**CS307 Principles of Database Systems**

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| **Project 1 Report** |
| **Database for Shipping Company SUSTC** |

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**Semester:** 2022 Autumn

**Lab Session:** Monday 7-8 (Class 2)

**Teacher:** Ran Cheng

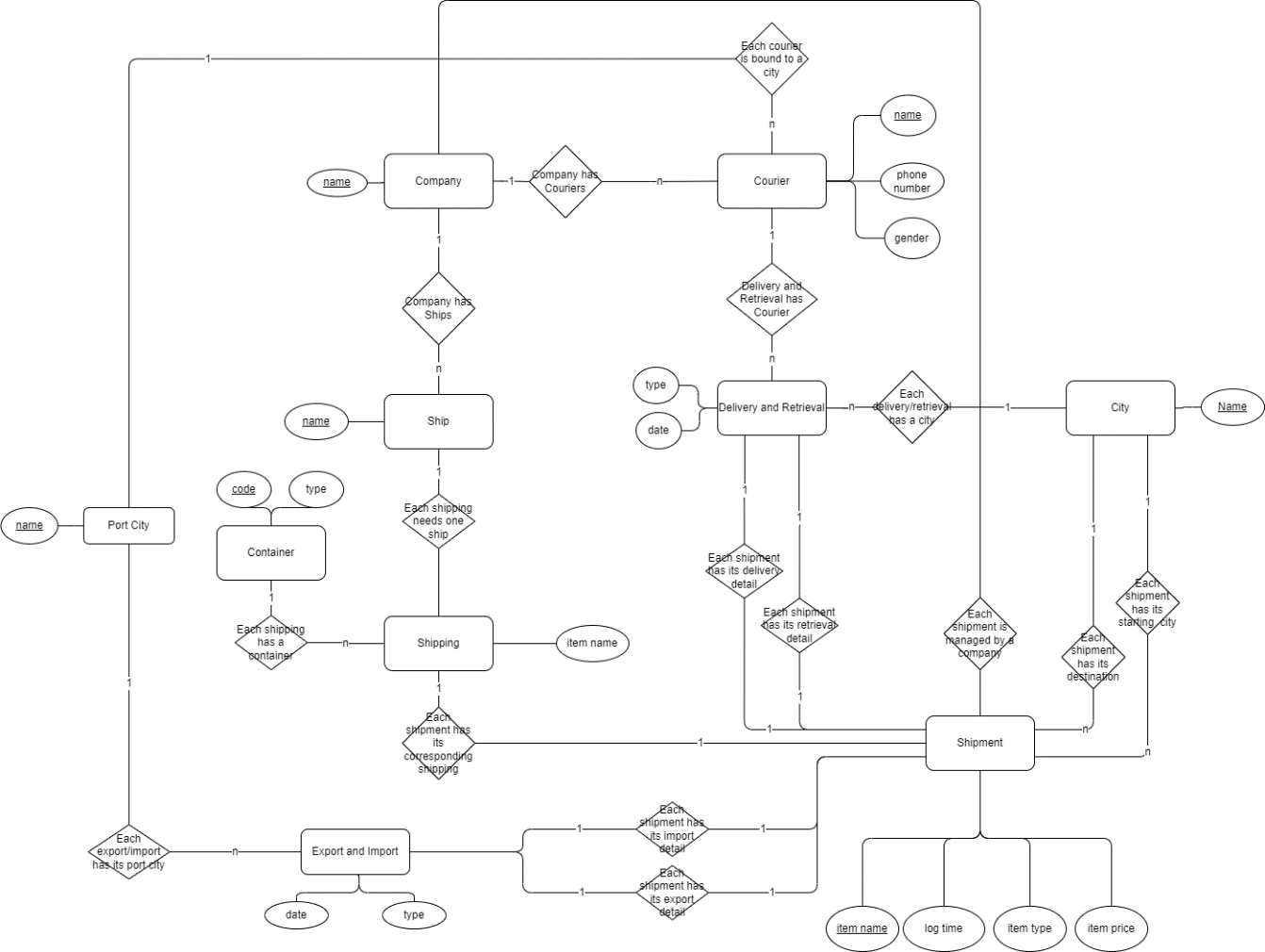
**Student Assistants:**

## Contributions

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| --- | --- | --- |
| Member | Contribution | Ratio |
| Xuanyu Liu | 1. Design and Draw E-R Diagram 2. Compare DMBS with File I/O | 50% |
| Zexin Feng | 1. Database Design 2. Data Import | 50% |

## Task1: E-R Diagram

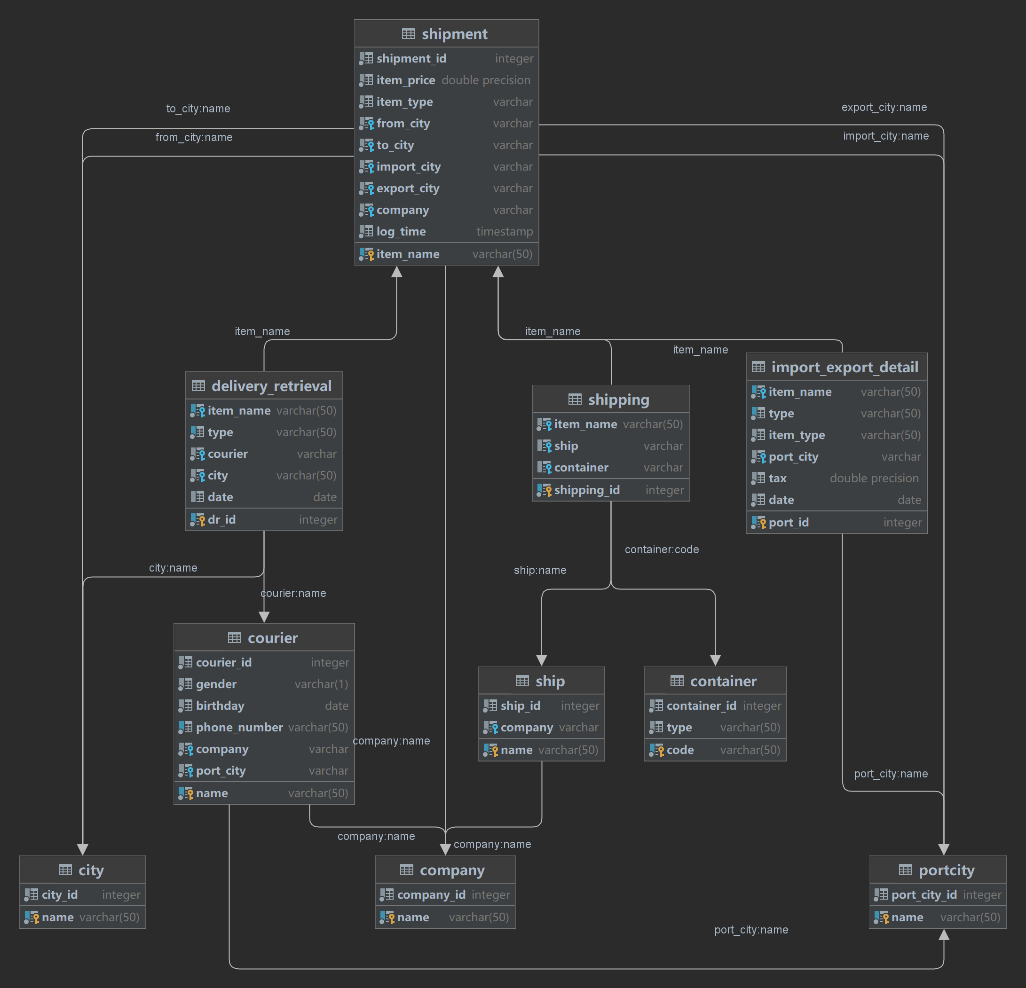
Based on the analysis to the data provided and the description about the data structure in project description, we designed following E-R diagram by using use Freedgo(<https://www.freedgo.com/>). The diagram is compressed forcedly, so it is not clear enough. The original E-R diagram is attached as **ER-Diagram.png**.



## Task2: Database Design

### Database Diagram

Our database diagram exported from DataGrip is as follows:



The full DDL scripts are attached as **createTables.sql**.

### Database Structure Description

* + 1. **City Table**

**City** table is designed to store the cities where courier retrieve and deliver items. **Name** is the primary key.

* + 1. **PortCity Table**

**PortCity** table is designed to store the cities where export and import items. Similar to above, **Name** is the primary key.

* + 1. **Company Table**

**Company** table is used to store the companies that manage the couriers, ships and items. **Name** columnis the primary key.

* + 1. **Courier Table**

1. **Courier** table is designed to store couriers who retrieve and deliver items.
2. **Gender, birthday, phone\_number** columnsare the basic information of a courier.
3. **Company** column is a foreign key referring to **Company** table, which represents that each courier works for a company.
4. **City** column is also a foreign key referring to **City** table, which means where the courier works. **Name** column is the primary key.
   * 1. **Ship Table**
5. **Ship** table stores the ships that carry items.
6. **Company** column is a foreign key referring to **Company** table, which represents that each ship belongs to a company.
   * 1. **Container Table**
7. **Container** table stores the containers information.
8. **Code** columnstores the identity of containers and is the primary key.
9. **Type** column stores the types of containers.
   * 1. **Shipment Table**

**Shipment** table stores all the items. **Please treat it the same as item table.**

1. **Item\_name, item\_type, item\_price** columns store the basic information of items, where **item\_name** column is the unique identity columns and also the primary key.
2. **From\_city, to\_city, company** columns are three foreign keys, the former two refer to **City** table, representing the starting city and destination of the item, the later refers to **Company** table, representing the company who manages the item.
3. **Log time** is the last update time of the item.
   * 1. **Shipping Table**

**Shipping** table is a connection table between **Shipment** tableand **Ship** table, **Shipment** table and **Container** table. So all columns of the tables are foreign keys.

1. **Ship** column refers to **Ship** table.
2. **Container** column refers to container table.
   * 1. **Delivery\_Retrieval**

**Delivery\_Retrieval** table is a connection table between **Shipment** table between **Courier** table.

1. **Date** column records when the item is delivered or retrieved.
2. **Type** column indicates that current record is delivery or retrieval.
   * 1. **Import\_Export\_Detail**

**Import\_Export\_Detail** table records the import or export detail of the item.

1. **Tax** column records the tax that the item needs to import or export.
2. **Type** column indicates that current record is import or export.
3. **Port\_city** column is a foreign key referring to **PortCity** Table, meaning where the item is imported or exported.
4. **Date** column records when the item is imported or exported.

## Task3: Data Import

### Environment Description

Hardware:

CPU: AMD Ryzen 5800X 8

RAM: 32GB DDR4 3600Mhz

Disk: SSD HikVision C2000Pro 1024GB

Software:

Operating System: Windows 11

File System: NTFS

DBMS: PostgreSQL ver42.5.0[stable]

Programing Language: Java 18.0

Compliler: JavaC 18.0

### Different Ways of Importing

### Speed Comparison

### Script Optimization

## Task4: Compare DBMS with File I/O

### Environment Description

### Method Introduction

### Comparative Analysis

### Advanced Requirements