

1.

1.1.

Employee (empNo, givenname, surname, DOB, gender, deptNo*, dept_name*)

Department (deptNo, dept_name, location, manager*)

WorkOn (empNo*, projNo, proj_name, deptNo, hours)

Highest form of Employee relation is 2NF

Prime attribute is empNo

Non Prime attributes are givenname, surname, DOB, gender, deptNo*, dept_name*)

Here, The relation fails at 3NF because non-prime attribute dept_name is determined by another non-prime attribute dept_No. Transitive property occurs in this relation because empNo -> deptNo and deptNo-> deptname.

Highest form Department relation is 1NF

Prime attributes are deptNo, location

Non Prime attributes are dept_name, manager

Here dept_name can be determined by dept_No. Since a prime attribute is fully dependent on proper subset of prime key, it is violation of second normal form.

Highest form of workon is 1NF

Prime attributes are empNo, projNo

Non Prime attributes are proj_name, deptNo, hours

Here, dept_name can be determined by emp_No as mentioned in the functional dependency. We have partial dependency here, WorkOn is violation of 2NF.

1.2.

a) Minimal basis of functional dependency for employee relation :

empNo -> givenname

empNo -> surname

empNo -> DOB

empNo -> deptNo

empNo -> dept_name

deptNo -> manager

Decomposed BCNF relation:

Emp_Info (empNo (PK), givenname, surname, DOB, deptNo*)

Department (deptNo (PK), Dept_name, manager)

b) Minimal basis of functional dependency for department relation

deptNo -> dept_name

deptNo -> manager

Decomposed BCNF relation :

Department (Dept No (PK), dept_name, manager)
 As obtained in the first process of decomposition of Employee tables
 Department_location (DeptNo* (pk), location (pk))

c) Minimal basis functional dependency for Workon relation

projNo -> proj_name

projNo -> deptNo

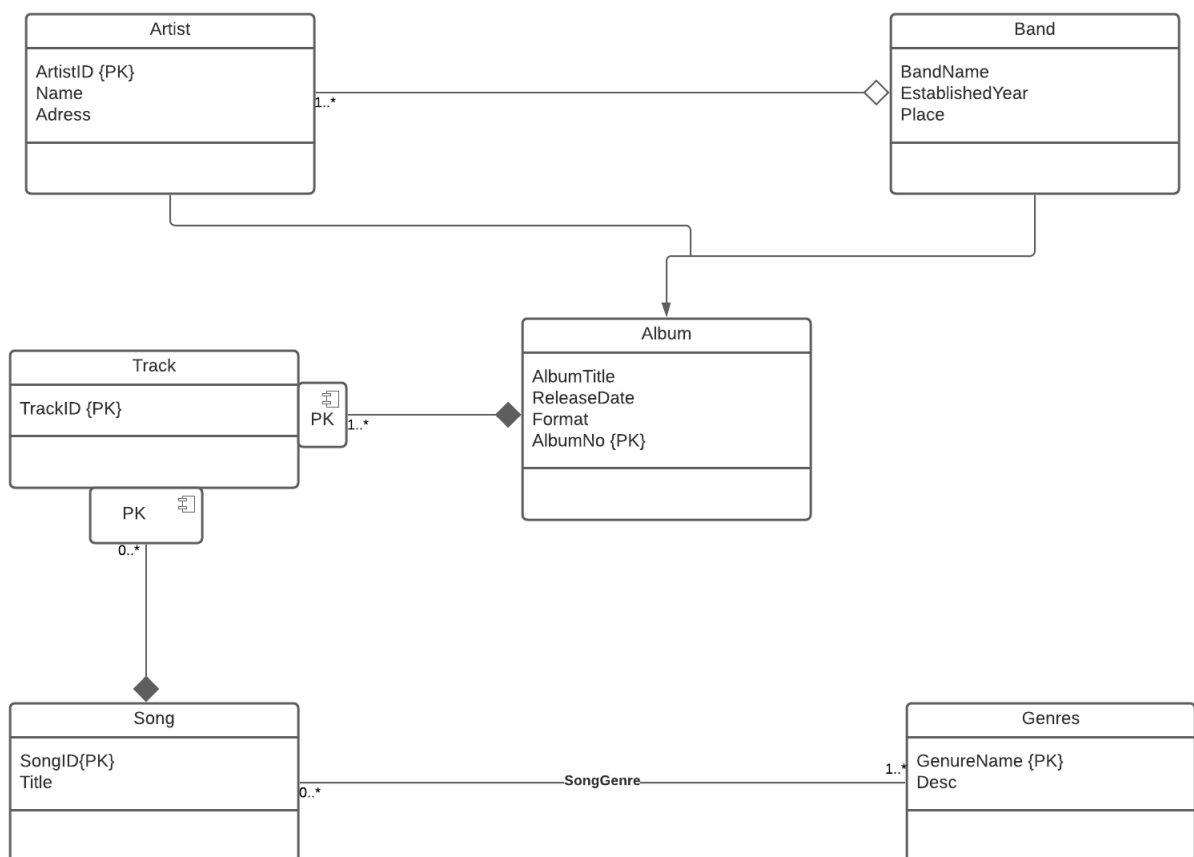
empNo, projNo -> hours

Decomposed BCNF Relation :

Project_det (projNo (pk), proj_name, deptNo")

Workon (empNo" (pk), projNo (pk), hours)

2.



3.

Software (softName, function)

Customer (custID, custName, address)

Contract(softName*,custID*)

Release (softName*, versionNo, feature)

Tester (empNo, empName)

TestCase (testNo, type, desc)

Test (versionNo*, testNo*, softName*, empNo*)

Project (projID, title, start date, end date, versionNo*, softName*)

WorkOn (projID*, empNo*)