

STEP 3 → https://github.com/Mkovshov/CSC423_Project.git

Table Creation:

CLIENT TABLE:

```
CREATE TABLE Client (  
    clientNumber INTEGER PRIMARY KEY,  
    firstName TEXT NOT NULL,  
    lastName TEXT NOT NULL,  
    street TEXT,  
    city TEXT,  
    postCode TEXT,  
    telephoneNumber TEXT NOT NULL CHECK (telephoneNumber GLOB '[0-9]*')  
);
```

EMPLOYEE TABLE:

```
CREATE TABLE Employee (  
    staffNumber INTEGER PRIMARY KEY,  
    firstName TEXT NOT NULL,  
    lastName TEXT NOT NULL,  
    street TEXT,  
    city TEXT,  
    postCode TEXT,  
    salary REAL NOT NULL CHECK (salary > 0),  
    telephoneNumber TEXT NOT NULL CHECK (telephoneNumber GLOB '[0-9]*')  
);
```

SERVICE_REQUIREMENT TABLE:

```
CREATE TABLE Service_Requirement (  
    requirementId INTEGER PRIMARY KEY,  
    clientNumber INTEGER NOT NULL,  
    startDate TEXT NOT NULL,  
    startTime TEXT NOT NULL,  
    duration INTEGER NOT NULL CHECK (duration > 0),  
    comments TEXT,  
    FOREIGN KEY (clientNumber) REFERENCES Client(clientNumber)  
);
```

EQUIPMENT TABLE:

```
CREATE TABLE Equipment (  
    equipmentId INTEGER PRIMARY KEY,  
    usage TEXT,  
    cost REAL NOT NULL CHECK (cost >= 0),  
    description TEXT NOT NULL  
);
```

ASSIGNMENT TABLE:

```
CREATE TABLE Assignment (  
    staffNumber INTEGER NOT NULL,  
    requirementId INTEGER NOT NULL,  
    PRIMARY KEY (staffNumber, requirementId),  
    FOREIGN KEY (staffNumber) REFERENCES Employee(staffNumber),  
    FOREIGN KEY (requirementId) REFERENCES Service_Requirement(requirementId)  
);
```

REQUIREMENT_EQUIPMENT TABLE:

```
CREATE TABLE Requirement_Equipment (  
    requirementId INTEGER NOT NULL,  
    equipmentId INTEGER NOT NULL,  
    quantity INTEGER NOT NULL CHECK (quantity > 0),  
    PRIMARY KEY (requirementId, equipmentId),  
    FOREIGN KEY (requirementId) REFERENCES Service_Requirement(requirementId),  
    FOREIGN KEY (equipmentId) REFERENCES Equipment(equipmentId)  
);
```

```

# 1. CLIENT TABLE
cursor.execute('''
CREATE TABLE IF NOT EXISTS Client (
    clientNumber INTEGER PRIMARY KEY,
    firstName TEXT NOT NULL,
    lastName TEXT NOT NULL,
    street TEXT,
    city TEXT,
    postCode TEXT,
    telephoneNumber TEXT NOT NULL CHECK (telephoneNumber GLOB '[0-9]*')
)
''')

# 2. EMPLOYEE TABLE
cursor.execute('''
CREATE TABLE IF NOT EXISTS Employee (
    staffNumber INTEGER PRIMARY KEY,
    firstName TEXT NOT NULL,
    lastName TEXT NOT NULL,
    street TEXT,
    city TEXT,
    postCode TEXT,
    salary REAL NOT NULL CHECK (salary > 0),
    telephoneNumber TEXT NOT NULL CHECK (telephoneNumber GLOB '[0-9]*')
)
''')

# 3. SERVICE_REQUIREMENT TABLE
cursor.execute('''
CREATE TABLE IF NOT EXISTS Service_Requirement (
    requirementId INTEGER PRIMARY KEY,
    clientNumber INTEGER NOT NULL,
    startDate TEXT NOT NULL,
    startTime TEXT NOT NULL,
    duration INTEGER NOT NULL CHECK (duration > 0),
    comments TEXT,
    FOREIGN KEY (clientNumber) REFERENCES Client(clientNumber)
)
''')

# 4. EQUIPMENT TABLE
cursor.execute('''
CREATE TABLE IF NOT EXISTS Equipment (
    equipmentId INTEGER PRIMARY KEY,
    usage TEXT,
    cost REAL NOT NULL CHECK (cost >= 0),
    description TEXT NOT NULL
)
''')

# 5. ASSIGNMENT TABLE
cursor.execute('''
CREATE TABLE IF NOT EXISTS Assignment (
    staffNumber INTEGER NOT NULL,
    requirementId INTEGER NOT NULL,
    PRIMARY KEY (staffNumber, requirementId),
    FOREIGN KEY (staffNumber) REFERENCES Employee(staffNumber),
    FOREIGN KEY (requirementId) REFERENCES Service_Requirement(requirementId)
)
''')

# 6. REQUIREMENT_EQUIPMENT TABLE
cursor.execute('''
CREATE TABLE IF NOT EXISTS Requirement_Equipment (
    requirementId INTEGER NOT NULL,
    equipmentId INTEGER NOT NULL,
    quantity INTEGER NOT NULL CHECK (quantity > 0),
    PRIMARY KEY (requirementId, equipmentId),
    FOREIGN KEY (requirementId) REFERENCES Service_Requirement(requirementId),
    FOREIGN KEY (equipmentId) REFERENCES Equipment(equipmentId)
)
''')

```

Sample Data insertion:

INSERT CLIENTS:

```
INSERT INTO Client VALUES (1001, 'John', 'Doe', '123 Main St', 'Boston', '02101',  
'6175551001');  
INSERT INTO Client VALUES (1002, 'Jane', 'Smith', '456 Oak Ave', 'Cambridge', '02138',  
'6175551002');  
INSERT INTO Client VALUES (1003, 'Robert', 'Johnson', '789 Pine Rd', 'Somerville', '02143',  
'6175551003');  
INSERT INTO Client VALUES (1004, 'Sarah', 'Williams', '321 Elm St', 'Boston', '02115',  
'6175551004');  
INSERT INTO Client VALUES (1005, 'Michael', 'Brown', '654 Maple Dr', 'Cambridge', '02139',  
'6175551005');  
INSERT INTO Client VALUES (1006, 'Emily', 'Davis', '987 Birch Ln', 'Boston', '02108',  
'6175551006');
```

INSERT EMPLOYEES:

```
INSERT INTO Employee VALUES (5001, 'Alice', 'Wilson', '111 First St', 'Boston', '02101',  
45000.00, '6175552001');  
INSERT INTO Employee VALUES (5002, 'Bob', 'Miller', '222 Second Ave', 'Cambridge',  
'02138', 42000.00, '6175552002');  
INSERT INTO Employee VALUES (5003, 'Carol', 'Taylor', '333 Third Rd', 'Somerville', '02143',  
48000.00, '6175552003');  
INSERT INTO Employee VALUES (5004, 'David', 'Anderson', '444 Fourth St', 'Boston', '02115',  
46000.00, '6175552004');  
INSERT INTO Employee VALUES (5005, 'Eva', 'Thomas', '555 Fifth Dr', 'Cambridge', '02139',  
44000.00, '6175552005');  
INSERT INTO Employee VALUES (5006, 'Frank', 'Jackson', '666 Sixth Ln', 'Boston', '02108',  
47000.00, '6175552006');
```

INSERT SERVICE REQUIREMENTS:

```
INSERT INTO Service_Requirement VALUES (2001, 1001, '2024-12-09', '07:00', 120, 'Morning  
cleaning');  
INSERT INTO Service_Requirement VALUES (2002, 1001, '2024-12-09', '17:00', 120, 'Evening  
cleaning');  
INSERT INTO Service_Requirement VALUES (2003, 1002, '2024-12-10', '10:00', 180, 'Weekly  
deep clean');  
INSERT INTO Service_Requirement VALUES (2004, 1003, '2024-12-11', '08:00', 90, 'Kitchen  
cleaning');
```

INSERT INTO Service_Requirement VALUES (2005, 1004, '2024-12-12', '14:00', 60, 'Quick cleanup');

INSERT INTO Service_Requirement VALUES (2006, 1005, '2024-12-13', '09:00', 240, 'Full day service');

INSERT EQUIPMENT:

INSERT INTO Equipment VALUES (3001, 'Daily', 1200.50, 'Industrial vacuum cleaner');

INSERT INTO Equipment VALUES (3002, 'Weekly', 850.00, 'Floor polisher');

INSERT INTO Equipment VALUES (3003, 'As needed', 350.75, 'Carpet cleaner');

INSERT INTO Equipment VALUES (3004, 'Daily', 200.00, 'High-pressure washer');

INSERT INTO Equipment VALUES (3005, 'Monthly', 1500.00, 'Window cleaning kit');

INSERT INTO Equipment VALUES (3006, 'Weekly', 600.25, 'Sanitizing sprayer');

INSERT ASSIGNMENTS:

INSERT INTO Assignment VALUES (5001, 2001);

INSERT INTO Assignment VALUES (5002, 2001);

INSERT INTO Assignment VALUES (5003, 2002);

INSERT INTO Assignment VALUES (5004, 2003);

INSERT INTO Assignment VALUES (5005, 2004);

INSERT INTO Assignment VALUES (5006, 2005);

INSERT INTO Assignment VALUES (5001, 2006);

INSERT REQUIREMENT_EQUIPMENT:

INSERT INTO Requirement_Equipment VALUES (2001, 3001, 2);

INSERT INTO Requirement_Equipment VALUES (2001, 3002, 1);

INSERT INTO Requirement_Equipment VALUES (2002, 3001, 1);

INSERT INTO Requirement_Equipment VALUES (2003, 3003, 3);

INSERT INTO Requirement_Equipment VALUES (2004, 3004, 1);

INSERT INTO Requirement_Equipment VALUES (2005, 3005, 2);

INSERT INTO Requirement_Equipment VALUES (2006, 3006, 1);

```

# Insert Clients
clients = [
    (1001, 'John', 'Doe', '123 Main St', 'Boston', '02101', '6175551001'),
    (1002, 'Jane', 'Smith', '456 Oak Ave', 'Cambridge', '02138', '6175551002'),
    (1003, 'Robert', 'Johnson', '789 Pine Rd', 'Somerville', '02143', '6175551003'),
    (1004, 'Sarah', 'Williams', '321 Elm St', 'Boston', '02115', '6175551004'),
    (1005, 'Michael', 'Brown', '654 Maple Dr', 'Cambridge', '02139', '6175551005'),
    (1006, 'Emily', 'Davis', '987 Birch Ln', 'Boston', '02108', '6175551006')
]
cursor.executemany('INSERT INTO Client VALUES (?, ?, ?, ?, ?, ?, ?)', clients)

# Insert Employees
employees = [
    (5001, 'Alice', 'Wilson', '111 First St', 'Boston', '02101', 45000.00, '6175552001'),
    (5002, 'Bob', 'Miller', '222 Second Ave', 'Cambridge', '02138', 42000.00, '6175552002'),
    (5003, 'Carol', 'Taylor', '333 Third Rd', 'Somerville', '02143', 48000.00, '6175552003'),
    (5004, 'David', 'Anderson', '444 Fourth St', 'Boston', '02115', 46000.00, '6175552004'),
    (5005, 'Eva', 'Thomas', '555 Fifth Dr', 'Cambridge', '02139', 44000.00, '6175552005'),
    (5006, 'Frank', 'Jackson', '666 Sixth Ln', 'Boston', '02108', 47000.00, '6175552006')
]
cursor.executemany('INSERT INTO Employee VALUES (?, ?, ?, ?, ?, ?, ?, ?)', employees)

# Insert Service Requirements
service_reqs = [
    (2001, 1001, '2024-12-09', '07:00', 120, 'Morning cleaning'),
    (2002, 1001, '2024-12-09', '17:00', 120, 'Evening cleaning'),
    (2003, 1002, '2024-12-10', '10:00', 180, 'Weekly deep clean'),
    (2004, 1003, '2024-12-11', '08:00', 90, 'Kitchen cleaning'),
    (2005, 1004, '2024-12-12', '14:00', 60, 'Quick cleanup'),
    (2006, 1005, '2024-12-13', '09:00', 240, 'Full day service')
]
cursor.executemany('INSERT INTO Service_Requirement VALUES (?, ?, ?, ?, ?, ?)', service_reqs)

# Insert Equipment
equipment = [
    (3001, 'Daily', 1200.50, 'Industrial vacuum cleaner'),
    (3002, 'Weekly', 850.00, 'Floor polisher'),
    (3003, 'As needed', 350.75, 'Carpet cleaner'),
    (3004, 'Daily', 200.00, 'High-pressure washer'),
    (3005, 'Monthly', 1500.00, 'Window cleaning kit'),
    (3006, 'Weekly', 600.25, 'Sanitizing sprayer')
]
cursor.executemany('INSERT INTO Equipment VALUES (?, ?, ?, ?)', equipment)

# Insert Assignments
assignments = [
    (5001, 2001),
    (5002, 2001),
    (5003, 2002),
    (5004, 2003),
    (5005, 2004),
    (5006, 2005),
    (5001, 2006)
]
cursor.executemany('INSERT INTO Assignment VALUES (?, ?)', assignments)

# Insert Requirement_Equipment
req_equipment = [
    (2001, 3001, 2),
    (2001, 3002, 1),
    (2002, 3001, 1),
    (2003, 3003, 3),
    (2004, 3004, 1),
    (2005, 3005, 2),
    (2006, 3006, 1)
]
cursor.executemany('INSERT INTO Requirement_Equipment VALUES (?, ?, ?)', req_equipment)

```

User Transactions:

TRANSACTION 1: Add a new client to the system

```
INSERT INTO Client VALUES (1007, 'Lisa', 'Garcia', '888 Sunset Blvd', 'Boston', '02110', '6175551007');
```

TRANSACTION 2: Record a new service requirement for a specific client

```
INSERT INTO Service_Requirement VALUES (2007, 1007, '2024-12-14', '13:00', 90, 'Initial consultation');
```

TRANSACTION 3: Insert a new assignment linking employee to service requirement

```
INSERT INTO Assignment VALUES (5002, 2007);
```

TRANSACTION 4: Retrieve service requirements for client 1001

```
SELECT requirementId, startDate, startTime, duration, comments  
FROM Service_Requirement  
WHERE clientNumber = 1001;
```

TRANSACTION 5: Retrieve all service requirements assigned to employee 5001

```
SELECT sr.requirementId, sr.startDate, sr.startTime, sr.duration,  
       c.firstName, c.lastName  
FROM Service_Requirement sr  
JOIN Assignment a ON sr.requirementId = a.requirementId  
JOIN Client c ON sr.clientNumber = c.clientNumber  
WHERE a.staffNumber = 5001;
```

```
# Query 1: Add a new client
print("\n1. Add a new client to the system")
cursor.execute('''
    INSERT INTO Client VALUES (1007, 'Lisa', 'Garcia', '888 Sunset Blvd',
                                'Boston', '02110', '6175551007')
''')
print("    Added client 1007: Lisa Garcia")

# Query 2: Record a new service requirement
print("\n2. Record a new service requirement for a specific client")
cursor.execute('''
    INSERT INTO Service_Requirement VALUES
    (2007, 1007, '2024-12-14', '13:00', 90, 'Initial consultation')
''')
print("    Added service requirement 2007 for client 1007")

# Query 3: Insert a new assignment
print("\n3. Insert a new assignment linking employee to service requirement")
cursor.execute('INSERT INTO Assignment VALUES (5002, 2007)')
print("    Assigned employee 5002 to requirement 2007")

# Query 4: Retrieve service requirements for client 1001
print("\n4. Retrieve service requirements for client 1001")
cursor.execute('''
    SELECT requirementId, startDate, startTime, duration, comments
    FROM Service_Requirement
    WHERE clientNumber = 1001
''')
results = cursor.fetchall()
column_names = [row[0] for row in cursor.description]
df = pd.DataFrame(results, columns=column_names)
print(df.to_string(index=False))

# Query 5: Retrieve all service requirements assigned to employee 5001
print("\n5. Retrieve all service requirements assigned to employee 5001")
cursor.execute('''
    SELECT sr.requirementId, sr.startDate, sr.startTime, sr.duration,
           c.firstName, c.lastName
    FROM Service_Requirement sr
    JOIN Assignment a ON sr.requirementId = a.requirementId
    JOIN Client c ON sr.clientNumber = c.clientNumber
    WHERE a.staffNumber = 5001
''')
```


Code output:

SUPERMAIDS CLEANING COMPANY – DATABASE IMPLEMENTATION

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DATABASE STATE BEFORE TRANSACTIONS

=====

Client:

| clientNumber | firstName | lastName | street | city | postCode | telephoneNumber |
|--------------|-----------|----------|--------------|------------|----------|-----------------|
| 1001 | John | Doe | 123 Main St | Boston | 02101 | 6175551001 |
| 1002 | Jane | Smith | 456 Oak Ave | Cambridge | 02138 | 6175551002 |
| 1003 | Robert | Johnson | 789 Pine Rd | Somerville | 02143 | 6175551003 |
| 1004 | Sarah | Williams | 321 Elm St | Boston | 02115 | 6175551004 |
| 1005 | Michael | Brown | 654 Maple Dr | Cambridge | 02139 | 6175551005 |
| 1006 | Emily | Davis | 987 Birch Ln | Boston | 02108 | 6175551006 |

Employee:

| staffNumber | firstName | lastName | street | city | postCode | salary | telephoneNumber |
|-------------|-----------|----------|----------------|------------|----------|---------|-----------------|
| 5001 | Alice | Wilson | 111 First St | Boston | 02101 | 45000.0 | 6175552001 |
| 5002 | Bob | Miller | 222 Second Ave | Cambridge | 02138 | 42000.0 | 6175552002 |
| 5003 | Carol | Taylor | 333 Third Rd | Somerville | 02143 | 48000.0 | 6175552003 |
| 5004 | David | Anderson | 444 Fourth St | Boston | 02115 | 46000.0 | 6175552004 |
| 5005 | Eva | Thomas | 555 Fifth Dr | Cambridge | 02139 | 44000.0 | 6175552005 |
| 5006 | Frank | Jackson | 666 Sixth Ln | Boston | 02108 | 47000.0 | 6175552006 |

Service_Requirement:

| requirementId | clientNumber | startDate | startTime | duration | comments |
|---------------|--------------|------------|-----------|----------|-------------------|
| 2001 | 1001 | 2024-12-09 | 07:00 | 120 | Morning cleaning |
| 2002 | 1001 | 2024-12-09 | 17:00 | 120 | Evening cleaning |
| 2003 | 1002 | 2024-12-10 | 10:00 | 180 | Weekly deep clean |
| 2004 | 1003 | 2024-12-11 | 08:00 | 90 | Kitchen cleaning |
| 2005 | 1004 | 2024-12-12 | 14:00 | 60 | Quick cleanup |
| 2006 | 1005 | 2024-12-13 | 09:00 | 240 | Full day service |

Equipment:

| equipmentId | usage | cost | description |
|-------------|-----------|---------|---------------------------|
| 3001 | Daily | 1200.50 | Industrial vacuum cleaner |
| 3002 | Weekly | 850.00 | Floor polisher |
| 3003 | As needed | 350.75 | Carpet cleaner |
| 3004 | Daily | 200.00 | High-pressure washer |
| 3005 | Monthly | 1500.00 | Window cleaning kit |
| 3006 | Weekly | 600.25 | Sanitizing sprayer |

Assignment:

| staffNumber | requirementId |
|-------------|---------------|
| 5001 | 2001 |
| 5002 | 2001 |
| 5003 | 2002 |
| 5004 | 2003 |
| 5005 | 2004 |
| 5006 | 2005 |
| 5001 | 2006 |

Requirement_Equipment:

| requirementId | equipmentId | quantity |
|---------------|-------------|----------|
| 2001 | 3001 | 2 |
| 2001 | 3002 | 1 |
| 2002 | 3001 | 1 |
| 2003 | 3003 | 3 |
| 2004 | 3004 | 1 |
| 2005 | 3005 | 2 |
| 2006 | 3006 | 1 |

1. Add a new client to the system
Added client 1007: Lisa Garcia
2. Record a new service requirement for a specific client
Added service requirement 2007 for client 1007
3. Insert a new assignment linking employee to service requirement
Assigned employee 5002 to requirement 2007
4. Retrieve service requirements for client 1001

| requirementId | startDate | startTime | duration | comments |
|---------------|------------|-----------|----------|------------------|
| 2001 | 2024-12-09 | 07:00 | 120 | Morning cleaning |
| 2002 | 2024-12-09 | 17:00 | 120 | Evening cleaning |
5. Retrieve all service requirements assigned to employee 5001

| requirementId | startDate | startTime | duration | firstName | lastName |
|---------------|------------|-----------|----------|-----------|----------|
| 2001 | 2024-12-09 | 07:00 | 120 | John | Doe |
| 2006 | 2024-12-13 | 09:00 | 240 | Michael | Brown |

===== All Table Contents =====

Client:

| clientNumber | firstName | lastName | street | city | postCode | telephoneNumber |
|--------------|-----------|----------|-----------------|------------|----------|-----------------|
| 1001 | John | Doe | 123 Main St | Boston | 02101 | 6175551001 |
| 1002 | Jane | Smith | 456 Oak Ave | Cambridge | 02138 | 6175551002 |
| 1003 | Robert | Johnson | 789 Pine Rd | Somerville | 02143 | 6175551003 |
| 1004 | Sarah | Williams | 321 Elm St | Boston | 02115 | 6175551004 |
| 1005 | Michael | Brown | 654 Maple Dr | Cambridge | 02139 | 6175551005 |
| 1006 | Emily | Davis | 987 Birch Ln | Boston | 02108 | 6175551006 |
| 1007 | Lisa | Garcia | 888 Sunset Blvd | Boston | 02110 | 6175551007 |

Employee:

| staffNumber | firstName | lastName | street | city | postCode | salary | telephoneNumber |
|-------------|-----------|----------|----------------|------------|----------|---------|-----------------|
| 5001 | Alice | Wilson | 111 First St | Boston | 02101 | 45000.0 | 6175552001 |
| 5002 | Bob | Miller | 222 Second Ave | Cambridge | 02138 | 42000.0 | 6175552002 |
| 5003 | Carol | Taylor | 333 Third Rd | Somerville | 02143 | 48000.0 | 6175552003 |
| 5004 | David | Anderson | 444 Fourth St | Boston | 02115 | 46000.0 | 6175552004 |
| 5005 | Eva | Thomas | 555 Fifth Dr | Cambridge | 02139 | 44000.0 | 6175552005 |
| 5006 | Frank | Jackson | 666 Sixth Ln | Boston | 02108 | 47000.0 | 6175552006 |

Service_Requirement:

| requirementId | clientNumber | startDate | startTime | duration | comments |
|---------------|--------------|------------|-----------|----------|----------------------|
| 2001 | 1001 | 2024-12-09 | 07:00 | 120 | Morning cleaning |
| 2002 | 1001 | 2024-12-09 | 17:00 | 120 | Evening cleaning |
| 2003 | 1002 | 2024-12-10 | 10:00 | 180 | Weekly deep clean |
| 2004 | 1003 | 2024-12-11 | 08:00 | 90 | Kitchen cleaning |
| 2005 | 1004 | 2024-12-12 | 14:00 | 60 | Quick cleanup |
| 2006 | 1005 | 2024-12-13 | 09:00 | 240 | Full day service |
| 2007 | 1007 | 2024-12-14 | 13:00 | 90 | Initial consultation |

Equipment:

| equipmentId | usage | cost | description |
|-------------|-----------|---------|---------------------------|
| 3001 | Daily | 1200.50 | Industrial vacuum cleaner |
| 3002 | Weekly | 850.00 | Floor polisher |
| 3003 | As needed | 350.75 | Carpet cleaner |
| 3004 | Daily | 200.00 | High-pressure washer |
| 3005 | Monthly | 1500.00 | Window cleaning kit |
| 3006 | Weekly | 600.25 | Sanitizing sprayer |

Assignment:

| staffNumber | requirementId |
|-------------|---------------|
| 5001 | 2001 |
| 5002 | 2001 |
| 5003 | 2002 |
| 5004 | 2003 |
| 5005 | 2004 |
| 5006 | 2005 |
| 5001 | 2006 |
| 5002 | 2007 |

Requirement_Equipment:

| requirementId | equipmentId | quantity |
|---------------|-------------|----------|
| 2001 | 3001 | 2 |
| 2001 | 3002 | 1 |
| 2002 | 3001 | 1 |
| 2003 | 3003 | 3 |
| 2004 | 3004 | 1 |
| 2005 | 3005 | 2 |
| 2006 | 3006 | 1 |

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PROJECT PART 3 COMPLETED SUCCESSFULLY!

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