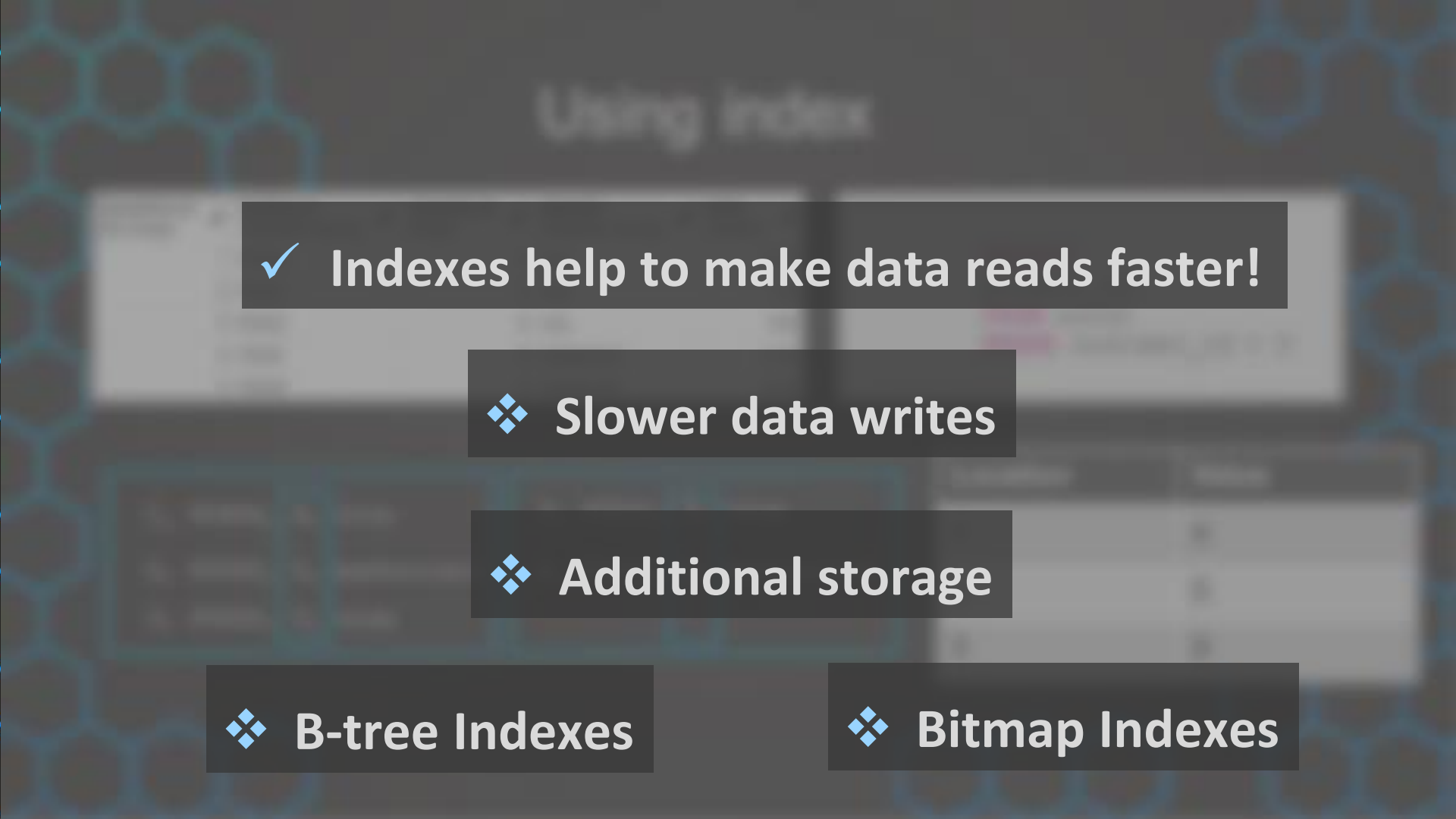
Using indexes

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

```
SELECT
product_id
FROM sales
WHERE customer_id = 5
```



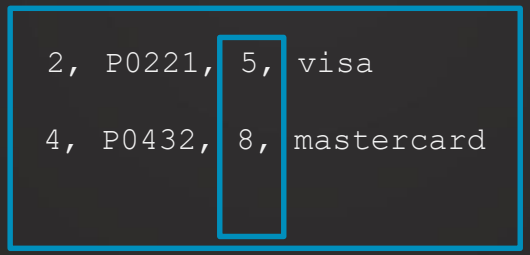
Location	Value
1	4
2	5
5	8


Using index
✓ Indexes help to make data reads faster!
❖ Slower data writes
❖ Additional storage
❖ B-tree Indexes
❖ Bitmap Indexes

Using indexes

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

```
SELECT
product_id
FROM sales
WHERE customer_id = 5
```



Location	Value
1	4
2	5
5	8

Using indexes

Location	Value
1	4
2	5
5	8

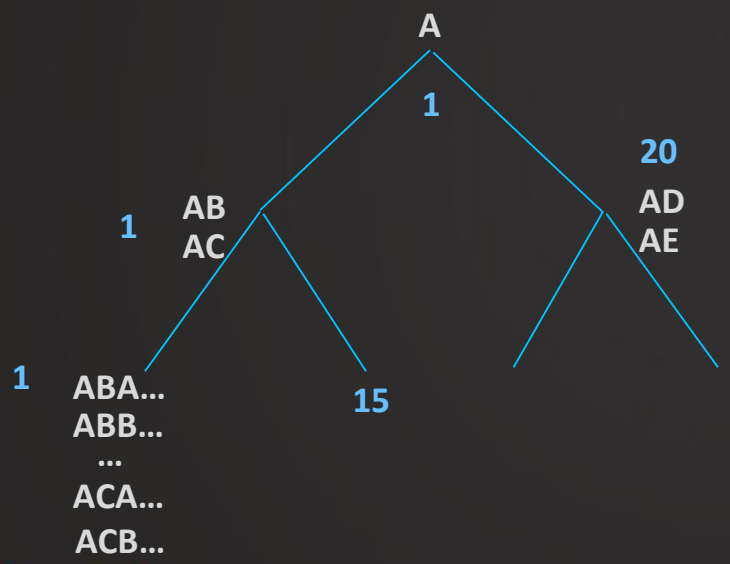
- ✓ Different types of indexes for different situations

- ❖ B-tree Indexes
- ❖ Bitmap Indexes

```
1, P0494, 4, visa
6, P0058, 5, mastercard
3, P0625, 5, visa
```

```
2, P0221, 5, visa
4, P0432, 8, mastercard
```

❖ B-tree Indexes



- ✓ Multi-level tree structure
- ✓ Breaks data down into pages or blocks
- ✓ Should be used for high-cardinality (unique) columns
- ✓ Not entire table (costy in terms of storage)

Bitmap index

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

- ✓ Particularily good for dataware houses
- ✓ Large amounts of data + low-cardinality
- ✓ Very storage efficient
- ✓ More optimized for read & few DML-operations

❖ Bitmap index

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

Row_id	Value
1	visa
4	mastercard

Bit
1 1 1 0 0
0 0 0 1 1

- ✓ Particularily good for dataware houses
- ✓ Large amounts of data + low-cardinality
- ✓ Very storage efficient

Good for many repeating values (dimensionality)

❖ Bitmap index

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

Value	1	2	3	4	5	6	7	8
mastercard				x	x			
visa	x	x	x					

- ✓ Particularily good for dataware houses
- ✓ Large amounts of data + low-cardinality
- ✓ Very storage efficient

Good for many repeating values (dimensionality)

Guidelines

B-tree Index

Default index

Unique columns

(surrogate key, names)

Bitmap Index

Slow to update

Storage efficient

Great read performance

Guidelines

Should we put index on every column?

No! They come with a cost!

Storage + Create/Update time

Only when necessary!

Avoid full table reads

Small tables do not require indexes

Guidelines

On which columns?

1. Large tables

2. Columns that are used as filters

transaction_id [PK] integer	product_id character varying	customer_id integer	payment character varying	price numeric
1	P0494	4	visa	18.29
2	P0221	5	visa	1.49
3	P0625	5	visa	5.89
4	P0431	8	mastercard	11.59
5	P0058	5	mastercard	12.39

Guidelines

Fact tables

- B-tree on surrogate key
- Bitmap key on foreign keys

Dimension table

- Size of table
- Are they used in searchs a lot?
- Choose based on cardinality

Demo: Creating indexes

```
CREATE INDEX index_name
ON table_name [USING method]
    (
     column_name
     [,…]
    );
```

Demo: Creating indexes

```
CREATE INDEX index_name
ON table_name
    (
     column_name
    );
```

Demo: Creating indexes

```
CREATE INDEX index_name
ON table_name
    (
     column_name1,
     column_name2
    );
```