1. Normalisasi
   1. 1NF

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| custNo | name | phoneNo | email | | | salesRepNo | | |
| C1 | Lidya | 8.125E+10 | [lidya@gmail.com](mailto:lidya@gmail.com) | | | S1 | | |
| C2 | Ali | 8.524E+10 | [ali@gmail.com](mailto:ali@gmail.com) | | | S1 | | |
| purchaseId | date | storeId | storeLocation | itemId | | | itemName | | |
| P1 | 2/13/2022 | S1 | Jakarta | I1 | | | Baju Batik | | |
| P2 | 2/13/2022 | S1 | Jakarta | I2 | | | Celana Kain | | |
| werhouseId | costOfUnit | unitsOnHand | werhouseAddress | | werhouseCity | | |
| W1 | 40000 | 100 | Bandung | | Bandung | | |
| W1 | 50000 | 50 | Bandung | | Bandung | | |

* 1. 2NF

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| custNo | name | phoneNo | email | salesRepNo | salesRepName |
| C1 | Lidya | 8.125E+10 | [lidya@gmail.com](mailto:lidya@gmail.com) | S1 | Wawan |
| C2 | Ali | 8.524E+10 | [ali@gmail.com](mailto:ali@gmail.com) | S1 | Wawan |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| purchaseId | date | custNo | storeId | storeLocation |
| P1 | 2/13/2022 | C1 | S1 | Jakarta |
| P2 | 2/13/2022 | C2 | S1 | Jakarta |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| itemId | itemName | size | quantity | price | category |
| I1 | Baju Batik | L | 2 | 50000 | Baju |
| I2 | Celana Kain | M | 3 | 60000 | Celana |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| werhouseId | costOfUnit | unitsOnHand | werhouseAddress | werhouseCity |
| W1 | 40000 | 100 | Bandung | Bandung |
| W1 | 50000 | 50 | Bandung | Bandung |

* 1. 2NF

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| custNo | name | phoneNo | email | salesRepNo | salesRepName |
| C1 | Lidya | 8.125E+10 | [lidya@gmail.com](mailto:lidya@gmail.com) | S1 | Wawan |
| C2 | Ali | 8.524E+10 | [ali@gmail.com](mailto:ali@gmail.com) | S1 | Wawan |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| purchaseId | date | custNo | storeId | storeLocation |
| P1 | 2/13/2022 | C1 | S1 | Jakarta |
| P2 | 2/13/2022 | C2 | S1 | Jakarta |

|  |  |  |
| --- | --- | --- |
| itemId | price | category |
| I1 | 50000 | Baju |
| I2 | 60000 | Celana |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| purchaseId | itemId | itemName | size | quantity |
| P1 | I1 | Baju Batik | L | 2 |
| P2 | I2 | Celana Kain | M | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| werhouseId | costOfUnit | unitsOnHand | werhouseAddress | werhouseCity |
| W1 | 40000 | 100 | Bandung | Bandung |

1. ERD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| custNo | name | phoneNo | email | salesRepNo |
| C1 | Lidya | 8.125E+10 | [lidya@gmail.com](mailto:lidya@gmail.com) | S1 |
| C2 | Ali | 8.524E+10 | [ali@gmail.com](mailto:ali@gmail.com) | S1 |

|  |  |
| --- | --- |
| salesRepNo | salesRepName |
| S1 | Wawan |

|  |  |  |  |
| --- | --- | --- | --- |
| purchaseId | date | custNo | storeId |
| P1 | 2/13/2022 | C1 | S1 |
| P2 | 2/13/2022 | C2 | S1 |

|  |  |
| --- | --- |
| storeId | storeLocation |
| S1 | Jakarta |

|  |  |  |
| --- | --- | --- |
| itemId | price | category |
| I1 | 50000 | Baju |
| I2 | 60000 | Celana |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| purchaseId | itemId | itemName | size | quantity |
| P1 | I1 | Baju Batik | L | 2 |
| P2 | I2 | Celana Kain | M | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| werhouseId | costOfUnit | unitsOnHand | werhouseAddress | werhouseCity |
| W1 | 40000 | 100 | Bandung | Bandung |

|  |  |
| --- | --- |
| werhouseId | itemId |
| W1 | I1 |
| W1 | I2 |

1. Physical Database Design
   1. Database Definition Language

CREATE TABLE IF NOT EXISTS `customer` (

`cust\_no` int(11) NOT NULL,

`name` varchar(50) DEFAULT NULL,

`phone\_no` varchar(50) DEFAULT NULL,

`email` varchar(50) DEFAULT NULL,

`sales\_rep\_no` int(11) DEFAULT NULL,

PRIMARY KEY (`cust\_no`),

KEY `Index 2` (`sales\_rep\_no`),

CONSTRAINT `FK\_customer\_sales` FOREIGN KEY (`sales\_rep\_no`) REFERENCES `sales` (`sales\_rep\_no`) ON DELETE NO ACTION ON UPDATE NO ACTION

)

CREATE TABLE IF NOT EXISTS `inventory` (

`werhouse\_id` int(11) DEFAULT NULL,

`item\_id` int(11) DEFAULT NULL,

KEY `werhouse\_id` (`werhouse\_id`),

KEY `item\_id` (`item\_id`),

CONSTRAINT `FK\_inventory\_item` FOREIGN KEY (`item\_id`) REFERENCES `item` (`item\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION,

CONSTRAINT `FK\_inventory\_warehouse` FOREIGN KEY (`werhouse\_id`) REFERENCES `warehouse` (`werhouse\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION

)

CREATE TABLE IF NOT EXISTS `item` (

`item\_id` int(11) NOT NULL,

`price` int(11) DEFAULT NULL,

`category` varchar(50) DEFAULT NULL,

PRIMARY KEY (`item\_id`)

)

CREATE TABLE IF NOT EXISTS `purchase` (

`purchase\_id` int(11) NOT NULL,

`date` date DEFAULT NULL,

`cust\_no` int(11) DEFAULT NULL,

`store\_id` int(11) DEFAULT NULL,

PRIMARY KEY (`purchase\_id`),

KEY `cust\_no` (`cust\_no`),

KEY `store\_id` (`store\_id`),

CONSTRAINT `FK\_purchase\_customer` FOREIGN KEY (`cust\_no`) REFERENCES `customer` (`cust\_no`) ON DELETE NO ACTION ON UPDATE NO ACTION,

CONSTRAINT `FK\_purchase\_store` FOREIGN KEY (`store\_id`) REFERENCES `store` (`store\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION

)

CREATE TABLE IF NOT EXISTS `purchase\_detail` (

`purchase\_id` int(11) NOT NULL,

`item\_id` int(11) DEFAULT NULL,

`item\_name` varchar(50) DEFAULT NULL,

`size` int(11) DEFAULT NULL,

`quantity` int(11) DEFAULT NULL,

PRIMARY KEY (`purchase\_id`),

KEY `item\_id` (`item\_id`),

CONSTRAINT `FK\_purchase\_detail\_item` FOREIGN KEY (`item\_id`) REFERENCES `item` (`item\_id`) ON DELETE NO ACTION ON UPDATE NO ACTION

)

CREATE TABLE IF NOT EXISTS `sales` (

`sales\_rep\_no` int(11) NOT NULL,

`sales\_rep\_name` varchar(50) DEFAULT NULL,

PRIMARY KEY (`sales\_rep\_no`)

)

CREATE TABLE IF NOT EXISTS `store` (

`store\_id` int(11) NOT NULL,

`store\_location` varchar(50) DEFAULT NULL,

PRIMARY KEY (`store\_id`)

)

CREATE TABLE IF NOT EXISTS `warehouse` (

`werhouse\_id` int(11) NOT NULL,

`cost\_of\_unit` int(11) DEFAULT NULL,

`units\_on\_hand` int(11) DEFAULT NULL,

`werhouse\_address` int(11) DEFAULT NULL,

`werhouse\_city` int(11) DEFAULT NULL,

PRIMARY KEY (`werhouse\_id`)

)

* 1. Database Definition Language

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| purchaseId | itemId | itemName | size | quantity | total |
| P1 | I1 | Baju Batik | L | 2 | 100000 |
| P2 | I2 | Celana Kain | M | 3 | 180000 |

* 1. Database Definition Language

**customer**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| cust\_no *(Primary)* | int(11) | No |  |  |  |  |
| name | varchar(50) | Yes | *NULL* |  |  |  |
| phone\_no | varchar(50) | Yes | *NULL* |  |  |  |
| email | varchar(50) | Yes | *NULL* |  |  |  |
| sales\_rep\_no | int(11) | Yes | *NULL* | sales -> sales\_rep\_no |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | cust\_no | 0 | A | No |  |
| Index 2 | BTREE | No | No | sales\_rep\_no | 0 | A | Yes |  |

**inventory**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| werhouse\_id | int(11) | Yes | *NULL* | warehouse -> werhouse\_id |  |  |
| item\_id | int(11) | Yes | *NULL* | item -> item\_id |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| werhouse\_id | BTREE | No | No | werhouse\_id | 0 | A | Yes |  |
| item\_id | BTREE | No | No | item\_id | 0 | A | Yes |  |

**item**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| item\_id *(Primary)* | int(11) | No |  |  |  |  |
| price | int(11) | Yes | *NULL* |  |  |  |
| category | varchar(50) | Yes | *NULL* |  |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | item\_id | 0 | A | No |  |

**purchase**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| purchase\_id *(Primary)* | int(11) | No |  |  |  |  |
| date | date | Yes | *NULL* |  |  |  |
| cust\_no | int(11) | Yes | *NULL* | customer -> cust\_no |  |  |
| store\_id | int(11) | Yes | *NULL* | store -> store\_id |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | purchase\_id | 0 | A | No |  |
| cust\_no | BTREE | No | No | cust\_no | 0 | A | Yes |  |
| store\_id | BTREE | No | No | store\_id | 0 | A | Yes |  |

**purchase\_detail**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| purchase\_id *(Primary)* | int(11) | No |  |  |  |  |
| item\_id | int(11) | Yes | *NULL* | item -> item\_id |  |  |
| item\_name | varchar(50) | Yes | *NULL* |  |  |  |
| size | int(11) | Yes | *NULL* |  |  |  |
| quantity | int(11) | Yes | *NULL* |  |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | purchase\_id | 0 | A | No |  |
| item\_id | BTREE | No | No | item\_id | 0 | A | Yes |  |

**sales**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| sales\_rep\_no *(Primary)* | int(11) | No |  |  |  |  |
| sales\_rep\_name | varchar(50) | Yes | *NULL* |  |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | sales\_rep\_no | 0 | A | No |  |

**store**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| store\_id *(Primary)* | int(11) | No |  |  |  |  |
| store\_location | varchar(50) | Yes | *NULL* |  |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | store\_id | 0 | A | No |  |

**warehouse**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| werhouse\_id *(Primary)* | int(11) | No |  |  |  |  |
| cost\_of\_unit | int(11) | Yes | *NULL* |  |  |  |
| units\_on\_hand | int(11) | Yes | *NULL* |  |  |  |
| werhouse\_address | int(11) | Yes | *NULL* |  |  |  |
| werhouse\_city | int(11) | Yes | *NULL* |  |  |  |

**Indexes**

| **Keyname** | **Type** | **Unique** | **Packed** | **Column** | **Cardinality** | **Collation** | **Null** | **Comment** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PRIMARY | BTREE | Yes | No | werhouse\_id | 0 | A | No |  |

1. Physical Database Design



1. Physical Database Design
   1. Duplikasi non key attribute pada 1 to \* relationship untuk reduce join

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| cust\_no *(Primary)* | int(11) | No |  |  |  |  |
| name | varchar(50) | Yes | *NULL* |  |  |  |
| phone\_no | varchar(50) | Yes | *NULL* |  |  |  |
| email | varchar(50) | Yes | *NULL* |  |  |  |
| sales\_rep\_no | int(11) | Yes | *NULL* | sales -> sales\_rep\_no |  |  |
| store\_location | varchar(50) | Yes | *NULL* |  |  |  |

* 1. Duplikasi non key attribute pada 1 to \* relationship untuk reduce join

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Type** | **Null** | **Default** | **Links to** | **Comments** | **Media type** |
| purchase\_id *(Primary)* | int(11) | No |  |  |  |  |
| date | date | Yes | *NULL* |  |  |  |
| cust\_no | int(11) | Yes | *NULL* | customer -> cust\_no |  |  |
| name | varchar(50) | Yes | *NULL* |  |  |  |
| store\_id | int(11) | Yes | *NULL* | store -> store\_id |  |  |
| store\_location | varchar(50) | Yes | *NULL* |  |  |  |

1. Distributed Database
   1. Fragmentation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| purchaseId | itemId | itemName | size | quantity |
| P1 | I1 | Baju Batik | L | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| purchaseId | itemId | itemName | size | quantity |
| P2 | I2 | Celana Kain | M | 3 |

* 1. Replication

|  |  |
| --- | --- |
| werhouseId | itemId |
| W1 | I1 |
| W1 | I1 |