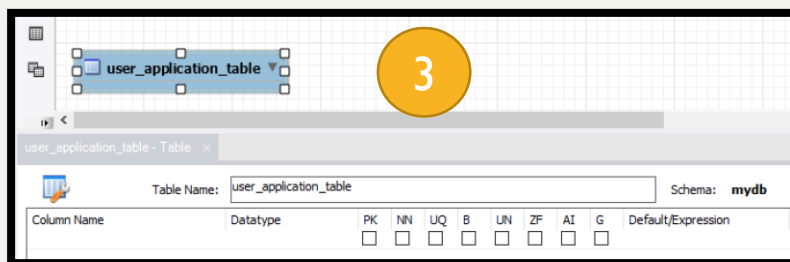
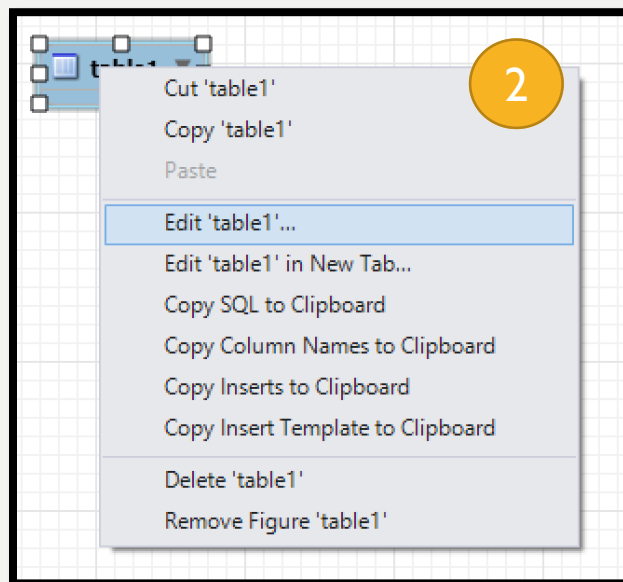
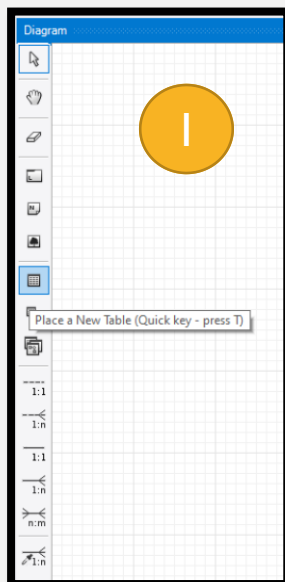


DESENHO VISUAL DE BASES DE DADOS

CONCEÇÃO E DESENVOLVIMENTO DE BASES DE DADOS



ADICIONAR UMA TABELA *ADD TABLE*

Selecionar



Clicar na zona de desenho

Selecionar a nova tabela

Botão direito do rato

Selecionar a opção *Edit 'Table1'*

user_application - Table

Table Name: user_application Schema: mydb

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
iduser_application	INT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Column Name: iduser_application Data Type: INT

Charset/Collation: Default Charset Default Collation

Expression:

Storage: ☐ Virtual ☐ Stored

☐ Primary Key ☐ Not Null ☐ Unique

☐ Binary ☐ Unsigned ☐ Zero Fill

☐ Auto Increment ☒ Generated

Comments:

Designação da Coluna

Tipo de Dados

Características das Colunas

ADICIONAR COLUNAS A UMA TABELA

Zona inferior do diagrama

→ Designação da Coluna

→ Tipo de Dados

→ Características das Colunas

ADICIONAR COLUNAS

- Características

- PK
- NN
- UQ
- BIN
- UN
- ZF
- AI
- G

TERMO	SIGNIFICADO
PK	PRIMARY KEY
NN	NOT NULL
UQ	UNIQUE
BIN	BINARY
UN	UNSIGNED
ZF	ZERO_FILL
AI	AUTO_INCREMENT
G	GENERATED (Campo Calculado)

CARATERÍSTICAS DAS COLUNAS *PRIMARY KEY (PK)*

PRIMARY KEY

application_user - Table										
Table Name: application_user										
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SIGNIFICADO

- A coluna é chave primária
 - *surrogate key*
 - *no sugorrate key (natural key)*

CARATERÍSTICAS DAS COLUNAS *PRIMARY KEY (PK)*

SURROGATE KEY

- Um identificador único na base de dados que não provém das regras de negócio do caso de estudo
- Identificador artificial

NATURAL KEY

- Um identificador único na base de dados que provém das regras de negócio do caso de estudo

CARACTERÍSTICAS DAS COLUNAS ***NOT NULL (NN)***

NOT NULL

application_user - Table									
Table Name: application_user									
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SIGNIFICADO

- Restrição (*constraint not null*)

CARACTERÍSTICAS DAS COLUNAS

UNIQUE (UQ)

UNIQUE

application_user - Table										
Table Name: application_user										
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SIGNIFICADO

- Coluna que contém só valores únicos em todas as células

CARACTERÍSTICAS DAS COLUNAS ***BINARY (BIN)***

BIN

application_user - Table									
Table Name: application_user									
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SIGNIFICADO

- SÓ para colunas do tipo VARCHAR
- Indique que os valores armazenados na coluna são *case-sensitive*

CARACTERÍSTICAS DAS COLUNAS *UNISIGNED (UN)*

UN

application_user - Table										
Table Name: application_user										
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SIGNIFICADO

- SÓ para colunas do tipo número
- A coluna assume valores positivos
- Não é possível atribuir o valor zero quando se combina esta opção com PRIMARY KEY e AUTO_INCREMENT

CARACTERÍSTICAS DAS COLUNAS

ZERO FILL (ZF)

ZF

application_user - Table										
Table Name: application_user										
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SIGNIFICADO

- SÓ para colunas do tipo número
- Coloca zeros à esquerda do número até atingir o espaço total reservado para o número

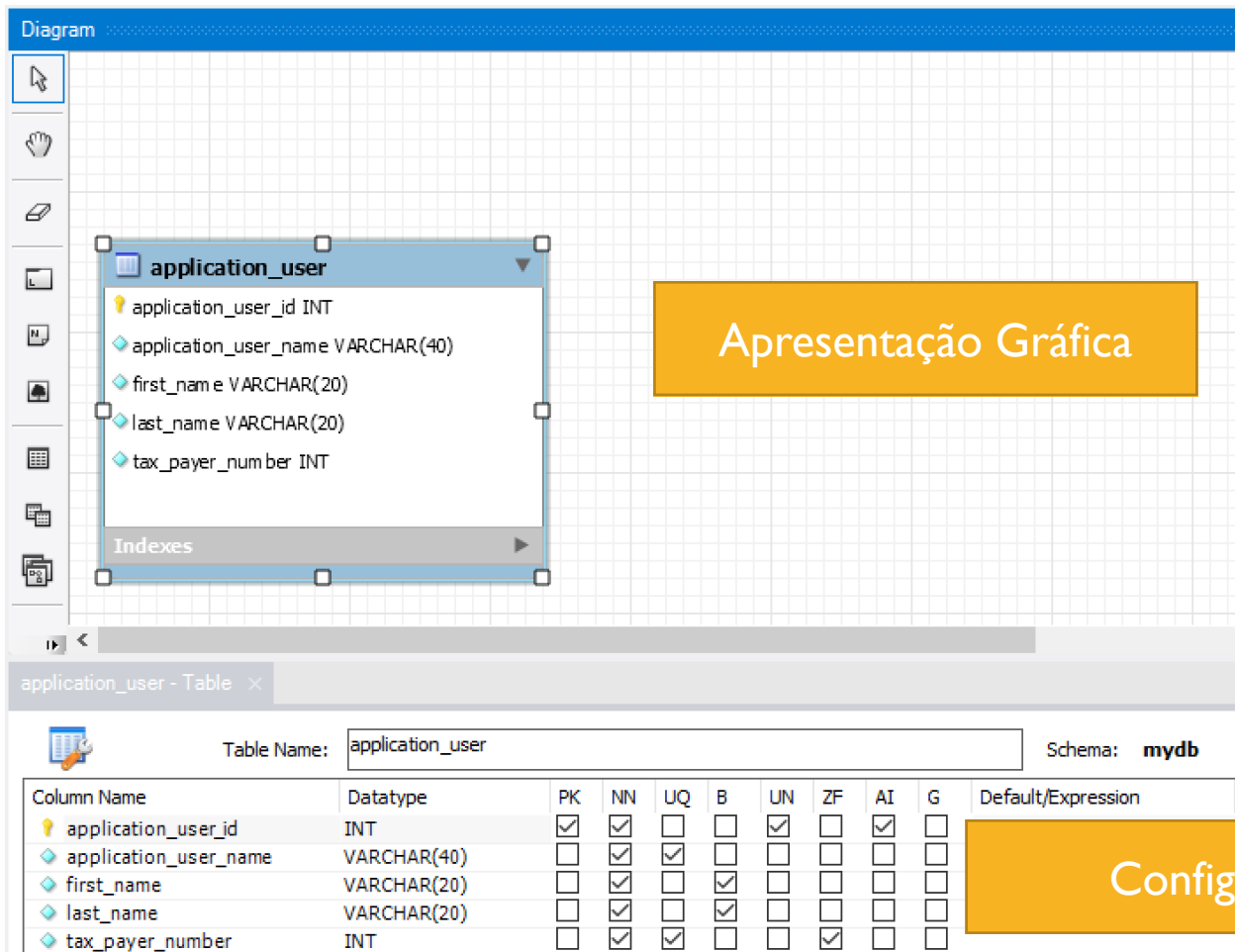
CARACTERÍSTICAS DAS COLUNAS ***AUTO_INCREMENT (AI)***

AUTO_INCREMENT

application_user - Table									
Table Name: application_user									
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
type	SET('C', 'A', 'E')	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SIGNIFICADO

- Para chaves primárias cujos valores são automaticamente gerados pelo servidor (chave artificial)



Apresentação Gráfica

Configuração

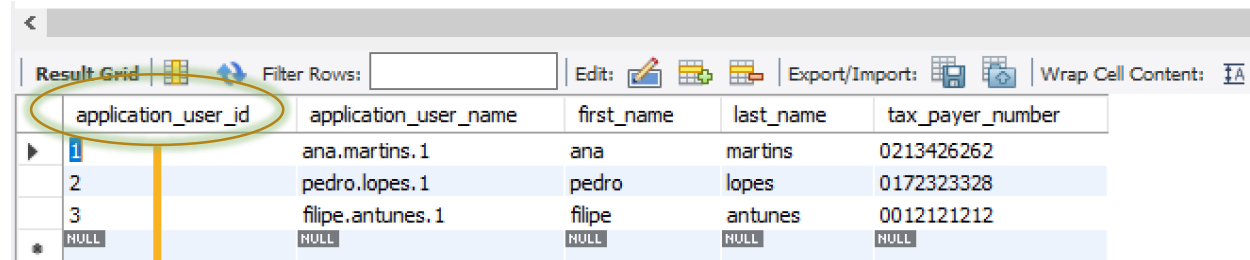
DESENHO

ADICIONAR UMA TABELA *FORWARD ENGINEER*

```
CREATE TABLE IF NOT EXISTS `mydb`.`application_user` (  
  `application_user_id` INT UNSIGNED NOT NULL AUTO_INCREMENT,  
  `application_user_name` VARCHAR(40) NOT NULL,  
  `first_name` VARCHAR(20) BINARY NOT NULL,  
  `last_name` VARCHAR(20) BINARY NOT NULL,  
  `tax_payer_number` INT ZEROFILL NOT NULL,  
  PRIMARY KEY (`application_user_id`),  
  UNIQUE INDEX `application_user_name_UNIQUE` (`application_user_name` ASC) VISIBLE,  
  UNIQUE INDEX `tax_payer_number_UNIQUE` (`tax_payer_number` ASC) VISIBLE)  
ENGINE = InnoDB  
  
COMMENT = 'A tabela guarda dados para controlo de acesso por parte de  
utilizadores de uma aplicação de acesso a bases de dados';
```



Coluna: application_user_id



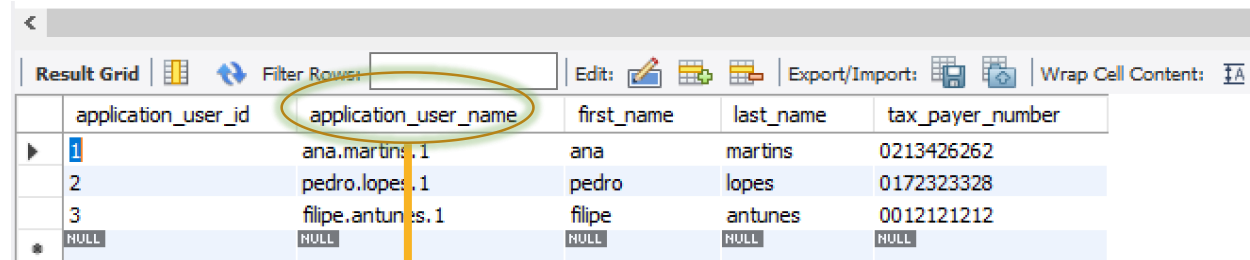
	application_user_id	application_user_name	first_name	last_name	tax_payer_number
1		ana.martins.1	ana	martins	0213426262
2		pedro.lopes.1	pedro	lopes	0172323328
3		filipe.antunes.1	filipe	antunes	0012121212
*	NULL	NULL	NULL	NULL	NULL

Início em 1
Preenchimento obrigatório
Valores únicos
Valores gerados automaticamente

**ADICIONAR LINHAS
ASPECTO FINAL**

application_user_id

Coluna: application_user_name



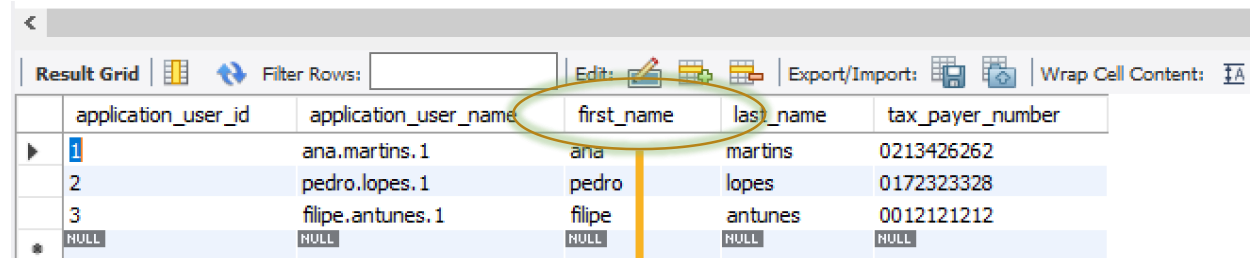
	application_user_id	application_user_name	first_name	last_name	tax_payer_number
1		ana.martins.1	ana	martins	0213426262
2		pedro.lopes.1	pedro	lopes	0172323328
3		filipe.antunes.1	filipe	antunes	0012121212
*	NULL	NULL	NULL	NULL	NULL

Preenchimento obrigatório
Valores únicos

ADICIONAR LINHAS
ASPECTO FINAL

Application_user_name

Coluna: first_name



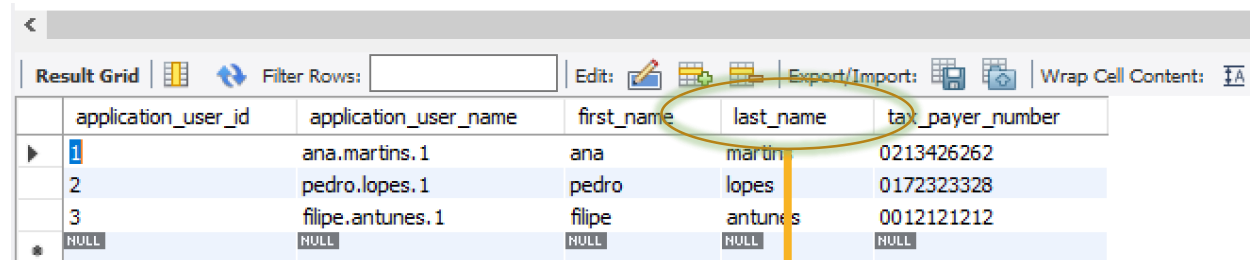
	application_user_id	application_user_name	first_name	last_name	tax_payer_number
1		ana.martins.1	ana	martins	0213426262
2		pedro.lopes.1	pedro	lopes	0172323328
3		filipe.antunes.1	filipe	antunes	0012121212
*	NULL	NULL	NULL	NULL	NULL

Preenchimento obrigatório
Case sensitive

**ADICIONAR LINHAS
ASPECTO FINAL**

first_name

Coluna: last_name



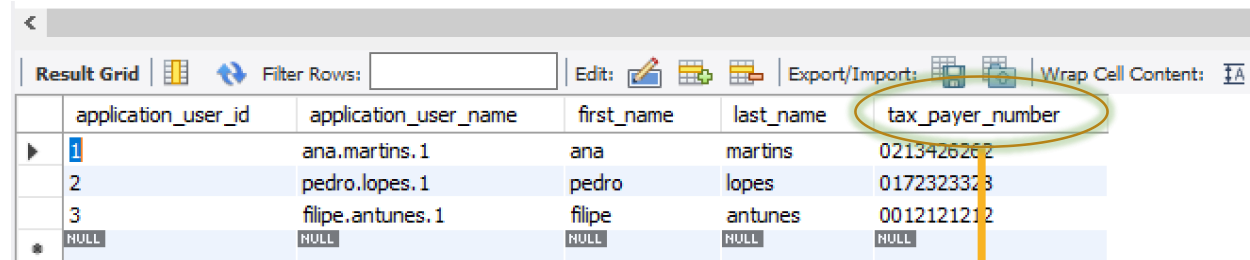
	application_user_id	application_user_name	first_name	last_name	tax_payer_number
1		ana.martins.1	ana	martins	0213426262
2		pedro.lopes.1	pedro	lopes	0172323328
3		filipe.antunes.1	filipe	antunes	0012121212
*	NULL	NULL	NULL	NULL	NULL

Preenchimento obrigatório
Case sensitive

ADICIONAR LINHAS
ASPECTO FINAL

last_name

Coluna: last_name



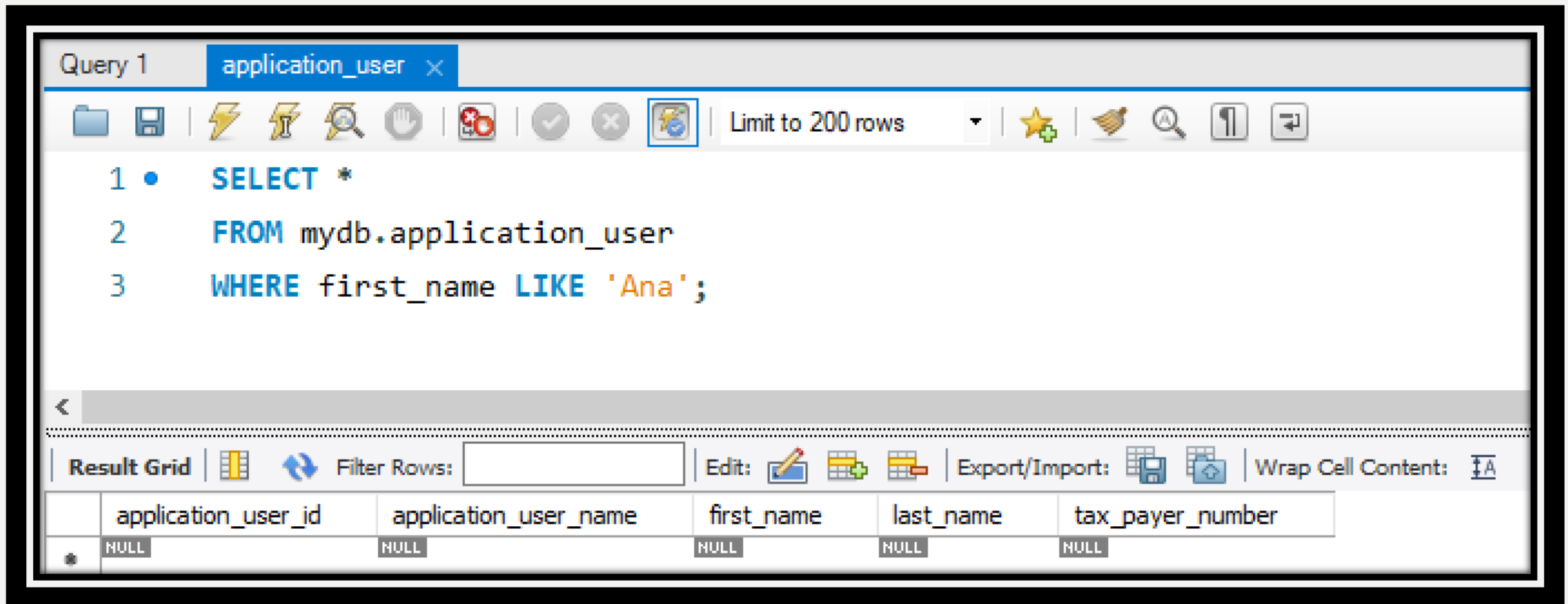
	application_user_id	application_user_name	first_name	last_name	tax_payer_number
1		ana.martins.1	ana	martins	0213426262
2		pedro.lopes.1	pedro	lopes	0172323323
3		filipe.antunes.1	filipe	antunes	0012121212
*	NULL	NULL	NULL	NULL	NULL

Preenchimento obrigatório
Valores únicos
Preenchimento com zeros até perfazer o espaço total

**ADICIONAR LINHAS
ASPECTO FINAL**

tax_payer_number

BINARY(COLUMNA: FIRST_NAME) PESQUISA CASE SENSITIVE



The screenshot shows a database query editor interface. At the top, there's a tab labeled "Query 1" and "application_user". Below the tab is a toolbar with various icons for file operations, execution, and viewing. The main area contains a SQL query:

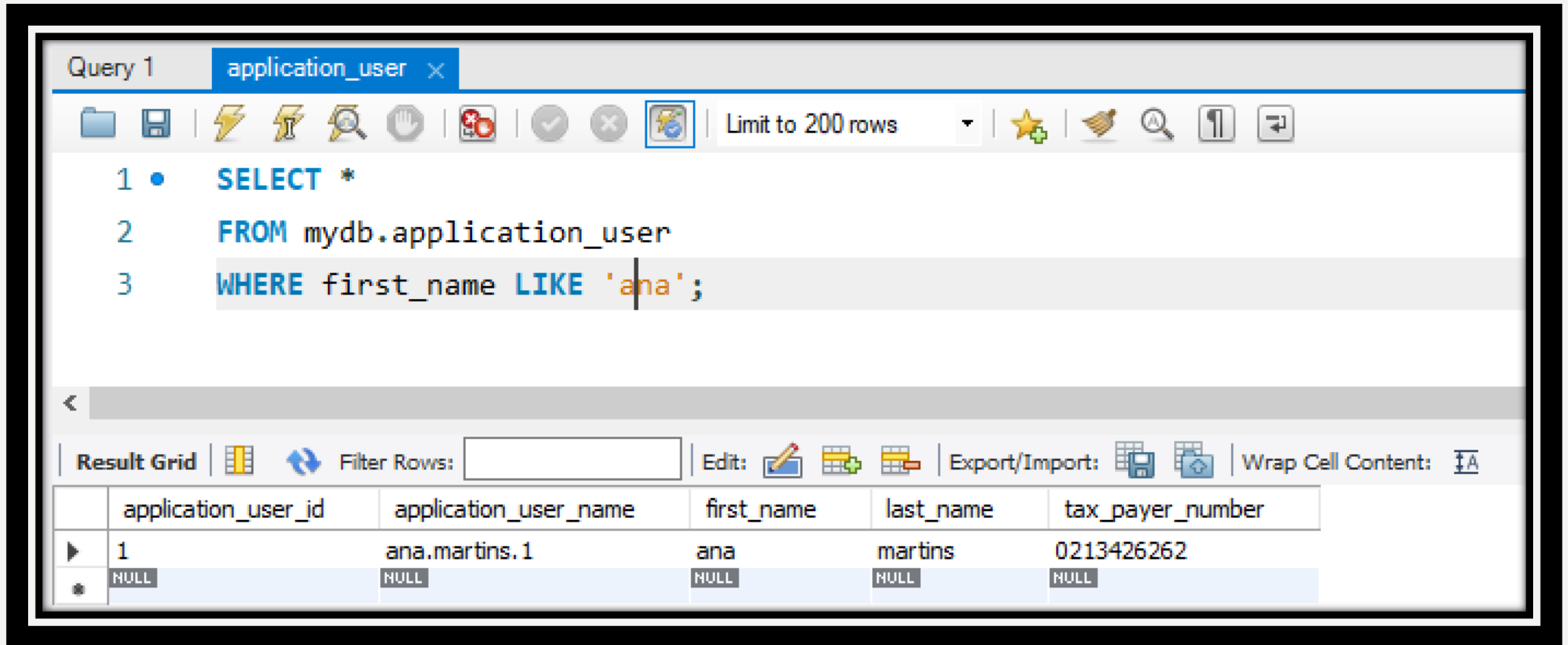
```
1 • SELECT *  
2 FROM mydb.application_user  
3 WHERE first_name LIKE 'Ana';
```

Below the query editor, there's a "Result Grid" section. It includes a "Filter Rows:" input field, an "Edit:" button, and "Export/Import:" and "Wrap Cell Content:" options. The result grid itself shows a table with the following columns: application_user_id, application_user_name, first_name, last_name, and tax_payer_number. The first row of data shows all columns as NULL.

application_user_id	application_user_name	first_name	last_name	tax_payer_number
NULL	NULL	NULL	NULL	NULL

BINARY(COLUMNA: FIRST_NAME)

PESQUISA CASE SENSITIVE



The screenshot displays a database query interface. At the top, a tab labeled "Query 1" and "application_user" is active. Below the tab is a toolbar with various icons for file operations, execution, and viewing. The SQL query is entered in a text area:

```
1 • SELECT *
2 FROM mydb.application_user
3 WHERE first_name LIKE 'ana';
```

Below the query editor, there is a "Result Grid" section. It includes a "Filter Rows:" input field and buttons for "Edit:", "Export/Import:", and "Wrap Cell Content:". The results are shown in a table with the following columns: application_user_id, application_user_name, first_name, last_name, and tax_payer_number.

	application_user_id	application_user_name	first_name	last_name	tax_payer_number
▶	1	ana.martins.1	ana	martins	0213426262
•	NULL	NULL	NULL	NULL	NULL

ADICIONAR COLUNAS AUDITORIA

application_user - Table

Table Name: Schema: **mydb**

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	current_timestamp

ADICIONAR COLUNAS CAMPOS CALCULADOS

application_user - Table

Table Name: Schema: **mydb**

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
application_user_id	INT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
application_user_name	VARCHAR(40)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
first_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
last_name	VARCHAR(20)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
full_name	VARCHAR(40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CONCAT(first_name, last_name)
tax_payer_number	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_by	INT	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
created_date	DATETIME	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	current_timestamp

Column Name:

Charset/Collation:

Comments:

Data Type:

Expression:

Storage: ☒ Virtual ☐ Stored

☐ Primary Key ☐ Not Null ☐ Unique

☐ Binary ☐ Unsigned ☐ Zero Fill

☐ Auto Increment ☒ Generated

GENERATED COLUMNS

Expressão de Calculo

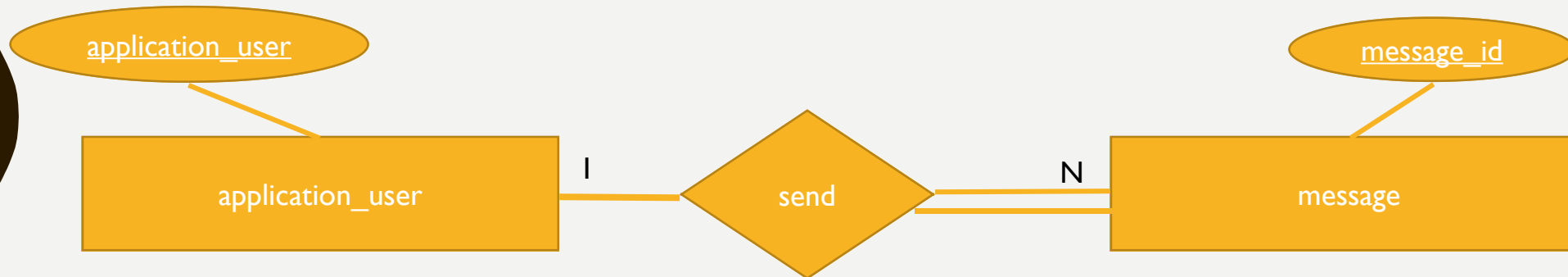


```
CREATE TABLE IF NOT EXISTS `mydb`.`application_user` (  
  `application_user_id` INT UNSIGNED NOT NULL AUTO_INCREMENT,  
  `application_user_name` VARCHAR(40) NOT NULL,  
  `first_name` VARCHAR(20) BINARY NOT NULL,  
  `last_name` VARCHAR(20) BINARY NOT NULL,  
  `full_name` VARCHAR(40) GENERATED ALWAYS AS (CONCAT(first_name, last_name)) VIRTUAL,  
  `tax_payer_number` INT ZEROFILL NOT NULL,  
  `created_by` INT UNSIGNED NOT NULL,  
  `created_date` DATETIME NOT NULL DEFAULT current_timestamp,  
  PRIMARY KEY (`application_user_id`),  
  UNIQUE INDEX `application_user_name_UNIQUE` (`application_user_name` ASC) VISIBLE,  
  UNIQUE INDEX `tax_payer_number_UNIQUE` (`tax_payer_number` ASC) VISIBLE)  
ENGINE = InnoDB  
COMMENT = 'A tabela guarda dados para controlo de acesso por parte de utilizadores de uma aplicação de acesso a bases de dados';
```


RELACIONAR TABELAS

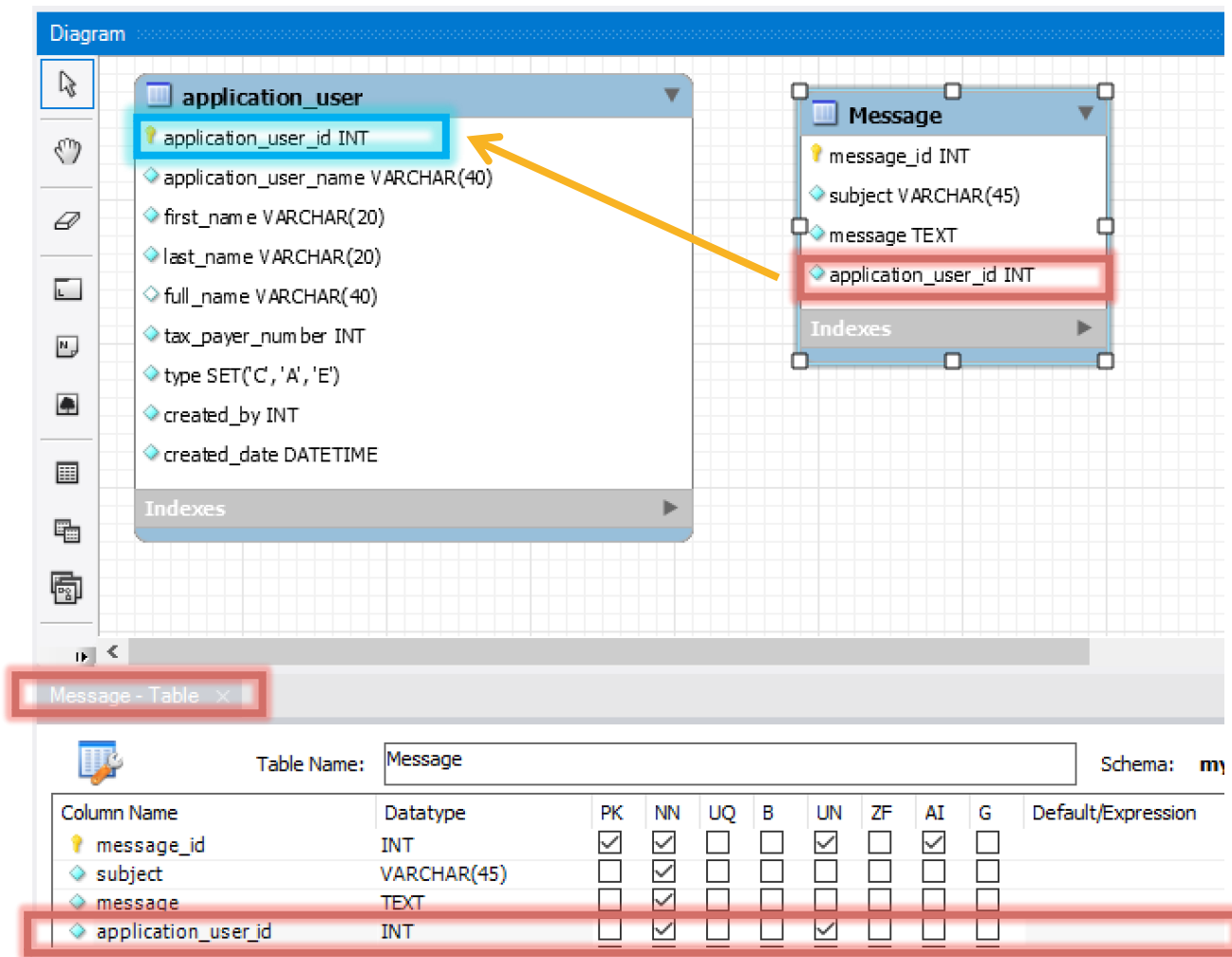
CASO DE ESTUDO

- Um utilizador pode enviar várias mensagens
- Uma mensagem é enviada por um utilizador
- Não há mensagens sem utilizador associado
- Pode existir um utilizador que nunca enviou nenhuma mensagem



`application_user(application_user_id, ...)`

`message(message_id, ..., application_user_id) FK application_user_id REFERENCES application_user(application_user_id)`



RELACIONAR TABELAS CASO DE ESTUDO

Criar as tabelas

Criar as suas colunas

Ligar as tabelas, usando as
chaves estrangeiras identificadas
no modelo lógico

RELACIONAR TABELAS CONFIGURAR CHAVE ESTRANGEIRA

Foreign Key Name	Referenced Table	Column	Referenced Column
------------------	------------------	--------	-------------------

Columns Indexes **Foreign Keys** Triggers Partitioning Options Inserts Privileges

Nome da FK

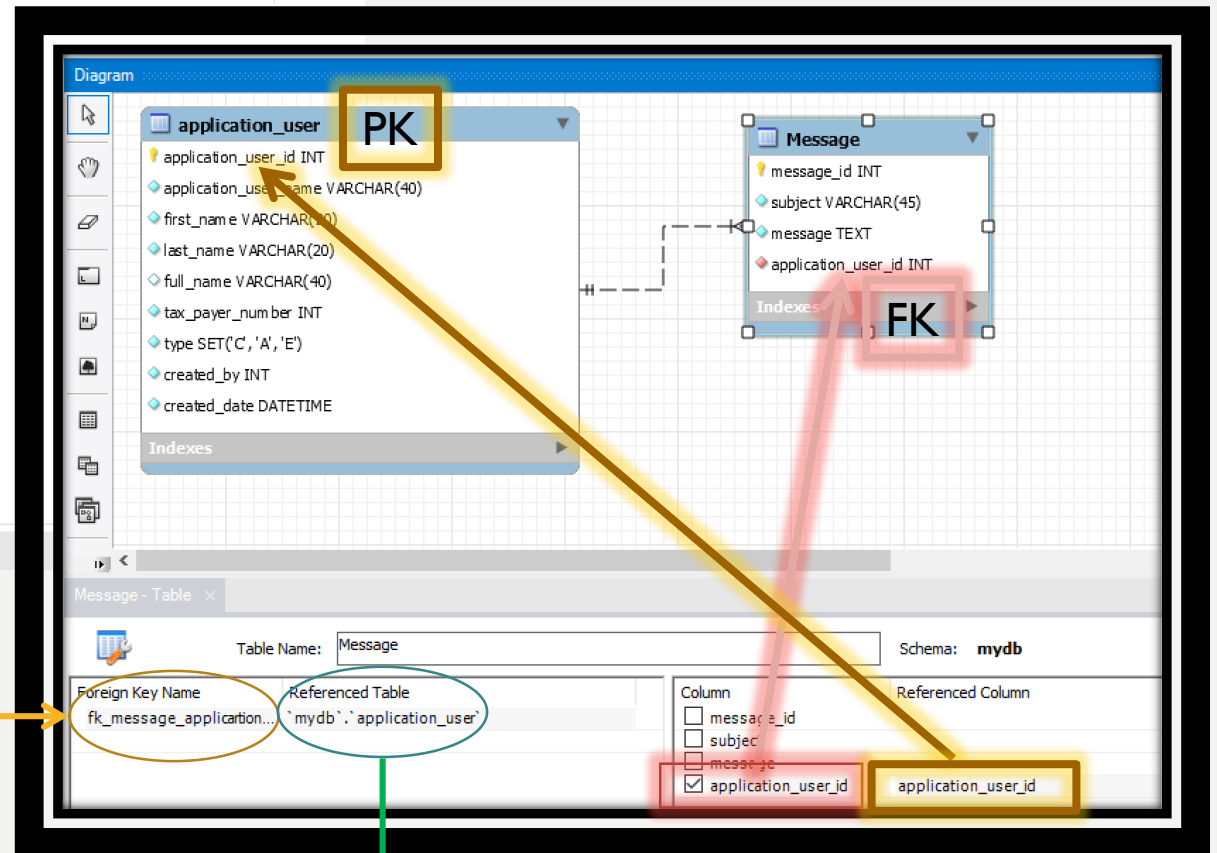
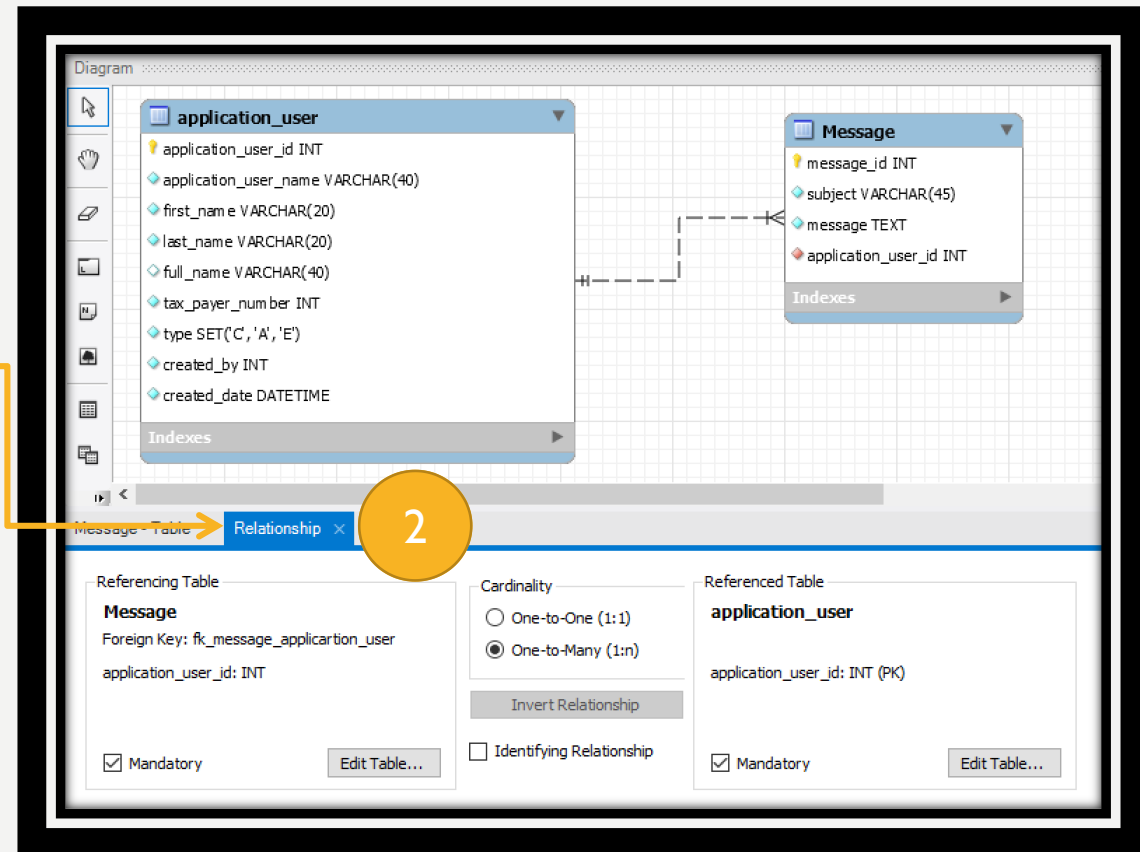
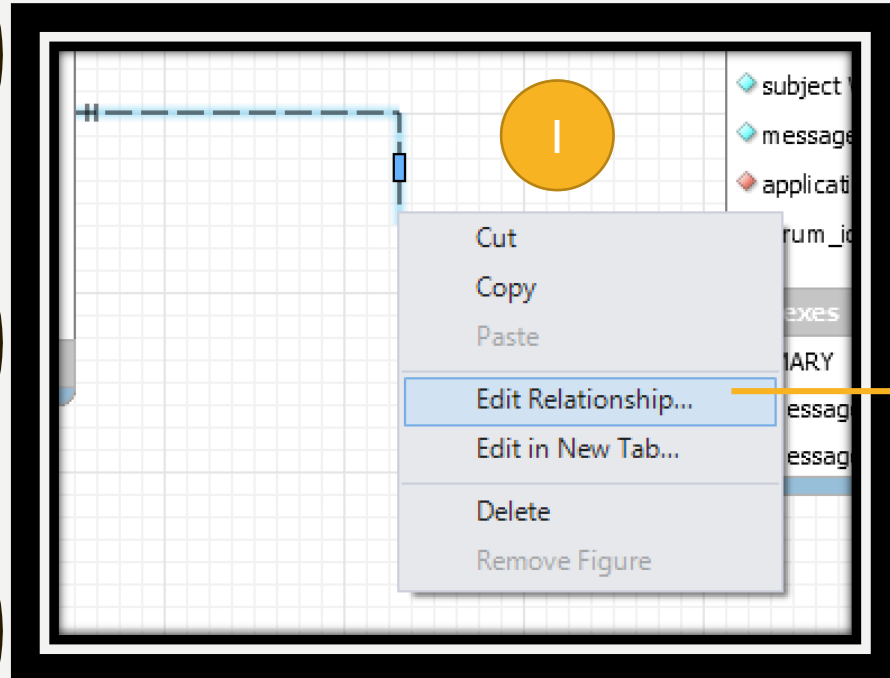


Tabela de Referência

RELACIONAR TABELAS CONFIGURAR CHAVE ESTRANGEIRA



ADICIONAR TABELAS

FORWARD ENGINEER

```
CREATE TABLE IF NOT EXISTS `mydb`.`application_user` (  
  `application_user_id` INT UNSIGNED NOT NULL AUTO_INCREMENT,  
  `application_user_name` VARCHAR(40) NOT NULL,  
  `first_name` VARCHAR(20) BINARY NOT NULL,  
  `last_name` VARCHAR(20) BINARY NOT NULL,  
  `full_name` VARCHAR(40) GENERATED ALWAYS AS (CONCAT(first_name, last_name)) VIRTUAL,  
  `tax_payer_number` INT ZEROFILL NOT NULL,  
  `type` SET('C', 'A', 'E') NOT NULL DEFAULT 'C',  
  `created_by` INT UNSIGNED NOT NULL,  
  `created_date` DATETIME NOT NULL DEFAULT current_timestamp,  
  PRIMARY KEY (`application_user_id`),  
  UNIQUE INDEX `application_user_name_UNIQUE` (`application_user_name` ASC) VISIBLE,  
  UNIQUE INDEX `tax_payer_number_UNIQUE` (`tax_payer_number` ASC) VISIBLE)  
ENGINE = InnoDB  
COMMENT = 'A tabela guarda dados para controlo de acesso por parte de utilizadores de uma aplicação de acesso a bases de dados';
```

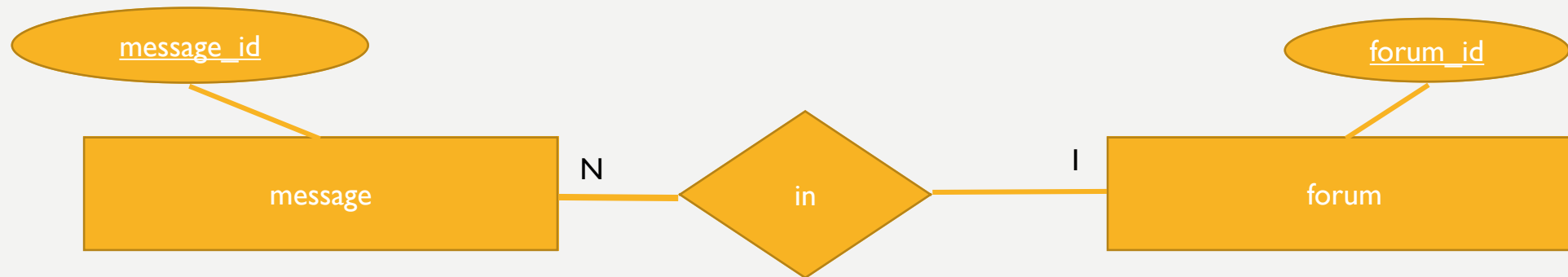
ADICIONAR TABELAS

FORWARD ENGINEER

```
CREATE TABLE IF NOT EXISTS `mydb`.`Message` (  
  `message_id` INT UNSIGNED NOT NULL AUTO_INCREMENT,  
  `subject` VARCHAR(45) NOT NULL,  
  `message` TEXT NOT NULL,  
  `application_user_id` INT UNSIGNED NOT NULL,  
  PRIMARY KEY (`message_id`),  
  INDEX `fk_message_application_user_idx` (`application_user_id` ASC) VISIBLE,  
  CONSTRAINT `fk_message_application_user`  
    FOREIGN KEY (`application_user_id`)  
    REFERENCES `mydb`.`application_user` (`application_user_id`)  
    ON DELETE NO ACTION  
    ON UPDATE NO ACTION)  
ENGINE = InnoDB;
```

CASO DE ESTUDO

- As mensagens são enviadas para fóruns
- No entanto, há algumas (**poucas**) mensagens que não têm fórum associado

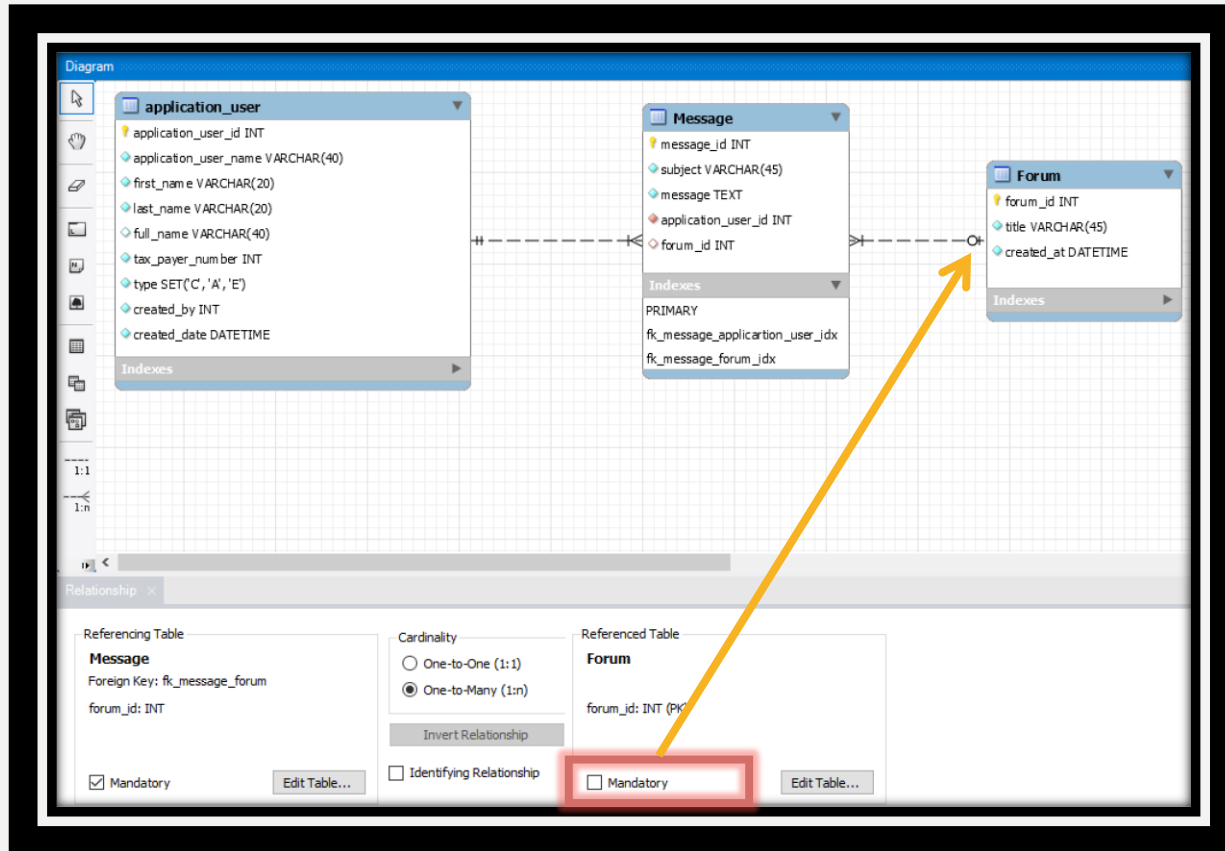


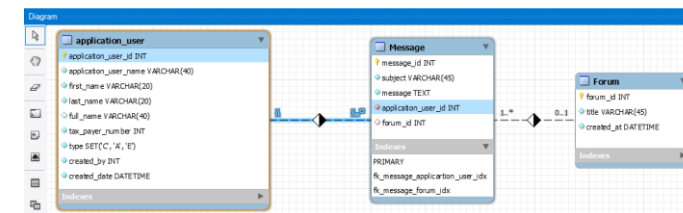
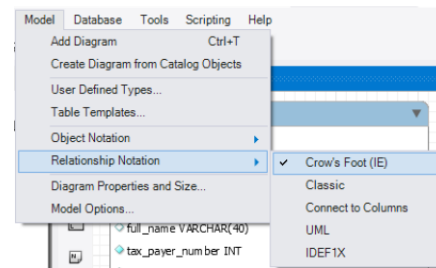
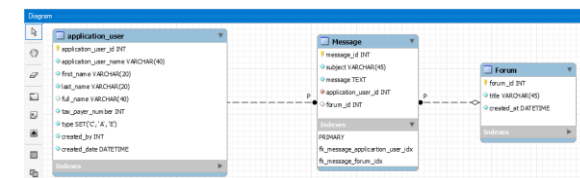
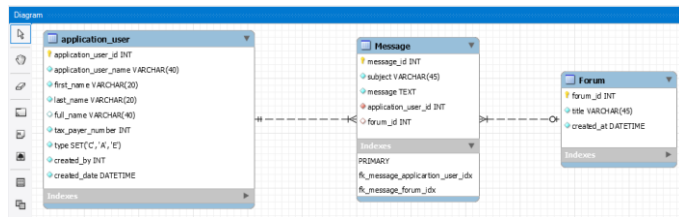
application_user(application_user_id, ...)

message(message_id, ..., application_user_id) FK application_user_id REFERENCES application_user(application_user_id)

POSSIBILIDADE DE VALORES **NULL**

CASO DE ESTUDO

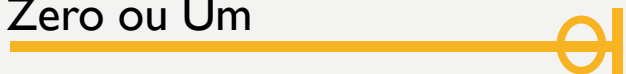




NOTAÇÕES

CROW'S FOOT NOTATION

Zero ou Um



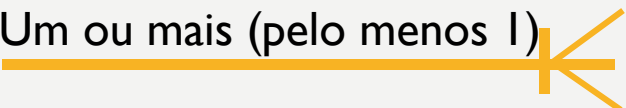
Exatamente Um



Zero ou mais



Um ou mais (pelo menos 1)



BIBLIOGRAFIA

MySQL Workbench: Data Modeling and Developement

Visual Model, Generate and Manage Databases

Michael McLaughlin

McGraw Hill Education

→ Chapter 4