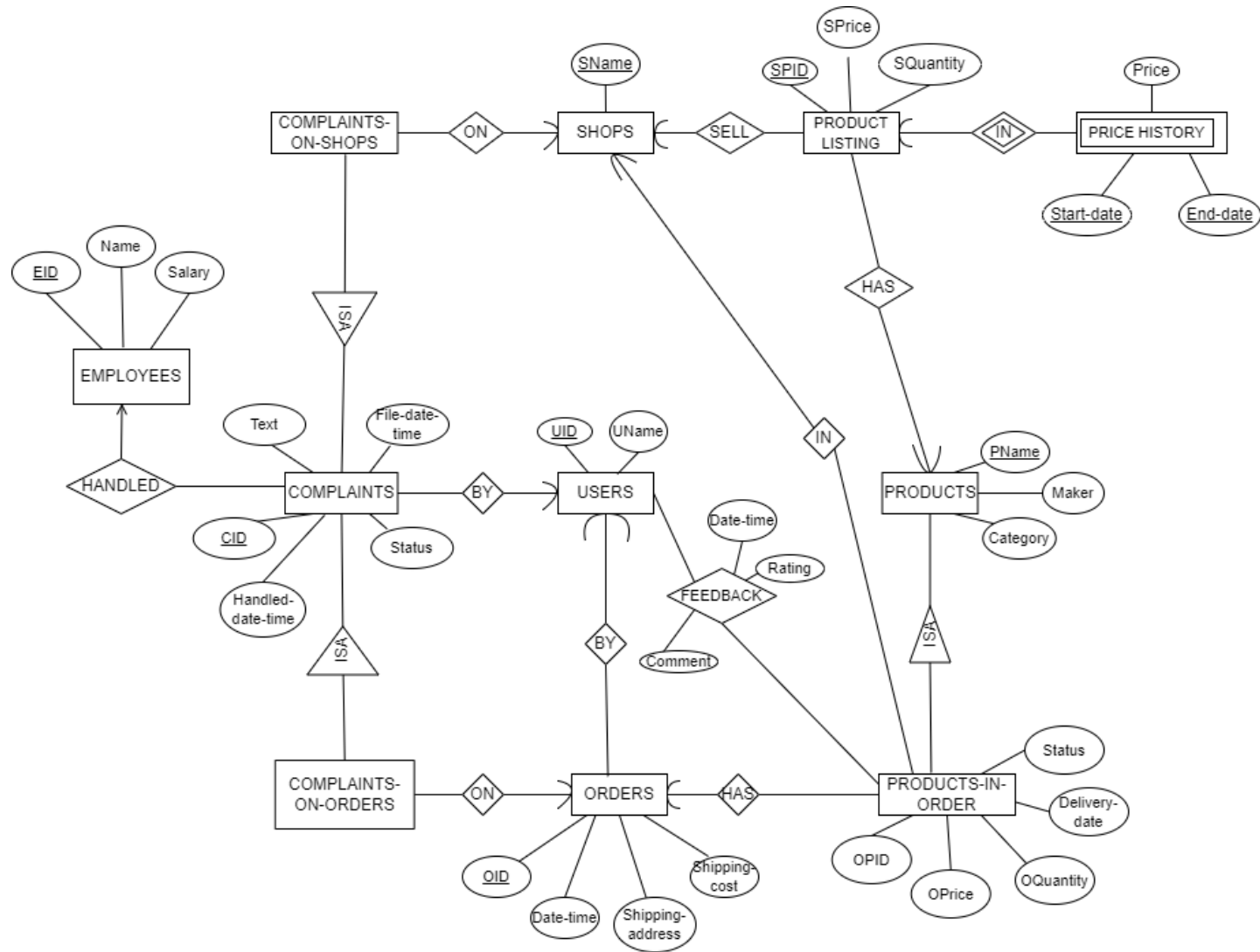


## ER Diagram



## Database Schema

### Entity Set -> Relation

- 1) Employees (EID, Name, Salary)  
Keys: EID  
Primary Key: EID  
Functional Dependencies:
  - 1) EID -> Name
  - 2) EID -> SalaryThe relation is in 3NF as all non-trivial FDs contain a key in LHS.
- 2) Shops (SName)  
Keys: SName  
Primary Key: SName  
Functional Dependencies:  
None  
The relation is in 3NF as there is no non-trivial FDs
- 3) Orders (OID, Date-time, Shipping-address, Shipping-cost, UID)  
Keys: OID  
Primary Key: OID  
Functional Dependencies:
  - 1) OID -> Date-time
  - 2) OID -> Shipping-address
  - 3) OID -> UID
  - 4) OID -> Total shipping CostThe relation is in 3NF as all non-trivial FDs contain a key in LHS.
- 4) Users (UID, Uname)  
Keys: UID  
Primary Key: UID  
Functional Dependencies:
  - 1) UID -> UNameThe relation is in 3NF as all non-trivial FDs contain a key in LHS.

### Many-to-Many Relationship -> Relation

- 1) Feedback (UID, PName, Comment, Date-Time, Rating)

Keys: {UID, PName}

Primary Key: {UID, PName}

Functional Dependencies:

1) UID, Pname, Date-Time-> Rating

2) UID, Pname, Date-Time-> Comment

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

### Weak Entity Set -> Relation

- 1) Price History (SPID, Start-Date, End-Date, Price)

Keys: {SPID, Start-Date, End-Date}

Primary Key: {SPID, Start-Date, End-Date}

Functional Dependencies:

1) SPID, Start-Date, End-Date -> Price

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

### Subclass / Superclass -> Relation (ER approach)

- 1) Products (PName, Maker, Category)

Keys: PName

Primary Key: PName

Functional Dependencies:

1) PName -> Maker

2) PName -> Category

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

- 2) Product Listing (SPID, SPrice, SQuantity, Pname, Sname)

Keys: SPID

Primary Key: SPID

Functional Dependencies:

1) SPID -> SPrice

2) SPID -> SQuantity

3) SPID -> SName

4) SPID -> PName

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

3) Products in orders (PName, OPID, OPrice, OQuantity, Delivery-date, Status, SName, OID)

Keys: PName

Primary Key: PName

Functional Dependencies:

- 1) PName, OID, SName -> OPID
- 2) OPID -> OPrice
- 3) OPID -> OQuantity
- 4) OPID -> Delivery-date
- 5) OPID -> Status

The relation is not in 3NF as non-trivial 2),3),4),5) FDs do not contain a key in LHS. The keys also do not contain all attributes in RHS of 2),3),4),5) FDs.

Step 1a: Create minimal basis - All RHS has to have only one attribute

- 1) PName, OID, SName -> OPID
- 2) OPID -> OPrice
- 3) OPID -> OQuantity
- 4) OPID -> Delivery-date
- 5) OPID -> Status

Step 1b: Create minimal basis - Remove redundant FDs

- 1) PName, OID, SName -> OPID
- 2) OPID -> OPrice
- 3) OPID -> OQuantity
- 4) OPID -> Delivery-date
- 5) OPID -> Status

No FDs are redundant based on closure of {PName, OID, Sname}<sup>+</sup> and {OPID}<sup>+</sup>.

Step 1c: Create minimal basis - Remove redundant attribute in LHS of each FDs

- 1) PName, OID, SName -> OPID
- 2) OPID -> OPrice
- 3) OPID -> OQuantity
- 4) OPID -> Delivery-date
- 5) OPID -> Status

Checking first FD: Pname, OID, and Sname are not redundant based on closure of {Pname}<sup>+</sup>, {OID}<sup>+</sup>, {Sname}<sup>+</sup>.

Step 2: Combine FDs that have the same LHS

- 1) PName, OID, SName -> OPID,
- 2) OPID -> OPrice, OQuantity, Delivery-date, Status

Step 3: Create tables for each remaining FDs

R1(PName, OID, SName, OPID)  
R2(OPID, OPrice, OQuantity, Delivery-date, Status)

Step 4: If none of the tables contain a key of the original table R, create a table that contains a key of R

R1(PName, OID, SName, OPID)  
R2(OPID, OPrice, OQuantity, Delivery-date, Status)

R1 contains a key of original table: Pname

Step 5: Remove redundant tables

R1(PName, OID, SName, OPID)  
R2(OPID, OPrice, OQuantity, Delivery-date, Status)

The new decomposed table R1, R2 is now in 3NF.

4) Complaints (CID, Filed-date-time, Text, Status, Handled-date-time, EID, UID)

Keys: CID

Primary Key: CID

Functional Dependencies:

- 1) CID -> Filed-date-time
- 2) CID -> Text
- 3) CID -> Status
- 4) CID -> employeeID
- 5) CID -> Handled-date-time
- 6) CID -> UID

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

5) Complaints on shops (CID, SName)

Keys: CID

Primary Key: CID

Functional Dependencies:

- 1) CID -> SName

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

6) Complaints on orders (CID, OID)

Keys: CID

Primary Key: CID

Functional Dependencies:

- 1) CID -> OID

The relation is in 3NF as all non-trivial FDs contain a key in LHS.

**APPENDIX C: INDIVIDUAL CONTRIBUTION FORM**

Name	Individual Contribution to Submission 1 (Lab 1)	Percentage of Contribution	Signature
Nathanael Axel Wibisono	ER Diagram & Written Discussion	16.67%	Axel
Wang Qianteng	ER Diagram & Written Discussion	16.67%	Qianteng
Shreya Ramasubramanian	ER Diagram & Written Discussion	16.67%	Shreya
Tan Ye Quan	ER Diagram & Written Discussion	16.67%	Ye Quan
Bansal Arushi	ER Diagram & Written Discussion	16.67%	Arushi
Wang Dian	ER Diagram & Written Discussion	16.67%	wd

Name	Individual Contribution to Submission 2 (Lab 3)	Percentage of Contribution	Signature
Nathanael Axel Wibisono	ER Diagram & Database Schema	16.67%	Axel
Wang Qianteng	ER Diagram & Database Schema	16.67%	Qianteng
Shreya Ramasubramanian	ER Diagram & Database Schema	16.67%	Shreya
Tan Ye Quan	ER Diagram & Database Schema	16.67%	Ye Quan
Bansal Arushi	ER Diagram & Database Schema	16.67%	Arushi
Wang Dian	ER Diagram & Database Schema	16.67%	wd

[illegible]