**Distributed Database Schema**

1.1         Global Database Tables

We have four global tables. They are *city, brand\_store, stock, cd, stock\_detail,import\_cd ,import\_cd\_detail, customer, orders, order\_details*. Their conceptual schemas are described below.

Table 1. the global tables

|  |
| --- |
| **Global Tables** |
| **City** (city\_id number, city\_name varchar2(255))  **brand\_store**(id number, name varchar2(255), district varchar2(255), city\_id number, hotline varchar2(15))  **stock**(id number, city\_id number, name varchar2(255), available number, capacity number)  **cd** (id number, title varchar2(255), price number, description varchar2(255))  **stock\_detail** (cd\_id number, stock\_id number, stock\_available number)  **import\_cd** (id number, stock\_id number, brand\_store\_id number, createdAt date default sysdate not null)  **import\_cd\_detail** (import\_cd\_id number, cd\_id number, quatity number)  **customer** (id number, city\_id number, name varchar2(255), number\_phone varchar2(15), score number)  **orders** (id number, brand\_store\_id number, stock\_id number, cust\_id number, total number, order\_date date default sysdate not null)  **orders\_details** (order\_id number, cd\_id number, quatity number, price number) |

1.2         Table Description

* **City (id number, name varchar2(255))**

Table 2. Description of Table “City”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of city | Integer | 1-10, no duplicate |
| **name** | The name city | String | ‘Ha Noi’: Ha Noi (Proportion: 50%)  ‘Ho Chi Minh’: Ho Chi Minh (Proportion: 50%) |

Number of records: 5000

* **brand\_store(id number, name varchar2(255), district varchar2(255), city\_id number, hotline varchar2(15))**

Table 3. Description of Table “brand\_store”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of brand store | Integer | 1-20, no duplicate |
| **Name** | The name of brand store | String | - |
| **district** | The district of brand store | String | - |
| **City\_id** | The id city of brand store | integer | 1-10 |
| **hotline** | The hotline of brand store | string | - |

Number of records: 15000

* **stock( id number, city\_id number, name varchar2(255), available number, capacity number)**

Table 4. Description of Table “Stock”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of stock | Integer | 1-20, no duplicate |
| **City\_id** | city code where the branch is located | Integer | city.id |
| **name** | The name of stock | String | - |
| **available** | Quantity available in stock | Integer | - |
| **capacity** | the capacity of goods in the stock | Integer | - |

Number of records: 50000

* **cd (id number, title varchar2(255), price number, description varchar2(255))**

Table 5. Description of Table “CD”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id** | The ID of cd | Integer |  |
| title | name of cd | String | - |
| Price | Price of cd | Integer | >0 |
| **description** | Description of cd | String | - |

Number of records: 100000

* **stock\_detail (cd\_id number, stock\_id number, stock\_available number)**

Table 5. Description of Table “Order”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **cd\_id** | The ID of customer who order a cd | Integer | cd.id |
| **stock\_id** | The ID of a ordered cd | Integer | stock.id |
| **stock\_available** | Amount of ordered cd | Integer | - |

Number of records: 100000

* **import\_cd (import\_cd\_id number, stock\_id number, brand\_store\_id number, createdAt date default sysdate not null)**

Table 5. Description of Table “**import\_cd**”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **import\_cd** | The if of import cd | Integer |  |
| **Stock\_id** | The id of stock where cd is located | Integer | stock.id |
| **brand\_store\_id** | The id brand store which import cd | Integer | **brand\_store.id** |
| **createdAt** | This is the time create import cd | date | - |

Number of records: 100000

* **import\_cd\_detail (import\_cd\_id number, cd\_id number, quatity number)**

Table 5. Description of Table “**import\_cd\_detail**”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **import\_cd\_id** | The ID of import which import cd | Integer | Import\_cd.id |
| **cd\_id** | The ID of a cd is imported | Integer | cd.id |
| **quantity** | Amount of cd is imported | Integer | - |

Number of records: 100000

* **customer (id number, city\_id number, name varchar2(255), number\_phone varchar2(15), score number)**

Table 5. Description of Table “**customer**”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id** | The ID of customer | Integer | customer.id |
| **city\_id** | The ID city of a lived customer | Integer | city.id |
| **name** | The name of customer | string | - |
| **score** | customer accumulative points | integer | Score >0 |

Number of records: 100000

* **orders (id number, brand\_store\_id number, stock\_id number, cust\_id number, total number, order\_date date default sysdate not null)**

Table 5. Description of Table “Order”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of order | Integer |  |
| **brand\_store\_id** | The ID of a ordered cds | Integer | **brand\_store**.id |
| **stock\_id** | The ID of stock export product for this order | Integer | Stock.id |
| **cust\_id** | The ID of customer who order a cd | Integer | Customer.id |
| **total** | The total money of order | Integer | - |
| **order\_date** | The date create order | Date | - |

Number of records: 100000

* **orders\_details (order\_id number, cd\_id number, quatity number, price number)**

Table 5. Description of Table “**orders\_details**”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **order\_id** | The ID of customer who order a cd | Integer | order.id |
| **cd\_id** | The ID of a ordered cd | Integer | cd.id |
| **quantity** | Amount of ordered cds | Integer | - |
| **price** | Price of ordered cd | Integer | - |

Number of records: 100000

1.3         Fragmentation

* stock(id number, city\_id number, name varchar2(255), available number, capacity number)

Table 7. Horizontal Fragmentation of Table “Stock”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **Stock.1** | 0 < id <= 10 |
| **Stock.2** | 10 <id<=20 |

Table 7. Vertical Fragmentation of Table “Stock”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **Stock.1, Stock.2** | (id, city\_id, name) |
| **Stock.4** | (id, available, capacity) |

* cd (id number, title varchar2(255), price number, description varchar2(255))

Table 8. Vertical Fragmentation of Table “CD”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **cd\_id.1, cd\_id.2** | (id, title, price) |
| **cd\_id.3** | (cd\_id, cd\_description) |

Table 8. Horizontal Fragmentation of Table “CD”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **id.1** | 0 < id <=50 |
| **id.2** | 50 < id <=100 |

* **import\_cd (id number, stock\_id number, brand\_store\_id number, createdAt date default sysdate not null)**

Table 9. Horizontal Fragmentation of Table “**import\_cd**”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **import\_cd 1** | 0<id <= 100 |
| **import\_cd 2** | 100< id <= 200 |

* **customer (id number, city\_id number, name varchar2(255), number\_phone varchar2(15), score number))**

Table 9. Horizontal Fragmentation of Table “**customer**”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **customer.1** | 0 < id <= 100 |
| **customer.2** | 100 < id <= 200 |

Table 9. Vertical Fragmentation of Table “**customer**”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **customer.1, customer.2** | id number, city\_id number, name, number\_phone, |
| **customer.3** | id, score |

* **orders (id number, brand\_store\_id number, stock\_id number, cust\_id number, total number, order\_date date default sysdate not null)**

Table 9. Horizontal Fragmentation of Table “orders”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **orders.1** | **id** <= 100 |
| **orders.2** | 100 < **id** <= 200 |

1.4         Allocation

Site Configuration: 3 sites deployed at 3 computers.

* **Scheme1: Basic Fragmentation**

Table 1. Allocation Scheme of Basic Fragmentation

|  |  |
| --- | --- |
| **At Site Name** | **Fragmentation Name** |
| **DB1 at Site 1** | **Stock.1, cd\_id.1,** **customer.1, import\_cd.1, orders.1** |
| **DB2 at Site 2** | **Stock.2, cd\_id.2,** **customer.2, import\_cd .2, orders.2** |
| **DB3 at Site 3** | **customer.3, cd\_id.3, Stock.3** |