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Relatório do trabalho prático
da
Unidade Curricular de **Administração de base de dados**

Sistema de faturação de uma empresa de design gráfico

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Introdução

Neste presente relatório está apresentado o trabalho pratico da unidade curricular de administração de base de dados que teve como tema um sistema de faturação.

Se encontram cá explicados os componentes do trabalho desde a modelação e estruturação da base de dados, ao desenvolvimento de todos os scripts usados como triggers, views, function e os demais.

Os componentes adicionados ao relatório, como diagramas e scripts estão anexados ao ficheiro original de submissão, neste caso o diagrama e os scripts para uma possível análise caso seja necessário.



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Modelação

Modelo entidade relacionamento

O modelo ER possui 6 tabelas:

1. *Zip_Code*: Tabela que armazena os dados de uma determinada localidade, os seus atributos são:

- **Zip_code** (chave primaria) : O código postal;
- Locality: A localidade;

2. *Clients*: Tabela que armazena os dados dos clientes, com os seguintes atributos:

- **Client_id** (chave primaria): o id do cliente;
- Client_zip_code (chave estrangeira): possui o código postal do cliente;
- Client_name: nome do cliente;
- Client_surname: apelido do cliente;
- Client_birth_date: data do nascimento do cliente;
- Client_cell_number: contato telefónico do cliente;
- Client_TIN: número de contribuinte do cliente;
- Client_e-mail: endereço eletrónico do cliente;

3. *Services*: Tabela que contém os serviços fornecidos pela organização:

- **Service_id** (chave primaria): id do serviço;
- Service_name: nome do serviço;
- Service_VAT: taxa de IVA que a organização paga por venda unitária;
- Service_description: Descrição do serviço;
- Service_price: o preço do serviço;

4. *Payment_Methods*: Tabela com os métodos de pagamentos disponíveis na organização:

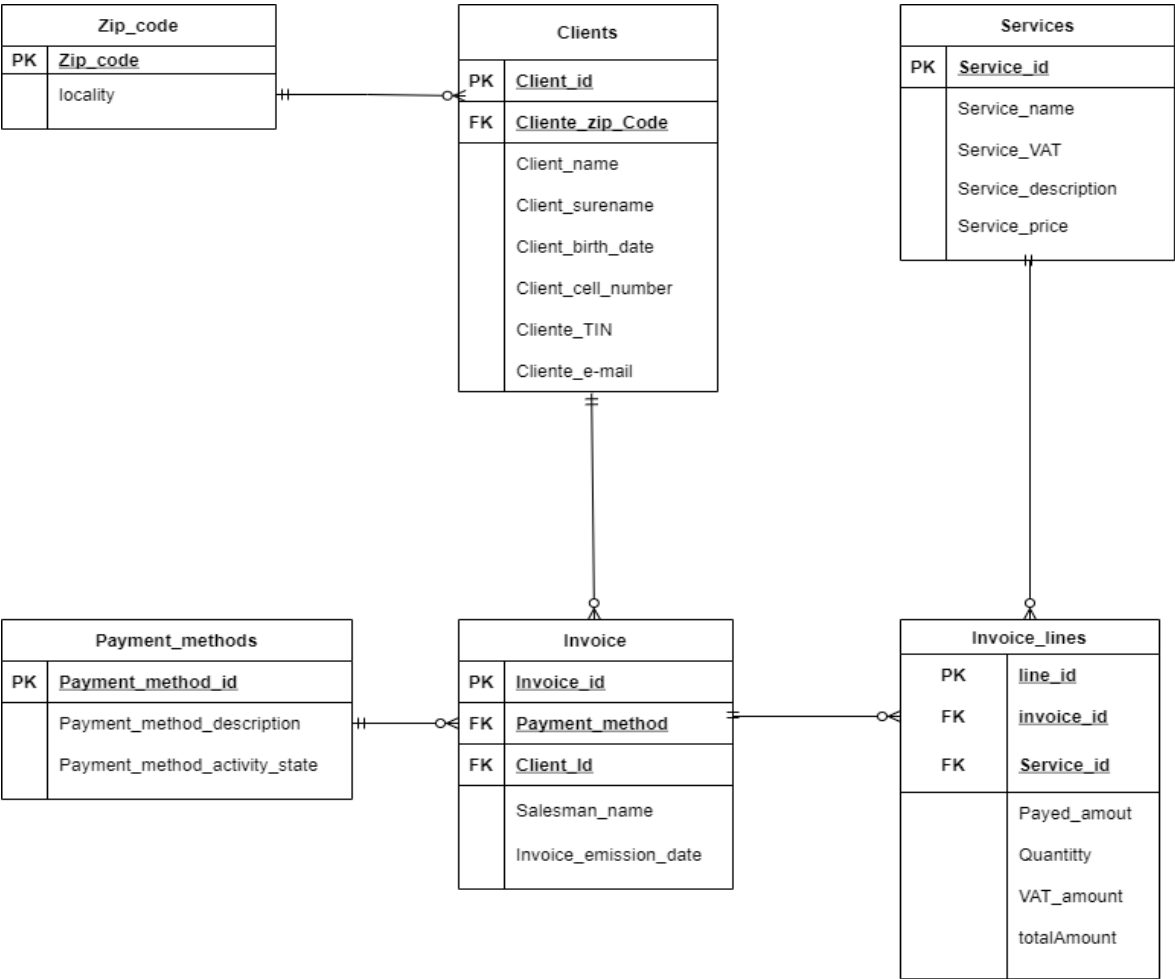
- **Payment_method_id** (chave primaria) : id do método de pagamento;
- Payment_method_description: descrição do método de pagamento;
- Payment_method_activity_state: estado de atividade do método do pagamento;

5. *Invoice*: Tabela que contém os dados da fatura:

- **Invoice_id** (chave primaria) :id da fatura;
- Payment_method (chave estrangeira) : o método de pagamento usado no pagamento do produto;
- Client_id (chave estrangeira) : o cliente que efetuou o pagamento;
- Salesman_name: Nome do funcionario que fez a venda ao cliente;
- Invoice_emission_date: a data da emissão do recibo;

6. *Invoice_lines*: Tabela que contém as linhas da fatura:

- **Line_id** (chave primaria): id da linha ;
- Invoice_id (chave estrangeira) : o id da fatura referente;
- Service_id (chave estrangeira) : o id do serviço adquirido/comprado na linha;
- Payed_amount: o preço pago por unidade do serviço;
- Quantity: a quantidade do serviço;
- VAT_amount: a quantidade total a pagar em IVA;
- totalAmount: o valor total arrecadado;



SQL scripting

Nesta etapa estão apresentados todos os scripts usados no trabalho e a explicação dos seus propósitos e funcionalidades.

Criação de tabelas

Zip_Code

```
create table zip_code(zip_code varchar(10) primary key, locality varchar(50));
```

Clients

```
create table clients(client_id int primary key identity, client_zip_code varchar(10),cliente_name  
varchar(100),cliente_surname varchar(100),client_birth_date date,client_cell_number  
varchar(20),client_TIN int, client_email varchar(100) constraint fk_client_zip_code foreign key  
(client_zip_code) references zip_code(zip_code));
```

Services

```
create table services(service_id int primary key identity,service_name varchar(50),service_vat float,  
service_description varchar(100),service_price float );
```

Payment_methods

```
create table payment_methods(payment_method_id int primary key identity,  
payment_method_description varchar(100), payment_method_activity_state bit );
```

Invoice

```
create table invoice(invoice_id int primary key identity, payment_method_id int,client_id int,  
salesman_name varchar(100),invoice_emission_date date, constraint fk_payment_method foreign key  
(payment_method_id) references Payment_methods(Payment_method_id),constraint fk_client_id  
foreign key(client_id) references clients(client_id));
```

Invoice_Lines

```
create table invoice_lines(lineid int identity, invoice_id,service_id int int, payed_amount float, int  
quantity, float VAT_amount,totalAmount , constraint fk_invoice_id foreign key (invoice_id) references  
invoice(invoice_id),constraint fk_service_id foreign key(service_id) references services(service_id));
```


Simulação de dados(Data mock)

Neste trabalho, 3 tabelas sofreram uma intensa injeção de dados, tendo elas 10000 registros cada, e os restante entre 4 e 5 registros

Clients

| | Numero de clientes no sistema |
|---|-------------------------------|
| 1 | 10001 |

/Invoice

| | Numero de faturas no sistema |
|---|------------------------------|
| 1 | 10000 |

/Invoice_Lines

| | Numero de linhas faturas no sistema |
|---|-------------------------------------|
| 1 | 10000 |

Zip_Code

| | Numero de codigos postais no sistema |
|---|--------------------------------------|
| 1 | 5 |

Services

| | Numero de serviços no sistema |
|---|-------------------------------|
| 1 | 5 |

Payment_methods

| | Numero de serviços no sistema |
|---|-------------------------------|
| 1 | 5 |

Functions

Nesta etapa, foram elaboradas 3 funções para garantir a consistência dos dados após as operações de inserção e atualização na base de dados, que são:

1. `calculate_VAT_value`: esta função calcula o valor do IVA a pagar após a criação de uma fatura:

```
--FUNCTIONS

/**
 *Returns the VAT paying amount
 *@return VAT_value
 */
drop function calculate_VAT_value;

GO
CREATE FUNCTION calculate_VAT_value (@productQuantity int , @payed_amount
float,@product_VAT float)
returns float
AS
    BEGIN
        declare @VAT_value FLOAT;
        SELECT @VAT_value =((@productQuantity * @payed_amount) * @product_VAT);
        return @VAT_value;
    END
GO
```

2. `calculate_totalAmount`: esta função calcula o valor total a pagar pelo cliente:

```
drop function calculate_totalAmount;

/**
 *@return totalAmount
 */
GO
CREATE FUNCTION calculate_totalAmount (@productQuantity int , @payed_amount float)
returns float
AS
    BEGIN
        declare @totalAmount FLOAT;
        SELECT @totalAmount =(@productQuantity * @payed_amount);
        return @totalAmount;
    END
GO
```

3. default_salesman_name: retorna o nome do funcionário padrão no caso do não fornecimento do nome do mesmo, ao emitir a fatura:

```
drop function default_salesman_name;

/**
*Returns a salesman name
*@return salesmanName
*
*/

GO
CREATE FUNCTION default_salesman_name ()
returns varchar(50)
AS
    BEGIN
        DECLARE @salesman varchar(50);

        SELECT @salesman= 'James Guevara';

        return @salesman;
    END
GO
```

Triggers

Nesta etapa foram criados 3 triggers:

1. insert_VAT_value: este trigger ocorre após a inserção de das linhas fatura, o trigger chama a função **calculate_VAT_value(...)** e atualiza o campo VAT_amout na tabela e de seguida chama a função **calculate_totalAmout(...)** e atualiza o campo totalAmount:

```
begin tran changeInsertVatTrigger;

GO
create trigger insert_VAT_value on
invoice_lines after insert
AS
    BEGIN
        DECLARE @productQuantity float, @payed_amount float, @product_VAT
float,@service_id_of_the_invoice_product int,@invoice_line_id int ;

        select @service_id_of_the_invoice_product= invoice_lines.service_id from
invoice_lines;
        select @productQuantity= invoice_lines.quantity from invoice_lines;
        select @payed_amount=serviceess.service_price from serviceess where
serviceess.service_id= @service_id_of_the_invoice_product;
        select @product_VAT=serviceess.service_vat from serviceess where
serviceess.service_id=@service_id_of_the_invoice_product;
        select @invoice_line_id = invoice_lines.line_id from invoice_lines;

        update invoice_lines set payed_amount= @payed_amount where
line_id=@invoice_line_id;
        update invoice_lines set VAT_amount=
dbo.calculate_VAT_value(@productQuantity,@payed_amount,@product_VAT) where
line_id=@invoice_line_id;
        update invoice_lines set totalAmount=
dbo.calculate_totalAmount(@productQuantity,@payed_amount) where line_id=@invoice_line_id;
    END
GO
```

2. insert_salesman_name: este trigger é acionado ao inserir uma fatura, se o nome do funcionario responsável da venda não for preenchido, o trigger chama a função **default_salesman_name()** e atualiza o campo salesman na tabela:

```

drop trigger insert_salesman_name;

/**
*Insert default salesman name to the invoice
*
*/
GO
create trigger insert_salesman_name on
invoice after insert
AS
    BEGIN
        DECLARE @salesman varchar(50), @invoice_id int;
        SELECT @salesman=invoice.salesman_name from invoice;
        SELECT @invoice_id=invoice.invoice_id from invoice

        if(@salesman is null)
            select @salesman= dbo.default_salesman_name();

        update invoice set salesman_name= @salesman where invoice_id=@invoice_id;
    END
GO

```

Stored procedures

1. insertClient: este trabalho pratico só tem uma stored procedure que é usada para fazer a inserção de clientes, porém ela executa muitas tarefas:
 - **Validação de dados:** ela valida o código postal e o email usando REGEX(regular expression.)
 - **Feedback de erros:** se uma REGEX for infringida, o sistema mostra um erro ao utilizador, o mesmo acontece se um outro erro ocorrer;
 - **Controlo de transação:** após validar os dados, antes da inserção na tabela dos clientes, é iniciada uma transação que se for bem-sucedida, é feito um commit, caso contrário mostra uma mensagem de erro ao utilizador isso tudo dentro de blocos **try-catch**;

```
drop procedure insertClient;
```

```
---STORED PROCEDURE THAT VALIDATES THE CLIENT EMAIL AND ZIP CODE WITH A TRANSACTION ON  
THE HEADSTART AND PRINTS ERROR IF NECESSARY TO THE SCREEN
```

```
GO
```

```
Create procedure insertClient(@client_zip_code varchar(10),@client_name  
varchar(100),@client_surname varchar(100),@client_birth_date date,@client_cell_number  
varchar(10),@client_TIN varchar(15),@client_email varchar(100))  
AS
```

```
begin
```

```
if @client_zip_code not like '[0-9][0-9][0-9][0-9][-][0-9][0-9][0-9]'  
begin  
    print 'formato do codigo postal invalido'  
    return;  
end
```

```
if @client_email not like '%[A-Z0-9][@][A-Z0-9]%[.][A-Z0-9]%'  
begin  
    print 'email invalido'  
    return;  
end
```

```
if @client_birth_date > GETDATE()  
begin  
    print 'Data de nascimento não pode ser futuristica!'  
    rollback;  
    return;  
end
```

```
begin try  
    begin tran clientInsertion
```

```

        insert into
clients(client_zip_code,client_name,client_surname,client_birth_date,client_cell_number,
client_TIN,client_email)

        values(@client_zip_code,@client_name,@client_surname,@client_birth_date,@client_c
ell_number,@client_TIN,@client_email);

        commit tran clientInsertion
    end try

    begin catch
        if @@ERROR !=0
            print 'Erro ao inserir cliente!'
            rollback tran
        end catch
    end;

GO

```

Cursors

Foram feitos cursores de seleção que agrupam os serviços da organização e para cada um, mostra os clientes e os seus dados essenciais, que mais aderem aos serviços, ordenados pelo valor total de aquisição aos serviços em específico de ordem decrescente, ou seja, dos que mais gastam aos que menos gastam:

--display the client data, he's locality, the consumed service and the amount that the client spent in total on the specific service

```
GO
DECLARE logotipo_cursor CURSOR for select c.client_id,c.client_name,
c.client_surname,c.client_email,c.client_birth_date,z.zip_code,z.locality,s.service_name
e, sum(iv.totalAmount) as total
from zip_code z,clients c, invoice i, invoice_lines iv, servicess s,payment_methods p
where c.client_zip_code=z.zip_code and c.client_id=i.client_id and
i.payment_method=p.payment_method_id and i.invoice_id=iv.invoice_id
and iv.service_id=s.service_id and s.service_id=1 group by c.client_id, c.client_name,
c.client_surname,c.client_email,c.client_birth_date,z.zip_code,z.locality,s.service_name
e order by total desc;
GO

GO
open logotipo_cursor;
GO

GO
DECLARE
@client_id int,@client_name varchar(max),@client_surname varchar(max),@client_email
varchar(max),@client_birth_date date,@client_zip varchar(10),@client_locality
varchar(max),@service_name varchar(max),@sum float;

fetch next from logotipo_cursor into
@client_id,@client_name,@client_surname,@client_email,@client_birth_date,@client_zip,@cl
ient_locality,@service_name,@sum

while @@FETCH_STATUS=0
begin
    print 'Id do cliente: ' +CAST( @client_id AS NVARCHAR(10)) + ' Nome do cliente: '
+ @client_name + ' ' + @client_surname + 'Email: ' +@client_email + ' Data de
nascimento: ' + CAST (@client_birth_date AS NVARCHAR(10))
+ ' Codigo postal: ' +@client_zip + +'Localidade: ' + @client_locality + 'Serviço:
' + @service_name + ' Total gasto: ' + CAST( @sum AS NVARCHAR(10))

    fetch next from logotipo_cursor into
@client_id,@client_name,@client_surname,@client_email,@client_birth_date,@client_zip,@cl
ient_locality,@service_name,@sum
end;
```


GO

GO

close logotipo_cursor;

GO

GO

deallocate logotipo_cursor;

GO

```
/*  
*****  
*****  
*****  
*****  
*/
```

GO

```
DECLARE logo_cursor CURSOR for select c.client_id,c.client_name,  
c.client_surname,c.client_email,c.client_birth_date,z.zip_code,z.locality,s.service_name  
e, sum(iv.totalAmount) as total  
from zip_code z,clients c, invoice i, invoice_lines iv, servicess s,payment_methods p  
where c.client_zip_code=z.zip_code and c.client_id=i.client_id and  
i.payment_method=p.payment_method_id and i.invoice_id=iv.invoice_id  
and iv.service_id=s.service_id and s.service_id=2 group by c.client_id, c.client_name,  
c.client_surname,c.client_email,c.client_birth_date,z.zip_code,z.locality,s.service_name  
e order by total desc;
```

GO

GO

open logo_cursor;

GO

GO

DECLARE

```
@client_id int,@client_name varchar(max),@client_surname varchar(max),@client_email  
varchar(max),@client_birth_date date,@client_zip varchar(10),@client_locality  
varchar(max),@service_name varchar(max),@sum float;
```

fetch next from logo_cursor into

```
@client_id,@client_name,@client_surname,@client_email,@client_birth_date,@client_zip,@cl  
ient_locality,@service_name,@sum
```

while @@FETCH_STATUS=0

begin

```
print 'Id do cliente: ' +CAST( @client_id AS NVARCHAR(10)) + ' Nome do cliente: '  
+ @client_name + ' ' + @client_surname + 'Email: ' +@client_email + ' Data de  
nascimento: ' + CAST (@client_birth_date AS NVARCHAR(10))  
+ ' Codigo postal: ' +@client_zip + +'Localidade: ' + @client_locality + 'Serviço:  
' + @service_name + ' Total gasto: ' + CAST( @sum AS NVARCHAR(10))
```

fetch next from logo_cursor into

```
@client_id,@client_name,@client_surname,@client_email,@client_birth_date,@client_zip,@cl  
ient_locality,@service_name,@sum
```

end;

GO

GO

close logo_cursor;

GO

```

GO
deallocate logo_cursor;
GO

/*****
*****/

GO
DECLARE desenho_artístico_cursor CURSOR for select c.client_id,c.client_name,
c.client_surname,c.client_email,c.client_birth_date,z.zip_code,z.locality,s.service_name
e, sum(iv.totalAmount) as total
from zip_code z,clients c, invoice i, invoice_lines iv, services s,payment_methods p
where c.client_zip_code=z.zip_code and c.client_id=i.client_id and
i.payment_method=p.payment_method_id and i.invoice_id=iv.invoice_id
and iv.service_id=s.service_id and s.service_id=2 group by c.client_id, c.client_name,
c.client_surname,c.client_email,c.client_birth_date,z.zip_code,z.locality,s.service_name
e order by total desc;
GO

GO
open desenho_artístico_cursor;
GO

GO
DECLARE
@client_id int,@client_name varchar(max),@client_surname varchar(max),@client_email
varchar(max),@client_birth_date date,@client_zip varchar(10),@client_locality
varchar(max),@service_name varchar(max),@sum float;

fetch next from desenho_artístico_cursor into
@client_id,@client_name,@client_surname,@client_email,@client_birth_date,@client_zip,@cl
ient_locality,@service_name,@sum

while @@FETCH_STATUS=0
begin
    print 'Id do cliente: ' +CAST( @client_id AS NVARCHAR(10)) + ' Nome do cliente: '
+ @client_name + ' ' + @client_surname + 'Email: ' +@client_email + ' Data de
nascimento: ' + CAST (@client_birth_date AS NVARCHAR(10))
+ ' Codigo postal: ' +@client_zip + +'Localidade: ' + @client_locality + 'Serviço:
' + @service_name + ' Total gasto: ' + CAST( @sum AS NVARCHAR(10))

    fetch next from desenho_artístico_cursor into
@client_id,@client_name,@client_surname,@client_email,@client_birth_date,@client_zip,@cl
ient_locality,@service_name,@sum
    end;
GO

GO
close desenho_artístico_cursor;
GO

GO
deallocate desenho_artístico_cursor;
GO

```


Views

Nesta etapa, foi criada uma view chamada **Payment_Lines**, que mostra as linhas faturas com os dados do cliente.

Também foi criado um login chamado WebFatura que tem a permissão de acessar a esta view.

```
drop view Payment_Lines;
```

GO

```
CREATE VIEW Payment_Lines AS
```

```
SELECT c.client_name as 'Nome do cliente', c.client_TIN 'Número de contribuinte',  
s.service_name as 'Nome do serviço', il.quantity as 'Quantidade',  
il.payed_amount as 'Valor pago', il.totalAmount as 'Total pago', il.VAT_amount as 'Valor  
do IVA', i.invoice_emission_date as 'Data de emissão'  
FROM services s, invoice i, invoice_lines il, clients c  
WHERE s.service_id=il.service_id and il.invoice_id=i.invoice_id and  
i.client_id=c.client_id;
```

GO

```
grant select on object:: Payment_Lines TO WebFatura;
```

The screenshot shows the Microsoft SQL Server Management Studio interface. The main window displays a SQL script with the following content:

```
--VIEWS  
1 drop view Payment_Lines;  
2  
3 GO  
4  
5  
6 CREATE VIEW Payment_Lines AS  
7 SELECT c.client_name as 'Nome do cliente', c.client_TIN 'Número de contribuinte',  
8 s.service_name as 'Nome do serviço', il.quantity as 'Quantidade',  
9 il.payed_amount as 'Valor pago', il.totalAmount as 'Total pago', il.VAT_amount as 'Valor  
do IVA', i.invoice_emission_date as 'Data de emissão'  
10 FROM services s, invoice i, invoice_lines il, clients c  
11 WHERE s.service_id=il.service_id and il.invoice_id=i.invoice_id and  
12 i.client_id=c.client_id;  
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2130  

```

Row number

Aqui foram criadas row numbers a uma query que seleciona os clientes os clientes que aderiram ao serviço logo:

```
select c.client_id,c.client_name,z.zip_code,z.locality,s.service_namee,  
sum(iv.totalAmount) as total, ROW_NUMBER() OVER (PARTITION BY service_namee order by  
service_namee ) as ROWNUMBER  
from zip_code z,clients c, invoice i,  
invoice_lines iv, servicess s,payment_methods p where c.client_zip_code=z.zip_code and  
c.client_id=i.client_id and i.payment_method=p.payment_method_id and  
i.invoice_id=iv.invoice_id  
and iv.service_id=s.service_id and s.service_id=2 group by c.client_id,  
c.client_name,z.zip_code,z.locality,s.service_namee order by total desc;
```

Pivot

Nesta etapa foram pivotados a tipos de pagamentos da tabela payment_methods

--PIVOT DOS METODOS DE PAGAMENTO E O TOTAL ARRECADADO NOS MESMOS

```
select numerario, cartao, cheque, MBway
from
(
    select p.payment_method_description, i.invoice_emission_date, iv.totalAmount
    from invoice i, invoice_lines iv, payment_methods p where
i.invoice_id=iv.invoice_id and i.payment_method=p.payment_method_id
) AS invoice_pivot_table
pivot
(
    sum(totalAmount) for payment_method_description in
([numerario],[cartao],[cheque],[MBway])
)as tabelaPivot
```

On cascade

Nesta etapa, para caso seja necessário, foi adicionado um delete on cascade em duas tabelas pertinentes:

```
-- DELETE ON CASCADE

--INVOICE

ALTER TABLE invoice
  DROP CONSTRAINT fk_client_id;

ALTER TABLE invoice add constraint
  FOREIGN KEY (fk_client_id) REFERENCES clients(client_id) ON DELETE CASCADE;

--INVOICE_LINES

ALTER TABLE invoice_lines
  DROP CONSTRAINT fk_invoice_id;

ALTER TABLE invoice add constraint
  FOREIGN KEY invoice_id; REFERENCES invoice(invoice_id) ON DELETE CASCADE;
```

Selects

1. Query que seleciona os clientes ordenados pelos que mais gastaram no serviço logo:

```
select c.client_id,c.client_name,z.zip_code,z.locality,s.service_namee,  
sum(iv.totalAmount) as total  
from zip_code z,clients c, invoice i,  
invoice_lines iv, servicess s,payment_methods p where c.client_zip_code=z.zip_code and  
c.client_id=i.client_id and i.payment_method=p.payment_method_id and  
i.invoice_id=iv.invoice_id  
and iv.service_id=s.service_id and s.service_id=2 group by c.client_id,  
c.client_name,z.zip_code,z.locality,s.service_namee order by total desc;
```

2. Query que seleciona o total faturado por serviço em todas as datas:

```
select i.invoice_emission_date, s.service_namee, sum(iv.VAT_amount) as 'Total iva pago'  
from servicess s, invoice i, invoice_lines iv where s.service_id =iv.service_id and  
iv.invoice_id=i.invoice_id  
group by i.invoice_emission_date,s.service_namee having sum(iv.VAT_amount) >10000  
order by i.invoice_emission_date;
```

3. Query que seleciona o metodo de pagamento mais usado no ano presente

```
select top 1 p.payment_method_descrition as 'Método de pagamento mais usado'  
,i.invoice_emission_date as 'Ano',count(i.payment_method) as 'Número de usos' from  
payment_methods p, invoice i where p.payment_method_id=i.payment_method group by  
p.payment_method_descrition,i.invoice_emission_date order by 'Número de usos' desc ;
```


Rank and dense rank

Foram aplicados o rank e dense rank sobre os métodos de pagamentos e pagamentos feitos pelos clientes:

```
select p.payment_method_description,i.client_id,i.invoice_emission_date,iv.totalAmount,  
rank() over (partition by payment_method_id order by payment_method_id asc) as [Rank],  
DENSE_RANK() over (partition by payment_method_id order by payment_method_id) AS  
DenseRank  
from invoice i, invoice_lines iv ,payment_methods p where  
p.payment_method_id=i.payment_method and i.invoice_id=iv.invoice_id ;
```

Filestream

```
--FILESTREAM CONFIGURATION
```

```
exec sp_configure filestream_access_level, 2 reconfigure
```

```
--TABLE CREATION
```

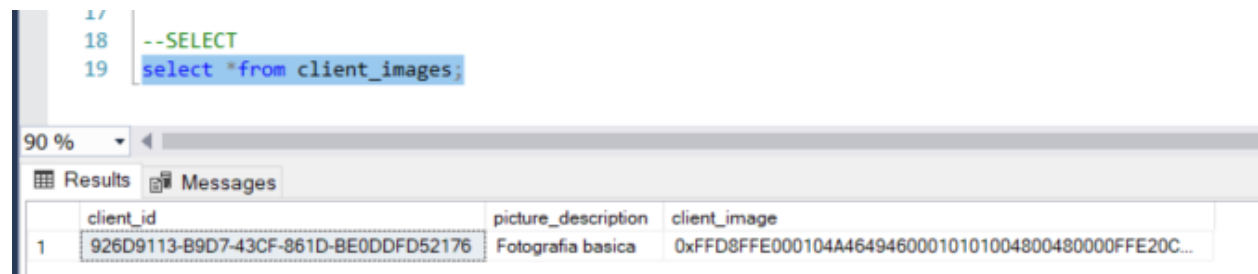
```
CREATE TABLE client_images( client_id UNIQUEIDENTIFIER ROWGUIDCOL NOT NULL UNIQUE ,  
                             picture_description VARCHAR(50),  
                             client_image VARBINARY(MAX) FILESTREAM NULL);
```

```
--INSERTION
```

```
insert into client_images(client_id,picture_description,client_image) SELECT NEWID(),  
'Fotografia basica', BulkColumn from openrowset  
(bulk  
'C:\Users\ValdoMpinga\Desktop\School\2ºAno\SemestreII\Administração_de_base_de_dados\Trabalho_pratico\Filestream\pexels-adrienne-andersen-2552130.jpg',single_blob) as picture;
```

```
--SELECT
```

```
select *from client_images;
```



The screenshot shows a SQL Server Enterprise Manager interface. At the top, a query window displays the following SQL code:

```
17  
18 --SELECT  
19 select *from client_images;
```

Below the query window, the 'Results' tab is active, showing a single row of data from the 'client_images' table. The columns are 'client_id', 'picture_description', and 'client_image'.

| | client_id | picture_description | client_image |
|---|--------------------------------------|---------------------|---|
| 1 | 926D9113-B9D7-43CF-861D-BE0DDFD52176 | Fotografia basica | 0xFFD8FFE000104A46494600010101004800480000FFE20C... |

Execution plan

Nesta etapa a performance da base de dados foi melhorado através do database tunnig

Sql tracer

| trabalho_pratico (DESKTOP-L6B5SS3N) | | | | | | | | | | | | |
|-------------------------------------|---|-----------------|------------|-----------|-----|-------|--------|----------|-----------------|------|-----------|--|
| EventClass | TextData | ApplicationName | NTUserName | LoginName | CPU | Reads | Writes | Duration | ClientProcessID | SPID | StartTime | |
| RPC:Completed | exec GetCurrentProductInfo | RSManagement | NETWORK... | NT AUT... | 0 | 130 | 0 | 11 | 7780 | 51 | 2021-06-C | |
| RPC:Completed | exec GetAllConfigurationInfo | RSManagement | NETWORK... | NT AUT... | 15 | 120 | 0 | 10 | 7780 | 51 | 2021-06-C | |
| RPC:Completed | exec GetAllConfigurationInfo | RSManagement | NETWORK... | NT AUT... | 0 | 5 | 0 | 1 | 7780 | 51 | 2021-06-C | |
| RPC:Completed | exec GetAllConfigurationInfo | RSManagement | NETWORK... | NT AUT... | 0 | 5 | 0 | 1 | 7780 | 51 | 2021-06-C | |
| RPC:Completed | exec GetAllConfigurationInfo | RSManagement | NETWORK... | NT AUT... | 0 | 5 | 0 | 0 | 7780 | 51 | 2021-06-C | |
| RPC:Completed | exec GetAnnouncedKey @InstallationID... | RSManagement | NETWORK... | NT AUT... | 0 | 127 | 0 | 4 | 7780 | 51 | 2021-06-C | |
| RPC:Completed | declare @p5 int set @p5=1 exec Ann... | RSManagement | NETWORK... | NT AUT... | 31 | 173 | 0 | 24 | 7780 | 51 | 2021-06-C | |
| Audit Logout | | Report Server | NETWORK... | NT AUT... | 16 | 27880 | 0 | 1493 | 5876 | 56 | 2021-06-C | |
| RPC:Completed | exec sp_reset_connection | Report Server | NETWORK... | NT AUT... | 0 | 0 | 0 | 0 | 5876 | 56 | 2021-06-C | |
| Audit Login | -- network protocol: LPC set quoted... | Report Server | NETWORK... | NT AUT... | | | | | 5876 | 56 | 2021-06-C | |
| SQL:BatchStarting | select top 1 NtSecDescState from Sec... | Report Server | NETWORK... | NT AUT... | | | | | 5876 | 56 | 2021-06-C | |
| SQL:StmtCompleted | select top 1 NtSecDescState from Sec... | Report Server | NETWORK... | NT AUT... | 0 | 24 | 0 | 1 | 5876 | 56 | 2021-06-C | |
| SQL:BatchCompleted | select top 1 NtSecDescState from Sec... | Report Server | NETWORK... | NT AUT... | 0 | 152 | 0 | 6 | 5876 | 56 | 2021-06-C | |
| Audit Logout | | Report Server | NETWORK... | NT AUT... | 0 | 28032 | 0 | 1184 | 5876 | 56 | 2021-06-C | |
| RPC:Completed | exec sp_reset_connection | Report Server | NETWORK... | NT AUT... | 0 | 0 | 0 | 0 | 5876 | 56 | 2021-06-C | |
| Audit Login | -- network protocol: LPC set quoted... | Report Server | NETWORK... | NT AUT... | | | | | 5876 | 56 | 2021-06-C | |
| RPC:Completed | exec PollEventsForRSProcess @NumberO... | Report Server | NETWORK... | NT AUT... | 31 | 168 | 0 | 31 | 5876 | 56 | 2021-06-C | |
| SQL:BatchStarting | | Report Server | NETWORK... | NT AUT... | | | | | 5876 | 56 | 2021-06-C | |
| SQL:StmtCompleted | set @BatchID = newid() | Report Server | NETWORK... | NT AUT... | 0 | 0 | 0 | 0 | 5876 | 56 | 2021-06-C | |
| SQL:StmtCompleted | UPDATE [Notifications] WITH (TABLOCK... | Report Server | NETWORK... | NT AUT... | 0 | 48 | 0 | 3 | 5876 | 56 | 2021-06-C | |
| SQL:StmtCompleted | select top 8 | Report Server | NETWORK... | NT AUT... | 0 | 100 | 0 | 2 | 5876 | 56 | 2021-06-C | |
| SQL:BatchCompleted | | Report Server | NETWORK... | NT AUT... | 78 | 697 | 0 | 102 | 5876 | 56 | 2021-06-C | |

| | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|--|
| N.[IsDataDriven], SUSER_NAME(Owner.[Sid]), Owner.[UserName], -- Report Data O.[Path], N.[ReportZone], O.[Type], SD.NtSecDescPrimary, N.[Version], Owner.[AuthType], SR.[SubscriptionResult] from [Notifications] N with (TABLOCKX) inner join [Catalog] O on O.[ItemID] = N.[ReportID] inner join [Users] Owner on N.SubscriptionOwnerID = Owner.UserID left outer join [SecData] SD on O.[PolicyID] = SD.[PolicyID] AND SD.AuthType = Owner.AuthType left outer join [SubscriptionResults] SR on N.[SubscriptionID] = SR.[SubscriptionID] AND CHECKSUM(convert(nvarchar(max),N.[ExtensionSettings])) = SR.[ExtensionSettingsHash] where N.[BatchID] = @BatchID | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|--|

Trace is running. Ln 861, Col 1 Rows: 861

Database engine tuning adviser

DESKTOP-L6BSS5N - ValdoMpinga 06/06/2021 11:30:21

DESKTOP-L6BSS5N - TuningDemo

General

Tuning Options

Progress

Recommendations

Reports

Estimated improvement: 22%

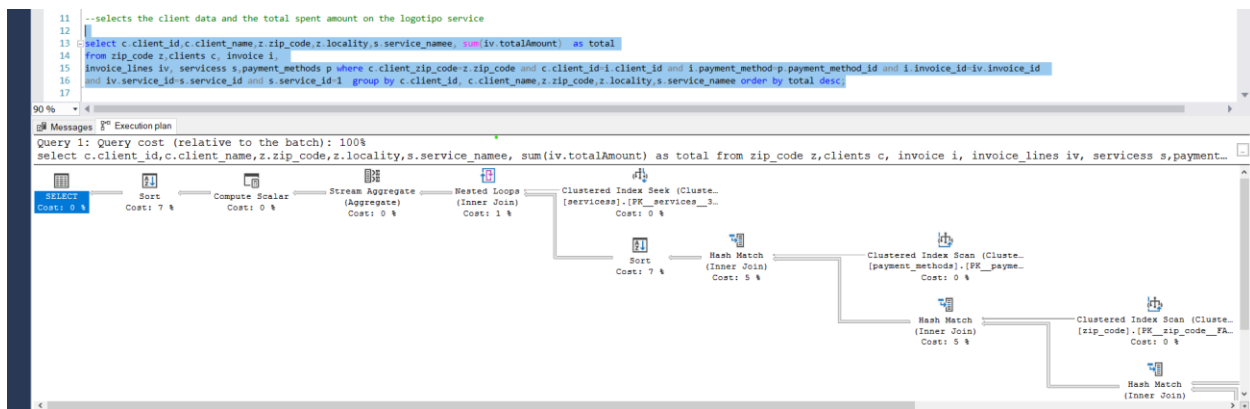
Partition Recommendations

Index Recommendations

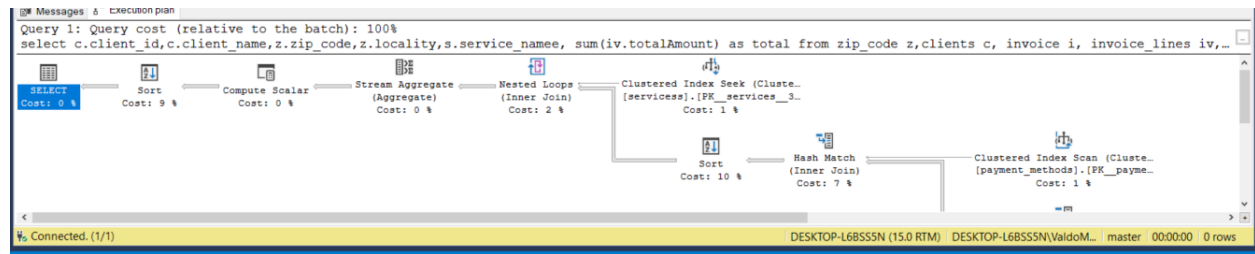
| Database Name | Object Name | Recommendation | Target of Recommendation | Online | Details | Partition Scheme | Size (KB) | Definition |
|--|-----------------------|----------------|---|--------|---------|------------------|-----------|---|
| <input checked="" type="checkbox"/> trabalho_pratico | [dbo].[clients] | create | _dta_index_clients_9_1589580701__K1_K2_3 | yes | | | 232 | ([client_id].asc,[client_zip_code].asc)include([client_na |
| <input checked="" type="checkbox"/> trabalho_pratico | [dbo].[clients] | create | _dta_stat_1589580701_2_1 | | | | | ([client_zip_code],[client_id]) |
| <input checked="" type="checkbox"/> trabalho_pratico | [dbo].[invoice] | create | _dta_index_invoice_9_1701581100__K1_K2_K3 | yes | | | 384 | ([invoice_id].asc,[payment_method].asc,[client_id].asc) |
| <input checked="" type="checkbox"/> trabalho_pratico | [dbo].[invoice] | create | _dta_stat_1701581100_2_3_1 | | | | | ([payment_method],[client_id],[invoice_id]) |
| <input checked="" type="checkbox"/> trabalho_pratico | [dbo].[invoice_lines] | create | _dta_index_invoice_lines_9_1765581328__K3_2_7 | yes | | | 248 | ([service_id].asc)include([invoice_id],[totalAmount]) |
| <input checked="" type="checkbox"/> trabalho_pratico | [dbo].[invoice_lines] | create | _dta_stat_1765581328_3_2 | | | | | ([service_id],[invoice_id]) |

Query execution plans, antes e depois do tuning

ANTES:



DEPOIS:



Backup para a Azure cloud

Nesta etapa o backup completo da base de dados foi feita e também a migração para azure do esquema com os dados:

Backup

| This PC > Local Disk (C:) > Trabalho_Pratico | | | | |
|--|------------------|------------------|------|-----------|
| | Name | Date modified | Type | Size |
| | trabalho_pratico | 06/06/2021 13:00 | File | 13.452 KB |

Migração

Data Migration Assistant

trabalhopratco

1 Select source 2 Select target 3 Select objects 4 Script & deploy schema

Source database: trabalho_pratico (DESKTOP-L6B55SN)
Target database: trabalho_pratico (trabalhopratco.database.windows.net)
Assessment issues: 1 collected object with at least one blocking issue, 1 collected object with at least one other issue

Select the schema objects from your source database that you would like to migrate to Azure SQL Database.

- ☒ **Stored Procedures**
 - ☒ dbo.check_zipCode
 - ☒ dbo.insertClient
- ☒ **Tables**
 - ☒ dbo.client_images (1 migration blocker)
 - ☒ dbo.clients
 - ☒ dbo.invoice
 - ☒ dbo.invoice_lines
 - ☒ dbo.payment_methods
 - ☒ dbo.servicess
 - ☒ dbo.zip_code
- ☒ **User-Defined Functions**
 - ☒ dbo.calculate_totalAmount
 - ☒ dbo.calculate_VAT_value
 - ☒ dbo.default_salesman_name
- ☒ **Views**
 - ☒ dbo.Payment_Lines (1 behavior change) **Fix Opportunity (1)**

View: dbo.Payment_Lines

⚠ This object can be migrated, but you may need to fix the issues described below.

Issue
Unqualified Join(s) detected
Change category: Behavior changes
Object details: Object [dbo].[Payment_Lines] uses the old style join syntax which can have poor performance at database compatibility level 90 and higher. For more details, please see: Line 4, Column 1.
Recommended Fix:

Original Statement
SELECT c.client_name as 'Nome do cliente', c.client_TIN 'Numero de contribuinte', s.service_name as 'Nome do serviço',
i.quantity as 'Quantidade',
i.payed_amount as 'Valor pago', i.totalAmount as 'Total pago', i.VAT_amount as 'Valor do IVA', i.invoice_emission_date as 'Data de emissão'
FROM servicess s, invoice i, invoice_lines il, clients c
WHERE s.service_id=i.service_id and il.invoice_id=i.invoice_id and i.client_id=c.client_id

Corrected Statement
SELECT c.client_name as 'Nome do cliente', c.client_TIN 'Numero de contribuinte', s.service_name as 'Nome do serviço',
i.quantity as 'Quantidade', i.payed_amount as 'Valor pago', i.totalAmount as 'Total pago', i.VAT_amount as 'Valor do IVA',
i.invoice_emission_date as 'Data de emissão' FROM servicess s INNER JOIN invoice_lines il ON s.service_id = il.service_id INNER

Apply All Change(s) **Ignore All Change(s)**

Back **Generate SQL script**

| Results Messages | | | | | | | | | |
|------------------|-----------|-----------------|-------------|----------------|-------------------|--------------------|------------|--------------------------|--|
| | client_id | client_zip_code | client_name | client_surname | client_birth_date | client_cell_number | client_TIN | client_email | |
| 9985 | 9985 | 4000-042 | Bianka | Rable | 1996-11-02 | 794-725-4789 | 1073051269 | brablenc@hp.com | |
| 9986 | 9986 | 3000-137 | Willamina | Prys | 1994-10-01 | 413-245-7932 | 3015953664 | wprysrd@yellowpages.com | |
| 9987 | 9987 | 3000-137 | Anson | Carme | 1991-05-18 | 949-982-8004 | 9644555961 | acarmere@reference.com | |
| 9988 | 9988 | 4900-300 | Kristoff... | Skeene | 1996-12-24 | 174-744-8622 | 2235715850 | kskeenerf@vistaprint.com | |
| 9989 | 9989 | 1000-023 | Penelope | Santorini | 1995-03-12 | 142-859-6882 | 9043039772 | psantorinir@usgs.gov | |
| 9990 | 9990 | 3000-137 | Andra | Roggier1 | 1991-08-12 | 382-524-4710 | 8792983227 | aroggierirh@trellian.com | |
| 9991 | 9991 | 1000-023 | Sergeant | Finder | 1994-08-13 | 752-925-9045 | 6275096543 | sfinderrri@dell.com | |
| 9992 | 9992 | 3000-137 | Kerian | Beddall | 1991-07-11 | 631-133-8419 | 8888543457 | kbeddallrj@nsw.gov.au | |
| 9993 | 9993 | 3000-137 | Wanids | Brissard | 1994-05-08 | 233-699-8021 | 2972154762 | wbrissardrk@example.com | |
| 9994 | 9994 | 4900-300 | Boycey | Duffyn | 2000-10-25 | 897-872-9710 | 2711109623 | bduffynr1@umn.edu | |
| 9995 | 9995 | 4900-300 | Shari | Sate | 1990-10-08 | 200-643-4550 | 2161553569 | ssaterm@forbes.com | |
| 9996 | 9996 | 4900-300 | Ellis | Fenna | 1995-12-29 | 928-273-2463 | 8541950026 | efennarn@baidu.com | |
| 9997 | 9997 | 4000-042 | Jasun | Carruthro | 1999-09-06 | 588-880-0851 | 6258407870 | jcarruthro@wisc.edu | |
| 9998 | 9998 | 4900-300 | Irma | Klas | 1996-09-23 | 767-865-1883 | 3986225234 | iklasr@vimeo.com | |
| 9999 | 9999 | 4900-300 | Sydney | Sexon | 2000-07-17 | 416-558-4610 | 4646293846 | ssexonr@prweb.com | |
| 10000 | 10000 | 1000-023 | Christine | Rothermel | 2003-04-28 | 192-573-6985 | 7641094422 | crothermelrr@jalum.net | |
| 10001 | 10001 | 4900-300 | Leopardo | Jhonas | 1923-04-03 | 964758274 | 23949294 | leopas@gmail.com | |

Ln 1, Col 22 (21 selected) Spaces: 4 UTF-8 CRLF SQL MSSQL 10,001 rows 00:00:00 trabalho_pratico.database.windows.net : trabalho_pratico

Script da migração

/****** DMA Schema Migration Deployment Script Script Date: 06/06/2021 14:57:02 *****/

-- 2 object(s) with recommendations identified during assessment. Please review these objects before deploying.

/***** Object: Table [dbo].[zip_code] Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[zip_code]') AND type in (N'U'))

BEGIN

CREATE TABLE [dbo].[zip_code](

[zip_code] [varchar](10) COLLATE SQL_Latin1_General_CP1_CI_AS NOT NULL,

[locality] [varchar](50) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

CONSTRAINT [PK__zip_code__FA8EDA7580992F60] PRIMARY KEY CLUSTERED

(

[zip_code] ASC

)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

)

END

GO

/***** Object: StoredProcedure [dbo].[check_zipCode] Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[check_zipCode]')
AND type in (N'P', N'PC'))

BEGIN

```

EXEC dbo.sp_executesql @statement = N'CREATE PROCEDURE [dbo].[check_zipCode] AS'

END

GO

ALTER procedure [dbo].[check_zipCode](@postalCode varchar(15))

AS

    begin

        if((select count(*) from zip_code where zip_code.zip_code = @postalCode)<1)

            print 'Loclidade inexistente!'

    end;

GO

/***** Object: Table [dbo].[clients]  Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[clients]') AND type in (N'U'))

BEGIN

CREATE TABLE [dbo].[clients](

    [client_id] [int] IDENTITY(1,1) NOT NULL,

    [client_zip_code] [varchar](10) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

    [client_name] [varchar](100) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

    [client_surname] [varchar](100) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

    [client_birth_date] [date] NULL,

    [client_cell_number] [varchar](20) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

    [client_TIN] [varchar](15) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

    [client_email] [varchar](100) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

CONSTRAINT [PK__clients__BF21A424BCBCC9A6] PRIMARY KEY CLUSTERED

```



```

(
    [client_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

)

END

GO

SET ANSI_PADDING ON

GO

IF NOT EXISTS (SELECT * FROM sys.indexes WHERE object_id = OBJECT_ID(N'[dbo].[clients]') AND name
= N'_dta_index_clients_9_1589580701__K1_K2_3')

CREATE NONCLUSTERED INDEX [_dta_index_clients_9_1589580701__K1_K2_3] ON [dbo].[clients]

(
    [client_id] ASC,
    [client_zip_code] ASC
)

INCLUDE (    [client_name]) WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF,
SORT_IN_TEMPDB = OFF, DROP_EXISTING = OFF, ONLINE = OFF, ALLOW_ROW_LOCKS = ON,
ALLOW_PAGE_LOCKS = ON)

GO

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.triggers WHERE object_id = OBJECT_ID(N'[dbo].[client_insertion]'))

EXEC dbo.sp_executesql @statement = N'create trigger client_insertion on
clients after insert

AS

    BEGIN

```

```

        DECLARE @postalCode varchar(15);

        select  @postalCode= c.client_zip_code from clients c;

        print "Code_:" + @postalCode;

        exec dbo.check_zipCode @postalCode

    END'

GO

ALTER TABLE [dbo].[clients] ENABLE TRIGGER [client_insertion]

GO

if not exists (select * from sys.stats where name = N'_dta_stat_1589580701_2_1' and object_id =
object_id(N'[dbo].[clients]'))

CREATE STATISTICS [_dta_stat_1589580701_2_1] ON [dbo].[clients]([client_zip_code], [client_id])

GO

/***** Object: StoredProcedure [dbo].[insertClient]  Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[insertClient]') AND
type in (N'P', N'PC'))

BEGIN

EXEC dbo.sp_executesql @statement = N'CREATE PROCEDURE [dbo].[insertClient] AS'

END

GO

ALTER procedure [dbo].[insertClient](@client_zip_code varchar(10),@client_name
varchar(100),@client_surname varchar(100),@client_birth_date date,@client_cell_number
varchar(10),@client_TIN varchar(15),@client_email varchar(100))

AS

        begin

                if @client_zip_code not like '[0-9][0-9][0-9][0-9][0-9][0-9][0-9]'

```

```

begin
    print 'formato do codigo postal invalido'
    return;
    --      if @client_email not like '\w[a-z 0-9]+@\w[a-
z]+[.]+\w{2,3}%'
end

```

```

if @client_email not like '%[A-Z0-9][@][A-Z0-9]%[.][A-Z0-9]%'
begin
    print 'email invalido'
    return;
end

```

```

if @client_birth_date > GETDATE()
begin
    print 'Data de nascimento não pode ser futuristica!'
    rollback;
    return;
end

```

```

begin try
    begin tran clientInsertion

        insert into
clients(client_zip_code,client_name,client_surname,client_birth_date,client_cell_number,client_TIN,cli
ent_email)

        values(@client_zip_code,@client_name,@client_surname,@client_birth_date,@client_cell_nu
mber,@client_TIN,@client_email);

```

```

        commit tran clientInsertion
    end try

    begin catch
        if @@ERROR !=0
            print 'Erro ao inserir cliente!'
            rollback tran
        end catch
    end;

```

GO

/***** Object: Table [dbo].[client_images] Script Date: 06/06/2021 14:57:02 *****/

/**

Assessment issue: [71627] Table with FILSTREAM column not supported in Azure SQL Database

Categories: Compatibility, MigrationBlocker

Applicable compatibility levels: CompatLevel150

Impact: The FILSTREAM column, which allows you to store unstructured data such as text documents, images, and videos in NTFS file system, is not supported in Azure SQL Database.

Impact details: The element Column: [dbo].[client_images].[client_image] has property IsFileStream set to a value that is not supported in Microsoft Azure SQL Database v12.

Recommendation: Upload the unstructured files to Azure Blob storage and store metadata related to these files (name, type, URL location, storage key etc.) in Azure SQL Database.

You may have re-engineer your application to enable streaming blobs to and from Azure SQL Database.

More information: Streaming Blobs To and From SQL Azure
(<https://go.microsoft.com/fwlink/?linkid=838302>)

**/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[client_images]') AND type in (N'U'))

BEGIN

CREATE TABLE [dbo].[client_images](

[client_id] [uniqueidentifier] ROWGUIDCOL NOT NULL,

[picture_description] [varchar](50) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

[client_image] [varbinary](max) FILESTREAM NULL,

CONSTRAINT [UQ__client_i__BF21A425B79DF934] UNIQUE NONCLUSTERED

(

[client_id] ASC

)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

) FILESTREAM_ON [FILESTREAM]

END

GO

/***** Object: Table [dbo].[servicess] Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[servicess]') AND type in (N'U'))

BEGIN

CREATE TABLE [dbo].[servicess](

[service_id] [int] IDENTITY(1,1) NOT NULL,

[service_namee] [varchar](50) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

[service_vat] [float] NULL,

[service_description] [varchar](100) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

[service_price] [float] NULL,

CONSTRAINT [PK__services__3E0DB8AFC9DF6AC6] PRIMARY KEY CLUSTERED

(

[service_id] ASC

)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

)

END

GO

/***** Object: Table [dbo].[payment_methods] Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[payment_methods]')
AND type in (N'U'))

BEGIN

CREATE TABLE [dbo].[payment_methods](

[payment_method_id] [int] IDENTITY(1,1) NOT NULL,

[payment_method_descrition] [varchar](100) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,

[payment_method_activity_state] [bit] NULL,

CONSTRAINT [PK__payment__8A3EA9EB059BB0B5] PRIMARY KEY CLUSTERED

(

[payment_method_id] ASC

)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

)

END

GO

/***** Object: UserDefinedFunction [dbo].[default_salesman_name] Script Date: 06/06/2021
14:57:02 *****/

```
SET ANSI_NULLS ON
```

```
GO
```

```
SET QUOTED_IDENTIFIER ON
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id =  
OBJECT_ID(N'[dbo].[default_salesman_name]') AND type in (N'FN', N'IF', N'TF', N'FS', N'FT'))
```

```
BEGIN
```

```
execute dbo.sp_executesql @statement = N'CREATE FUNCTION default_salesman_name ()
```

```
returns varchar(50)
```

```
AS
```

```
    BEGIN
```

```
        DECLARE @salesman varchar(50);
```

```
        SELECT @salesman= "James Guevara";
```

```
        return @salesman;
```

```
    END
```

```
,
```

```
END
```

```
GO
```

```
/****** Object: Table [dbo].[invoice]  Script Date: 06/06/2021 14:57:02 *****/
```

```
SET ANSI_NULLS ON
```

```
GO
```

```
SET QUOTED_IDENTIFIER ON
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[invoice]') AND type in  
(N'U'))
```

```
BEGIN
```

```

CREATE TABLE [dbo].[invoice](
    [invoice_id] [int] IDENTITY(1,1) NOT NULL,
    [payment_method] [int] NULL,
    [client_id] [int] NULL,
    [salesman_name] [varchar](100) COLLATE SQL_Latin1_General_CP1_CI_AS NULL,
    [invoice_emission_date] [date] NULL,
    CONSTRAINT [PK__invoice__F58DFD494EDEE5DB] PRIMARY KEY CLUSTERED
(
    [invoice_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)
)
END
GO

IF NOT EXISTS (SELECT * FROM sys.indexes WHERE object_id = OBJECT_ID(N'[dbo].[invoice]') AND name
= N'_dta_index_invoice_9_1701581100__K1_K2_K3')
CREATE NONCLUSTERED INDEX [_dta_index_invoice_9_1701581100__K1_K2_K3] ON [dbo].[invoice]
(
    [invoice_id] ASC,
    [payment_method] ASC,
    [client_id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, SORT_IN_TEMPDB = OFF, DROP_EXISTING
= OFF, ONLINE = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)
GO
SET ANSI_NULLS ON
GO
SET QUOTED_IDENTIFIER ON
GO
IF NOT EXISTS (SELECT * FROM sys.triggers WHERE object_id =
OBJECT_ID(N'[dbo].[insert_salesman_name]'))

```



```
EXEC dbo.sp_executesql @statement = N'create trigger insert_salesman_name on  
invoice after insert
```

```
AS
```

```
BEGIN
```

```
    DECLARE @salesman varchar(50), @invoice_id int;
```

```
    SELECT @salesman=invoice.salesman_name from invoice;
```

```
    SELECT @invoice_id=invoice.invoice_id from invoice
```

```
    if(@salesman is null)
```

```
        select @salesman= dbo.default_salesman_name();
```

```
    update invoice set salesman_name= @salesman where invoice_id=@invoice_id;
```

```
END
```

```
,
```

```
GO
```

```
ALTER TABLE [dbo].[invoice] ENABLE TRIGGER [insert_salesman_name]
```

```
GO
```

```
if not exists (select * from sys.stats where name = N'_dta_stat_1701581100_2_3_1' and object_id =  
object_id(N'[dbo].[invoice]'))
```

```
CREATE STATISTICS [_dta_stat_1701581100_2_3_1] ON [dbo].[invoice]([payment_method], [client_id],  
[invoice_id])
```

```
GO
```

```
/****** Object: UserDefinedFunction [dbo].[calculate_totalAmount]  Script Date: 06/06/2021  
14:57:02 *****/
```

```
SET ANSI_NULLS ON
```

```
GO
```

```
SET QUOTED_IDENTIFIER ON
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id =  
OBJECT_ID(N'[dbo].[calculate_totalAmount]') AND type in (N'FN', N'IF', N'TF', N'FS', N'FT'))
```

BEGIN

execute dbo.sp_executesql @statement = N'CREATE FUNCTION calculate_totalAmount
(@productQuantity int , @payed_amount float)

returns float

AS

BEGIN

declare @totalAmount FLOAT;

SELECT @totalAmount =(@productQuantity * @payed_amount);

return @totalAmount;

END

,

END

GO

/***** Object: UserDefinedFunction [dbo].[calculate_VAT_value] Script Date: 06/06/2021 14:57:02
*****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id =
OBJECT_ID(N'[dbo].[calculate_VAT_value]') AND type in (N'FN', N'IF', N'TF', N'FS', N'FT'))

BEGIN

execute dbo.sp_executesql @statement = N'CREATE FUNCTION calculate_VAT_value
(@productQuantity int , @payed_amount float,@product_VAT float)

returns float

AS

BEGIN

declare @VAT_value FLOAT;

SELECT @VAT_value =((@productQuantity * @payed_amount) * @product_VAT);

```

        return @VAT_value;

    END

,

END

GO

/***** Object: Table [dbo].[invoice_lines]  Script Date: 06/06/2021 14:57:02 *****/

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.objects WHERE object_id = OBJECT_ID(N'[dbo].[invoice_lines]') AND
type in (N'U'))

BEGIN

CREATE TABLE [dbo].[invoice_lines](

    [line_id] [int] IDENTITY(1,1) NOT NULL,

    [invoice_id] [int] NULL,

    [service_id] [int] NULL,

    [payed_amount] [float] NULL,

    [quantity] [int] NULL,

    [VAT_amount] [float] NULL,

    [totalAmount] [float] NULL,

CONSTRAINT [PK_invoice_lines] PRIMARY KEY CLUSTERED

(

    [line_id] ASC

)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,

ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

)

END

```

GO

IF NOT EXISTS (SELECT * FROM sys.indexes WHERE object_id = OBJECT_ID(N'[dbo].[invoice_lines]') AND name = N'_dta_index_invoice_lines_9_1765581328__K3_2_7')

CREATE NONCLUSTERED INDEX [_dta_index_invoice_lines_9_1765581328__K3_2_7] ON [dbo].[invoice_lines]

(

[service_id] ASC

)

INCLUDE ([invoice_id],

[totalAmount]) WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, SORT_IN_TEMPDB = OFF, DROP_EXISTING = OFF, ONLINE = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON)

GO

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.triggers WHERE object_id = OBJECT_ID(N'[dbo].[insert_VAT_value]'))

EXEC dbo.sp_executesql @statement = N'create trigger insert_VAT_value on

invoice_lines after insert

AS

BEGIN

DECLARE @productQuantity float, @payed_amount float, @product_VAT float, @service_id_of_the_invoice_product int, @invoice_line_id int ;

select @service_id_of_the_invoice_product= invoice_lines.service_id from invoice_lines;

select @productQuantity= invoice_lines.quantity from invoice_lines;

select @payed_amount=serviceess.service_price from serviceess where serviceess.service_id= @service_id_of_the_invoice_product;

```
select @payed_amount=serviceess.service_price from serviceess where
serviceess.service_id= @service_id_of_the_invoice_product;
```

```
select @payed_amount=serviceess.service_price from serviceess where
serviceess.service_id= @service_id_of_the_invoice_product;
```

```
select @product_VAT=serviceess.service_vat from serviceess where
serviceess.service_id=@service_id_of_the_invoice_product;
```

```
select @invoice_line_id = invoice_lines.line_id from invoice_lines;
```

```
print "Product of id: " + CAST( @invoice_line_id AS NVARCHAR(10))+ " "
+ CAST( @service_id_of_the_invoice_product AS NVARCHAR(10));
```

```
update invoice_lines set payed_amount= @payed_amount where
line_id=@invoice_line_id;
```

```
update invoice_lines set VAT_amount=
dbo.calculate_VAT_value(@productQuantity,@payed_amount,@product_VAT) where
line_id=@invoice_line_id;
```

```
update invoice_lines set totalAmount=
dbo.calculate_totalAmount(@productQuantity,@payed_amount) where line_id=@invoice_line_id;
```

```
END
```

```
,
```

```
GO
```

```
ALTER TABLE [dbo].[invoice_lines] ENABLE TRIGGER [insert_VAT_value]
```

```
GO
```

```
if not exists (select * from sys.stats where name = N'_dta_stat_1765581328_3_2' and object_id =
object_id(N'[dbo].[invoice_lines]'))
```

```
CREATE STATISTICS [_dta_stat_1765581328_3_2] ON [dbo].[invoice_lines]([service_id], [invoice_id])
```

```
GO
```

```
/***** Object: View [dbo].[Payment_Lines] Script Date: 06/06/2021 14:57:02 *****/
```

```
/**
```

Assessment issue: Unqualified Join(s) detected

Categories: Compatibility, BehaviorChange

Applicable compatibility levels: CompatLevel150

Impact: Starting with database compatibility level 90 and higher, in rare occasions, the 'unqualified join' syntax can cause 'missing join predicate' warnings, leading to long running queries.

Impact details: Object [dbo].[Payment_Lines] uses the old style join syntax which can have poor performance at database compatibility level 90 and higher. For more details, please see: Line 4, Column 1.

Recommendation: An example of "Unqualified join" is

```
select * from table1, table2  
where table1.col1 = table2.col1
```

Use explicit JOIN syntax in all cases. SQL Server supports the below explicit joins:

- LEFT OUTER JOIN or LEFT JOIN
- RIGHT OUTER JOIN or RIGHT JOIN
- FULL OUTER JOIN or FULL JOIN
- INNER JOIN

More information: - Missing join Predicate Event Class
(<https://go.microsoft.com/fwlink/?LinkId=798567>)

- Deprecation of "Old Style" JOIN Syntax: Only A Partial Thing
(<https://go.microsoft.com/fwlink/?LinkId=798568>)

- DOC : Please strive to use ANSI-style joins instead of deprecated syntax
(<https://go.microsoft.com/fwlink/?LinkId=798569>)

- Missing join predicate icon should be red (<https://go.microsoft.com/fwlink/?LinkId=798570>)

****/**

SET ANSI_NULLS ON

GO

SET QUOTED_IDENTIFIER ON

GO

IF NOT EXISTS (SELECT * FROM sys.views WHERE object_id = OBJECT_ID(N'[dbo].[Payment_Lines]'))

EXEC dbo.sp_executesql @statement = N'CREATE VIEW Payment_Lines AS

```
SELECT c.client_name as "Nome do cliente", c.client_TIN "Numero de contribuinte" ,s.service_name as  
"Nome do serviço" , il.quantity as "Quantidade"
```

```
,il.payed_amount as "Valor pago" ,il.totalAmount as "Total pago" ,il.VAT_amount as "Valor do IVA"  
,i.invoice_emission_date as "Data de emissão"
```

```
FROM servicess s, invoice i, invoice_lines il, clients c
```

```
WHERE s.service_id=il.service_id and il.invoice_id=i.invoice_id and i.client_id=c.client_id;
```

```
,
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id =  
OBJECT_ID(N'[dbo].[fk_client_zip_code]') AND parent_object_id = OBJECT_ID(N'[dbo].[clients]'))
```

```
ALTER TABLE [dbo].[clients] WITH CHECK ADD CONSTRAINT [fk_client_zip_code] FOREIGN  
KEY([client_zip_code])
```

```
REFERENCES [dbo].[zip_code] ([zip_code])
```

```
GO
```

```
IF EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id =  
OBJECT_ID(N'[dbo].[fk_client_zip_code]') AND parent_object_id = OBJECT_ID(N'[dbo].[clients]'))
```

```
ALTER TABLE [dbo].[clients] CHECK CONSTRAINT [fk_client_zip_code]
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id = OBJECT_ID(N'[dbo].[fk_client_id]')  
AND parent_object_id = OBJECT_ID(N'[dbo].[invoice]'))
```

```
ALTER TABLE [dbo].[invoice] WITH CHECK ADD CONSTRAINT [fk_client_id] FOREIGN KEY([client_id])
```

```
REFERENCES [dbo].[clients] ([client_id])
```

```
ON DELETE CASCADE
```

```
GO
```

```
IF EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id = OBJECT_ID(N'[dbo].[fk_client_id]') AND  
parent_object_id = OBJECT_ID(N'[dbo].[invoice]'))
```

```
ALTER TABLE [dbo].[invoice] CHECK CONSTRAINT [fk_client_id]
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id =  
OBJECT_ID(N'[dbo].[fk_payment_method]') AND parent_object_id = OBJECT_ID(N'[dbo].[invoice]'))
```

```
ALTER TABLE [dbo].[invoice] WITH CHECK ADD CONSTRAINT [fk_payment_method] FOREIGN  
KEY([payment_method])
```

```
REFERENCES [dbo].[payment_methods] ([payment_method_id])
```

```
GO
```

```
IF EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id =  
OBJECT_ID(N'[dbo].[fk_payment_method]') AND parent_object_id = OBJECT_ID(N'[dbo].[invoice]'))
```

```
ALTER TABLE [dbo].[invoice] CHECK CONSTRAINT [fk_payment_method]
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id = OBJECT_ID(N'[dbo].[fk_invoice_id]')  
AND parent_object_id = OBJECT_ID(N'[dbo].[invoice_lines]'))
```

```
ALTER TABLE [dbo].[invoice_lines] WITH CHECK ADD CONSTRAINT [fk_invoice_id] FOREIGN  
KEY([invoice_id])
```

```
REFERENCES [dbo].[invoice] ([invoice_id])
```

```
ON DELETE CASCADE
```

```
GO
```

```
IF EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id = OBJECT_ID(N'[dbo].[fk_invoice_id]') AND  
parent_object_id = OBJECT_ID(N'[dbo].[invoice_lines]'))
```

```
ALTER TABLE [dbo].[invoice_lines] CHECK CONSTRAINT [fk_invoice_id]
```

```
GO
```

```
IF NOT EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id = OBJECT_ID(N'[dbo].[fk_service_id]')  
AND parent_object_id = OBJECT_ID(N'[dbo].[invoice_lines]'))
```

```
ALTER TABLE [dbo].[invoice_lines] WITH CHECK ADD CONSTRAINT [fk_service_id] FOREIGN  
KEY([service_id])
```

```
REFERENCES [dbo].[servicess] ([service_id])
```

```
GO
```

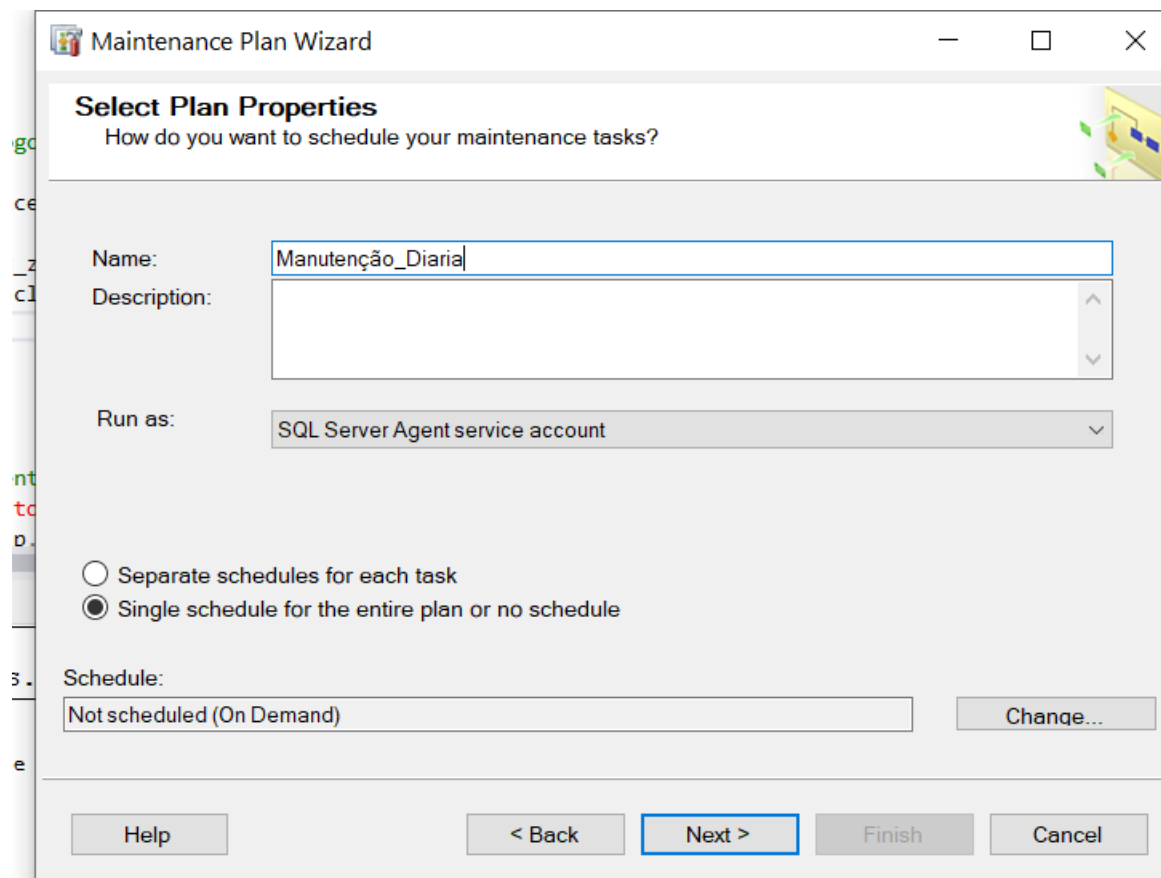
```
IF EXISTS (SELECT * FROM sys.foreign_keys WHERE object_id = OBJECT_ID(N'[dbo].[fk_service_id]') AND  
parent_object_id = OBJECT_ID(N'[dbo].[invoice_lines]'))
```

```
ALTER TABLE [dbo].[invoice_lines] CHECK CONSTRAINT [fk_service_id]
```

```
GO
```


Database maintenance

Nesta etapa foi feita a configuração da manutenção da base de dados diária em reorganização de índices, integração de dados e cópia de segurança:



The screenshot shows the 'Maintenance Plan Wizard' window, specifically the 'Select Plan Properties' step. The window title is 'Maintenance Plan Wizard'. The subtitle is 'Select Plan Properties' with the question 'How do you want to schedule your maintenance tasks?'. The 'Name' field is filled with 'Manutenção_Diaria'. The 'Description' field is empty. The 'Run as' dropdown is set to 'SQL Server Agent service account'. There are two radio buttons: 'Separate schedules for each task' (unselected) and 'Single schedule for the entire plan or no schedule' (selected). The 'Schedule' dropdown is set to 'Not scheduled (On Demand)', with a 'Change...' button next to it. At the bottom, there are five buttons: 'Help', '< Back', 'Next >' (highlighted with a blue border), 'Finish', and 'Cancel'.

Maintenance Plan Wizard

Select Plan Properties
How do you want to schedule your maintenance tasks?

Name: Manutenção_Diaria

Description:

Run as: SQL Server Agent service account

☐ Separate schedules for each task
☒ Single schedule for the entire plan or no schedule

Schedule: Not scheduled (On Demand) [Change...](#)

[Help](#) [< Back](#) [Next >](#) [Finish](#) [Cancel](#)

New Job Schedule

Name:

Manutenção_Diaria

Jobs in Schedule

Schedule type:

Recurring

☒ Enabled

One-time occurrence

Date:

06/06/2021

Time:

15:34:51

Frequency

Occurs:

Daily

Recurs every:

1

day(s)

Daily frequency

☒ Occurs once at:

18:00:00

☐ Occurs every:

1

hour(s)

Starting at:

00:00:00

Ending at:

23:59:59

Duration

Start date:

06/06/2021

☐ End date:

06/06/2021

☒ No end date:

Summary

Description:

Occurs every day at 18:00:00. Schedule will be used starting on 06/06/2021.

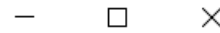
OK

Cancel

Help



Maintenance Plan Wizard



Select Maintenance Tasks

Which tasks should this plan perform?



Select one or more maintenance tasks:

- ☒ Check Database Integrity
- ☐ Shrink Database
- ☒ Reorganize Index
- ☐ Rebuild Index
- ☐ Update Statistics
- ☐ Clean Up History
- ☐ Execute SQL Server Agent Job
- ☒ Back Up Database (Full)
- ☐ Back Up Database (Differential)
- ☐ Back Up Database (Transaction Log)
- ☐ Maintenance Cleanup Task



The Back Up Database (Full) task allows you to specify the source databases, destination files or tapes, and over full backup.

Help

< Back

Next >

Finish

Cancel



Maintenance Plan Wizard



Maintenance Plan Wizard Progress

Click Stop to interrupt the operation.



Success

5 Total 0 Error
5 Success 0 Warning

Details:

| Action | Status | Message |
|---|---------|---------|
| ✓ Creating maintenance plan "Manutenção_Diar... | Success | |
| ✓ Adding tasks to the maintenance plan | Success | |
| ✓ Adding scheduling options | Success | |
| ✓ Adding reporting options | Success | |
| ✓ Saving maintenance plan "Manutenção_Diaria" | Success | |

Stop

Report ▼

Close

Reports

Nesta etapa foi gerado um relatório no report server

| Faturas | | | |
|---------------------|-------------------------------|-------------------|-------------------|
| | invoice emission date | service nameee | Total iva pago |
| ⊕ | 1/1/2021 Total 12:00:00 AM | | 408684.3183 |
| ⊕ | 1/2/2021 Total 12:00:00 AM | . | 422057.8245 |
| ⊕ | 1/3/2021 Total 12:00:00 AM | | 438567.3141 |
| ⊕ | 1/4/2021 Total 12:00:00 AM | | 417570.8151 |
| Total | | | 1686880.272 |
| 6/7/2021 2:28:44 AM | | | |

Conclusão

Foi um trabalho muito interessante, deu para praticar SQL desde o básico ao complexo, ainda há muito por aprender e muita experiencia por obter, desde que não se pare por aqui.