



# **REPORT**

**Global Solution Package (Pvt.) Ltd**

**Module: Advanced Database Management Systems**

**Course: Management Information Systems (Special)**

**Batch : 19.1 UGC**

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## INTRODUCTION TO THE COMPANY

Overview to company	
Company name :	Global Packaging Solution
Company category :	Polythene Manufacturing Factory
Location :	Borupana, Dehiwala
Site visited :	2020.12.02
Introduction to the Research	
<p>The research project was carried out with the industrial collaboration of Global Packaging Solution. The company that sites a polythene manufacturing process which provides a greater contribution to the national income growth by providing high quality plastic products to Sri Lankan market. Company assets their own manufacturing factory, two warehouses and one sales office which are located at Borupana and Dehiwala.</p>	
Proposed User Scenario	
<p>When a customer gives an order, the administrative department checks for the availability of raw materials and approve the order. Then according to the user requirements, the product is manufactured. The manufacturing process is completed at the factory located in Borupana which also located with the main warehouse at the same premises.</p> <p>The raw materials needed to manufacture polythene is comes as tiny beads. First, they mix the raw materials to get the polythene pulp using the mixing machine and then that pulp goes through a film blowing machine which can convert the polythene pulp into a polythene roll.</p>	

These rolls are going through a cutting machine so that the handle cut is removed at the moment. This handle cut is considered as recycling waste and convert to raw materials again using special kind of machine.

The polythene bag which removed the handle cut is the pass to a separate machine to attach the gusset and then pass to the next level to the printing machine. Here they print what the user expect to have in the order.

The final process is quality checking and packaging. Here the employees check whether the end products are manufactured with enough quality and remove the exceptions to recycle again. The polybags that ready to sell are well packed and stored in the warehouse that located at the same premises.

The packages that need to sell are transported to the warehouse that located in Dehiwala where they have their Sales Outlet.

Here the Sales department check for the date to hand over the finished order and contact the customer to visit the store. Then the customer can have their order right after he/she made the full payment. Then a bill is generated and given to the customer and the sales department updates the order details in their records.

For the supplier side, the Global Packaging Solution have both international and local suppliers itself to get raw materials. When they run out of raw materials the administrative department contacts the supplier and makes an order for the raw materials make the payment and generates the invoice. These details are stored in the records.

When the raw materials arrived at the factory location, they are stored in the warehouse which is located at the same location.

Sales department, Production, HR department, Administrative department, and Warehouse are basic types of departments managed under the company. All the departments are managed by a manager and every manager is specific to that department. Every employee has their own records that are stored in order to manage their salary and workload.

At the current state company handles the accounts and all other monetary values using a software called Quick Labs but due to increase of employees, orders, and management issues they expect to have a system which supports their business and to expand it.

#### **Company Processes**

- Film Blowing
- Cutting
- Printing
- Quality Checking
- Packing

#### **Raw Material Categories**

- High Density Polythene (HDPE)
- Low Density Polythene (LDP)
- Polypropylene (PP)

#### **Types of Departments in the company**

- Production Department
- Sales Department
- Administration Department
- HR Department

Product Categories	
Product	Sizes
Chicken bag	177+100x330 mm
Small shopping bag	250+125x415 mm
Large shopping bag	278+127x508 mm
Jumbo bag	445+190x762 mm
Small grocery bag	203x127 mm
Large grocery bag	178x54 mm

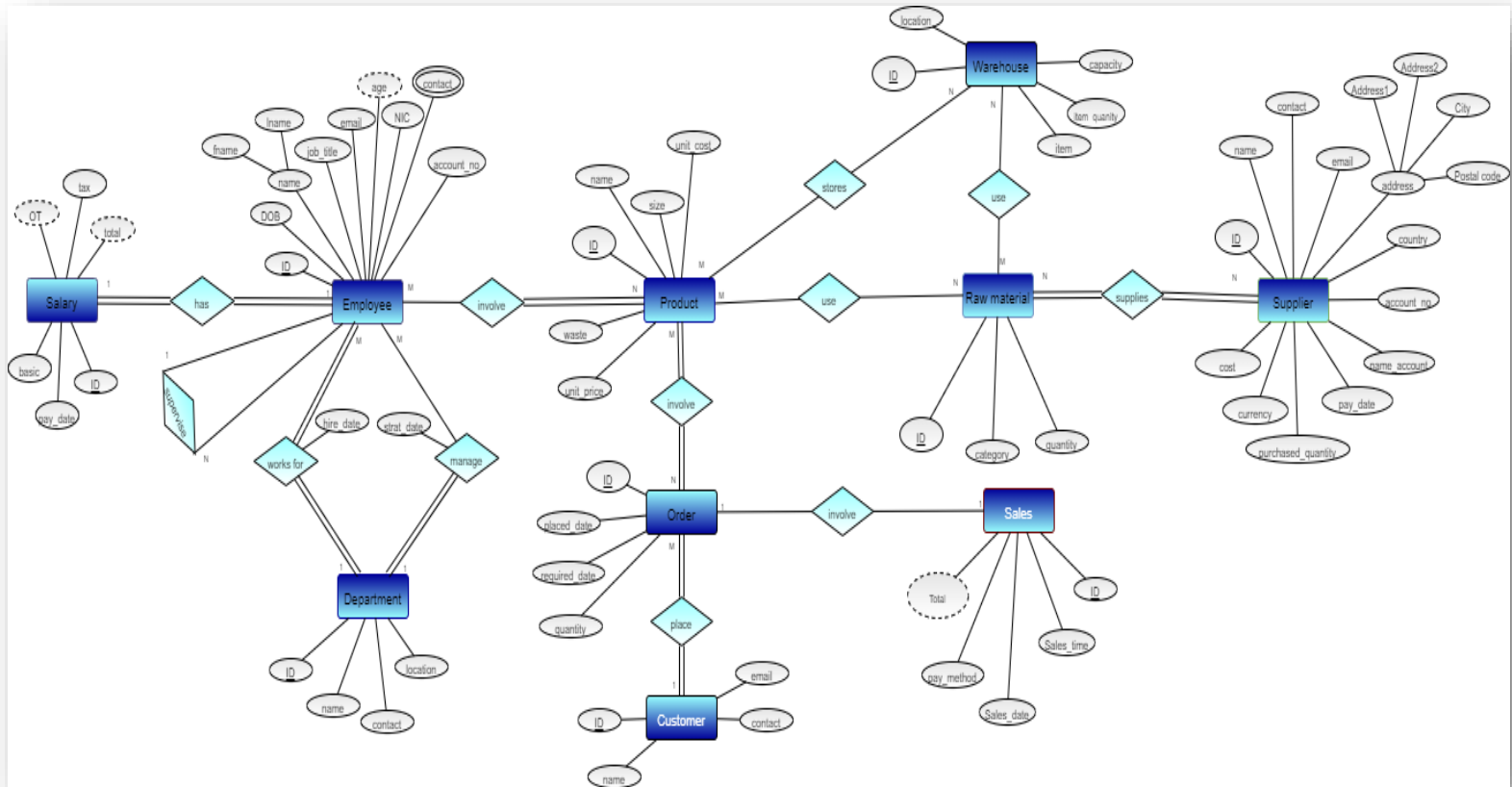
## Company Overview



Used tool: [Free Concept Map Maker - Create Concept Maps Online | Visme](https://www.visme.co/free-concept-map-maker/)

## EXTENDED ENTITY RELATIONSHIP DIAGRAM

: [Link to ER diagram \(.txt\)](#) and [editable vector image\(.svg\)](#) also attached



Tools used: [Draw.io](#) / [diagrams.net](#)

## ADDITIONAL ASSUMPTIONS

- All employees have their bank account in the same bank.
- Customers are not directly connect with employees. Automated system provides filling forms and everything.
- Warehouse keeps both finish products and raw materials. But only finished products quantity is considered as items.
- Customer needs to place an order before purchase the product.



- Every customer, and department have one contact number for each. Not consider as a multivalued attribute.
- Customer name is identified as the company which gives the order.
- If customer needs their order to be ready at separate dates, the system generates separate dates for the given dates.

## RELATIONAL SCHEMA



## NORMALIZATION

**Employee table**

<u>Emp_ID</u>	FName	Lname	Job title	Email	NIC	Gender	Acc_no	DOB	Salary_ID	Dep_ID
---------------	-------	-------	-----------	-------	-----	--------	--------	-----	-----------	--------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not any transitive dependencies

**Emp\_Contact table**

<u>Emp_ID</u>	<u>Contact_no</u>
---------------	-------------------

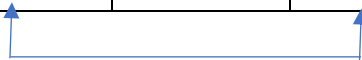
This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not any transitive dependencies

**Salary table**

<u>Salary id</u>	Salary category	Date	Basic	OT	Tax	Total salary
------------------	-----------------	------	-------	----	-----	--------------



The diagram shows a blue arrow pointing from the 'Salary category' cell to the 'Basic' cell, indicating a transitive dependency where 'Basic' depends on 'Salary category'.

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is not in 3NF ,because it has transitive dependency. Salary category is a non-prime attribute. Basic salary depends on salary category. Because of that we can take salary category and basic columns to another separate table.

**Salarycategory table**

<u>Salary category ID</u>	Salary category	Basic
---------------------------	-----------------	-------

### Salary table

<u>Salary ID</u>	Date	OT	Tax	Total salary	Salary category id
------------------	------	----	-----	--------------	--------------------

### Department table

<u>Dep_number</u>	Name	Location	Contact_No
-------------------	------	----------	------------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not any transitive dependencies

### Supplier table

<u>id</u>	Fname	Lname	Contact no	email	Address 1	Address 2	city	Postal code	country	Acc	<u>bank</u>	<u>Pay-no</u>	Pay_date	Purchased Qty	currency	amount
-----------	-------	-------	------------	-------	-----------	-----------	------	-------------	---------	-----	-------------	---------------	----------	---------------	----------	--------

This table is in 1NF because it has This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is not in 2NF.because it has partial dependencies

Supplier\_id, pay\_no → purchased\_date, Purchased\_qty, currency, cost

Supplier Id → Fname, Lname, contact\_no, email, Adreess1, Address2, City, Postal code, country, Account\_no

<u>Sup_id</u>	Fname	Lname	Contact_no	email	Adrees1	Address2	city	Pos_code	Country	Acc_no
---------------	-------	-------	------------	-------	---------	----------	------	----------	---------	--------



<u>Sup_id</u>	Pay_no	Purchased date	Purchased_qty	Currency	cost
---------------	--------	----------------	---------------	----------	------

This table is not in 3NF ,because Postal code depends on Country

### Postalcode\_Country table

<u>Postal code</u>	country
--------------------	---------

<u>Sup_id</u>	Fname	Lname	Contact no	email	Address 1	Address 2	city	country	Acc_no	Postal code
---------------	-------	-------	------------	-------	-----------	-----------	------	---------	--------	-------------

<u>Sup_id</u>	Pay_no	Purchased date	Purchased_qty	currency	cost
---------------	--------	----------------	---------------	----------	------

#### Customer table

<u>Customer_ID</u>	name	Contact no	E-mail	Sale_id
--------------------	------	------------	--------	---------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not any transitive dependencies

#### Order table

<u>Order_ID</u>	Placed date	Required date	quantity	Customer_Id
-----------------	-------------	---------------	----------	-------------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not any transitive dependencies

#### Product table

ID	Name	size	Unit price	Unit cost	waste
----	------	------	------------	-----------	-------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not transitive dependencies

#### Order -product table

<u>Order_id</u>	<u>Product_id</u>
-----------------	-------------------

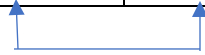
This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not transitive dependencies

### Sales Table

<u>Sale_id</u>	Sales_date	Sale time	Pay_method	Order_id	Paid_amount	discount
----------------	------------	-----------	------------	----------	-------------	----------



This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is not in 3NF because it has transitive dependencies

<u>Sale_id</u>	Sales date	Sale item	Pay method	Oder id	Paid-amount id
----------------	------------	-----------	------------	---------	----------------

<u>Paid_amount id</u>	Paid amount	discount
-----------------------	-------------	----------

### Raw material table

<u>Raw_material_id</u>	<u>category</u>	<u>quantity</u>
------------------------	-----------------	-----------------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not transitive dependencies

### Supplier\_raw material table

<u>Supplier_id</u>	<u>Raw material ID</u>
--------------------	------------------------

This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.

This table is in 3NF because it has not transitive dependencies

### Warehouse table




<u>Warehouse_id</u>	location	capacity	Item-quantity	Item_name
---------------------	----------	----------	---------------	-----------






This table is in 1NF because it has not any multivalued attributes or nester relationships

This table is in 2NF because it has not any partial dependencies.













This table is in 3NF because it has not transitive dependencies












## Database Dictionary screen shots

Type	Name	Restriction
1.3 Sequence	public.DB_web_attendance_id_seq	auto
 Index	public.DB_web_attendance_emp_id_id_f36433d1	auto
 Function	nextval("DB_web_attendance_id_seq"::regclass)	auto
 Foreign Key	public.DB_web_attendance.DB_web_attendance_emp_id_id_f36433d1_fk_DB_web_employee_id	auto
 Primary Key	public.DB_web_attendance_pkey	auto

Type	Name	Restriction
1.3 Sequence	public.DB_web_customer_id_seq	auto
 Function	nextval("DB_web_customer_id_seq"::regclass)	auto
 Check	public.DB_web_customer_contact_check	auto
 Primary Key	public.DB_web_customer_pkey	auto
 Check	public.DB_web_customer_contact_check	normal
 Foreign Key	public.DB_web_order.DB_web_order_customer_id_9ecf7d60_fk_DB_web_customer_id	normal

Type	Name	Restriction
1.3 Sequence	public.DB_web_department_id_seq	auto
 Function	nextval("DB_web_department_id_seq"::regclass)	auto
 Primary Key	public.DB_web_department_pkey	auto
 Foreign Key	public.DB_web_employee.DB_web_employee_department_Name_id_8163b351_fk_DB_web_de	normal

Type	Name	Restriction
1.3 Sequence	public.DB_web_employee_id_seq	auto
 Index	public.DB_web_employee_department_Name_id_8163b351	auto
 Index	public.DB_web_employee_job_Title_id_f45f5f6b	auto
 Function	nextval("DB_web_employee_id_seq"::regclass)	auto
 Check	public.DB_web_employee_bank_Account_Number_check	auto
 Check	public.DB_web_employee_nic_check	auto
 Foreign Key	public.DB_web_employee.DB_web_employee_department_Name_id_8163b351_fk_DB_web_de	auto
 Foreign Key	public.DB_web_employee.DB_web_employee_job_Title_id_f45f5f6b_fk_DB_web_jobtype_id	auto
 Primary Key	public.DB_web_employee_pkey	auto
 Check	public.DB_web_employee_bank_Account_Number_check	normal
 Check	public.DB_web_employee_nic_check	normal
 Foreign Key	public.DB_web_attendance.DB_web_attendance_emp_id_id_f36433d1_fk_DB_web_employee_id	normal
 Foreign Key	public.DB_web_salary.DB_web_salary_emp_id_id_77141db3_fk_DB_web_employee_id	normal

Type	Name	Restriction
1.3 Sequence	public.DB_web_jobtype_id_seq	auto
 Function	nextval("DB_web_jobtype_id_seq"::regclass)	auto
 Check	public.DB_web_jobtype_basic_salary_check	auto
 Check	public.DB_web_jobtype_epf_check	auto
 Check	public.DB_web_jobtype_etf_check	auto
 Check	public.DB_web_jobtype_ot_salary_per_H_check	auto
 Primary Key	public.DB_web_jobtype_pkey	auto
 Check	public.DB_web_jobtype_basic_salary_check	normal
 Check	public.DB_web_jobtype_epf_check	normal
 Check	public.DB_web_jobtype_etf_check	normal
 Check	public.DB_web_jobtype_ot_salary_per_H_check	normal
 Foreign Key	public.DB_web_employee.DB_web_employee_job_Title_id_f45f5f6b_fk_DB_web_jobtype_id	normal

Type	Name	Restriction
1.3 Sequence	public.DB_web_order_id_seq	auto
Index	public.DB_web_order_customer_id_9ecf7d60	auto
Function	nextval("DB_web_order_id_seq"::regclass)	auto
Check	public.DB_web_order_quantity_check	auto
Foreign Key	public.DB_web_order.DB_web_order_customer_id_9ecf7d60_fk_DB_web_customer_id	auto
Primary Key	public.DB_web_order_pkey	auto
Check	public.DB_web_order_quantity_check	normal
Foreign Key	public.DB_web_productorder.DB_web_productorder_order_id_id_0647c49d_fk_DB_web_order_id	normal
Foreign Key	public.DB_web_sales.DB_web_sales_order_id_id_dfa29a11_fk_DB_web_order_id	normal

Type	Name	Restriction
1.3 Sequence	public.DB_web_product_id_seq	auto
Function	nextval("DB_web_product_id_seq"::regclass)	auto
Check	public.DB_web_product_wast_check	auto
Primary Key	public.DB_web_product_pkey	auto
Check	public.DB_web_product_wast_check	normal
Foreign Key	public.DB_web_productorder.DB_web_productorder_product_id_id_fe4e5114_fk_DB_web_product_id	normal
Foreign Key	public.DB_web_productstock.DB_web_productstock_product_id_id_1d2e3176_fk_DB_web_product_id	normal

Type	Name	Restriction
1.3 Sequence	public.DB_web_productorder_id_seq	auto
Index	public.DB_web_productorder_order_id_id_0647c49d	auto
Index	public.DB_web_productorder_product_id_id_fe4e5114	auto
Function	nextval("DB_web_productorder_id_seq"::regclass)	auto
Foreign Key	public.DB_web_productorder.DB_web_productorder_order_id_id_0647c49d_fk_DB_web_order_id	auto
Foreign Key	public.DB_web_productorder.DB_web_productorder_product_id_id_fe4e5114_fk_DB_web_product_id	auto
Primary Key	public.DB_web_productorder_pkey	auto

## Create Table Statements screen shots

The screenshot shows a code editor with the following content:

```

1 from datetime import datetime, time
2 from django.core.mail import send_mail
3 from django.db import models
4
5 # Create your models here.
6
7 class Department(models.Model):
8     """ Department """
9     name = models.CharField(max_length=20)
10    location = models.CharField(max_length=10)
11    contact = models.CharField(max_length=10)
12
13    # emp_count = models.IntegerField()
14
15    def __str__(self):
16        """ return representation of the model """
17        return self.name
18
19
20
21 class Jobtype(models.Model):
22    job_title = models.CharField(max_length=10)
23    basic_salary = models.PositiveIntegerField()
24    ot_salary_per_H = models.PositiveIntegerField()
25    etf = models.PositiveIntegerField()
26    epf = models.PositiveIntegerField()
27
28    def __str__(self):
29        """ return representation of the model """
30        return self.job_title
31
32
33 """ Create instance for table: Model """
34 Employee

```

The editor interface includes a sidebar with a file explorer showing the project structure, a terminal at the bottom, and a status bar indicating the file encoding (UTF-8) and Python version (3.7).

The screenshot shows a code editor with the Django models for `ProductOrder` and `Supplier`. The `ProductOrder` model has a `product_id` foreign key to `Product` and an `oder_id` foreign key to `Order`, both with `on_delete=models.CASCADE`. The `Supplier` model has fields for `first_name`, `last_name`, `contact`, `email`, `address`, and `ACCN`. The `SupplierRAWM` model has a `RAWM_id` foreign key to `RAWM` and a `Sup_id` foreign key to `Supplier`, both with `on_delete=models.CASCADE`. The `__str__` method for `Supplier` returns `self.first_name`.

```
class ProductOrder(models.Model):
    """ Details about order product """
    product_id = models.ForeignKey(Product, on_delete=models.CASCADE)
    oder_id = models.ForeignKey(Order, on_delete=models.CASCADE)

    def __init__(self):
        return self.oder_id

class Supplier(models.Model):
    """ Details about Supplier """
    first_name = models.CharField(max_length=10)
    last_name = models.CharField(max_length=10)
    contact = models.CharField(max_length=10)
    email = models.EmailField()
    address = models.CharField(max_length=20)
    ACCN = models.PositiveIntegerField()

    def __str__(self):
        """ return representation of the model """
        return self.first_name

class SupplierRAWM(models.Model):
    """ Details about Supplier and RAW Materials """
    RAWM_id = models.ForeignKey(RAWM, on_delete=models.CASCADE)
    Sup_id = models.ForeignKey(Supplier, on_delete=models.CASCADE)

    def __init__(self):
        """ return representation of the model """
        return self.RAWM_id
```

The screenshot shows a code editor with the Django models for `Employee` and `Attendance`. The `Employee` model has fields for `first_name`, `last_name`, `job_title`, `email`, `contact_number`, `nic`, `gender`, `bank_account_number`, `hire_date`, `DOB`, and `department_name`. The `Attendance` model has a `emp_id` foreign key to `Employee` and fields for `arrived` and `left`. The `__mul__` method for `Attendance` returns `self.emp_id.first_name, self.left`. The `workingtime` property for `Attendance` returns `self.emp_id.first_name, self.left`.

```
class Employee(models.Model):
    """ Employee model """
    first_name = models.CharField(max_length=20)
    last_name = models.CharField(max_length=20)
    job_title = models.ForeignKey(Jobtype, on_delete=models.CASCADE)
    email = models.EmailField()
    contact_number = models.CharField(max_length=10)
    nic = models.PositiveIntegerField()
    gender = models.CharField(max_length=1)
    bank_account_number = models.PositiveIntegerField()
    hire_date = models.DateTimeField(auto_now_add=True)
    DOB = models.DateField()
    department_name = models.ForeignKey(Department, on_delete=models.CASCADE)

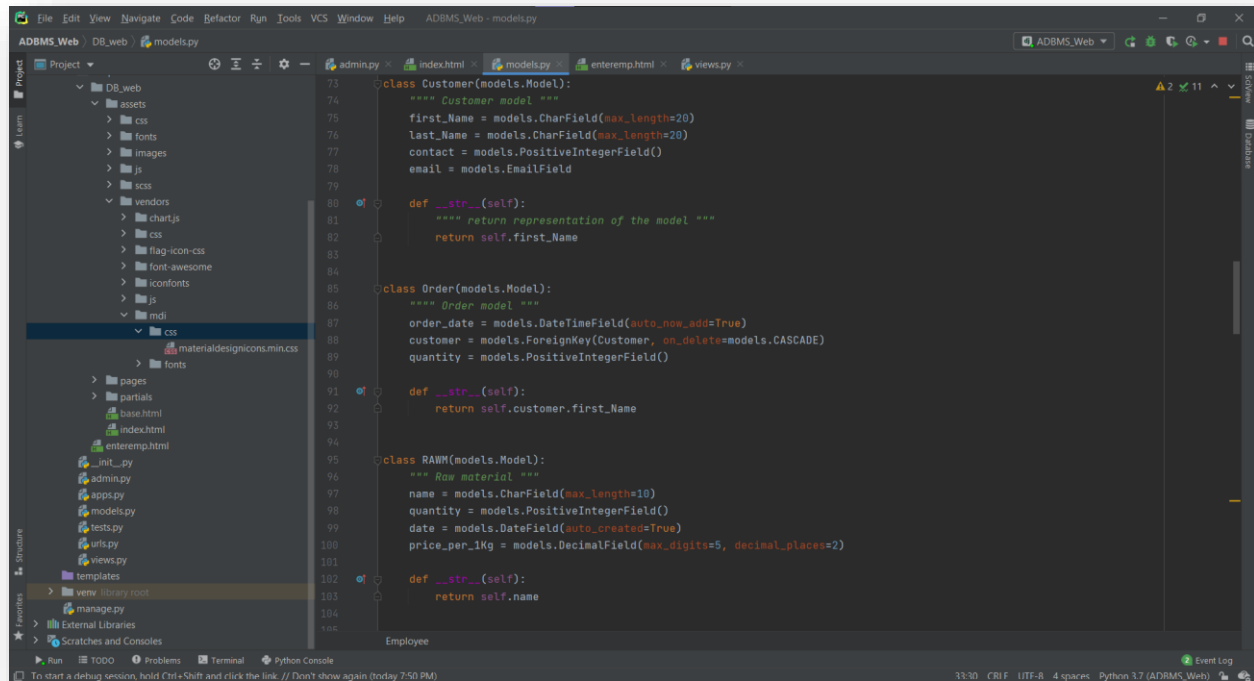
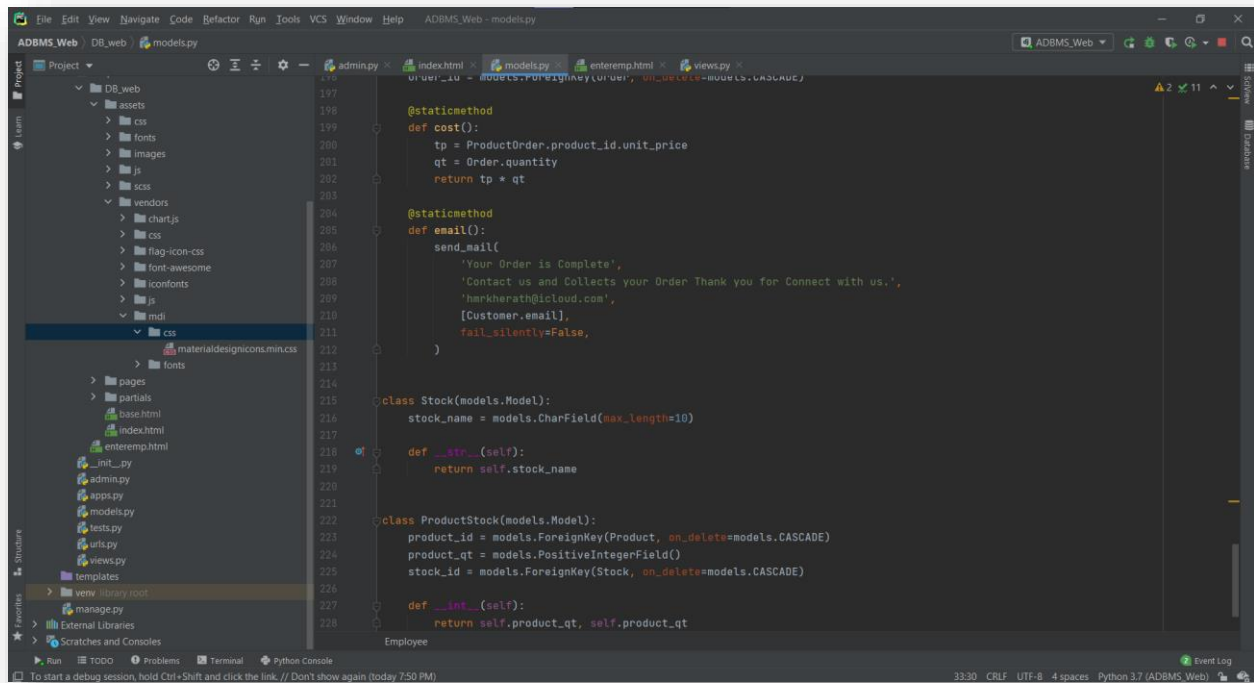
    def __str__(self):
        """ return representation of the model """
        return self.first_name

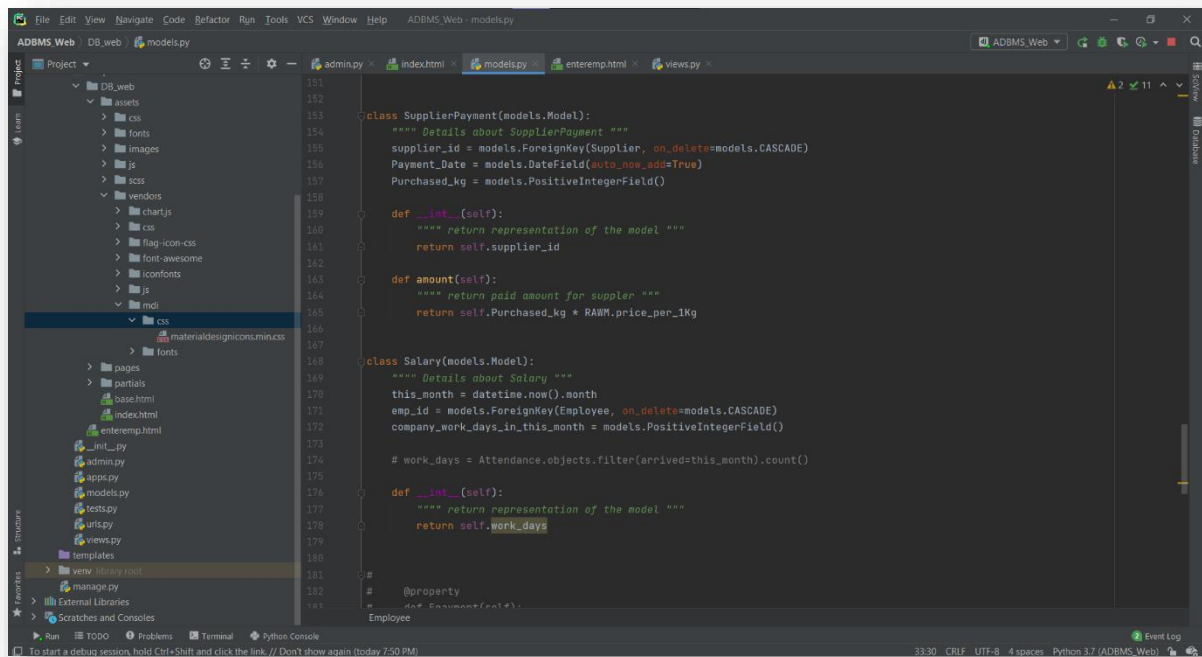
class Attendance(models.Model):
    emp_id = models.ForeignKey(Employee, on_delete=models.CASCADE)
    arrived = models.DateTimeField()
    left = models.DateTimeField()

    def __mul__(self):
        """ return representation of the model """
        return self.emp_id.first_name, self.left

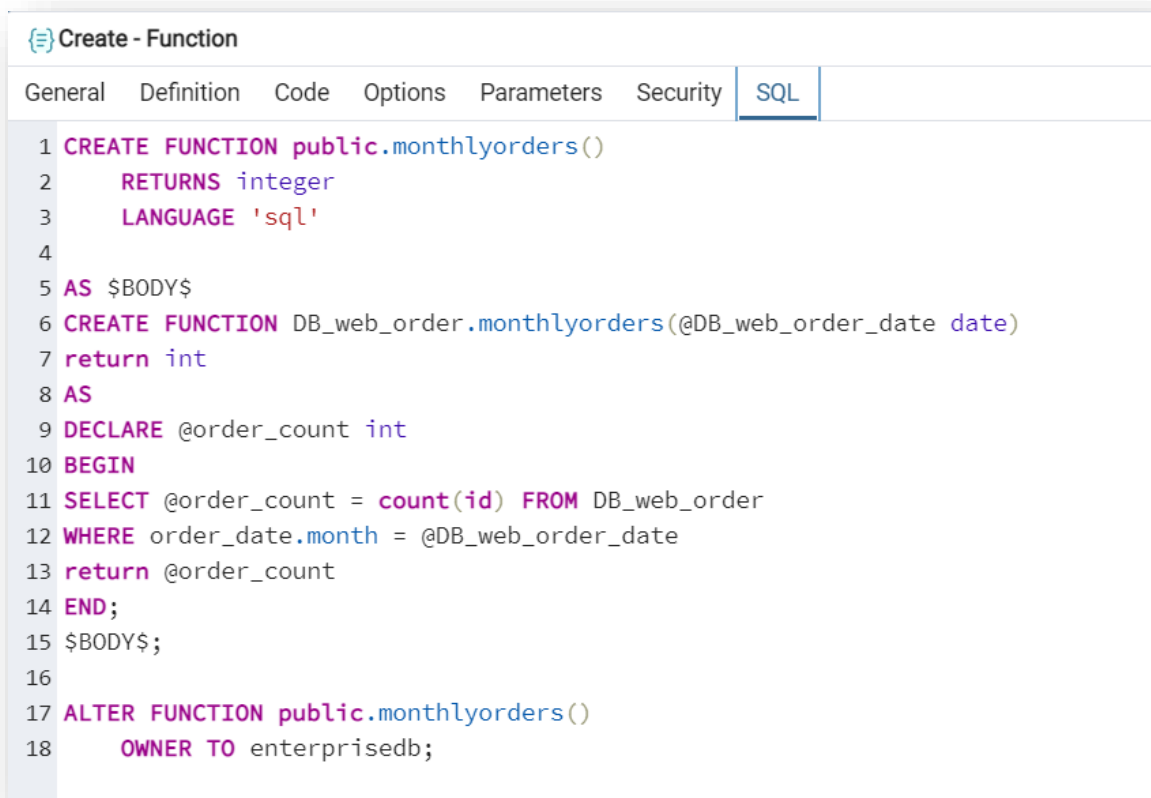
    @property
    def workingtime(self):
        """ return Employee Working time """
        return self.emp_id.first_name, self.left
```







## Create Functions Statements screen shots



```

1 CREATE FUNCTION public.monthlyorders()
2 RETURNS integer
3 LANGUAGE 'sql'
4
5 AS $BODY$
6 CREATE FUNCTION ADBMS.Epayment(@work_days int, @jobtype int, @basic_salary int, @companay_work_in_this_month int, @epf int, @etf int):
7 return int
8 AS
9 DECLARE @epayment int
10 BEGIN
11 IF work_days <= companay_work_in_this_month:
12 return basic_salary - (epf + etf)
13 else:
14 worked = work_days - company_work_days_in_this_month
15 ot = ot_salary_per_H * worked
16 return basic_salary + ot - (epf + etf)
17 $BODY$;
18
19 ALTER FUNCTION public.monthlyorders()
20 OWNER TO enterprisedb;

```

## Create Procedure Statements screen shots

```

1 CREATE OR REPLACE PROCEDURE public.enterorderidselectcoustomerdetals()
2 LANGUAGE 'sql'
3 AS $BODY$
4 create procedure enterorderidselectcoustomerdetals
5 ( @order_id int)
6
7 AS
8 begin
9 select Fname,Lname,contact_no from
10 coustome C INNER JOIN Order 0 on
11 C.customer_id=0.Customer_id
12 where order_id=@order_id
13 End;
14 $BODY$;

```

Create - Procedure

GeneralDefinitionCodeOptionsParametersSecuritySQL

```
1 CREATE OR REPLACE PROCEDURE public.enterorderidselectcustomerdetails()
2 LANGUAGE 'sql'
3 AS $BODY$
4 create procedure updatemail(@Emp_id char(5),@email varchar(100))
5 AS
6 begin
7 UPDATE employee
8 SET email=@email
9 where Emp_id=@Emp_id
10 END;
11 $BODY$;
```

## Create Triggers Statements screen shots

Create - Trigger function

GeneralDefinitionCodeOptionsParametersSecuritySQL

```
1 CREATE FUNCTION public.top5salebyquantity()
2 RETURNS trigger
3 LANGUAGE 'plpgsql'
4 NOT LEAKPROOF
5 AS $BODY$
6 Create VIEW top5salebyquantity
7 AS
8 Select top 3
9 Sales-id,productID ,
10 Name AS ProductName,
11 SUM(Sales.quantity)AS TotalQuantity
12 From sales
13 Join products ON
14 Sales.product-id=products.product-id
15 Group by sales,product-id,
16 Name
17 Order by SUM(Sales.Quantity) DESC
18 $BODY$;
19
20 ALTER FUNCTION public.top5salebyquantity()
21 OWNER TO enterprisedb;
```

Create - Trigger function

General Definition Code Options Parameters Security SQL

```
1 Create trigger [dbo].[Customer-INSERT]
2 ON [dbo].[Customer]
3 AFTER INSERT
4 AS
5 Begin
6 Set nocount on ;
7 Declare @CoustomerID=INSERTED.Customerid
8 From INSERTED
9 INSERT INTO Customerlogs
10 VALUES(@CoustomerId,'Inserted')
11 End;
```

## Create View Statements screen shots

Create - View

General Definition Code Security SQL

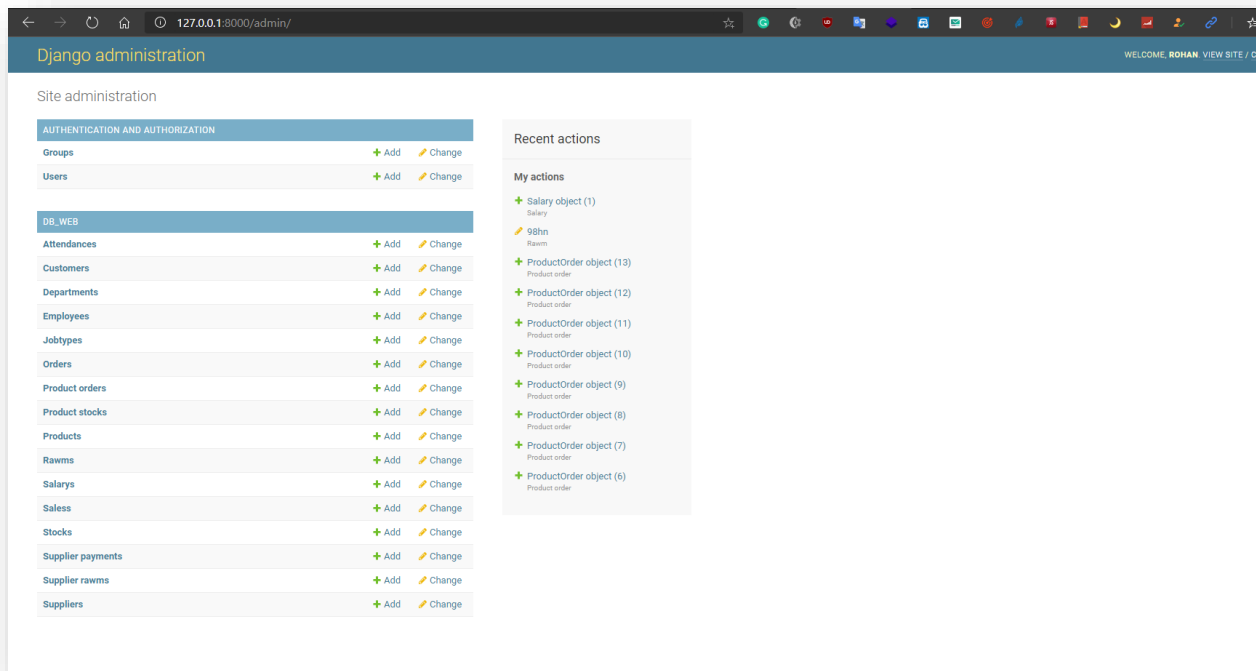
```
1 CREATE OR REPLACE VIEW public.top5salebyquantity
2 AS
3 Create VIEW top5salebyquantity
4 AS
5 Select top 3
6 Sales-id,productID ,
7 Name AS ProductName,
8 SUM(Sales.quantity)AS TotalQuantity
9 From sales
10 Join products ON
11 Sales.product-id=products.product-id
12 Group by sales,product-id,
13 Name
14 Order by SUM(Sales.Quantity) DESC;
15
16 ALTER TABLE public.top5salebyquantity
17 OWNER TO enterprisedb;
```

## Create - View

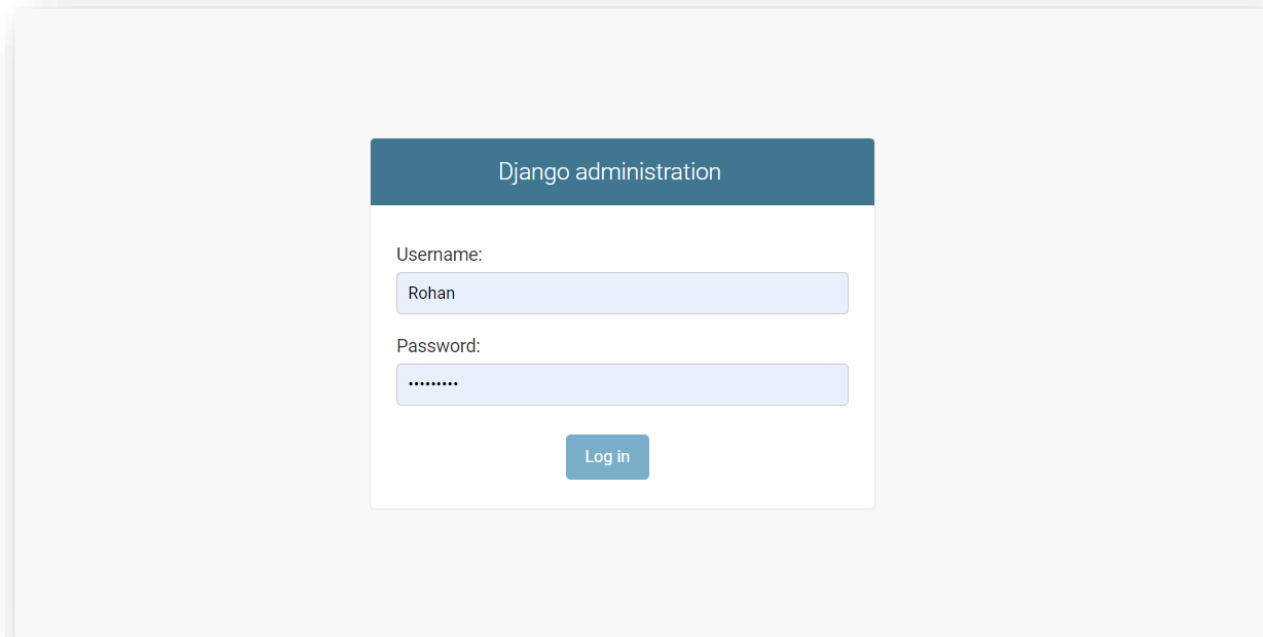
General Definition Code Security SQL

```
1 CREATE OR REPLACE VIEW public."Products Above Average Price"  
2 AS  
3 Create VIEW [Products Above Average Price ] AS  
4 Select Product-name, unit-price  
5 From products  
6 Where unit-Price > (SELECT AVG(unit-pice) From Product;  
7  
8 ALTER TABLE public."Products Above Average Price"  
9 OWNER TO enterprisedb;
```

## Admin Panel Screen Shots



## User Login Screen Shots



## Dashboard Screen Shots

