

# Database Design & SQL

## TERM PROJECT - 1

### COFFEE MAKERS



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# Chapter 1

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## COMPANY OVERVIEW

### 1.1. Company Name:

**BeatCrimBrown Pvt. Ltd.**

### 1.2. Company Description:

BeatCrimBrown Pvt. Ltd. was founded by Harsh Kumar Jhamb and James Ross in June 2017 to cater to the demand for ever increasing people's love for the coffee. BeatCrimBrown takes pride in selling coffee makers from various manufacturers and companies all around the world. We ensure that in this way you get to experience the diverse world class coffee maker's technology. Also, our Company's prime mission is Customer satisfaction. Customers are our first priority and hence we ensure that each and every customer is happy with our service at the end of the day.

We offer a large variety of coffee makers from many companies and manufacturers. We offer different types of coffee makers such as drip coffee makers, espresso coffee makers etc. and we also sell other drink makers such as Latte, Cappuccino etc. So, whether you are a coffee lover or you just can't start your day without a cup of coffee, or even just a regular Coffee drinker, We have the right Product for You!!

### 1.3. Type of Company:

We are a Private Retailer Company selling various types of coffee from different brands, companies and manufacturers around the globe.

### 1.4. Product:

Coffee Makers – All types of coffee makers.

## Chapter 2

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### ATTRIBUTES

#### 2.1. Product Attributes:

The Following Product Attributes have been identified:

1. **Product Id**     →    (Primary Key / UID)
2. **Company**
3. **Brand**
4. **Model**
5. **Variant**
6. **Active Status**
7. **Serial Number**
8. **Type**
9. **Description**
10. **Price**
11. **Color**
12. **Cup capacity**
13. **Weight**
14. **Dimensions**
15. **Wattage**
16. **Voltage**
17. **Warranty**
18. **Ratings**

Chapter 3

CUSTOMER SALES INVOICE

BeatCrimBrown

BeatCrimBrown Pvt. Ltd.  
590, Amvid Square, Lester Ave, Toronto, ON M3K 6Z8  
Contact No.: 519-816-2267 / 519-816-2278  
Email id: contact@beatcrimbrown.com

CUSTOMER SALES INVOICE

**Billed To**  
**Customer Name:** Mary Cooper  
**Customer ID:** 10000003  
**Customer Address/Contact:**  
123 Tombay  
Toronto, ON M3K 4J1  
519-730-9432

**Order ID:** 90000061  
**Date:** 21/09/2021  
**Associate Name:** Jasneet Kaur  
**Associate ID:** 20000000

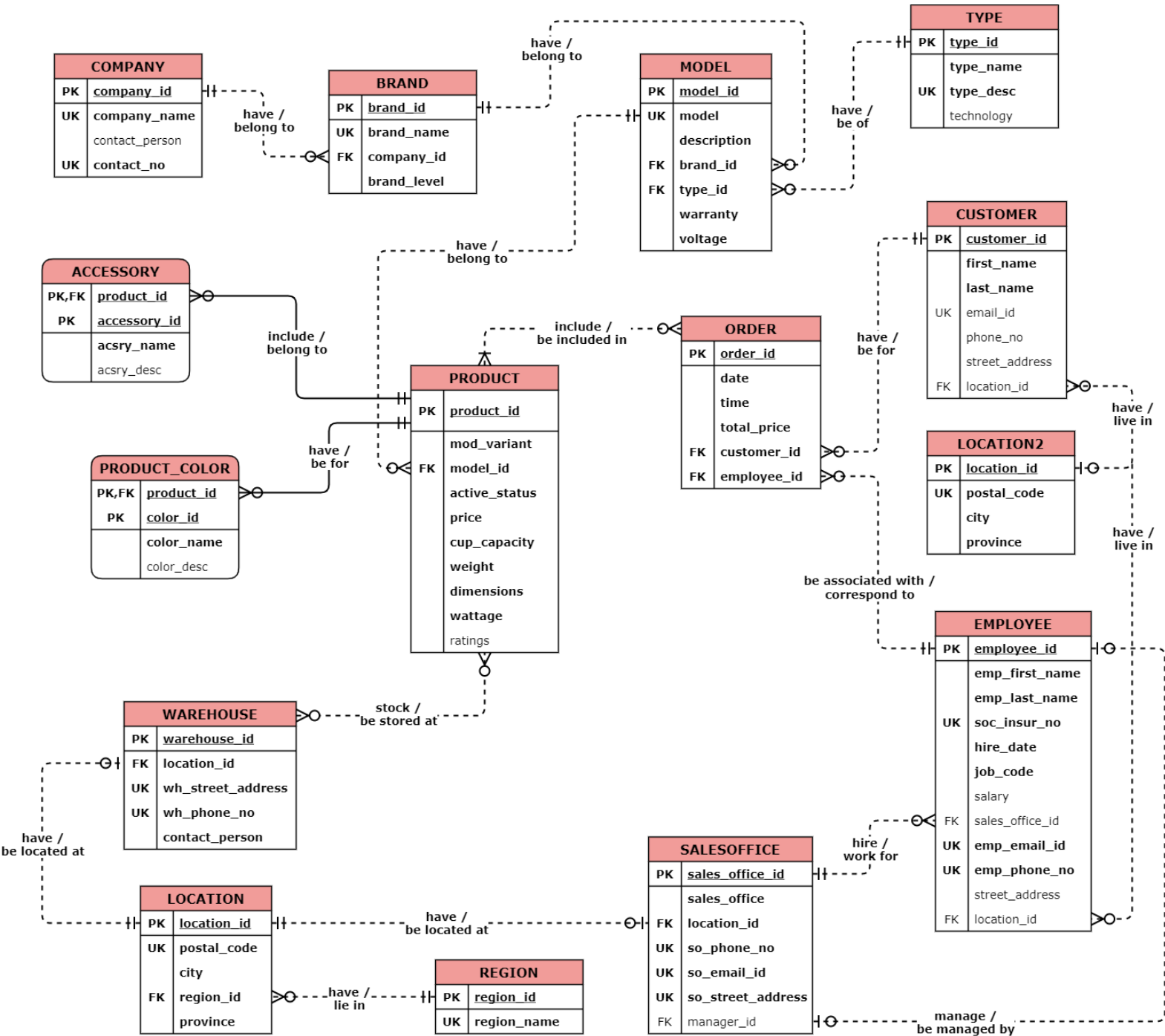
Sr. No.	Product ID	Model	Variant	Brand	Description	QTY	Unit price	Total Price
1.	410020	472WR567	12 Cup	Braun	12 Cup Drip Coffee Maker	3	\$105.39	\$316.17
2.	410123	S45944RT	Latte +	Hamilton Beach	Coffee Maker, Single Serve	2	\$99.99	\$199.98
3.	410094	JJ78337TG	JJCL14	Salton	14 Cup Drip Coffee Maker	1	\$49.00	\$98.00
4.	410064	KDSS56ER	XKPCC	Keurig	Single Serve K-Cup Pod and Carafe Coffee Maker	1	\$148.00	\$296.00
5.	410023	EM-100C	12 Cup	Cuisinart	Espresso Maker	2	\$197.60	\$395.20
		Sub - Total:						\$1,305.35
		Sales Tax:						\$150.20
		Shipping Charges:						\$116.54
		Miscellaneous Services Charge:						\$130.43
		Total Price to be Paid:						\$1,702.52

Thank You!!  
We hope to serve you again soon in future!!!

Chapter 4

ENTITY-RELATIONSHIP DIAGRAMS

4.1. ERD with Many-to-Many Relationships:



Each **COMPANY** *may* have Zero, One or more **BRAND**s  
Each **BRAND** *must* belong to One and only One **COMPANY**

Each **BRAND** *may* have Zero, One or more **MODEL**s  
Each **MODEL** *must* belong to One and only One **BRAND**

Each **TYPE** *may* have Zero, One or more **MODEL**s  
Each **MODEL** *must* be of One and only One **TYPE**

Each **MODEL** *may* have Zero, One or more **PRODUCT**s  
Each **PRODUCT** *must* belong to One and only One **MODEL**

Each **PRODUCT** *may* include Zero, One or more **ACCESSORY**s  
Each **ACCESSORY** *must* belong to One and only One **PRODUCT**

Each **PRODUCT** *may* have Zero, One or more **PRODUCT\_COLORS**  
Each **PRODUCT\_COLOR** *must* be for One and only One **PRODUCT**

Each **CUSTOMER** *may* have Zero, One or more **ORDERS**  
Each **ORDER** *must* be for One and only One **CUSTOMER**

Each **EMPLOYEE** *may* be associated with Zero, One or more **ORDERS**  
Each **ORDER** *must* correspond to One and only One **EMPLOYEE**

Each **ORDER** *must* include One or more **PRODUCT**s  
Each **PRODUCT** *may* be included in Zero, One or more **ORDERS**

Each **WAREHOUSE** *may* stock Zero, One or more **PRODUCT**s  
Each **PRODUCT** *may* be stored at Zero, One or more **WAREHOUSE**s

Each **SALESOFFICE** *may* hire Zero, One or more **EMPLOYEE**s  
Each **EMPLOYEE** *must* work for One and only One **SALESOFFICE**

Each **EMPLOYEE** *may* manage Zero or One **SALESOFFICE**s  
Each **SALESOFFICE** *may* be managed by Zero or One **EMPLOYEE**

Each **REGION** *may* have Zero or One **LOCATION**s  
Each **LOCATION** *must* lie in One and only One **REGION**

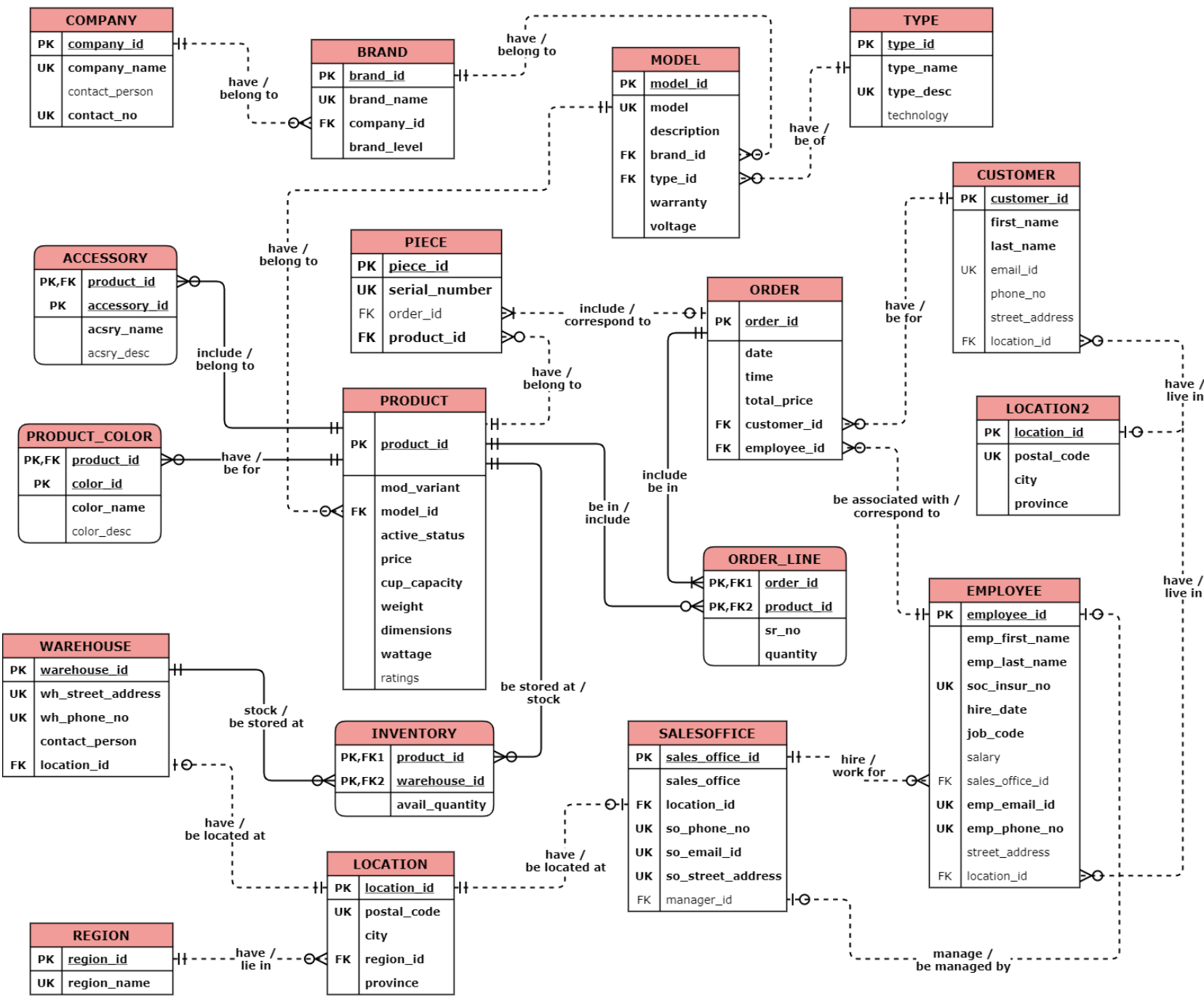
Each **LOCATION** *may* have Zero or One **SALESOFFICE**s  
Each **SALESOFFICE** *must* be located at One and only One **LOCATION**

Each **LOCATION** *may* have Zero or One **WAREHOUSE**s  
Each **WAREHOUSE** *must* be located at One and only One **LOCATION**

Each **LOCATION2** *may* have Zero or One **CUSTOMER**s  
Each **CUSTOMER** *may* live in Zero or One **LOCATION**

Each **LOCATION2** *may* have Zero or One **EMPLOYEE**s  
Each **EMPLOYEE** *may* live in Zero or One **LOCATION**

4.2. ERD with Many-to-Many Relationships Resolved:



Each COMPANY **may** have Zero, One or more BRANDs  
Each BRAND **must** belong to One and only One COMPANY

Each BRAND **may** have Zero, One or more MODELs  
Each MODEL **must** belong to One and only One BRAND

Each TYPE **may** have Zero, One or more MODELs  
Each MODEL **must** be of One and only One TYPE

Each MODEL **may** have Zero, One or more PRODUCTs  
Each PRODUCT **must** belong to One and only One MODEL

Each PRODUCT **may** include Zero, One or more ACCESSORYs  
Each ACCESSORY **must** belong to One and only One PRODUCT

Each PRODUCT **may** have Zero, One or more PRODUCT\_COLORs  
Each PRODUCT\_COLOR **must** be for One and only One PRODUCT

Each REGION **may** have Zero or One LOCATIONs  
Each LOCATION **must** lie in One and only One REGION

Each LOCATION **may** have Zero or One SALESOFFICEs  
Each SALESOFFICE **must** be located at One and only One LOCATION

Each LOCATION **may** have Zero or One WAREHOUSEs  
Each WAREHOUSE **must** be located at One and only One LOCATION

Each LOCATION2 **may** have Zero or One CUSTOMERs  
Each CUSTOMER **may** live in Zero or One LOCATION

Each LOCATION2 **may** have Zero or One EMPLOYEEs  
Each EMPLOYEE **may** live in Zero or One LOCATION

Each CUSTOMER **may** have Zero, One or more ORDERs  
Each ORDER **must** be for One and only One CUSTOMER

Each EMPLOYEE **may** be associated with Zero, One or more ORDERs  
Each ORDER **must** correspond to One and only One EMPLOYEE

Each PRODUCT **may** be stored at Zero, One or more INVENTORYs  
Each INVENTORY **must** stock One and only One PRODUCT

Each WAREHOUSE **may** stock Zero, One or more INVENTORYs  
Each INVENTORY **must** be stored at One and only One WAREHOUSE

Each ORDER **must** include One or more ORDER\_LINES  
Each ORDER\_LINES **must** be in One and only One ORDER

Each PRODUCT **may** be in Zero, One or more ORDER\_LINES  
Each ORDER\_LINES **must** include One and only One PRODUCT

Each PRODUCT **may** have Zero, One or more PIECEs  
Each PIECE **must** belong to One and only One PRODUCT

Each ORDER **must** include One or more PIECEs  
Each PIECE **may** correspond to Zero or One ORDER

Each SALESOFFICE **may** hire Zero, One or more EMPLOYEEs  
Each EMPLOYEE **must** work for One and only One SALESOFFICE

Each EMPLOYEE **may** manage Zero or One SALESOFFICEs  
Each SALESOFFICE **may** be managed by Zero or One EMPLOYEE

## Chapter 5

### RELATIONAL MODELS

#### 5.1. Relational (Physical) Model - Table Format:

COMPANYS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	company_id	INTEGER	
uk	*	company_name	VARCHAR	200
	O	contact_person	VARCHAR	100
uk	*	contact_no	VARCHAR	15

BRANDS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	brand_id	INTEGER	
uk	*	brand_name	VARCHAR	70
fk	*	company_id	INTEGER	
	*	brand_level	VARCHAR	30

MODELS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	model_id	INTEGER	
uk	*	model	VARCHAR	100
	*	description	VARCHAR	300
fk	*	brand_id	INTEGER	
fk	*	type_id	INTEGER	
	*	warranty_years	INTEGER	
	*	voltage	INTEGER	



TYPES				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	type_id	INTEGER	
	*	type_name	VARCHAR	70
uk	*	type_desc	VARCHAR	200
	O	technology	VARCHAR	100

PRODUCTS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	product_id	INTEGER	
	*	mod_variant	VARCHAR	70
fk	*	model_id	INTEGER	
	*	active_status	VARCHAR	1
	*	price	DECIMAL	6,2
	*	cup_capacity	INTEGER	
	*	weight_pounds	DECIMAL	4,2
	*	dimensions	VARCHAR	40
	*	wattage	DECIMAL	5,1
	O	ratings	DECIMAL	2,1

ACCESSORYS				
Key Type	Optionality	Column Name	Data Type	Length
pk, fk	*	product_id	INTEGER	
pk	*	accessory_id	INTEGER	
	*	accessory_name	VARCHAR	100
	O	accessory_desc	VARCHAR	200

PRODUCT_COLORS				
Key Type	Optionality	Column Name	Data Type	Length
pk, fk	*	product_id	INTEGER	
pk	*	color_id	INTEGER	
	*	color_name	VARCHAR	50
	O	color_desc	VARCHAR	100

PIECES				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	piece_id	INTEGER	
uk	*	serial_number	VARCHAR	50
fk	O	order_id	INTEGER	
fk	*	product_id	INTEGER	

ORDERS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	order_id	INTEGER	
	*	order_date	DATE	
	*	order_time	VARCHAR	8
	*	total_price	DECIMAL	8,2
fk	*	customer_id	INTEGER	
fk	*	employee_id	INTEGER	

ORDER_LINES				
Key Type	Optionality	Column Name	Data Type	Length
pk, fk	*	order_id	INTEGER	
pk, fk	*	product_id	INTEGER	
	*	sr_no	INTEGER	
	*	quantity	INTEGER	

CUSTOMERS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	customer_id	INTEGER	
	*	first_name	VARCHAR	70
	*	last_name	VARCHAR	70
uk	O	email_id	VARCHAR	100
	O	phone_no	VARCHAR	15
	O	street_address	VARCHAR	100
fk	O	location_id	INTEGER	

EMPLOYEES				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	employee_id	INTEGER	
	*	emp_first_name	VARCHAR	70
	*	emp_last_name	VARCHAR	70
uk	*	soc_insurance_no	DECIMAL	9,0
	*	hire_date	DATE	
	*	job_code	VARCHAR	1
	O	salary	DECIMAL	8,2
fk	O	sales_office_id	INTEGER	
uk	*	emp_email_id	VARCHAR	100
uk	*	emp_phone_no	VARCHAR	15
	O	street_address	VARCHAR	100
fk	O	location_id	INTEGER	

LOCATION2S				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	location_id	INTEGER	
uk	*	postal_code	VARCHAR	6
	*	city	VARCHAR	40
	*	province	VARCHAR	40

SALESOFFICES				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	sales_office_id	INTEGER	
	*	sales_office	VARCHAR	70
fk	*	location_id	INTEGER	
uk	*	so_phone_no	VARCHAR	15
uk	*	so_email_id	VARCHAR	100
uk	*	so_street_address	VARCHAR	100
fk	O	manager_id	INTEGER	

WAREHOUSES				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	warehouse_id	INTEGER	
uk	*	wh_street_address	VARCHAR	100
uk	*	wh_phone_no	VARCHAR	15
	*	contact_person	VARCHAR	70
fk	*	location_id	INTEGER	

INVENTORYS				
Key Type	Optionality	Column Name	Data Type	Length
pk, fk	*	product_id	INTEGER	
pk, fk	*	warehouse_id	INTEGER	
	*	avail_quantity	INTEGER	

LOCATIONS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	location_id	INTEGER	
uk	*	postal_code	VARCHAR	6
	*	city	VARCHAR	40
fk	*	region_id	INTEGER	
	*	province	VARCHAR	40

REGIONS				
Key Type	Optionality	Column Name	Data Type	Length
pk	*	region_id	INTEGER	
uk	*	region_name	VARCHAR	100

## 5.2. Relational (Physical) Model - Text Format:

**COMPANYS** (company\_id, company\_name, contact\_person, contact\_no)

**BRANDS** (brand\_id, brand\_name, company\_id, brand\_level)

FK company\_id → COMPANYS

**MODELS** (model\_id, model, description, brand\_id, type\_id, warranty\_years, voltage)

FK brand\_id → BRANDS

FK type\_id → TYPES

**TYPES** (type\_id, type\_name, type\_desc, technology)

**PRODUCTS** (product\_id, mod\_variant, model\_id, active\_status, price, cup\_capacity, weight\_pounds, dimensions, wattage, ratings)

FK model\_id → MODELS

**ACCESSORYS** (product\_id, accessory\_id, accessory\_name, accessory\_desc)

FK product\_id → PRODUCTS

**PRODUCT\_COLORS** (product\_id, color\_id, color\_name, color\_desc)

FK product\_id → PRODUCTS

**PIECES** (piece\_id, serial\_number, order\_id, product\_id)

FK order\_id → ORDERS

FK product\_id → PRODUCTS

**ORDERS** (order\_id, order\_date, order\_time, total\_price, customer\_id, employee\_id)

FK customer\_id → CUSTOMERS

FK employee\_id → EMPLOYEES

**ORDER\_LINES** (order\_id, product\_id, sr\_no, quantity)

FK order\_id → ORDERS

FK product\_id → PRODUCTS

**CUSTOMERS** (customer\_id, first\_name, last\_name, email\_id, phone\_no, street\_address, location\_id)

FK location\_id → LOCATION2S

**EMPLOYEES** (employee\_id, emp\_first\_name, emp\_last\_name, soc\_insurance\_no, hire\_date, job\_code, salary, sales\_office\_id, emp\_email\_id, emp\_phone\_no, street\_address, location\_id)

FK sales\_office\_id → SALESOFFICES

FK location\_id → LOCATION2S

**LOCATION2S** (location\_id, postal\_code, city, province)

**SALESOFFICES** (sales\_office\_id, sales\_office, location\_id, so\_phone\_no, so\_email\_id, so\_street\_address, manager\_id)

FK location\_id → LOCATIONS

FK manager\_id → EMPLOYEES

**WAREHOUSES** (warehouse\_id, wh\_street\_address, wh\_phone\_no, contact\_person, location\_id)

FK location\_id → LOCATIONS

**INVENTORYS** (product\_id, warehouse\_id, avail\_quantity)

FK product\_id → PRODUCTS

FK warehouse\_id → WAREHOUSES

**LOCATIONS** (location\_id, postal\_code, city, region\_id, province)

FK region\_id → REGIONS

**REGIONS** (region\_id, region\_name)

## Chapter 6

### ADDITIONAL BUSINESS RULES

#### 6.1. Database Business Rules - Table Format

Table	Column Name	Data Type	Business Rule
COMPANYS	company_id	INTEGER	pk, auto-generated IDENTITY primary key START WITH 30000 INCREMENT BY 1

Table	Column Name	Data Type	Business Rule
BRANDS	brand_id	INTEGER	pk, auto-generated IDENTITY primary key START WITH 31000 INCREMENT BY 1

Table	Column Name	Data Type	Business Rule
MODELS	warranty_years	INTEGER	DEFAULT – 1, warranty_years must be between 1 AND 5

Table	Column Name	Data Type	Business Rule
PRODUCTS	active_status	VARCHAR	DEFAULT – 'Y', active_status must be 'Y' or 'N'

Table	Column Name	Data Type	Business Rule
CUSTOMERS	customer_id	INTEGER	pk, auto-generated IDENTITY primary key START WITH 10000000 INCREMENT BY 1

Table	Column Name	Data Type	Business Rule
ORDERS	order_id	INTEGER	pk, auto-generated SEQUENCE primary key START WITH 90000000 INCREMENT BY 1
	order_date	DATE	DEFAULT – CURRENT DATE, order_date must be >= '2018-01-01'

Table	Column Name	Data Type	Business Rule
ORDER_LINES	quantity	INTEGER	quantity must be >= 1

Table	Column Name	Data Type	Business Rule
EMPLOYEES	employee_id	INTEGER	pk, auto-generated IDENTITY primary key START WITH 20000000 INCREMENT BY 1
	hire_date	DATE	hire_date must be >= '2017-09-01'
	job_code	VARCHAR	DEFAULT – 'T' job_code must be 'T', 'J', 'M'
	salary	DECIMAL	IS NULL or must be between 60000.00 AND 170000.00

Table	Column Name	Data Type	Business Rule
INVENTORYS	avail_quantity	INTEGER	avail_quantity must be <= 500

Table	Column Name	Data Type	Business Rule
LOCATION2S	location_id	INTEGER	pk, auto-generated IDENTITY primary key START WITH 7000000 INCREMENT BY 1

Table	Column Name	Data Type	Business Rule
LOCATIONS	location_id	INTEGER	pk, auto-generated IDENTITY primary key START WITH 8000000 INCREMENT BY 1