**BEAR Project: Final Report**

**DBDS DataBase Design Speciallists, Inc.**

“We are always 5NF.”

**To: Design Team Leader**

**From:** Hampshire, Jason NN:15, DA

**Subject:** BEAR Final Report

**Date: December 5, 2021 (late submission)**

**Logical Data Model**

**Graphical user interface, diagram

Description automatically generated**

**Physical Data Model**

**Graphical user interface

Description automatically generated with low confidence**

***Test Query Results:***

**1)** **What electric vehicle has the largest milage?**

VNumber

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E0014

**2) For each bicycle, list all of its rentals in chronological (date) order**

VNumber RentDate

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B0001 2020-12-10 10:30:00.000

B0001 2020-12-11 10:00:00.000

B0001 2020-12-16 10:30:00.000

B0003 2020-12-16 09:30:00.000

B0011 2020-12-10 10:30:00.000

B0011 2020-12-16 09:30:00.000

B0011 2020-12-16 13:30:00.000

T0002 2020-12-19 10:30:00.000

**3) What is the location of the Downtown Site?**

Name Address

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Downtown Site 423 Main St.

**4) List the top 2 bicycles base on the number of hours rented**

VNumber TimeTotal

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B0001 960

B0011 480

**5) List the electric automobile rentals made in October 2020 and in December 2020 at the Airport Site.**

VNumber RentDate

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E0012 2020-10-14 09:30:00.000

E0012 2020-12-27 10:30:00.000

E0523 2020-12-26 09:30:00.000

E0524 2020-12-29 06:00:00.000

**6) What vehicles are currently available for rent?**

VNumber

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B0011

B0003

T0002

B0011

B0011

E0444

E0523

**7) List the renters of bicycles and the types of bicycles they rented**

Name Type

------------------------------ ----

Anne Green R

Bill Brown R

Bill Smith R

Evan Black R

Evan Black T

Gail White R

**8) Who (Name and ID) manages the Downtown Site?**

Name ID

------------------ -----

Mary Manager P0101

**9) Who (Name and ID) has access to Suburban Site vehicle data?**

Name ID

------------------ -----

NULL NULL

Jane Smith P2109

Joe Brown P2108

Mike Green P2303

Sam Supervisor P0103

**10) How many times has each vehicle actually been rented?**

VNumber Frequency

------- -----------

B0001 3

B0003 1

B0011 3

E0012 4

E0014 1

E0444 1

E0523 1

E0524 1

T0002 1

**11) List the vehicles maintained by P2108**

VNumber

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B0001

B0010

E0012

**12) List the vehicle, type, and date rented for all vehicles rented by Anne Green.**

VNumber Type StartTime

------- ---- -----------------------

B0001 B 2020-12-10 10:30:00.000

B0011 B 2020-12-16 09:30:00.000

B0011 B 2020-12-16 13:30:00.000

E0012 E 2020-11-26 09:30:00.000

**Appendix:**

***DML INSERT Statements:***

CREATE TABLE Bike

(

VNumber char(5) NOT NULL ,

Type char(1) NULL ,

HourRate float NULL ,

MaxCharge float NULL ,

Size int NULL ,

PRIMARY KEY CLUSTERED (VNumber ASC)

)

go

CREATE TABLE Bike\_Type

(

Type char(1) NOT NULL ,

Description char(6) NULL ,

PRIMARY KEY CLUSTERED (Type ASC)

)

go

CREATE TABLE Certification

(

PersonNumber char(5) NOT NULL ,

CertType char(1) NULL ,

Description char(9) NULL ,

DatePassed datetime NULL ,

PRIMARY KEY CLUSTERED (PersonNumber ASC)

)

go

CREATE TABLE ElectricVehicle

(

VNumber char(5) NOT NULL ,

Miles int NULL ,

BaseRate float NULL ,

MinuteRate float NULL ,

VIN char(10) NULL ,

PRIMARY KEY CLUSTERED (VNumber ASC)

)

go

CREATE TABLE Maintenance

(

PersonNumber char(5) NOT NULL ,

PRIMARY KEY CLUSTERED (PersonNumber ASC)

)

go

CREATE TABLE Management

(

PersonNumber char(5) NOT NULL ,

LastAccessDate datetime NULL ,

PRIMARY KEY CLUSTERED (PersonNumber ASC)

)

go

CREATE TABLE Personnel

(

PersonNumber char(5) NOT NULL ,

BeginningDate datetime NULL ,

EndDate datetime NULL ,

Name char(18) NULL ,

PRIMARY KEY CLUSTERED (PersonNumber ASC)

)

go

CREATE TABLE Renter

(

RenterID int NOT NULL ,

DOB datetime NULL ,

License char(10) NULL ,

Name char(30) NULL ,

Address char(50) NULL ,

PRIMARY KEY CLUSTERED (RenterID ASC)

)

go

CREATE TABLE Rents

(

RenterID int NOT NULL ,

VNumber char(5) NOT NULL ,

StartTime datetime NULL ,

EndTime datetime NULL ,

PRIMARY KEY CLUSTERED (RenterID ASC,VNumber ASC)

)

go

CREATE TABLE Site

(

SiteID char(2) NOT NULL ,

Address char(50) NULL ,

Name char(30) NULL ,

PersonNumber char(5) NULL ,

PRIMARY KEY CLUSTERED (SiteID ASC)

)

go

CREATE TABLE Status

(

Status char(1) NOT NULL ,

Description char(11) NULL ,

PRIMARY KEY CLUSTERED (Status ASC)

)

go

CREATE TABLE Tasks

(

PersonNumber char(5) NOT NULL ,

VNumber char(5) NOT NULL ,

DateStarted datetime NULL ,

DateCompleted datetime NULL ,

Comment char(25) NULL ,

PRIMARY KEY CLUSTERED (PersonNumber ASC,VNumber ASC)

)

go

CREATE TABLE Vehicle

(

VNumber char(5) NOT NULL ,

Type char(1) NULL ,

Status char(1) NULL ,

Rents int NULL ,

SiteID char(2) NULL ,

PurchaseDate char(8) NULL ,

PRIMARY KEY CLUSTERED (VNumber ASC)

)

go

ALTER TABLE Bike

ADD FOREIGN KEY (VNumber) REFERENCES Vehicle(VNumber)

go

ALTER TABLE Bike

ADD FOREIGN KEY (Type) REFERENCES Bike\_Type(Type)

go

ALTER TABLE Certification

ADD FOREIGN KEY (PersonNumber) REFERENCES Maintenance(PersonNumber)

go

ALTER TABLE ElectricVehicle

ADD FOREIGN KEY (VNumber) REFERENCES Vehicle(VNumber)

go

ALTER TABLE Maintenance

ADD FOREIGN KEY (PersonNumber) REFERENCES Personnel(PersonNumber)

go

ALTER TABLE Management

ADD FOREIGN KEY (PersonNumber) REFERENCES Personnel(PersonNumber)

go

ALTER TABLE Rents

ADD FOREIGN KEY (VNumber) REFERENCES Vehicle(VNumber)

go

ALTER TABLE Rents

ADD FOREIGN KEY (RenterID) REFERENCES Renter(RenterID)

go

ALTER TABLE Site

ADD FOREIGN KEY (PersonNumber) REFERENCES Management(PersonNumber)

go

ALTER TABLE Tasks

ADD FOREIGN KEY (PersonNumber) REFERENCES Maintenance(PersonNumber)

go

ALTER TABLE Tasks

ADD FOREIGN KEY (VNumber) REFERENCES Vehicle(VNumber)

go

ALTER TABLE Vehicle

ADD FOREIGN KEY (SiteID) REFERENCES Site(SiteID)

go

ALTER TABLE Vehicle

ADD FOREIGN KEY (Status) REFERENCES Status(Status)

go

####################

(second generation to fix two tables that were incorrect)

CREATE TABLE Rents

(

RentID int NOT NULL ,

VNumber char(5) NOT NULL ,

RenterID int NOT NULL ,

StartTime datetime NULL ,

EndTime datetime NULL ,

PRIMARY KEY CLUSTERED (RentID ASC)

)

go

CREATE TABLE Tasks

(

TaskID char(5) NOT NULL ,

PersonNumber char(5) NOT NULL ,

VNumber char(5) NOT NULL ,

DateStarted datetime NULL ,

DateCompleted datetime NULL ,

Comment char(25) NULL ,

PRIMARY KEY CLUSTERED (TaskID ASC)

)

go

ALTER TABLE Rents

ADD FOREIGN KEY (VNumber) REFERENCES Vehicle(VNumber)

go

ALTER TABLE Rents

ADD FOREIGN KEY (RenterID) REFERENCES Renter(RenterID)

go

ALTER TABLE Tasks

ADD FOREIGN KEY (PersonNumber) REFERENCES Maintenance(PersonNumber)

go

ALTER TABLE Tasks

ADD FOREIGN KEY (VNumber) REFERENCES Vehicle(VNumber)

go

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***SELECT \* for all tables***

**Bike:**

VNumber Type HourRate MaxCharge Size

------- ---- ---------------------- ---------------------- -----------

B0001 R 8 56 26

B0003 R 6 43 24

B0010 R 8 56 26

B0011 R 8 56 26

T0002 T 10 70 26

**Bike Type:**

Type Description

---- -----------

R Road

T Tandem

**Certification:**

PersonNumber CertType Description DatePassed

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P2108 B Bicycle 2016-11-06 00:00:00.000

P2108 E Electric 2016-11-10 00:00:00.000

P2108 K Kiosk 2016-11-04 00:00:00.000

P2109 B Bicycle 2016-11-06 00:00:00.000

P2202 B Bicycle 2016-11-06 00:00:00.000

P2303 B Bicycle 2016-11-25 00:00:00.000

P2303 E Electric 2016-11-20 00:00:00.000

**ElectricVehicle:**

VNumber Miles BaseRate MinuteRate VIN

------- ----------- ---------------------- ---------------------- ----------

E0012 2505 9 0.4 EV10000234

E0014 3505 9 0.4 EV10000235

E0444 1200 10 0.4 EV10000500

E0523 500 11 0.5 EV10000600

E0524 10 11 0.5 EV10000601

**Maintenance:**

PersonNumber

------------

P2108

P2109

P2202

P2303

**Management:**

PersonNumber LastAccessDate

------------ -----------------------

P0000 NULL

P0101 NULL

P0102 NULL

P0103 NULL

**Personnel:**

PersonNumber BeginningDate EndDate Name

------------ ----------------------- ----------------------- ------------------

P0000 NULL NULL Bob Bureaucrat

P0101 NULL NULL NULL

P0102 NULL NULL NULL

P0103 NULL NULL NULL

P2108 2016-11-03 00:00:00.000 NULL Joe Brown

P2109 2016-11-03 00:00:00.000 NULL Jane Smith

P2202 2016-11-05 00:00:00.000 NULL Frank Martin

P2213 2016-11-10 00:00:00.000 2016-11-20 00:00:00.000 Anne Dough

P2303 2016-11-10 00:00:00.000 NULL Mike Green

P2309 2017-01-10 00:00:00.000 NULL Alice Grey

P2400 2017-01-10 00:00:00.000 NULL Joe Brown

**Renter:**

RenterID DOB License Name Address

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1 1995-01-02 00:00:00.000 IN24340020 Anne Green 233 Main St.

2 1990-11-03 00:00:00.000 IN24388033 John Dough 123 1st St.

3 2000-10-04 00:00:00.000 IN67800000 Bill Smith 444 W. State.

4 1997-06-06 00:00:00.000 KY44230100 Gail White PO Box 2388.

8 1995-04-12 00:00:00.000 IN24500001 Evan Black 42 Blvd Pl

9 1997-06-06 00:00:00.000 TX99923411 Bill Brown 888 Tudor Dr

**Rents:**

RentID VNumber RenterID StartTime EndTime

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1 B0001 1 2020-12-10 12:30:00.000 2020-12-10 12:30:00.000

2 B0011 1 2020-12-16 12:30:00.000 2020-12-16 12:30:00.000

3 B0001 3 2020-12-11 16:00:00.000 2020-12-11 16:00:00.000

4 B0001 4 2020-12-16 18:30:00.000 2020-12-16 18:30:00.000

5 B0003 8 2020-12-16 12:30:00.000 2020-12-16 12:30:00.000

6 T0002 8 2020-12-19 12:30:00.000 2020-12-19 12:30:00.000

7 B0011 9 2020-12-10 12:30:00.000 2020-12-10 12:30:00.000

8 B0011 1 2020-12-16 16:30:00.000 2020-12-16 16:30:00.000

9 E0012 1 2020-11-26 09:30:00.000 2020-11-26 18:30:00.000

10 E0012 2 2020-11-27 10:30:00.000 2020-11-27 18:30:00.000

11 E0014 2 2020-11-26 10:30:00.000 2020-11-26 14:30:00.000

12 E0444 4 2020-11-29 09:30:00.000 2020-11-30 09:30:00.000

13 E0012 8 2020-10-14 09:30:00.000 2020-10-15 13:30:00.000

14 E0523 8 2020-12-26 09:30:00.000 2020-01-02 18:30:00.000

15 E0524 9 2020-12-29 06:00:00.000 2020-12-21 13:00:00.000

16 E0012 2 2020-12-27 10:30:00.000 2020-12-27 18:30:00.000

**Site:**

SiteID Address Name PersonNumber

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AS 44 Airport Dr. Airport Site P0102

DS 423 Main St. Downtown Site P0101

SS 22 Center Circle Suburban Site P0103

**Status:**

Status Description

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A Available

M Maintenance

R Rented

**Tasks:**

TaskID PersonNumber VNumber DateStarted DateCompleted Comment

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T0001 P2108 E0012 2017-01-10 00:00:00.000 2017-01-10 00:00:00.000 Broken wiper

T0002 P2109 B0003 2017-01-11 00:00:00.000 2017-01-11 00:00:00.000 Flat tire

T0003 P2108 B0001 2017-11-10 00:00:00.000 2017-11-10 00:00:00.000 Broken chain

T0004 P2109 B0003 2017-11-11 00:00:00.000 2017-11-11 00:00:00.000 Flat tire

T0005 P2108 B0010 2017-01-20 00:00:00.000 2017-01-20 00:00:00.000 New wheel

T0006 P2303 E0524 2017-12-20 00:00:00.000 2017-12-21 00:00:00.000 Initial checks

**Vehicle:**

VNumber Type Status Rents SiteID PurchaseDate

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B0001 B R 3 SS Aug 2020

B0003 B A 1 SS Aug 2020

B0010 B M 0 DS NULL

B0011 B A 3 DS Oct 2020

E0012 E R 4 AS Sep 2020

E0014 E R 3 AS Sep 2020

E0444 E A 3 SS Nov 2020

E0523 E A 0 SS Dec 2020

E0524 E M 0 SS Dec 2020

T0002 B A 4 SS Aug 2020

**Query Code:**

USE BEAR15;

-- 1) What electric vehicle has the largest milage?

SELECT VNumber FROM ElectricVehicle

WHERE Miles = (SELECT MAX(Miles) FROM ElectricVehicle);

-- 2) For each bicycle, list all of its rentals in chronological (date) order

SELECT Rents.VNumber, StartTime AS RentDate FROM Rents

JOIN Bike ON Rents.VNumber = Bike.VNumber

ORDER BY Rents.VNumber, Rents.StartTime;

-- 3) What is the location of the Downtown Site?

SELECT Name, Address

FROM Site

WHERE SiteID = 'DS';

-- 4) List the top 2 bicycles base on the number of hours rented

SELECT TOP 2 Rents.VNumber, SUM(DATEDIFF(mi, StartTime, EndTime)) as TimeTotal FROM Rents

JOIN Bike ON Rents.VNumber = Bike.VNumber

GROUP BY Rents.VNumber

ORDER BY TimeTotal DESC;

-- 5) List the electric automobile rentals made in October 2020 and in December 2020 at the Airport Site.

SELECT Rents.VNumber, StartTime AS RentDate FROM Rents

JOIN ElectricVehicle ON ElectricVehicle.VNumber = Rents.VNumber

WHERE StartTime between '2020-10-1' AND '2020-10-31'

OR StartTime between '2020-12-1' AND '2020-12-31';

-- 6) What vehicles are currently available for rent?

SELECT Rents.VNumber FROM Rents

JOIN Vehicle ON Vehicle.VNumber = Rents.VNumber

WHERE Vehicle.Status = 'A'

-- 7) List the renters of bicycles and the types of bicycles they rented

SELECT DISTINCT Renter.Name, Bike.Type FROM Renter

JOIN Rents ON Rents.RenterID = Renter.RenterID

JOIN Bike ON Rents.VNumber = Bike.VNumber

ORDER BY Renter.Name;

-- 8) Who (Name and ID) manages the Downtown Site?

SELECT Personnel.Name, Personnel.PersonNumber AS ID FROM Personnel

JOIN Site ON Site.PersonNumber = Personnel.PersonNumber

WHERE Site.SiteID = 'DS';

-- 9) Who (Name and ID) has access to Suburban Site vehicle data?

SELECT DISTINCT Personnel.Name, Personnel.PersonNumber AS ID FROM Personnel

FULL JOIN Tasks ON Tasks.PersonNumber = Personnel.PersonNumber

FULL JOIN Vehicle ON Vehicle.VNumber = Tasks.VNumber

FULL JOIN Site ON Site.PersonNumber = Personnel.PersonNumber

WHERE Site.SiteID = 'SS'

OR Vehicle.SiteID = 'SS';

-- 10) How many times has each vehicle actually been rented?

SELECT Rents.VNumber, COUNT(RENTS.VNumber) AS Frequency FROM Rents

GROUP BY Rents.VNumber;

-- 11) List the vehicles maintained by P2108

SELECT DISTINCT Vehicle.VNumber FROM Vehicle

JOIN Tasks ON Vehicle.VNumber = Tasks.VNumber

WHERE Tasks.PersonNumber = 'P2108';

-- 12) List the vehicle, type, and date rented for all vehicles rented by Anne Green.

SELECT Rents.VNumber, Vehicle.Type, Rents.StartTime FROM Rents

JOIN Vehicle ON Vehicle.VNumber = Rents.VNumber

JOIN Renter ON Renter.RenterID = Rents.RenterID

WHERE RENTER.Name = 'Anne Green';

***Draft Models:***

***Draft 1(Logical Only):***

Diagram

Description automatically generated

***Draft 2(Logical then Physical):***

***Diagram

Description automatically generated***

***Graphical user interface, diagram

Description automatically generated***

***Draft 3 (Logical then Physical):***

***Diagram

Description automatically generated***

***A picture containing text, screenshot, sign

Description automatically generated***

***Functional Dependencies:***

**Timeline

Description automatically generated with medium confidence**

**Timeline

Description automatically generated with medium confidence**

**Timeline

Description automatically generated with medium confidence**