

# Universidad de Costa Rica

Informática Empresarial

IF 4100 — Fundamentos de Bases de Datos

## **PROYECTO FINAL**

Docentes:

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## **1. Nombre de los DBAs:**

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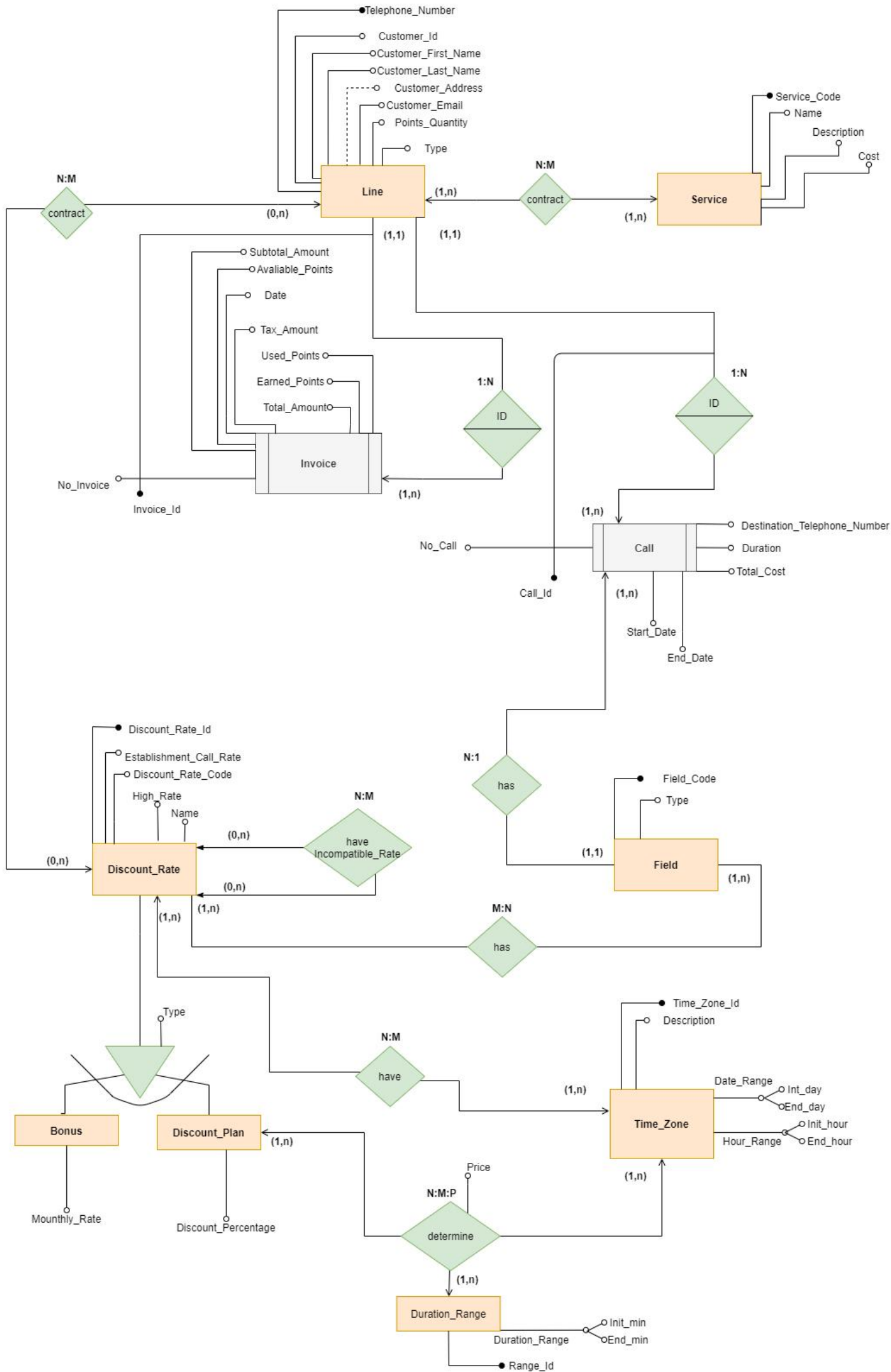
## **2. Documento de Modelado Conceptual de la base de datos**

### **Supuestos semánticos**

1. En línea puede ser que no tenga contratada ninguna tasa de descuento.
2. La identificación del cliente va ser el número de cédula.
3. Se necesita desplegar la información sobre un cliente con su correspondiente número telefónico, identificación, nombre, apellido y el estado de la línea contratada así como el nombre del servicio vinculado a dicha línea.

### **Semántica no reflejada**

1. El tipo de línea puede ser básica, ADSL, RDSI.
2. En línea la dirección del cliente puede no registrarse ninguna y el correo electrónico es obligatorio.
3. En la relación determinar el costo de la llamada expresada en colones/minuto. Este costo se utilizará para calcular el costo total de cada una de las llamadas realizadas en cada línea telefónica.
4. En ámbito un tipo puede ser (provincial, interprovincial, internacional).
5. En tarifa de descuentos puede que no haya cuota de establecimiento de llamada.
6. Los bonos permiten disponer de una tarifa plana para realizar llamadas a cualquier hora del día.
7. En planes de descuento tienen un determinado porcentaje de descuento siempre y cuando se realicen en unas determinadas franjas horarias.
8. Factura mensual por línea, suma una serie de puntos cada dos meses (tomando en cuenta una fecha X de facturación y hasta la fecha Y (Y sería igual a X + 2 meses)) según la facturación realizada y otorga un punto cada 6\$ de consumo en llamadas.
9. En la factura los puntos obtenidos los puede aplicar a la factura pendiente a razón de 1 punto por dólar.



### 3. Documento de Modelado Lógico de la base de datos

#### A. Transformación al modelo relacional

##### ■ (Paso 1) Entidades fuertes

Line (Telephone\_Number, Customer\_id, Customer\_First\_Name, Customer\_Last\_Name, Customer\_Address, Customer\_Email, Points\_Quantity, Type)

Service (Service\_Code, Name, Description, Cost)

Field (Field\_Code, Type)

Time\_Zone (Time\_Zone\_Id, Description, Init\_Day, End\_Day, Init\_hour, End\_Hour).

Duration\_Range (Range\_Id, Init\_Min, End\_Min)

##### ■ (Paso 2) Entidades débiles

Invoice ( Telephone\_Number, No\_Invoice, Subtotal\_Amount, Date, Tax\_Amount, Available\_Points, Used\_Points, Earned\_Points, Total\_Amount)

Call (Telephone\_Number, No\_Call, Start\_Date, End\_Date, Duration, Destination\_Telephone\_Number, Total\_Cost)

##### ■ (Paso 3) Relaciones 1:1

No hay relaciones 1:1.

##### ■ (Paso 4) Relaciones 1:N

##### ■ (Paso 5) Relaciones M:N

(has) Incompatible\_Discount\_Rate (Discount\_Rate\_Id\_C, Discount\_Rate\_Id)

(has) Discount\_Rate\_Field (Discount\_Rate\_Id, Field\_Code)

(contract) Line\_Service (Telephone\_Number, Service\_Code)

(contract) Line\_Discount\_Rate (Discount\_Rate\_Id, Telephone\_Number)

##### ■ (Paso 6) Atributos multivalor

No hay atributos multivalor.

##### ■ (Paso 7) Unión Ternarias

Determine (Discount\_Rate\_Id, Range\_Id, Time\_Zone\_Id, Price)

■ **(Paso 8) Especialización**

Discount\_Rate (Discount\_Rate\_Id, Establishment\_Call\_Rate, Discount\_Rate\_Code, High\_Rate, Name)

Bonus (Discount\_Rate\_Id, Type, Monthly\_Rate)

Discount\_Plan (Discount\_Rate\_Id, Discount\_Percentage)

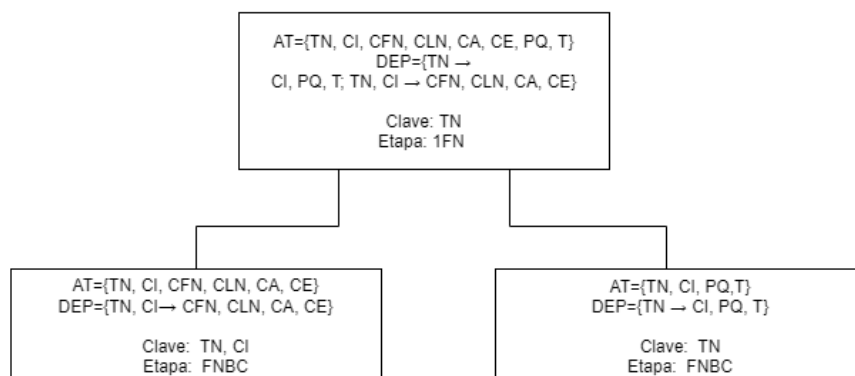
B. Dependencias funcionales y multivaluadas contenidas en cada relación

- Adjunto en la sección de normalización.

C. Proceso de Normalización

- **Line:** es elemental, no hay extraños y no hay redundancia.

Line (L)	
Telephone_Number	TN
Customer_id	CI
Customer_First_Name	CFN
Customer_Last_Name	CLN
Customer_Address	CA
Customer_Email	CE
Points_Quantity	PQ
Type	T



Relaciones normalizadas:

Line\_Customer(Telephone\_Number, Customer\_Id, Customer\_First\_Name, Customer\_Last\_Name, Customer\_Address, Customer\_Email)

Line (Telephone\_Number, Points\_Quantity, Type)

- **Service:** es elemental, no hay extraños y no hay redundancia.

Service (S)	
Service_Code	SC
Name	N
Description	D
Cost	C

$AT=\{SC, N, D, C\}$ $DEP=\{SC \rightarrow N, D, C\}$  Clave: SC Etapas: FNBC
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Relaciones normalizadas:

Service (Service\_Code, Name, Description, Cost)

- **Field:** es elemental, no hay extraños y no hay redundancia.

Field (F)	
Field_Code	FC
Type	T

$AT=\{FC, T\}$ $DEP=\{FC \rightarrow T\}$  Clave: FC Etapas: FNBC
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Relaciones normalizadas:

Field (Field\_Code, Type)

- **Time\_Zone:** es elemental, no hay extraños y no hay redundancia.

Time_Zone (TZ)	
Time_Zone_Id	TZI
Description	D
Init_Day	ID
End_Day	ED
Init_hour	IH
End_Hour	EH

$AT=\{TZI, D, ID, ED, IH, EH\}$   
 $DEP=\{TZI \rightarrow D, ID, ED, IH, EH\}$

Clave: TZI  
 Etapa: FNBC

Relaciones normalizadas:

Time\_Zone (Time\_Zone\_Id, Description, Init\_Day, End\_Day, Init\_Hour, End\_Hour)

- **Duration\_Range:** es elemental, no hay extraños y no hay redundancia.

DurationRange (DR)	
Range_Id	R
Init_Min	IM
End_Min	EM

$AT=\{R, IM, EM\}$   
 $DEP=\{R \rightarrow IM, EM\}$

Clave: R  
 Etapa: FNBC

Relaciones normalizadas:

Duration\_Range (Range\_Id, Init\_Min, End\_Min)

- **Invoice:** es elemental, no hay extraños y no hay redundancia.

Invoice (I)	
No_Invoice	NI
Telephone_Number	TN
Date	D

$AT=\{NI, TN, D\}$ $DEP=\{NI \rightarrow TN, D\}$  Clave: NI Etapa: FNBC
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Relaciones normalizadas:

Invoice (No\_Invoice, Telephone\_Number, Date)

- **Call:** es elemental, no hay extraños y no hay redundancia.

Call (C)	
No_Call	NC
Telephone_Number	TN
Start_Date	SD
End_Date	ED
Destination_Telephone_Number	DTN

$AT=\{NC, TN, SD, ED, DTN\}$ $DEP=\{NC, TN \rightarrow SD, ED, DTN\}$  Clave: NC, TN Etapa: FNBC
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Relaciones normalizadas:

Call (No\_Call, Telephone\_Number, Start\_Date, End\_Date, Destination\_Telephone\_Number)



- **(has) Incompatible\_Discount\_Rate:** es elemental, no hay extraños y no hay redundancia.

Discount_Rate	
Discount_Rate_Id_C	DC
Discount_Rate_Id	DI

AT={ DC,DI} DEP= no hay  Clave: DC,DI Etapa: FNBC
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Relaciones normalizadas:

Incompatible\_Discount\_Rate (Discount\_Rate\_Id\_C, Discount\_Rate\_Id)

- **(has) Discount\_Rate\_Field:** es elemental, no hay extraños y no hay redundancia.

Discount_Rate_Field	
Discount_Rate_Id	DC
Field_Code	FC

AT={ DC,FC} DEP= no hay  Clave: DC,FC Etapa: FNBC
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Relaciones normalizadas:

Discount\_Rate\_Field (Discount\_Rate\_Id, Field\_Code)

- **(contract) Line\_Service:** es elemental, no hay extraños y no hay redundancia.

Line_Service	
Telephone_Number	TN
Service_Code	SC

AT={ TN,SC } DEP= no hay  Clave: TN,SC Etapa: FNBC
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Relaciones normalizadas:

Line\_Service (Telephone\_Number, Service\_Code)

- **(contract) Line\_Discount\_Rate:** es elemental, no hay extraños y no hay redundancia.

Line_Discount_Rate	
Discount_Rate_Id	DR
Telephone_Number	TN

AT={ DR,TN } DEP= no hay  Clave: DR,TN Etapa: FNBC
--

Relaciones normalizadas:

Line\_Discount\_Rate (Discount\_Rate\_Id, Telephone\_Number)

- **Determine:** es elemental, no hay extraños y no hay redundancia.

Determine (D)	
Discount_Rate_Id	DRI
Range_Id	RI
Time_Zone_Id	TZI
Price	P

AT={DRI, RI, TZI, P}
DEP={DRI, RI, TZI → P}
Clave: DRI, RI, TZI
Etapas: FNBC

Relaciones normalizadas:

Determine (Discount\_Rate\_Id, Range\_Id, Time\_Zone\_Id, Price)

- **Discount\_Rate:** es elemental, no hay extraños y no hay redundancia.

(has) Discount_Rate (DR)	
Discount_Rate_Id	DRI
Establishment_Call_Rate	E
High_Rate	HR
Discount_Rate_Code	DRC
Name	N

AT={DRI, E, HR, DRC, N}
DEP={DRI → N, E, HR, DRC}
Clave: DRI
Etapas: FNBC

Relaciones normalizadas:

Discount\_Rate (Discount\_Rate\_Id, Name, Establishment\_Call\_Rate, High\_Rate, Discount\_Rate\_Code)

- **Bonus:** es elemental, no hay extraños y no hay redundancia.

Bonus	
Discount_Rate_Id	DRI
Type	T
Mountly_Rate	MR

$AT=\{DRI, T, MR\}$ $DEP=\{DRI \rightarrow T, MR\}$  Clave: DRI Etapas: FNBC
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Relaciones normalizadas:

Bonus (Discount\_Rate\_Id, Type, Mountly\_Rate)

- **Discount\_Plan:** es elemental, no hay extraños y no hay redundancia.

Discount_Plan	
Discount_Rate_Id	DRI
Discount_Percentage	DP

$AT=\{DRI, DP\}$ $DEP=\{DRI \rightarrow DP\}$  Clave: DRI Etapas: FNBC
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Relaciones normalizadas:

Discount\_Plan (Discount\_Rate\_Id, Discount\_Percentage)

Una vez finalizada la normalización, se toma la decisión de volver a añadir todos los atributos calculables a las tablas, dado que la empresa desea almacenar estos datos. A continuación se mostrarán los atributos retomados en cada tabla:

- Para la tabla **Invoice** se retoman los atributos: Subtotal\_Amount, Tax\_Amount, Available\_Points, Used\_Points, Earned\_Points, Total\_Amount)
- Para la tabla **Call** se retoman los atributos: Duration, Total\_Cost

## D. Diccionario de datos

### ■ Line

#### Columns

Name	Data type	Null	Description	Restrictions
Telephone_Number	int	False	Customer's line telephone number	PK_Line__571C7A72CB42C22C
Points_Quantity	int	False	Quantity of points the line has	Constraint default in 0
Type	tinyint	False	Line type, can be basic, ADSL or ISDN	
Status	char(1)	False	Line status, can be active(A) or inactive(I)	Constraint default in A
Creation_Date	datetime	False	Date and time of creation	Constraint default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the line	Constraint default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Constraint default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the line	Constraint default suser_sname()

#### Relations

Foreign table	Type	Primary table	Relation name
Call	Many to one	Line	Call_Line_Telephone_Number_fk
Invoice	Many to one	Line	Invoice_Line_Telephone_Number_fk
Line_Customer	Many to one	Line	Line_Customer_Line_Telephone_Number_fk
Line_Discount_Rate	Many to one	Line	Line_Discount_Rate_Line_Telephone_Number_fk
Line_Service	Many to one	Line	Line_Service_Line_Telephone_Number_fk

### ■ Line\_Customer

#### Columns

Name	Data type	Nullable	Description	Restrictions
Telephone_Number	int	False	Customer's line telephone number	Line_Customer_Line_Telephone_Number_fk
Customer_Id	int	False	A customer's unique identification number	
Customer_First_Name	nvarchar(50)	False	Customer's name	
Customer_Last_Name	nvarchar(50)	False	Customer's last name	
Customer_Address	nvarchar(50)	True	Customer's address	
Customer_Email	nvarchar(50)	False	Customer's email	
Creation_Date	datetime	False	Date and time of creation	Constraint default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the customer	Constraint default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Constraint default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the customer	Constraint default suser_sname()

#### Relations

Foreign table	Type	Primary table	Relation name
Line_Customer	Many to one	Line	Line_Customer_Line_Telephone_Number_fk

### ■ Service

#### Columns

Name	Data type	Nullable	Description	Restrictions
Service_Code	int	False	Unique service code	PK_Service__9B0A053356168F41
Name	nvarchar(50)	False	Service name	
Description	nvarchar(200)	False	Service description	
Cost	money	True	Cost of the service	
Status	char(1)	False	Service status, can be active(A) or inactive(I)	Constraint default in A
Creation_Date	datetime	False	Date and time of creation	Constraint default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the service	Constraint default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Constraint default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the service	Constraint default suser_sname()

#### Relations

Foreign table	Type	Primary table	Relation name
Line_Service	Many to one	Service	Line_Service_Service_Service_Code_fk

#### Field

##### Columns

Name	Data type	Nullable	Description	Restrictions
Field_Code	int	False	Unique file code	PK_Field__9CA9FED10A77F1A2
Type	tinyint	False	Type of field, it can be provincial, interprovincial or international	
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the field	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the field	Contrain default suser_sname()

#### Relations

Foreign table	Type	Primary table	Relation name
Discount_Rate_Field	Many to one	Field	Discount_Rate_Field_Field_Field_Code_fk

#### Time\_Zone

##### Columns

Name	Data type	Nullable	Description	Restrictions
Time_Zone_Id	int	False	Unique time zone identifier	PK_Time_Zon__B87FDB189453D5F7
Description	nvarchar(20)	False	Description of the time zone	
Init_Day	tinyint	False	Time zone start day	
End_Day	tinyint	False	Day of the end of the time zone	
Init_Hour	time(7)	False	Time zone start hour	
End_Hour	time(7)	False	Time zone end hour	
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the time zone	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the time zone	Contrain default suser_sname()

#### Relations

Foreign table	Type	Primary table	Relation name
Discount_Rate_Range_Time_Zone	Many to one	Time_Zone	Discount_Rate_Range_Time_Zone_Time_Zone_Time_Zone_Id_fk

#### Duration\_Range

##### Columns

Name	Data type	Nullable	Description	Restrictions
Range_Id	int	False	Unique duration range identifier	PK_Duration__91882907A4E3AA68
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the duration range	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the duration range	Contrain default suser_sname()
Init_Min	int	False	Start time	
End_Min	int	False	End time	

#### Relations

Foreign table	Type	Primary table
Discount_Rate_Range_Time_Zone	Many to one	Duration_Range

## ■ Invoice

### Columns

Name	Data type	Nullable	Description	Restrictions
Range_Id	int	False	Unique duration range identifier	PK_Duration_91882907A4E3AA68
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the duration range	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the duration range	Contrain default suser_sname()
Init_Min	int	False	Start time	
End_Min	int	False	End time	

### Relations

Foreign table	Type	Primary table
Discount_Rate_Range_Time_Zone	Many to one	Duration_Range

## ■ Call

### Columns

Name	Data type	Nullable	Description	Restrictions
No_Call	int	False	Unique call identifier	PK_Call_C6B5E0B127367BD1
Telephone_Number	int	False	Telephone number of the caller	Call_Line_Telephone_Number_fk
Destination_Telephone_Number	int	False	Telephone number being called	
Start_Date	datetime	False	Date and time when call starts	
End_Date	datetime	True	Date and time when call ends	
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the call	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the call	Contrain default suser_sname()

### Relations

Foreign table	Type	Primary Table	Relation name
Call	Many to one	Line	Call_Line_Telephone_Number_fk

## ■ Incompatible\_Discount\_Rate

### Columns

Name	Data type	Nullable	Description	Restrictions
Discount_Rate_Id_C	int	False	Discount rate identifier	Incompatible_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk
Discount_Rate_Id	int	False	Discount rate identifier	Incompatible_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk_2
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the incompatible discount rate	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the incompatible discount rate	Contrain default suser_sname()

### Relations

Foreign table	Type	Primary table	Relation name
Incompatible_Discount_Rate	Many to one	Discount_Rate	Incompatible_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk
Incompatible_Discount_Rate	Many to one	Discount_Rate	Incompatible_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk_2

## ■ Line\_Service

### Columns

Name	Data type	Nullable	Description	Restrictions
Telephone_Number	int	False	Customer's line telephone number	Line_Service_Line_Telephone_Number_fk
Service_Code	int	False	Unique service identifier	Line_Service_Service_Service_Code_fk
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the line service	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the line service	Contrain default suser_sname()

### Relations

Foreign table	Type	Primary table	Relation name
Line_Service	Many to one	Line	Line_Service_Line_Telephone_Number_fk
Line_Service	Many to one	Service	Line_Service_Service_Service_Code_fk

## ■ Line\_Discount\_Rate

### Columns

Name	Data type	Nullable	Description	Restrictions
Discount_Rate_Id	int	False	Unique discount rate identifier	Line_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk
Telephone_Number	int	False	Customer's line telephone number	Line_Discount_Rate_Line_Telephone_Number_fk
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the line discount rate	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the line discount rate	Contrain default suser_sname()

### Relations

Foreign table	Type	Primary table	Relation name
Line_Discount_Rate	Many to one	Discount_Rate	Line_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk
Line_Discount_Rate	Many to one	Line	Line_Discount_Rate_Line_Telephone_Number_fk

## ■ Discount\_Rate

### Columns

Name	Data type	Nullable	Description	Restrictions
Discount_Rate_Id	int	False	Discount rate identifier	PK_Discount_3C72A94CEB32D84D
Establishment_Call_Rate	money	False	Established call rate	Constraint default in 0
High_Rate	money	False	Maximum money that can be used	
Discount_Rate_Code	int	False	Unique discount rate code	
Name	nvarchar(50)	False	Name of the discount rate	
Creation_Date	datetime	False	Date and time of creation	Contrain default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the discount rate	Contrain default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrain default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the discount rate	Contrain default suser_sname()

### Relations

Foreign table	Type	Primary table	Relation name
Bonus	Many to one	Discount_Rate	Bonus_Discount_Rate_Discount_Rate_Id_fk
Discount_Plan	Many to one	Discount_Rate	Discount_Plan_Discount_Rate_Discount_Rate_Id_fk
Discount_Rate_Field	Many to one	Discount_Rate	Discount_Rate_Field_Discount_Rate_Discount_Rate_Id_fk
Discount_Rate_Range_Time_Zone	Many to one	Discount_Rate	Discount_Rate_Range_Time_Zone_Discount_Rate_Discount_Rate_Id_fk
Incompatible_Discount_Rate	Many to one	Discount_Rate	Incompatible_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk
Incompatible_Discount_Rate	Many to one	Discount_Rate	Incompatible_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk_2
Line_Discount_Rate	Many to one	Discount_Rate	Line_Discount_Rate_Discount_Rate_Discount_Rate_Id_fk



## ■ Determine

Columns				
Name	Data type	Nullable	Description	Restrictions
Discount_Rate_Id	int	False	Discount rate identifier	Discount_Rate_Range_Time_Zone_Discount_Rate_Discount_Rate_Id_fk
Discount_Range_Id	int	False	Discount range identifier	Discount_Rate_Range_Time_Zone_Duration_Range_Range_Id_fk
Time_Zone_Id	int	False	Time zone identifier	Discount_Rate_Range_Time_Zone_Time_Zone_Time_Zone_Id_fk
Price	money	False		
Creation_Date	datetime	False	Date and time of creation	Contrait default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the discount rate range time zone	Contrait default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrait default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the discount rate range time zone	Contrait default suser_sname()

Relations				
Foreign table	Type	Primary table	Relation name	
Discount_Rate_Range_Time_Zone	Many to one	Discount_Rate	Discount_Rate_Range_Time_Zone_Discount_Rate_Discount_Rate_Id_fk	
Discount_Rate_Range_Time_Zone	Many to one	Duration_Range	Discount_Rate_Range_Time_Zone_Duration_Range_Range_Id_fk	
Discount_Rate_Range_Time_Zone	Many to one	Time_Zone	Discount_Rate_Range_Time_Zone_Time_Zone_Time_Zone_Id_fk	

## ■ Bonus

Columns				
Column	Data type	Nullable	Description	Restrictions
Discount_Rate_Id	int	False	Discount rate identifier	Bonus_Discount_Rate_Discount_Rate_Id_fk
Type	nvarchar(10)	False	Type of bonus	
Monthly_Rate	nvarchar(10)	False	Monthly rate	
Creation_Date	datetime	False	Date and time of creation	Contrait default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the bonus	Contrait default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrait default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the bonus	Contrait default suser_sname()

Relations				
Foreign table	Type	Primary table	Relation name	
Bonus	Many to one	Discount_Rate	Bonus_Discount_Rate_Discount_Rate_Id_fk	

## ■ Discount\_Plan

Columns				
Name	Data type	Nullable	Description	Restrictions
Discount_Rate_Id	int	False	Unique discount plan identifier	Discount_Plan_Discount_Rate_Discount_Rate_Id_fk
Discount_Percentage	float	False	Discount percentage	
Creation_Date	datetime	False	Date and time of creation	Contrait default sysdatetime()
Creation_User	nvarchar(128)	False	User who created the discount plan	Contrait default suser_sname()
Last_Update_Date	datetime	False	Date and time of last update	Contrait default sysdatetime()
Last_Update_User	nvarchar(128)	False	User who last updated the discount plan	Contrait default suser_sname()

Relations				
Foreign table	Type	Primary table	Relation name	
Discount_Plan	int	Discount_Rate	Discount_Plan_Discount_Rate_Discount_Rate_Id_fk	

## 4. Modelo físico de la base de datos

A. Script abreviado del Modelo Físico de la base de datos

- Junto en el .rar del proyecto.