**Distributed Database Schema**

1.1         Global Database Tables

We have four global tables. They are *Publisher, Book, Customer* and *Order*. Their conceptual schemas are described below.

Table 1. the global tables

|  |
| --- |
| **Global Tables** |
| **Publisher (id int key, name char(100), nation char(3))**  **Book (id int key, title char(100), authors char(200), publisher\_id int, copies int)**  **Customer (id int key, name char (25), rank int)**  **Orders (customer\_id int, book\_id int, quantity int)** |

1.2         Table Description

* **Publisher (id int key, name char(100), nation char(3))**

Table 2. Description of Table “Publisher”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of publisher | Integer | 100001-105000, no duplicate |
| **name** | The name of publisher | String | - |
| **nation** | The nation of publisher | String | ‘USA’: USA (Proportion: 50%)  ‘PRC’: China (Proportion: 50%) |

Number of records: 5000

* **Customer (id int key, name char (25), rank int)**

Table 3. Description of Table “Customer”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of customer | Integer | 300001-315000, no duplicate |
| **name** | The name of customer | String | - |
| **rank** | The rank of customer | Integer | 1: Golden Customer (Proportion: 40%)  2: Silver Customer (Proportion: 30%)  3: Bronze Customer (Proportion: 30%) |

Number of records: 15000

* **Book (id int key, title char(100), authors char(25), publisher\_id int, copies int)**

Table 4. Description of Table “Book”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **id (key)** | The ID of book | Integer | 200001-250000, no duplicate |
| **title** | The title of book | String | - |
| **authors** | The authors of book | String | - |
| **publisher\_id** | The ID of publisher that publishes book | Integer | Publisher.id |
| **copies** | The number of published copies | Integer |  |

Number of records: 50000

* **Order (customer\_id int, book\_id int, quantity int)**

Table 5. Description of Table “Order”

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Type** | **Value** |
| **customer\_id** | The ID of customer who order a book | Integer | customer.id |
| **book\_id** | The ID of a ordered book | Integer | book.id |
| **quantity** | Amount of ordered books | Integer | - |

Number of records: 100000

1.3         Fragmentation

* **Stock (stock\_id, stock\_name, stock\_address,** **stock\_available, stock\_capacity )**

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** | (stock\_id, stock\_name, stock\_address) |
| **Stock.4** | (stock\_id, stock\_available, stock\_capacity) |

* CD **(id int key, name char (25), rank int)**

Table 8. Vertical Fragmentation of Table “CD”

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

* CD **(id int key, name char (25), rank int)**

Table 8. Horizontal Fragmentation of Table “CD”

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **cd\_id.1** | 0 < Cd\_id <=50 |
| **cd\_id.2** | 50 < cd\_id <=100 |

* **import\_cd (customer\_id int, book\_id int, quantity int)**

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

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

* **customer (customer\_id int, book\_id int, quantity int)**

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

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

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

|  |  |
| --- | --- |
| **Fragmentation Name** | **Fragmentation Condition** |
| **customer.1, customer.2** | **cust\_id, cust\_name, cust\_address, cust\_number\_phone, cust\_email, brand\_store\_id** |
| **customer.3** | **cust\_id, cust\_score** |

* **orders (customer\_id int, book\_id int, quantity int)**

Table 9. Horizontal Fragmentation of Table “orders”

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