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CMPT 308

Lab 9 – Function Dependencies and 3NF

Functional Dependencies:

eid → FirstName, LastName, age

Engineers.eid → degree, FavVidGame

FlightControlOps.eid → chairPref, PrefDrink, HangCure

Astronauts.eid → yrsFlying, GolfHandi, SpouseName

drivesIn.eid, drivesIn.CraftName →

Spacecraft.CraftName → tail#, wgtTons, FuelType, crewCap

Spacecraft.CraftName, SysInCraft.SysName →

Systems.SysName → descrip, costUSD

PartsInSystem.SysName, PartsInSystem.PartName →

Parts.partName → descry, costUSD

Catalog.Supname, Catalog.PartName →

Suppliers.SupName → address, PayTerms

Third-Normal Form Explanation:

This database is constructed using entity subtypes for all "employees", where Astronauts, Engineers, and Flight Control Operators are all subtypes of "employee", the supertype. Every type of employee has a distinct "eid" that cannot be repeated, and a first name, last name, and age that depends only on that eid. Engineers have a

degree and a favorite video game, where flight control operators and astronauts do not. Likewise, Flight Control Operators have a chair preference, preferred drink and hangover cure, whereas the other types do not. Astronauts have years flying, a golf handicap, and a spouse name where the other types do not. Each of these characteristics is organized such that they depend only on the primary key (eid) in each table, and nothing but that primary key (eid).

Given the provided information, an astronaut is the only type of employee that can drive a spacecraft. Given this, an associative entity is necessary to connect the astronauts to the spacecrafts they drive (hence the "drivesIn" table). Since a spacecraft has many systems, an associative entity is necessary to connect these as well. The same relationship is true for systems and parts as well as parts to suppliers. These are all connected by associative entities. Each one of these tables, as indicated in the ER diagram, have fields that apply only on their respective primary key, and there are no transitive dependencies on any of them. For this reason, the database is in 3NF and BCNF.