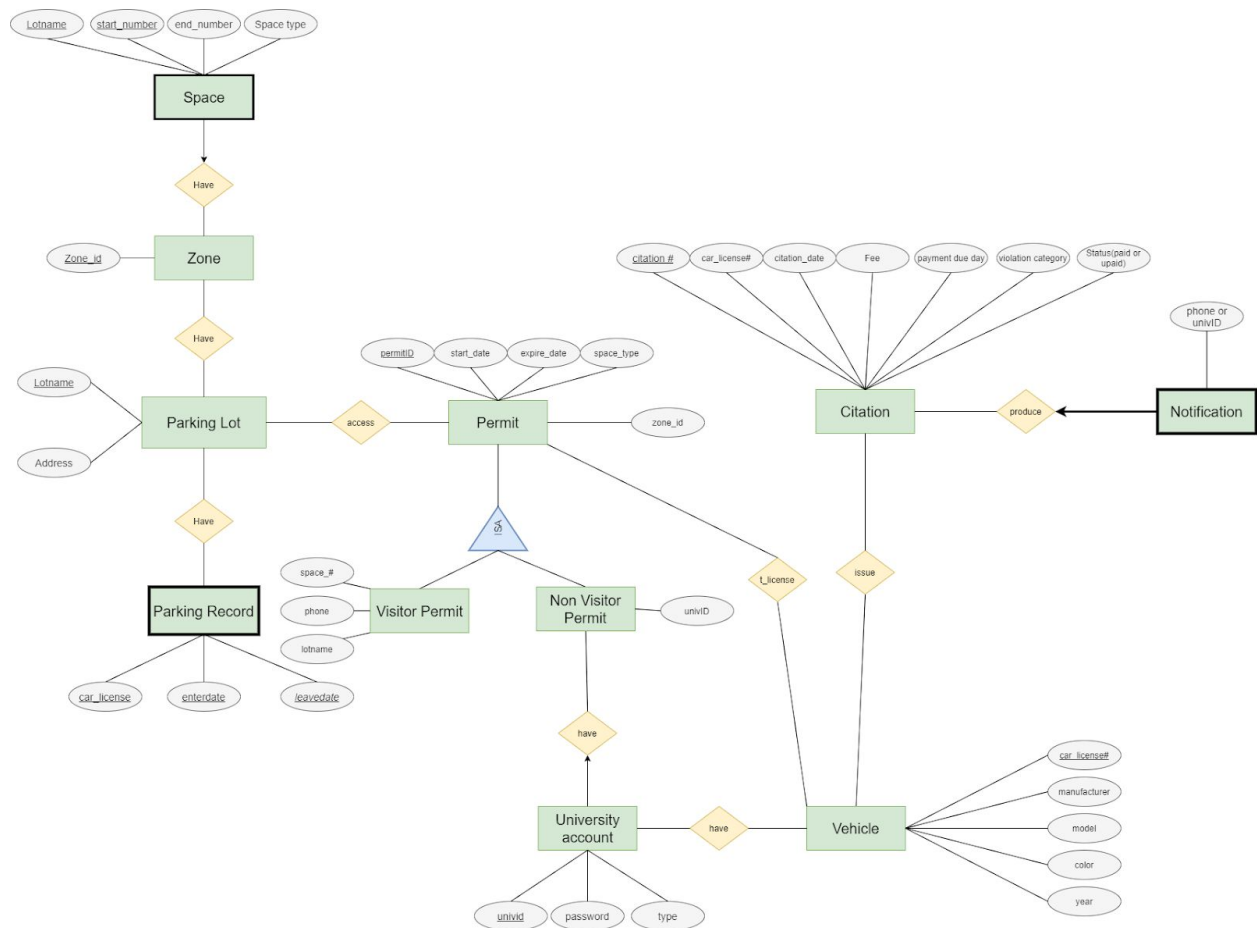


# Team I Final report

## ER-design



The ER model used in our project is shown in the picture above.

Space is an entity belonging to a zone. A space has lotname, start\_number, end\_number and space\_type. The space is defined as parking slots in a zone of a parking lot. The start number and end number indicate the spaces in this range are the given space\_type this space type is used in permit to indicate which type of space the permit is associated with. Space type could be divided into Regular, Handicapped and Electric categories.

Zone is an entity that belongs to a lot. A zone has Zone\_id which indicates which type of zone it is. Possible zone types include A, B, C, D, AS, BS, CS, DS, V. This id is also used in permits to indicate if the permit could park on a specific lot.

Parking lot is an entity that represents a parking lot in the university. Parking lots have it's lot of names and addresses. Parking lots will be used in visitor's permit and citation.

Permit is an entity that is issued by the admin user of this system. A permit has a unique permit id, start date, expired date, space type, lot name and zone id. The zone id identifies the permit from 3 categories( Student, Employee and Visitor). When Zone id is 'V' which represents the permit is a visitor permit. In this case the permit will include duration, lot name, phone number and space number as attribute. When zone id is other than 'V'. It indicates a non-visitor permit. This permit will include univid as an attribute.

Parking Record is an entity used to store the parking information of the system. When a user parks into a parking lot it will generate a Parking record which means a vehicle is parking in the parking system. This entity will store the car's plate number, lot name enter date, exit date. When users exit the parking lot this record will be removed and the information will be used to calculate citation.

University account is an entity to store the student and employee's login info. It has a univ id and password and type. The type include Admin, Student and Employee.

T\_license is a relation between permit and vehicle. It contains the permit id and the plate number of the vehicle. A record in this table means the vehicle is registered with the permit. For Student permits each permit could have 1 vehicle. For Employee permits it could have up to 2 vehicle records.

Vehicle is an entity that stores vehicle information that is parked in our parking system. It stores the car's plate number, manufacturer name, model, color and year.

Citation is a table to store the violation in the parking system. It is issued when a user exits the lot. System will check the parking record and permit info to see if any violation happened. If there is a violation it will store the vehicle's plate number, the model, color, date of violation, fee and payment status. And also insert a record in the notification table to inform the driver.

## **Constrains**

Zone table have foreign key of lot name from parking lot table which only allow zones to bind with existing lot. Zone table also have the primary key of lotname and zid as primary key which does not allow a lot to have same zone.

Space table have foreign key of lot name from the parking lot table which only allows space to bind with existing lot.

Permit table has primary key of "permitid" which makes "permitid" unique in the system. It have foreign key lotname from the parking lot table which restricts visitors to park in a existing lot.

T-license table has foreign key "permitid" from from permit table. This constrain only allows the user to add a vehicle to an existing permit. The primary key "permitid"+"car\_license" prevent duplicate records.

Citation table has primary key of "cnum" which makes "cnum" unique in the system. It have foreign key lotname from the parking lot table which restricts citation issued in a existing lot.

For the constraints about student permits could only have 1 vehicle and 2 for employee permits. We are implementing it in our java program. When a student is trying to update the vehicle list, the system will delete the old record and insert the old one to ensure the student will only have 1 vehicle. When an employee needs to update a vehicle list he/she will be asked if this is a new vehicle. System will look up the number of vehicles under this permit if this employee already has 2 vehicles. Systems will reject this request.

## Functional Dependencies

Univuser(Univid,status, passwd)

F = {Univid->status, passwd}

Parkinglot(lotname, address, space\_start,space\_end, vspace\_start, vspace\_end)

F = {lotname->address, space\_start, space\_end, vspace\_star, vspace\_end}

Zone(lotname,zid)

SpaceType(lotname,spacetype,start\_num,end\_num)

F = {lotname,start\_num->end\_num, lotname,start\_num->spacetype}

Permit(permitid, zid, start\_date, expire\_date, space\_type, univid, phone, space\_num, lotname, status)

F = {permitid->zid, start\_date, expire\_date, space\_type, univid, phone, space\_num, lotname, status}

License(permitid,car\_license)

Vehicle(car\_license,manufacturer,model,year, color)

F = {car\_license -> manufacturer,model,year, color}

ParkingRecord(car\_license,lotname, enterdate,leavedate,spacenumber,zone)

F = {car\_license -> lotname, enterdate, leavedate, spacenumber, zone  
lotname, enterdate, leavedate, spacenumber, zone -> car\_license}  
Citation(cnum, car\_license, model, color, lotname, citation\_date, payment\_due,  
category, fee, status)  
F = {cnum -> car\_license, model, color, lotname, citation\_date, payment\_due,  
category, fee, status}  
notification(cnum, univid, phone)  
F = {cnum -> univid,  
cnum -> phone}