

Part 2: Practicing Normalization

Exercise 1: Transforming Attributes

The manager of a company dinner club would like to have an information system that assists him to plan the meals and to keep track of who attends the dinners, and so on.

Because the manager is not an IS expert, the following table is used to store the information. As a member can attend many dinners and a member will not attend more than 1 dinner on the same date, **the primary key of the following table is Member ID and Dinner ID**. Dinners can have many courses, from one-course dinner to as many courses as the chef desired.

Member = customer

Dinner = meal

Venue = location

Food = specific food item

PK = MEMBERID + DINNERID

TEST: Does each attribute depend on both components of the Primary Key, or just a portion?

<u>Mem berID</u>	Membe rName	Member Address	<u>Dinn erID</u>	Dinne rDate	Venu eCod e	VenueDe scription	Food Code	FoodDes cription
214	Peter Wong	325 Meadow Park	D0001	02/02/2 020	L01	Grand_Ball _Room	EN3	Stu ed crab
							DEB	Beef
235	Mary Lee	123 Bellfower	D0002	02/02/2 020	L02	Café	EN5	Chocolate Mousse
							DEB	Beef
250	John Doe	9923 Orange	D0003	03/03/2 0	L01	Grand_Ball _Room	SO1	Marinated Steak
							EN5	Chocolate Mousse
							DE2	Apple Pie

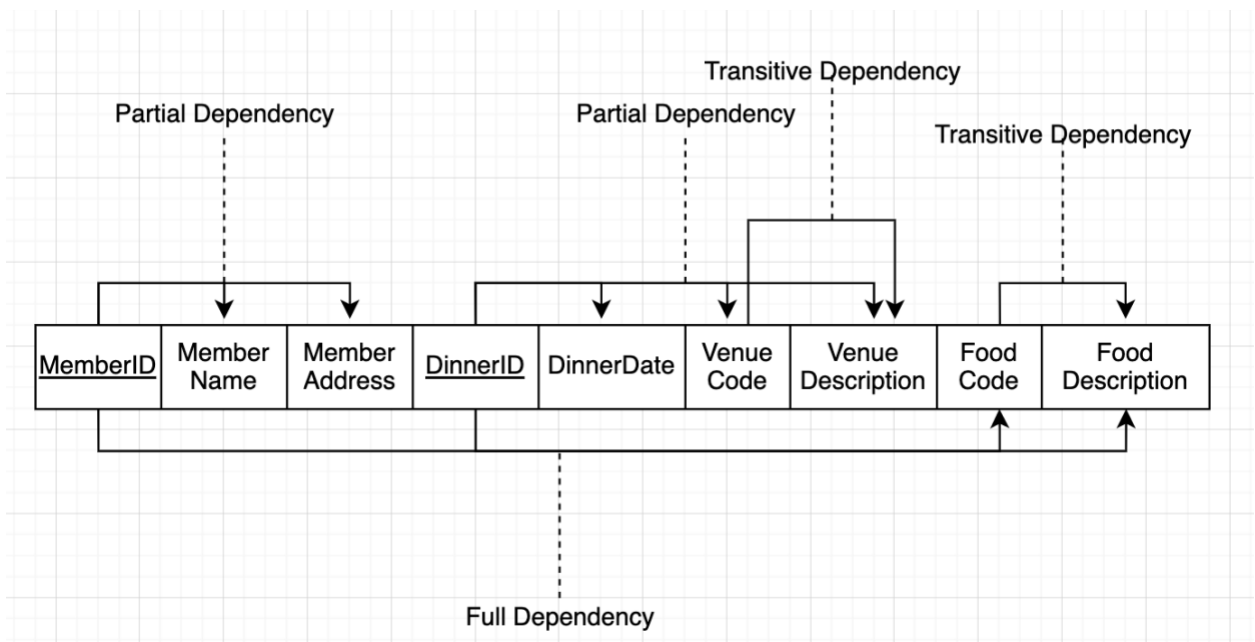
235	Mary Lee	123 Bellfower	D0004	03/03/2020	L02	Café	S01	Pumpkin Soup
							SA2	Marinated Steak
							DE2	Apple Pie
300	Paul Lee	123 Bellfower	D0004	03/03/2020	L03	Petit_Ball_Room	SA2	Marinated Steak

1. **Is the above table considered a relation? Why or why not? Is it in any normal form? If so, which one?** *The above table is not considered a relation because it is not in any normal form. It would first need to be broken down into atomized parts if it were to be considered 1NF.*
2. Transform the table above into first normal form 1NF. (To do this, check if there are multivalued attributes and transform the table to get rid of them)

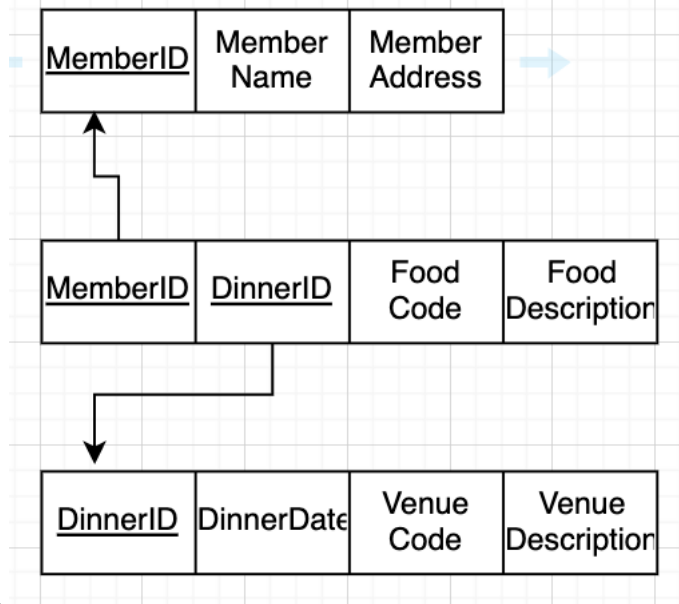
MemberID	MemberName	Member Address	DinnerID	DinnerDate	VenueCode	VenueDescription	Food Code	FoodDescription
214	Peter Wong	325 Meadow Park	D0001	02/02/2020	L01	Grand_Ball_Room	EN3	Stuffed crab
214	Peter Wong	325 Meadow Park	D0001	02/02/2020	L01	Grand_Ball_Room	DEB	Beef
235	Mary Lee	123 Bellfower	D0002	02/02/2020	L02	Café	EN5	Chocolate Mousse
235	Mary Lee	123 Bellfower	D0002	02/02/2020	L02	Cafe	DEB	Beef
250	John Doe	9923 Orange	D0003	03/03/2020	L01	Grand_Ball_Room	SO1	Marinated Steak
250	John Doe	9923 Orange	D0003	03/03/2020	L01	Grand_Ball_Room	EN5	Chocolate Mousse
250	John Doe	9923 Orange	D0003	03/03/2020	L01	Grand_Ball_Room	DE2	Apple Pie

235	Mary Lee	123 Bellfower	D0004	03/03/2020	L02	Café	S01	Pumpkin Soup
235	Mary Lee	123 Bellfower	D0004	03/03/2020	L02	Café	SA2	Marinated Steak
235	Mary Lee	123 Bellfower	D0004	03/03/2020	L02	Café	DE2	Apple Pie
300	Paul Lee	123 Bellfower	D0004	03/03/2020	L03	Petit_Ball_Room	SA2	Marinated Steak

- a. Identify the dependencies and which type they are (full dependencies, partial dependencies, transitive dependencies).

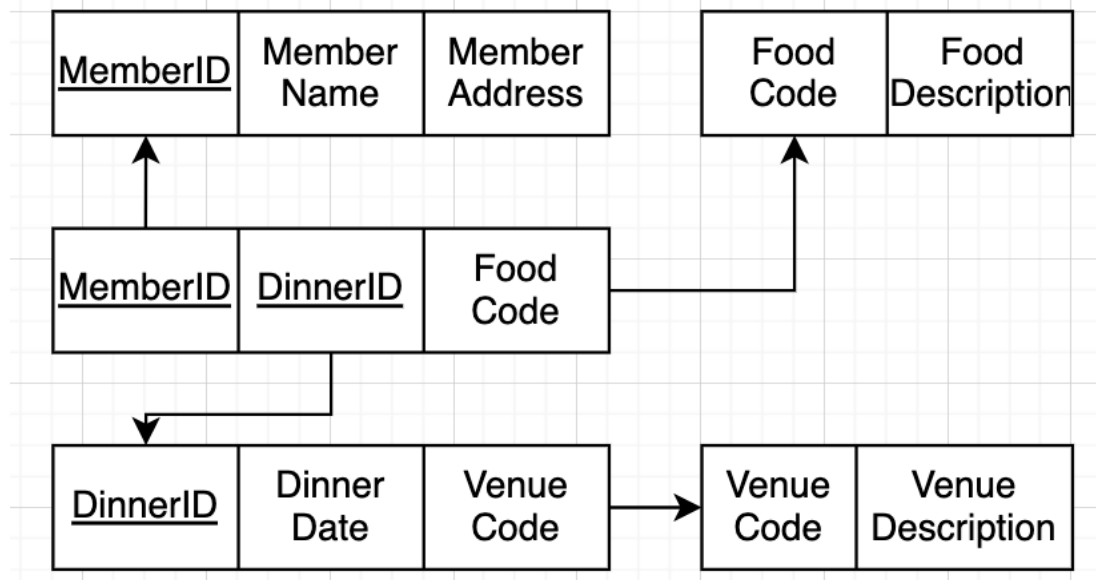


3. Transform the table above into second normal form 2NF. (To do these separate partial



dependencies into separate tables).

4. Transform the table above into third normal form 3NF. (To do this, remove the transitive dependencies by creating separate tables and relate them with the common attribute)



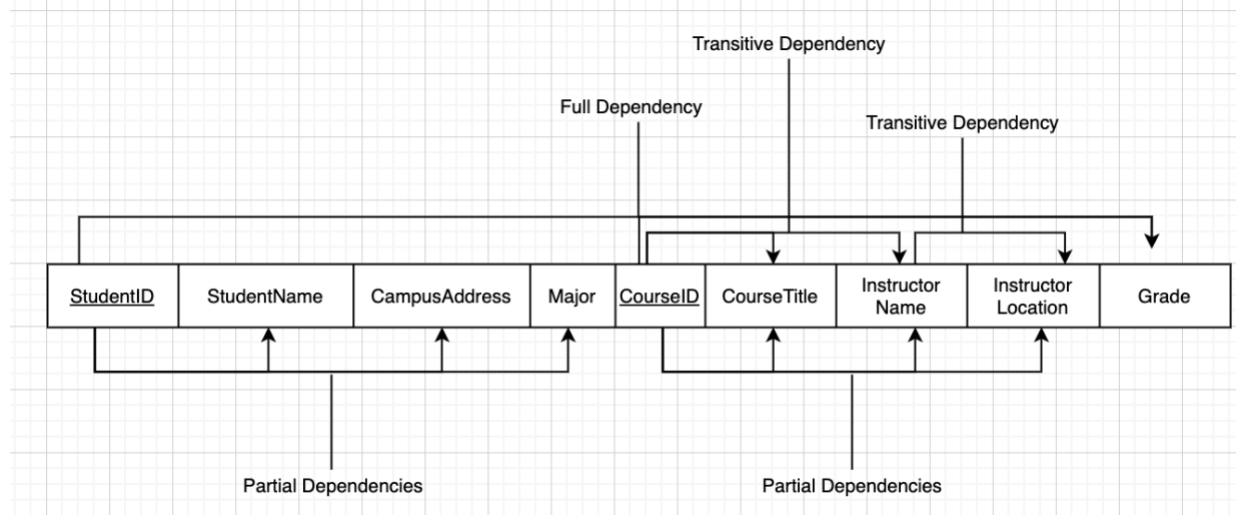
Exercise 2: Normalizing Grade Reports

Figure 4-4 shows a relation called GRADE REPORT for a university. Your assignment is as follows:

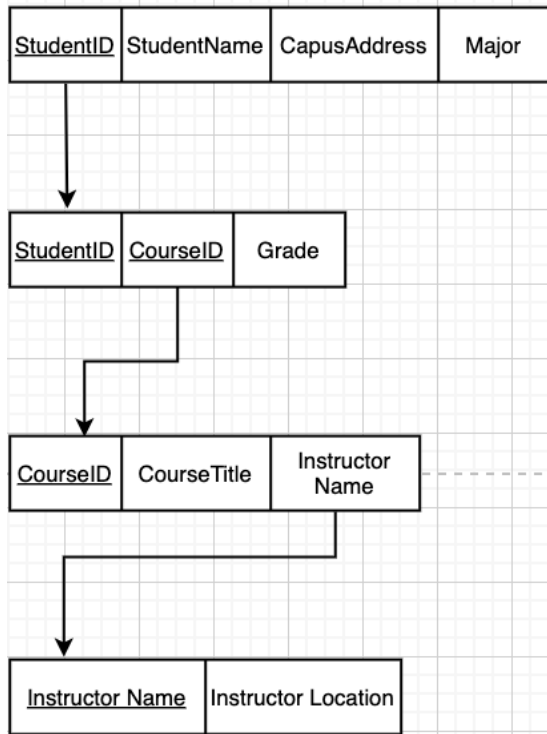
Table 4-4 Grade Report Relation

Grade Report								
StudentID	StudentName	CampusAddress	Major	CourseID	CourseTitle	Instructor Name	Instructor Location	Grade
168300458	Williams	208 Brooks	IS	IS 350	Database Mgt	Codd	B 104	A
168300458	Williams	208 Brooks	IS	IS 465	Systems Analysis	Parsons	B 317	B
543291073	Baker	104 Phillips	Acctg	IS 350	Database Mgt	Codd	B 104	C
543291073	Baker	104 Phillips	Acctg	Acct 201	Fund Acctg	Miller	H 310	B
543291073	Baker	104 Phillips	Acctg	Mkgt 300	Intro Mkgt	Bennett	B 212	A

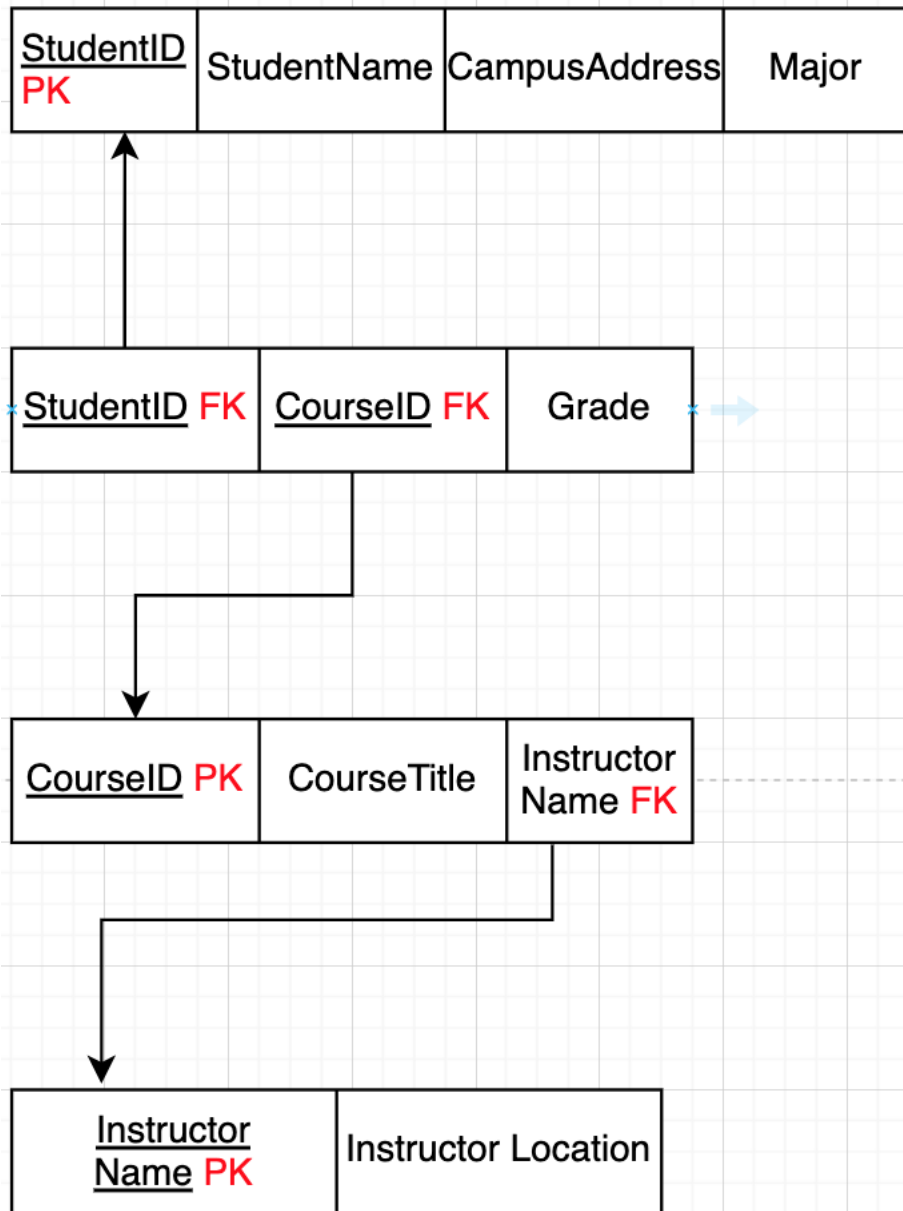
- Draw a logical model for the table above, and graph and explain (with arrows) the functional dependencies in the relation.



- In what normal form is this relation? *1NF*
- Transform the GRADE REPORT table into relations in 3NF.



- d. Draw a model for your 3NF relations and show the primary key/foreign key relationships.



Exercise 3: Normalizing a Shipping Manifest

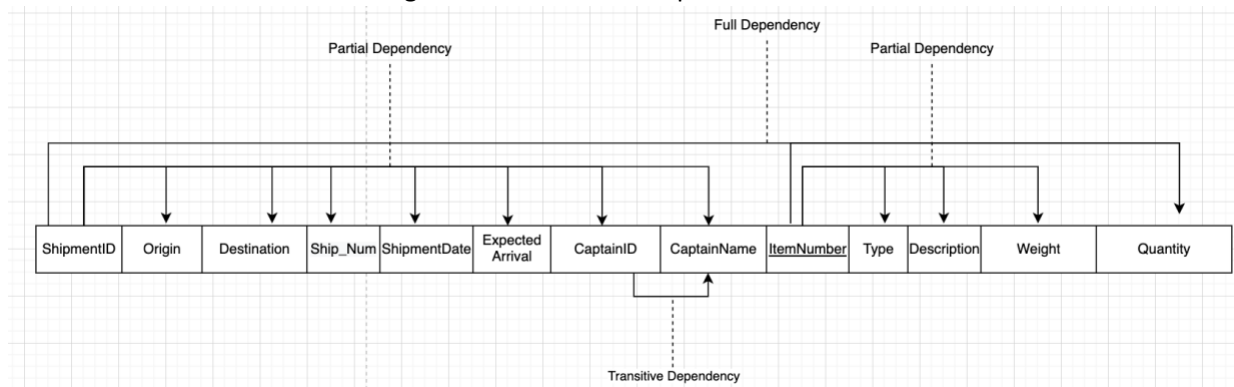
Figure 4-5 shows a relation for a shipping manifest.

Shipment ID:	00-0001	Shipment Date:	01/10/2018
Origin:	Boston	Expected Arrival:	01/14/2018
Destination:	Brazil		
Ship Number:	39	Captain:	002-15
			Henry Moore

Item Number	Type	Description	Weight	Quantity	TOTALWEIGHT
3223	BM	Concrete	500	100	50,000
		Form			
3297	BM	Steel	87	2,000	174,000
		Beam			
				Shipment Total:	224,000

NOTE: This is all a single table.

- a. Draw a relational schema and diagram the functional dependencies in the relation.



- b. In what normal form is this relation? *This has no normal form.*

- c. Decompose MANIFEST into a set of 3NF relations.

<u>CaptainID</u>	CaptainName
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<u>ShipmentID</u>	Origin	Destination	Ship_Num	ShipmentDate	ExpectedArrival	CaptainID
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<u>ShipmentID</u>	<u>ItemNum</u>	Quantity
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<u>ItemNum</u>	Type	Description	Weight
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- d. Draw a relational schema for your 3NF relations and show the referential integrity constraints. (See e)
- e. Draw your answer to part d using Microsoft Visio (or any other tool specified by your instructor).

<u>CaptainID</u>	CaptainName
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<u>ShipmentID</u>	Origin	Destination	Ship_Num	ShipmentDate	ExpectedArrival	CaptainID
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<u>ShipmentID</u>	<u>ItemNum</u>	Quantity
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<u>ItemNum</u>	Type	Description	Weight
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