

# Accounting System

**Group ID: 5**

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**Lab:** Lab 9

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**Functional dependencies, identify the normal form and normalize the relations if they are not in BCNF form.**

**1. RealAccount**

RealAccount		
FK [Not Null]	<u>AccountID</u>	varchar(20)

**Candidate Key:-**

{ AccountID }

**Functional Dependencies:-**

1. AccountID → AccountID

**Verify condition of normal forms:-**

The table has only one column hence it satisfies BCNF form.

## 2. NominalAccount

NominalAccount		
FK [Not Null]	<u>AccountID</u>	varchar(20)

### Candidate Key:-

{ AccountID }

### Functional Dependencies:-

1. AccountID  $\rightarrow$  AccountID

### Verify condition of normal forms:-

The table has only one column hence it satisfies BCNF form.

## 3. PersonalAccount\_Email

PersonalAccount_Email		
FK [Not Null]	<u>AccountID</u>	varchar(20)
	<u>EmailAddress</u>	Varchar(100)

### Candidate Key:-

{ AccountID, EmailAddress }

### Functional Dependencies:-

1. { AccountID, EmailAddress }  $\rightarrow$  { AccountID, EmailAddress }

### Verifying Condition of different Normal Forms:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

#### 4. PersonalAccount\_Contact

PersonalAccount_ContactNumber		
FK [Not Null]	AccountID	varchar(20)
	ContactNumber	numeric

##### Candidate Key:-

{ ContactNumber }

##### Functional Dependencies:-

2. { ContactNumber }  $\rightarrow$  { AccountID }

##### Verifying Condition of different Normal Forms:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

#### 5. AccountGroup

Account Group		
PK [Not Null]	<u>AccountGroupID</u>	varchar(20)
	Header	boolean
	ShowIn	enum
	Name	Varchar(50)
FK [Not Null]	CompanyID	varchar(20)

**Candidate key:-**

1. { AccountGroupID }

**Functional dependencies:-**

1. { AccountGroupID }  $\rightarrow$  { AccountGroupID, Header, ShowIn, Name, CompanyID }

**Verify normal form conditions:-**

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

**6. Account**

Account		
PK [Not Null]	<u>AccountID</u>	varchar(20)
	AccountName	Varchar(50)
	Description	Varchar(300)
FK [Not Null]	AccountGroupID	varchar(20)

**Candidate Key:-**

- { AccountID }

**Function dependencies:-**

1. { AccountID }  $\rightarrow$  { AccountID, AccountName, Description, AccountGroupID }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

### 7. CompanyContactNumber

COMPANY_ContactNumber		
FK [Not Null]	CompanyID	varchar(20)
	ContactNumber	Numeric

#### ❖ Update Anomalies:-

As contactNumber can be null we cannot classify it as a candidate key, hence we would have to alter table structure and make ContactNumber NOT NULL, so that it becomes a candidate key and we could form functional dependency.

#### ❖ After resolving the anomaly:-

##### Candidate Key:-

{ ContactNumber }

##### Function dependencies:-

1. { ContactNumber } → { CompanyID }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

### 8. Company

COMPANY		
PK [Not Null]	<u>CompanyID</u>	varchar(20)
	CompanyName	Varchar(50)
	GSTIN	Varchar(15)
	AddresLine1	Varchar(300)
	AddresLine2	Varchar(300)
	Pincode	Varchar(6)
FK [Not Null]	CityID	Serial
	Logo	Varchar(50)

### Candidate Key:-

{ CompanyID }

### Function dependencies:-

1.  $\{ \text{CompanyID} \} \rightarrow \{ \text{CompanyID}, \text{CompanyName}, \text{GSTIN}, \text{AddresLine1}, \text{AddresLine2}, \text{Pincode}, \text{CityID}, \text{Logo} \}$

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 9. Country

Country		
PK [Not Null]	<u>CountryID</u>	Serial
	CountryName	Varchar(30)

### Candidate Key:-

$\{ \text{CountryID} \}$

### Function dependencies:-

1.  $\{ \text{CountryID} \} \rightarrow \{ \text{CountryID}, \text{CountryName} \}$

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 10. State

State		
PK [Not Null]	<u>StateID</u>	Serial
	StateName	Varchar(30)
FK [Not Null]	CountryId	Serial

### Candidate Key:-

{ StateID }

### Function dependencies:-

1. { StateID } → { CountryID, StateID, StateName }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 11. FinancialTransactions

FinancialTransactions		
PK (Not Null)	TransactionNumber	INT
	Description	Varchar(300)
	TransactionDate	Date

### Candidate Key:-

{ TransactionNumber }

### Function dependencies:-

1. { TransactionNumber } →  
{ TransactionNumber, Description, TransactionDate }



**Verify normal forms conditions:-**

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

**12. FinancialTransactionsEntry**

FinancialTransactionsEntry		
FK (Not Null)	AccountID	INT
FK (Not Null)	TransactionNumber	INT
	Amount	Decimal

**Candidate Key:-**

{ AccountID, TransactionNumber }

**Functional Dependencies:-**

1. { AccountID, TransactionNumber } → { AccountID, TransactionNumber, Amount }

**Verifying Condition of different Normal Forms:-**

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

### 13. PurchaseInvoice

PurchaseInvoice		
PK [Not Null]	<u>ReceiptID</u>	INT
	Date	DATE
FK (Not Null)	AccountID	varchar(20)
FK, PK (Not Null)	CompanyID	varchar(20)

#### Candidate Key:-

{ ReceiptID }

#### Function dependencies:-

1. { ReceiptID }  $\rightarrow$  { ReceiptID, Date, AccountID, CompanyID }

#### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

### 14. PurchaseItem

Purchase Item		
FK (Not Null)	ReceiptID	SERIAL
FK (Not Null)	ItemID	varchar(20)
	Amount	decimal(15,2)
	Qty	real

**Candidate Key:-**

{ ReceiptID, ItemID }

**Function dependencies:-**

1. { ReceiptID , ItemID } → { ReceiptID, ItemID, Amount, Qty }

**Verify normal forms conditions:-**

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

**15. SalesInvoice**

SalesInvoice		
PK [Not Null]	<u>InvoiceID</u>	INT
	Date	DATE
FK (Not Null)	AccountID	varchar(20)
FK, PK (Not Null)	CompanyID	varchar(20)

**Candidate Key:-**

{ InvoiceID}  
{ InvoiceID, CompanyID}

**Function dependencies:-**

1. { InvoiceID } → { InvoiceID, Date, AccountID, CompanyID }
2. { InvoiceID, CompanyID } → { InvoiceID, Date, AccountID, CompanyID }

**Verify normal forms conditions:-**

1. The table has no multivalued attribute hence it satisfies 1 NF condition.

2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 16. SalesItem

Sales Item		
FK (Not Null)	InvoiceID	SERIAL
FK (Not Null)	ItemID	varchar(20)
(Not Null)	Amount	decimal(15,2)
(Not Null)	Qty	real

### Candidate Key:-

{ InvoiceID, ItemID }

### Function dependencies:-

1. { InvoiceID , ItemID } → { InvoiceID, ItemID, Amount, Qty }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 17. ItemGroup

ItemGroup		
PK [Not Null]	<u>ItemGroupID</u>	varchar
	Category	Varchar
FK [Not Null]	CompanyID	varchar
FK	ParentItemGroupID	varchar

### Candidate Key:-

{ItemGroupID}

### Function dependencies:-

1. {ItemGroupID} → {ItemGroupID, Category, CompanyID, ParentItemGroupID }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 18. Item

Item		
PK [Not Null]	<u>ItemID</u>	varchar
	ItemName	Varchar
	Barcode	INT
	Price	Numeric
FK [Not Null]	ItemGroupID	varchar

### Candidate Key:-

{ ItemID }

### Function dependencies:-

1. { ItemID } → { ItemID, ItemName, Barcode, Price, ItemGroupID }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.

## 19. City

City		
PK [Not Null]	<u>CityID</u>	Serial
	CityName	Varchar
FK [Not Null]	StateID	Serial

### Candidate Key:-

{ CityID }

### Function dependencies:-

1. { CityID }  $\rightarrow$  { CityID, CityName, StateID }

### Verify normal forms conditions:-

1. The table has no multivalued attribute hence it satisfies 1 NF condition.
2. The LHS of the above functional dependencies, it is a candidate key. Hence it satisfies 2<sup>nd</sup> NF condition.
3. The LHS of the above functional dependencies, it is a super key. Hence it satisfies 3<sup>rd</sup> NF condition.
4. The LHS of the above functional dependencies, it is a super key. Hence it satisfies the BCNF condition.