



Constraints & Triggers

Motivation and overview

Constraints and Triggers

- For relational databases
- SQL standard; systems vary considerably

(Integrity) Constraints *static*
constrain allowable database states

Triggers *dynamic*
monitor database changes,
check conditions and initiate actions

Integrity Constraints

Impose restrictions on allowable data, beyond those imposed by structure and types

Examples

$0.0 < \text{GPA} \leq 4.0$

$\text{enrollment} < 50,000 \rightarrow 75,000$

decision : 'Y' 'N' null

$\text{major} = \text{'cs'} \Rightarrow \text{decision} = \text{null}$

$\text{sizeHs} < 200 \Rightarrow \text{not admitted enr} > 30,000$

Integrity Constraints

Impose restrictions on allowable data, beyond those imposed by structure and types

Why use them?

Data-entry errors (inserts)

Correctness criteria (updates)

Enforce consistency

Tell system about data — store, query processing

Integrity Constraints

Impose restrictions on allowable data, beyond those imposed by structure and types

Classification

Non-null

Key

Referential integrity (foreign key)

Attribute-based

Tuple-based

General assertions

Declaring and enforcing constraints

Declaration

- With original schema – checked after bulk loading
- Or later – checked on current DB

Enforcement

- Check after every ~~modification~~ *transaction* *“dangerous”*
- Deferred constraint checking

Triggers

“Event-Condition-Action Rules”

When event occurs, check condition; if true, do action

Examples

enrollment > 35,000 \Rightarrow reject all applicants

insert app with GPA > 3.95 \Rightarrow accept automatically

update sizetts to be > 7,000 \Rightarrow change to “wrong”
raise error

Triggers

“Event-Condition-Action Rules”

When *event* occurs, check *condition*; if true, do *action*

Why use them?

Move logic from apps into DBMS

To enforce constraints

- expressiveness

- constraint “repair” logic

Triggers in SQL

“Event-Condition-Action Rules”

```
Create Trigger name  
Before|After|Instead of events  
[ referencing-variables ]  
[ For Each Row ]  
When ( condition )  
action
```

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Triggers

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