PROJECT ON INVENTORY CONTROL AND MANAGEMENT DATABASE SYSTEM

MADE BY: MOHIT TALREJA
ROLL NO.: 177237
COURSE/YEAR: B.TECH 2/4 CSE
GUIDED BY: DR. T. RAMAKRISHNUDU

SUBJECT: DATABASE MANAGEMENT SYSTEMS

ACKNOWLEDGEMENT

This project wouldn't have been made possible without the consistence guidance and support of my professor Dr. T. Ramakrishnudu, with whose help I was able to develop a strong foundation in the DBMS course.

I would also like to thank my college NIT Warangal for providing me the desired environment for learning.

Lastly, I would like to thank my parents for making me the person I am today.

PROBLEM STATEMENT

PROBLEM STATEMENT

The aim of the inventory control and management database is to enable small and large enterprises to keep a track of the stock of goods, so that based on the **Economic Order Quantity(EOQ)** the company can minimize the cost of holding the inventory and hence maximize the profit.

The system also enables the enterprise to store:

- Location of the warehouses for the goods
- Employee information and their bank details to transfer salary to
- Details of suppliers and retailers
- Tax on goods
- Transactions taken place with suppliers (orders) and retailers (sales).

ECONOMIC ORDER QUANTITY

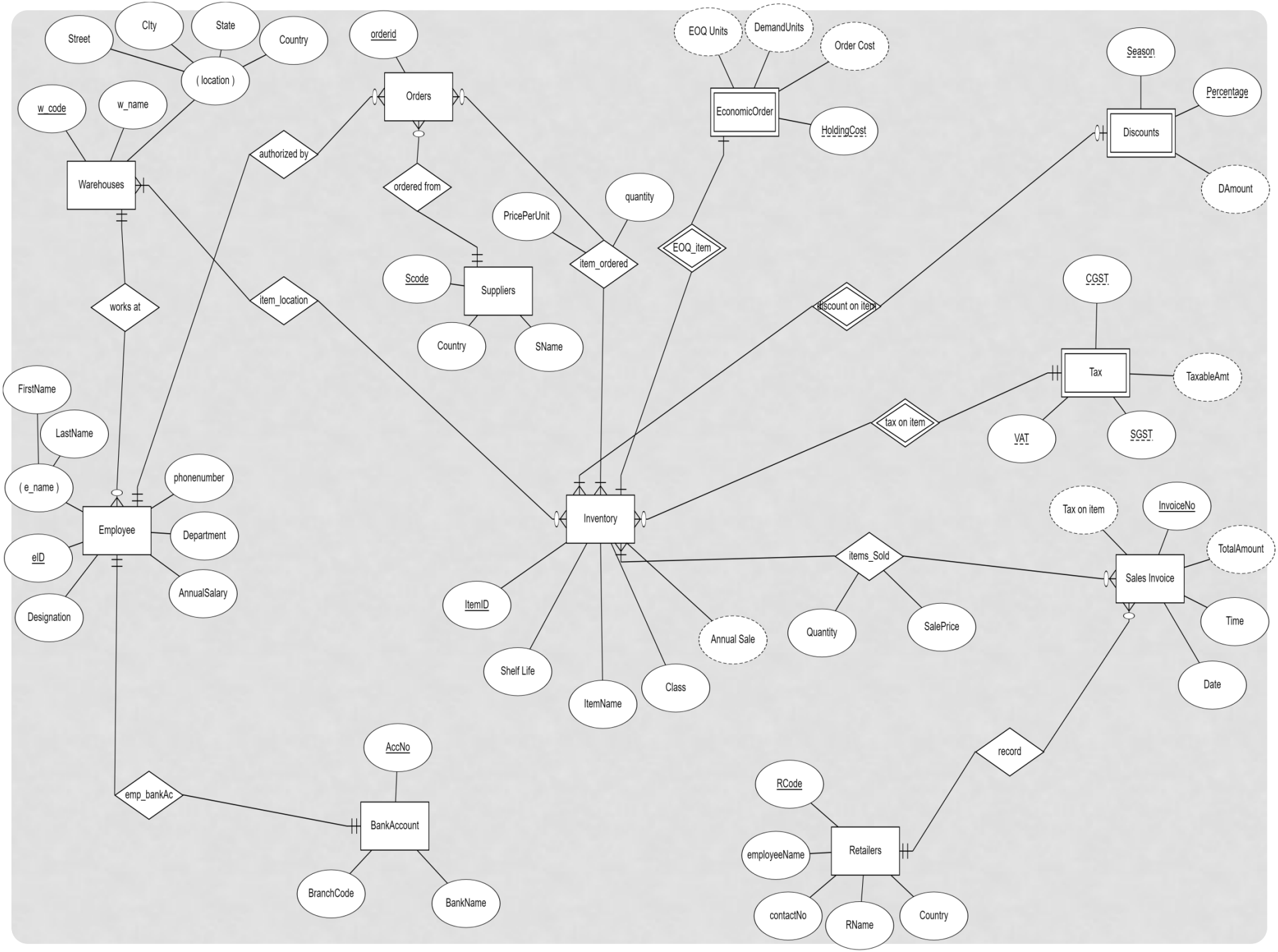
Economic order quantity (EOQ) is the ideal order quantity a company should purchase for its inventory given a set cost of production, a certain demand rate, and other variables. This is done to minimize inventory holding costs and order-related costs

$$Q = \sqrt{\frac{2DS}{H}}$$

Q = EOQ units
D = demand in units (typically on annual basis)
S = order cost (per purchase order)
H = holding costs (per unit, per year)

Source: https://www.investopedia.com/terms/e/economicorderquantity.asp

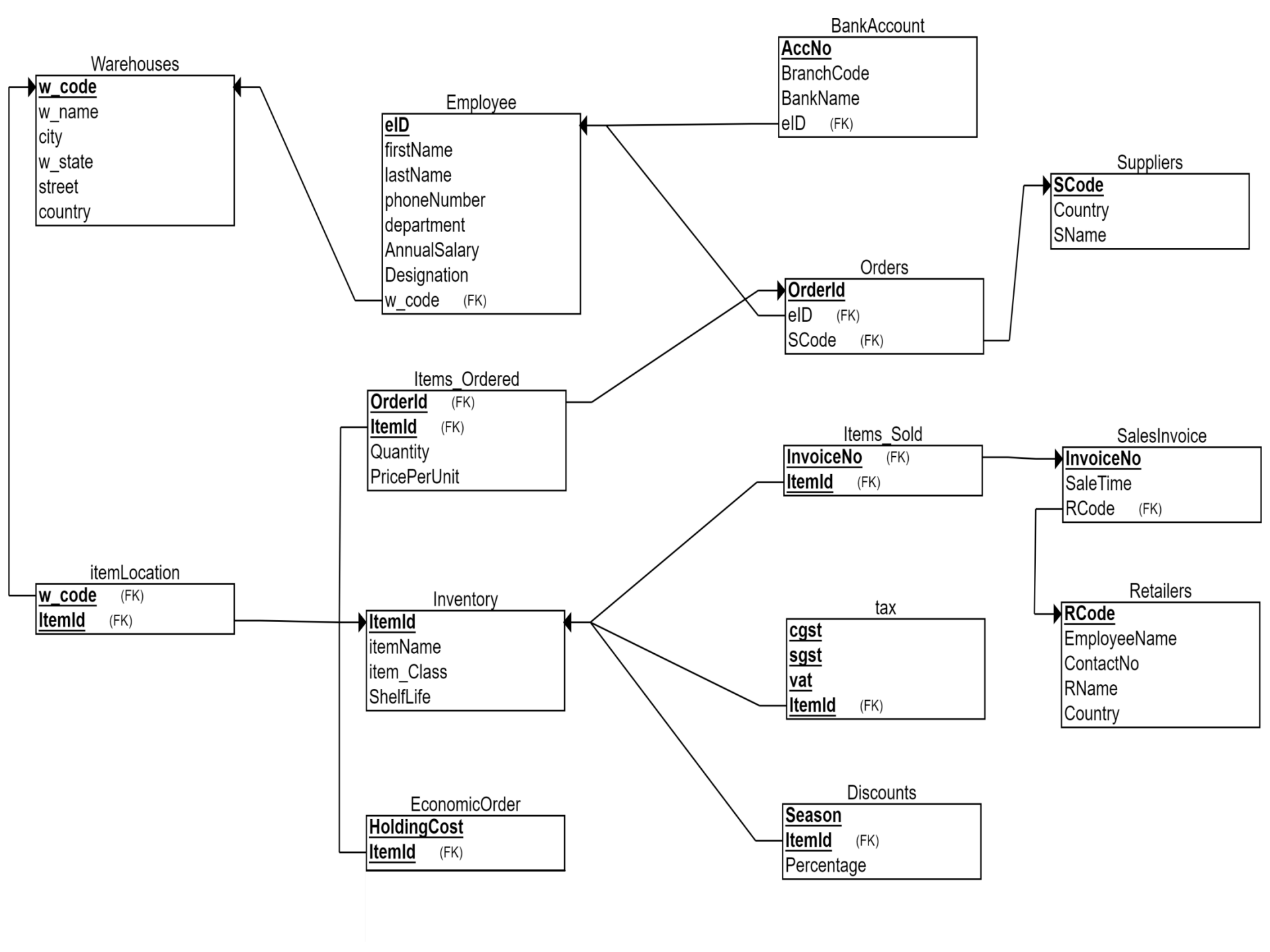
ER MODEL


Street
CIty
State
Country
(location)
w_code
w_name
Warehouses
works at
orderid
Orders
authorized by
ordered from
Scode
Suppliers
Country
SName
PricePerUnit
quantity
item_ordered
item_location
EOQ Units
DemandUnits
Order Cost
EconomicOrder
HoldingCost
EOQ_item
Season
Percentage
Discounts
DAmount
discount on item
CGST
Tax
TaxableAmt
VAT
SGST
tax on item
FirstName
LastName
(e_name)
phonenumber
Employee
Department
eID
AnnualSalary
Designation
Inventory
ItemID
Shelf Life
ItemName
Class
Annual Sale
items_Sold
Quantity
SalePrice
Tax on item
InvoiceNo
TotalAmount
Sales Invoice
Time
Date
record
emp_bankAc
AccNo
BankAccount
BranchCode
BankName
RCode
employeeName
Retailers
contactNo
RName
Country

ASSUMPTIONS

- An employee can work at only one warehouse.
- An employee can have only one bank account in which the salary is credited.
- It is mandatory for an order to be authorized by any one employee.
- Many orders are permissible for 1 supplier but not vice versa. Same rule applies for sales invoices and retailers.
- There is only 1 tax & discount for 1 item, but the same tax & discount may be applicable to many items in the inventory.

CONVERSION TO RELATIONAL MODEL


Warehouses
w_code
w_name
city
w_state
street
country
Employee
eID
firstName
lastName
phoneNumber
department
AnnualSalary
Designation
w_code (FK)
BankAccount
AccNo
BranchCode
BankName
eID (FK)
Suppliers
SCode
Country
SName
Orders
OrderId
eID (FK)
SCode (FK)
Items_Ordered
OrderId (FK)
ItemId (FK)
Quantity
PricePerUnit
Items_Sold
InvoiceNo (FK)
ItemId (FK)
SalesInvoice
InvoiceNo
SaleTime
RCode (FK)
itemLocation
w_code (FK)
ItemId (FK)
Inventory
ItemId
itemName
item_Class
ShelfLife
tax
cgst
sgst
vat
ItemId (FK)
Retailers
RCode
EmployeeName
ContactNo
RName
Country
EconomicOrder
HoldingCost
ItemId (FK)
Discounts
Season
ItemId (FK)
Percentage

NORMALIZATION

BCNF AND 3NF

- All the tables are in Boyce-Codd Normal Form BCNF and hence in 3rd Normal Form since all the non-key attributes are fully dependent on the primary key and the only functional dependencies are the ones between the primary key and the non-key attributes. Hence all determinants are candidate keys, thus satisfying the condition for BCNF.
- For example, in the inventory table, the functional dependencies are:

ItemID -> {ItemName, Class, ShelfLife}

These do no violate BCNF, hence table Inventory is in BCNF and 3NF.

CREATION OF TABLES

WAREHOUSES

```
create table warehouses(
    w_code int primary key,
    w_name varchar2(20),
    city varchar2(20),
    w_state varchar2(20),
    street varchar2(20),
    country varchar2(20)
);
```

	W_CODE	W_NAME	CITY	W_STATE	STREET	COUNTRY
1	101	alpha old	warangal	telangana	hunter road	India
2	102	alpha new	hyderabad	telangana	jubilee	India
3	103	beta old	bengaluru	karnataka	tumkur	India
4	104	beta new	indore	madhya pradesh	abc colony	India

```
insert into warehouses values(101,'alpha old','warangal','telangana','hunter road','India');
insert into warehouses values(102,'alpha new','hyderabad','telangana','jubilee','India');
insert into warehouses values(103,'beta old','bengaluru','karnataka','tumkur','India');
insert into warehouses values(104,'beta new','indore','madhya pradesh','abc colony','India');
```

EMPLOYEE

```
create table employee(
    eid int primary key,
    firstName varchar2(20),
    lastName varchar2(20),
    phoneNumber varchar2(20),
    department varchar2(20),
    AnnualSalary int,
    Designation varchar2(20),
    w_code int,
    foreign key (w_code) references warehouses
);
```

	EID	FIRSTNAME	LASTNAME	PHONENUMBER	DEPARTMENT	ANNUALSALARY	DESIGNATION	W_CODE
1	201	mahendra	dhoni	1234567890	sales	10000	manager	101
2	202	virat	kohli	9234567890	HR	100000	manager	101
3	203	sachin	tendulkar	1235867890	sales	1023400	manager	102
4	204	ricky	ponting	3675867890	HR	982000	manager	102
5	205	jonny	bairstow	6758367890	IT	9820000	project lead	103
6	206	david	warner	5867889790	Accounts	90082000	manager	103
7	207	Ravi	Ashwin	3675807890	Law	87600	Trainee	104
8	208	Rishabh	Pant	9675867890	IT	94382000	Lead	104

```
insert into employee values(201,'mahendra','dhoni','1234567890','sales',10000,'manager',101);
insert into employee values(202,'virat','kohli','9234567890','HR',100000,'manager',101);
insert into employee values(203,'sachin','tendulkar','1235867890','sales',1023400,'manager',102);
insert into employee values(204,'ricky','ponting','3675867890','HR',982000,'manager',102);
insert into employee values(205,'jonny','bairstow','6758367890','IT',9820000,'project lead',103);
insert into employee values(206,'david','warner','5867889790','Accounts',90082000,'manager',103);
insert into employee values(207,'Ravi','Ashwin','3675807890','Law',87600,'Trainee',104);
insert into employee values(208,'Rishabh','Pant','9675867890','IT',94382000,'Lead',104);
```

BANKACCOUNT

```
create table BankAccount(
    AccNo int primary key,
    BranchCode varchar2(10),
    BankName varchar2(20),
    eid int,
    foreign key (eid) references employee
);
```

	ACCNO	BRANCHCODE	BANKNAME	EID
1	1003007895040	98321	SBI	201
2	1002007885040	98391	PNB	202
3	9003007895040	98326	SBI	203
4	4003007895040	68321	BOB	204
5	8003007895040	28321	SBI	205
6	1003007854040	78321	SBI	206
7	2003009995040	48321	BOB	207
8	8003007895239	18321	ICICI	208

```
insert into bankaccount values(1003007895040,98321,'SBI',201);
insert into bankaccount values(1002007885040,98391,'PNB',202);
insert into bankaccount values(9003007895040,98326,'SBI',203);
insert into bankaccount values(4003007895040,68321,'BOB',204);
insert into bankaccount values(8003007895040,28321,'SBI',205);
insert into bankaccount values(1003007854040,78321,'SBI',206);
insert into bankaccount values(2003009995040,48321,'BOB',207);
insert into bankaccount values(8003007895239,18321,'ICICI',208);
```

INVENTORY

```
create table inventory(
    ItemId int primary key,
    itemName varchar2(20),
    item_class varchar2(20),
    shelfLife numeric(10,2)
);
```

	ITEMID	ITEMNAME	ITEM_CLASS	SHELFLIFE
1	1	dyeing agent	B	2
2	2	clorox	A	10
3	3	cotton balls	C	0.5
4	4	oxidising agent	A	2
5	5	reducing agent	B	4

```
insert into inventory values(1,'dyeing agent','B',2);
insert into inventory values(2,'clorox','A',10);
insert into inventory values(3,'cotton balls','C',0.5);
insert into inventory values(4,'oxidising agent','A',2);
insert into inventory values(5,'reducing agent','B',4);
```

ITEM_LOCATION

```
create table item_location(
    w_code int,
    itemId int,
    primary key (w_code,itemId),
    foreign key (w_code) references warehouses,
    foreign key (itemId) references inventory
);

insert into item_location values(101,1);
insert into item_location values(102,1);
insert into item_location values(103,2);
insert into item_location values(101,2);
insert into item_location values(101,3);
insert into item_location values(104,4);
insert into item_location values(101,4);
insert into item_location values(102,4);
insert into item_location values(103,4);
insert into item_location values(101,5);
```

	W_CODE	ITEMID
1	101	1
2	102	1
3	103	2
4	101	2
5	101	3
6	104	4
7	101	4
8	102	4
9	103	4
10	101	5

TAX

```
create table Tax(
    cgst numeric(4,2),
    sgst numeric(4,2),
    vat numeric(4,2),
    itemId int,
    primary key (cgst,sgst,vat,itemId),
    foreign key (itemId) references inventory
);

insert into tax values(15,7,2,1);
insert into tax values(18,9,2,2);
insert into tax values(5,3,3,3);
insert into tax values(5,7,2,4);
insert into tax values(15,9,4,5);
```

	CGST	SGST	VAT	ITEMID
1	15	7	2	1
2	18	9	2	2
3	5	3	3	3
4	5	7	2	4
5	15	9	4	5

DISCOUNTS

```
create table discounts(
    season varchar2(20),
    percentage numeric(4,2),
    itemId int,
    primary key (season,itemId),
    foreign key (itemId) references inventory
);

insert into discounts values('summer',25,1);
insert into discounts values('winter',40,2);
insert into discounts values('summer',20,4);
```

	SEASON	PERCENTAGE	ITEMID
1	summer	25	1
2	winter	40	2
3	summer	20	4

SUPPLIERS

```
create table suppliers(
    scode int primary key,
    country varchar2(20),
    sname varchar2(20)
);
```

	SCODE	COUNTRY	SNAME
1	301	India	Simmba Ltd
2	303	USA	Oracl Ltd
3	305	UK	Dairy Milk Ltd

```
insert into suppliers values(301,'India','Simmba Ltd');
insert into suppliers values(303,'USA','Oracl Ltd');
insert into suppliers values(305,'UK','Dairy Milk Ltd');
```

ORDERS

```
create table orders(
    orderId int primary key,
    eid int,
    scode int,
    foreign key (eid) references employee,
    foreign key (scode) references suppliers
);
```

	ORDERID	EID	SCODE
1	21301	201	301
2	21302	204	303
3	21303	207	305

```
insert into orders values(21301,201,301);
insert into orders values(21302,204,303);
insert into orders values(21303,207,305);
```

ITEM_ORDERED

```
create table item_ordered(
    orderId int,
    itemId int,
    quantity int,
    pricePerUnit numeric(10,2),
    primary key (orderId,ItemId),
    foreign key (itemId) references inventory,
    foreign key (orderId) references orders
);

insert into item_ordered values(21301,1,100,30);
insert into item_ordered values(21301,3,200,50);
insert into item_ordered values(21302,2,10,30);
insert into item_ordered values(21303,1,100,35);
insert into item_ordered values(21303,2,100,32);
```

	ORDERID	ITEMID	QUANTITY	PRICEPERUNIT
1	21301	1	100	30
2	21301	3	200	50
3	21302	2	10	30
4	21303	1	100	35
5	21303	2	100	32

ECONOMICORDER

```
create table EconomicOrder(
    HoldingCost numeric(10,2),
    itemId int,
    primary key (itemId,HoldingCost),
    foreign key (itemId) references inventory
);

insert into economicorder values(200,1);
insert into economicorder values(20,2);
insert into economicorder values(3200,3);
insert into economicorder values(1200,4);
insert into economicorder values(7,5);
```

	HOLDINGCOST	ITEMID
1	200	1
2	20	2
3	3200	3
4	1200	4
5	7	5

RETAILERS

```
create table retailers(
    rcode int primary key,
    employeeName varchar2(20),
    contactNo varchar2(20),
    Rname varchar2(20),
    country varchar2(20)
);
```

	RCODE	EMPLOYEENAME	CONTACTNO	RNAME	COUNTRY
1	501	hasan	9786987698788	Adidas	USA
2	502	pathan	86987698788	GAP	USA
3	503	rohan	67887698788	Myntra	India

```
insert into retailers values(501,'hasan','9786987698788','Adidas','USA');
insert into retailers values(502,'pathan','86987698788','GAP','USA');
insert into retailers values(503,'rohan','67887698788','Myntra','India');
```

SALESINVOICE

```
create table salesInvoice(
    invoiceNo int primary key,
    saleTime timestamp,
    rcode int,
    foreign key (rcode) references retailers
);
```

	INVOICENO	SALETIME	RCODE
1	102301	01-JUN-14 06.20.00.742000000	501
2	102302	03-NOV-18 17.20.00.742000000	502
3	102303	04-FEB-19 22.10.00.742000000	503

```
insert into salesinvoice values(102301,TO_TIMESTAMP('2014-06-01 06:20:00.742000000', 'YYYY-MM-DD HH24:MI:SS.FF'),501);
insert into salesinvoice values(102302,TO_TIMESTAMP('2018-11-03 17:20:00.742000000', 'YYYY-MM-DD HH24:MI:SS.FF'),502);
insert into salesinvoice values(102303,TO_TIMESTAMP('2019-02-04 22:10:00.742000000', 'YYYY-MM-DD HH24:MI:SS.FF'),503);
```

ITEMS_SOLD

```
create table Items_sold(
    invoiceNo int,
    itemId int,
    primary key(invoiceNo,itemId),
    foreign key (invoiceNo) references salesInvoice,
    foreign key (itemId) references inventory
);

insert into items_sold values(102301,1,12.34,100);
insert into items_sold values(102301,2,30.65,10);
insert into items_sold values(102301,3,12.12,45);
insert into items_sold values(102302,3,98,22);
insert into items_sold values(102302,5,99.99,11);
insert into items_sold values(102303,4,76.45,5);
```

	INVOICENO	ITEMID	SALEPRICE	QUANTITY
1	102301	1	12.34	100
2	102301	2	30.65	10
3	102301	3	12.12	45
4	102302	3	98	22
5	102302	5	99.99	11
6	102303	4	76.45	5

REFERENCES

REFERENCES

- Oracle SQL developer
- Database System Concepts by Silberschatz, Korth, Sudarshan
- ERD Plus online
- Investopedia.com