Constraints & Triggers

Motivation and overview

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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

$0.0 < GPA \leq 4.0$

enrollment $< 50,000 \longrightarrow 75,000$

decision : `Y' `N' null

major = `cs' $\Rightarrow$ decision = null

sizeHS $< 200 \Rightarrow$ not admitted enr $> 30,000$

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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 ~~modification~~ *"dangerous"* *transaction*

- Deferred constraint checking

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Triggers

"Event-Condition-Action Rules"

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

Examples

Enrollment > 35,000 ⟹ reject all applicants

insert app with GPA > 3.95 ⟹ accept automatically

update sizeHS to be > 7,000 → 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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