in collaboration with

Softwarica College of IT & E-commerce | Coventry University

ST4056CEM

Introduction to Web Development and Database Systems

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ABSTRACT

This project emphasizes on creating and managing system of database for effective management as well as improvement operation of video game parlour. The system was storing and processing data related to customers and session. Management of book as well as roles of staff along side machines and consoles were stored by this system. Also, normalization was applied to 3NF for minimizing data redundance and ensuring data integrity. SQL queries will facilitate for data insertion, update and delete. The main theme of the project was to enhance parlour operation effectively and support growth by giving structured and scalable solution of database.

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INTRODUCTION

This database coursework includes design of rational system of database of video game parlor. It demonstrates effective and normalized database system. Information on customers, sessions, bookings etc were stored on this database system. Operations efficiency, streamline session management and betterment on experience of customers was provided by this platform. Data integrity and reduce of redundancy was successful due to fully normalization of database. SQL queries implement was for manipulation of data to enable seamless operations from starting like booking session to last generating reports. The service and operations were maintained smoothly with the help improvement in database.

1.AIM

Figure 1:AIM

The main was design and implement database with fully normalization for video game parlor which improve effective stores and manages customers, staff session with ensuring easy access and efficiency in operations.

2.OBJECTIVES

Figure 2:OBJ

To normalize database into 3NF was one of the objectives. Also, er diagram was made for showing the relationship between different entities. Also, query of SQL was used to insert data in system. Handling of session and customers record were also ensured. At last, database was evaluated for any changes need for optimization.

3.PROBLEM STATEMENT

It solves the problem like managing session bookings, customer details, staff roles, machine and console assignment as well as game management in video game parlour. Existing data handling methods are improved as they were inefficient which leads towards errors and delays. It main was to design and implement a well-structured database to address these challenges and enhance operational efficiency.

4.FEATURES AND FUNCTIONALITITES

There are different function and functionalities in database. Customer management was one of them it is used for tracking member details, with types, fees and booking of members. Also, record session schedules, types, fees and floor allocation was managed by session management. Booking system was used for managing bookings, both prepaid and non-paid bookings. Staff session based on roles like counter, maintenance, café was assigned according to staff assignments. Track machine and console usage per session was used for machine and console allocation. Session bookings, customer attendance and machine utilization were used for reporting.

5.SCOPE OF PROJECT

To manage all aspects of customer service from session booking to traffic staff roles and machine usage for database system for the video game parlour. This project mainly focused on design of relational database for storing all data efficiently as well as development of SQL queries for performing CURD (create, read, update and delete) operation in database.

6.DEVELOPMENT METHODOLODY

At first, normalization was used for minimizing data redundancy. 1NF was done for removing atomicity as well as one primary key in each table. Duplicate row and column were also removed in 1NF. Each column and row must contain one value was also ensured. In 2NF, parital dependency is removed by making all non-key attributes must fully be dependent on a primary key. In 3NF, transitive dependency by making all non-prime attribute is dependent on another non-prime attribute. After that, designing tool like visual paradigm was used for ER diagram. DBMS (Data base management system) was used for creating and managing the database in structured way. SQL programming languages was used for inserting data, updating, deleting as well as data manipulation.

7.DESING ARCHITECUTRE

7.1 NORMALIZATION

Process of data organization to reduce data redundancy and improving integrity of data which involves divides large tables into small ones and defining relationships between them. It helps in reducing repeating data well as making storage and retrieval more efficiently. Moreover, it’s aim

was to keep consistent and remove data irregularities for making information formatted and structured (Tomar, n.d.). Types of normalization was discussed below:

1.1NF (First normal form)

Here, table was made unique as well as no repetition of groups of data was checked. Here, each entry has a unique identifier called as primary key.

2. 2NF (Second normal form)

All non-key attributes are functionally dependent on primary key as well as non-key attributes fully functionally dependent on primary key.

3. 3NF (Third normal form)

Here, transitive functionality was checked. Every non-principal column should be non-transitively dependent on each key within the table.

Then, 1NF of given question was done and nothing was changed.

Session fees						
Session_id	Session_day	Start_time	End_time	Session_type	Floor	Floor_price
1	SUNDAY	9:00 AM	9:00 PM	FREE	1	1500
2	SUNDAY	9:00 AM	9:00 PM	FREE	2	1000
3	SATURDAY	9:00 AM	9:00 PM	FREE	1	1500
4	FRIDAY	6:00 PM	10:00 PM	SPECIAL	2	1000
			Bigul Niraula			

Staff_Duty			
Staff_ID	Staff_Name	Session_ID*	Role
1	Sagar Aryal	1	Cafe
2	Bikesh Khagdi	1	Maintenance
3	Saroj Sapkota	1	Counter
4	Jonathan Shrestha	2	Counter
5	Rohan Chaudhary	2	Maintenance
6	Rajeev Karmacharya	2	Cafe
			Bigul Niraula

		Booking				
Booking_ID	Session_ID*	Customer_Name	Date	Member_Y/N	Fee	Prepaid_Y/N
1	1	Saanvi Bhatta	22/07/2024	Y	NA	NA
2	1	Bill Gates	22/07/2024	N	1500	N
3	1	Elon Musk	22/07/2024	Y	1000	Y
4	1	Jack Ma	25/08/2024	N	1500	N
5	2	Kamala Harris	22/07/2024	Y	1000	N
6	4	Rishi Sunak	5/7/2024	Y	1000	Y
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Arcade machines			
Machine_ID	Game	Year	Floor
23	COC	2010	1
123	GTA	2013	1
45	Spiderman	2016	2
1234	PUBG	2004	1
		Bigul Niraula	

A	B	C	D	E
Consoles_games				
1	Elden Ring: Shadow of the Erdtree	PG	Xbox 360	3
2	Final Fantasy VII Rebirth	PG	PS3	2
3	Destiny 2: The Final Shape	PG	PS2	3
4	Tekken 8	PG	PS3	2
5	Persona 3 Reload	PG	Nintendo 64	2
6	Cavern of Dreams	15	Nintendo Switch	4
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Session_Consoles			
Session_ID	Date	Console	Qty
1	22/07/2024	PS2	2
2	22/07/2024	PS3	2
			Bigul Niraula

Customers							
Customer_ID	First_Name	Surname	Address	Member_Type	Membership_Fee	Join_Date	Date_of_Birth
1	Saanvi	Bhatta	Baneshwor, Kathmandu	Standard	1500	1/1/2024	1/3/2015
2	Bill	Gates	Maitidevi, Kathmandu	Premium	20000	6/7/2024	12/10/2001
3	Elon	Musk	Putalisadak, Kathmandu	Premium	20000	28/03/2024	20/07/2003
4	Kamala	Harris	Kapan, Kathmandu	Standard	1500	5/1/2024	1/5/1973
					Bigul Niraula		

IN 2NF, tables were breakdown and 10 tables was made to reduce data partial dependency.

A	B	C	D	E	F	G
Session fees						
Session_ID	Session_Day	Start_Time	End_Time	Session_Type	Floor	Floor_Price
1	SUNDAY	9:00 AM	9:00 PM	FREE	1	1500
2	SUNDAY	9:00 AM	9:00 PM	FREE	2	1000
3	SATURDAY	9:00 AM	9:00 PM	FREE	1	1500
4	FRIDAY	6:00 PM	10:00 PM	SPECIAL	2	1000
			Bigul Niraula			

Staff_Session

Staff_ID	Session_ID
1	1
2	1
3	1
4	2
5	2
6	2
	Bigul Niraula

Staff_Details

Staff_ID	Staff_Name	Role
1	Sagar Aryal	Cafe
2	Bikesh Khagdi	Maintenance
3	Saroj Sapkota	Counter
4	Jonathan Shrestha	Counter
5	Rohan Chaudhary	Maintenance
6	Rajeev Karmacharya	Cafe
		Bigul Niraula

Session_Booking

Booking_ID	Session_ID	Date
1	1	22/07/2024
2	1	22/07/2024
3	1	22/07/2024
4	1	25/08/2024
5	2	22/07/2024
6	4	5/7/2024
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Customer_Payment

Customer_ID	Customer_Name	Member_Y/N	Fee	Prepaid_Y/N
1	Saanvi Bhatta	Y	NA	NA
2	Bill Gates	N	1500	N
3	Elon Musk	Y	1000	Y
4	Jack Ma	N	1500	N
5	Kamala Harris	Y	1000	N
6	Rishi Sunak	Y	1000	Y
		Bigul Niraula		

Arcade machines

Machine_ID	Game	Year	Floor
23	COC	2010	1
123	GTA	2013	1
45	Spiderman	2016	2
1234	PUBG	2004	1
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Games

Game_ID	Game_Name	PEGI
1	Elden Ring: Shadow of the Erdtree	PG
2	Final Fantasy VII Rebirth	PG
3	Destiny 2: The Final Shape	PG
4	Tekken 8	PG
5	Persona 3 Reload	PG
6	Cavern of Dreams	15
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Console_Quantity

CONSOLE_NAME	CONSOLE_QTY
XBOX 360	3
PS3	2
PS2	3
NINTENDO 64	2
NINTENDO SWITCH	4
Bigul Niraula	

Session_Consoles

Session_ID	Date	Console	Qty
1	22/07/2024	PS2	2
2	22/07/2024	PS3	2
	Bigul Niraula		

Customers

Customer_ID	First_Name	Surname	Address	Member_Type	Membership_Fee	Join_Date	Date_of_Birth
1	Saanvi	Bhatta	Baneshwor, Kathmandu	Standard	1500	1/1/2024	1/3/2015
2	Bill	Gates	Maitidevi, Kathmandu	Premium	20000	6/7/2024	12/10/2001
3	Elon	Musk	Putalisadak, Kathmandu	Premium	20000	28/03/2024	20/07/2003
4	Kamala	Harris	Kapan, Kathmandu	Standard	1500	5/1/2024	1/5/1973
			Bigul Niraula				

After that, 3NF was done to non-prime attribute dependent on another non-prime attribute.

Session_fees

Session_ID	Session_Day	Start_Time	End_Time	Session_Type	Floor	Floor_Price
1	SUNDAY	9:00 AM	9:00 PM	FREE	1	1500
2	SUNDAY	9:00 AM	9:00 PM	FREE	2	1000
3	SATURDAY	9:00 AM	9:00 PM	FREE	1	1500
4	FRIDAY	6:00 PM	10:00 PM	SPECIAL	2	1000
		Bigul Niraula				

Staff_Session

Staff_ID	Session_ID
1	1
2	1
3	1
4	2
5	2
6	2
	Bigul Niraula

Staff_Details

Staff_ID	Staff_Name	Role
1	Sagar Aryal	Cafe
2	Bikesh Khagdi	Maintenance
3	Saroj Sapkota	Counter
4	Jonathan Shrestha	Counter
5	Rohan Chaudhary	Maintenance
6	Rajeev Karmacharya	Cafe
	Bigul Niraula	

Session_Booking

Booking_ID	Session_ID	Date
1	1	22/07/2024
2	1	22/07/2024
3	1	22/07/2024
4	1	25/08/2024
5	2	22/07/2024
6	4	5/7/2024
	Bigul Niraula	

Customer_Payment

Customer_ID	Fee	Prepaid_Y/N
1	NA	NA
2	1500	N
3	1000	Y
5	1500	N
4	1000	N
6	1000	Y
	Bigul Niraula	

Arcade machines			
Machine_ID	Game	Year	Floor
23	COC	2010	1
123	GTA	2013	1
45	Spiderman	2016	2
1234	PUBG	2004	1
	Bigul Niraula		

Games		
Game_ID	Game_Name	PEGI
1	Elden Ring: Shadow of the Erdtree	PG
2	Final Fantasy VII Rebirth	PG
3	Destiny 2: The Final Shape	PG
4	Tekken 8	PG
5	Persona 3 Reload	PG
6	Cavern of Dreams	15
	Bigul Niraula	

Console_Quantity	
CONSOLE_NAME	CONSOLE_QTY
XBOX 360	3
PS3	2
PS2	3
NINTENDO 64	2
NINTENDO SWITCH	4
Bigul Niraula	

Session_Consoles			
Session_ID	Date	Console	Qty
1	22/07/2024	PS2	2
2	22/07/2024	PS3	2
	Bigul Niraula		

Customers					
CUSTOMER_ID	FIRST_NAME	SURNAME	ADDRESS	JOIN_DATE	DATE_OF_BIRTH
1	SAANVI	BHATTA	BANESHWOR, KATHMANDU	1/1/2024	1/3/2015
2	BILL	GATES	MAITIDEVI, KATHMANDU	6/7/2024	12/10/2001
3	ELON	MUSK	PUTALISADAK, KATHMANDU	28/03/2024	20/07/2003
4	KAMALA	HARRIS	KAPAN, KATHMANDU	5/1/2024	1/5/1973
		Bigul Niraula			

Membership fee		
CUSTOMER_ID	MEMBER_TYPE	MEMBERSHIP_FEE
C1	STANDARD	RS 1500
C2	PREMIUM	RS 20000
C3	PREMIUM	RS 20000
C4	STANDARD	RS 1500
C5	STANDARD	RS 1500
C6	PREMIUM	RS 20000
	Bigul Niraula	

At first every table was on 1NF so nothing was changed.

7.2 ER -DIAgram

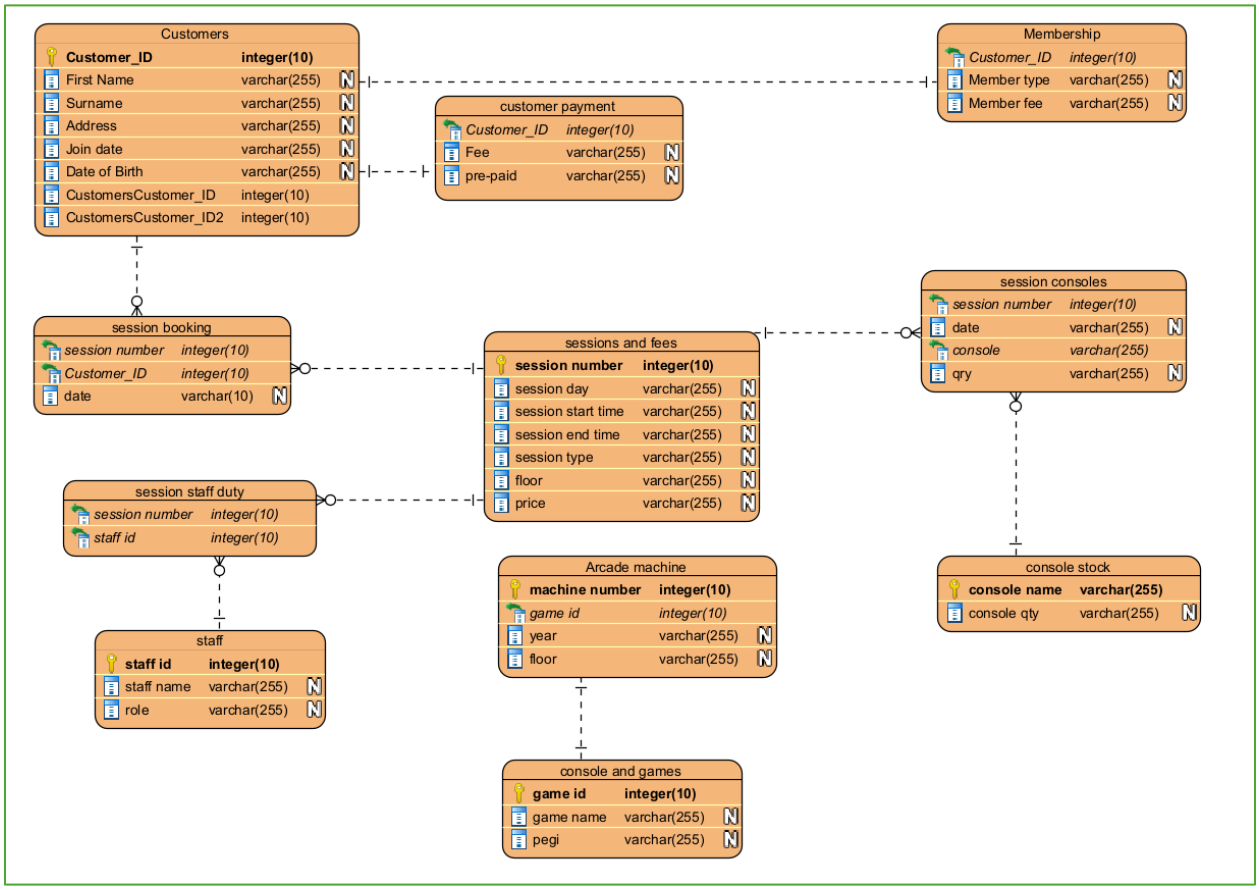

Figure 3:dia

7.3 dictionary of data

7.4 Creating data and data insert

```sql
CREATE DATABASE VideoGameParlour;
USE VideoGameParlour;
CREATE TABLE CUSTOMERS (
    CUSTOMER_ID INT PRIMARY KEY,
    FIRST_NAME VARCHAR(50) NOT NULL,
    SURNAME VARCHAR(50) NOT NULL,
    ADDRESS VARCHAR(255) NOT NULL,
    JOIN_DATE DATE NOT NULL,
    DATE_OF_BIRTH DATE NOT NULL
);
CREATE TABLE MEMBERSHIP (
    CUSTOMER_ID INT PRIMARY KEY,
    MEMBER_TYPE VARCHAR(20) CHECK (MEMBER_TYPE IN ('STANDARD', 'PREMIUM')),
    MEMBERSHIP_FEE DECIMAL(10,2) NOT NULL,
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMERS(CUSTOMER_ID) ON DELETE CASCADE
);


CREATE TABLE SESSIONS (
    SESSION_NUMBER INT PRIMARY KEY,
    SESSION_DAY VARCHAR(20) NOT NULL,
    SESSION_START_TIME TIME NOT NULL,
    SESSION_END_TIME TIME NOT NULL,
    SESSION_TYPE VARCHAR(20) NOT NULL,
    FLOOR INT CHECK (FLOOR >= 1),
    PRICE DECIMAL(10,2) NOT NULL
);


CREATE TABLE SESSION_BOOKINGS (
```

```
    SESSION_NUMBER INT,
    CUSTOMER_ID INT,
    DATE DATE NOT NULL,
    PRIMARY KEY (SESSION_NUMBER, CUSTOMER_ID),
    FOREIGN KEY (SESSION_NUMBER) REFERENCES SESSIONS(SESSION_NUMBER) ON DELETE CASCADE,
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMERS(CUSTOMER_ID) ON DELETE CASCADE
);


CREATE TABLE CUSTOMER_PAYMENT (
    CUSTOMER_ID INT PRIMARY KEY,
    FEE DECIMAL(10,2) NOT NULL,
    PRE_PAID_YN CHAR(1) CHECK (PRE_PAID_YN IN ('Y', 'N')),
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMERS(CUSTOMER_ID) ON DELETE CASCADE
);
```

```
    FEE DECIMAL(10,2) NOT NULL,
    PRE_PAID_YN CHAR(1) CHECK (PRE_PAID_YN IN ('Y', 'N')),
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMERS(CUSTOMER_ID) ON DELETE CASCADE
);


CREATE TABLE STAFF (
    STAFF_ID VARCHAR(10) PRIMARY KEY,
    STAFF_NAME VARCHAR(100) NOT NULL,
    ROLE VARCHAR(50) NOT NULL
);


CREATE TABLE SESSION_STAFF (
    SESSION_NUMBER INT,
```

```
   STAFF_ID VARCHAR(10),
   PRIMARY KEY (SESSION_NUMBER, STAFF_ID),
   FOREIGN KEY (SESSION_NUMBER) REFERENCES SESSIONS(SESSION_NUMBER) ON DELETE CASCADE,
   FOREIGN KEY (STAFF_ID) REFERENCES STAFF(STAFF_ID) ON DELETE CASCADE
);


CREATE TABLE MACHINE (
   MACHINE_NUMBER INT PRIMARY KEY,
   GAME_ID INT NOT NULL,
   YEAR INT NOT NULL,
   FLOOR INT NOT NULL
);
```

```sql
CREATE TABLE GAMES (
    GAME_ID INT PRIMARY KEY,
    GAME_NAME VARCHAR(100) NOT NULL,
    PEGI VARCHAR(10) NOT NULL
);

CREATE TABLE CONSOLE_STOCK (
    CONSOLE_NAME VARCHAR(50) PRIMARY KEY,
    CONSOLE_QTY INT NOT NULL
);
CREATE TABLE SESSION_CONSOLES (
    SESSION_NUMBER INT,
    DATE DATE NOT NULL,
    CONSOLE VARCHAR(50),
    QTY INT NOT NULL,
```

```sql
INSERT INTO CUSTOMERS VALUES
(1, 'SAANVI', 'BHATTA', 'BANESHWOR, KATHMANDU', '2024-01-01', '2015-03-01'),
(2, 'BILL', 'GATES', 'MAITIDEVI, KATHMANDU', '2024-07-06', '2001-10-12'),
(3, 'ELON', 'MUSK', 'PUTALISADAK, KATHMANDU', '2024-03-28', '2003-07-20');

INSERT INTO MEMBERSHIP VALUES
(1, 'STANDARD', 1500),
(2, 'PREMIUM', 20000),
(3, 'PREMIUM', 20000);


INSERT INTO SESSIONS VALUES
(1, 'SUNDAY', '09:00:00', '21:00:00', 'FREE', 1, 1500),
(2, 'SUNDAY', '09:00:00', '21:00:00', 'FREE', 2, 1000);
```

```
103
104 INSERT INTO SESSIONS VALUES
105 (1, 'SUNDAY', '09:00:00', '21:00:00', 'FREE', 1, 1500),
106 (2, 'SUNDAY', '09:00:00', '21:00:00', 'FREE', 2, 1000);
107
108
109 INSERT INTO SESSION_BOOKINGS VALUES
110 (1, 1, '2024-07-22'),
111 (1, 2, '2024-07-22');
112
113
114 INSERT INTO CUSTOMER_PAYMENT VALUES
115 (1, 1500, 'N'),
116 (2, 20000, 'Y');
```

```
114 INSERT INTO CUSTOMER_PAYMENT VALUES
115 (1, 1500, 'N'),
116 (2, 20000, 'Y');
117
118
119 INSERT INTO STAFF VALUES
120 ('S1', 'SAGAR ARYAL', 'CAFE'),
121 ('S2', 'BIKESH KHAGDI', 'MAINTENANCE');
122
123
124 INSERT INTO SESSION_STAFF VALUES
125 (1, 'S1'),
126 (1, 'S2');
127
```

```
128
129 INSERT INTO MACHINE VALUES
130 (23, 1, 2010, 1),
131 (123, 2, 2013, 1);
132
133
134 INSERT INTO GAMES VALUES
135 (1, 'ELDEN RING: SHADOW OF THE ERDTREE', 'PG'),
136 (2, 'FINAL FANTASY VII REBIRTH', 'PG');
137
```

```
138
139 INSERT INTO CONSOLE_STOCK VALUES
140 ('XBOX 360', 3),
141 ('PS3', 2);
142
143
144 INSERT INTO SESSION_CONSOLES VALUES
145 (1, '2024-07-22', 'PS3', 2);
146
147
```

Table	Action	Rows	Type	Collation	Size	Overhead
console_stock	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
customers	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KiB	-
customer_payment	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
games	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
machine	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
membership	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KiB	-
sessions	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
session_bookings	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	32.0 KiB	-
session_consoles	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	32.0 KiB	-
session_staff	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	32.0 KiB	-
staff	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
11 tables	Sum	23	InnoDB	utf8mb4_general_ci	224.0 KiB	0 B

7.5 Database queries

```
use videogameparlour;
SELECT C.CUSTOMER_ID, C.FIRST_NAME, C.SURNAME
FROM CUSTOMERS C
JOIN SESSION_BOOKINGS SB ON C.CUSTOMER_ID = SB.CUSTOMER_ID
JOIN CUSTOMER_PAYMENT CP ON C.CUSTOMER_ID = CP.CUSTOMER_ID
WHERE SB.SESSION_NUMBER = 1 AND CP.PRE_PAID_YN = 'N';
```

CUSTOMER_ID	FIRST_NAME	SURNAME
1	SAANVI	BHATTA

```
use videogameparlour;
SELECT MACHINE_NUMBER, GAME_ID, YEAR, FLOOR
FROM MACHINE
WHERE FLOOR = 1
ORDER BY MACHINE_NUMBER DESC;
```

	MACHINE_NUMBER ▼ 1	GAME_ID	YEAR	FLOOR
Edit Copy Delete	123	2	2013	1
Edit Copy Delete	23	1	2010	1

```sql
use videogameparlour;
SELECT COUNT(*) AS Total_Games
FROM SESSION_CONSOLES
WHERE CONSOLE = 'PS3';
SELECT S.STAFF_ID, S.STAFF_NAME, S.ROLE
FROM STAFF S
JOIN SESSION_STAFF SS ON S.STAFF_ID = SS.STAFF_ID
WHERE SS.SESSION_NUMBER = 1 AND S.ROLE = 'MAINTENANCE';
UPDATE MACHINE
SET FLOOR = 2
WHERE GAME_ID = (SELECT GAME_ID FROM GAMES WHERE GAME_NAME = 'PUBG');
DELETE FROM MACHINE
WHERE GAME_ID = (SELECT GAME_ID FROM GAMES WHERE GAME_NAME = 'GTA');

```

Your SQL query has been executed successfully.

```sql
SELECT COUNT(*) AS Total_Games FROM SESSION_CONSOLES WHERE CONSOLE = 'PS3';
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Extra options

Total_Games
1

STAFF_ID	STAFF_NAME	ROLE
S2	BIKESH KHAGDI	MAINTENANCE

8.VERSION CONTROL

Github = https://github.com/becool1321/2nd-sem-web-cw2.git

Youtube = https://youtu.be/jUwg1vBfD6Q

CONCLUSION

Overall, this database system provides systematic solution for managing different types of operations in video game parlour like ensuring data integrity, efficiency as well as improvement in scalability. Also, normalization and SQL queries was implemented for data storage and retrieval process in the system of database which made smoothness for customer bookings, assignment of staff, details of different session and equipment usage. It not only meets current need but also support its scalability for future. For enhancing in efficient operations as well as customers service and contributing overall success of business this database was successful implemented.

References

Tomar, N. (n.d.). Normalization and its Types. https://www.c-sharpcorner.com/uploadfile/nipuntomar/normalization-and-its-types/