

Individual Final Project

Vy Vo

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ISDS 402-01 12220

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1. Parenthetical methods

DEALERS (TaxID, FName, LName, StreetAddress, City, State, Zip, Phone, CellPhone, Comments)

ITEMS (ItemID, Description, Price)

COMMISSIONS (CommissionID, CommissionRate)

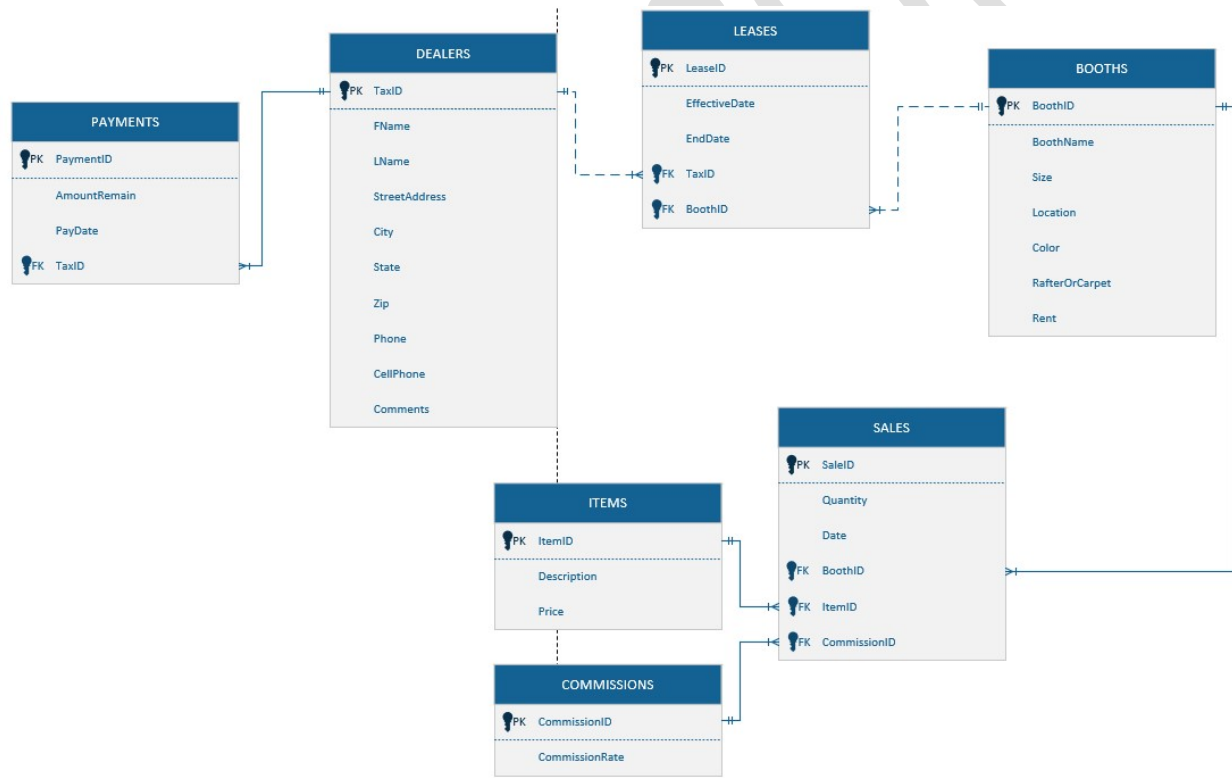
BOOTHS (BoothID, BoothName, Size, Location, Color, RafterOrCarpet, Rent)

SALES (SaleID, Quantity, Date, *BoothID*, *ItemID*, *CommissionID*)

LEASES (LeaseID, EffectiveDate, EndDate, *TaxID*, *BoothID*)

PAYMENTS (PaymentID, AmountRemain, PayDate, *TaxID*)

2. Proposed database design model



Cardinality Justification

The relationship between PAYMENTS and DEALERS tables is the maximum cardinality that should be one to many since a dealer can receive many PAYMENTS from NHD that they rent multiple booths, but one payment must be sent to one specific dealer. The minimum cardinality is mandatory to mandatory since there must be at least one payment sent to one dealer, or one dealer must be received at least one payment from NHD.

The relationship between DEALERS and LEASES is one to many to the maximum cardinality because one dealer can sign at least one to many leases to rent one or many booths but each lease should have only one dealer involved in while the term still be effective. For the minimum cardinality between DEALERS and LEASES, it has to be mandatory to mandatory since a dealer must sign a lease to rent the booth. In the case that the dealer does not agree to sign to rent the booth, the lease is invalid.

Between LEASES and BOOTHS, the maximum cardinality is one to many since at least one booth must be available for lease to many dealers. In addition, one or many booths can be signed in one lease which only one dealer allow to rent it. The minimum cardinality is mandatory to mandatory because the booth must be under the lease to be used. In the case the dealer is not willing to sign a lease, then a booth cannot be rent out.

In the relationship between BOOTHS and SALES, the maximum cardinality is one to many also since one booth can have one to many sales in a day or in a month, and one sale should be identified to a particular booth. The minimum cardinality in this relationship is mandatory to mandatory since the booth must sell their products to make sales that is a reason why the booth exists in the business.

Between SALES and ITEMS, the maximum cardinality is one to many because one specific type of item can be sold for many sales or many items can be sold in one sale and in multiple sales. The minimum cardinality is mandatory to mandatory since at least one item should be sold in one sale and one sale should include at least one specific item type.

The relationship between SALES and COMMISSIONS is one to many of the maximum cardinality, the commission rate can be applied to many different sales based on the range of sales amount of each transaction. On the other hand, the minimum cardinality is mandatory to mandatory since there is only one commission key for only one specific commission rate only.

PAYMENTS, DEALERS, BOOTHS, SALES, COMMISSIONS, and ITEMS are strong entities because they can self-identify that do not dependent on any entity. However, the LEASES and table is weak because LEASES cannot define itself that depends on DEALERS and BOOTHS to make it becomes meaning.

3. Matrix Tables

DEALERS: The Dealers table contains private or contact information related to the Dealer who rent one or many booths in the shopping mall.

Field Name	Data Type	Data Size	Key	Default Value	Require	Details
TaxID	VarChar	10	Primary Key	None	Yes	Unique
FName	Char	15	None	None	Yes	None
LName	Char	15	None	None	Yes	None
StreetAddress	VarChar	35	None	None	No	None
City	Char	15	None	None	No	None
State	Char	2	None	None	No	None
Zip	Char	10	None	None	No	None
Phone	Char	12	None	None	No	None
CellPhone	Char	12	None	None	Yes	None
Comments	Char	60	None	None	No	None

ITEMS: Item table contains identified key and item description or name for a specific item sold in one particular booth.

Field Name	Data Type	Data Size	Key	Default Value	Require	Details
ItemID	Integer		Primary Key	DBMS Supplied	Yes	Surrogate Key Initial value = 20100 Increment = 10
Description	VarChar	100	None	None	None	None
Price	Numeric	9, 2	None	None	Yes	None

COMMISSIONS: The table represents the identified key and commission rate which is applied to each different sales that the booth performs for each month

Field Name	Data Type	Data Size	Key	Default Value	Require	Details
CommissionID	Integer		Primary Key	DBMS Supplies	Yes	Surrogate Key Initial Value = 50000 Increment Value = 5
CommissionRate	Numeric	5,2	None	None	Yes	None

BOOTHs: The table contains attributes like key id, the name of the booth, specific location or location number dealer hire, characteristics for the booth like color, rafter or carpet

Field Name	Data Type	Data Size	Key	Default Value	Require	Details
BoothID	VarChar	5	Primary Key	DBMS Supplied	Yes	Unique
BoothName	VarChar	25	None	None	Yes	None
Size	VarChar	5	None	None	Yes	None
Location	Char	20	None	None	Yes	None
Color	Char	6	None	None	Yes	None
RafterOrCarpet	Char	6	None	None	Yes	None
Rent	Numeric	9, 2	None	None	Yes	None

SALES: The table will manage information of each sale for each booth, including data of unique identity sale, the quantity the item have been sold that sold by a particular booth with specific commission rate.

Field Name	Data Type	Data Size	Key	Default Value	Require	Details
SaleID	Integer		Primary Key	DBMS Supplied	Yes	Surrogate Key Initial Value = 100 Increment value = 10
Quantity	Integer		None	None	Yes	None
Date	Date		None	None	Yes	None
BoothID	VarChar	5	Foreign Key	None	Yes	None
ItemID	Integer		Foreign Key	None	Yes	None
CommissionID	Integer		Foreign Key	None	Yes	None

LEASES: Lease table contains attributes such as the start effective date and the end date the booth rent which helps to indicate if the booth is vacant during that period, how much the booth pay for rent, who owns the booth and which booth they rent

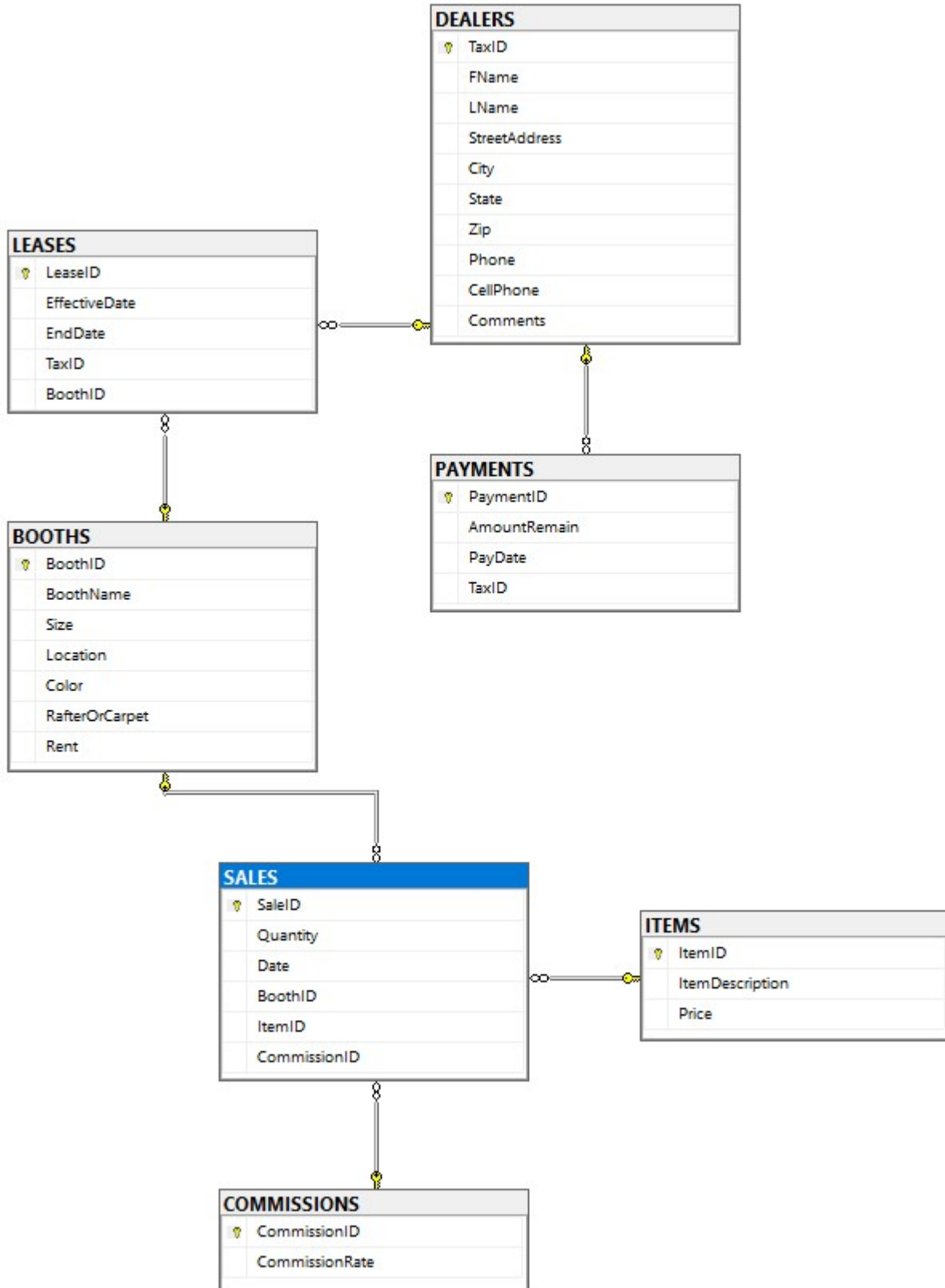
Field Name	Data Type	Data Size	Key	Default Value	Require	Details
LeaseID	Integer		Primary Key	DBMS Supplies	Yes	Surrogate Key Initial Value = 30000 Increment Value = 1
EffectiveDate	Date		None	None	Yes	None
EndDate	Date		None	None	Yes	None
TaxID	VarChar	10	Foreign Key	None	Yes	None
BoothID	VarChar	5	Foreign Key	None	Yes	None

PAYMENTS: Payment table contains payment identity, remaining amount that NHD need to pay back to each dealer after deducting the commission and rent, which date NHD will issue the check to the dealer.

Field Name	Data Type	Data Size	Key	Default Value	Require	Details
PaymentID	Integer		Primary Key	DBMS Supplies	Yes	Surrogate Key Initial Value = 40001 Increment Value = 1
AmountRemain	Numeric	9, 2	None	None	No	None
PayDate	Date		None	None	Yes	None
TaxID	VarChar	10	Foreign Key	None	Yes	None

4. SQL DDL (Please find the file named 'IP_CREATE_INSERT INTO VALUES Syntax.txt' in the separated attachment)

5. Database Diagram in SQL Server Management Studio (SSMS)



6. Screenshots dummy records of each table

a. DEALERS table

	TaxID	FName	LName	StreetAddress	City	State	Zip	Phone	CellPhone	Comments
1	34-0012835	Helen	Emmett	1633 Broadway	New York	NY	10019	NULL	212-489-1600	Call cellphone first. Up to 8% discount is appro...
2	34-2355899	Paul	Miller	2141 Rosecrans Ave	El Segundo	CA	90245	310-726-2700	310-726-2700	NULL
3	34-2534587	Sally	Sue	1719 Gall Ave	Pittsburgh	PA	15209	255-785-6935	255-453-9684	Call cellphone first. Up to 8% discount is appro...
4	34-2589635	Augustine	LeBron	131 Smokey Ln	Marienville	PA	16239	814-927-6628	814-927-2286	Call cellphone first. Up to 8% discount is appro...
5	34-4712935	David	King	2545 Windward Concord	Alpharetta	GA	30005	NULL	678-319-8000	Accommodate available booth
6	34-5074519	John	Green	1000 Wilson Blvd	Arlington	VA	22209	703-276-9500	702-458-3294	Call cellphone first. Up to 8% discount is appro...
7	34-6237452	Lake	Smith	401 Clematis St	West Palm Beach	FL	33401	561-659-8025	516-822-1425	NULL
8	34-7410936	Lucy	White	60 Danbury Rd	Wilton	CT	06897	NULL	203-254-6700	Call cellphone first. Up to 8% discount is appro...
9	34-7439517	Orpha	Ansley	3883 Howard Hughes Pl	Las Vegas	NV	89169	702-735-2200	702-735-2289	Accommodate available booth
10	34-7852493	Tom	Taylor	75 N Country Rd	Port Jefferson	NY	11777	631-473-1320	613-485-7623	Call cellphone first. Up to 8% discount is appro...
11	34-8512963	Alen	Lee	PO Box 22	Sonoma	CA	95476	NULL	758-451-2369	Accommodate available booth
12	34-9010084	Jeff	Johnson	6290 W Erie St	Chandler	AZ	85226	480-892-4321	480-935-4785	NULL
13	34-9456287	Mitchel	Fields	2200 Fletcher Ave	Fort Lee	NJ	07024	NULL	201-224-2680	Accommodate available booth
14	34-9527634	Miguel	Thomas	250 Monroe Ave	Grand Rapids	MI	49503	616-458-6805	646-458-6669	NULL
15	34-9872308	Leslie	Maury	11505 E 43rd St	Tulsa	OK	74146	918-663-7500	918-663-8819	Accommodate available booth

b. PAYMENTS table

	PaymentID	AmountRemain	PayDate	TaxID
1	40001	NULL	2021-02-15	34-2534587
2	40002	NULL	2021-02-15	34-6237452
3	40003	NULL	2021-03-15	34-5074519
4	40004	NULL	2021-04-15	34-9456287
5	40005	NULL	2021-05-15	34-2355899
6	40006	NULL	2021-02-15	34-8512963
7	40007	NULL	2021-03-15	34-7410936
8	40008	NULL	2021-04-15	34-4712935
9	40009	NULL	2021-05-15	34-7852493
10	40010	NULL	2021-02-15	34-2589635
11	40011	NULL	2021-03-15	34-7439517
12	40012	NULL	2021-04-15	34-9527634
13	40013	NULL	2021-05-15	34-0012835
14	40014	NULL	2021-02-15	34-9872308
15	40015	NULL	2021-03-15	34-9010084

c. BOOTHS table

	BoothID	BoothName	Size	Location	Color	RafterOrCarpet	Rent
1	A-01	Ralph Lauren	12x18	Outside perimeter	Yellow	Rafter	310.00
2	A-02	Chanel	12x18	Outside perimeter	Green	Rafter	310.00
3	A-03	Carter	12x12	Outside perimeter	White	Rafter	290.00
4	A-04	Nike	12x12	Outside perimeter	Yellow	Rafter	290.00
5	A-05	Cartier	12x12	Outside perimeter	Green	Carpet	290.00
6	B-01	Samsung	8x10	Inside perimeter	Tan	Carpet	120.00
7	B-02	LG	8x10	Inside perimeter	White	Rafter	120.00
8	B-03	Sephora	8x10	Inside perimeter	Green	Carpet	120.00
9	B-04	Dell	8x8	Inside perimeter	Tan	Carpet	105.00
10	B-05	GNC	8x8	Inside perimeter	Tan	Carpet	105.00
11	C-01	Kitchen Aid	8x8	Aisle	White	Carpet	90.00
12	C-02	Dicks Sporting Goods	8x8	Aisle	Green	Carpet	90.00
13	C-03	Marshalls	8x8	Aisle	White	Carpet	90.00
14	C-04	Living Spaces	8x8	Aisle	Tan	Carpet	90.00
15	C-05	Michaels	8x8	Aisle	Green	Carpet	90.00

d. LEASES table

	LeaseID	EffectiveDate	EndDate	TaxID	BoothID
1	30000	2021-01-01	2026-12-31	34-9456287	A-01
2	30001	2021-01-01	2026-12-31	34-4712935	A-02
3	30002	2021-01-01	2026-12-31	34-2534587	A-03
4	30003	2021-01-01	2026-12-31	34-2355899	A-04
5	30004	2021-01-01	2026-12-31	34-5074519	A-05
6	30005	2021-01-01	2026-12-31	34-7439517	B-01
7	30006	2021-01-01	2026-12-31	34-0012835	B-02
8	30007	2021-02-28	2026-02-27	34-6237452	B-03
9	30008	2021-02-28	2026-02-27	34-9010084	B-04
10	30009	2021-02-28	2026-02-27	34-7852493	B-05
11	30010	2021-02-28	2026-02-27	34-9872308	C-01
12	30011	2021-02-28	2025-02-27	34-8512963	C-02
13	30012	2021-02-28	2025-02-27	34-2589635	C-03
14	30013	2021-02-28	2026-02-27	34-9527634	C-04
15	30014	2021-04-30	2025-04-29	34-7410936	C-05

e. SALES table

	SaleID	Quantity	Date	BoothID	ItemID	CommissionID
1	100	1000	2021-01-31	A-01	20100	50000
2	110	1500	2021-01-31	A-02	20110	50005
3	120	200	2021-01-31	A-03	20120	50010
4	130	200	2021-01-31	A-04	20130	50015
5	140	500	2021-01-31	A-05	20140	50020
6	150	300	2021-02-28	C-05	20150	50025
7	160	120	2021-02-28	B-01	20160	50030
8	170	300	2021-02-28	B-02	20170	50035
9	180	50	2021-02-28	B-03	20180	50040
10	190	500	2021-02-28	B-04	20190	50045
11	200	200	2021-03-31	B-05	20200	50050
12	210	150	2021-04-30	C-01	20210	50055
13	220	100	2021-04-30	C-02	20220	50060
14	230	200	2021-04-30	C-03	20230	50065
15	240	500	2021-04-30	C-04	20240	50070

f. ITEMS table

	ItemID	ItemDescription	Price
1	20100	Men Fashion	60.59
2	20110	Women Fashion	70.99
3	20120	Kid Fashion	30.50
4	20130	Shoes	50.99
5	20140	Jewelry & Acce...	200.99
6	20150	Electronics	199.99
7	20160	Appliance	90.59
8	20170	Beauty & Pers...	50.99
9	20180	Furniture	150.00
10	20190	Computers & I...	99.99
11	20200	Housewares	40.50
12	20210	Sports & Wellb...	25.99
13	20220	Home Goods	99.99
14	20230	Nutrition & Vita...	59.50
15	20240	Art & Craft	10.50

g. COMMISSIONS table

	CommissionID	CommissionRate
1	50000	0.10
2	50005	0.12
3	50010	0.13
4	50015	0.04
5	50020	0.15
6	50025	0.06
7	50030	0.07
8	50035	0.08
9	50040	0.09
10	50045	0.01
11	50050	0.11
12	50055	0.02
13	50060	0.03
14	50065	0.14
15	50070	0.05

7. SQL Queries Screenshots

Please find the file named 'IP_QUERIES_SQL Syntax step 7.txt' in the separated attachment for the SQL syntax

a. List the total sales for each dealer over a month's time frame

	TaxID	FName	LName	Date	TotalSales
1	34-2355899	Paul	Miller	2021-01-31	10,198.00
2	34-2534587	Sally	Sue	2021-01-31	6,100.00
3	34-4712935	David	King	2021-01-31	106,485.00
4	34-5074519	John	Green	2021-01-31	100,495.00
5	34-9456287	Mitchel	Fields	2021-01-31	60,590.00
6	34-0012835	Helen	Emmett	2021-02-28	15,297.00
7	34-6237452	Lake	Smith	2021-02-28	7,500.00
8	34-7410936	Lucy	White	2021-02-28	59,997.00
9	34-7439517	Orpha	Ansley	2021-02-28	10,870.80
10	34-9010084	Jeff	Johnson	2021-02-28	49,995.00
11	34-7852493	Tom	Taylor	2021-03-31	8,100.00
12	34-2589635	Augustine	LeBron	2021-04-30	11,900.00
13	34-8512963	Alen	Lee	2021-04-30	9,999.00
14	34-9527634	Miguel	Thomas	2021-04-30	5,250.00
15	34-9872308	Leslie	Maury	2021-04-30	3,898.50

- b. List the amount due from NHD to each dealer after all deductions are considered in a particular month

	TaxID	FName	LName	Date	AmountRemain
1	34-2355899	Paul	Miller	2021-01-31	9,500.08
2	34-2534587	Sally	Sue	2021-01-31	5,017.00
3	34-4712935	David	King	2021-01-31	93,396.80
4	34-5074519	John	Green	2021-01-31	85,130.75
5	34-9456287	Mitchel	Fields	2021-01-31	54,221.00

- c. List the dealers and their corresponding booth(s) lease details

	TaxID	FName	LName	StreetAddress	City	State	Zip	Phone	CellPhone	Comments	LeaseID	EffectiveDate	EndDate	TaxID	BoothID
1	34-9456287	Mitchel	Fields	2200 Fletcher Ave	Fort Lee	NJ	07024	NULL	201-224-2680	Accommodate available booth	30000	2021-01-01	2026-12-31	34-9456287	A-01
2	34-4712935	David	King	2545 Windward Concord	Alpharetta	GA	30005	NULL	678-319-8000	Accommodate available booth	30001	2021-01-01	2026-12-31	34-4712935	A-02
3	34-2534587	Sally	Sue	1719 Gall Ave	Pittsburgh	PA	15209	255-785-6935	255-453-9684	Call cellphone first. Up to 8% discount is appro...	30002	2021-01-01	2026-12-31	34-2534587	A-03
4	34-2355899	Paul	Miller	2141 Rosecrans Ave	El Segun	CA	90245	310-726-2700	310-726-2700	NULL	30003	2021-01-01	2026-12-31	34-2355899	A-04
5	34-5074519	John	Green	1000 Wilson Blvd	Arlington	VA	22209	703-276-9500	702-458-3294	Call cellphone first. Up to 8% discount is appro...	30004	2021-01-01	2026-12-31	34-5074519	A-05
6	34-7439517	Orpha	Ansley	3883 Howard Hughes Pl	Las Vegas	NV	89169	702-735-2200	702-735-2289	Accommodate available booth	30005	2021-01-01	2026-12-31	34-7439517	B-01
7	34-0012835	Helen	Emm...	1633 Broadway	New York	NY	10019	NULL	212-489-1600	Call cellphone first. Up to 8% discount is appro...	30006	2021-01-01	2026-12-31	34-0012835	B-02
8	34-6237452	Lake	Smith	401 Clematis St	West Pa...	FL	33401	561-659-8025	516-822-1425	NULL	30007	2021-02-28	2026-02-27	34-6237452	B-03
9	34-9010084	Jeff	Johns...	6290 W Erie St	Chandler	AZ	85226	480-892-4321	480-935-4785	NULL	30008	2021-02-28	2026-02-27	34-9010084	B-04
10	34-7852493	Tom	Taylor	75 N Country Rd	Port Jeff...	NY	11777	631-473-1320	613-485-7623	Call cellphone first. Up to 8% discount is appro...	30009	2021-02-28	2026-02-27	34-7852493	B-05
11	34-9872308	Leslie	Maury	11505 E 43rd St	Tulsa	OK	74146	918-663-7500	918-663-8819	Accommodate available booth	30010	2021-02-28	2026-02-27	34-9872308	C-01
12	34-8512963	Alan	Lee	PO Box 22	Sonoma	CA	95476	NULL	758-451-2369	Accommodate available booth	30011	2021-02-28	2025-02-27	34-8512963	C-02
13	34-2589635	Augu...	LeBron	131 Smokey Ln	Marienvi...	PA	16239	814-927-6628	814-927-2286	Call cellphone first. Up to 8% discount is appro...	30012	2021-02-28	2025-02-27	34-2589635	C-03
14	34-9527634	Miguel	Thom...	250 Monroe Ave	Grand R...	MI	49503	616-458-6805	646-458-6669	NULL	30013	2021-02-28	2026-02-27	34-9527634	C-04
15	34-7410936	Lucy	White	60 Danbury Rd	Wilton	CT	06897	NULL	203-254-6700	Call cellphone first. Up to 8% discount is appro...	30014	2021-04-30	2025-04-29	34-7410936	C-05

- d. List the revenues for NHD in a particular month

	TaxID	Date	Revenue
1	34-2355899	2021-01-31	697.92
2	34-2534587	2021-01-31	1,083.00
3	34-4712935	2021-01-31	13,088.20
4	34-5074519	2021-01-31	15,364.25
5	34-9456287	2021-01-31	6,369.00

- e. List the booths that have not been leased

	Vacant	VacantAsOf
1	A-01	2026-12-31
2	A-02	2026-12-31
3	A-03	2026-12-31
4	A-04	2026-12-31
5	A-05	2026-12-31
6	B-01	2026-12-31
7	B-02	2026-12-31
8	B-03	2026-02-27
9	B-04	2026-02-27
10	B-05	2026-02-27
11	C-01	2026-02-27
12	C-02	2025-02-27
13	C-03	2025-02-27
14	C-04	2026-02-27
15	C-05	2025-04-29

8. Discuss and explain the following questions:

- a) *Why is normalization important when defining a database design?*

Normalization is a technique that is used to reduce the complexity and inconsistency of data in the database. Normalization enhances the stability of the database system because it can eliminate data redundancy like insertion, deletion, and updating anomalies which can generate errors in the data. Having a highly normalized data schema are benefits:

- Increased consistency: information is stored in one place only. It reduces the possibility of inconsistent data which is containing multiple entities.
- Easier object-to-data mapping: highly normalized data schemas, in general, are closer conceptually to object-oriented goals of promoting high cohesion, and loose coupling between classes results in similar solutions.

- b) *How do you validate a proposed database design model before implementation?*

To validate a database design, we need to be aware of the problem statement thoroughly.

We need to confirm that if the database model used is appropriate for this problem. More precisely speaking, we need to make sure that the design was suitable for a relational database or non-relational database. By identifying the primary attributes of the database, then possibly identify the primary keys for the entity, then connecting entities by foreign key constraints, implementing relationship among entities in the diagram, and convert the diagram into the relational model to perform the high normalization.

c) What challenges did you face during this course regarding database concepts in this project?

Due to the covid – 19, all classes are transferred online. There are some challenges in communication, surrounding distractions, background noise, or even some technical difficulties.

d) What would be your advice to future ISDS 402 students?

Even in virtual or in-person classes, my advice to future students who will take ISDS 402 is more proactive in interaction with the professor, asking questions they are still confused about. They should collaborate more frequently in teamwork in group assignments and practice more hands-on problems in SQL to strengthen knowledge and master material. Watching outer sources like YouTube videos to better understand the concepts on material covered in class.