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# 1. Business description

## 1.1 Problem domain definition

The goal of this paper is to introduce a database that meets the needs of an online video game digital distribution service store. The database should be able to store all information in proper format, construct associated relationships, ready to be accessed and modified at any time.

# 2. Requirements

## 2.1 Customer

Each customer has an unique ID, first name, last name, address, city, state and zip code.

Each customer can have 0 to many accounts.

## 2.2 Account

Each account has an unique email, username, password and balance.

Each account can make 0 to many payments. Each account can only have 1 owner. Each account can only have 1 friend list. Each account can do 0 to many rating surveys.

## 2.3 Payment

Each payment has an unique ID, date, subtotal, status. Tax and total information can be obtained from stored data.

Each payment can only be made by 1 account. Each payment can only buy 1 game.

## 2.4 Game

Each game has an unique ID, title, size, style and publish date.

Each game can have 0 to many player status. Each game can have 0 to many game achievements.

## 2.5 PlayerStatus

Each player status has an unique ID, description and data.

Each player status can only be added to 1 game.

## 2.6 Rating

Each rating has an unique ID, game name and satisfaction feedback.

Each rating survey can only be rated once.

## 2.7 GameAchievement

Each game achievement has an unique ID, title, description and status.

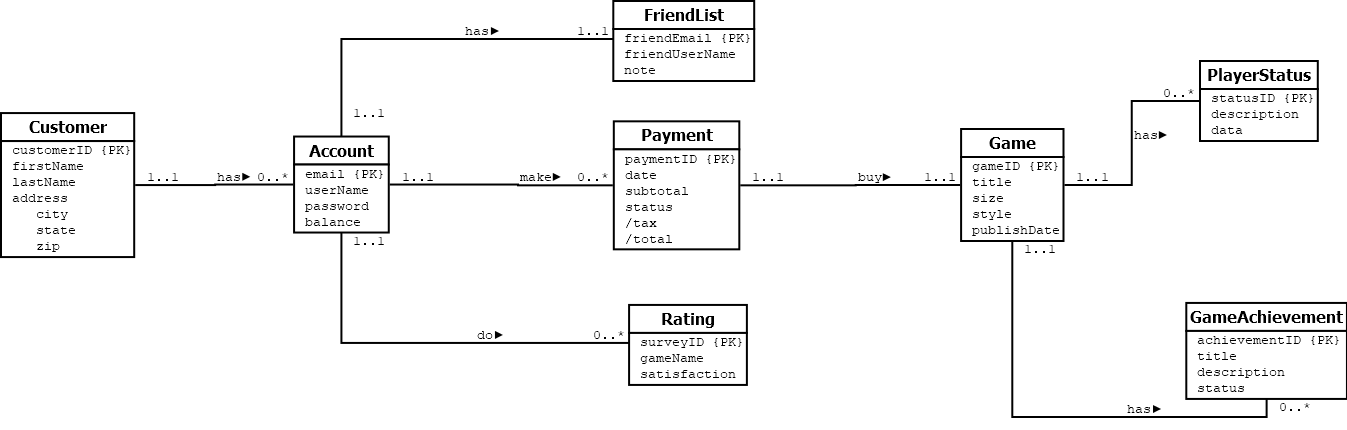
Each game achievement can only be obtained by 1 account.

## 2.8 FriendList

Each friend list has an unique email, username and note.

Each friend list can only be obtained by 1 account.

# 3. ER Model



# 4. Database Schema

Customer(customerID, firstName, lastName, address, addressCity, addressState, addressZip)

Account(email, userName, password, balance, owner)

FriendList(friendEmail, friendUserName, note, belonging)

Payment(paymentID, date, subtotal, status, payer)

Rating(surveyID, gameName, satisfaction, rater)

Game(gameID, title, size, style, publishDate, account)

PlayerStatus(statusID, description, data, gamer)

GameAchievement(achievementID, title, description, status, gamer)

# 5. Data Dictionary

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Customer: Contains information about the customer who registered online video game digital distribution service store. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| CustomerID | Customer id number | Char(9) | 000000000-999999999 | No | Yes | No |
| FirstName | Customer first name | Varchar2(25) | All | No | No | No |
| LastName | Customer last name | Varchar2(25) | All | No | No | No |
| Address | Customer address | Varchar2(50) | All | No | No | No |
| AddressCity | Customer address city | Varchar2(25) | All | No | No | No |
| AddressState | Customer address state | Varchar2(25) | All | No | No | No |
| AddressZip | Customer address zip code | Char(5) | 00000-99999 | No | No | No |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CustomerAccount: Contains information about the customer account. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| Email | Account email | Varchar2(25) | All | No | Yes | No |
| UserName | Account username | Varchar2(25) | All | No | No | No |
| Pwd | Account password | Varchar2(25) | All | No | No | No |
| Balance | Account remaining balance | Number(9,2) | 0000000.00-9999999.00 | No | No | No |
| AccountOwner | Account owner | Char(9) | 000000000-99999999 | No | No | Yes |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| FriendList: Contains information about friends of an account. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| FriendEmail | Email address of the friend | Varchar2(25) | All | No | Yes | No |
| FriendUserName | User name of the friend | Varchar2(25) | All | No | No | No |
| Note | Friend note | Varchar2(50) | All | No | No | No |
| Belonging | Belongs to the account | Varchar2(25) | All | No | No | Yes |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Payment: Contains information about payment transaction | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| PaymentID | Payment id number | Char(9) | 00000000-999999999 | No | Yes | No |
| Paydate | Payment date | Date | >1/1/1900 | No | No | No |
| Subtotal | Payment subtotal | Number(9,2) | 000000.00-999999.99 | No | No | No |
| Status | Payment status | Varchar2(25) | All | No | No | No |
| Payer | Payer | Varchar2(25) | All | No | No | Yes |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rating: Contains information about the rating survey data. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| SurveyID | Survey id number | Varchar2(25) | All | No | Yes | No |
| GameName | Game name | Varchar2(25) | All | No | No | No |
| Satisfaction | Client satisfaction | Number(2,1) | 0.0-10.0 | No | No | No |
| Rater | Rater of the survey | Varchar2(25) | All | No | No | Yes |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Game: Contains information about the game. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| GameID | Game id number | Char(9) | 000000000-999999999 | No | Yes | No |
| Title | Game title | Varchar2(25) | All | No | No | No |
| InstallSize | Game size | Varchar2(25) | All | No | No | No |
| GameStyle | Game style | Varchar2(25) | All | No | No | No |
| PublishDate | Game publish date | Date | >1/1/1900 | No | No | No |
| GameOrder | Payment id number | Char(9) | 00000000-999999999 | No | No | Yes |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PlayerStatus: Contains information about player’s game performance status. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| StatusID | Status id | Char(9) | 000000000-999999999 | No | Yes | No |
| StatusDescription | Status description | Varchar2(50) | All | No | No | No |
| PlayerData | Status recorded data | Varchar2(25) | All | No | No | No |
| Gamer | Game information | Char(9) | 000000000-999999999 | No | No | Yes |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| GameAchievement: Contains information about game achievement systems. | | | | | | |
| Attribute Name | Description | Datatype | Domain | Nullable | PK | FK |
| AchievementID | Achievement id number | Char(9) | 000000000-999999999 | No | Yes | No |
| Title | Achievement title | Varchar2(25) | All | No | No | No |
| AchievementDescription | Achievement description | Varchar2(50) | All | No | No | No |
| AchievementStatus | Achievement status | Varchar2(25) | All | No | No | No |
| Gamer | Game information | Char(9) | 000000000-999999999 | No | No | Yes |

# 6. DDL

Create TABLE Customer

(

CustomerID CHAR(9) CONSTRAINT customer\_pk PRIMARY KEY,

FirstName VARCHAR2(25) NOT NULL,

LastName VARCHAR2(25) NOT NULL,

Address VARCHAR2(50) NOT NULL,

AddressCity VARCHAR2(25) NOT NULL,

AddressState VARCHAR2(25) NOT NULL,

AddressZip CHAR(5) NOT NULL

);

Create TABLE CustomerAccount

(

Email VARCHAR2(25) CONSTRAINT customerAccount\_pk PRIMARY KEY,

UserName VARCHAR2(25) NOT NULL,

Pwd VARCHAR2(25) NOT NULL,

Balance NUMBER(9,2) NOT NULL,

AccountOwner CHAR(9) NOT NULL CONSTRAINT customerAccount\_fk\_customer REFERENCES Customer(CustomerID)

);

Create TABLE FriendList

(

FriendEmail VARCHAR2(25) CONSTRAINT friendList\_pk PRIMARY KEY,

FriendUserName VARCHAR2(25) NOT NULL,

Note VARCHAR2(50) NOT NULL,

Belonging VARCHAR2(25) NOT NULL CONSTRAINT friendList\_fk\_customerAccount REFERENCES CustomerAccount(Email)

);

Create TABLE Payment

(

PaymentID CHAR(9) CONSTRAINT payment\_pk PRIMARY KEY,

Paydate DATE NOT NULL,

Subtotal NUMBER(9,2) NOT NULL,

Status VARCHAR2(25) NOT NULL,

Payer VARCHAR2(25) NOT NULL CONSTRAINT payment\_fk\_customerAccount REFERENCES CustomerAccount(Email)

);

Create TABLE Rating

(

SurveyID CHAR(9) CONSTRAINT rating\_pk PRIMARY KEY,

GameName VARCHAR2(25) NOT NULL,

Satisfaction NUMBER(2,1) NOT NULL,

Rater VARCHAR2(25) NOT NULL CONSTRAINT rating\_fk\_customerAccount REFERENCES CustomerAccount(Email)

);

Create TABLE Game

(

GameID CHAR(9) CONSTRAINT game\_pk PRIMARY KEY,

Title VARCHAR2(25) NOT NULL,

InstallSize VARCHAR2(25) NOT NULL,

GameStyle VARCHAR2(25) NOT NULL,

PublishDate Date NOT NULL,

GameOrder CHAR(9) NOT NULL CONSTRAINT game\_fk\_payment REFERENCES Payment(PaymentID)

);

Create TABLE PlayerStatus

(

StatusID CHAR(9) CONSTRAINT status\_pk PRIMARY KEY,

StatusDescription VARCHAR2(50) NOT NULL,

PlayerData VARCHAR2(25) NOT NULL,

Gamer CHAR(9) NOT NULL CONSTRAINT ststus\_fk\_game REFERENCES Game(GameID)

);

Create TABLE GameAchievement

(

AchievementID CHAR(9) CONSTRAINT achievement\_pk PRIMARY KEY,

Title VARCHAR2(25) NOT NULL,

AchievementDescription VARCHAR2(50) NOT NULL,

AchievementStatus VARCHAR2(25) NOT NULL,

Gamer CHAR(9) NOT NULL CONSTRAINT achievement\_fk\_game REFERENCES Game(GameID)

);

# 7. DML

INSERT INTO Customer (CustomerID, FirstName, LastName, Address, AddressCity, AddressState, AddressZip)

VALUES ('000000561', 'Alex','Bob','3122 Wood Street', 'Philadelphia', 'PA', '19112');

INSERT INTO Customer (CustomerID, FirstName, LastName, Address, AddressCity, AddressState, AddressZip)

VALUES ('000006666', 'Charlie','David','113 North Garden Street', 'Philadelphia', 'PA', '16775');

INSERT INTO Customer (CustomerID, FirstName, LastName, Address, AddressCity, AddressState, AddressZip)

VALUES ('000666661', 'Eason','Frank','956 Forest Street', 'Chicago', 'IL', '60666');

INSERT INTO CustomerAccount (Email, UserName, Pwd, Balance, AccountOwner)

VALUES ('a1@gmail.com', 'a1','aaa111','26.61', '000000561');

INSERT INTO CustomerAccount (Email, UserName, Pwd, Balance, AccountOwner)

VALUES ('bbb2@gmail.com', 'bbb2','bbb2222222222bbb','6626.61', '000006666');

INSERT INTO CustomerAccount (Email, UserName, Pwd, Balance, AccountOwner)

VALUES ('cc3@hotmail.com', 'cc3','ccc33333333ccc','0.61', '000666661');

INSERT INTO FriendList (FriendEmail, FriendUserName, Note, Belonging)

VALUES ('fa1@gmail.com', 'fa1','Friend of mine', 'a1@gmail.com');

INSERT INTO FriendList (FriendEmail, FriendUserName, Note, Belonging)

VALUES ('fa2@gmail.com', 'fa2','Friend of A', 'bbb2@gmail.com');

INSERT INTO FriendList (FriendEmail, FriendUserName, Note, Belonging)

VALUES ('fa3@gmail.com', 'fa3','Friend of B', 'cc3@hotmail.com');

INSERT INTO Payment (PaymentID, Paydate, Subtotal, Status, Payer)

VALUES ('000000001', '01-MAR-2008','5645.48', 'Completed', 'a1@gmail.com');

INSERT INTO Payment (PaymentID, Paydate, Subtotal, Status, Payer)

VALUES ('000000341', '29-JUN-2010','82.52', 'Completed', 'bbb2@gmail.com');

INSERT INTO Payment (PaymentID, Paydate, Subtotal, Status, Payer)

VALUES ('000066661', '27-AUG-2020','1.96', 'Pending', 'cc3@hotmail.com');

INSERT INTO Rating (SurveyID, GameName, Satisfaction, Rater)

VALUES ('1A5121682', 'Super Mario','9.9', 'a1@gmail.com');

INSERT INTO Rating (SurveyID, GameName, Satisfaction, Rater)

VALUES ('2A5122186', 'Super Mario','9.3', 'bbb2@gmail.com');

INSERT INTO Rating (SurveyID, GameName, Satisfaction, Rater)

VALUES ('3B5129684', 'World of Warcraft','9.6', 'cc3@hotmail.com');

INSERT INTO Game (GameID, Title, InstallSize, GameStyle, PublishDate, GameOrder)

VALUES ('000000001', 'Super Mario','50MB', 'Casual', '06-MAY-1996', '000000001');

INSERT INTO Game (GameID, Title, InstallSize, GameStyle, PublishDate, GameOrder)

VALUES ('000000026', 'World of Warcraft','61GB', 'MMORPG', '16-JAN-2000', '000000341');

INSERT INTO Game (GameID, Title, InstallSize, GameStyle, PublishDate, GameOrder)

VALUES ('000000661', 'Cyberpunk','200GB', 'RPG', '06-MAY-2020', '000066661');

INSERT INTO PlayerStatus (StatusID, StatusDescription, PlayerData, Gamer)

VALUES ('000000001', 'Jumped times','853', '000000001');

INSERT INTO PlayerStatus (StatusID, StatusDescription, PlayerData, Gamer)

VALUES ('000000006', 'Rabbit killed','561', '000000026');

INSERT INTO PlayerStatus (StatusID, StatusDescription, PlayerData, Gamer)

VALUES ('000000009', 'Money earned','$19542623', '000000661');

INSERT INTO GameAchievement (AchievementID, Title, AchievementDescription, AchievementStatus, Gamer)

VALUES ('000000001', ' Winner!','Arrive the destination', 'Completed', '000000001');

INSERT INTO GameAchievement (AchievementID, Title, AchievementDescription, AchievementStatus, Gamer)

VALUES ('000000055', ' Rabbit killer','Kill 1000 rabbits', 'In progress', '000000026');

INSERT INTO GameAchievement (AchievementID, Title, AchievementDescription, AchievementStatus, Gamer)

VALUES ('000000166', ' Hunter! Ready!','Pick up a sniper rifle', 'In progress', '000000661');

# 8. Queries

1. Show all customer’s names(first name and last name) and account balance.

SELECT FirstName, LastName, Balance FROM Customer, CustomerAccount WHERE Customer.CustomerID = CustomerAccount.AccountOwner;

Output:

FIRSTNAME LASTNAME BALANCE

------------------------- ------------------------- ----------

Alex Bob 26.61

Charlie David 6662.61

Eason Frank .61

1. Show all completed payments, with the account's email and username.

SELECT PaymentID, PayDate,Subtotal, Status, Email, Username FROM Payment, CustomerAccount WHERE Status = 'Completed' AND Payment.Payer = CustomerAccount.Email;

Output:

PAYMENTID PAYDATE SUBTOTAL STATUS EMAIL USERNAME

--------- --------- ---------- ------------------------- ------------------------- -------------------------

000000001 01-MAR-08 5645.48 Completed a1@gmail.com a1

000000341 29-JUN-10 82.52 Completed bbb2@gmail.com bbb2

1. Show all games that are published after 2000.

SELECT \* FROM Game WHERE PublishDate > '01-JAN-2000';

Output:

GAMEID TITLE INSTALLSIZE GAMESTYLE PUBLISHDA GAMEORDER

--------- ------------------------- ------------------------- ------------------------- --------- ---------

000000026 World of Warcraft 61GB MMORPG 16-JAN-00 000000341

000000661 Cyberpunk 200GB RPG 06-MAY-20 000066661

1. Show all ‘In progress’ game achievements, with the game title.

SELECT AchievementID, GameAchievement.Title, AchievementDescription, AchievementStatus, Game.Title FROM GameAchievement, Game WHERE GameAchievement.Gamer = Game.GameID AND AchievementStatus = 'In progress';

Output:

ACHIEVEMENT TITLE ACHIEVEMENTDESCRIPTION ACHIEVEMENTSTATUS TITLE

--------- ------------------------- -------------------------------------------------- ------------------------- -------------------------

000000055 Rabbit killer Kill 1000 rabbits In progress World of Warcraft

000000166 Hunter! Ready! Pick up a sniper rifle In progress Cyberpunk

1. Show all completed payments, whose subtotal is less than the average expense.

SELECT \* FROM Payment WHERE Subtotal < (SELECT AVG(Subtotal) FROM Payment);

Output:

PAYMENTID PAYDATE SUBTOTAL STATUS PAYER

--------- --------- ---------- ------------------------- -------------------------

000000341 29-JUN-10 82.52 Completed bbb2@gmail.com

000066661 27-AUG-20 1.96 Pending cc3@hotmail.com

1. Show Super Mario’s average rating, if there are any surveys exist.

SELECT GameName, AVG(Satisfaction) FROM Rating WHERE Gamename = 'Super Mario'

GROUP BY GameName;

Output:

GAMENAME AVG(SATISFACTION)

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Super Mario 9.6