

Lab 9 Database Management:

1. Functional Dependencies:

People: PID → fname, lname, age

Engineers: PID → highestAcademicDegreeEarned, favorite video game

FlightControlOperators: PID → chairPref, prefDrink, hangoverCure

Astronauts: PID → yearsFlying, golfHandicap, spouseName

Spacecrafts: SID → name, tail#, weightTONS, fuelType, crewCapacity

Crew: PID, SID →

Systems: SysID → name, descr, costUSD

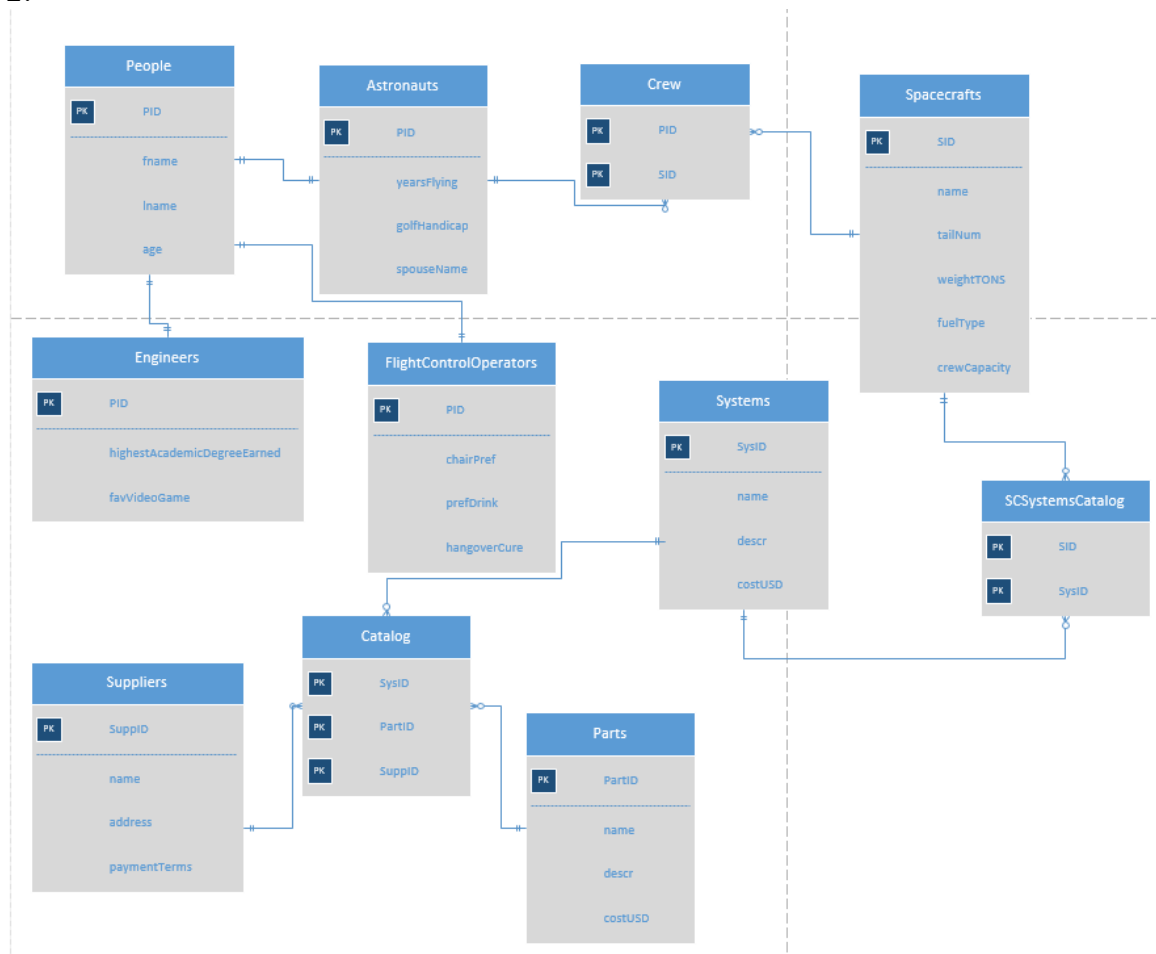
SpaceCraftSystemCatalog: SID, SysID →

Parts: PartID → name, descr, costUSD

Suppliers: SuppID → name, address, paymentTerms

Catalog: SysID, PartID, SuppID →

2.



3. My design is in Third Normal Form and Boyce-Codd normal form because it is in 1st and Second normal form and it has no transitive dependencies or multi-key dependencies. To break this down into a proof, we can start by ensuring the tables are in first normal

form. Since all of the columns are datatypes and require single input values, then we can say that they are atomic and thus all tables are in first normal form. The only field that would potentially dispute this is the address field, where we could argue it has internal structure. However, for the purpose of this assignment, we will say that the address has no internal structure and is thus in first normal form.

Once we have first normal form, we then must show there are no partial key dependencies to prove that the tables are in 2nd normal form. In most of the tables, the keys are not composite and therefore they have no chance of partial dependency problems. The keys that are composite reside in tables that have no other attributes so they clearly do not have partial dependencies.

The third requirement to be in 3rd normal form is that there are no other potential keys. In all the tables with a single key, there are no other unique elements that would make a good primary key. This is the reason that we created artificial primary keys for them. In the other tables, the composite keys come from the primary keys of the entities involved in the relation. There is nothing that is determined by them, so since they are all included in the key there is no way there could be any other key. Based on our functional dependencies and the structure of our tables, we can say that we have 3rd normal form. Boyce-Codd works as well because in the weak entities where it would be a problem, there are no attributes functionally determined by the key that could make it a problem.

Thus, we have 3rd Normal form and Boyce-Codd normal form.