Tutorial 9-10 (Question 1, 2 and 3)
Normalization – Dependency Diagram

1. Using the INVOICE table structure shown in the table, draw its dependency diagram and identify all dependencies (including all partial and transitive dependencies). You can assume that the table does not contain repeating groups and that any invoice number may reference more than one product. You can also assume that any given product is supplied by a single vendor, but a vendor can supply many products. Therefore, it is proper to conclude that the following dependency exists:

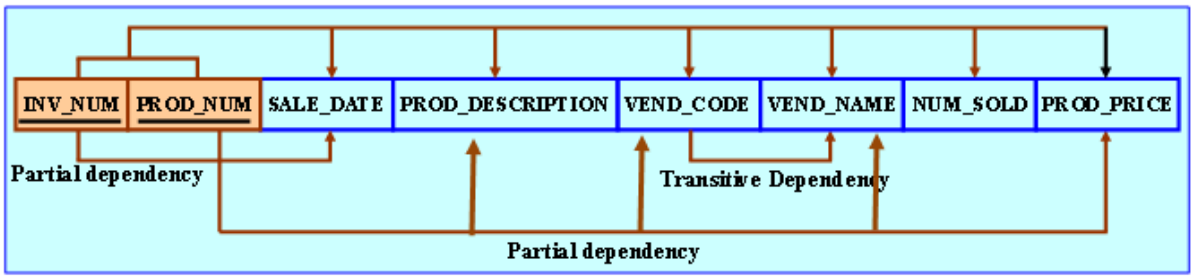
   PROD_NUM → PROD_DESCRIPTION, PROD_PRICE, VEND_CODE, VEND_NAME

   (*Hint*: This table uses a composite primary key.)

Table 1 Sample INVOICE Records

Attribute Name	Sample Value	Sample Value	Sample Value	Sample Value	Sample Value
INV_NUM	211347	211347	211347	211348	211349
PROD_NUM	AA-E3422QW	QD-300932X	RU-995748G	AA-E3422QW	GH-778345P
SALE_DATE	15-Jan-2004	15-Jan-2004	15-Jan-2004	15-Jan-2004	16-Jan-2004
PROD_DESCRIPTION	Rotary sander	0.25-in. drill bit	Band saw	Rotary sander	Power drill
VEND_CODE	211	211	309	211	157
VEND_NAME	NeverFail, Inc.	NeverFail, Inc.	BeGood, Inc.	NeverFail, Inc.	ToughGo, Inc.
NUM_SOLD	1	8	1	2	1
PROD_PRICE	$49.95	$3.45	$39.99	$49.95	$87.75

Problem 1 Solution



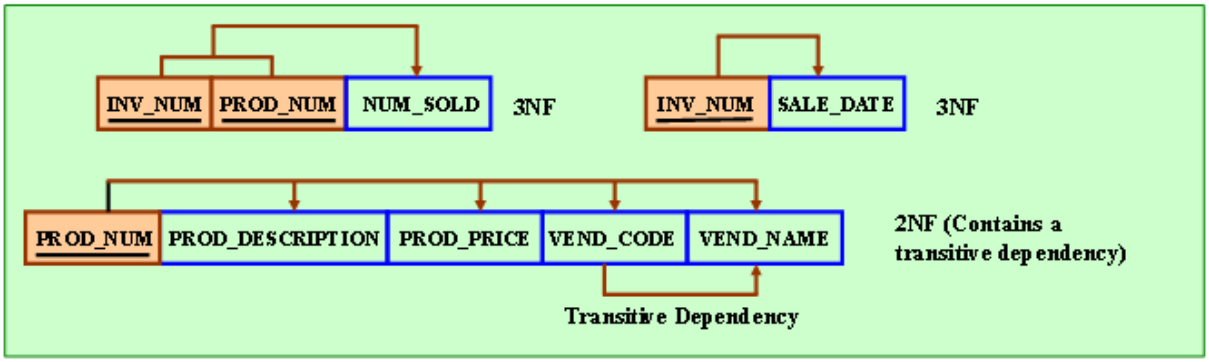
1NF (DBDL format) – *remove repeating groups*

INVOICE (INV_NUM, PROD_NUM, SALE_DATE, PROD_DESCRIPTION, VEND_CODE, VEND_NAME, NUM_SOLD, PROD_PRICE)

2. Using the initial dependency diagram drawn in Problem 1, remove all partial dependencies, draw the new dependency diagrams, and identify the normal forms for each table structure you created.

   (*Hint*: Your actions should produce three dependency diagrams.)

Problem 2 Solution

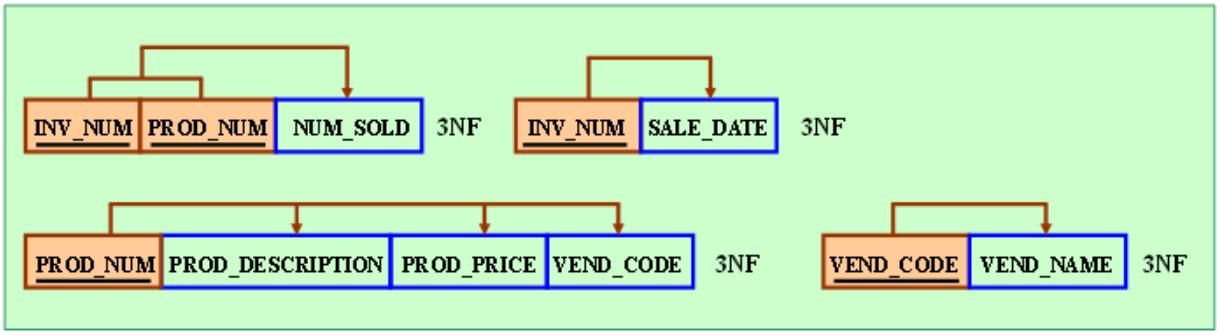


2NF (DBDL format) – *remove partial dependency*

INV_PROD (INV_NUM*, PROD_NUM*, NUM_SOLD)
INVOICE (INV_NUM, SALE_DATE)
PRODUCT (PROD_NUM, PROD_DESCRIPTION, PROD_PRICE, VEND_CODE, VEND_NAME)

3. Using the table structures you created in Problem 2, remove all transitive dependencies, draw the new dependency diagrams, and identify the normal forms for each table structure you created.

Problem 3 Solution



3NF (DBDL format) – *remove transitive dependency*

INV_PROD (INV_NUM*, PROD_NUM*, NUM_SOLD)
INVOICE (INV_NUM, SALE_DATE)
PRODUCT (PROD_NUM, PROD_DESCRIPTION, PROD_PRICE, VEND_CODE*)
VENDOR (VEND_CODE, VEND_NAME)