

CPSC 304 Project Cover Page

Milestone #: 2

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Group Number: 13

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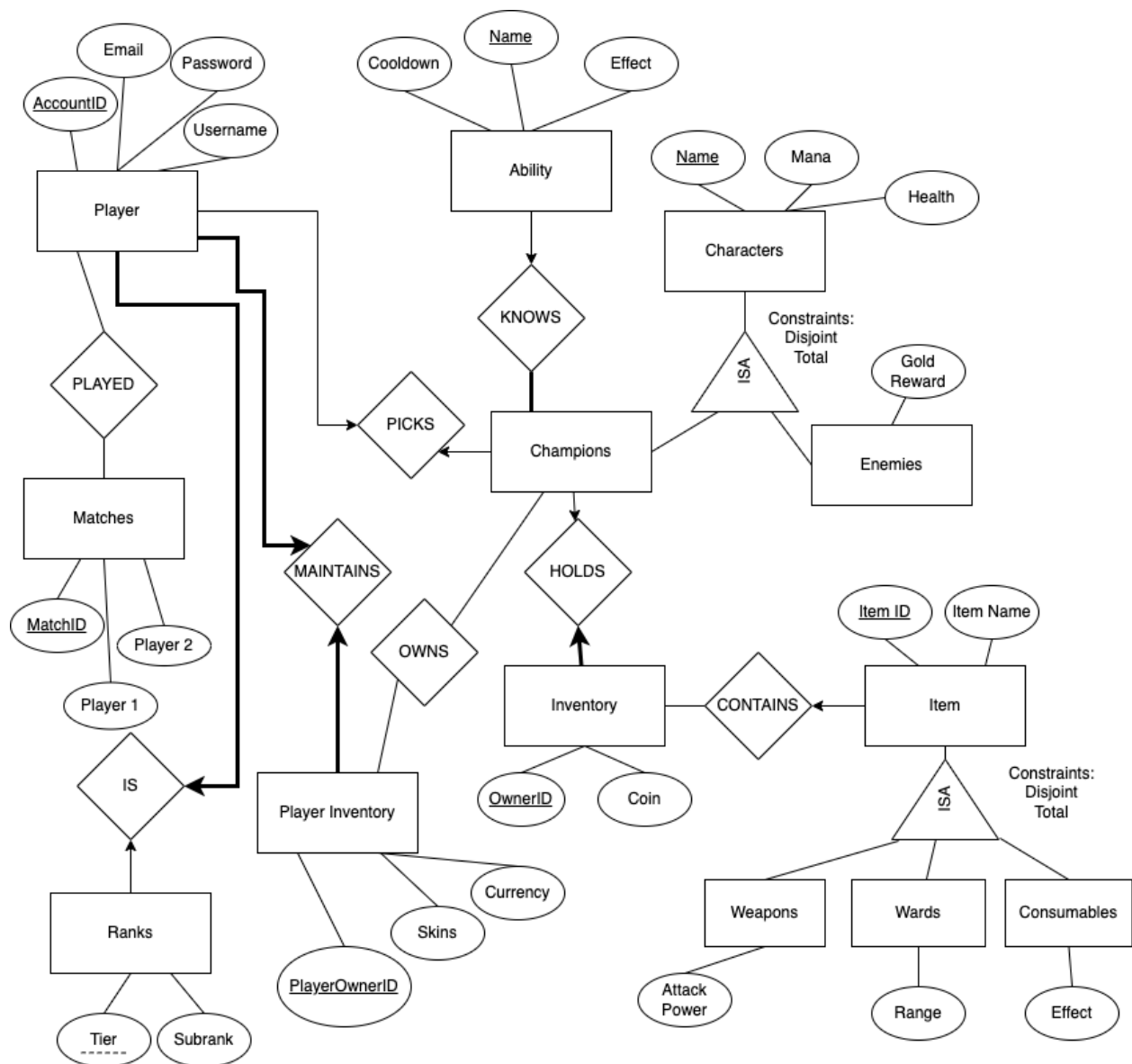
By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

2. Description:

This database stores information that is necessary for an RPG video game to function. It holds data like a player's account information, the inventory of each player, the abilities and items the player possesses, etc. This information is used by the game in order to keep track of progress throughout the duration of the game. It allows for a player to exit and enter back into the game and resume gameplay without any progress lost.

3. ER diagram:



4. Schema:

Matches(MatchID(PK): Char[20], Player1: Char[20], Player2: Char[20])

- Candidate Key(s): MatchID

Player(AccountID(PK): Char[30], Email: Char[40], Password: Char[20], Username: Char[30])

- Candidate Key(s): AccountID, Username

Picks(AccountID(PK,FK): Char[30], Champ_Name(PK,FK): Char[20])

- Candidate Key(s): AccountID, Champ_Name

PlayerInventory(PlayerOwnerID(PK):Char[20], Skins:Char[10], Currency:INTEGER, AccountID(FK): Char[30]), NOT NULL AccountID

- Candidate Key(s): PlayerOwnerID

Ranks_Is(Tier(PK): INTEGER, AccountID(PK, FK): Char[30], Subrank: Char[10])

- Candidate Key(s): Tier, AccountID

ability_knows(Name(PK): Char[30], Champ_Name(FK): Char[20], Cooldown: Char[20], Effect: Char[20]), NOT NULL Champ_Name

- Candidate Key(s): Champ_Name

Character(Name(PK): Char[20], Mana: INTEGER, Health: INTEGER)

- Candidate Key(s): Name

Champion(Name (PK, FK): Char[20])

- Candidate Key(s): Name

Enemies(Name (PK, FK): Char[20], GoldReward: INTEGER)

- Candidate Key(s): Name

Item_contains(ItemID(PK): Char[30], ItemName: Char[20], OwnerID(FK): Char[30])

- Candidate Key(s): ItemID, ItemName, OwnerID

Weapons(ItemID(FK, PK): Char[30] , AttackPower: INTEGER)

- Candidate Key(s): ItemID

Wards(ItemID(FK, PK): Char[30], Range: INTEGER)

- Candidate Key(s): ItemID

Consumables(ItemID(FK, PK): Char[30], Effect: Char[50])

- Candidate Key(s): ItemID

Inventory_holds(OwnerID(PK): Char[30], Coin: INTEGER, Name:(FK): Char[20])

- Candidate Key(s): OwnerID, Name

Owns(PlayerOwnerID(FK, PK): Char[30] , Champ_Name(PK, FK): Char[30])

- Candidate Key(s): PlayerOwnerID, Champ_Name

5. Functional Dependencies:

Matches(MatchID, Player1, Player2)

- MatchID -> Player1, Player2

Player(AccountID, Email, Password, Username)

- AccountID -> Email, Password, Username
- Username -> Email, Password, AccountID
- AccountID -> MatchID

Picks(AccountID, Champ_Name)

- Champ_Name -> AccountID
- AccountID -> Champ_Name

PlayerInventory(PlayerOwnerID, Skins, Currency, AccountID)

- PlayerOwnerID -> Skins, Currency, AccountID
- Currency -> Subrank

Ranks_Is(Tier, AccountID, Subrank)

- Tier, AccountID -> Subrank

Ability_knows(Name, Champ_name, Cooldown, Effect)

- Name -> Champ_Name, Cooldown, Effect
- Effect -> Cooldown

Character(Name, Mana, Health)

- Name -> Mana, Health
- Name -> ItemID
- Health -> Mana

Enemies(Name, GoldReward)

- Name -> GoldReward

Item_Contains(ItemID, ItemName, OwnerID)

- ItemID -> ItemName, OwnerID

Weapons(ItemID, AttackPower)

- ItemID -> AttackPower

Wards(ItemID, Range)

- ItemID -> Range

Consumables(ItemID, Effect)

- ItemID -> Effect

Inventory_holds(OwnerID, Coin, Name)

- OwnerID -> Coin, Name

Owms(PlayerOwnerID, Champ_Name)

- PlayerOwnerID -> Champ_Name
- Champ_Name -> PlayerOwnerID

6. Normalization (We decompose each into BCNF)

1. PlayerInventory(PlayerOwnerID, Skins, Currency)

- PlayerOwnerID -> Skins, Currency
- Currency -> Subrank

Since, Currency is not a superkey then it is not in BCNF. Thus, we decompose starting with the FD: Currency -> Subrank.

PlayerInventory_1(PlayerOwnerID, Skins, Currency), PlayerInventory_2(Currency, Subrank) (**BCNF**)

2. Ability_knows(Name, Champ_Name, Cooldown, Effect)

- Name -> Champ_Name, Cooldown, Effect
- Effect -> Cooldown

Since, Effect is not a superkey then it is not in BCNF. Thus, we decompose starting with the FD: Effect -> Cooldown

Ability_Knows_1(Name, Champ_Name, Effect), Ability_Knows_2(Effect, Cooldown) (**BCNF**)

3. Character(Name, Mana, Health)

- Name -> Mana, Health
- Name -> ItemID
- Health -> Mana

Since, Health is not a superkey then it is not in BCNF. Thus, we decompose starting with the FD: Health -> Mana

Character_1(Name, Health), Character_2(Health, Mana) (**BCNF**)

Tables Listed Post Normalization:

Matches(MatchID(PK): Char[20], Player1: Char[20], Player2: Char[20])

- Candidate Key(s): MatchID

Player(AccountID(PK): Char[30], Email: Char[40], Password: Char[20], Username: Char[30])

- Candidate Key(s): AccountID, Username

Picks(AccountID(PK,FK): Char[30], Champ_Name(PK,FK): Char[20])

- Candidate Key(s): AccountID, Champ_Name

PlayerInventory(PlayerOwnerID(PK):Char[20], Skins:Char[10], Currency:INTEGER, AccountID(FK): Char[30]), NOT NULL AccountID

- Candidate Key(s): PlayerOwnerID

PlayerInventory_2(Currency:INTEGER, Subrank: Char[10])

Ranks_Is(Tier(PK): INTEGER, AccountID(PK, FK): Char[30], Subrank: Char[10])

- Candidate Key(s): Tier, AccountID

ability_knows_1(Name(PK): Char[30], Champ_Name(FK): Char[20], Effect: Char[20]), NOT NULL Champ_Name

- Candidate Key(s): Champ_Name

ability_knows_2(Effect: Char[20], Cooldown: Char[20])

Character_1(Name(PK): Char[20], Health: INTEGER)

- Candidate Key(s): Name

Character_2(Health:INTEGER, Mana: INTEGER)

Champion(Name (PK, FK): Char[20])

- Candidate Key(s): Name

Enemies(Name (PK, FK): Char[20], GoldReward: INTEGER)

- Candidate Key(s): Name

Item_contains(ItemID(PK): Char[30], ItemName: Char[20], OwnerID(FK): Char[30])

- Candidate Key(s): ItemID, ItemName, OwnerID

Weapons(ItemID(FK, PK): Char[30] , AttackPower: INTEGER)

- Candidate Key(s): ItemID

Wards(ItemID(FK, PK): Char[30], Range: INTEGER)

- Candidate Key(s): ItemID

Consumables(ItemID(FK, PK): Char[30], Effect: Char[50])

- Candidate Key(s): ItemID

Inventory_holds(OwnerID(PK): Char[30], Coin: INTEGER, Name:(FK): Char[20])

- Candidate Key(s): OwnerID, Name

Owns(PlayerOwnerID(FK, PK): Char[30] , Champ_Name(PK, FK): Char[30])

- Candidate Key(s): PlayerOwnerID, Champ_Name

7. SQL for creating tables:

```
CREATE TABLE Matches (  
    MatchID CHAR(20),  
    Player1 CHAR(20),  
    Player2 CHAR(20),  
    PRIMARY KEY(MatchID),  
    FOREIGN KEY(Player1) REFERENCES Player(AccountID)  
    FOREIGN KEY(Player2) REFERENCES Player(AccountID)  
)
```

```
CREATE TABLE Player(  
    AccountID CHAR(20),  
    Email CHAR(40),  
    Password CHAR(20),  
    Username CHAR(30),  
    PRIMARY KEY(AccountID)  
)
```

```
CREATE TABLE Picks(  
    AccountID CHAR(30),  
    Champ_Name CHAR(20),  
    PRIMARY KEY (AccountID, Champ_Name)  
    FOREIGN KEY (AccountID) REFERENCES Player  
    FOREIGN KEY (Champ_Name) REFERENCES Champion  
)
```

```
CREATE TABLE PlayerInventory_1 (  
    PlayerOwnerID CHAR(20) PRIMARY KEY,  
    Skin CHAR(10),  
    Currency INTEGER,  
    AccountID CHAR(20),  
    FOREIGN KEY (AccountID) REFERENCES Player  
)
```

```
CREATE TABLE PlayerInventory_2 (  
    Currency INTEGER PRIMARY KEY,  
    Subrank CHAR(20),  
)
```

```
CREATE TABLE Ranks_Is(  
    Tier INTEGER,  
    AccountID CHAR(30),  
    Subrank Char(20),
```

```
        PRIMARY KEY (AccountID),  
        FOREIGN KEY (AccountID) REFERENCES Player  
    )
```

```
CREATE TABLE Ability_Knows_1(  
    Name CHAR(20),  
    Champ_name CHAR(20) NOT NULL,  
    Effect CHAR(20),  
    PRIMARY KEY(Name),  
    FOREIGN KEY(NAME) REFERENCES Champion  
)
```

```
CREATE TABLE Ability_Knows_2(  
    Effect CHAR(20) PRIMARY KEY,  
    Cooldown CHAR(20)  
)
```

```
CREATE TABLE Character_1(  
    Name CHAR(20),  
    Health INTEGER,  
    PRIMARY KEY (Name)  
)
```

```
CREATE TABLE Character_2(  
    Health INTEGER PRIMARY KEY,  
    Mana INTEGER  
)
```

```
CREATE TABLE Champion (  
    Name CHAR(20),  
    PRIMARY KEY(Name),  
    FOREIGN KEY(Name), REFERENCES Character  
)
```

```
CREATE TABLE Enemies (  
    Name CHAR(20),  
    Gold_reward INTEGER,  
    PRIMARY KEY(Name),  
    FOREIGN KEY(Name), REFERENCES Character  
)
```

```
CREATE TABLE Item_contains (  
    ItemID CHAR(30) PRIMARY KEY,  
    ItemName CHAR(20),
```



```

        OwnerID CHAR(30),
        FOREIGN KEY(OwnerID), REFERENCES Inventory
    )

CREATE TABLE Weapons (
    ItemID CHAR(30) PRIMARY KEY,
    AttackPower INTEGER,
    FOREIGN KEY(ItemID), REFERENCES Item_contains
)

CREATE TABLE Wards (
    ItemID CHAR(30) PRIMARY KEY,
    Range INTEGER,
    FOREIGN KEY(ItemID), REFERENCES Item_contains
)

CREATE TABLE Consumables (
    ItemID CHAR(30) PRIMARY KEY,
    Effect CHAR(50),
    FOREIGN KEY(ItemID), REFERENCES Item_contains
)

CREATE TABLE Inventory_holds (
    OwnerID CHAR(30) PRIMARY KEY,
    Coin INTEGER,
    Name CHAR(20)
    FOREIGN KEY(Name), REFERENCES Champion
)

CREATE TABLE Owns (
    PlayerOwnerID CHAR(30),
    Champ_name CHAR(30),
    PRIMARY KEY(PlayerOwnerID, Champ_name)
    FOREIGN KEY(PlayerOwnerID), REFERENCES Inventory_holds,
    FOREIGN KEY(Champ_name), REFERENCES Champion
)

```

8. INSERT Tables

```
INSERT INTO Matches(MatchID, Player1, Player2) VALUES ("102", "gamer1", "gamer2")
INSERT INTO Matches(MatchID, Player1, Player2) VALUES ("103", "gamer1", "gamer2")
INSERT INTO Matches(MatchID, Player1, Player2) VALUES ("104", "gamer1", "gamer2")
INSERT INTO Matches(MatchID, Player1, Player2) VALUES ("105", "gamer1", "gamer2")
INSERT INTO Matches(MatchID, Player1, Player2) VALUES ("106", "gamer1", "gamer2")
```

```
INSERT INTO Player(AccountID, Email, Password, Username) VALUES ("gamer1",
"gamer1@email.com", "gamer1password", "gamer1username")
INSERT INTO Player(AccountID, Email, Password, Username) VALUES ("gamer2",
"gamer2@email.com", "gamer2password", "gamer2username")
INSERT INTO Player(AccountID, Email, Password, Username) VALUES ("gamer3",
"gamer3@email.com", "gamer3password", "gamer3username")
INSERT INTO Player(AccountID, Email, Password, Username) VALUES ("gamer4",
"gamer4@email.com", "gamer4password", "gamer4username")
INSERT INTO Player(AccountID, Email, Password, Username) VALUES ("gamer5",
"gamer5@email.com", "gamer5password", "gamer5username")
```

```
INSERT INTO Picks(AccountID, Champ_Name) VALUES ("gamer1", "Champion01")
INSERT INTO Picks(AccountID, Champ_Name) VALUES ("gamer2", "Champion02")
INSERT INTO Picks(AccountID, Champ_Name) VALUES ("gamer3", "Champion03")
INSERT INTO Picks(AccountID, Champ_Name) VALUES ("gamer4", "Champion04")
INSERT INTO Picks(AccountID, Champ_Name) VALUES ("gamer5", "Champion05")
```

```
INSERT INTO PlayerInventory_1(PlayerOwnerID, Skin, Currency, AccountID) VALUES
("playerInventory1", "skin01", 999, "gamer1")
INSERT INTO PlayerInventory_1(PlayerOwnerID, Skin, Currency, AccountID) VALUES
("playerInventory2", "skin02", 999, "gamer2")
INSERT INTO PlayerInventory_1(PlayerOwnerID, Skin, Currency, AccountID) VALUES
("playerInventory3", "skin03", 999, "gamer3")
INSERT INTO PlayerInventory_1(PlayerOwnerID, Skin, Currency, AccountID) VALUES
("playerInventory4", "skin04", 999, "gamer4")
INSERT INTO PlayerInventory_1(PlayerOwnerID, Skin, Currency, AccountID) VALUES
("playerInventory5", "skin05", 999, "gamer5")
```

```
INSERT INTO PlayerInventory_2(Currency, Subrank) VALUES (999, "subrank01")
INSERT INTO PlayerInventory_2(Currency, Subrank) VALUES (998, "subrank02")
INSERT INTO PlayerInventory_2(Currency, Subrank) VALUES (997, "subrank03")
INSERT INTO PlayerInventory_2(Currency, Subrank) VALUES (996, "subrank04")
INSERT INTO PlayerInventory_2(Currency, Subrank) VALUES (995, "subrank05")
```

```
INSERT INTO Ranks_Is(Tier, AccountID, Subrank) VALUES (1, "gamer1", "subrank01")
INSERT INTO Ranks_Is(Tier, AccountID, Subrank) VALUES (2, "gamer2", "subrank02")
INSERT INTO Ranks_Is(Tier, AccountID, Subrank) VALUES (3, "gamer3", "subrank03")
INSERT INTO Ranks_Is(Tier, AccountID, Subrank) VALUES (1, "gamer4", "subrank04")
INSERT INTO Ranks_Is(Tier, AccountID, Subrank) VALUES (2, "gamer5", "subrank01")
```

```
INSERT INTO Abliity_Knows_1(Name, Champ_name, Effect) VALUES ("Ability01", "Champion01",
"Effect01")
INSERT INTO Abliity_Knows_1(Name, Champ_name, Effect) VALUES ("Ability02", "Champion02",
"Effect02")
INSERT INTO Abliity_Knows_1(Name, Champ_name, Effect) VALUES ("Ability03", "Champion03",
"Effect03")
INSERT INTO Abliity_Knows_1(Name, Champ_name, Effect) VALUES ("Ability04", "Champion04",
"Effect04")
INSERT INTO Abliity_Knows_1(Name, Champ_name, Effect) VALUES ("Ability05", "Champion05",
"Effect05")
```

```
INSERT INTO Ability_knows_2(Effect, Cooldown) VALUES ("Effect01", "11")
INSERT INTO Ability_knows_2(Effect, Cooldown) VALUES ("Effect02", "12")
INSERT INTO Ability_knows_2(Effect, Cooldown) VALUES ("Effect03", "13")
INSERT INTO Ability_knows_2(Effect, Cooldown) VALUES ("Effect04", "14")
INSERT INTO Ability_knows_2(Effect, Cooldown) VALUES ("Effect05", "15")
```

```
INSERT INTO Character_1(Name, Health) VALUES ("Chamion01", 100)
INSERT INTO Character_1(Name, Health) VALUES ("Chamion02", 200)
INSERT INTO Character_1(Name, Health) VALUES ("Chamion03", 300)
INSERT INTO Character_1(Name, Health) VALUES ("Chamion04", 400)
INSERT INTO Character_1(Name, Health) VALUES ("Chamion05", 500)
INSERT INTO Character_1(Name, Health) VALUES ("Enemy01", 100)
INSERT INTO Character_1(Name, Health) VALUES ("Enemy02", 200)
INSERT INTO Character_1(Name, Health) VALUES ("Enemy03", 300)
INSERT INTO Character_1(Name, Health) VALUES ("Enemy04", 400)
INSERT INTO Character_1(Name, Health) VALUES ("Enemy05", 500)
```

```
INSERT INTO Character_2(Health, Mana) VALUES (100, 50)
INSERT INTO Character_2(Health, Mana) VALUES (200, 100)
INSERT INTO Character_2(Health, Mana) VALUES (300, 150)
INSERT INTO Character_2(Health, Mana) VALUES (400, 200)
INSERT INTO Character_2(Health, Mana) VALUES (500, 250)
```

```
INSERT INTO Champion(Name) VALUES ("Chamion01")
INSERT INTO Champion(Name) VALUES ("Chamion02")
INSERT INTO Champion(Name) VALUES ("Chamion03")
INSERT INTO Champion(Name) VALUES ("Chamion04")
```

```
INSERT INTO Champion(Name) VALUES ("Champion05")
```

```
INSERT INTO Enemies(Name, Gold_reward) VALUES ("Enemy01", 10)
```

```
INSERT INTO Enemies(Name, Gold_reward) VALUES ("Enemy02", 20)
```

```
INSERT INTO Enemies(Name, Gold_reward) VALUES ("Enemy03", 30)
```

```
INSERT INTO Enemies(Name, Gold_reward) VALUES ("Enemy04", 40)
```

```
INSERT INTO Enemies(Name, Gold_reward) VALUES ("Enemy05", 50)
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("ward01", "itemName01",  
"championinventory01")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("ward02", "itemName02",  
"championinventory02")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("ward03", "itemName03",  
"championinventory03")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("ward04", "itemName04",  
"championinventory04")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("ward05", "itemName05",  
"championinventory05")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("weapon01", "itemName01",  
"championinventory01")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("weapon02", "itemName02",  
"championinventory02")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("weapon03", "itemName03",  
"championinventory03")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("weapon04", "itemName04",  
"championinventory04")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("weapon05", "itemName05",  
"championinventory05")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("consumable01",  
"itemName01", "championinventory01")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("consumable02",  
"itemName02", "championinventory02")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("consumable03",  
"itemName03", "championinventory03")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("consumable04",  
"itemName04", "championinventory04")
```

```
INSERT INTO Item_contains(ItemID, ItemName, OwnerID) VALUES ("consumable05",  
"itemName05", "championinventory05")
```

```
INSERT INTO Weapons(ItemID, AttackPower) VALUES ("weapon01", 10)
```

```
INSERT INTO Weapons(ItemID, AttackPower) VALUES ("weapon02", 20)
```

```
INSERT INTO Weapons(ItemID, AttackPower) VALUES ("weapon03", 30)
```

```
INSERT INTO Weapons(ItemID, AttackPower) VALUES ("weapon04", 40)
```

INSERT INTO Weapons(ItemID, AttackPower) VALUES ("weapon05", 50)

INSERT INTO Wards(ItemID, Range) VALUES ("ward01", 10)

INSERT INTO Wards(ItemID, Range) VALUES ("ward02", 20)

INSERT INTO Wards(ItemID, Range) VALUES ("ward03", 30)

INSERT INTO Wards(ItemID, Range) VALUES ("ward04", 40)

INSERT INTO Wards(ItemID, Range) VALUES ("ward05", 50)

INSERT INTO Consumables(ItemID, Effect) VALUES ("consumable01", 10)

INSERT INTO Consumables(ItemID, Effect) VALUES ("consumable02", 20)

INSERT INTO Consumables(ItemID, Effect) VALUES ("consumable03", 30)

INSERT INTO Consumables(ItemID, Effect) VALUES ("consumable04", 40)

INSERT INTO Consumables(ItemID, Effect) VALUES ("consumable05", 50)

INSERT INTO Inventory_holds(OwnerID, Coin, Name) VALUES ("championinventory01", 10, "Champion01")

INSERT INTO Inventory_holds(OwnerID, Coin, Name) VALUES ("championinventory02", 20, "Champion02")

INSERT INTO Inventory_holds(OwnerID, Coin, Name) VALUES ("championinventory03", 30, "Champion03")

INSERT INTO Inventory_holds(OwnerID, Coin, Name) VALUES ("championinventory04", 40, "Champion04")

INSERT INTO Inventory_holds(OwnerID, Coin, Name) VALUES ("championinventory05", 50, "Champion05")

INSERT INTO Owns(OwnerID, Champ_name) VALUES ("owner01", "Champion01")

INSERT INTO Owns(OwnerID, Champ_name) VALUES ("owner02", "Champion02")

INSERT INTO Owns(OwnerID, Champ_name) VALUES ("owner03", "Champion03")

INSERT INTO Owns(OwnerID, Champ_name) VALUES ("owner04", "Champion04")

INSERT INTO Owns(OwnerID, Champ_name) VALUES ("owner05", "Champion05")