

CPSC 304 Project Cover Page

Milestone #: 2

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Group Number: 69

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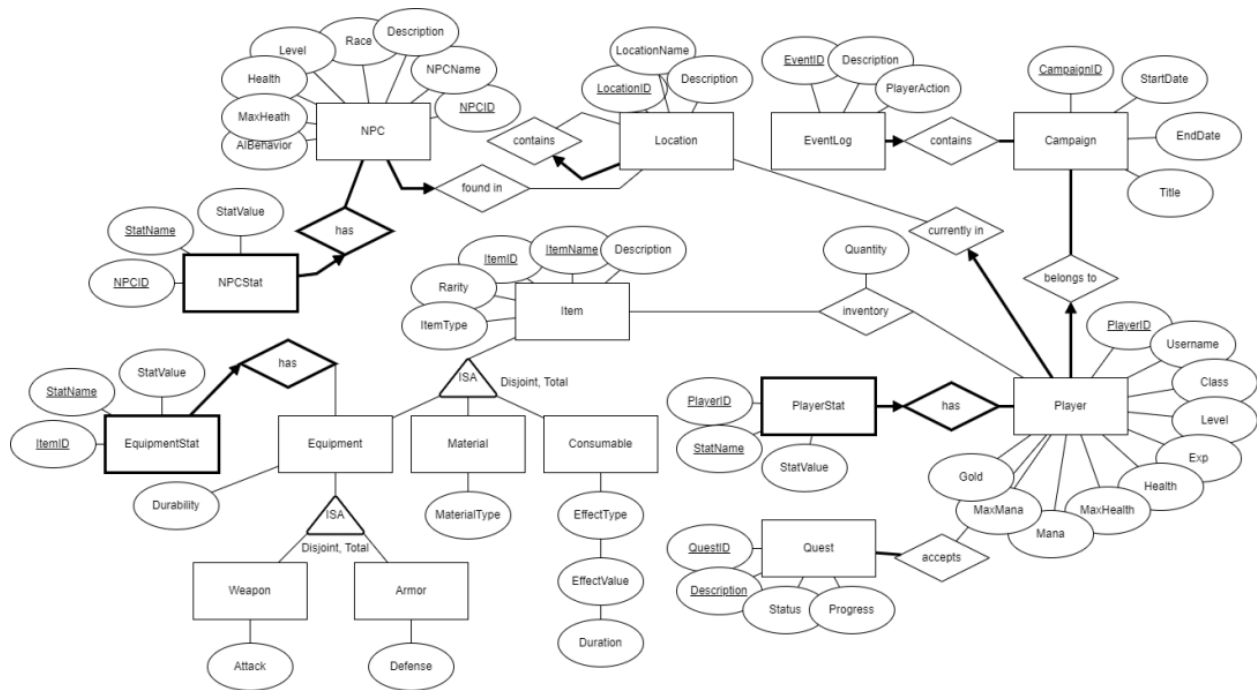
By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address,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

Our project aims to help manage the data within a Dungeons and Dragons Game. We model the relationships between the entities (Players, NPC's, Locations, Items, etc.) and help track Events that occur within a Campaign.

3. ER Diagram



4. Table Schema

LEGEND for FD's:

– NPC – NPCID - NID NPCName - NN (npc) Description: ND Race: NR (npc) Level: NL (npc) Health: NH (npc) MaxHealth: NMH AIBehaviour: NAI	–Player – PlayerID: PID Username: PU Class: PC (player) Level: PL Exp: PXP Health: PH MaxHealth: PMH Mana: PM MaxMana: PMM Gold: PG	– Item – ItemName: IN ItemID: ITD (item) Description: ID Rarity: IR ItemType: IT	– EventLog – EventID: EID (event) Description: ED PlayerAction: PA CampaignID: CID
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LocationID: LID	CampaignID: CID LocationID: LID		
– Campaign – CampaignID: CID StartDate: SD EndDate: END Title: CT	– PlayerStat – (player) StatName: PSN (player) StatValue: PSV	– NPCStat – (npc) StatName: NSN (npc) StatValue: NSV	– Inventory – ItemName: IN ItemID: ITD PlayerID: PID Quantity: IQ
– Quest – QuestID: QID (quest) Description: QD Status: QS Progress: QP	– AcceptedQuests – QuestID: QID PlayerID: PID	– Location – LocationID: LID LocationName: LN (location) Description: LD ParentLocationID: PLID	– Equipment – ItemName: IN ItemID: ITD Durability: DU
– Material – ItemID: ITD MaterialType: MT	– Consumable – ItemID: ITD EffectType: ET EffectValue: EV Duration: CD	– EquipmentStat – (equipment) StatName: ESN (equipment) StatValue: ESV	– Weapon – ItemID: ITD Attack: IA
– Armour – ItemName: IN ItemID: ITD Defense: AD			

Functional Dependencies: *see below for which FD is associated with which schema*

PID → PU, PC, PL, PXP, PH, PMH, PM, PMM, PG, CID, LID

PU → PID, PC, PL, PXP, PH, PMH, PM, PMM, PG, CID, LID

PL, PC → PMH, PMM

PID, PSN → PSV

NID → NN, NR, ND, NL, NH, NMH, NAI, LID

NR, NL → NMH

NSN, NID → NSV

LID → LN, LD, PLID
CID → SD, END, CT
EID → ED, PA, CID
QID → QN, QD, QS, QP
ITD, PID → IQ
ITD → IN, ID, IR, IT
IN → ITD, ID, IR, IT
ITD → DU
ESN, ITD → ESV
ITD → MT
ITD → ET, EV, CD
ITD → WA
ITD → AD

5. Functional Dependencies

Player

Player(PlayerID: INT, Username: VARCHAR(255), Class: VARCHAR(255), Level: INT, Exp: INT, Health: INT, MaxHealth: INT, Mana: INT, MaxMana: INT, Gold: INT, **CampaignID**: INT, **LocationID**: INT)

Candidate key: Username

Constraints: Username NOT NULL UNIQUE, Class NOT NULL, Level NOT NULL, Exp NOT NULL, Health NOT NULL, MaxHealth NOT NULL, Mana NOT NULL, MaxMana NOT NULL, Gold NOT NULL, CampaignID NOT NULL, LocationID NOT NULL

PID → PU, PC, PL, PXP, PH, PMH, PM, PMM, PG, CID, LID
PL, PC → PMH, PMM (this FD is not using a PK)

Player Stat

(this is a weak entity, so StatName is a partial key)

PlayerStat(**PlayerID**: INT, StatName: VARCHAR(20), StatValue: INT)

Candidate key: N/A

Constraints: StatValue NOT NULL,

PID, PSN → PSV

NPC

NPC(NPCID: INT, NPCName: VARCHAR(50), Description: VARCHAR(255), Race: VARCHAR(20), Level: INT, Health: INT, MaxHealth: INT, AIBehaviour: VARCHAR(255), **LocationID**: INT)

Candidate key: N/A

Constraints: NPCName NOT NULL, Race NOT NULL, Level NOT NULL, Health NOT NULL, MaxHealth NOT NULL, Description NOT NULL, LocationID NOT NULL

NID → NN, NR, ND, NL, NH, NMH, NAI, LID

NR, NL → NMH (this FD is not using a PK)

NPC Stat

(this is a weak entity, so StatName is a partial key)

NPCStat(**NPCID**: INT, StatName, StatValue)

Candidate key: N/A

Constraints: StatValue NOT NULL

NSN, NID → NSV

Location

Location(LocationID: INT, LocationName: VARCHAR(50), Description: VARCHAR(50), **parentLocationID**: INT)

Candidate key: LocationName

Constraints: LocationName UNIQUE NOT NULL, Description NOT NULL

LID → LN, LD, INID

Campaign

Campaign(CampaignID: INT, Title: VARCHAR(255), StartDate: DATE, EndDate: DATE)

Candidate key: Title

Constraints: Title UNIQUE NOT NULL, StartDate NOT NULL

CID → SD, END, CT

EventLog

EventLog(EventID: INT, Description: VARCHAR(255), PlayerAction: VARCHAR(255),
CampaignID: INT)

Candidate key: N/A

Constraints: Description NOT NULL, PlayerAction NOT NULL, CampaignID NOT NULL

EID → ED, PA, CID

Quest

Quest(QuestID: INT, QuestName: VARCHAR(50), Description: VARCHAR(255), Status:
VARCHAR(20), Progress: NUMERIC(5, 2))

Candidate key: N/A

Constraints: QuestName NOT NULL, Description NOT NULL, Status NOT NULL, Progress
NOT NULL

QID → QN, QD, QS, QP

AcceptedQuest

AcceptedQuest(QuestID: INT, PlayerID: INT)

Candidate key: N/A

Constraints: N/A

Inventory

Inventory(ItemID: INT, PlayerID: INT, Quantity: INT)

Candidate key: N/A

Constraints: Quantity NOT NULL

ITD, PID → IQ

Item

Item(ItemID: INT, ItemName: VARCHAR(50), ItemType: VARCHAR(20), Rarity: VARCHAR(20), Description: VARCHAR(255))

Candidate key: ItemName

Constraints: ItemName UNIQUE NOT NULL, ItemType NOT NULL, Rarity NOT NULL, Description NOT NULL

ITD → ID, IR, IT

Equipment (subclass entity of item)

Equipment(ItemID: INT, Durability: INT)

Constraints: Durability NOT NULL

ITD → DU

Equipment Stat

(this is a weak entity, so StatName is a partial key)

EquipmentStat(ItemID: INT, StatName: VARCHAR(20), StatValue: INT)

Constraints: StatValue NOT NULL

ESN, ITD → ESV

Material (subclass entity of item)

Material(ItemID: INT, MaterialType: VARCHAR(50))

Constraints: MaterialType NOT NULL

ITD → MT

Consumable (subclass entity of item)

Consumable(ItemID: INT, EffectType: VARCHAR(50), EffectValue: INT, Duration: INT)

Constraints: EffectType NOT NULL, EffectValue NOT NULL, Duration NOT NULL

ITD → ET, EV, CD

Weapon (subclass entity of equipment)

Weapon(ItemID: INT, Attack: INT)

Constraints: Attack NOT NULL

ITD → WA

Armour (subclass entity of equipment)

Armour(**ItemID**: INT, Defense: INT)

Constraints: Defense NOT NULL

ITD → AD

6. Normalization (BCNF)

Normalizing Player Table

Player(**PID**, PU, PC, LC, PH, PMH, PM, PMM, **CID, LID**)

Candidate Keys: PID, PU

Violating FD: PL, PC → PMH, PMM

Decompose on PL, PC

Player₁(**PC**, **PL**, PMH, PMM)

Player₂(**PID**, PU, **PC, PL**, PH, PM, PG, **CID, LID**)

Normalizing NPC Table

NPC(**NPCID**: INT, NPCName: VARCHAR(50), Description: VARCHAR(255), Race: VARCHAR(20), Level: INT, Health: INT, MaxHealth: INT, AIBehaviour: VARCHAR(255), **LocationID**: INT)

Candidate keys: N/A

Violating FD: NR, NL → NMH

Decompose on NR, NL → NMH to create 2 Tables:

NPC₁(**Race**: VARCHAR(20), **Level**: INT, MaxHealth: INT)

NPC₂(**NPCID**: INT, NPCName: VARCHAR(50), Description: VARCHAR(255), **Race**: VARCHAR(20), **Level**: INT, Health: INT, AIBehaviour: VARCHAR(255), **LocationID**: INT)

Normalized Tables

Player₁(**Class**: VARCHAR(255), **Level**: INT, MaxHealth: INT, MaxMana: INT)

Player₂(PlayerID: INT, Username: VARCHAR(255), **Class**: VARCHAR(255), **Level**: INT, Exp: INT, Health: INT, MaxHealth: INT, Mana: INT, MaxMana: INT, Gold: INT, **CampaignID**: INT, **LocationID**: INT)

NPC₁(Race: VARCHAR(20), Level: INT, MaxHealth: INT)

NPC₂(NPCID: INT, NPCName: VARCHAR(50), Description: VARCHAR(255), **Race**: VARCHAR(20), **Level**: INT, Health: INT, AIBehaviour: VARCHAR(255), **LocationID**: INT)

→ Primary Keys: NPCID, Race, Level

→ Candidate Keys: N/A

→ Foreign Keys: Race, Level, LocationID

PlayerStat(**PlayerID**: INT, StatName: VARCHAR(20), StatValue: INT)

NPCStat(**NPCID**: INT, StatName, StatValue)

Location(LocationID: INT, LocationName: VARCHAR(50), Description: VARCHAR(50), **parentLocationID**: INT)

Campaign(CampaignID: INT, Title: VARCHAR(255), StartDate: DATE, EndDate: DATE)

EventLog(EventID: INT, Description: VARCHAR(255), PlayerAction: VARCHAR(255), **CampaignID**: INT)

Quest(QuestID: INT, QuestName: VARCHAR(50), Description: VARCHAR(255), Status: VARCHAR(20), Progress: NUMERIC(5, 2))

AcceptedQuest(QuestID: INT, **PlayerID**: INT)

Inventory(ItemID: INT, **PlayerID**: INT, Quantity: INT)

Item(ItemID: INT, ItemName: VARCHAR(50), ItemType: VARCHAR(20), Rarity: VARCHAR(20), Description: VARCHAR(255))

Equipment(ItemID: INT, Durability: INT)

EquipmentStat(**ItemID**: INT, StatName: VARCHAR(20), StatValue: INT)

Weapon(**ItemID**: INT, Attack: INT)

Armour(**ItemID**: INT, Defense: INT)

Material(**ItemID**: INT, MaterialType: VARCHAR(50))

Consumable(**ItemID**: INT, EffectType: VARCHAR(50), EffectValue: INT, Duration: INT)

7. SQL DDL

```
CREATE TABLE Player1 (  
    Class VARCHAR(255) NOT NULL,
```

```
Level INT NOT NULL,  
MaxHealth INT NOT NULL,  
MaxMana INT NOT NULL,  
PRIMARY KEY (Class, Level)  
);
```

```
CREATE TABLE Player2 (  
    PlayerID INT PRIMARY KEY,  
    Username VARCHAR(255) NOT NULL UNIQUE,  
    Class VARCHAR(255) NOT NULL,  
    Level INT NOT NULL,  
    Exp INT NOT NULL,  
    Health INT NOT NULL,  
    MaxHealth INT NOT NULL,  
    Mana INT NOT NULL,  
    MaxMana INT NOT NULL,  
    Gold INT NOT NULL,  
    CampaignID INT NOT NULL,  
    LocationID INT NOT NULL,  
    FOREIGN KEY (Class, Level) REFERENCES Player1(Class, Level),  
    FOREIGN KEY (CampaignID) REFERENCES Campaign(CampaignID),  
    FOREIGN KEY (LocationID) REFERENCES Location(LocationID)  
);
```

```
CREATE TABLE NPC1 (  
    Race VARCHAR(20) NOT NULL,  
    Level INT NOT NULL,  
    MaxHealth INT NOT NULL,  
    PRIMARY KEY (Race, Level)  
);
```

```
CREATE TABLE NPC2 (  
    NPCID INT PRIMARY KEY,  
    NPCName VARCHAR(50) NOT NULL,  
    Description VARCHAR(255) NOT NULL,  
    Race VARCHAR(20) NOT NULL,
```

```
Level INT NOT NULL,  
Health INT NOT NULL,  
AIBehaviour VARCHAR(255) NOT NULL,  
LocationID INT NOT NULL,  
FOREIGN KEY (Race, Level) REFERENCES NPC1(Race, Level),  
FOREIGN KEY (LocationID) REFERENCES Location(LocationID)  
);
```

```
CREATE TABLE PlayerStat (  
    PlayerID INT NOT NULL,  
    StatName VARCHAR(20) NOT NULL,  
    StatValue INT NOT NULL,  
    PRIMARY KEY (PlayerID, StatName),  
    FOREIGN KEY (PlayerID) REFERENCES Player2(PlayerID)  
);
```

```
CREATE TABLE NPCStat (  
    NPCID INT NOT NULL,  
    StatName VARCHAR(20) NOT NULL,  
    StatValue INT NOT NULL,  
    PRIMARY KEY (NPCID, StatName),  
    FOREIGN KEY (NPCID) REFERENCES NPC2(NPCID)  
);
```

```
CREATE TABLE Location (  
    LocationID INT PRIMARY KEY,  
    LocationName VARCHAR(50) NOT NULL UNIQUE,  
    Description VARCHAR(50) NOT NULL,  
    ParentLocationID INT,  
    FOREIGN KEY (ParentLocationID) REFERENCES Location(LocationID)  
);
```

```
CREATE TABLE Campaign (  
    CampaignID INT PRIMARY KEY,  
    Title VARCHAR(255) NOT NULL UNIQUE,
```

```
    StartDate DATE NOT NULL,  
    EndDate DATE NOT NULL  
);
```

```
CREATE TABLE EventLog (  
    EventID INT PRIMARY KEY,  
    Description VARCHAR(255) NOT NULL,  
    PlayerAction VARCHAR(255) NOT NULL,  
    CampaignID INT NOT NULL,  
    FOREIGN KEY (CampaignID) REFERENCES Campaign(CampaignID)  
);
```

```
CREATE TABLE Quest (  
    QuestID INT PRIMARY KEY,  
    QuestName VARCHAR(50) NOT NULL,  
    Description VARCHAR(255) NOT NULL,  
    Status VARCHAR(20) NOT NULL,  
    Progress NUMERIC(5, 2) NOT NULL  
);
```

```
CREATE TABLE AcceptedQuest (  
    QuestID INT NOT NULL,  
    PlayerID INT NOT NULL,  
    PRIMARY KEY (QuestID, PlayerID),  
    FOREIGN KEY (QuestID) REFERENCES Quest(QuestID),  
    FOREIGN KEY (PlayerID) REFERENCES Player2(PlayerID)  
);
```

```
CREATE TABLE Inventory (  
    ItemID INT NOT NULL,  
    PlayerID INT NOT NULL,  
    Quantity INT NOT NULL,  
    PRIMARY KEY (ItemID, PlayerID),  
    FOREIGN KEY (ItemID) REFERENCES Item(ItemID),  
    FOREIGN KEY (PlayerID) REFERENCES Player2(PlayerID)
```

);

```
CREATE TABLE Item (  
    ItemID INT PRIMARY KEY,  
    ItemName VARCHAR(50) NOT NULL UNIQUE,  
    ItemType VARCHAR(20) NOT NULL,  
    Rarity VARCHAR(20) NOT NULL,  
    Description VARCHAR(255) NOT NULL  
);
```

```
CREATE TABLE Equipment (  
    ItemID INT PRIMARY KEY,  
    Durability INT NOT NULL,  
    FOREIGN KEY (ItemID) REFERENCES Item(ItemID)  
);
```

```
CREATE TABLE EquipmentStat (  
    ItemID INT NOT NULL,  
    StatName VARCHAR(20) NOT NULL,  
    StatValue INT NOT NULL,  
    PRIMARY KEY (ItemID, StatName),  
    FOREIGN KEY (ItemID) REFERENCES Equipment(ItemID)  
);
```

```
CREATE TABLE Weapon (  
    ItemID INT PRIMARY KEY,  
    Attack INT NOT NULL,  
    FOREIGN KEY (ItemID) REFERENCES Equipment(ItemID)  
);
```

```
CREATE TABLE Armour (  
    ItemID INT PRIMARY KEY,  
    Defense INT NOT NULL,  
    FOREIGN KEY (ItemID) REFERENCES Equipment(ItemID)  
);
```

```
CREATE TABLE Material (  
    ItemID INT PRIMARY KEY,  
    MaterialType VARCHAR(50) NOT NULL,  
    FOREIGN KEY (ItemID) REFERENCES Item(ItemID)  
);
```

```
CREATE TABLE Consumable (  
    ItemID INT PRIMARY KEY,  
    EffectType VARCHAR(50) NOT NULL,  
    EffectValue INT NOT NULL,  
    Duration INT NOT NULL,  
    FOREIGN KEY (ItemID) REFERENCES Item(ItemID)  
);
```

8. INSERT Statements

```
INSERT INTO Player1 (Class, Level, MaxHealth, MaxMana)  
VALUES  
('Warrior', 10, 100, 50),  
('Mage', 8, 80, 100),  
('Assassin', 12, 90, 60),  
('Cleric', 15, 120, 80),  
('Archer', 7, 70, 40);
```

```
INSERT INTO Player2 (PlayerID, Username, Class, Level, Exp, Health, MaxHealth, Mana,  
MaxMana, Gold, CampaignID, LocationID)  
VALUES  
(1, 'PlayerOne', 'Warrior', 10, 2500, 100, 100, 50, 50, 500, 1, 1),  
(2, 'PlayerTwo', 'Mage', 8, 2000, 80, 80, 100, 100, 300, 1, 2),  
(3, 'PlayerThree', 'Assassin', 12, 3000, 90, 90, 60, 60, 400, 2, 3),  
(4, 'PlayerFour', 'Cleric', 15, 3500, 120, 120, 80, 80, 600, 2, 4),  
(5, 'PlayerFive', 'Archer', 7, 1800, 70, 70, 40, 40, 200, 3, 5);
```

```
INSERT INTO NPC1 (Race, Level, MaxHealth)
```

VALUES

('Goblin', 5, 50),
('Orc', 10, 100),
('Elf', 8, 80),
('Dwarf', 12, 120),
('Dragon', 20, 200);

INSERT INTO NPC2 (NPCID, NPCName, Description, Race, Level, Health, AIBehaviour, LocationID)

VALUES

(1, 'Pitnik', 'A small green goblin.', 'Goblin', 5, 50, 'Hostile', 2),
(2, 'Bolg', 'A large gray orc.', 'Orc', 10, 100, 'Hostile', 5),
(3, 'Sylphie', 'A slender elf.', 'Elf', 8, 80, 'Neutral', 1),
(4, 'Dain', 'A stout dwarf.', 'Dwarf', 12, 120, 'Friendly', 4),
(5, 'Olwen', 'A fearsome dragon.', 'Dragon', 20, 200, 'Hostile', 3);

INSERT INTO PlayerStat (PlayerID, StatName, StatValue)

VALUES

(1, 'STR', 15),
(2, 'INT', 20),
(3, 'AGI', 18),
(4, 'VIT', 22),
(5, 'DEX', 12);

INSERT INTO NPCStat (NPCID, StatName, StatValue)

VALUES

(1, 'STR', 10),
(2, 'INT', 8),
(3, 'AGI', 12),
(4, 'VIT', 14),
(5, 'DEX', 18);

INSERT INTO Location (LocationID, LocationName, Description, ParentLocationID)

VALUES

(1, 'Elven Forest', 'A dense and dark forest.', NULL),


```
(2, 'Goblin Village', 'A small and dirty village.', NULL),
(3, 'Dragon's Mountain', 'A tall and treacherous mountain.', NULL),
(4, 'Dwarven Castle', 'An old yet magnificent castle.', NULL),
(5, 'Orc Cave', 'A deep and smelly cave.', NULL);
```

```
INSERT INTO Campaign (CampaignID, StartDate, EndDate, Title)
VALUES
```

```
(1, '2024-01-01', '2024-12-31', 'The Great Adventure'),
(2, '2023-01-01', '2023-12-31', 'The Lost Kingdom'),
(3, '2022-01-01', '2022-12-31', 'The Dark Forest'),
(4, '2021-01-01', '2021-12-31', 'The Rising Sun'),
(5, '2020-01-01', '2020-12-31', 'The Hidden Treasure');
```

```
INSERT INTO EventLog (EventID, Description, PlayerAction, CampaignID)
VALUES
```

```
(1, 'PlayerOne defeated Goblin', 'Attack', 1),
(2, 'PlayerTwo found a treasure chest', 'Search', 1),
(3, 'PlayerThree completed a quest', 'Claim', 2),
(4, 'PlayerFour healed PlayerFive', 'Heal', 2),
(5, 'PlayerFive discovered a secret passage', 'Explore', 3);
```

```
INSERT INTO Quest (QuestID, QuestName, Description, Status, Progress)
VALUES
```

```
(1, 'Defeat the Dragon', 'Defeat the dragon in the mountain.', 'In Progress', 50.00),
(2, 'Find the Lost Treasure', 'Locate and retrieve the lost treasure.', 'Completed', 100.00),
(3, 'Save the Village', 'Protect the village from the invading forces.', 'In Progress', 73.45),
(4, 'Rescue the Royal Family', 'Rescue the kidnapped royal family.', 'Not Started', 0.00),
(5, 'Destroy the Evil Artifact', 'Destroy the artifact causing chaos.', 'Completed', 100.00);
```

```
INSERT INTO AcceptedQuest (QuestID, PlayerID)
VALUES
```

```
(1, 1),
(2, 2),
(3, 3),
(4, 4),
```

(5, 5);

INSERT INTO Inventory (ItemID, PlayerID, Quantity)

VALUES

(1, 1, 2),

(2, 2, 1),

(3, 3, 5),

(4, 4, 1),

(5, 5, 3);

INSERT INTO Item (ItemID, ItemName, ItemType, Rarity, Description)

VALUES

(1, 'Sword', 'Weapon', 'Common', 'A blunt wooden sword. '),

(2, 'Shield', 'Armor', 'Uncommon', 'A sturdy shield of steel. '),

(3, 'Healing Potion', 'Consumable', 'Rare', 'A healing potion. '),

(4, 'Elven Bow', 'Weapon', 'Epic', 'A longbow crafted from elven wood. '),

(5, 'Dwarven Helmet', 'Armor', 'Legendary', 'A helmet forged from dwarven mithril. ');

INSERT INTO Equipment (ItemID, Durability)

VALUES

(1, 80),

(2, 60),

(4, 90),

(5, 100),

(6, 50);

INSERT INTO EquipmentStat (ItemID, StatName, StatValue)

VALUES

(1, 'STR', 10),

(2, 'VIT', 20),

(4, 'DEX', 30),

(5, 'AGI', 40),

(6, 'INT', 15);

INSERT INTO Weapon (ItemID, Attack)

VALUES

(1, 15),
(4, 25),
(7, 35),
(8, 45),
(9, 55);

INSERT INTO Armour (ItemID, Defense)

VALUES

(2, 10),
(5, 30),
(10, 20),
(11, 40),
(12, 50);

INSERT INTO Material (ItemID, MaterialType)

VALUES

(1, 'Wood'),
(2, 'Steel'),
(5, 'Mithril'),
(13, 'Iron'),
(14, 'Silver');

INSERT INTO Consumable (ItemID, EffectType, EffectValue, Duration)

VALUES

(3, 'Small Healing Potion', 50, 30),
(15, 'Mana Elixir', 20, 60),
(16, 'Magic Scroll', 30, 45),
(17, 'Smoke Bomb', 40, 50),
(18, 'Roasted Meat', 25, 35);