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Relational Schema

Player(Surname: String, Forename: String, Account_Number: Integer, Email Address: String)

Character_has(Character_Name: String, Level: Integer, Health: Integer, MaxHealth: Integer, Character_Type: String, AttackinScore: Integer, DefenceScore: Integer, ManaScore: Integer, ExperiencePoints: Integer, money_bank: Integer, Account_Number: Integer)

Item(ItemName: String, Price: Integer, Quantity: Integer, HealingScore: Integer, ManaScore: Integer)

possessItem(ItemName: String, Price: Real, Quantity: Integer, ManaScore: Integer, Healing Score: Integer, Character_Name: String, Account_Number)

CombatActivities(Result: Integer, Damage: Integer, Battle_Data: Integer, Attacker: String, Defender: String, BattleNo: Integer)

EngagesInCombat(Character_Name: String, Account_Number : Integer, BattleNo: Integer)

ItemEngagesInCombat(Name: String, BattleNo: String)

Armour(Defend Score: Integer, BodyPart: String, ItemName: String)

Weapon(AttackScore: Integer, ItemName: String)

Integrity constraints

IC's for Player: Primary key Account Number

IC's for Character_has: Primary Key: {Character_Name, Account_Number} Foreign key Account_Number referencing Player, On delete CASCADE/REJECT, ACCOUNT_NUMBER CANNOT BE NULL, CHARACTER_NAME CANNOT BE NULL, CHARACTER_NAME CANNOT BE NULL.

IC's for Item: Primary key ItemName

IC's for possessItem: Primary key: ItemName. Foreign key Character_Name referencing Character_has On delete CASCADE/REJECT. Foreign key Account_Number referencing Character_has On delete CASCADE/REJECT . ItemName CANNOT BE NULL.

IC's for CombatActivities: : Primary Key BattleNo, BATTLENO CANNOT BE NULL.

IC's for EngagesInCombat: Primary key (Chracter_Name, BattleNo, Account_Number}, Foreign key Character_Name referencing Character_has On delete CASCADE/REJECT, Foreign key Account_Number referencing Character_has On delete CASCADE/REJECT, Foreign key BattleNo referencing CombatActivities On delete CASCADE/REJECT, CHARACTER_NAME CANNOT BE NULL, ACCOUNT_NUMBER CANNOT BE NULL

IC's for ItemEngagesInCombat: Primary key: {BattleNo, Name}, Foreign key BattleNo referencing CombatActivities On delete CASCADE/REJECT , Foreign key ItemName referencing Item On delete CASCADE/REJECT.

IC's for Armour: Foreign key ItemName referencing Item, on delete CASCADE/REJECT.

IC's for Weapon: Foreign key ItemName referencing Item, on delete CASCADE/REJECT.

Normalisation Level

Comment for Player: In 2nd normal form. No multivalued attributes and all the fields are dependent on the account number. Not in third normal form as we could get the email if we know the surname and forename of a person using the account, unless the email does not directly contain the individuals name. Has order 0NF.

Comment for Character_has: Character_has is in 2nd normal form as it has no multivalued attributes, and it is a prime. Has order 2NF. Not in 3rd normal form as money_bank is

dependent on Character_Type and not on character_name and Account_Number. This is because the cost of a character is dependent on the type being bought

Comment for Item: In 2nd Normal form as there are no multivalued attributes and all the attributes are dependent on the primary key. Not in 3rd normal form as the price of item is dependent on the quantity of the item. Therefore: order 2NF.

Comment for possessItem: Not in 3rd normal form as Account Number and Character name are dependent on each other. In 1st normal form as there are no multivalued attributes and in 2nd normal form as all the keys are dependent on the name of item. So, order 2NF.

Comment for CombatActivities: Not in normal form i.e., has order 0NF as we have multivalued attributes.

Comment for EngagesInCombat: In third normal form as all no multivalued attributes, no part of a key determines a non-prime attribute, and no non-prime attribute determines a non-prime attribute . So has order 3NF.

Comment for ItemEngagesInCombat:

Comment for Armour: There are no multivalued attributes, all the non-prime attributes are dependent on the primary key and the non-prime attributes are not dependent on each other. This is because the defence score is not dependent on the BodyPart. Therefore, we have 3NF.

Comment for Weapon: There are no multivalued attributes. The AttackScore and Range is dependent on the ItemName. Range is not dependent on the AttackScore and vice versa, i.e. no non-prime attribute determines a non-prime attribute.

SQL DDL statements
CREATE TABLE Player(
       Surname VARCHAR,
       Forename VARCHAR,
       Account_Number INTEGER NOT NULL,
       Email Address VARCHAR,
       PRIMARY KEY (Account_Number)
);

CREATE TABLE Character_has(
       Account_Number INTEGER NOT NULL,
       Character_Name VARCHAR NOT NULL,
       Creation_Date VARCHAR,
       Expiry_Date VARCHAR,
       Character_Type VARCHAR,
       Level INTEGER,
       ExperiencePoints INTEGER,
       MaxHealth INTEGER,
       Health INTEGER,
       AttackinScore INTEGER,
       DefenceScore INTEGER,
       ManaScore VARCHAR,
       Money_bank REAL,
       PRIMARY KEY (Character_Name, Account_Number),
       FOREIGN KEY(Account_Number) REFERENCES Player(Account_Number)

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        ON DELETE CASCADE);

CREATE TABLE Item(
        ItemName VARCHAR NOT NULL,
        Price REAL,
        Quantity INTEGER,
        HealingScore INTEGER,
        ManaScore VARCHAR,
        PRIMARY KEY(ItemName)
);

CREATE TABLE possessItem(
        ItemName VARCHAR NOT NULL,
        Price REAL,
        Quantity INTEGER,
        ManaScore VARCHAR,
        HealingScore INTEGER,
        Character_Name VARCHAR,
        Account_Number INTEGER,
        PRIMARY KEY(ItemName),
        FOREIGN KEY(Account_Number) REFERENCES Character_has(Account_Number) ON
DELETE CASCADE
        FOREIGN KEY (Character_Name) REFERENCES Character_has (Character_Name) ON
DELETE CASCADE
        );

CREATE TABLE CombatActivities(
        Battle_Date VARCHAR,
        BattleNo INTEGER NOT NULL,
        Result INTEGER,
        Damage INTEGER,
        Defender VARCHAR,
        Attacker VARCHAR,
        PRIMARY KEY(BattleNo)
);

CREATE TABLE  engagesInCombat(
Account_Number INTEGER(8) NOT NULL,
Character_Name VARCHAR NOT NULL,
BattleNo INTEGER NOT NULL,
PRIMARY KEY (Character_Name, Account_Number, BattleNo),
FOREIGN KEY (Character_Name) REFERENCES Character_has(Character_Name) ON DELETE
CASCADE
FOREIGN KEY (Account_Number) REFERENCES Character_has (Account_Number) ON
DELETE CASCADE
FOREIGN Key(BattleNo) REFERENCES CombatActivities(BattleNo) ON DELETE CASCADE);
```

```
CREATE TABLE  ItemEngagesInCombat(
ItemName VARCHAR NOT NULL,
BattleNo INTEGER NOT NULL,
PRIMARY KEY ( BattleNo, ItemName),
FOREIGN KEY  (BattleNo)  REFERENCES CombatActivities(BattleNo)  ON DELETE CASCADE,
FOREIGN KEY( ItemName) REFERENCES Item(ItemName) ON DELETE CASCADE
);


CREATE TABLE Armour(
        ItemName VARCHAR NOT NULL,
        DefendScore INTEGER,
        BodyPart VARCHAR,
        PRIMARY KEY(ItemName),
        FOREIGN KEY  (ItemName) REFERENCES Item(ItemName) ON DELETE CASCADE
);

CREATE TABLE Weapon(
        ItemName VARCHAR NOT NULL,
        AttackScore INTEGER,
        Range INTEGER,
        PRIMARY KEY(ItemName),
        FOREIGN KEY  (ItemName) REFERENCES Item ON DELETE CASCADE
);
```