**ILP Business Orientation Batch-1 : Assignment**

**Normalization of tables**

**Tables:**

**1] Employee Information**

Unnormalized:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EmployeeID** | **EmployeeName** | **Department** | **ManagerID** | **Salary** | **HireDate** |
| 1 | John Smith | HR | 101 | 50000 | 2022-01-15 |
| 2 | Alice Brown | IT | 102 | 60000 | 2022-02-20 |
| 3 | Mark Johnson | Sales | 101 | 55000 | 2022-03-10 |

Primary Key: EmployeeID

1NF form:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EmployeeID** | **EmployeeName** | **Department** | **ManagerID** | **Salary** | **HireDate** |
| 1 | John Smith | HR | 101 | 50000 | 2022-01-15 |
| 2 | Alice Brown | IT | 102 | 60000 | 2022-02-20 |
| 3 | Mark Johnson | Sales | 101 | 55000 | 2022-03-10 |

No changes were made, since every cell contained atomic values.

2NF form:

Employee Information

|  |  |  |  |
| --- | --- | --- | --- |
| **EmployeeID** | **EmployeeName** | **Salary** | **HireDate** |
| 1 | John Smith | 50000 | 2022-01-15 |
| 2 | Alice Brown | 60000 | 2022-02-20 |
| 3 | Mark Johnson | 55000 | 2022-03-10 |

Department and Manager Mapping

|  |  |  |
| --- | --- | --- |
| **EmployeeID** | **Department** | **ManagerID** |
| 1 | HR | 101 |
| 2 | IT | 102 |
| 3 | Sales | 101 |

3NF form (More efficient form):

Employee Information:

|  |  |  |  |
| --- | --- | --- | --- |
| **EmployeeID** | **EmployeeName** | **Salary** | **HireDate** |
| 1 | John Smith | 50000 | 2022-01-15 |
| 2 | Alice Brown | 60000 | 2022-02-20 |
| 3 | Mark Johnson | 55000 | 2022-03-10 |

Department Information

|  |  |
| --- | --- |
| **DepartmentID** | **Department** |
| D-1 | HR |
| D-2 | IT |
| D-3 | Sales |

Manager Information

|  |  |
| --- | --- |
| **ManagerID** | **ManagerName** |
| 101 | Kyle Brown |
| 102 | Portia Gardens |

Employee-Mapping Table

|  |  |  |
| --- | --- | --- |
| **EmployeeID** | **DepartmentID** | **ManagerID** |
| 1 | D-1 | 101 |
| 2 | D-2 | 102 |
| 3 | D-3 | 101 |

**2] Training Programs**

Unnormalized:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ProgramID** | **ProgramName** | **Trainer** | **Department** | **EmployeeID** | **EmployeeName** | **Date** |
| 1 | Java Fundamentals | John Smith | IT | 101 | Alice Brown | 2022-03-01 |
| 2 | Project Management | Sarah White | HR | 102 | Bob Green | 2022-03-10 |
| 3 | Sales Techniques | Mark Johnson | Sales | 103 | Charlie Black | 2022-03-20 |

Primary Key: ProgramID

1NF form:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ProgramID** | **ProgramName** | **Trainer** | **Department** | **EmployeeID** | **EmployeeName** | **Date** |
| 1 | Java Fundamentals | John Smith | IT | 101 | Alice Brown | 2022-03-01 |
| 2 | Project Management | Sarah White | HR | 102 | Bob Green | 2022-03-10 |
| 3 | Sales Techniques | Mark Johnson | Sales | 103 | Charlie Black | 2022-03-20 |

No changes were made, since every cell contained atomic values.

2NF form:

|  |  |  |
| --- | --- | --- |
| **ProgramID** | **ProgramName** | **Trainer** |
| 1 | Java Fundamentals | John Smith |
| 2 | Project Management | Sarah White |
| 3 | Sales Techniques | Mark Johnson |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ProgramID** | **Department** | **EmployeeID** | **EmployeeName** | **Date** |
| 1 | IT | 101 | Alice Brown | 2022-03-01 |
| 2 | HR | 102 | Bob Green | 2022-03-10 |
| 3 | Sales | 103 | Charlie Black | 2022-03-20 |

3NF form:

Program Information

|  |  |  |
| --- | --- | --- |
| **ProgramID** | **ProgramName** | **Trainer** |
| 1 | Java Fundamentals | John Smith |
| 2 | Project Management | Sarah White |
| 3 | Sales Techniques | Mark Johnson |

Employee Information

|  |  |
| --- | --- |
| **EmployeeID** | **EmployeeName** |
| 101 | Alice Brown |
| 102 | Bob Green |
| 103 | Charlie Black |

Program-Employee Mapping

|  |  |  |  |
| --- | --- | --- | --- |
| **ProgramID** | **Department** | **EmployeeID** | **Date** |
| 1 | IT | 101 | 2022-03-01 |
| 2 | HR | 102 | 2022-03-10 |
| 3 | Sales | 103 | 2022-03-20 |

More Efficient 3NF:

Employee Information

|  |  |
| --- | --- |
| **EmployeeID** | **EmployeeName** |
| 101 | Alice Brown |
| 102 | Bob Green |
| 103 | Charlie Black |

Program Information

|  |  |  |
| --- | --- | --- |
| **ProgramID** | **ProgramName** | **Trainer** |
| 1 | Java Fundamentals | John Smith |
| 2 | Project Management | Sarah White |
| 3 | Sales Techniques | Mark Johnson |

Department Information

|  |  |
| --- | --- |
| **DepartmentID** | **DeptName** |
| D-101 | IT |
| D-102 | HR |
| D-103 | Sales |

Employee-Department-Program Mapping

|  |  |  |  |
| --- | --- | --- | --- |
| **ProgramID** | **DepartmentID** | **EmployeeID** | **Date** |
| 1 | D-101 | 101 | 2022-03-01 |
| 2 | D-102 | 102 | 2022-03-10 |
| 3 | D-103 | 103 | 2022-03-20 |

**3] Customer Orders**

Unnormalized:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **OrderID** | **CustomerName** | **ProductID** | **ProductName** | **Qty** | **UnitPrice** | **TotalAmount** | **OrderDate** |
| 1 | John Doe | 101 | Laptop | 2 | 800 | 1600 | 2022-01-15 |
| 2 | Jane Smith | 102 | Smartphone | 1 | 500 | 500 | 2022-02-20 |
| 3 | John Doe | 103 | Printer | 1 | 200 | 200 | 2022-03-10 |

Primary Key: OrderID

1NF Form:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **OrderID** | **CustomerName** | **ProductID** | **ProductName** | **Qty** | **UnitPrice** | **TotalAmount** | **OrderDate** |
| 1 | John Doe | 101 | Laptop | 2 | 800 | 1600 | 2022-01-15 |
| 2 | Jane Smith | 102 | Smartphone | 1 | 500 | 500 | 2022-02-20 |
| 3 | John Doe | 103 | Printer | 1 | 200 | 200 | 2022-03-10 |

No changes were made, since every cell contained atomic values.

2NF Form:

|  |  |  |
| --- | --- | --- |
| **OrderID** | **CustomerName** | **OrderDate** |
| 1 | John Doe | 2022-01-15 |
| 2 | Jane Smith | 2022-02-20 |
| 3 | John Doe | 2022-03-10 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **OrderID** | **ProductID** | **ProductName** | **Qty** | **UnitPrice** | **TotalAmount** |
| 1 | 101 | Laptop | 2 | 800 | 1600 |
| 2 | 102 | Smartphone | 1 | 500 | 500 |
| 3 | 103 | Printer | 1 | 200 | 200 |

3NF Form:

Order Information

|  |  |  |
| --- | --- | --- |
| **OrderID** | **CustomerName** | **OrderDate** |
| 1 | John Doe | 2022-01-15 |
| 2 | Jane Smith | 2022-02-20 |
| 3 | John Doe | 2022-03-10 |

Product Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ProductID** | **ProductName** | **Qty** | **UnitPrice** | **TotalAmount** |
| 101 | Laptop | 2 | 800 | 1600 |
| 102 | Smartphone | 1 | 500 | 500 |
| 103 | Printer | 1 | 200 | 200 |

Order-Product Information

|  |  |
| --- | --- |
| **OrderID** | **ProductID** |
| 1 | 101 |
| 2 | 102 |
| 3 | 103 |

More Efficient 3NF:

Order Information

|  |  |  |
| --- | --- | --- |
| **OrderID** | **CustomerID** | **OrderDate** |
| 1 | C-1 | 2022-01-15 |
| 2 | C-2 | 2022-02-20 |
| 3 | C-1 | 2022-03-10 |

Customer Information

|  |  |
| --- | --- |
| **CustomerID** | **CustomerName** |
| C-1 | John Doe |
| C-2 | Jane Smith |

Product Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ProductID** | **ProductName** | **Qty** | **UnitPrice** | **TotalAmount** |
| 101 | Laptop | 2 | 800 | 1600 |
| 102 | Smartphone | 1 | 500 | 500 |
| 103 | Printer | 1 | 200 | 200 |

Order-Product Mapping

|  |  |
| --- | --- |
| **OrderID** | **ProductID** |
| 1 | 101 |
| 2 | 102 |
| 3 | 103 |

**4] Stress Management**

Unnormalized:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EmployeeID** | **FirstName** | **LastName** | **StressLevel** | **HoursOfWork** | **BreaksTaken** | **PhysicalActivity** | **CounselingSessions** |
| 101 | Sarah | White | Moderate | 45 | 3 | Yoga | 2 |
| 102 | Bob | Green | High | 50 | 2 | Jogging | 1 |
| 103 | Charlie | Black | Low | 40 | 4 | Meditation | 3 |
| 104 | David | Miller | High | 48 | 1 | Gym | 2 |
| 105 | Jane | Doe | Moderate | 42 | 3 | Walking | 1 |

Primary Key: EmployeeID

1NF Form:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EmployeeID** | **FirstName** | **LastName** | **StressLevel** | **HoursOfWork** | **BreaksTaken** | **PhysicalActivity** | **CounselingSessions** |
| 101 | Sarah | White | Moderate | 45 | 3 | Yoga | 2 |
| 102 | Bob | Green | High | 50 | 2 | Jogging | 1 |
| 103 | Charlie | Black | Low | 40 | 4 | Meditation | 3 |
| 104 | David | Miller | High | 48 | 1 | Gym | 2 |
| 105 | Jane | Doe | Moderate | 42 | 3 | Walking | 1 |

No changes were made, since every cell contained atomic values.

2NF Form:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EmployeeID** | **FirstName** | **LastName** | **HoursOfWork** | **BreaksTaken** |
| 101 | Sarah | White | 45 | 3 |
| 102 | Bob | Green | 50 | 2 |
| 103 | Charlie | Black | 40 | 4 |
| 104 | David | Miller | 48 | 1 |
| 105 | Jane | Doe | 42 | 3 |

|  |  |  |  |
| --- | --- | --- | --- |
| **EmployeeID** | **StressLevel** | **PhysicalActivity** | **CounselingSessions** |
| 101 | Moderate | Yoga | 2 |
| 102 | High | Jogging | 1 |
| 103 | Low | Meditation | 3 |
| 104 | High | Gym | 2 |
| 105 | Moderate | Walking | 1 |

3NF Form:

Employee Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EmployeeID** | **FirstName** | **LastName** | **HoursOfWork** | **BreaksTaken** |
| 101 | Sarah | White | 45 | 3 |
| 102 | Bob | Green | 50 | 2 |
| 103 | Charlie | Black | 40 | 4 |
| 104 | David | Miller | 48 | 1 |
| 105 | Jane | Doe | 42 | 3 |

Stress Information

|  |  |
| --- | --- |
| **StressType** | **StressLevel** |
| S-1 | Low |
| S-2 | Moderate |
| S-3 | High |

Employee-Stress Mapping

|  |  |  |  |
| --- | --- | --- | --- |
| **EmployeeID** | **StressType** | **PhysicalActivity** | **CounselingSessions** |
| 101 | S-2 | Yoga | 2 |
| 102 | S-3 | Jogging | 1 |
| 103 | S-1 | Meditation | 3 |
| 104 | S-3 | Gym | 2 |
| 105 | S-2 | Walking | 1 |

**5] Flea Market**

Unnormalized:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ItemID** | **SellerName** | **ItemName** | **Category** | **Price** | **Quantity** | **Description** | **Condition** | **Location** | **DateListed** |
| 101 | John's Treasures | Vintage Chair | Furniture | 50.00 | 2 | Beautiful vintage chair, excellent condition | Like New | Booth 15, Section A | 2022-01-15 |
| 102 | Alice's Finds | Antique Clock | Home Decor | 80.00 | 1 | Authentic antique clock with Roman numerals | Good | Stall 8, Section B | 2022-02-20 |
| 103 | Mark's Collectibles | Vinyl Records | Music | 15.00 | 10 | Various artists and genres, in good condition | Used | Booth 20, Section C | 2022-03-10 |
| 104 | Emma's Treasures | Vintage Jewelry | Accessories | 35.00 | 5 | Assorted vintage jewelry pieces, unique designs | Excellent | Stall 12, Section D | 2022-04-05 |
| 105 | Robert's Finds | Retro Camera | Electronics | 60.00 | 1 | Vintage Polaroid camera with original case | Good | Booth 5, Section A | 2022-05-15 |

Primary Key: ItemID

1NF Form:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ItemID** | **SellerName** | **ItemName** | **Category** | **Price** | **Quantity** | **Description** | **Condition** | **Location** | **DateListed** |
| 101 | John's Treasures | Vintage Chair | Furniture | 50.00 | 2 | Beautiful vintage chair, excellent condition | Like New | Booth 15, Section A | 2022-01-15 |
| 102 | Alice's Finds | Antique Clock | Home Decor | 80.00 | 1 | Authentic antique clock with Roman numerals | Good | Stall 8, Section B | 2022-02-20 |
| 103 | Mark's Collectibles | Vinyl Records | Music | 15.00 | 10 | Various artists and genres, in good condition | Used | Booth 20, Section C | 2022-03-10 |
| 104 | Emma's Treasures | Vintage Jewelry | Accessories | 35.00 | 5 | Assorted vintage jewelry pieces, unique designs | Excellent | Stall 12, Section D | 2022-04-05 |
| 105 | Robert's Finds | Retro Camera | Electronics | 60.00 | 1 | Vintage Polaroid camera with original case | Good | Booth 5, Section A | 2022-05-15 |

No changes were made, since every cell contained atomic values.

2NF Form:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ItemID** | **ItemName** | **Category** | **Price** | **Quantity** | **Description** | **Condition** |
| 101 | Vintage Chair | Furniture | 50.00 | 2 | Beautiful vintage chair, excellent condition | Like New |
| 102 | Antique Clock | Home Decor | 80.00 | 1 | Authentic antique clock with Roman numerals | Good |
| 103 | Vinyl Records | Music | 15.00 | 10 | Various artists and genres, in good condition | Used |
| 104 | Vintage Jewelry | Accessories | 35.00 | 5 | Assorted vintage jewelry pieces, unique designs | Excellent |
| 105 | Retro Camera | Electronics | 60.00 | 1 | Vintage Polaroid camera with original case | Good |

|  |  |  |  |
| --- | --- | --- | --- |
| **ItemID** | **SellerName** | **Location** | **DateListed** |
| 101 | John's Treasures | Booth 15, Section A | 2022-01-15 |
| 102 | Alice's Finds | Stall 8, Section B | 2022-02-20 |
| 103 | Mark's Collectibles | Booth 20, Section C | 2022-03-10 |
| 104 | Emma's Treasures | Stall 12, Section D | 2022-04-05 |
| 105 | Robert's Finds | Booth 5, Section A | 2022-05-15 |

3NF Form:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ItemID** | **ItemName** | **Category** | **Price** | **Quantity** | **Description** | **Condition** |
| 101 | Vintage Chair | Furniture | 50.00 | 2 | Beautiful vintage chair, excellent condition | Like New |
| 102 | Antique Clock | Home Decor | 80.00 | 1 | Authentic antique clock with Roman numerals | Good |
| 103 | Vinyl Records | Music | 15.00 | 10 | Various artists and genres, in good condition | Used |
| 104 | Vintage Jewelry | Accessories | 35.00 | 5 | Assorted vintage jewelry pieces, unique designs | Excellent |
| 105 | Retro Camera | Electronics | 60.00 | 1 | Vintage Polaroid camera with original case | Good |

|  |  |  |
| --- | --- | --- |
| **ItemID** | **SellerID** | **DateListed** |
| 101 | S-1 | 2022-01-15 |
| 102 | S-2 | 2022-02-20 |
| 103 | S-3 | 2022-03-10 |
| 104 | S-4 | 2022-04-05 |
| 105 | S-5 | 2022-05-15 |

|  |  |  |
| --- | --- | --- |
| **SellerID** | **SellerName** | **Location** |
| S-1 | John's Treasures | Booth 15, Section A |
| S-2 | Alice's Finds | Stall 8, Section B |
| S-3 | Mark's Collectibles | Booth 20, Section C |
| S-4 | Emma's Treasures | Stall 12, Section D |
| S-5 | Robert's Finds | Booth 5, Section A |

**6] Learning Management System**

Unnormalized:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **CourseName** | **Instructor** | **Department** | **Credits** | **Enrolled**  **Students** | **StartDate** | **EndDate** | **Location** | **Availability** |
| 101 | Introduction to Biology | Prof. Smith | Science | 3 | 25 | 2022-01-15 | 2022-05-10 | Room 101 | Open |
| 102 | Programming in Python | Prof. Brown | Computer Science | 4 | 30 | 2022-02-20 | 2022-06-15 | Lab 3, Building B | Closed |
| 103 | Financial Accounting | Prof. Green | Finance | 3 | 20 | 2022-03-10 | 2022-07-05 | Room 201 | Open |
| 104 | English Literature | Prof. White | Humanities | 3 | 22 | 2022-04-05 | 2022-08-20 | Room 301 | Open |
| 105 | Web Development Fundamentals | Prof. Black | IT | 4 | 28 | 2022-05-15 | 2022-09-25 | Lab 2, Building A | Closed |

Primary Key: CID (Course ID)

1NF Form:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CID** | **CourseName** | **Instructor** | **Department** | **Credits** | **Enrolled**  **Students** | **StartDate** | **EndDate** | **Location** | **Availability** |
| 101 | Introduction to Biology | Prof. Smith | Science | 3 | 25 | 2022-01-15 | 2022-05-10 | Room 101 | Open |
| 102 | Programming in Python | Prof. Brown | Computer Science | 4 | 30 | 2022-02-20 | 2022-06-15 | Lab 3, Building B | Closed |
| 103 | Financial Accounting | Prof. Green | Finance | 3 | 20 | 2022-03-10 | 2022-07-05 | Room 201 | Open |
| 104 | English Literature | Prof. White | Humanities | 3 | 22 | 2022-04-05 | 2022-08-20 | Room 301 | Open |
| 105 | Web Development Fundamentals | Prof. Black | IT | 4 | 28 | 2022-05-15 | 2022-09-25 | Lab 2, Building A | Closed |

No changes were made, since every cell contained atomic values.

2NF Form:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **CourseName** | **Credits** | **Enrolled**  **Students** | **StartDate** | **EndDate** | **Availability** |
| 101 | Introduction to Biology | 3 | 25 | 2022-01-15 | 2022-05-10 | Open |
| 102 | Programming in Python | 4 | 30 | 2022-02-20 | 2022-06-15 | Closed |
| 103 | Financial Accounting | 3 | 20 | 2022-03-10 | 2022-07-05 | Open |
| 104 | English Literature | 3 | 22 | 2022-04-05 | 2022-08-20 | Open |
| 105 | Web Development Fundamentals | 4 | 28 | 2022-05-15 | 2022-09-25 | Closed |

|  |  |  |  |
| --- | --- | --- | --- |
| **CID** | **Instructor** | **Department** | **Location** |
| 101 | Prof. Smith | Science | Room 101 |
| 102 | Prof. Brown | Computer Science | Lab 3, Building B |
| 103 | Prof. Green | Finance | Room 201 |
| 104 | Prof. White | Humanities | Room 301 |
| 105 | Prof. Black | IT | Lab 2, Building A |

3NF Form:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **CourseName** | **Credits** | **Enrolled**  **Students** | **StartDate** | **EndDate** | **Availability** |
| 101 | Introduction to Biology | 3 | 25 | 2022-01-15 | 2022-05-10 | Open |
| 102 | Programming in Python | 4 | 30 | 2022-02-20 | 2022-06-15 | Closed |
| 103 | Financial Accounting | 3 | 20 | 2022-03-10 | 2022-07-05 | Open |
| 104 | English Literature | 3 | 22 | 2022-04-05 | 2022-08-20 | Open |
| 105 | Web Development Fundamentals | 4 | 28 | 2022-05-15 | 2022-09-25 | Closed |

|  |  |  |
| --- | --- | --- |
| **InstructorID** | **Instructor** | **Department** |
| I-1 | Prof. Smith | Science |
| I-2 | Prof. Brown | Computer Science |
| I-3 | Prof. Green | Finance |
| I-4 | Prof. White | Humanities |
| I-5 | Prof. Black | IT |

|  |  |  |
| --- | --- | --- |
| **CID** | **InstructorID** | **Location** |
| 101 | I-1 | Room 101 |
| 102 | I-2 | Lab 3, Building B |
| 103 | I-3 | Room 201 |
| 104 | I-4 | Room 301 |
| 105 | I-5 | Lab 2, Building A |