DOTS is committed to providing safe, cost effective and innovative services that anticipate the needs of our growing community of more than 50,000 students,faculty and staff in the city of College Park and beyond.

We have designed a conceptual schema for the Transport Department using the entity relationship model, which aims for easy management of all the departments, employees, vehicles, and routes. Every employee has a unique employee Id and his full name is stored in two fields[first name, last name] and has all the other required information along with multiple phone numbers. An employee can work only in one department, whereas a department can have multiple employees. There are 7 departments that are identified by a unique department ID and have multiple vehicles assigned. All the vehicles are identified by a unique vehicle ID and are assigned to only one employee at a time and the Licence No of that employee must be noted. The routes can have a unique route Id. A vehicle going on a route must have at least one employee assigned. There are events, described by origin, destination, duration and capacity, for which a vehicle and a driver(employee) must be booked. The department can place multiple orders which have count and cost details.

Our database keeps track of all employees, departments, events and orders for the maintenance of the vehicles assigned for the easy transportation of all the students of UMD campus.

MISSION:

Mission Statement

The main objective of this project is to have a simple but efficient database structure for the Department of Transportation in order to maintain the data and to look into real time day-to-day schedules and activities of the various departments that are a part of DOTS. This database along with the university student database can be helpful in increasing the service times and expanding the routes for the benefit of students accordingly.The final aim is to provide seamless transportation service to all the students of the University.

Mission Objectives

As DOTS consultant we aim to provide DOTS UMD with the following services:

- To show the number of NITERide pickups in each location points
- To gain insights about the events that occur and to use them for predicting peak event booking times.
- To identify replacements for assigned employees.
- To know which department actively recruits the most number of students from the University.
- To count the number of UMD students employed by each department.
- To show the number of NITERide dropOff in each location points.

ER SCHEMA:

Entities, Attributes and Primary Keys

Employee (**empId**, empName, -empFirstName, -empLastName, empSSN, empStuUID, empAddress, -empAddressLine1, -empAddressLine2, -empZip, -empCity, empPhnNumber[1,2..],empWeeklyHours)

Vehicle (**vhId,** vhModel, vhCapacity, vhRunningStatus)

Route (**rotNo**, rotStartLoc, rotEndLoc, rotStopCount, rotFrequency)

Department (**dptId**, dptDescription, dptEmpCount, dptVehCount)

Event (**eveId**, eveDate, eveOrigin, eveDestination, eveDuration, eveCapacity)

Location (**locId**, locName, locCoordinate, -locLattitude, -locLongitude)

Relationships, Attributes, Degrees, Participating Entities and Constraints:

Work: binary relationship
1 Employee to 1 and only 1 Department
1 Department to 1 or many Employee

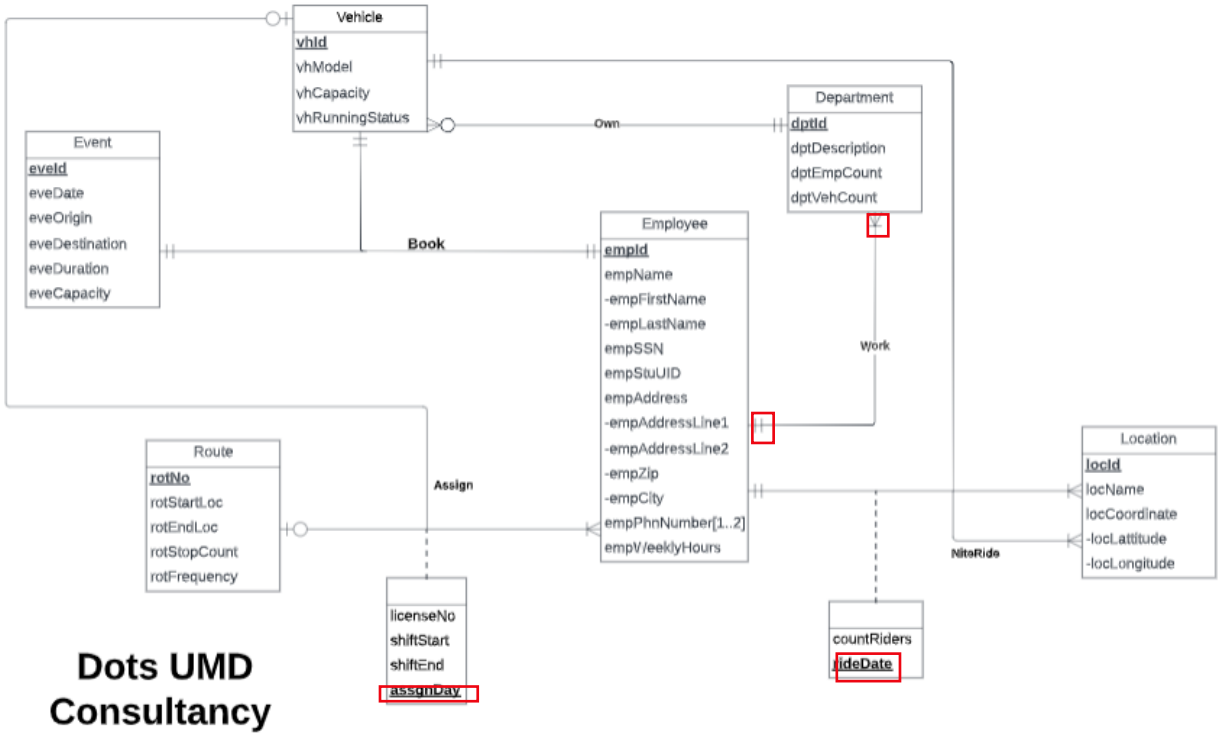
Own: binary relationship
1 Vehicle to 1 and only 1 Department
1 Department to 0 or many Vehicle

Assign(LicenseNo) : Ternary relationship
1 Employee and 1 Vehicle to 1 and only 1 Route
1 Employee and 1 Route to 1 and only 1 Vehicle
1 Route and 1 Vehicle to 0 or many Employee

Book: Ternary relationship
1 Employee and 1 Vehicle to 1 and only 1 Event
1 Employee and 1 Event to 1 and only 1 Vehicle
1 Vehicle and 1 Event to 1 and only 1 Employee

NiteRide: Quaternary relationship
1 Employee, 1 vehicle and 1 pickup(location) to 1 or many dropoff(location)
1 Employee, 1 vehicle and 1 dropoff(location) to 1 or many pickup(location)
1Employee, 1 pickup(location), 1 dropoff(location) to 1 and only 1 Vehicle
1 Vehicle, 1 pickup(location), 1 dropoff(location) to 1 and only 1 Employee

ER MODEL:



RELATIONS:

Department (**dptId**, dptDescription, dptEmpCount, dptVehCount)

Location (**locId**, locName, locLattitude, locLongitude)

Employee (**empId**, empFirstName, empLastName, empSSN, empStuUID, empAddressLine1, empAddressLine2, empZip, empCity, empWeeklyHours, *dptId*)

EmployeePhone(*empId,* **empPhnNumber**)

Vehicle (**vhId**, vhModel, vhCapacity, vhRunningStatus, *dptId*)

Event (**eveId**, eveDate, eveOrigin, eveDestination, eveDuration, eveCapacity)

Route (**rotNo**, rotStartLoc, rotEndLoc, rotStopCount, rotFrequency)

Assign (***empId***, ***vhId***, *rotNo*, licenseNo, shiftStart, shiftEnd, **assgnDay**)

Book (***empId***, ***vhId***, ***eveId***)

Niteride(*vhId*, ***empId***, ***picLocId***, ***dropLocId***, **rideDate**, countRiders)
Here picLocId and dropLocId are instances of LocId

BUSINESS RULE:

[R1] When a department is deleted, all the employees belonging to that department will have the corresponding information set to null.
[R2] When department information is updated, the corresponding information in the employee table will also be updated.
[R3] When an employee is deleted, his phone numbers will also be deleted.
[R4] When an employee information is updated, the corresponding information gets updated in the EmployeePhone table as well.
[R5] When a department is deleted, all the corresponding vehicles' department information is set to null.
[R6] When department information is updated, the corresponding information for vehicle will also be updated accordingly.
[R7] An employee who is assigned to a vehicle going in a route cannot be deleted.
[R8] When an employee information is updated, the corresponding department information is also updated.
[R9] A vehicle assigned to an employee and a route cannot be deleted.
[R10] When a vehicle information is updated, the corresponding information in assign table cannot be updated.
[R11]A route assigned to a vehicle and an employee cannot be deleted.
[R12]The route information in assign table gets updated, when the information in the route table is updated.
[R13] An employee assigned with a booking for an event cannot be deleted.
[R14] When an employee information is updated, the corresponding information in book table will also be updated.
[R15] A vehicle assigned to an event and an employee cannot be deleted.
[R16] When vehicle information is updated, the corresponding information in event table cannot be updated.

[R17] When an event is deleted, the corresponding book information is also deleted.
[R18] When an event information is updated, the corresponding information in book table will also be updated.
[R19] A vehicle cannot be deleted when it is assigned a NiteRide booking.
[R20] When a vehicle information is updated, the corresponding information in niteride table is also updated.
[R21] An employee cannot be deleted when assigned a NiteRide booking.
[R22] Employee information gets updated in the NiteRide table when it is changed in the Employee table.
[R23] When a location is deleted, the corresponding pickup Location will be deleted from the NiteRide booking.
[R24] When the location information is updated, corresponding changes are made in NiteRide table.
[R25] When a location is deleted, the corresponding dropOff Location will be deleted from the NiteRide booking.
[R26] When the location information is updated, corresponding changes are made in NiteRide table.

Referential Integrities:

Relation	**Foreign Key**	**Base Relation**	**Primary Key**	**Business Rule**	**Constraint ON DELETE**	**Business Rule**	**Constraint ON UPDATE**
Employee	dptId	Department	dptId	R1	SET NULL	R2	CASCADE
Employee Phone	empId	Employee	empId	R3	CASCADE	R4	CASCADE
Vehicle	dptId	Department	dptId	R5	SET NULL	R6	CASCADE
Assign	empId	Employee	empId	R7	NO ACTION	R8	CASCADE
Assign	vhId	Vehicle	vhId	R9	NO ACTION	R10	NO ACTION
Assign	rotNo	Route	rotNo	R11	NO ACTION	R12	CASCADE
Book	empId	Employee	empId	R13	NO ACTION	R14	CASCADE
Book	vhId	Vehicle	vhId	R15	NO ACTION	R16	NO ACTION
Book	evId	Event	evId	R17	CASCADE	R18	CASCADE

NiteRide	vhId	Vehicle	vhId	R19	NO ACTION	R20	CASCADE
NiteRide	empId	Employee	empId	R21	NO ACTION	R22	CASCADE
NiteRide	picLocId	Location	locId	R23	CASCADE	R24	CASCADE
NiteRide	dropLocId	Location	locId	R25	CASCADE	R26	CASCADE