

# Database Lab

## Triggers

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Notice

**No Database Lab** on December 12  
Use time for self-study

# Topics

- conceptual design
- logical design
- consistency constraints
- data manipulation
- queries
- transactions
- views
- stored procedures and user-defined functions
- **triggers**
- security

# Stored Procedures and User-defined Functions

- User-defined routines:
    - Functions
    - Procedures
    - Trigger
  - SQL with control flow operators
    - implementation languages SQL, PL/pgSQL, ...
  - skalar functions:
    - Functions always returning a single value
  - Table functions:
    - functions that return tables („parameterized views“)
  - Stored procedures:
    - "Functions,, that (can) contain updates
  - **Trigger / rules**
    - actions which are executed event-based
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# Trigger

- ▶ trigger event
    - when should the trigger fire
    - insert, update, delete, truncate
  - ▶ trigger type
    - is it a statement or row-level trigger?
  - ▶ condition
    - should it fire only when certain conditions are met?
  - ▶ action
    - what should the trigger do?
  - ▶ execution time
    - before or after the triggering action has been performed?
    - or instead of the triggering action?
-

# Triggers: Examples

```
create table numbers (numberone int, numberb int);  
insert into numbers values(0,100);
```

```
create or replace function examplef() returns TRIGGER AS  
$$
```

```
BEGIN
```

```
    raise notice 'Hi';
```

```
    NEW.numberb = OLD.numberb
```

```
                + NEW.numberone - OLD.numberone;
```

```
    return NEW;
```

```
END;
```

```
$$ LANGUAGE plpgsql;
```

## Triggers: Examples (2)

```
create trigger examplet  
before update on numbers  
for each row  
when (NEW.numberone is not null)  
execute procedure examplef();  
  
update numbers set numberone = numberone + 100;  
select * from numbers;
```

# Instead Triggers

- ▶ above triggers execute before or after triggering operation
- ▶ “instead triggers” execute instead of the triggering operation
- ▶ in this way it is possible to implement operations that normally cannot be executed
  - e.g., insertion, update, deletion of rows in views



# Today's Exercise

- ▶ see exercises on the web
- ▶ if not done already, implement the view VanV over the \*\_JT tables
  - see section on views
- ▶ try to insert a new van into this view
- ▶ implement the function to execute instead of the insertion into the view
- ▶ define an instead trigger