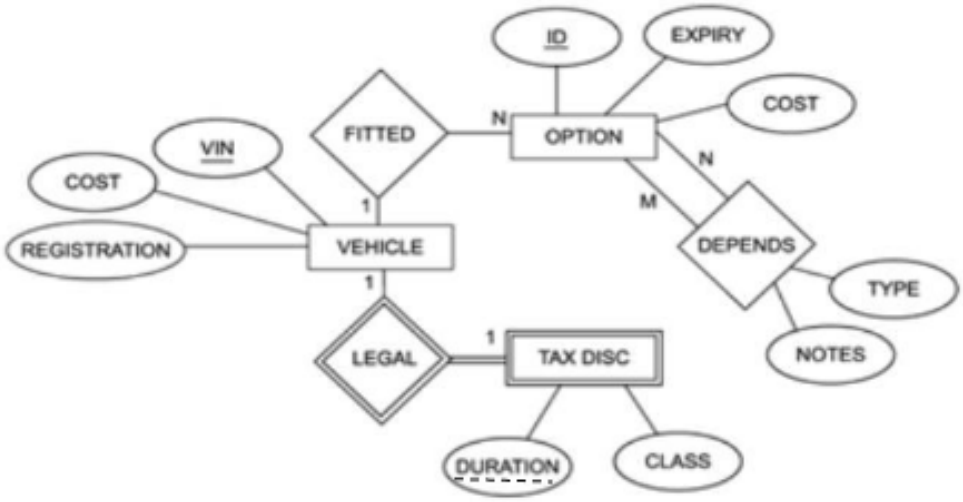
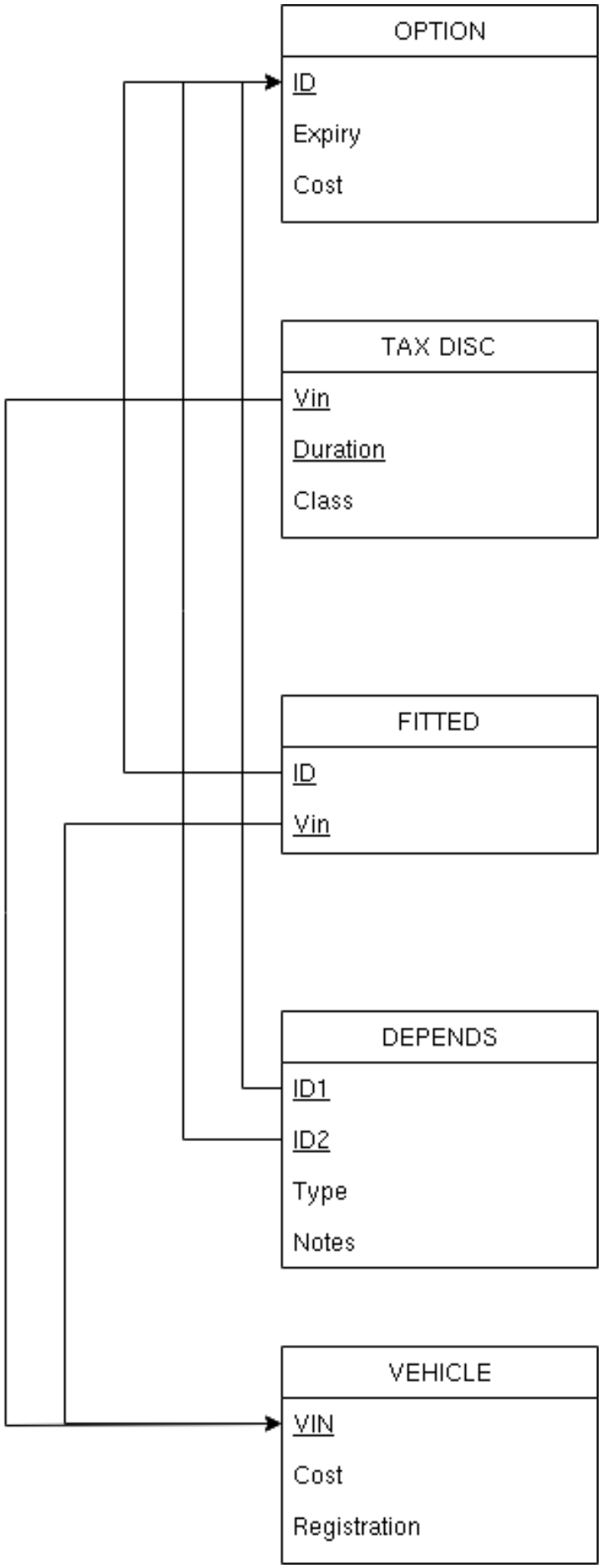
Database Systems CS 4347.006 – Homework 3

Iniyan Joseph (IIJ210000)

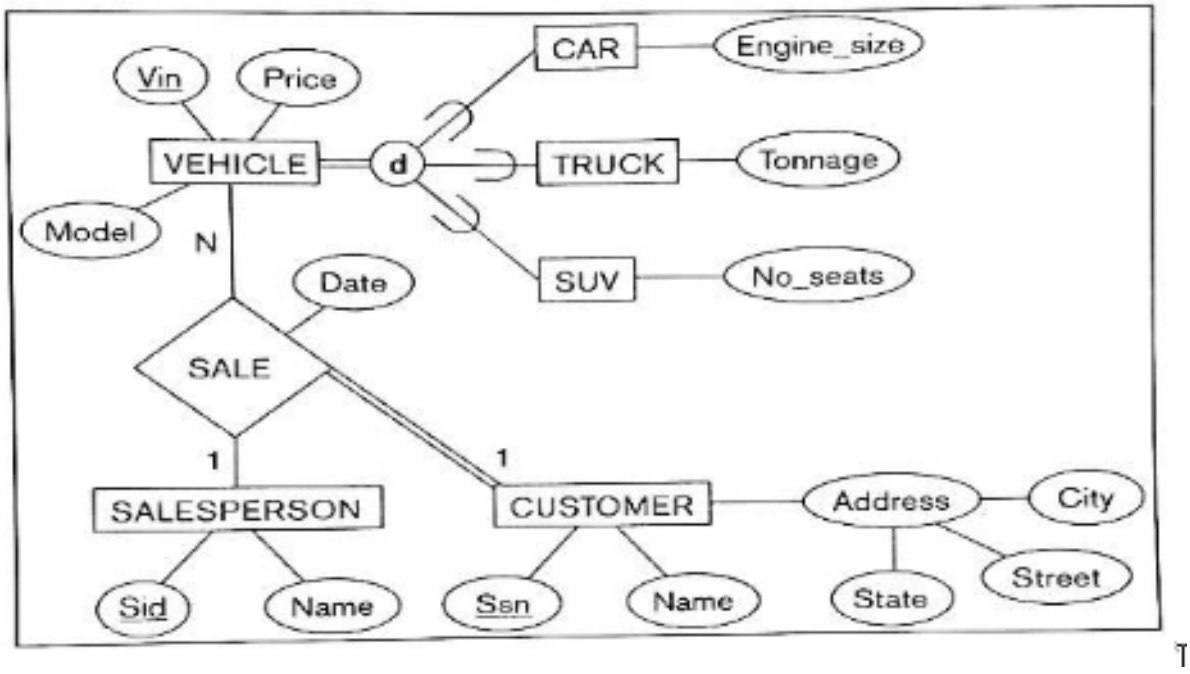
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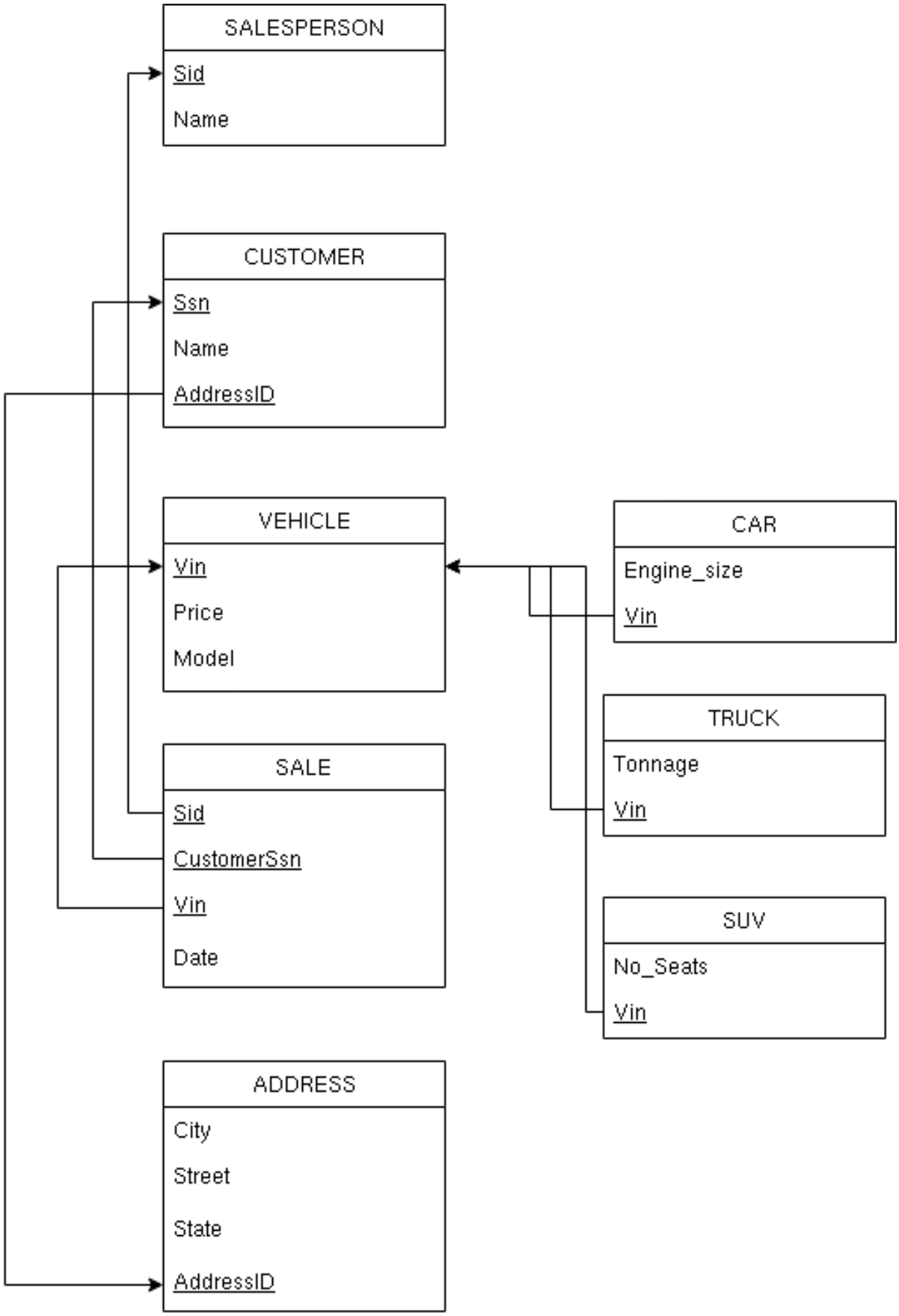
Problem 1: Translate the following ER Diagram into a relational database schema.



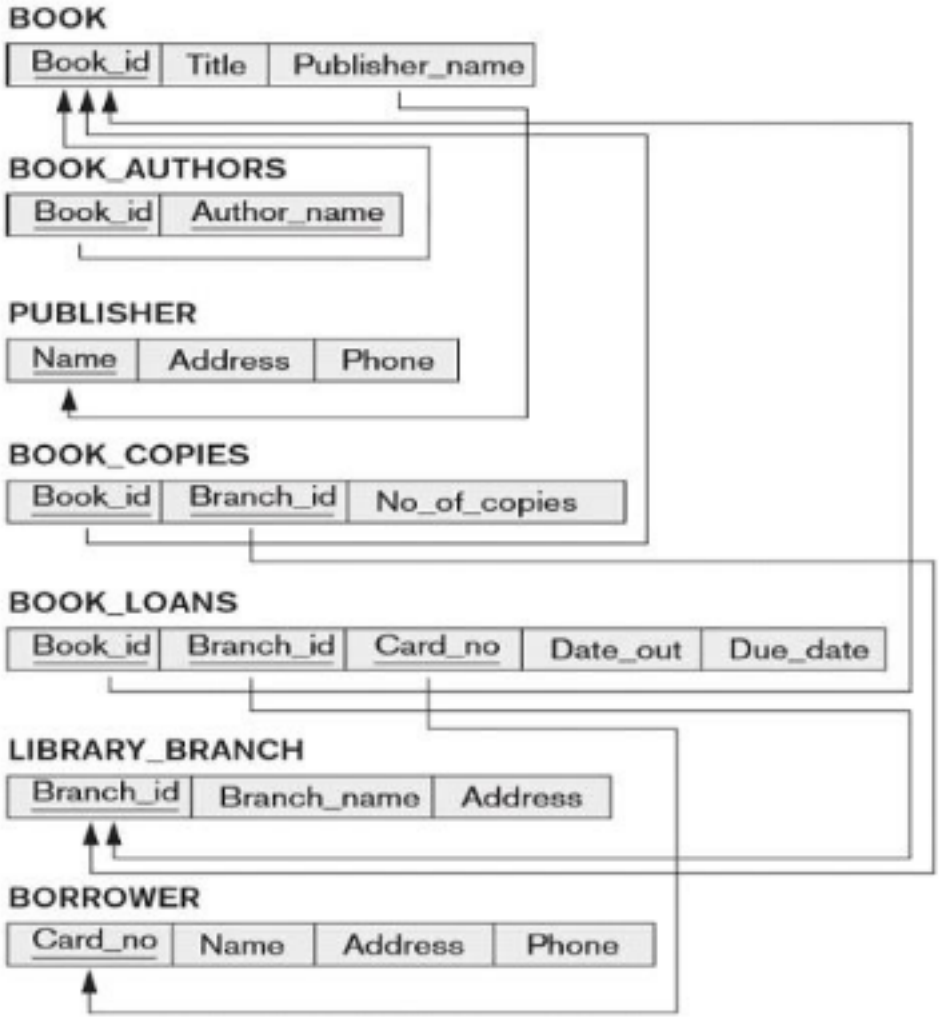

OPTION
ID
Expiry
Cost
TAX DISC
Vin
Duration
Class
FITTED
ID
Vin
DEPENDS
ID1
ID2
Type
Notes
VEHICLE
VIN
Cost
Registration

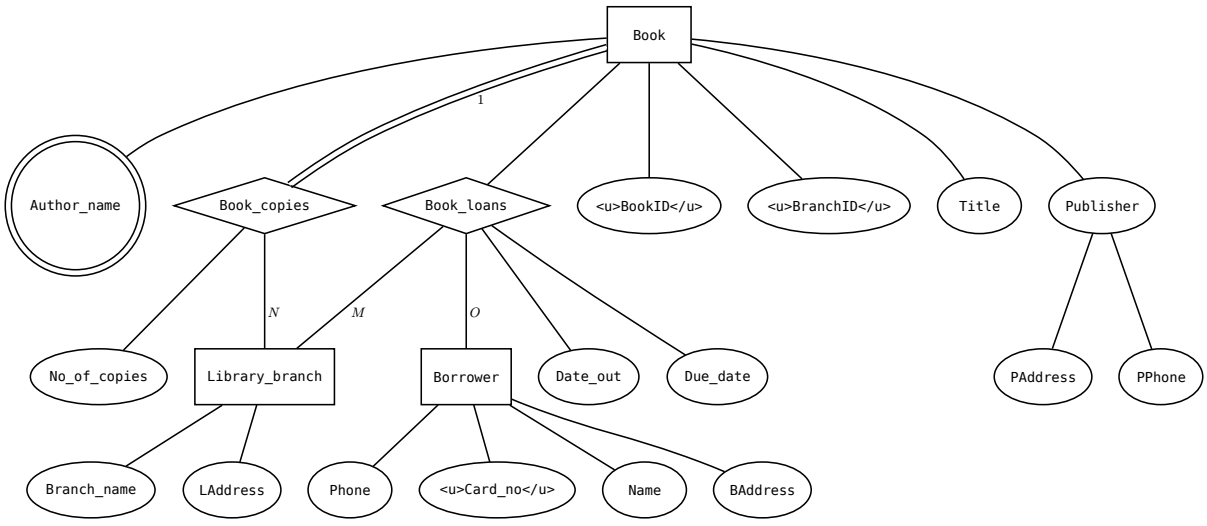
Problem 2: Consider the following EER diagram for a car dealer database; map this diagram into a relational database schema




SALESPERSON
Sid
Name
CUSTOMER
Ssn
Name
AddressID
VEHICLE
Vin
Price
Model
CAR
Engine_size
Vin
TRUCK
Tonnage
Vin
SUV
No_Seats
Vin
SALE
Sid
CustomerSsn
Vin
Date
ADDRESS
City
Street
State
AddressID

Problem 3: Given the following relational database schema of a Library, Draw an ER Model that would be mapped into this schema





Problem 4: Assume the following relational schema and tables

Vehicle

VRN	Ma	Mo	Color
123	Honda	Hawk	Red
234	Mazda	RX7	Blue
345	Ford	Taurus	Blue
456	Ford	Ranger	Green
890	Suzuki	Intruder	Black

Own

VRN	SSN
123	bcd
234	abc
456	def
567	ghi

Person

SSN	Name	Addr	Phone
abc	Dave	Birch	xxx
bcd	Mary	Grove	yyy
cde	Sriram	Oak	zzz
def	Fang	Birch	www
hij	Gilford	Birch	ttt

4.1 Write a relational algebra query to return all tuples of Vehicle relation with Ma = 'Honda'

1. $\sigma_{(\text{Ma='Honda'})}$ (Vehicle)
   - (123, 'Honda', 'Hawk', 'Red')

4.2 Write a relational algebra query to return the VRN and Color of Vehicles with Ma = 'Honda'

1. $\pi_{\text{VRN, Color}}(\sigma_{(\text{Ma='Honda'})}$ (Vehicle))
   - (123, 'Red')

4.3 Write the result of the query: Vehicle x Own (Cartesian Product)

VRN	Ma	Mo	Color	VRN	SSN
123	Honda	Hawk	Red	123	bcd
123	Honda	Hawk	Red	234	abc
123	Honda	Hawk	Red	456	def
123	Honda	Hawk	Red	567	ghi
234	Mazda	RX7	Blue	123	bcd
234	Mazda	RX7	Blue	234	abc
234	Mazda	RX7	Blue	456	def
234	Mazda	RX7	Blue	567	ghi
345	Ford	Taurus	Blue	123	bcd
345	Ford	Taurus	Blue	234	abc
345	Ford	Taurus	Blue	456	def
345	Ford	Taurus	Blue	567	ghi
456	Ford	Ranger	Green	123	bcd
456	Ford	Ranger	Green	234	abc
456	Ford	Ranger	Green	456	def
456	Ford	Ranger	Green	567	ghi
890	Suzuki	Intruder	Black	123	bcd
890	Suzuki	Intruder	Black	234	abc
890	Suzuki	Intruder	Black	456	def
890	Suzuki	Intruder	Black	567	ghi

4.4 Write the result of the query: Vehicle ∗ Own (Natural Join)

VRN	Ma	Mo	Color	VRN	SSN
123	Honda	Hawk	Red	123	bcd
234	Mazda	RX7	Blue	234	abc
456	Ford	Ranger	Green	456	def

4.5 Write the result of the query: Own x Person (Cartesian Product)

VRN	SSN	SSN	Name	Add	Phone
123	bcd	abc	Dave	Birch	xxx
234	abc	abc	Dave	Birch	xxx
456	def	abc	Dave	Birch	xxx
567	ghi	abc	Dave	Birch	xxx
123	bcd	bcd	Mary	Grove	yyy
234	abc	bcd	Mary	Grove	yyy
456	def	bcd	Mary	Grove	yyy
567	ghi	bcd	Mary	Grove	yyy
123	bcd	cde	Sriram	Oak	zzz
234	abc	cde	Sriram	Oak	zzz
456	def	cde	Sriram	Oak	zzz
567	ghi	cde	Sriram	Oak	zzz
123	bcd	def	Fang	Birch	www
234	abc	def	Fang	Birch	www
456	def	def	Fang	Birch	www
567	ghi	def	Fang	Birch	www
123	bcd	hij	Girferd	Birch	ttt
234	abc	hij	Girferd	Birch	ttt
456	def	hij	Girferd	Birch	ttt
567	ghi	hij	Girferd	Birch	ttt

4.6 Write the result of the query: Own ∗ Person (Natural Join)

VRN	SSN	SSN	Name	Add	Phone
234	abc	abc	Dave	Birch	xxx
123	bcd	bcd	Mary	Grove	yyy
456	def	def	Fang	Birch	www