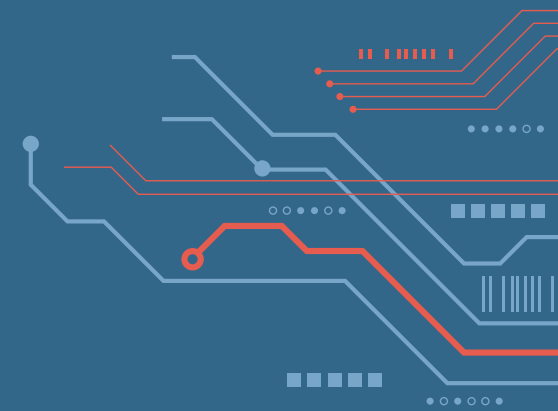# Process Management website database of a company specializing manufacture wooden furniture

Group1:
- Trần Hùng Cường
- Lương Phúc Khang
- Vương Minh Khang
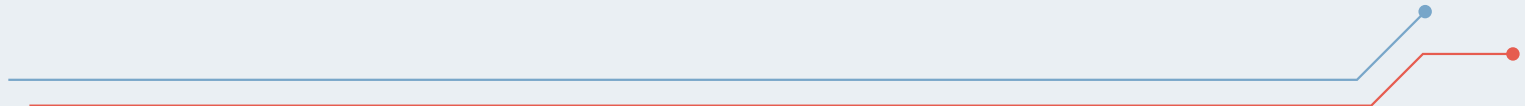- Nguyễn Tiến Lợi

3 Main Part

I. Requirement summary

❖ Employee manager:

o Employee: Employee ID, employee name, age, date of birth, address, phone number, email, position

o Department: Department ID, department name

+ Each employee will have to belong to a department

+ A department has many employees and has 1 room

I. Requirement summary

❖ Materials management:

o Materials: Material ID, material name, price of each piece, quantity in stock

o Supply company: Company name, address, phone number, email

+ Materials are periodically imported by the supplier along with the supply record. Each supply record has information: Record ID, supply date, supply time, amount.

+ Each supply record comprises only one material and from a company
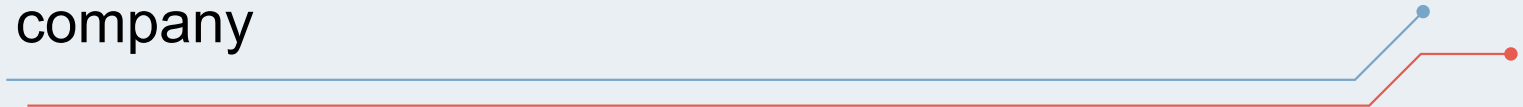
I. Requirement summary

❖ Production process:

o Machine: Machine ID, machine name, import date, maintenance cycle

o Workshop: Workshop ID, area

o Product type: product type ID, product type name, original price, manufacture days and manufacture amount in that day

o Place of distribution: Distributor ID, name, address, phone number of the place of distribution

II. Conceptual data model

3 Steps

II. Conceptual data model
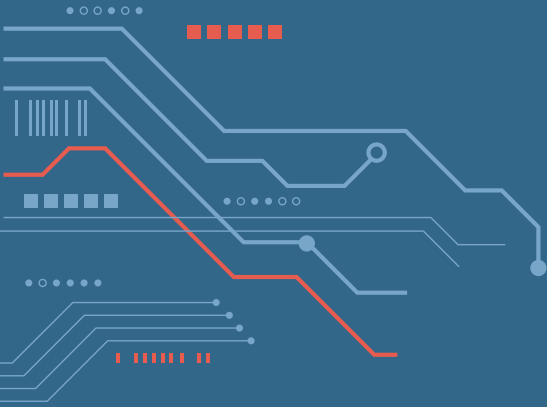
01   **Entity set and attribute identification**

02   **Identify relationship sets and cardinality constraints**

03   **Entity relationship diagram**
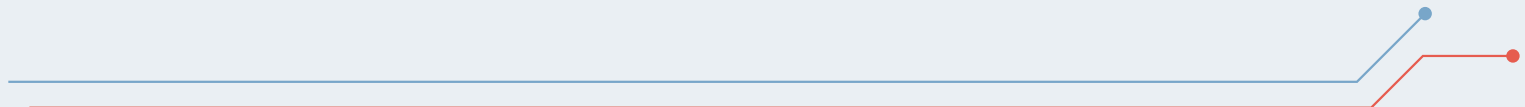
01

Entity set and attribute identification

01. Entity set and attribute identification

Entity set name	Attribute	Description
Department (strong entity set)	Department_ID (PK)	Department ID (unique)
	Department Name	Department name
Employee (strong entity set)	Employee_ID (PK)	Employee's ID (unique)
	Employee Name	Employee's name
	Title	Employee's title
	DOB	Employee's day of birth
	Email	Employee's email
	Address	Employee's address
	Phone_Number	Employee's phone number

01. Entity set and attribute identification

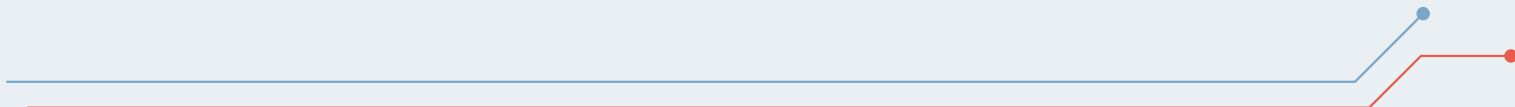| Entity set name	Attribute	Description
Workshop (strong entity set)	Workshop_ID (PK)	Workshop ID (unique)
	Area	Workshop Area
Machine (strong entity set)	Machine_ID	Machine ID (unique)
	Machine_Name	Machine name
	Import_Date	Machine import date
Product Type (strong entity set)	Product Type_ID (PK)	Product Type ID (unique)
	Product_Type_Name	Product Type name
	Original price	Original price of the product
	Manufacture_Date	Manufacture date
	Manufacture_Amount	Manufacture amount

01. Entity set and attribute identification

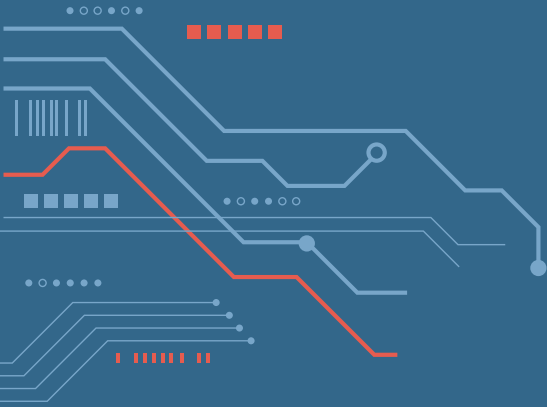| Entity set name	Attribute	Description
Place Of Distribution (strong entity set)	Maintenance Period	Machine maintenance period
	Distributor_Name	Distributor's name
	Distributor Address	Distributor's address
	Dis_PhoneNum	Distributor's phone number
Materials (strong entity set)	Materials_ID	Materials ID (unique)
	Materials_Name	Materials name
	Price_Of_Each_Piece	Price of each piece materials
	Quantity In Stock	Quantity materials in stock

01. Entity set and attribute identification

Entity set name	Attribute	Description
Supply Company (strong entity set)	SCo_Name (PK)	Supply company name (unique)
	SCo_Email	Supply company email
	SCo_Address	Supply company address
	SCo_PhoneNum	Supply company phone number
Supply Record (strong entity set)	Record ID (PK)	Record ID (unique)
	Supply Date	Supply date
	Supply_Time	Supply time
	Amount	Amount of supply

02

Identify relationship sets and cardinality constraints
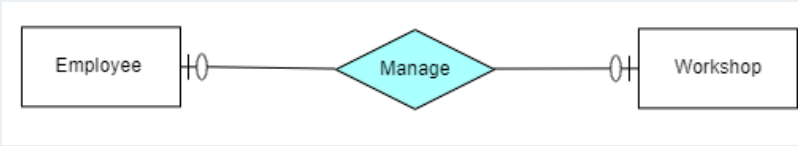
Relationship set name	Attribute	Description	Cardinality constraint
Work on		- Each employee will have to belong to a department. A department has many employees and has 1 room.	

02. Identify relationship sets and cardinality constraints
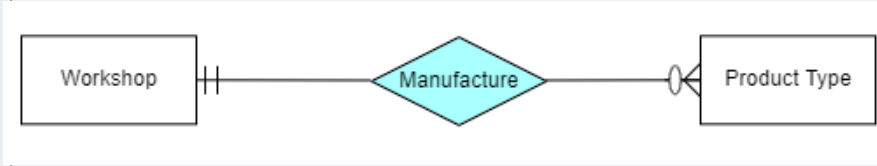
Relationship set name	Attribute	Description	Cardinality constraint
Working		- Employees will work in one workshop - One workshop can be work by many employees	

Relationship set name	Attribute	Description	Cardinality constraint
Manage		Each workshop will have one manager and each manager will manage only one workshop.	

02. Identify relationship sets and cardinality constraints

Relationship set name	Attribute	Description	Cardinality constraint
Manufacture		Each workshop manufactures many products type and each product only can be manufacture from one workshop.	

02. Identify relationship sets and cardinality constraints

Relationship set name	Attribute	Description	Cardinality constraint
Contain		Each machine will belong to a workshop	Workshop —||—◯— Contain —◯|<— Machine
Made		Each finished product is made from many machines and each machine produces only one type of finished product.	Product Type —||—◯— Made —|<— Machine

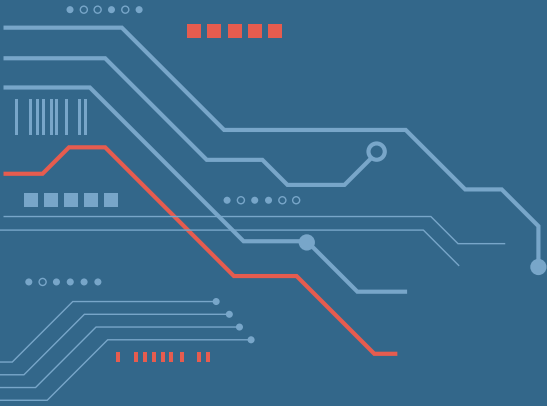# 02. Identify relationship sets and cardinality constraints

Relationship set name	Attribute	Description	Cardinality constraint
Distribution	Amount Distribution _Date	All kinds of finished products are delivered to the place of distribution on time with the specified quantity.	

03

Entity relationship diagram

Department
- Department_ID
- Department Name

Product Type
- Product Type ID
- Manufacture_Date
- Manufacture_Amount
- Original price
- Product_Type_Name

Machine
- Machine ID
- Machine_Name
- Import_Date
- maintenance period

Materials
- Materials ID
- Materials_Name
- Price_Of_Each_Piece
- Quantity In Stock

Distribution
- Amount
- Distribution_Date

Place Of Distribution
- Dis_PhoneNum
- Distributor_Name
- Distributor Address
- Distributor ID

Employee
- DOB
- Address
- Employee_Name
- Email
- Title
- Employee ID
- Phone_Number

Workshop
- Workshop ID
- Area

Supply Record
- Supply Date
- Record ID
- Supply_Time
- Amount

Supply Company
- SCo_Address
- SCo_PhoneNum
- SCo_Name
- SCo_Email

Relationships: Made, Use, Distribution, Comprise, Work on, Manufacture, Contain, Export, Working, Manage

III. Relational database design

3 Steps

III. Relational database design

01 ERD to relational schemas

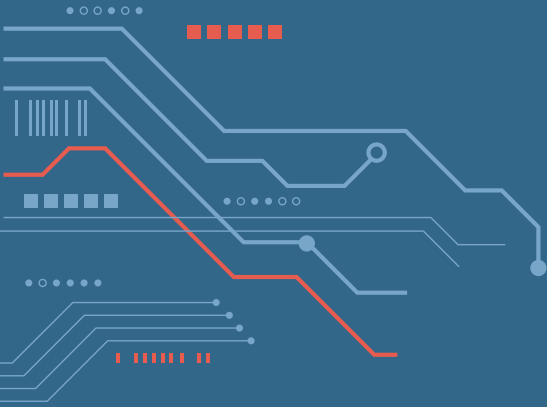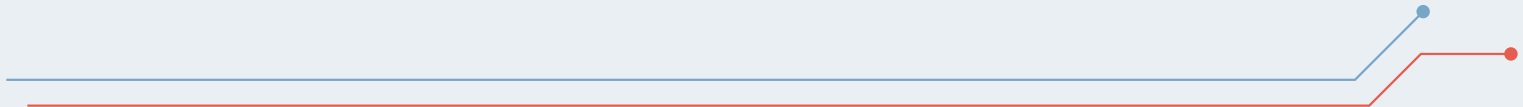**02** Normalization

03 Database diagram

01

ERD to relational schemas

01. ERD to relational schemas

❖ Convert entity sets
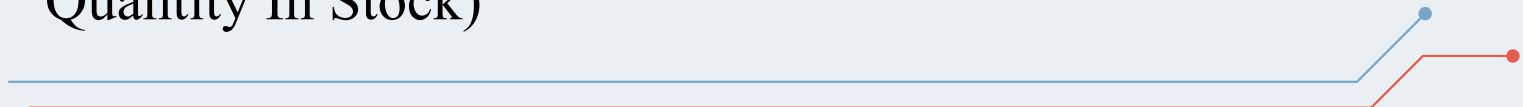
❖ Convert relationship sets

01. ERD to relational schemas

❖ Convert entity sets

- Department (<u>Department ID</u>, Department Name)
- Employee (<u>Employee ID</u>, Phone Number, Employee Name, Address, Email, Title, DOB)
- Workshop (<u>Workshop ID</u>, Area)
- Machine (<u>Machine ID</u>, Machine Name, maintenance period, Import Date)
- Materials (<u>Materials ID</u>, Materials Name, Price Of Each Piece, Quantity In Stock)
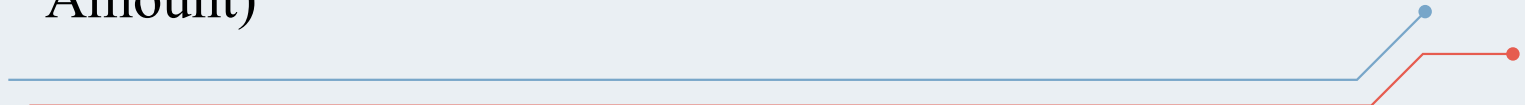
01. ERD to relational schemas

❖ Convert entity sets

- Supply Company (<u>SCo Name</u>, Sco Address, SCo Phone Number, SCo Email)
- Product Type (<u>Product Type ID</u>, Product Type Name, Original price, Manufacture_Date, Manufacture_Amount)
- Place Of Distribution (<u>Distributor ID</u>, Distributor Name, Distributor Address, Dis_PhoneNum)
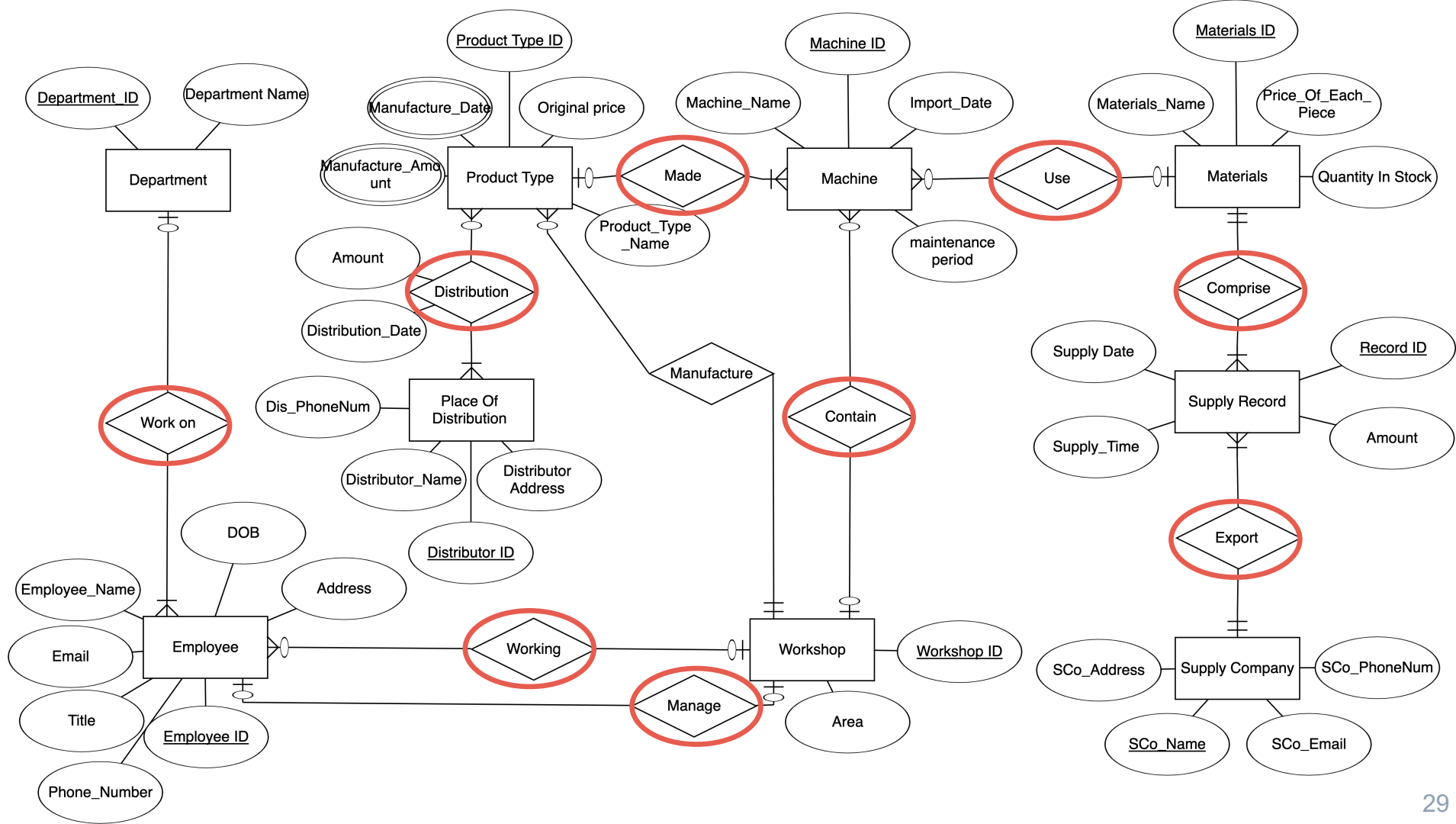- Supply Record (<u>Record ID,</u> Supply_Time, Supply Date, Amount)

01. ERD to relational schemas

❖ Convert relationship sets

29
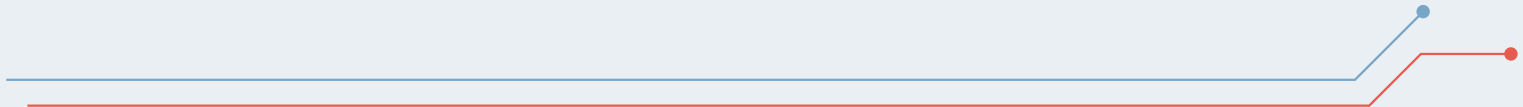
01. ERD to relational schemas

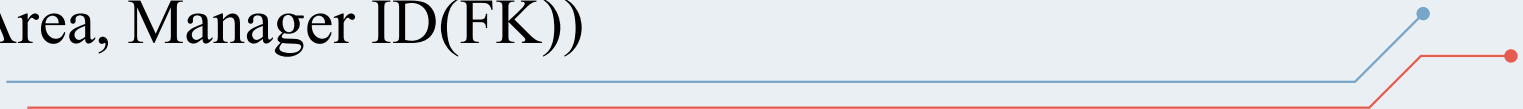❖ Convert relationship sets

- Convert Work on relationship set: Employee (Employee ID, Phone Number, Employee Name, Address, Email, Title, DOB, Department_ID(FK))

- Convert Working relationship set: Employee (Employee ID, Phone Number, Employee Name, Address, Email, Title, DOB, Department_ID(FK), Workshop ID (FK))

- Convert Manage relationship set: Workshop (Workshop ID, Area, Manager ID(FK))

01. ERD to relational schemas

❖ Convert relationship sets

- Convert Contain relationship set: Machine (<u>Machine ID</u>, Machine Name, maintenance period, Import Date, Workshop ID(FK))
- Convert Use relationship set: Machine (<u>Machine ID</u>, Machine Name, maintenance period, Import Date, Workshop ID(FK), Materials ID(FK))
- Convert Comprise relationship set: Supply Record (<u>Record ID,</u> Supply_Time, Supply Date, Amount, Materials ID(FK))
- Convert Export relationship set: Supply Record (<u>Record ID,</u> Supply_Time, Supply Date, Amount, Materials ID(FK), SCo_Name(FK))

01. ERD to relational schemas

❖ Convert relationship sets

- Convert Made relationship set: Machine (Machine ID, Machine Name, maintenance period, Import Date, Workshop ID(FK), Materials ID(FK), Product Type ID (FK))
- Convert Manufacture relationship set: Product type (Product Type ID, Product_Type_Name, Original Price, Manufacture_Date, Manufacture _amount, Workshop ID(FK))
- Convert Distribution relationship set: Pro_Distribution (Distributor ID, Product Type ID, Dis_Amount, Dis_Date)
- ➢ Note: Manufacture_Date, Manufacture_Amount is Multivalued

01. ERD to relational schemas

❖ Finally, we obtain the following relational schemas

- Employee (<u>Employee ID</u>, Phone Number, Employee Name, Address, Email, Title, DOB, Department_ID(FK), Workshop ID (FK))
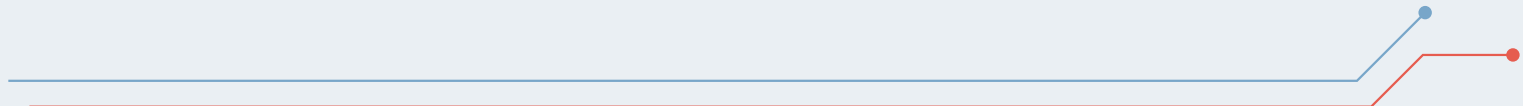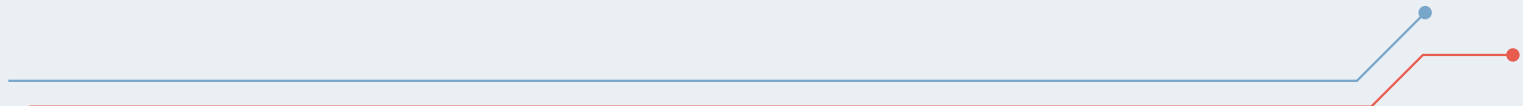- Department (<u>Department ID</u>, Department Name)
- Workshop (<u>Workshop ID</u>, Area, Manager ID)
- Machine (<u>Machine ID</u>, Machine Name, maintenance period, Import Date, Workshop ID(FK), Materials ID(FK), Product Type ID (FK))

01. ERD to relational schemas

- Materials (<u>Materials ID</u>, Materials Name, Price Of Each Piece, Quantity In Stock)
- Supply Record (<u>Record ID,</u> Supply_Time, Supply Date, Amount, Materials ID(FK), SCo_Name(FK))
- Supply Company (<u>SCo Name</u>, Sco Address, SCo Phone Number, SCo Email)
- Product type (<u>Product Type ID,</u> Product_Type_Name, Original Price, Manufacture_Date, Manufacture_amount, Workshop ID(Fk))
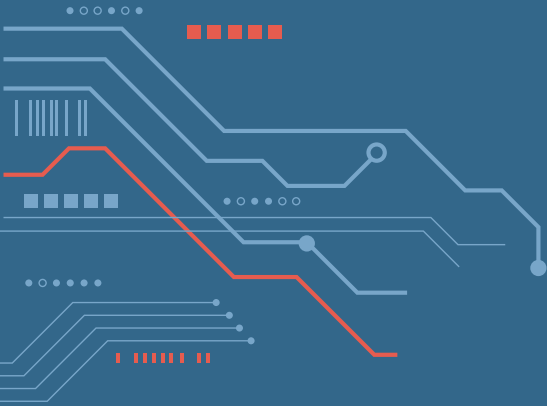
01. ERD to relational schemas

- Pro_Distribution (<u>Distributor ID, Product Type ID</u>, Dis_Amount, Dis_Date)
- Place Of Distribution (<u>Distributor ID</u>, Distributor Name, Distributor Address, Dis_PhoneNum)

02

Normalization

02. Normalization

❖ Find all functional dependencies

❖ Check if the database is in 1NF, 2NF, 3NF

❖ Normalization
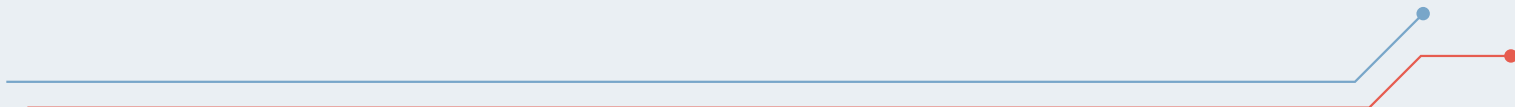
02. Normalization

❖ Find all functional dependencies

- Employee ID → Phone Number, Employee Name, Address, Email, Title, DOB, Department_ID, Workshop ID
- Department ID → Department Name
- Workshop ID → Area, Manager ID
- Machine ID → Machine Name, maintenance period, Import Date, Workshop ID, Materials ID, Product Type ID

02. Normalization

❖ Find all functional dependencies

- Materials ID → Materials Name, Price Of Each Piece, Quantity In Stock
- Record ID → Supply_Time, Supply Date, Amount, Materials ID, SCo_Name
- SCo Name → Sco Address, SCo Phone Number, SCo Email
- Product Type ID → Product_Type_Name, Original Price, Manufacture_Date, Manufacture_amount, Workshop ID
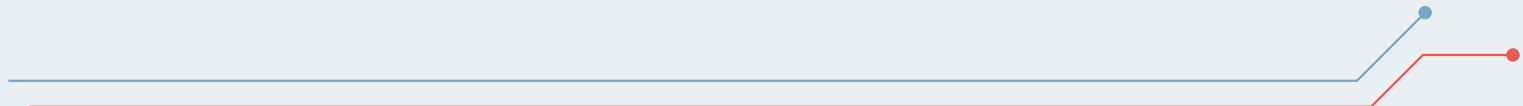
02. Normalization

❖ Find all functional dependencies

- Distributor ID, Product Type ID → Dis_Amount, Dis_Date
- Distributor ID→ Distributor Name, Distributor Address, Dis_PhoneNum

02. Normalization

❖ Check if the database is in 1NF, 2NF, 3NF

- 1NF: If every attribute of the relation has atomic values
- 2NF: If it is in 1NF and every non-prime attribute is fully functionally dependent on the keys.
- 3NF: If it is in 2NF and no non-prime attribute is transitively dependent on the keys.

02. Normalization

➢ This schema not in 1NF
• Manufacture_Date, Manufacture_Amount is Multivalued

02. Normalization

❖ Normalization

➢ 1NF:

- Employee (<u>Employee ID</u>, Phone Number, Employee Name, Address, Email, Title, DOB, Department_ID(FK), Workshop ID (FK))
- Department (<u>Department ID</u>, Department Name)
- Workshop (<u>Workshop ID</u>, Area, Manager ID)
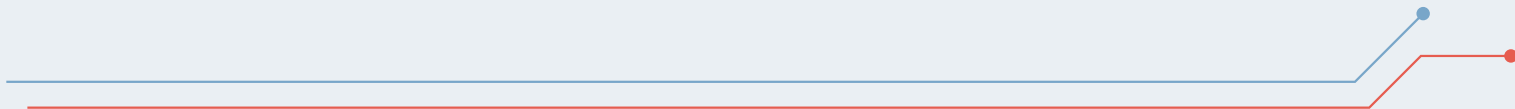- Machine (<u>Machine ID</u>, Machine Name, maintenance period, Import Date, Workshop ID(FK), Materials ID(FK), Product Type ID (FK))
- Materials (<u>Materials ID</u>, Materials Name, Price Of Each Piece, Quantity In Stock)
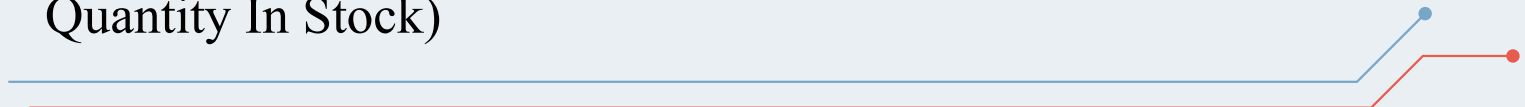
02. Normalization

- Supply Record (<u>Record ID,</u> Supply_Time, Supply Date, Amount, Materials ID(FK), SCo_Name(FK))
- Supply Company (<u>SCo Name</u>, Sco Address, SCo Phone Number, SCo Email)
- Pro_Distribution (<u>Distributor ID, Product Type ID</u>, Dis_Amount, Dis_Date)
- Product type (<u>Product Type ID,</u> Product_Type_Name, Original Price, Workshop ID)
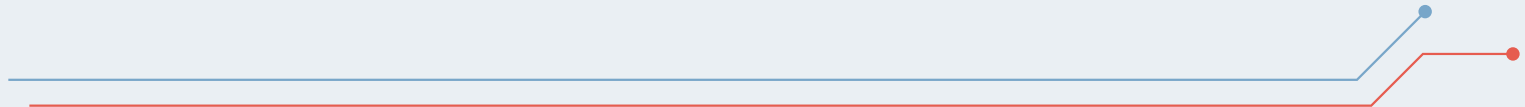
02. Normalization

- Manufacture_Record(<u>Product Type ID, Manufacture Date, Manufacture_amount</u>)
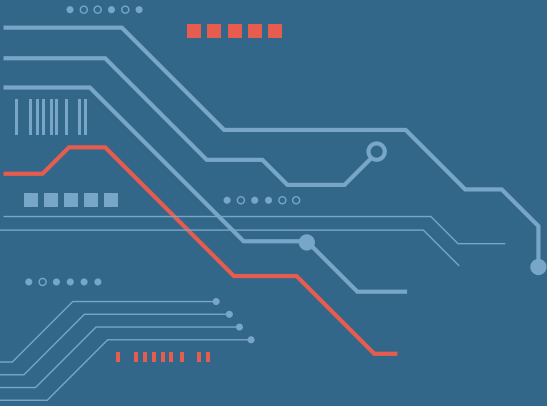- Place Of Distribution (<u>Distributor ID</u>, Distributor Name, Distributor Address, Dis_PhoneNum)

02. Normalization

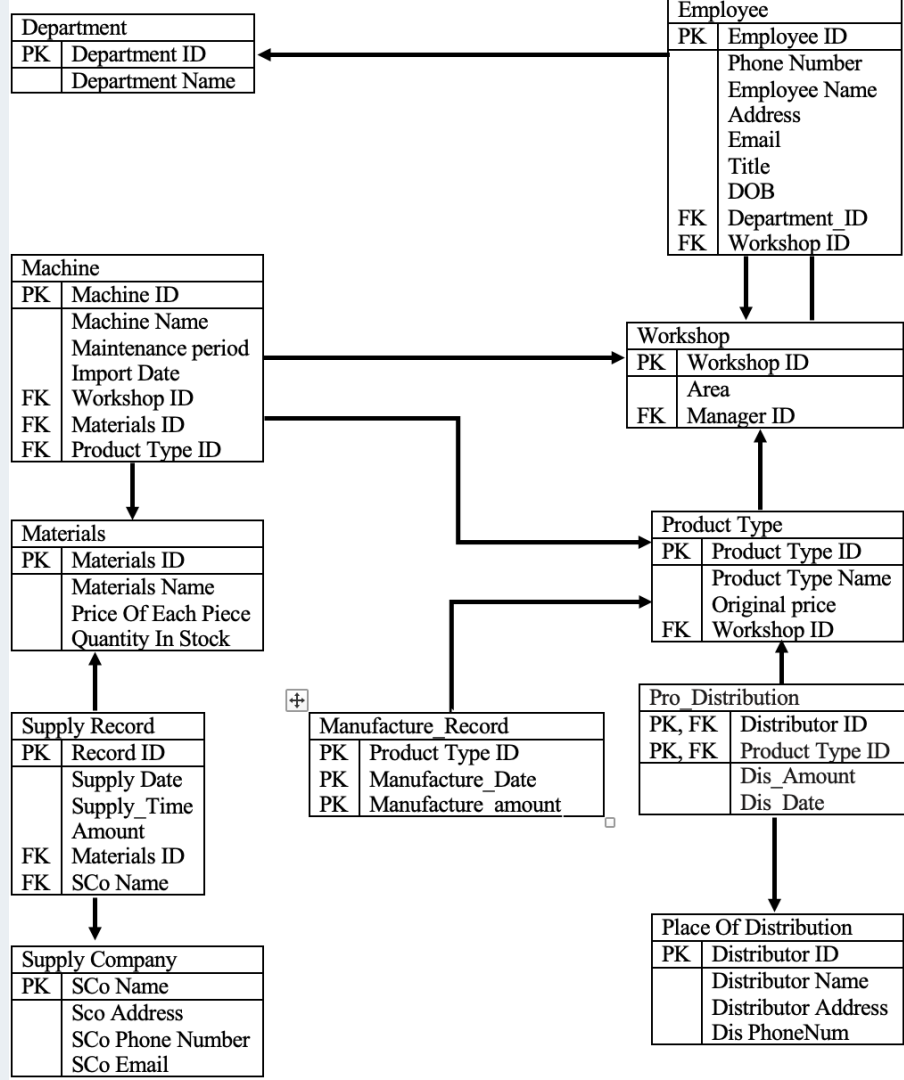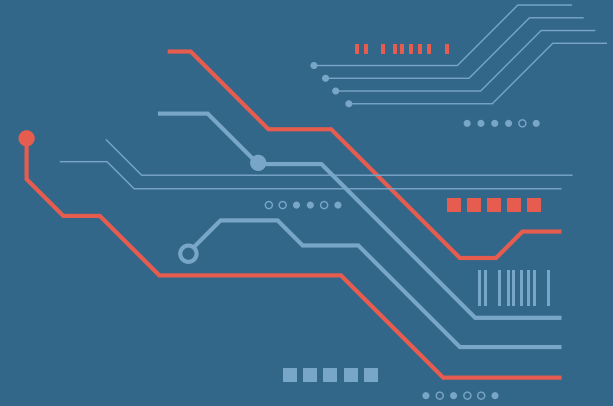- This Schema is in 2NF
- This Schema is in 3NF

03

Database diagram

Department

PK	Department ID
	Department Name

Employee

PK	Employee ID
	Phone Number
	Employee Name
	Address
	Email
	Title
	DOB
FK	Department_ID
FK	Workshop ID

Machine

PK	Machine ID
	Machine Name
	Maintenance period
	Import Date
FK	Workshop ID
FK	Materials ID
FK	Product Type ID

Workshop

PK	Workshop ID
	Area
FK	Manager ID

Materials

PK	Materials ID
	Materials Name
	Price Of Each Piece
	Quantity In Stock

Product Type

PK	Product Type ID
	Product Type Name
	Original price
FK	Workshop ID

Supply Record

PK	Record ID
	Supply Date
	Supply_Time
	Amount
FK	Materials ID
FK	SCo Name

Manufacture_Record

PK	Product Type ID
PK	Manufacture_Date
PK	Manufacture_amount

Pro_Distribution

PK, FK	Distributor ID
PK, FK	Product Type ID
	Dis_Amount
	Dis_Date

Supply Company

PK	SCo Name
	Sco Address
	SCo Phone Number
	SCo Email

Place Of Distribution

PK	Distributor ID
	Distributor Name
	Distributor Address
	Dis PhoneNum

THANKS FOR LISTENING

Do you have any questions?