SQL – Assertion

CS 4750
Database Systems

Assertions

- Assertions = conditions that the database must always satisfy

- Domain constraints and referential-integrity constraints are specific forms of assertions

- `CHECK` – verify the assertion on one-table, one-attribute

- `ASSERTION` – verify one or more tables, one or more attributes

Some constraints cannot be expressed by using only domain constraints or referential-integrity constraints; for example,

- "Every department must have at least five courses offered every semester" – must be expressed as an assertion
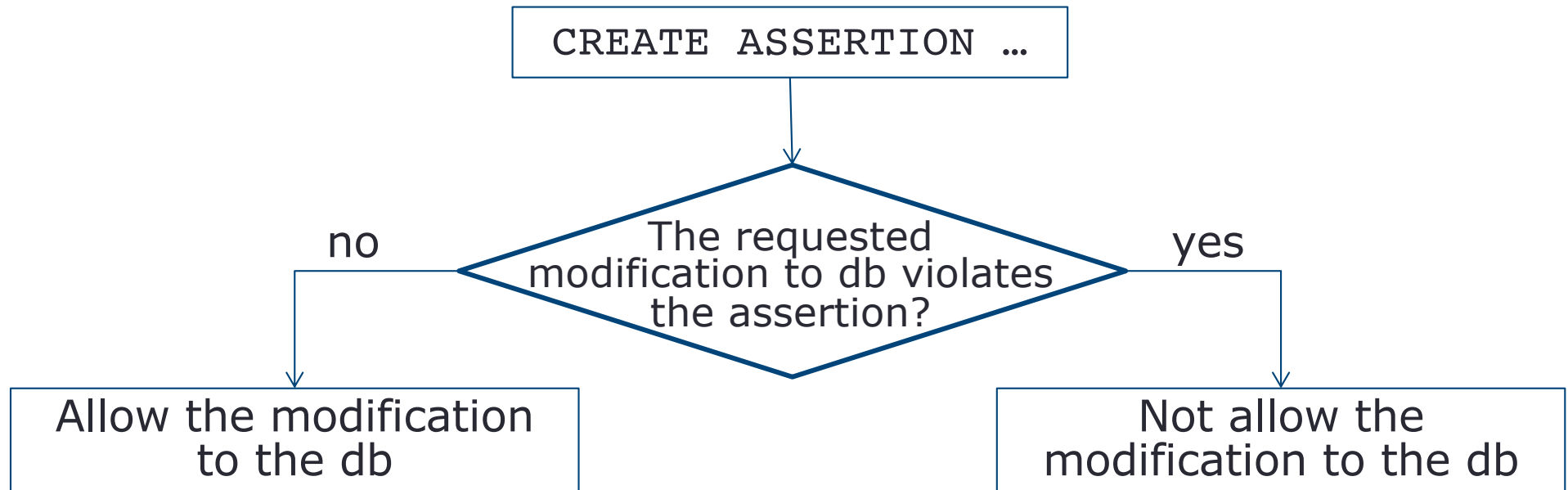
Note:

- Although `ASSERTION` is in the SQL standard, most DBMS does not support it. Therefore, `CHECK` and `TRIGGERS` are commonly used as work around approaches.

How Do Assertions Work?

- **CREATE ASSERTION** `<assertion-name>`
- **CHECK** `<predicate>`;

- **DROP ASSERTION** `<assertion-name>`

```
CREATE ASSERTION …
```

The requested modification to db violates the assertion?

no → Allow the modification to the db

yes → Not allow the modification to the db

Example (1)

For each tuple in the *student* relation, the value of the attribute *tot_cred* must equal the sum of credits of courses that the student has completed successfully.

```
CREATE ASSERTION credits_earned_constraint
CHECK (NOT EXISTS
            (SELECT ID
             FROM    student
             WHERE   tot_cred <> (SELECT SUM(credits)
                                  FROM    takes
                                          NATURAL JOIN course
                                  WHERE   student.ID=takes.ID
                                  AND     grade IS NOT NULL
                                  AND     grade <> 'F' ) ) )
```

Example (2)

The total length of all movies by a given studio shall not exceed 10,000 minutes

```
CREATE ASSERTION sumLength
CHECK (10000 >= ALL
          (SELECT     SUM(length)
           FROM       Movies
           GROUP BY   studioName ) )
```

Since this constraint involves only the relation Movies, it can be expressed as a tuple-based CHECK constraint

```
CHECK (10000 >= ALL
          (SELECT     SUM(length)
           FROM       Movies
           GROUP BY   studioName ) )
```

Comparison of Constraints

Type of constraint	Where declared	When activated	Guaranteed to hold?
Attributed-based CHECK	With attribute	On insertion to relation or attribute update	No if subqueries
Tuple-based CHECK	Element of relation schema	On insertion to relation or tuple update	No if subqueries
ASSERTION	Element of database scheme	On any change to any mentioned relation	Yes