PES UNIVERSITY

100 feet Ring Road, BSK 3rd Stage
Bengaluru 560085

UE17CS252
Database Management Systems

Project Report

Art Gallery Database Management System

PES1201700769 Ria Kalia
PES1201700829 Amrutha S
PES1201701369 Krithika P

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1. INTRODUCTION

An art gallery is a place where various artworks like paintings, sculptures and models are displayed, which can be viewed by the public. Art galleries exhibit the culture of a particular place, and can be a great source of inspiration.
Art Galleries are literally a store house of information – there's tons of data associated with a particular artwork - like the name of the artist, his personal details, the medium of the artwork etc. Storing this information using pen and paper can be quite tedious. Our art gallery management system takes care of these problems by storing large amounts of data, and providing easy access to it – whether it is for viewing all the data, or for viewing specific data, based on constraints. It also allows authorized access to the database, thereby making the database secure from unauthorized users.
The purpose of this project is to build an application program which aims at reducing manual work while handling data related to an art gallery. In addition to this, we aim to make database accessing easier and more secure, and also provide a user-friendly interface, to make these transactions easier.

2. PROBLEM STATEMENT

There are various art galleries spread throughout the world, and they contain a huge amount of data, which is needed on a daily basis. A customer might want to know if a particular branch of the art gallery contains artworks by a particular artist, or if a particular painting is sold or not, or the date of an auction, and its location. Our aim is to make searching for such data faster, and to enable managers of these art galleries to maintain up-to-date databases, thereby increasing its relevance. However, these privileges shouldn't be extended to everyone – employees should be allowed to make only specific changes to the database, and not to all the information in it. The customers should only be allowed to view specific parts of the database, and not all of it, since the database can contain sensitive data such as financial details of the art gallery, and of other customers as well.

These problems can be tackled by using a relational database, and providing the end users different views, based on what functionality of the database they should be allowed to use. Managers, employees and customers are given login IDs and passwords, and they are allowed to execute specific functions based on their authorization details. Only the DBA and a few specified personnel should have complete access to the database and all of its operations.

3. THE MINIWORLD

Every organization, whether big or small, has challenges to overcome and managing information is one of them. This art gallery is titled 'Frick Art Gallery' and its database contains 8 tables – Employee, Art Gallery, Exhibition, Auction, Artist, Customer, Payment, Artwork.
There are various branches of Frick Art Gallery spread throughout the world, and hence we have a table dedicated to that (Art Gallery), which contains information such as Branch code, which is unique to an art gallery, and the Manager name. It also has details such as the number of employees, number of auctions etc.

An art gallery has various employees and managers, and their personal details such as contact number, address, email ID, date of birth etc are stored in the database. The details of the artists and customers are stored in a similar fashion as well, as one may need to contact them. All these tables have primary keys such as Employee ID, Customer ID and Branch code.

Art galleries host various exhibitions and auctions, where artworks are displayed and sold, and information regarding the same needs to be stored. Hence, we have tables for that, where information such as the income, expenditure from that exhibition / auction is recorded. The branch where the event is held is also recorded, which can be identified by the Branch code. This enables easy access to past records.

It's important to store details of all the artworks belonging to an art gallery – whether past or present, and hence details of these are also stored. Details of which branch a particular artwork belongs to, and whether it's available or not is present. If the artwork is not available, then the details of the customer it was sold to is shown.

Keeping track of the transactions in an art gallery is very important, and details such as Transaction ID, Customer ID, Branch code and relevant transaction details is a must, and is covered by our database.

4. REQUIREMENTS SPECIFICATION

This art gallery management system provides three views – for customers, employees and managers. The database contains login IDs and passwords of the aforementioned people, and on successful login, they're guided to their respective home pages. We have linked postgres to our webpage via PHP, so that the changes made through the website our actually reflected in the database. We also have a login page, and based on the credentials of the users, they're taken to either of the 3 aforementioned views.

A manager can view Employees and Payments, and insert, update values, and delete records from the same. A manager can also search for records by Employee ID and Employee name. This feature is only available for managers and not for employees, as you don't want employees making changes to the database. Similarly, only managers can access records of any employee and any transaction.

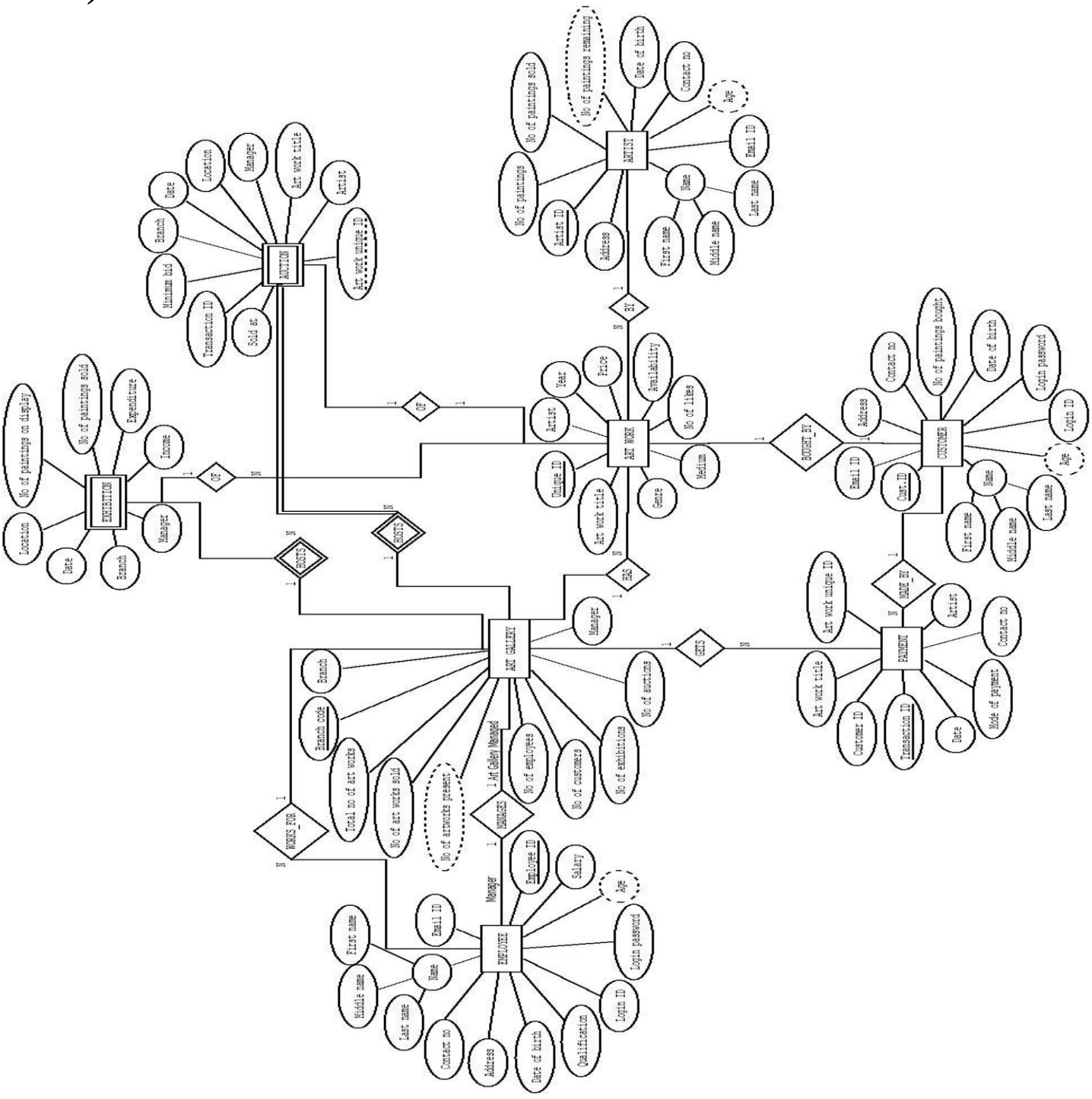
When an employee logs in, he can view details of artists. An employee can search, insert, update and delete records from an artist. Employees have been vested with the authority to change records of artists because they're the bridge between the customers and artists.

In customer view, there are three views available – Auctions, Exhibitions and Transactions. A customer can view details about past auctions and exhibitions. However, they can view only basic details about them – such as the date, location and number of artworks present. They cannot view the expenditure and income, which is restricted to the higher authorities. A customer can also view all of his transactions – which is present in the transactions tab. No action such as update and delete can be done on this data. A user can view only his transactions.

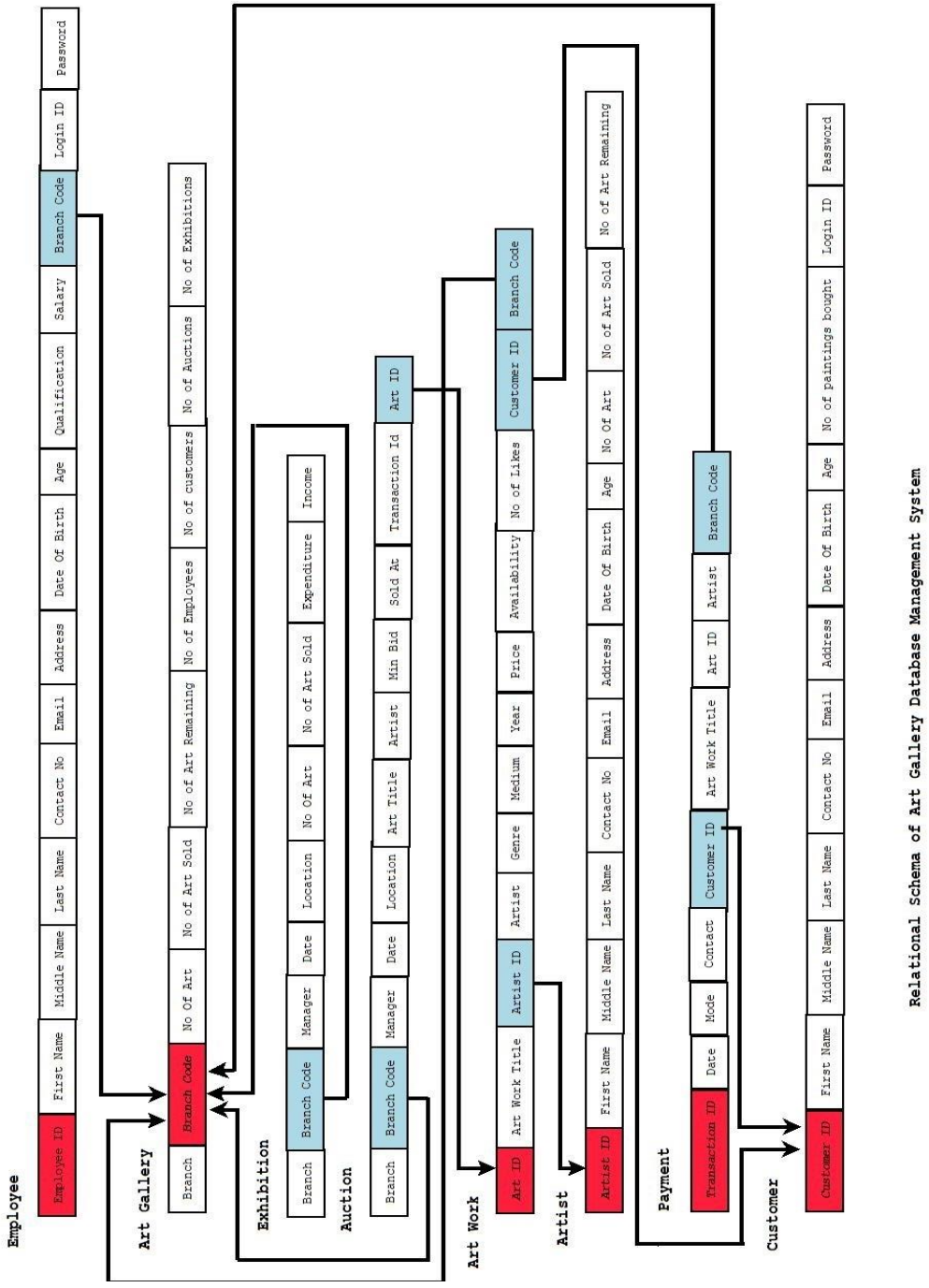
There's no registration page available on the website. Users can register by going to a branch of the art gallery and making a transaction. Only on doing so will they be provided with login credentials by the DBA. This is done to prevent dummy / fake accounts, and to ensure that only valid users are a part of the database.

5. DESIGN

i) ER DIAGRAM



ii) SCHEMA DIAGRAM



iii) SQL

a) DDL Statements

This database has 8 tables including employee, artwork, art gallery, artist, exhibition, auction, payment, customer. Following are the create statements for these tables.

EMLOYEE TABLE

```
CREATE TABLE EMPLOYEE (EMP_ID VARCHAR(10) PRIMARY KEY,
FIRST_NAME CHAR (20) NOT NULL,
MIDDLE_NAME CHAR (20),
LAST_NAME CHAR (20) NOT NULL,
CONTACT_NO INT UNIQUE NOT NULL,
EMAIL_ID VARCHAR (30) UNIQUE NOT NULL,
ADDRESS VARCHAR (100) NOT NULL,
DATE_OF_BIRTH DATE NOT NULL,
SALARY DECIMAL (10,2) NOT NULL,
LOGIN_ID CHAR (20) NOT NULL,
PASSWORD CHAR (20) NOT NULL,
QUALIFICATION VARCHAR (100));
```

ART GALLERY TABLE:

```
CREATE TABLE ART_GALLERY (BRANCH CHAR(20) NOT NULL,
BRANCH_CODE VARCHAR (20) PRIMARY KEY,
MANAGER CHAR (20) NOT NULL,
TOTAL_ARTWORKS INT NOT NULL,
TOTAL_SOLD INT,
TOTAL_REMAINING INT,
NO_CUSTOMER INT,
NO_EMPLOYEE INT,
NO_EXHIBITIONS INT,
NO_AUCTIONS INT);
```

EXHIBITION TABLE:

```
CREATE TABLE EXHIBITION (BRANCH CHAR (10) NOT NULL,
MANAGER CHAR (20) NOT NULL,
DATE DATE NOT NULL,
LOCATION VARCHAR (30) NOT NULL,
TOTAL_ARTWORKS INT NOT NULL,
TOTAL_SOLD INT,
EXPENDITURE DECIMAL (10,2) NOT NULL,
INCOME DECIMAL (10 , 2 ) NOT NULL);
```

AUCTION TABLE:

```
CREATE TABLE AUCTION (BRANCH CHAR(10) NOT NULL,
MANAGER CHAR (10) NOT NULL,
```

DATE DATE NOT NULL,
LOCATION VARCHAR (30) NOT NULL,
ART_TITLE CHAR (20) NOT NULL,
ARTIST CHAR (10) NOT NULL,
MINIMUM_PRICE DECIMAL (10,2); NOT NULL,
SOLD_PRICE DECIMAL (10,2);,
TRANS_ID VARCHAR (10) UNIQUE);

ARTIST TABLE:
CREATE TABLE ARTIST (ARTIST_ID VARCHAR(10) PRIMARY KEY,
FIRST_NAME CHAR (20) NOT NULL,
MIDDLE_NAME CHAR (20),
LAST_NAME CHAR (20) NOT NULL,
CONTACT_NO DECIMAL (10) UNIQUE NOT NULL,
EMAIL_ID VARCHAR (30) UNIQUE NOT NULL,
ADDRESS VARCHAR(100) NOT NULL,
DATE_OF_BIRTH DATE NOT NULL,
TOTAL_ARTWORKS INT,
TOTAL_SOLD INT,
TOTAL_REMAINING INT) ;

CUSTOMER TABLE:
CREATE TABLE CUSTOMER (CUSTOMER_ID VARCHAR(10) PRIMARY KEY,
FIRST_NAME CHAR (20) NOT NULL,
MIDDLE_NAME CHAR (20),
LAST_NAME CHAR (20) NOT NULL,
CONTACT_NO INT UNIQUE NOT NULL,
EMAIL_ID VARCHAR (30) UNIQUE NOT NULL,
ADDRESS VARCHAR (100) NOT NULL,
DATE_OF_BIRTH DATE NOT NULL,
LOGIN_ID CHAR (20) NOT NULL,
PASSWORD CHAR (20) NOT NULL,
NO_OF_PURCHASE INT);

PAYMENT TABLE
CREATE TABLE PAYMENT (TRANSACTION_ID VARCHAR (10) PRIMARY KEY,
ART_ID VARCHAR (10) NOT NULL,
ART_TITLE CHAR(20) NOT NULL,
ARTIST CHAR(20) NOT NULL,
MODE CHAR(10) NOT NULL,
CONTACT_NO INT UNIQUE ,
DATE DATE NOT NULL);

ARTWORK TABLE:
CREATE TABLE ARTWORK (ART_ID VARCHAR (10) PRIMARY KEY,
ART_TITLE CHAR (20) NOT NULL,

```
ARTIST CHAR (20) NOT NULL,
GENRE CHAR (20),
MEDIUM CHAR (30) ,
YEAR DATE NOT NULL,
PRICE DECIMAL (10,2) NOT NULL,
AVAILABILITY CHAR(3) NOT NULL,
TOTAL_LIKES INT);
```

ALTER STATEMENTS:

```
ALTER TABLE EMPLOYEE
ADD COLUMN BRANCH_CODE VARCHAR(20) REFERENCES
ART_GALLERY (BRANCH_CODE);

ALTER TABLE EXHIBITION
ADD COLUMN BRANCH_CODE VARCHAR(20) REFERENCES
ART_GALLERY (BRANCH_CODE);

ALTER TABLE AUCTION
ADD COLUMN BRANCH_CODE VARCHAR(20) REFERENCES
ART_GALLERY (BRANCH_CODE),
ADD COLUMN ART_ID VARCHAR(10) REFERENCES ARTWORK(ART_ID);

ALTER TABLE PAYMENT
ADD COLUMN CUSTOMER_ID VARCHAR(10) REFERENCES
CUSTOMER(CUSTOMER_ID),
ADD COLUMN BRANCH_CODE VARCHAR(20) REFERENCES
ART_GALLERY(BRANCH_CODE);

ALTER TABLE ARTWORK
ADD COLUMN ARTIST_ID VARCHAR(10) REFERENCES ARTIST(ARTIST_ID),
ADD COLUMN CUSTOMER_ID VARCHAR(10) REFERENCES
CUSTOMER(CUSTOMER_ID),
ADD COLUMN BRANCH_CODE VARCHAR(20) REFERENCES
ART_GALLERY(BRANCH_CODE);
```

b) INSERT statements for bulk loading of initial data

Insertion into ART_GALLERY

```
INSERT INTO ART_GALLERY VALUES ('Al Fahidi','B01UAE','Eleanor
Smith',531,178,353,251,15,25,17);
INSERT INTO ART_GALLERY VALUES ('Sharjah','B02UAE','Manal
Ataya',382,111,271,198,17,21,14);
INSERT INTO ART_GALLERY VALUES ('Kolkata','BO1IND','Shiva
Murthy',655,421,234,392,27,23,11);
INSERT INTO ART_GALLERY VALUES ('Chennai','B02IND','Srushti
Shetty',631,350,281,350,23,15,9);
INSERT INTO ART_GALLERY VALUES ('Singapore','B01MAL','Chang Hwee
Nee',730,591,139,372,30,31,29);
INSERT INTO ART_GALLERY VALUES ('Paris','B01FRA','Giles Dyan',321,152,169,105,12,13,15);
INSERT INTO ART_GALLERY VALUES ('Montignac','B02FRA','Mary
Louise',201,98,103,73,11,15,9);
INSERT INTO ART_GALLERY VALUES ('Berlin','B01GER','Emma',198,100,98,73,12,12,7);
INSERT INTO ART_GALLERY VALUES ('Leipzig','B02GER','Nikola Klaus',177,92,85,92,19,23,14);
INSERT INTO ART_GALLERY VALUES ('Rome','B01ITA','Stefan
Salvatore',321,150,169,100,25,17,14);
```

Insertion into ARTWORK

```
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('AC001','You & Me','April Coppini',Abstract','Pencil','2003-07-
07',15000.00,'No',67,'A001US','B01FRA');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('AC002','You were First','April Coppini','Abstract','Pencil','2007-09-
02',17000.00,'Yes',53,'A001US','B02FRA');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('BH001','The Age of Guilt','Brett Harvey','Figurative','Concrete','2018-07-
08',9000.00,'Yes',50,'A001CAN','B01ITA');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('CZ001','Her','Cayce Zavaglia','Potrait','Paint','2010-02-02',10000.00,'Yes',43,'A002CAN','B01ITA');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('DB001','The Current','Daniel Bilmes','Potrait','Pencil','2018-08-
03',5000.00,'Yes',25,'A002UK','B02IND');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
```

```
('DR001','The Painter','Darren Reid','Landscape','Acrylic','2015-09-
01',9000.00,'No',42,'A003UK','B02IND');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('JG001','A study','Jennifer Gennari','Potrait','Acrylic','2017-01-07',6000.00,'No',50,'A002US','B01UAE');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('JB001','Alterado','Johan Barrios','Potrait','Oil on canvas','2016-04-
03',5000.00,'No',42,'A001ITA','B01ITA');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('JS001','Crimson','Jordan Sokol','Potrait','Oil on pane;','2018-03-
06',7000.00,'Yes',51,'A002ITA','B01ITA');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('LK001','Wild','Lene Kilde','Sculpture','Steel wire','2015-04-03',5000.00,'Yes',32,'A001SCO','B02GER');
INSERT INTO
ARTWORK(ART_ID,ART_TITLE,ARTIST,GENRE,MEDIUM,YEAR,PRICE,AVAILABILITY,TOT
AL_LIKES,ARTIST_ID,BRANCH_CODE) VALUES
('LK002','Hands','Lene Kilde','Sculpture','Concrete','2015-09-08',6000.00,'No',41,'A001SCO','B02GER');
```

6. IMPLEMENTATION

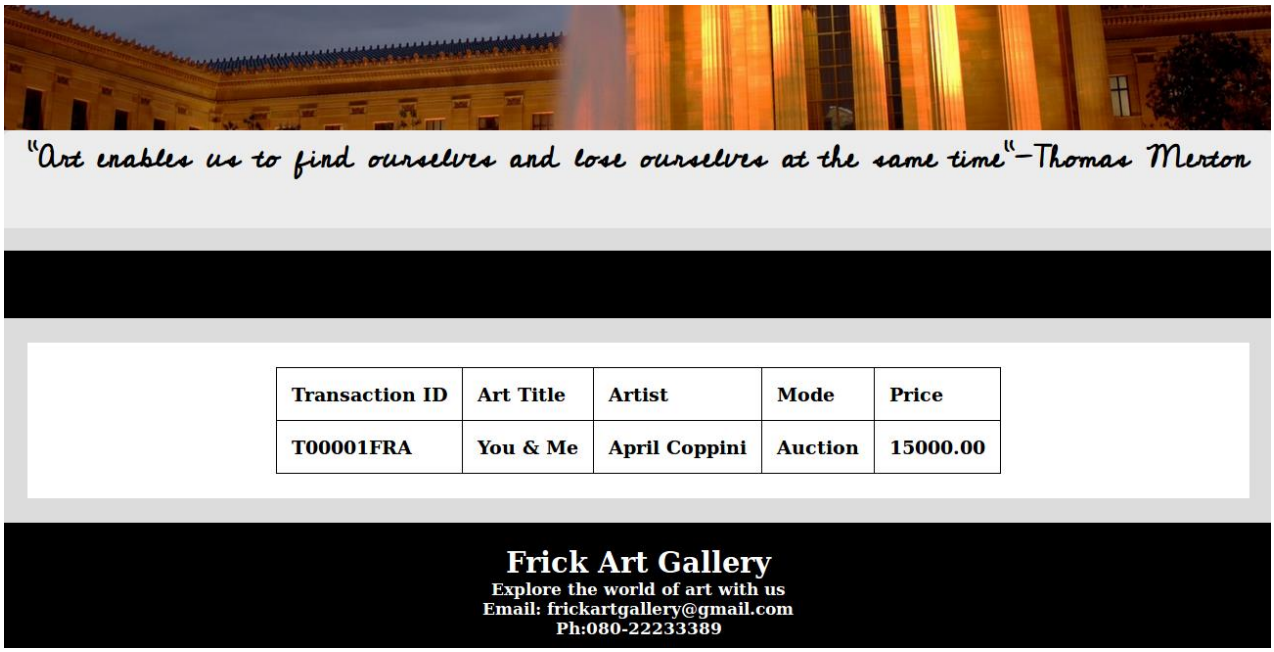
i) Web user interfaces

a) PHP forms / UI Screenshots

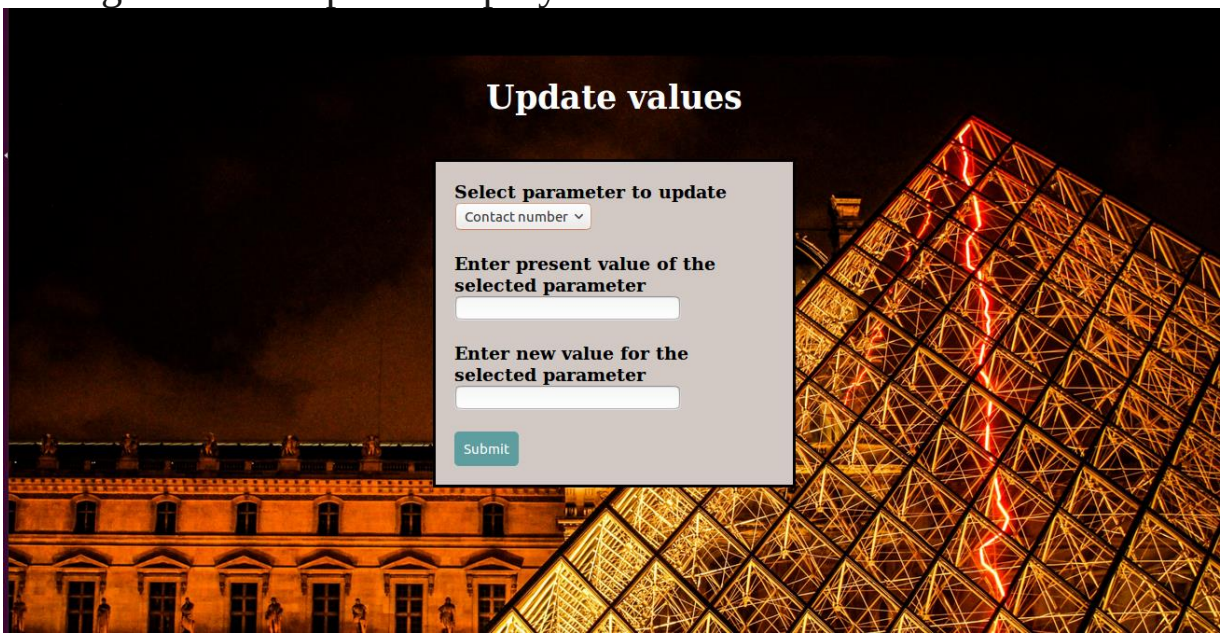
Home page

Customer View

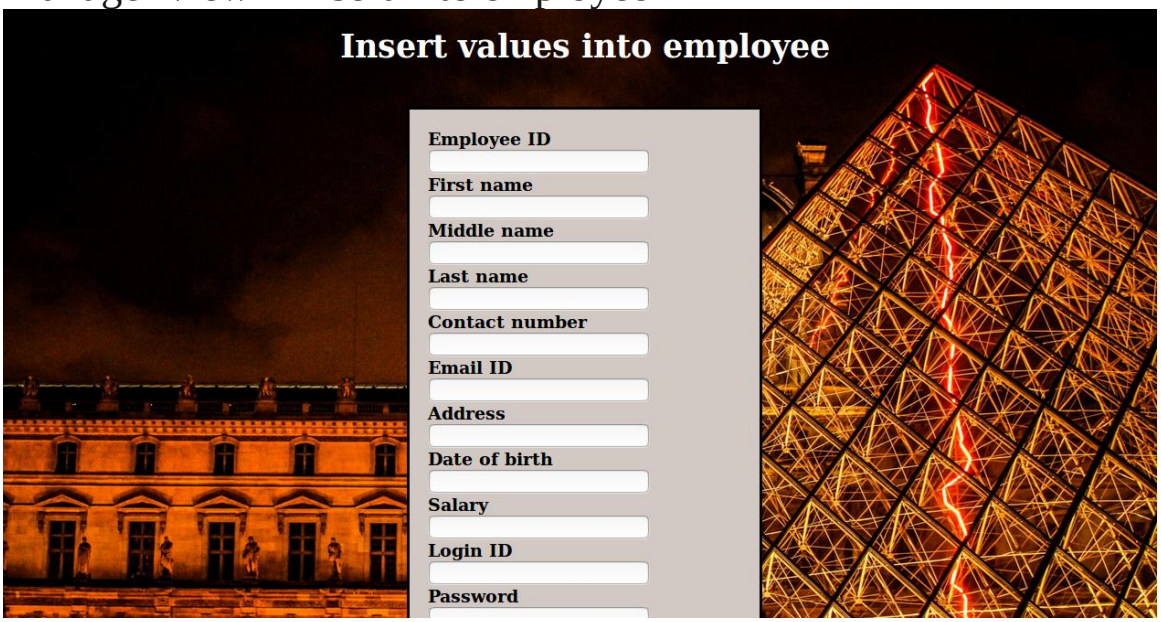
Customer View – Transactions tab



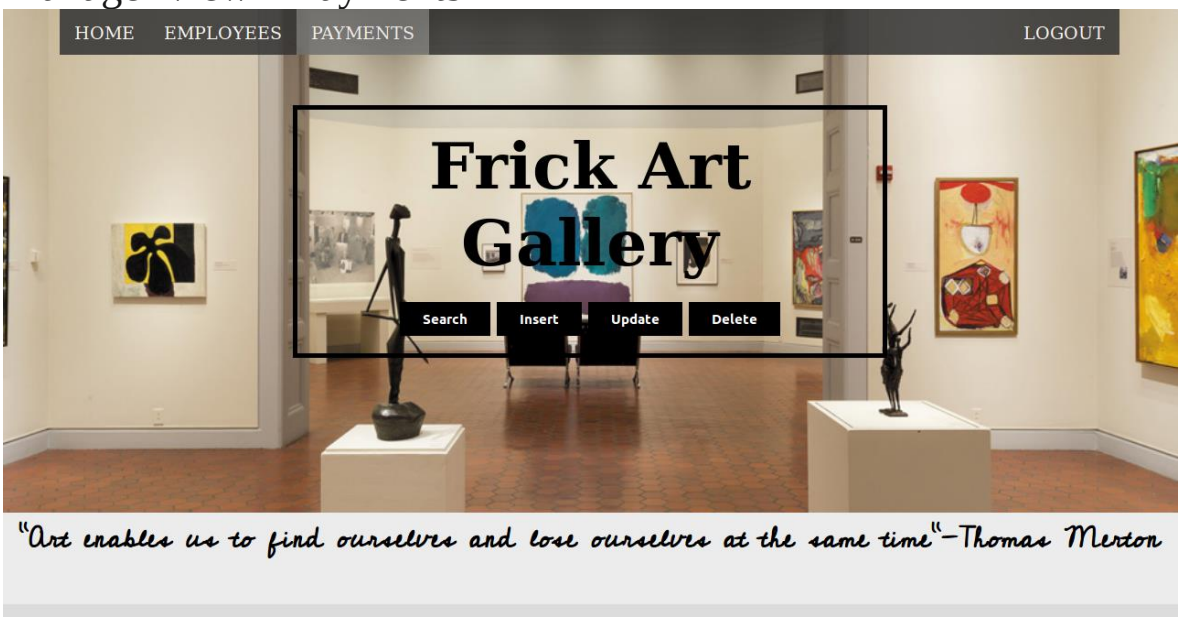
Manager view – Update employee values



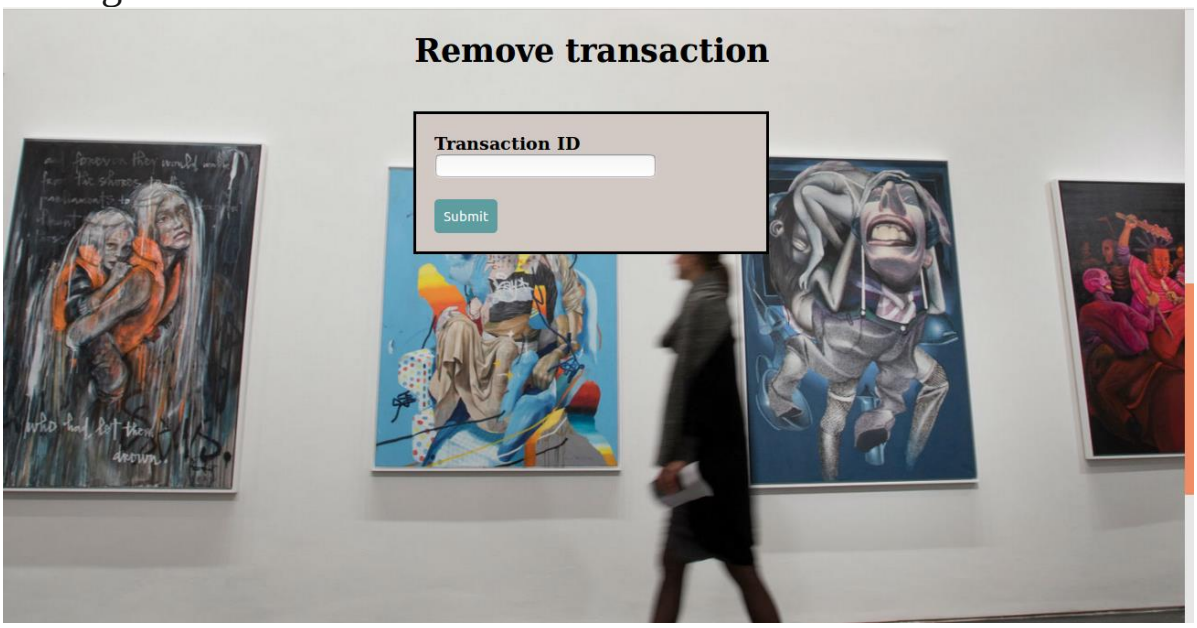
Manager view – Insert into employee



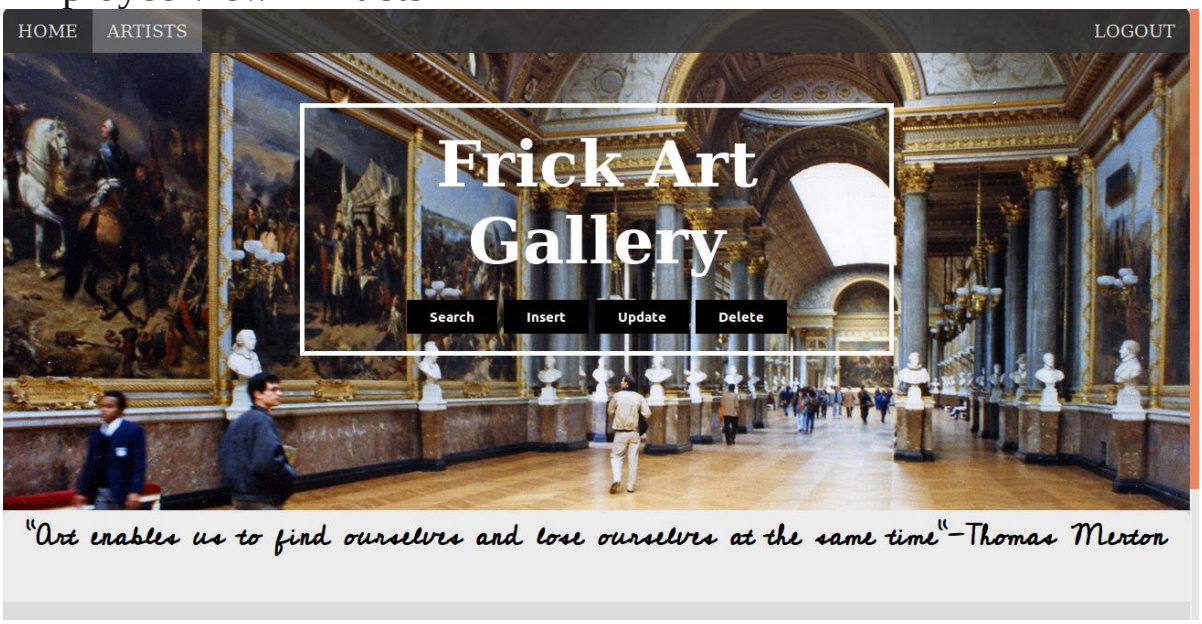
Manager view – Payments



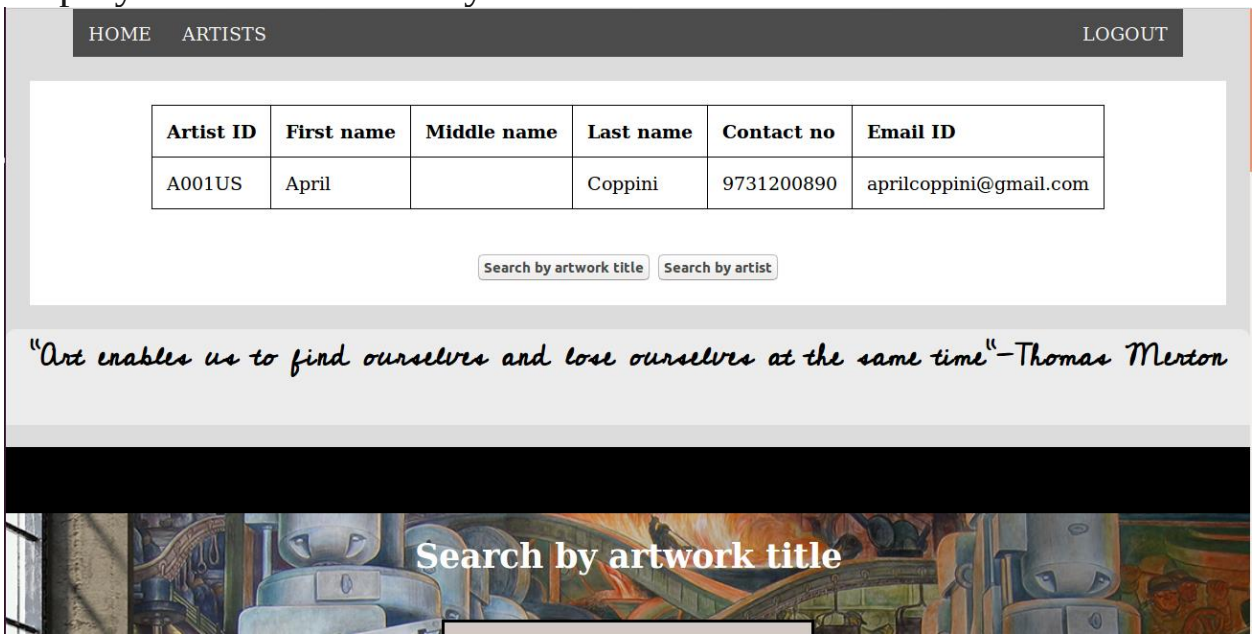
Manager view – Delete transactions



Employee view - Artists



Employee view – Search by artist name



b) SQL

Snapshot of the employee table

```
 emp_id  |      first_name      |     middle_name      |      last_name       | contact_no |        email_id         |                 address
             | date_of_birth |  salary   |       login_id       |       password       | qualification | branch_code
---------+----------------------+----------------------+----------------------+------------+-------------------------+-------------------------
---------------+---------------+-----------+----------------------+----------------------+---------------+------------
 E002UAE | Veeru                | S                    | Seth                 | 9849312349 | veeruseth@gmail.com     | 54 The Crescent TORQUAY T
Q4 2IK         | 1998-11-06    |  10000.00 | veeru                | v123?                | BBA           | B02UAE
 E002IND | Aniket               |                      | M                    | 8792054960 | aniketm@gmail.com       | 7549 North StreetCLEVELAN
D TS4 8DC      | 1999-12-27    |   9000.00 | aniket               | a123?                | BBA           | B02IND
 E001MAL | John                 |                      | Grey                 | 9048563722 | johngrey@gmail.com      | 463 Church Street IPSWICH
 IP91 1CQ       | 1979-05-14    |   6000.00 | john                 | j123?                | BSc           | B01MAL
 E001FRA | Nadia                | K                    | Petrova              | 9045803123 | nadiapetrova@gmail.com  | 936 Park Avenue SUNDERLAN
D SR3 0TY      | 1990-11-14    |   5500.00 | nadia                | n123?                | BSc           | B01FRA
 E002FRA | Valerie              | S                    | Marais               | 9012387065 | valeriamarais@gmail.com | 7789 Springfield Road CAR
LISLE CA55 0GY | 1987-10-12    |   6000.00 | valerie              | v123?                | BBA           | B02FRA
 E001GER | Max                  |                      | Lebas                | 7065907809 | maxlebas@gmail.com      | 35 Kings Road OXFORD OX33
 5LP            | 1979-05-07    |   7000.00 | max                  | m123?                | BSc           | B01GER
 E002GER | Jean                 | Marie                | Bechard              | 9607659807 | jeanbechard@gmail.com   | 9426 School Lane INVERNES
S IV35 8CP     | 1985-03-03    |   8000.00 | jean                 | j123?                | BBA           | B02GER
 E001ITA | Violette             |                      | Quint                | 9786045322 | violettequint@gmail.com | 49 Church Lane STEVENAGE
SG21 3NA       | 1980-05-07    |   7500.00 | violette             | v123?                | BBA           | B01ITA
 M002UAE | Manal                |                      | Ataya                | 9495830282 | manalataya@gmail.com    | 9150 High Street OXFORD O
X93 3JB        | 1995-01-09    | 100000.00 | manal                | m345?                | MBA           | B02UAE
 M001UAE | Eleanor              |                      | Smith                | 7869403267 | eleanorsmith@gmail.com  | 9733 South Street GUILDFO
RD GU70 0HI    | 1999-09-12    | 110000.00 | elenor               | e345?                | MBA           | B01UAE
 M002IND | Srushti              |                      | Shetty               | 9849312353 | shrushetty@gmail.com    | 54 The Crescent TORQUAY T
Q4 2IK         | 1998-11-16    | 100000.00 | shrusthi             | s345?                | MBA           | B02IND
 M001MAL | Chang                | Hwee                 | Nu                   | 8792054988 | changnu@gmail.com       | 7549 North StreetCLEVELAN
D TS4 8DC      | 1992-10-20    |  90000.00 | chung                | c345?                | MBA           | B01MAL
 M002FRA | Mary                 |                      | Louise               | 9045803142 | mary19@gmail.com        | 936 Park Avenue SUNDERLAN
D SR3 0TY      | 1998-01-16    |  55000.00 | mary                 | m345?                | MSc           | B02FRA
 M001GER | Emma                 |                      |                      | 9012387080 | emma678@gmail.com       | 7789 Springfield Road CAR
LISLE CA55 0GY | 1987-09-22    |  60000.00 | emma                 | e345?                | MBA           | B01GER
 M002GER | Nikola               |                      | Klaus                | 7065907669 | nikklaus@gmail.com      | 35 Kings Road OXFORD OX33
 5LP            | 1979-04-27    |  70000.00 | nick                 | n345?                | MSc           | B02GER
 M001ITA | Stefan               |                      | Salvatore            | 9609959807 | salvatore02@gmail.com   | 9426 School Lane INVERNES
S IV35 8CP     | 1985-03-13    |  80000.00 | Stefan               | s345?                | MBA           | B01ITA
 E001IND | Krishna              | S                    | K                    | 7869403260 | krishnask@gmail.com     | 9733 South Street GUILDFO
RD GU70 OHI    | 1999-09-06    |  11000.00 | Krishna              | K123?                | BBA           | B01IND
 M001FRA | Gilee                |                      | Dyan                 | 9048563712 | gilerdyan@gmail.com     | 463 Church Street IPSWICH
 IP91 1CQ       | 1979-12-13    |  60000.00 | giler                | g345?                | MSc           | B01FRA
 M001IND | Shiva                |                      | Murthy               | 9786045342 | shivamurthy@gmail.com   | 49 Church Lane STEVENAGE
SG21 3NA       | 1980-02-17    |  75000.00 | shiva                | s356?                | MBA           | B01IND
:
```

Snapshot of the artwork tab;e

```
 art_id |      art_title       |        artist        |        genre         |             medium             |    year    |  price   | availabi
lity | total_likes | artist_id | customer_id | branch_code
--------+----------------------+----------------------+----------------------+--------------------------------+------------+----------+---------
-----+-------------+-----------+-------------+-------------
 AC002  | You were First       | April Coppini        | Abstract             | Pencil                         | 2007-09-02 | 17000.00 | Yes
    |          53 | A001US    |             | B02FRA
 BH001  | The Age of Guilt     | Brett Harvey         | Figurative           | Concrete                       | 2018-07-08 |  9000.00 | Yes
    |          50 | A001CAN   |             | B01ITA
 CZ001  | Her                  | Cayce Zavaglia       | Potrait              | Paint                          | 2010-02-02 | 10000.00 | Yes
    |          43 | A002CAN   |             | B01ITA
 DB001  | The Current          | Daniel Bilmes        | Potrait              | Pencil                         | 2018-08-03 |  5000.00 | Yes
    |          25 | A002UK    |             | B02IND
 LK001  | Wild                 | Lene Kilde           | Sculpture            | Steel wire                     | 2015-04-03 |  5000.00 | Yes
    |          32 | A001SCO   |             | B02GER
 DR001  | The Painter          | Darren Reid          | Landscape            | Acrylic                        | 2015-09-01 |  9000.00 | No
    |          42 | A003UK    | IND001      | B02IND
 JG001  | A study              | Jennifer Gennari     | Potrait              | Acrylic                        | 2017-01-07 |  6000.00 | No
    |          50 | A002US    | UAE001      | B01UAE
 JB001  | Alterado             | Johan Barrios        | Potrait              | Oil on canvas                  | 2016-04-03 |  5000.00 | No
    |          42 | A001ITA   | ITA001      | B01ITA
 JS001  | Crimson              | Jordan Sokol         | Potrait              | Oil on pane;                   | 2018-03-06 |  7000.00 | Yes
    |          51 | A002ITA   | ITA002      | B01ITA
 LK002  | Hands                | Lene Kilde           | Sculpture            | Concrete                       | 2015-09-08 |  6000.00 | No
    |          41 | A001SCO   | SCO001      | B02GER
 AC001  | You & Me             | April Coppini        | Abstract             | Pencil                         | 2003-07-07 | 15000.00 | No
    |          67 | A001US    | FRA001      | B01FRA
(11 rows)

(END)
```

Execution of the following query

Query to find first name, middle name, last name and contact number of Artists who have more than 50 likes on their artwork.

```
artgallery=# SELECT A.FIRST_NAME,A.MIDDLE_NAME,A.LAST_NAME,A.CONTACT_NO
artgallery-#
artgallery-# FROM ARTIST AS A
artgallery-#
artgallery-# WHERE A.ARTIST_ID IN (SELECT AW.ARTIST_ID FROM ARTWORK AS AW WHERE AW.TOTAL_LIKES>=50 )
artgallery-#
artgallery-# GROUP BY A.ARTIST_ID;
      first_name      |     middle_name      |      last_name       | contact_no
----------------------+----------------------+----------------------+------------
 Jordan               |                      | Sokol                | 6980017183
 April                |                      | Coppini              | 9731200890
 Brett                | Michael              | Harvey               | 7121139685
 Jennifer             | Kristen              | Gennari              | 7312158938
(4 rows)
```

ii) SQL QUERIES

COMPLEX QUERIES

QUERY 1
Display the name of the customer and the art title of the art that he bought which is made using pencil.

```
SELECT C.FIRST_NAME, C.LAST_NAME, P.ART_TITLE
FROM (CUSTOMER AS C RIGHT OUTER JOIN PAYMENT AS P ON C.CUSTOMER_ID =
P.CUSTOMER_ID)
WHERE P.ART_TITLE IN (SELECT ART_TITLE FROM ARTWORK WHERE
MEDIUM='Pencil');
```

```
     first_name      |     last_name        |     art_title
---------------------+----------------------+----------------------
 Francis             | Courtet              | You & Me
(1 row)
```

QUERY 2
For each genre that has more than 3 artworks, retrieve the genre and no. of arts of that genre whose price is more than 6000.

```
SELECT GENRE, COUNT (*)
FROM ARTWORK
WHERE PRICE>6000 AND GENRE IN (SELECT genre
                               FROM ARTWORK
                               GROUP BY GENRE
                               HAVING COUNT (*) > 3)
GROUP BY genre;
```

```
       genre          | count
----------------------+-------
 Potrait              |     2
```

QUERY 3
Query to find first name, middle name, last name and contact number of Artists who have more than 50 likes on their artwork.

```
SELECT A.FIRST_NAME, A.MIDDLE_NAME,A.LAST_NAME,A.CONTACT_NO
FROM ARTIST AS A
WHERE A.ARTIST_ID IN (SELECT AW.ARTIST_ID FROM ARTWORK AS AW WHERE
AW.TOTAL_LIKES>=50 )
```

```
GROUP BY A.ARTIST_ID;
```

```
     first_name      |     middle_name     |      last_name       | contact_no
---------------------+---------------------+----------------------+------------
 Jordan              |                     | Sokol                | 6980017183
 April               |                     | Coppini              | 9731200890
 Brett               | Michael             | Harvey               | 7121139685
 Jennifer            | Kristen             | Gennari              | 7312158938
(4 rows)
```

QUERY 4
Retrieve artworks that haven't been sold yet.

```
SELECT AW.ART_TITLE, AW.ARTIST FROM ARTWORK AS AW WHERE NOT EXISTS
(SELECT * FROM PAYMENT AS PAY WHERE PAY.ARTWORK_ID=AW.ART_ID);
```

```
    art_title          |       artist
-----------------------+---------------------
 You were First        | April Coppini
 The Age of Guilt      | Brett Harvey
 Her                   | Cayce Zavaglia
 The Current           | Daniel Bilmes
 Wild                  | Lene Kilde
(5 rows)
```

QUERY 5
Query to show the branch name and total remaining arts from the branch whose exhibition was held in India and their total income was above 32000.

```
SELECT BRANCH, TOTAL_REMAINING
FROM ART_GALLERY
WHERE BRANCH IN (SELECT BRANCH, MANAGER FROM EXHIBITION
                    WHERE (BRANCH_CODE LIKE '%IND' AND INCOME<32000));
```

```
      branch          | total_remaining
----------------------+-----------------
 Chennai              |             281
(1 row)
```

QUERY 6
To find out which customers bought artworks which had less than 50 likes.

```
SELECT FIRST_NAME,
MIDDLE_NAME,LAST_NAME,CONTACT_NO,EMAIL_ID,ART_TITLE,ARTIST
FROM (ARTWORK NATURAL JOIN CUSTOMER)
WHERE TOTAL_LIKES<50;
```

```
    first_name     |    middle_name     |     last_name      | contact_no |        email_id
|     art_title      |       artist
--------------------+-------------------------+---------------------+----------------+-------------------
-----------------+--------------------+--------------------
 Mahendra          | Singh                   | Dhoni               | 9342145803| msd@gmail.com
| The Painter       | Darren Reid
 Katerina          |                         | Petrova             | 9859395309|
katerinapetrova@gmail.com | Alterado          | Johan Barrios
 Lucy              |                         | Sinclair            | 6879549789|
lucysinclair@gmail.com       | Hands             | Lene Kilde
(3 rows)
```

QUERY 7
Query to find how out all payments that were made under the mode auction .

```
SELECT * FROM PAYMENT INNER JOIN AUCTION
ON PAYMENT.TRANSACTION_ID= AUCTION.TRANSACTION_ID;
```

```
transaction_id | art_id |     art_title      |       artist       |    mode    | contact_no |    date    |
customer_id | branch_code |  price   |   branch   |      manager       |    date    |   location    |
art_title      |       artist       | minimum_price |      sold_price      | trans_id  | branch_code | art_id
---------------+--------+--------------------+--------------------+------------+------------+------------+-
-----------+-------------+----------+------------+--------------------+------------+---------------+--------
-------------+---------------------+--------------+---------------------+-----------+-------------+--------
 T00001UAE     | JG001  | A study            | Jennifer Gennari    | Auction    | 6758493020 |
2013-04-03 | UAE001     | B01UAE     |  6000.00 | Al Fahidi  | Eleanor Smith       | 2018-09-07 |
Museum of Arts | A study            | Jennifer Gennari    |       3500.00 | 6000.00           |
T00001UAE | B01UAE     | JG001
 T00001ITA     | JB001  | Alterado           | Johan Barrios       | Exhibition | 9834005686 | 2016-
06-13 | ITA001     | B01ITA     |  9000.00 | Rome       | Stefan Salvatore    | 2019-01-01 | Sculpt
Art    | Crimson            | Jordon Sokol       |       6500.00 | 7000.00           | T00001ITA |
B01ITA     | JS001
 T00001FRA     | AC001  | You & Me           | April Coppini       | Auction    | 4389459376 |
2014-02-03 | FRA001     | B01FRA     | 15000.00 | Paris      | Gille Dyan          | 2005-11-05 |
The Big Hall   | You & Me           | April Coppini       |      10000.00 | 15000.00          |
T00001FRA | B01FRA     | AC001
(3 rows)
```

SIMPLE QUERIES

QUERY 1
Print the details of the employee whose salary is greater than 8000 in ascending order

```
SELECT FIRST_NAME,
MIDDLE_NAME,LAST_NAME,CONTACT_NO,EMAIL_ID,SALARY
```

```
FROM EMPLOYEE
WHERE SALARY>8000
ORDER BY SALARY;
```

QUERY 2
Query to find the details of the most sold artwork in all auctions.

```
SELECT ART_TITLE,ARTIST,DATE,(SOLD_PRICE-MINIMUM_PRICE)AS
DIFF,SOLD_PRICE AS SOLD_AT
FROM    AUCTION
WHERE SOLD_PRICE IN  (SELECT MAX(SOLD_PRICE) FROM AUCTION);
```

QUERY 3
Query to find which branch the painting 'Her' is in.

```
SELECT AW.BRANCH_CODE, AG.BRANCH
FROM ARTWORK AS AW, ART_GALLERY AS AG
WHERE AW.ART_TITLE='Her' AND AW.BRANCH_CODE = AG.BRANCH_CODE;
```

QUERY 4
Query to find out which art gallery has the most number of auctions

```
SELECT BRANCH, BRANCH_CODE FROM ART_GALLERY
WHERE NO_AUCTIONS IN (SELECT MAX (NO_AUCTIONS) FROM ART_GALLERY);
```

QUERY 5
Query to find out details of customers who've made more than 7 purchases

```
SELECT CUSTOMER_ID, FIRST_NAME, LAST_NAME,CONTACT_NO,EMAIL_ID
FROM CUSTOMER
WHERE NO_OF_PURCHASE>7;
```

QUERY 6
Query to find the number of customers from France

```
SELECT COUNT (CUSTOMER_ID) FROM CUSTOMER WHERE CUSTOMER_ID LIKE
'FRA%';
```

iii) Test Cases

- Insertion of phone numbers having more than or lesser than 10 digits results in an error. This is done using the CHECK statement.
- If you try to enter a branch code that doesn't exist in the Art Gallery table into the employee, payment or artwork table, it results in an error as the branch code is the foreign keys of these tables. Only branch codes present in Art Gallery can be entered into the database.
- While logging in into the website, the username and password is checked with the database, and if it isn't present in it, the user can't log in. If there's a match, based on whether the user associated with that username & password is a manager, employee or customer, entry to the required homepage is granted.
- The first name and last name of the customer, employee and artist can never be NULL, but the middle name and last name can be null.
- The email IDs of all customers, employees and artists have to be unique. It results in an error otherwise.

7. DISCUSSION AND CONCLUSION WITH PROPOSED ENHANCEMENTS

Our project is only a humble venture to satisfy the needs of managing an art gallery in an efficient way. We have successfully implemented the art gallery database management which helps in centralizing data used for managing tasks performed in an art gallery .We have successfully implemented various functionalities of postgres and PHP, and created a functional database management system for an art gallery, which in turn makes things a lot easier for the end user.
The art gallery database management system prototype demonstrates easy navigation, and stores data in a systematic way. Overall, the efficiency has improved and the work process has simplified. We created a database that an Art gallery can use for keeping track on its employees. Every branch manager can access the employee details and keep a track of them through this database management system. His work gets easier, as he can use a database on a computer, rather than on paper. It also has a facility for employee login where employee can login and can see all the artworks. This make it easy for the employee to keep a track of all the artworks in a particular branch and can access the details at any point of time. This is also helpful when a customer enquires about the details of an artwork from an employee. Instead of going through pages of data, the employee can run a simple query and get the required information much faster. Therefore, this project has not just simplified data access, but made it quicker as well, thereby saving time.

This project has a wide scope of improvement, and a lot of features can be added to it. The employee view can be extended to viewing and adding artworks, and accessing transaction details only of the branch that they belong to, and not for other branches. The website can be extended to allow online payments, and perhaps have online auctions as well. The database can also contain a table that pertains to different artworks, and what people's reviews about it are. Based on this information, we can try and generate information about what kinds of artwork people like, which artist they like, and what price range is the ideal one. Such reports can be generated, which can largely help in improving art galleries.

Images of the artworks present in an art gallery should be uploaded onto the website, and users should be able to view these and buy them via online transactions, without having to visit the art gallery at all. These features can make a large difference to the revenue of an art gallery, and also help in increasing its popularity.

8. REFERENCES

Book references:
Fundamentals of Database Systems; 7th edition; Elmasri, Navathe;
Database Management Systems; 3rd edition; Ramakrishna, Gekhre;

https://www.systemcodegeeks.com/databases/postgresql/connect-postgresql-using-php/

9. Appendices

i) Databases, Tools & Technologies Used w/ versions

postgres version used: 9.5
PHP version used: 7

ii) Metadata (#tables, #views, etc.)

```
artgallery=# \d employee
            Table "public.employee"
    Column     |          Type          | Modifiers
---------------+------------------------+-----------
 emp_id        | character varying(10)  | not null
 first_name    | character(20)          | not null
 middle_name   | character(20)          |
 last_name     | character(20)          | not null
 contact_no    | numeric(10,0)          | not null
 email_id      | character varying(30)  | not null
 address       | character varying(100) | not null
 date_of_birth | date                   | not null
 salary        | numeric(10,2)          | not null
 login_id      | character(20)          | not null
 password      | character(20)          | not null
 qualification | character varying(100) |
 branch_code   | character varying(20)  |
Indexes:
    "employee_pkey" PRIMARY KEY, btree (emp_id)
    "employee_contact_no_key" UNIQUE CONSTRAINT,
btree (contact_no)
    "employee_email_id_key" UNIQUE CONSTRAINT,
btree (email_id)
Foreign-key constraints:
    "employee_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
```

```
artgallery=# \d art_gallery
     Column      |          Type          | Modifiers
-----------------+------------------------+-----------
 branch          | character(20)          | not null
 branch_code     | character varying(20)  | not null
 manager         | character(20)          | not null
 total_artworks  | integer                | not null
 total_sold      | integer                |
 total_remaining | integer                |
 no_customer     | integer                |
 no_employee     | integer                |
 no_exhibitions  | integer                |
 no_auctions     | integer                |
Indexes:
    "art_gallery_pkey" PRIMARY KEY, btree
(branch_code)
Referenced by:
    TABLE "artwork" CONSTRAINT
"artwork_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
    TABLE "auction" CONSTRAINT
"auction_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
    TABLE "employee" CONSTRAINT
"employee_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
```

```
    TABLE "exhibition" CONSTRAINT
"exhibition_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
```

```
    TABLE "payment" CONSTRAINT
"payment_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
```

```
artgallery=# \d exhibition
            Table "public.exhibition"
    Column     |          Type          | Modifiers
---------------+------------------------+-----------
 branch        | character(10)          | not null
 manager       | character(20)          | not null
 date          | date                   | not null
 location      | character varying(30) | not null
 total_artworks | integer               | not null
 total_sold    | integer                |
 expenditure   | numeric(10,2)          | not null
 income        | numeric(10,2)          | not null
 branch_code   | character varying(20) |
Foreign-key constraints:
    "exhibition_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
```

```
artgallery=# \d auction
            Table "public.auction"
    Column     |          Type          | Modifiers
---------------+------------------------+-----------
 branch        | character(10)          | not null
 manager       | character(20)          | not null
 date          | date                   | not null
 location      | character varying(30) | not null
 art_title     | character(20)          | not null
 artist        | character(20)          | not null
 minimum_price | numeric(10,2)          | not null
 sold_price    | character(20)          |
 trans_id      | character varying(10) |
 branch_code   | character varying(20) |
 art_id        | character varying(10) |
Indexes:
    "auction_trans_id_key" UNIQUE CONSTRAINT, btree
(trans_id)
Foreign-key constraints:
    "auction_art_id_fkey" FOREIGN KEY (art_id)
REFERENCES artwork(art_id)
    "auction_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
```

```
artgallery=# \d artist
              Table "public.artist"
     Column      |          Type          | Modifiers
-----------------+------------------------+-----------
 artist_id       | character varying(10)  | not null
 first_name      | character(20)          | not null
 middle_name     | character(20)          |
 last_name       | character(20)          | not null
 contact_no      | numeric(10,0)          | not null
 email_id        | character varying(30)  | not null
 address         | character varying(100) | not null
 date_of_birth   | date                   | not null
 total_artworks  | integer                |
 total_sold      | integer                |
 total_remaining | integer                |
Indexes:
    "artist_pkey" PRIMARY KEY, btree (artist_id)
    "artist_contact_no_key" UNIQUE CONSTRAINT, btree
(contact_no)
    "artist_email_id_key" UNIQUE CONSTRAINT, btree
(email_id)
Referenced by:
    TABLE "artwork" CONSTRAINT
"artwork_artist_id_fkey" FOREIGN KEY (artist_id)
REFERENCES artist(artist_id)
```

```
artgallery=# \d customer
              Table "public.customer"
     Column     |          Type          | Modifiers
----------------+------------------------+-----------
 customer_id    | character varying(10)  | not null
 first_name     | character(20)          | not null
 middle_name    | character(20)          |
 last_name      | character(20)          | not null
 contact_no     | numeric(10,0)          | not null
 email_id       | character varying(30)  | not null
 address        | character varying(100) | not null
 date_of_birth  | date                   | not null
 login_id       | character(20)          | not null
 password       | character varying(20)  | not null
 no_of_purchase | integer                |
Indexes:
    "customer_pkey" PRIMARY KEY, btree (customer_id)
    "customer_contact_no_key" UNIQUE CONSTRAINT,
btree (contact_no)
    "customer_email_id_key" UNIQUE CONSTRAINT,
btree (email_id)
Referenced by:
    TABLE "artwork" CONSTRAINT
"artwork_customer_id_fkey" FOREIGN KEY
(customer_id) REFERENCES customer(customer_id)
    TABLE "payment" CONSTRAINT
"payment_customer_id_fkey" FOREIGN KEY
(customer_id) REFERENCES customer(customer_id)
```

```
artgallery=# \d payment
              Table "public.payment"
     Column     |         Type          | Modifiers
----------------+-----------------------+-----------
 transaction_id | character varying(10) | not null
 art_id         | character varying(10) | not null
 art_title      | character(20)         | not null
 artist         | character(20)         | not null
 mode           | character(10)         | not null
 contact_no     | numeric(10,0)         |
 date           | date                  | not null
 customer_id    | character varying(10) |
 branch_code    | character varying(20) |
 price          | numeric(10,2)         |
Indexes:
    "payment_pkey" PRIMARY KEY, btree (transaction_id)
    "payment_contact_no_key" UNIQUE CONSTRAINT,
btree (contact_no)
Foreign-key constraints:
    "payment_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
    "payment_customer_id_fkey" FOREIGN KEY
(customer_id) REFERENCES customer(customer_id)
```

```
artgallery=# \d artwork
              Table "public.artwork"
    Column    |         Type          | Modifiers
--------------+-----------------------+-----------
 art_id       | character varying(10) | not null
 art_title    | character(20)         | not null
 artist       | character(20)         | not null
 genre        | character(20)         |
 medium       | character(30)         |
 year         | date                  | not null
 price        | numeric(10,2)         | not null
 availability | character(3)          | not null
 total_likes  | integer               |
 artist_id    | character varying(10) |
 customer_id  | character varying(10) |
 branch_code  | character varying(20) |
Indexes:
    "artwork_pkey" PRIMARY KEY, btree (art_id)
Foreign-key constraints:
    "artwork_artist_id_fkey" FOREIGN KEY (artist_id)
REFERENCES artist(artist_id)
    "artwork_branch_code_fkey" FOREIGN KEY
(branch_code) REFERENCES art_gallery(branch_code)
    "artwork_customer_id_fkey" FOREIGN KEY
(customer_id) REFERENCES customer(customer_id)
Referenced by:
    TABLE "auction" CONSTRAINT "auction_art_id_fkey"
FOREIGN KEY (art_id) REFERENCES artwork(art_id)
```