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Assignment 8: Normalization 3

Design and document with a fully annotated ER diagram, then build, a relational database for NASA using the following data. You may create primary keys for strong entities.

Engineers: First name, last name, highest degree, age, favorite video game

Astronauts: First name, last name, years flying, age, golf handicap

Flight Control Operators: First name, last name, chair preference, age, preferred drink

Spacecraft: name, tail number, weight in tons, fuel type, crew capacity

Crew: who (astronauts) Flew on what spacecraft

Systems: name, description (a spacecraft has many systems)

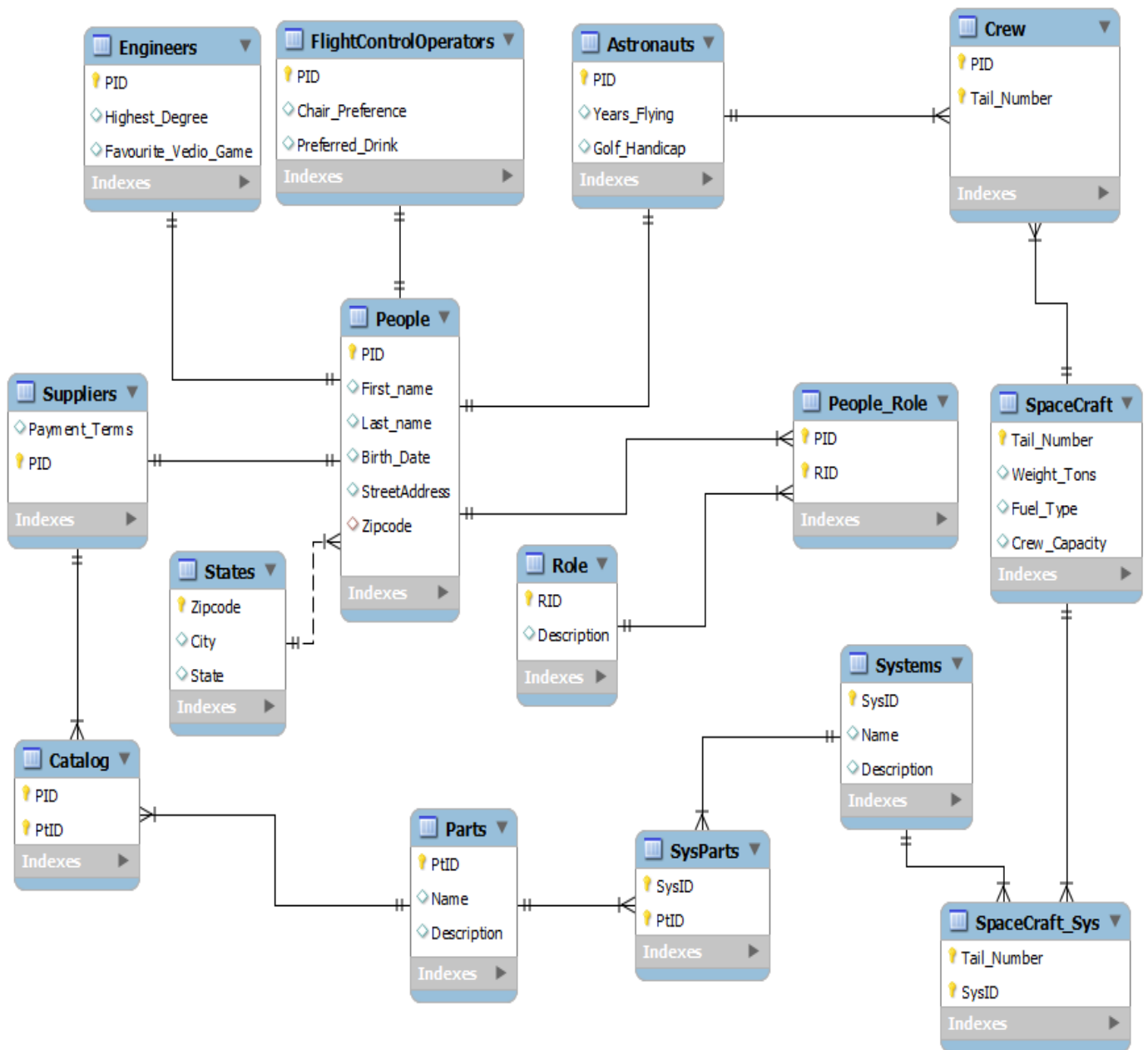
Parts: name, description (a system has many parts)

Suppliers: name, address, payment terms (suppliers supply parts for systems for spacecraft)

Catalog: who supplies what parts

Insert a little test data so that you can be sure that your referential integrity constraints are working properly.

Solution 1: ER diagram of the above database is given below:



Create Statements:

-- States table

```
create table States(  
    Zipcode      integer,  
    City         text,  
    State        text,  
    Primary key(Zipcode)  
);
```

-- People table

```
create table People(  
    PID          char(3),  
    First_name   text not null,  
    Last_name    text not null,  
    Birth_Date   Date,  
    StreetAddress text,  
    Zipcode      integer not null references States(Zipcode),  
    Primary key(PID)  
);
```

-- Role table

```
create table Role(  
    RID          char(3),  
    Description   text,  
    Primary key(RID)  
);
```

-- People_Role table

```
create table People_Role(  
    PID          char(3) not null references People(PID),  
    RID          char(3) not null references Role(RID),  
    Primary key(PID,RID)  
);
```

-- Engineers table

```
create table Engineers(  
    PID                                char(3) not null references People(PID),  
    Highest_Degree                    text,  
    Favourite_Vedio_Game              text,  
    Primary key(PID)  
);
```

-- FlightControlOperators table

```
create table FlightControlOperators(  
    PID                                char(3) not null references People(PID),  
    Chair_Preference                  text,  
    Preferred_Drink                   text,  
    Primary key(PID)  
);
```

-- Astronauts table

```
create table Astronauts (  
    PID                                char(3) not null references People(PID),  
    Year_Flying                       int,  
    Golf_Handicap                     int,  
    Primary key(PID)  
);
```

-- Suppliers table

```
create table Suppliers(  
    PID                                char(3) not null references People(PID),  
    Payment_Terms                     text,  
    Primary key(PID)  
);
```

-- SpaceCraft table

```
create table SpaceCraft (  
    Tail_Number                       char(3),  
    Weight_Tons                       decimal,  
    Fuel_Type                          text,
```

```
        Crew_Capacity          int,  
        Primary key(Tail_Number)  
    );
```

-- Crew table

```
create table Crew(  
    PID                char(3) not null references Astronauts(PID),  
    Tail_Number        char(3) not null references SpaceCraft(Tail_Number),  
    Primary key(PID, Tail_Number)  
);
```

-- Systems table

```
create table Systems (  
    SysID              char(3),  
    Name               text,  
    Description        text,  
    Primary key(SysID)  
);
```

-- SpaceCraft_Sys table

```
create table SpaceCraft_Sys(  
    Tail_Number        char(3) not null references SpaceCraft(Tail_Number),  
    SysID              char(3) not null references Systems(SysID),  
    Primary key(Tail_Number , SysID)  
);
```

-- Parts table

```
create table Parts (  
    PtID              char(3),  
    Name              text,  
    Description        text,  
    Primary key(PtID)  
);
```

-- SysParts table

```
create table SysParts (  
    PtID              char(3),  
    SysID              char(3),  
    Primary key(PtID, SysID)
```

```
        SysID          char(3) not null references Systems(SysID),
        PtID           char(3) not null references Parts(PtID),
    Primary key(SysID,PtID)
);
```

-- Catalog table

```
create table Catalog (
    PID                char(3) not null references Suppliers(PID),
    PtID               char(3) not null references Parts(PtID),
    Primary key(PID,PtID)
);
```

Insert Statements:

--Role:

```
INSERT INTO Role( RID, Description )  
VALUES('r01', 'Engineer');
```

```
INSERT INTO Role( RID, Description )  
VALUES('r02', 'FlightControlOperator');
```

```
INSERT INTO Role( RID, Description )  
VALUES('r03', 'Astronauts');
```

```
INSERT INTO Role( RID, Description )  
VALUES('r04', 'Suppliers');
```

```
select * from Role;
```

	rid character(3)	description text
1	r01	Engineer
2	r02	FlightControlOperator
3	r03	Astronauts
4	r04	Suppliers

--States:

```
INSERT INTO States( Zipcode, City, State )  
VALUES('12601', 'Poughkeepsie', 'NY');
```

```
INSERT INTO States( Zipcode, City, State )  
VALUES('12203', 'Albany', 'NY');
```

```
INSERT INTO States( Zipcode, City, State )  
VALUES('12533', 'Hopewell junction', 'NY');
```

```
INSERT INTO States( Zipcode, City, State )  
VALUES('12540', 'Orange', 'NY');
```

```
INSERT INTO States( Zipcode, City, State )  
VALUES('10006', 'Manhattan', 'NY');
```

```
INSERT INTO States( Zipcode, City, State )
VALUES('12538', 'Hyde Park', 'NY');
```

```
INSERT INTO States( Zipcode, City, State )
VALUES('12569', 'Pleasant Valley', 'NY');
```

```
select * from States;
```

	zipcode integer	city text	state text
1	12601	Poughkeepsie	NY
2	12203	Albany	NY
3	12533	Hopewell junction	NY
4	12540	Orange	NY
5	10006	Manhattan	NY
6	12538	Hyde Park	NY
7	12569	Pleasant Valley	NY

--People:

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P01', 'Jackson', 'Brown', '12-04-1970', '27 Main Street', '12601');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P02', 'Gus', 'Frein', '12-04-1971', '17 Deer Creek Way', '12203');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P03', 'Georgy', 'Black', '01-10-1973', '255 Sunny Pl', '12533');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P04', 'Harrison', 'Ford', '10-04-1970', '1024 South Rd', '12601');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P05', 'Jason', 'Alexander', '11-09-1969', '14 Wallaby Way', '12538');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P06', 'Catherine', 'Harper', '10-04-1960', '1628 Fairway Dr', '10006');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
VALUES('P07', 'Deborah', 'Goddard', '12-08-1975', '118 Franklin Ave', '12533');
```

```
INSERT INTO People( PID, First_naMe, Last_naMe, Birth_Date, StreetAddress, Zipcode )
```



```
VALUES('P08', 'Sean' , 'Connery', '08-07-1979' , '128 Front St', '12569');
```

```
INSERT INTO People( PID, First_name, Last_name, Birth_Date, StreetAddress, Zipcode )  
VALUES('P09', 'Martin' , 'Stanford', '09-05-1974' , '185 Willis Ave', '12540');
```

```
INSERT INTO People( PID, First_name, Last_name, Birth_Date, StreetAddress, Zipcode )  
VALUES('P10', 'Elle' , 'Morrison', '10-04-1971' , '189 Willis Ave', '12540');
```

```
Select * from People;
```

	pid character(3)	first_name text	last_name text	birth_date date	streetaddress text	zipcode integer
1	P01	Jackson	Brown	1970-12-04	27 Main Street	12601
2	P02	Gus	Frein	1971-12-04	17 Deer Creek Way	12203
3	P03	Georgy	Black	1973-01-10	255 Sunny Pl	12533
4	P04	Harrison	Ford	1970-10-04	1024 South Rd	12601
5	P05	Jason	Alexander	1969-11-09	14 Wallaby Way	12538
6	P06	Catherine	Harper	1960-10-04	1628 Fairway Dr	10006
7	P07	Deborah	Goddard	1975-12-08	118 Franklin Ave	12533
8	P08	Sean	Connery	1979-08-07	128 Front St	12569
9	P09	Martin	Stanford	1974-09-05	185 Willis Ave	12540
10	P10	Elle	Morrison	1971-10-04	189 Willis Ave	12540

--People_Role:

```
INSERT INTO People_Role( PID, RID )  
VALUES('P01', 'r01');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P01', 'r03');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P02', 'r01');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P03', 'r03');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P04', 'r04');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P05', 'r03');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P05', 'r01');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P06', 'r02');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P07', 'r01');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P08', 'r03');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P09', 'r04');
```

```
INSERT INTO People_Role( PID, RID )  
VALUES('P10', 'r02');
```

```
Select * from People_Role;
```

	pid character(3)	rid character(3)
1	P01	r01
2	P01	r03
3	P02	r01
4	P03	r03
5	P04	r04
6	P05	r03
7	P05	r01
8	P06	r02
9	P07	r01
10	P08	r03
11	P09	r04
12	P10	r02

--Engineers:

```
INSERT INTO Engineers( PID, Highest_degree, Favourite_Vedio_Game)  
VALUES('P01', 'Graduate', 'Artillery');
```

```
INSERT INTO Engineers( PID, Highest_degree, Favourite_Vedio_Game)  
VALUES('P02', 'Graduate', 'Stone Sling');
```

```
INSERT INTO Engineers( PID, Highest_degree, Favourite_Vedio_Game)
```

```
VALUES('P05', 'Graduate', 'Tank Wars');
```

```
INSERT INTO Engineers( PID, Highest_degree, Favourite_Vedio_Game)  
VALUES('P07', 'Graduate', 'Gorillas');
```

```
select * from Engineers;
```

	pid character(3)	highest_degree text	favourite_vedio_game text
1	P01	Graduate	Artillery
2	P02	Graduate	Stone Sling
3	P05	Graduate	Tank Wars
4	P07	Graduate	Gorillas

--FlightControlOperators:

```
INSERT INTO FlightControlOperators( PID, Chair_Preference, Preferred_Drink)  
VALUES('P06', 'First chair', 'Coffee');
```

```
INSERT INTO FlightControlOperators( PID, Chair_Preference, Preferred_Drink)  
VALUES('P10', 'Pilot chair', 'Mocha');
```

```
select * from FlightControlOperators;
```

	pid character(3)	chair_preference text	preferred_drink text
1	P06	First chair	Coffee
2	P10	Pilot chair	Mocha

--Astronauts:

```
INSERT INTO Astronauts( PID, Year_Flying, Golf_Handicap)  
VALUES('P01', '10', '30');
```

```
INSERT INTO Astronauts( PID, Year_Flying, Golf_Handicap)  
VALUES('P03', '15', '56');
```

```
INSERT INTO Astronauts( PID, Year_Flying, Golf_Handicap)  
VALUES('P05', '20', '12');
```

```
INSERT INTO Astronauts( PID, Year_Flying, Golf_Handicap)  
VALUES('P08', '12', '63');
```

select * from Astronauts;

	pid character(3)	year_flying integer	golf_handicap integer
1	P01	10	30
2	P03	15	56
3	P05	20	12
4	P08	12	63

--Suppliers:

```
INSERT INTO Suppliers( PID, Payment_Terms)
VALUES('P04','Payment in advance');
```

```
INSERT INTO Suppliers( PID, Payment_Terms)
VALUES('P09','Payment 60 days after invoice date');
```

select * from Suppliers;

	pid character(3)	payment_terms text
1	P04	Payment in advance
2	P09	Payment 60 days after invoice date

--SpaceCraft:

```
INSERT INTO SpaceCraft( Tail_number, Weight_Tons, Fuel_Type, Crew_Capacity)
VALUES('T01','2.89','monomethyl hydrazine','4');
```

```
INSERT INTO SpaceCraft( Tail_number, Weight_Tons, Fuel_Type, Crew_Capacity)
VALUES('T02','1.89','Batteries','2');
```

```
INSERT INTO SpaceCraft( Tail_number, Weight_Tons, Fuel_Type, Crew_Capacity)
VALUES('T03','2.22','Radioisotope thermoelectric generator','3');
```

select * from SpaceCraft;

	tail_number character(3)	weight_tons numeric	fuel_type text	crew_capacity integer
1	T01	2.89	monomethyl hydrazine	4
2	T02	1.89	Batteries	2
3	T03	2.22	Radioisotope thermoelectric generator	3

--Crew:

```
INSERT INTO Crew( PID, Tail_Number)
VALUES('P01','T01');
```

```
INSERT INTO Crew( PID, Tail_Number)
VALUES('P03','T02');
```

```
INSERT INTO Crew( PID, Tail_Number)
VALUES('P05','T03');
```

```
INSERT INTO Crew( PID, Tail_Number)
VALUES('P08','T01');
```

```
select * from Crew;
```

	pid character(3)	tail_number character(3)
1	P01	T01
2	P03	T02
3	P05	T03
4	P08	T01

--Systems:

```
INSERT INTO Systems( SysID, Name, Description)
VALUES('S01','High-gain antenna',' High-gain antennas are typically used on interplanetary spacecraft');
```

```
INSERT INTO Systems( SysID, Name, Description)
VALUES('S02','Spacecraft clock',' It meters the passing of time during the life of the spacecraft');
```

```
INSERT INTO Systems( SysID, Name, Description)
VALUES('S03','Reaction wheels',' Electrically-powered wheels mounted in three orthogonal axes aboard
a spacecraft');
```

```
select * from Systems;
```

	sysid character(3)	name text	description text
1	S01	High-gain antenna	High-gain antennas are typically used on interplanetary spacecraft
2	S02	Spacecraft clock	It meters the passing of time during the life of the spacecraft
3	S03	Reaction wheels	Electrically-powered wheels mounted in three orthogonal axes aboard a spacecraft

--SpaceCraft_Sys:

```
INSERT INTO SpaceCraft_Sys( Tail_Number, SysID)
VALUES('T01','S01');
```

```
INSERT INTO SpaceCraft_Sys( Tail_Number, SysID)
VALUES('T01','S02');
```

```
INSERT INTO SpaceCraft_Sys( Tail_Number, SysID)
VALUES('T02','S03');
```

```
INSERT INTO SpaceCraft_Sys( Tail_Number, SysID)
VALUES('T03','S03');
```

```
INSERT INTO SpaceCraft_Sys( Tail_Number, SysID)
VALUES('T03','S02');
```

```
select * from SpaceCraft_Sys;
```

	tail_number character(3)	sysid character(3)
1	T01	S01
2	T01	S02
3	T02	S03
4	T03	S03
5	T03	S02

--Parts:

```
INSERT INTO Parts( PtId, Name, Description)
VALUES('Pt1','Transmitter','The transmitter radiates the resulting signal, called downlink, from an antenna');
```

```
INSERT INTO Parts( PtId, Name, Description)
VALUES('Pt2','RAM','Random access memory');
```

```
INSERT INTO Parts( PtId, Name, Description)
VALUES('Pt3','Propellant','The fuel and oxidizer burned to produce thrust in a rocket engine');
```

```
Select * from Parts;
```

	ptid character(3)	name text	description text
1	Pt1	Transmitter	The transmitter radiates the resulting signal, called downlink, from an antenna
2	Pt2	RAM	Random access memory
3	Pt3	Propellant	The fuel and oxidizer burned to produce thrust in a rocket engine

--SysParts:

```
INSERT INTO SysParts( SysID, Ptid)
VALUES('S01','Pt1');
```

```
INSERT INTO SysParts( SysID, Ptid)
VALUES('S02','Pt1');
```

```
INSERT INTO SysParts( SysID, Ptid)
VALUES('S02','Pt3');
```

```
INSERT INTO SysParts( SysID, Ptid)
VALUES('S03','Pt2');
```

```
INSERT INTO SysParts( SysID, Ptid)
VALUES('S03','Pt3');
```

```
Select * from SysParts;
```

	sysid character(3)	ptid character(3)
1	S01	Pt1
2	S02	Pt1
3	S02	Pt3
4	S03	Pt2
5	S03	Pt3

--Catalog:

```
INSERT INTO Catalog( PID, Ptid)
VALUES('P04','Pt1');
```

```
INSERT INTO Catalog( PID, Ptid)
VALUES('P09','Pt2');
```

```
INSERT INTO Catalog( PID, Ptid)
VALUES('P04','Pt3');
```

```
INSERT INTO Catalog( PID, Ptid)
VALUES('P09','Pt1');
```

```
select * from Catalog;
```

	pid character(3)	ptid character(3)
1	P04	Pt1
2	P09	Pt2
3	P04	Pt3
4	P09	Pt1

Query to find who has supplied System parts of 'Spacecraft clock' :

[illegible]