**UNNORMALIZED**

Project = (ProjectNum, ProjectName, Status, StartDate, {EmployeeNum, EmployeeName, Title, DeptNum, DeptName, EmployeeProjectHours} )

**Note:**

* Each employee has only one job title.
* Each employee belongs to only one department.
* Each employee may be assigned to more than one project.
* EmployeeProjectHours is the number of hours the employee was assigned to that project.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ProjectNum | ProjectName | Status | StartDate |  |
| 1 | Database | Active | 27/03/23 | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | EmployeeNum | EmployeeName | TItle | DeptNum | DeptName | EmployeeProjectHours | | 1 | Steph | Teacher | 1 | Comp Sci | 90 | | 2 | Pete | Student | 1 | Comp Sci | 70 | |
| 2 | Design | Upcoming | 30/04/23 | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | EmployeeNum | EmployeeName | TItle | DeptNum | DeptName | EmployeeProjectHours | | 1 | Steph | Teacher | 1 | Comp Sci | 75 | |
| 3 | Java | Upcoming | 15/05/23 | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | EmployeeNum | EmployeeName | TItle | DeptNum | DeptName | EmployeeProjectHours | | 3 | Jack | Student | 2 | Arts | 45 | |

**1NF – each field has a value, uniquely identify each row, non-divisible fields**

Projects = (ProjectNum, ProjectName, Status, StartDate, EmployeeNum, EmployeeName, Title, DeptNum, DeptName, EmployeeProjectHours)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ProjectNum | ProjectName | Status | StartDate | EmployeeNum | EmployeeName | TItle | DeptNum | DeptName | EmployeeProjectHours |
| 1 | Database | Active | 27/03/23 | 1 | Steph | Teacher | 1 | Comp Sci | 90 |
| 1 | Database | Active | 27/03/23 | 2 | Pete | Student | 1 | Comp Sci | 70 |
| 2 | Design | Upcoming | 30/04/23 | 1 | Steph | Teacher | 1 | Comp Sci | 75 |
| 3 | Java | Upcoming | 15/05/23 | 3 | Jack | Student | 2 | Arts | 45 |

**2NF – must be in 1NF, remove partial dependencies**

Project = (ProjectNum, ProjectName, Status, StartDate)

Employee = (EmployeeNum, EmployeeName, Title, DeptNum, DeptName)

EmployeeProject = (ProjectNum, EmployeeNum, EmployeeProjectHours)

|  |  |  |  |
| --- | --- | --- | --- |
| ProjectNum | ProjectName | Status | StartDate |
| 1 | Database | Active | 27/03/23 |
| 2 | Design | Upcoming | 30/04/23 |
| 3 | Java | Upcoming | 15/05/23 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EmployeeNum | EmployeeName | TItle | DeptNum | DeptName |
| 1 | Steph | Teacher | 1 | Comp Sci |
| 2 | Pete | Student | 1 | Comp Sci |
| 3 | Jack | Student | 2 | Arts |

|  |  |  |
| --- | --- | --- |
| ProjectNum | EmployeeNum | EmployeeProjectHours |
| 1 | 1 | 90 |
| 1 | 2 | 70 |
| 2 | 1 | 75 |
| 3 | 3 | 45 |

**3NF – must be in 2NF, remove transitive dependencies**

Project = (ProjectNum, ProjectName, Status, StartDate)

Employee = (EmployeeNum, EmployeeName, Title, DeptNum, DeptName)

EmployeeProject = (ProjectNum, EmployeeNum, EmployeeProjectHours)

Department = (DeptNum, DeptName)

|  |  |  |  |
| --- | --- | --- | --- |
| ProjectNum | ProjectName | Status | StartDate |
| 1 | Database | Active | 27/03/23 |
| 2 | Design | Upcoming | 30/04/23 |
| 3 | Java | Upcoming | 15/05/23 |

|  |  |  |  |
| --- | --- | --- | --- |
| EmployeeNum | EmployeeName | TItle | DeptNum |
| 1 | Steph | Teacher | 1 |
| 2 | Pete | Student | 1 |
| 3 | Jack | Student | 2 |

|  |  |  |
| --- | --- | --- |
| ProjectNum | EmployeeNum | EmployeeProjectHours |
| 1 | 1 | 90 |
| 1 | 2 | 70 |
| 2 | 1 | 75 |
| 3 | 3 | 45 |

|  |  |
| --- | --- |
| DeptNum | DeptName |
| 1 | Comp Sci |
| 2 | Arts |