SQL – Assertion

CS 4750
Database Systems

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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

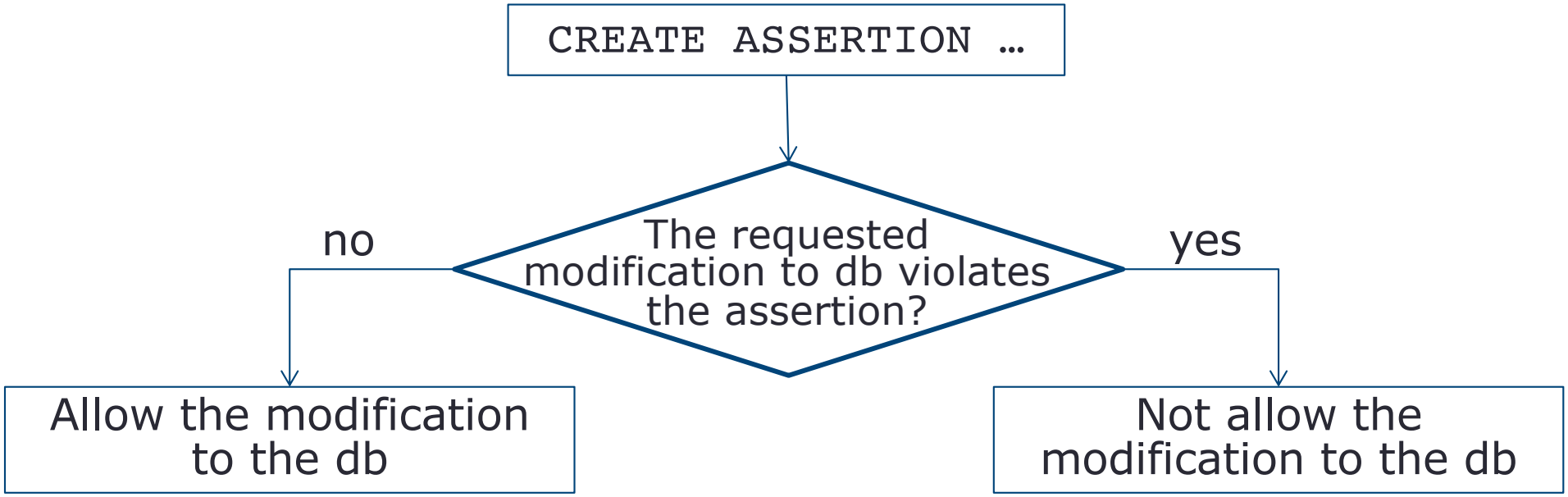
Note:

- 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>



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