Database Modeling and Database Systems — Unit 6

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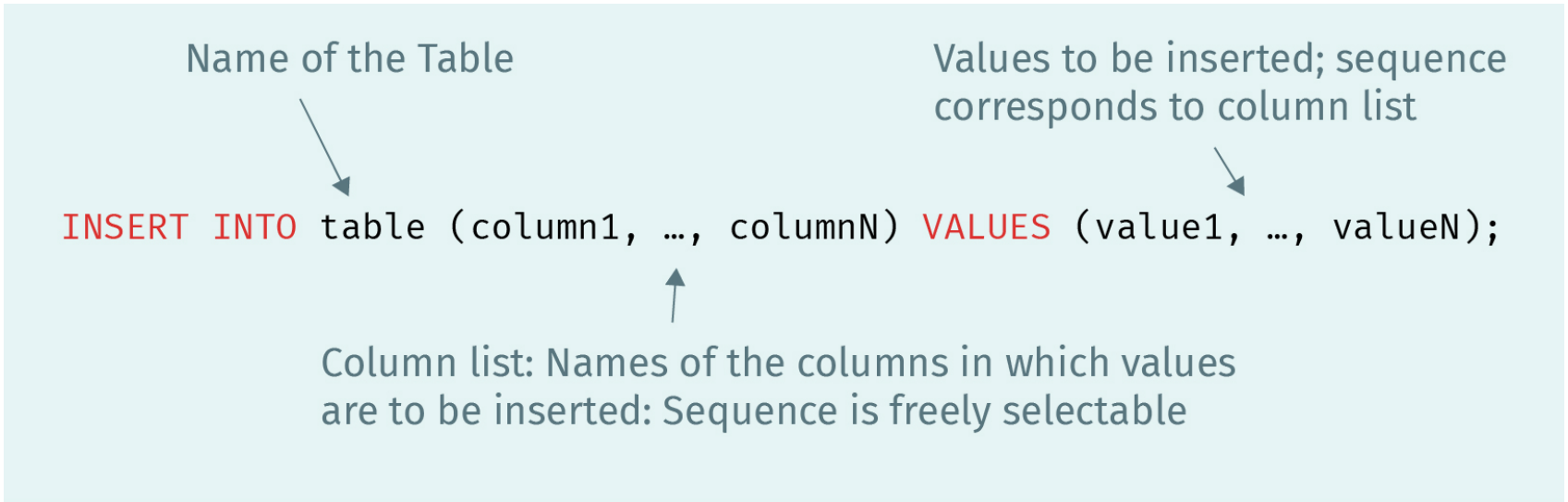
DATABASE OPERATIONS

1. Use SQL statements to insert new records.
2. Use SQL statements to modify records and schemas.
3. Explain what transactions are and how they operate.

DATABASE CONCEPTS

1. What is a DEFAULT value in SQL?
2. Give an example of why a developer would need to change a database schema.
3. What is a bank transaction?

INSERT statement



INSERT statement

```
INSERT INTO branch VALUES (1, '123 London Road', '+49 1123 5543');
INSERT INTO finencial_advisor VALUES (1, 'Lukas', 'Muller', 'lukas.muller@iubnak.de', '+49 1123 5543 ext. 1', 1);
INSERT INTO customer VALUES (1, 'Elias', 'Wagner', 'elias.wagner@mymail.de', '+49 1596 3574', 1);
```

INSERT examples

```sql
CREATE TABLE branch (
branchID INTEGER AUTO_INCREMENT PRIMARY key,
branchAddress VARCHAR(50) DEFAULT '99 Republic Boulevard' NOT NULL,
branchPhoneNumber VARCHAR(13) NULL
);

INSERT INTO branch VALUES (1, '123 London Road', '+49 1123 5543');
INSERT INTO branch VALUES (2, '12 Frankfurt Street', '+49 1875 6632');
INSERT INTO branch VALUES (3, '6654 Paris Street', '+49 9632 1228');

INSERT INTO branch (branchAddress, branchPhoneNumber, branchID)
VALUES ('123Barington Street', '+49 8866 2491', 4);

INSERT INTO branch (branchPhoneNumber) VALUES ('+49 5552 2228');

INSERT INTO branch VALUES (6.25, DEFAULT, '+49 6545 8526');

SELECT * FROM branch;
```

branch (6r × 3c)

branchID	branchAddress	branchPhoneNumber
1	123 London Road	+49 1123 5543
2	12 Frankfurt Street	+49 1875 6632
3	6654 Paris Street	+49 9632 1228
4	123Barington Street	+49 8866 2491
5	99 Republic Boulevard	+49 5552 2228
6	99 Republic Boulevard	+49 6545 8526

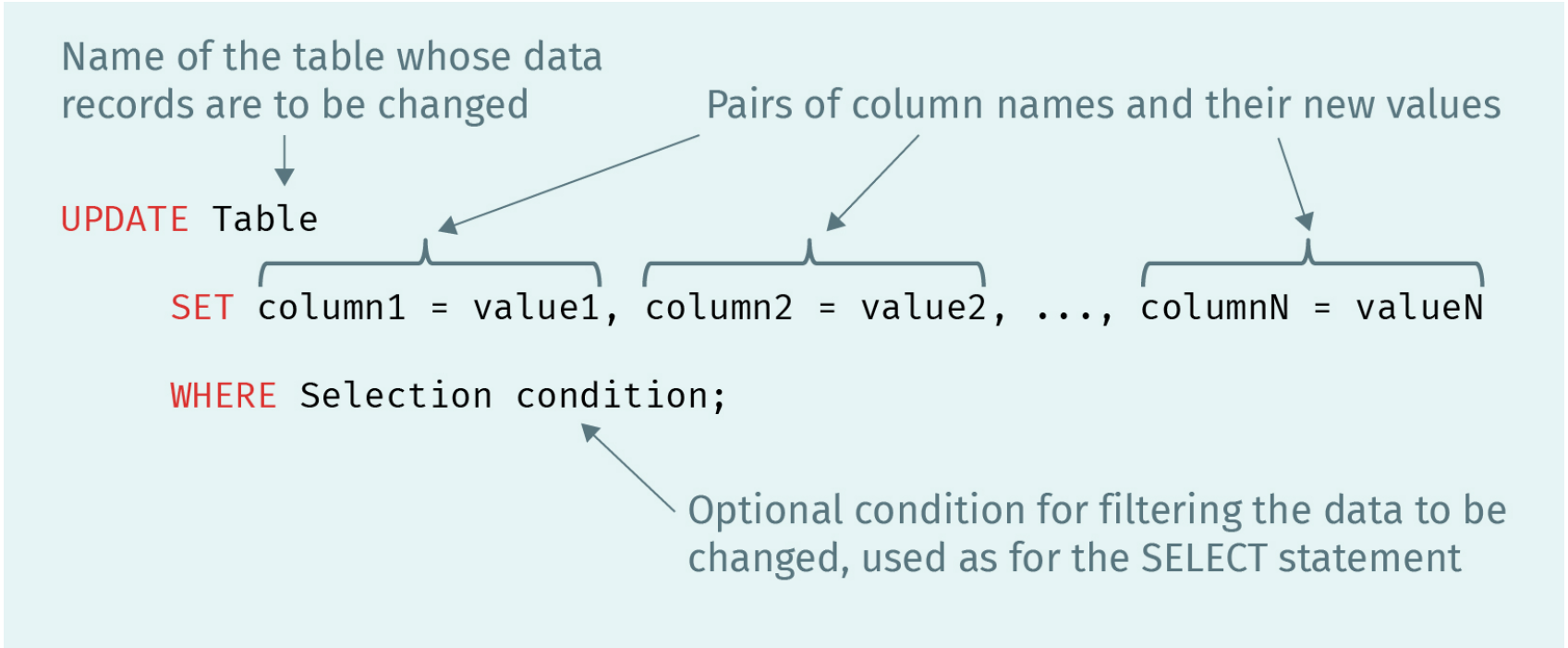
Copying data records

```
19
20  CREATE TABLE branch2 (
21  branchID INTEGER AUTO_INCREMENT PRIMARY key,
22  branchAddress VARCHAR(50) DEFAULT '99 Republic Boulevard' NOT NULL,
23  branchPhoneNumber VARCHAR(13) NULL
24  );
25
26  INSERT INTO branch2
27  SELECT * FROM branch
28  WHERE
29  branchAddress LIKE '99 Republic Boulevard';
30
31  SELECT * FROM branch2;
```

branch2 (2r × 3c)

branchID	branchAddress	branchPhoneNumber
5	99 Republic Boulevard	+49 5552 2228
6	99 Republic Boulevard	+49 6545 8526

Update Example



Update example

```
33  UPDATE branch
34  SET branchAddress = '990 Royal Street'
35  WHERE
36  branchID = 6;
37
38  SELECT * FROM branch;
```

branch (6r × 3c)

branchID	branchAddress	branchPhoneNumber
1	123 London Road	+49 1123 5543
2	12 Frankfurt Street	+49 1875 6632
3	6654 Paris Street	+49 9632 1228
4	123Barington Street	+49 8866 2491
5	99 Republic Boulevard	+49 5552 2228
6	990 Royal Street	+49 6545 8526

Deleting Data (DELETE)

```
42  DELETE FROM branch2
43  WHERE branchPhoneNUmber LIKE '+49 6545 8526';
44
45  SELECT * FROM branch2;
```

branch2 (1r × 3c)

branchID	branchAddress	branchPhoneNumber
5	99 Republic Boulevard	+49 5552 2228

Changing Tables (ALTER TABLE)

Table 48: Elements of ALTER TABLE

Elements of ALTER TABLE	Description
`ALTER TABLE` table	Defines the table to be changed
`ADD column definition`	Adds a column; syntax as for `CREATE TABLE`
`ALTER column definition` in some DBMSs (like MySQL): `MODIFY column definition`	Changes properties of a column by specifying all properties; syntax as for `CREATE TABLE`
`DROP column`	Delete a column by specifying the column name
`ADD CONSTRAINT constraintdefinition`	Adds a constraint: Includes primary and foreign keys as well as `NOT NULL` and `UNIQUE` conditions, the latter also for multiple columns.
`DROP CONSTRAINT constraintname`	Delete a constraint: Includes primary and foreign keys as well as `NOT NULL` and `UNIQUE` conditions, the latter also for multiple columns

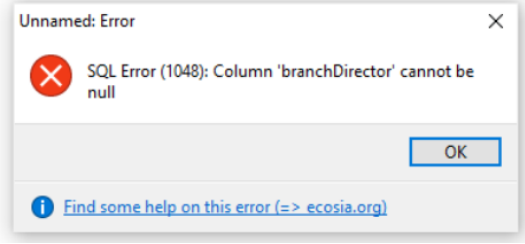
ALTER examples

```
47  ALTER TABLE branch2
48  ADD COLUMN branchDirector VARCHAR(50) NULL;
49
50  SELECT * from branch2
```

branch2 (1r × 4c)

branchID	branchAddress	branchPhoneNumber	branchDirector
5	99 Republic Boulevard	+49 5552 2228	(NULL)

```
59  MODIFY
60  branchDirector VARCHAR(50) NOT NULL;
61
62  INSERT INTO branch2 VALUES(6, '16 Blue lake road', '+49 9119 3773', NULL);
```



Transactions

Markiert den Start einer Transaktion (im DBMS MariaDB)

```
START TRANSACTION;

SQL-Statement1;

SQL-Statement2;

...

SQL-StatementN;

COMMIT;
```

Alle durch diese SQL-Statements definierten Änderungen (COMMIT) oder keine davon (ROLLBACK) werden dauerhaft in der Datenbank gespeichert.

Schließt eine Transaktion ab

What is a DEFAULT value in SQL?

Definition

A DEFAULT value in SQL is a predefined value that is set for a table column when no value is specified. If a row is inserted without a value for this column, the column will be filled with its DEFAULT value.

Why change a database schema?

Example Scenario

A developer may need to change a database schema to add new features, such as a new data type that needs to be stored, which wasn't considered in the initial design. For instance, adding a column for storing user avatars in a user profiles table.

What is a bank transaction?

Explanation

A bank transaction is any transfer of funds that can affect an account balance. It can be a deposit, withdrawal, or transfer, and it typically involves the movement of funds between accounts either within the same bank or across different financial institutions.

Transfer Task

Given the following financial advisor table:

finencial_advisor (4r × 6c)

FinencialAdvisorID	FinencialAdvisorFirstName	FinencialAdvisorLastName	FinencialAdvisorEmailAddress	FinencialAdvisorPhoneNumber	BRANCH_BranchID
1	Lukas	Muller	lukas.muller@iubnak.de	+49 1123 5543 ext. 1	1
2	Leon	Schmidt	leon.schmidt@iubnak.de	+49 1123 5543 ext. 2	1
3	Finn	Schmidt	finn.schmidt@iubnak.de	+49 1875 6632 ext. 1	2
4	Finn	Fischer	finn.fischer@iubnak.de	+49 9632 1228 ext. 1	3

1. Write the SQL statements used to insert the data shown in the above image in the table (named finencial_advisor).
2. Modify the FinencialAdvisorID field so that its value automatically increases for each new inserted record.
3. Insert a record of a new finencial advisor whose name is Susan Huber and email address is susan.huber@iubank.de. Check that the new record's ID is 5.

Transfer Tasks (Continued)

4. Add a phone number to Susan's record using her ID. The phone number is +49 1875 6632 ext. 2.
5. Add a constraint to ensure that the phone number cannot be empty.
6. Delete all financial advisors working at branch 1.
7. Add to the table a new integer column named numberOfEmploymentYears and then set this value for all employees to 3.5. Check the contents of the table.
8. Delete the branch_branchID from the table.

Insert Data into financial_advisor

```
INSERT INTO financial_advisor
(FinancialAdvisorFirstName, FinancialAdvisorLastName,
FinancialAdvisorEmailAddress, FinancialAdvisorPhoneNumber,
BRANCH_BranchID)
VALUES
('Lukas', 'Muller', 'lukas.muller@iubank.de',
    '+49 1123 5543 ext. 1', 1),
('Leon', 'Schmidt', 'leon.schmidt@iubank.de',
    '+49 1123 5543 ext. 2', 1),
('Finn', 'Schmidt', 'finn.schmidt@iubank.de',
    '+49 1875 6632 ext. 1', 2),
('Finn', 'Fischer', 'finn.fischer@iubank.de',
    '+49 9632 1228 ext. 1', 3);
```

Modify ID Auto-Increment

```
ALTER TABLE financial_advisor
CHANGE FinancialAdvisorID FinancialAdvisorID INT
                                              AUTO_INCREMENT;
```

Insert Susan Huber's Record

```
INSERT INTO financial_advisor
(FinancialAdvisorFirstName, FinancialAdvisorLastName,
FinancialAdvisorEmailAddress)
VALUES
('Susan', 'Huber', 'susan.huber@iubank.de');

SELECT FinancialAdvisorID FROM financial_advisor
WHERE FinancialAdvisorEmailAddress =
                                    'susan.huber@iubank.de';
```

Add Phone Number Constraint

```
ALTER TABLE financial_advisor
  MODIFY COLUMN FinancialAdvisorPhoneNumber VARCHAR(255)
                                                NOT NULL;
```

Delete Advisors at Branch 1

```
DELETE FROM financial_advisor WHERE BRANCH_BranchID = 1;
```

Add numberOfEmploymentYears Column

```
ALTER TABLE financial_advisor
  ADD COLUMN numberOfEmploymentYears DECIMAL(10,1);

UPDATE financial_advisor
SET numberOfEmploymentYears = 3.5;

SELECT * FROM financial_advisor;
```

Delete branch_branchID Column

```
ALTER TABLE financial_advisor DROP COLUMN BRANCH_BranchID;
```