Provisionamento de infraestrutura na AWS usando Terraform

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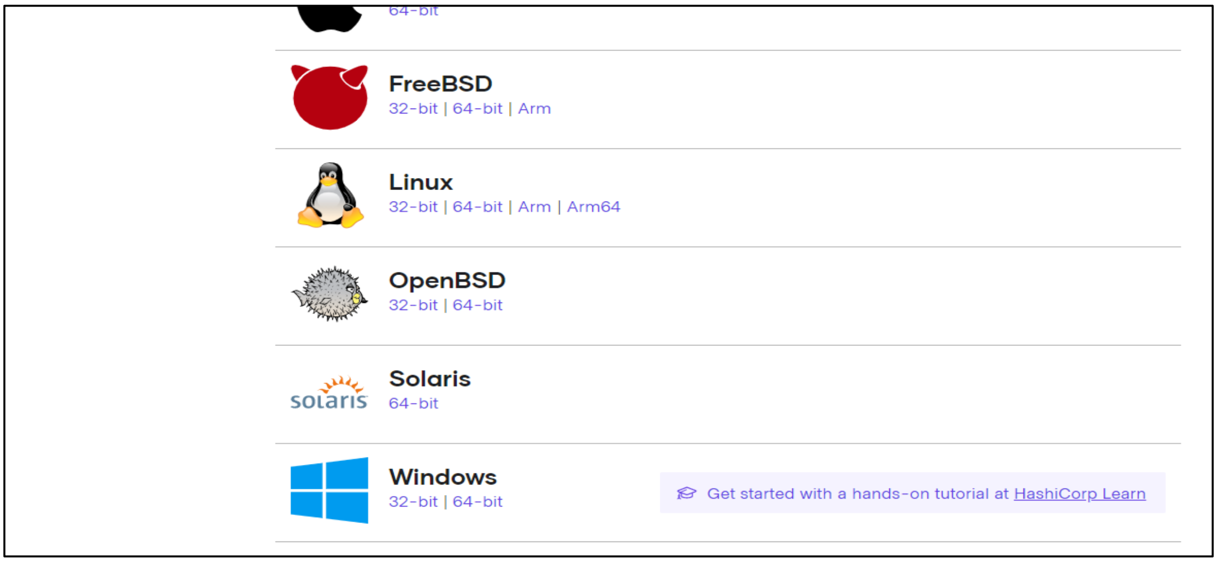
Objetivo: Implantação do PostgreSQL na AWS utilizando o Terraform;

Softwares utilizados:

- Terraform v0.14.6;
- VsCode 1.53.2;
- Postgres 12.5;

Instalação do Terraform no Windows 10

- Baixando pacote apropriado do Terraform (versão 0.14.6) para o Windows 64 bits em https://www.terraform.io/downloads.html:



64-bit

FreeBSD
32-bit | 64-bit | Arm

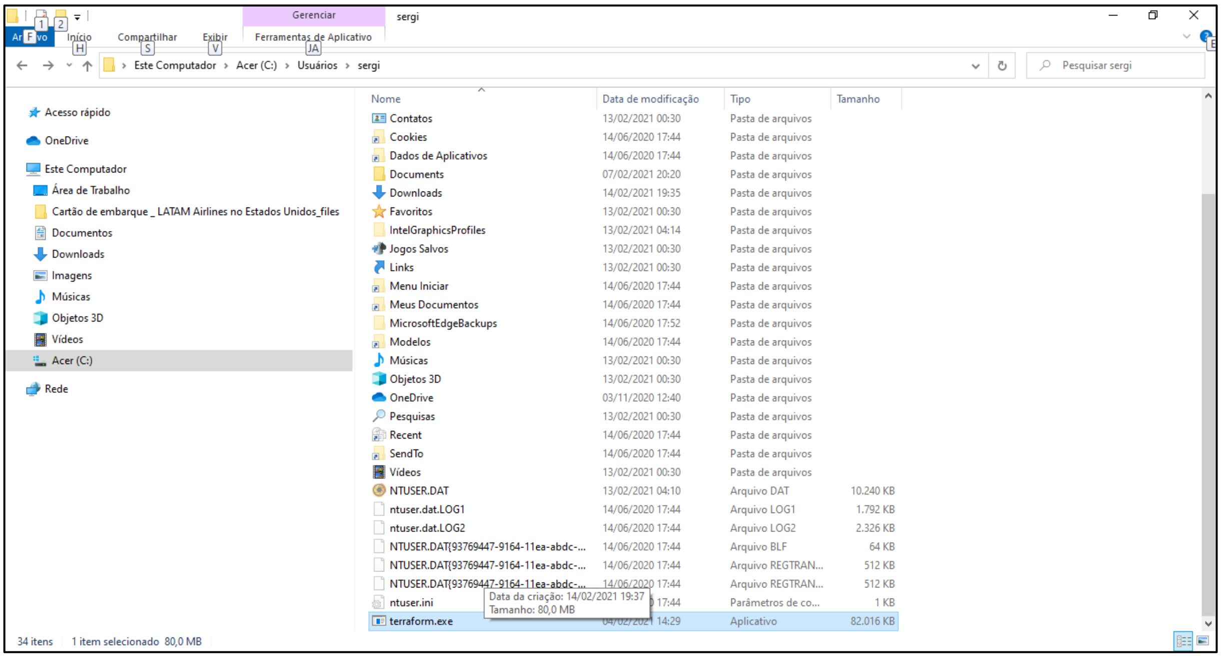
Linux
32-bit | 64-bit | Arm | Arm64

OpenBSD
32-bit | 64-bit

Solaris
64-bit

Windows
32-bit | 64-bit

- Passar arquivo de instalação para o usuário apropriado:



Este Computador › Acer (C:) › Usuários › sergi

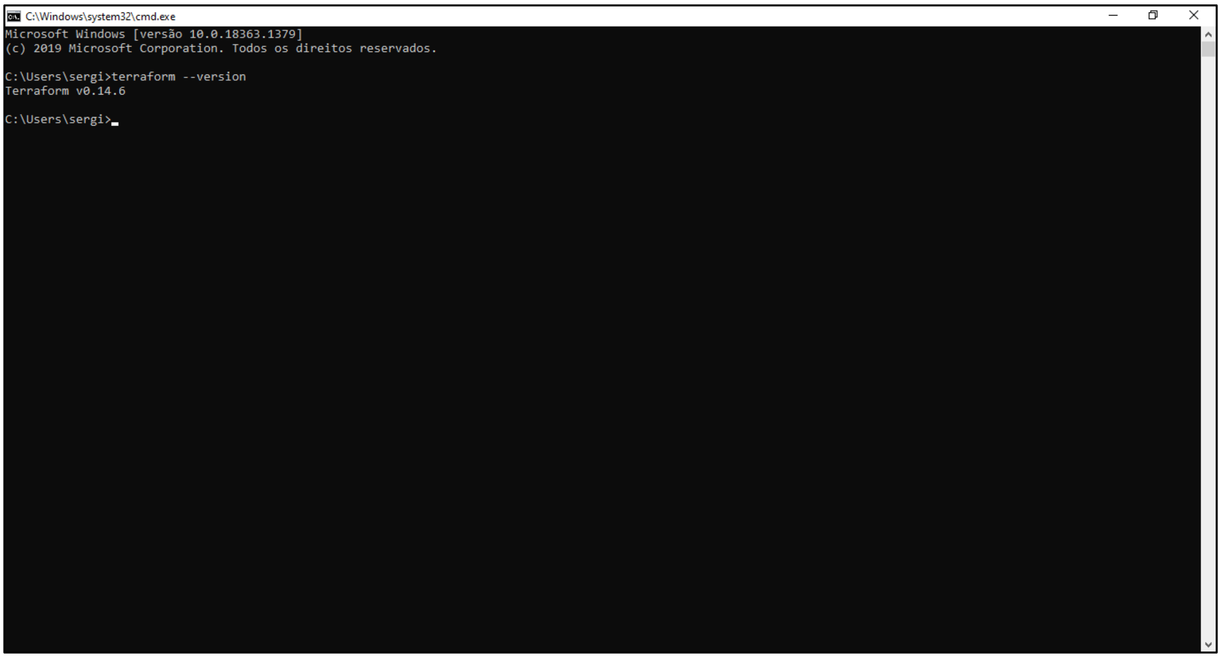
Acesso rápido
OneDrive
Este Computador
Área de Trabalho
Cartão de embarque _ LATAM Airlines no Estados Unidos_files
Documentos
Downloads
Imagens
Músicas
Objetos 3D
Vídeos
Acer (C:)
Rede

Nome	Data de modificação	Tipo	Tamanho
Contatos	13/02/2021 00:30	Pasta de arquivos	
Cookies	14/06/2020 17:44	Pasta de arquivos	
Dados de Aplicativos	14/06/2020 17:44	Pasta de arquivos	
Documents	07/02/2021 20:20	Pasta de arquivos	
Downloads	14/02/2021 19:35	Pasta de arquivos	
Favoritos	13/02/2021 00:30	Pasta de arquivos	
IntelGraphicsProfiles	13/02/2021 04:14	Pasta de arquivos	
Jogos Salvos	13/02/2021 00:30	Pasta de arquivos	
Links	13/02/2021 00:30	Pasta de arquivos	
Menu Iniciar	14/06/2020 17:44	Pasta de arquivos	
Meus Documentos	14/06/2020 17:44	Pasta de arquivos	
MicrosoftEdgeBackups	14/06/2020 17:52	Pasta de arquivos	
Modelos	14/06/2020 17:44	Pasta de arquivos	
Músicas	13/02/2021 00:30	Pasta de arquivos	
Objetos 3D	13/02/2021 00:30	Pasta de arquivos	
OneDrive	03/11/2020 12:40	Pasta de arquivos	
Pesquisas	13/02/2021 00:30	Pasta de arquivos	
Recent	14/06/2020 17:44	Pasta de arquivos	
SendTo	14/06/2020 17:44	Pasta de arquivos	
Vídeos	13/02/2021 00:30	Pasta de arquivos	
NTUSER.DAT	13/02/2021 04:10	Arquivo DAT	10.240 KB
ntuser.dat.LOG1	14/06/2020 17:44	Arquivo LOG1	1.792 KB
ntuser.dat.LOG2	14/06/2020 17:44	Arquivo LOG2	2.326 KB
NTUSER.DAT{93769447-9164-11ea-abdc-...	14/06/2020 17:44	Arquivo BLF	64 KB
NTUSER.DAT{93769447-9164-11ea-abdc-...	14/06/2020 17:44	Arquivo REGTRAN...	512 KB
NTUSER.DAT{93769447-9164-11ea-abdc-...	14/06/2020 17:44	Arquivo REGTRAN...	512 KB
ntuser.ini	17:44	Parâmetros de co...	1 KB
terraform.exe	04/02/2021 14:29	Aplicativo	82.016 KB

Data da criação: 14/02/2021 19:37
Tamanho: 80,0 MB

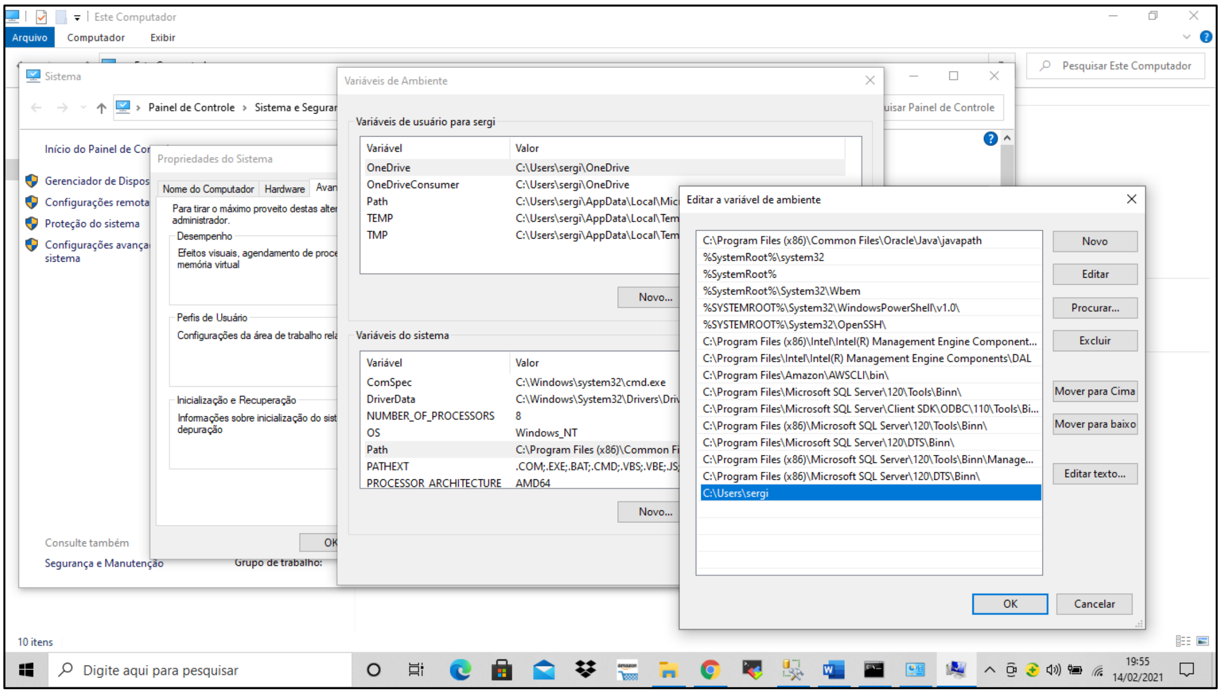
34 itens 1 item selecionado 80,0 MB

- Verificando versão do Terraform no usuário específico:



```
Microsoft Windows [versão 10.0.18363.1379]
(c) 2019 Microsoft Corporation. Todos os direitos reservados.

C:\Users\sergi>terraform --version
Terraform v0.14.6

C:\Users\sergi>_
```

- Adicionar a variável de ambiente em PATH:



Variáveis de usuário para sergi

Variável	Valor
OneDrive	C:\Users\sergi\OneDrive
OneDriveConsumer	C:\Users\sergi\OneDrive
Path	C:\Users\sergi\AppData\Local\Mic
TEMP	C:\Users\sergi\AppData\Local\Tem
TMP	C:\Users\sergi\AppData\Local\Tem

Variáveis do sistema

Variável	Valor
ComSpec	C:\Windows\system32\cmd.exe
DriverData	C:\Windows\System32\Drivers\Driv
NUMBER_OF_PROCESSORS	8
OS	Windows_NT
Path	C:\Program Files (x86)\Common Fi
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;
PROCESSOR_ARCHITECTURE	AMD64

Editar a variável de ambiente

```
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
%SYSTEMROOT%\System32\OpenSSH\
C:\Program Files (x86)\Intel\Intel(R) Management Engine Component...
C:\Program Files\Intel\Intel(R) Management Engine Components\DAL
C:\Program Files\Amazon\AWSCLI\bin\
C:\Program Files\Microsoft SQL Server\120\Tools\Binn\
C:\Program Files\Microsoft SQL Server\Client SDK\ODBC\110\Tools\Bi...
C:\Program Files (x86)\Microsoft SQL Server\120\Tools\Binn\
C:\Program Files\Microsoft SQL Server\120\DTS\Binn\
C:\Program Files (x86)\Microsoft SQL Server\120\Tools\Binn\Manage...
C:\Program Files (x86)\Microsoft SQL Server\120\DTS\Binn\
C:\Users\sergi
```

Provisionamento da infraestrutura no VSCODE

Componentes:

- VPC: “main”;
- Internet Gateway: “gw”;
- Subnets: “public_a”, “public_b”, “private_a” e “private_b”;
- Route tables: “rt_public” e “rt_private”;
- Route table Associations: “public_a”, “public_b”, “private_a” e “private_b”;
- Security Groups: “web” e “db”;
- Load Balancer Security Group: “alb”;
- Load Balancer: “lb”;
- Target Group: “tg”;
- Load Balancer Listener: “lbl”;
- Db Subnet Group: “default”;
- IAM Role para habilitar o enhanced monitoring: "rds_enhanced_monitoring";
- Db Master: “postgre”;
- Db Replica: “postgre-replica”;
- Cloudwatch Metrics: “database_cpu”, “database_disk_free” e “database_memory_free”;

1. **Arquivo main.tf:**

```
# Provider
provider "aws" {
  region     = var.region
  access_key = var.access_key
  secret_key = var.secret_key
}
# Tag local
locals {
    tags = {
    Name = "Terraform"
}
}
#VPC
resource "aws_vpc" "main" {
  cidr_block       = var.cidr_block
  tags = local.tags
}
#Internet Gateway
resource "aws_internet_gateway" "gw" {
  vpc_id = aws_vpc.main.id
  tags = local.tags
}
#Subnets
resource "aws_subnet" "public_a" {
  vpc_id     = aws_vpc.main.id
  cidr_block = "192.168.1.0/24"
  availability_zone = "us-east-1a"
  tags = {
    Name = "Public 1a"
  }
}
resource "aws_subnet" "public_b" {
  vpc_id     = aws_vpc.main.id
  cidr_block = "192.168.2.0/24"
  availability_zone = "us-east-1b"
  tags = {
    Name = "Public 1b"
  }
}
resource "aws_subnet" "private_a" {
  vpc_id     = aws_vpc.main.id
  cidr_block = "192.168.6.0/23"
  availability_zone = "us-east-1c"
  tags = {
    Name = "Private 1a"
  }
}
resource "aws_subnet" "private_b" {
  vpc_id     = aws_vpc.main.id
  cidr_block = "192.168.4.0/23"
  availability_zone = "us-east-1d"
  tags = {
    Name = "Private 1b"
  }
}
#Route Tables
resource "aws_route_table" "rt_public" {
  vpc_id = aws_vpc.main.id
  route {
    cidr_block = "0.0.0.0/0"
    gateway_id = aws_internet_gateway.gw.id
  }
tags = {
    Name = "Terraform public"
  }
}

resource "aws_route_table" "rt_private" {
  vpc_id = aws_vpc.main.id
  tags = {
    Name = "Terraform private"
  }
```

```
}
#Route tables associations
resource "aws_route_table_association" "public_a" {
  subnet_id      = aws_subnet.public_a.id
  route_table_id = aws_route_table.rt_public.id
}
resource "aws_route_table_association" "public_b" {
  subnet_id      = aws_subnet.public_b.id
  route_table_id = aws_route_table.rt_public.id
}
resource "aws_route_table_association" "private_a" {
  subnet_id      = aws_subnet.private_a.id
  route_table_id = aws_route_table.rt_private.id
}
resource "aws_route_table_association" "private_b" {
  subnet_id      = aws_subnet.private_b.id
  route_table_id = aws_route_table.rt_private.id
}
#Security Groups
resource "aws_security_group" "web" {
  name        = "web"
  description = "Allow TLS public inbound traffic"
  vpc_id      = aws_vpc.main.id
  ingress {
    from_port   = 80 #http
    to_port     = 80
    protocol    = "tcp"
    cidr_blocks = [var.cidr_block]
  }
  ingress {
    from_port   = 443 #https
    to_port     = 443
    protocol    = "tcp"
    cidr_blocks = [var.cidr_block]
  }
  ingress {
    from_port   = -1
    to_port     = -1
    protocol    = "icmp"
    cidr_blocks = [var.cidr_block]
  }
  egress {
    from_port   = 5432
    to_port     = 5432
    protocol    = "tcp"
    cidr_blocks = [var.private_a_cidr_block]
  }
  tags = {
    Name = "Web Server"
  }
}
resource "aws_security_group" "db" {
  name        = "db"
  description = "Allow incoming database connections"
  vpc_id      = aws_vpc.main.id
  ingress {
    from_port   = 5432
    to_port     = 5432
    protocol    = "tcp"
    security_groups = [aws_security_group.web.id]
  }
  ingress {
    from_port   = 22
    to_port     = 22
    protocol    = "tcp"
    cidr_blocks = [var.cidr_block]
  }
  ingress {
    from_port   = -1
    to_port     = -1
    protocol    = "icmp"
    cidr_blocks = [var.cidr_block]
  }
  egress {
    from_port   = 80
    to_port     = 80
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }
  egress {
    from_port   = 443
    to_port     = 443
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }
  tags = {
    Name = "Database"
  }
}
```

2. **Arquivo variables.tf:**

```
variable "region"{
    default = "us-east-1"
    description = "Região"
 }
 variable "access_key"{
    default = "AKIATGHD5TSAZLGJVPPM"
}
 variable "secret_key"{
    default = "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"
 }
 variable "cidr_block"{
    default = "192.168.0.0/16"
 }
 variable "private_a_cidr_block" {
     default = "192.168.6.0/23"
 }
variable "engine_version" {
  default     = "12.5"
  type        = string
  description = "Engine Version do DB"
}
variable "parameter_group" {
  default     = "default.postgres12"
  type        = string
  description = "Parameter Group do DB"
}
variable "monitoring_interval" {
  default     = 30
  type        = number
  description = "Intervalo em segundos, nos quais o Enhanced Monitoring coleta métricas "
}
variable "deletion_protection" {
  default     = false
  type        = bool
  description = "Flag que protege o DB contra o delete"
}
variable "cloudwatch_logs_exports" {
  default     = ["postgresql", "upgrade"]
  type        = list
  description = "Lista dos logs do CloudWatch Logs"
}
variable "alarm_cpu_threshold" {
  default     = 75
  type        = number
  description = "Threshold do Alarme de CPU como porcentagem"
}
variable "alarm_free_disk_threshold" {
  # 5GB
  default     = 5000000000
  type        = number
  description = "Threshold do alarme de disco livre em bytes"
}
variable "alarm_free_memory_threshold" {
  # 128MB
  default     = 128000000
  type        = number
  description = "Threshold do alarme de memória livre em bytes"
}
variable "ami" {
   default = "ami-0915bcb5fa77e4892"
}
variable "instance_type" {
   default = "t2.micro"
```

```
}
variable "key_pair" {
   default = "sergio"
}
```

3. **Arquivo lb.tf:**

```
resource "aws_security_group" "alb" {
  name        = "ALB-SG"
  description = "Load Balancer security group"
  vpc_id      = aws_vpc.main.id
  ingress {
    from_port   = 80
    to_port     = 80
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }
  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }
tags = {
    Name = "load balancer"
  }
}
resource "aws_lb" "lb" {
  name               = "ALB"
  load_balancer_type = "application"
  security_groups    = [aws_security_group.alb.id]
  subnets            = ["${aws_subnet.public_a.id}", "${aws_subnet.public_b.id}"]
  tags = {
    name = "ALB"
  }
}
resource "aws_lb_target_group" "tg" {
  name     = "ALB-TG"
  port     = 80
  protocol = "HTTP"
  vpc_id   = aws_vpc.main.id
  health_check {
      path = "/"
      healthy_threshold = 2
  }
}
resource "aws_lb_listener" "lbl" {
  load_balancer_arn = aws_lb.lb.arn
  port              = "80"
  protocol          = "HTTP"
  default_action {
    target_group_arn = aws_lb_target_group.tg.id
    type             = "forward"
  }
}
```

4. **Arquivo rds.tf:**

```
resource "aws_db_subnet_group" "default" {
  name       = "main"
  subnet_ids = [aws_subnet.private_a.id, aws_subnet.private_b.id]
  tags = {
    Name = "My DB subnet group"
  }
}
# IAM Role para habilitar o enhanced monitoring
resource "aws_iam_role" "rds_enhanced_monitoring" {
  name_prefix        = "rds-enhanced-monitoring-"
  assume_role_policy = data.aws_iam_policy_document.rds_enhanced_monitoring.json
}
resource "aws_iam_role_policy_attachment" "rds_enhanced_monitoring" {
  role       = aws_iam_role.rds_enhanced_monitoring.name
  policy_arn = "arn:aws:iam::aws:policy/service-role/AmazonRDSEnhancedMonitoringRole"
}
data "aws_iam_policy_document" "rds_enhanced_monitoring" {
  statement {
    actions = [
      "sts:AssumeRole",
    ]
    effect = "Allow"
    principals {
      type        = "Service"
      identifiers = ["monitoring.rds.amazonaws.com"]
    }
  }
}
# DB Master
resource "aws_db_instance" "postgre" {
  allocated_storage    = 10
  storage_type         = "gp2"
  engine               = "postgres"
  engine_version       = var.engine_version
  instance_class       = "db.t3.medium"
  name                 = "mydb"
  username             = "sergio"
  password             = "$Winterf3l"
  multi_az             = true
  parameter_group_name = var.parameter_group
  skip_final_snapshot  = true
  performance_insights_enabled = true
  maintenance_window = "Mon:00:00-Mon:03:00"
  backup_window      = "03:00-06:00"
  backup_retention_period = 1
  monitoring_interval             = var.monitoring_interval
  monitoring_role_arn             = aws_iam_role.rds_enhanced_monitoring.arn
  deletion_protection             = var.deletion_protection
  enabled_cloudwatch_logs_exports = var.cloudwatch_logs_exports
  db_subnet_group_name = aws_db_subnet_group.default.id
  vpc_security_group_ids  = [aws_security_group.db.id]
}
# DB Replica
resource "aws_db_instance" "postgre-replica" {
  replicate_source_db = aws_db_instance.postgre.id
  allocated_storage    = 10
  storage_type         = "gp2"
  engine               = "postgres"
  engine_version       = var.engine_version
  instance_class       = "db.t3.medium"
  name                 = "mydb"
  username             = ""
  password             = ""
  multi_az             = true
  parameter_group_name = var.parameter_group
  skip_final_snapshot  = true
  performance_insights_enabled = true
  maintenance_window = "Tue:00:00-Tue:03:00"
  backup_window      = "03:00-06:00"
  backup_retention_period = 0
  #db_subnet_group_name = aws_db_subnet_group.default.id
  vpc_security_group_ids  = [aws_security_group.db.id]
}
#Cloudwatch
# Utilização de CPU
 resource "aws_cloudwatch_metric_alarm" "database_cpu" {
  alarm_name          = "postgres_cpu"
  alarm_description   = "Database server CPU utilization"
  comparison_operator = "GreaterThanThreshold"
  evaluation_periods  = "1"
  metric_name         = "CPUUtilization"
  namespace           = "AWS/RDS"
  period              = "300"
  statistic           = "Average"
  threshold           = var.alarm_cpu_threshold
  dimensions = {
    DBInstanceIdentifier = aws_db_instance.postgre.id
  }
}
# Espaço em disco livre
resource "aws_cloudwatch_metric_alarm" "database_disk_free" {
  alarm_name          = "postgre_disk"
  alarm_description   = "Database server free storage space"
  comparison_operator = "LessThanThreshold"
  evaluation_periods  = "1"
  metric_name         = "FreeStorageSpace"
  namespace           = "AWS/RDS"
  period              = "60"
  statistic           = "Average"
  threshold           = var.alarm_free_disk_threshold
  dimensions = {
    DBInstanceIdentifier = aws_db_instance.postgre.id
  }
}
# Memória Livre
  resource "aws_cloudwatch_metric_alarm" "database_memory_free" {
  alarm_name          = "postgre_memory"
  alarm_description   = "Database server freeable memory"
  comparison_operator = "LessThanThreshold"
  evaluation_periods  = "1"
  metric_name         = "FreeableMemory"
  namespace           = "AWS/RDS"
  period              = "60"
  statistic           = "Average"
  threshold           = var.alarm_free_memory_threshold
  dimensions = {
    DBInstanceIdentifier = aws_db_instance.postgre.id
  }
}
```

5. Arquivo Ec2.tf:

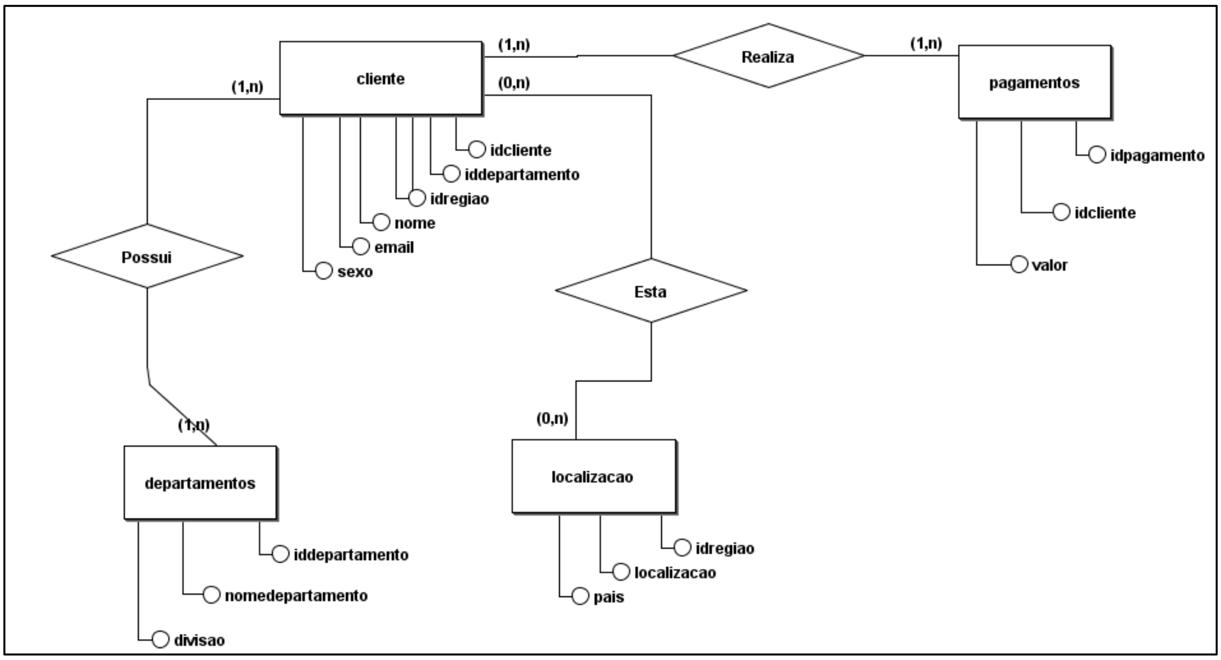
```
resource "aws_security_group" "sgautoscaling" {
  name        = "autoscaling"
  description = "secutiry group do autoscaling"
  vpc_id      = aws_vpc.main.id
  ingress {
    from_port   = 22
    to_port     = 22
    protocol    = "tcp"
    cidr_blocks = ["0.0.0.0/0"]
  }
  ingress {
    from_port   = 80
    to_port     = 80
    protocol    = "tcp"
    security_groups = [aws_security_group.alb.id]
  }
  egress {
    from_port   = 0
    to_port     = 0
    protocol    = "-1"
    cidr_blocks = ["0.0.0.0/0"]
  }
  tags = {
    Name = "Autoscaling"
  }
}
resource "aws_launch_configuration" "lcautoscaling" {
  name          = "autoscaling-launcher"
  image_id      = var.ami
  instance_type = var.instance_type
  key_name      = var.key_pair
  security_groups = [aws_security_group.sgautoscaling.id]
  associate_public_ip_address = true
  user_data = "${file("ec2_setup.sh")}"
}
resource "aws_autoscaling_group" "autoscalingg" {
  name                      = "terraform-autoscaling"
  vpc_zone_identifier       = [aws_subnet.public_a.id, aws_subnet.public_b.id]
  launch_configuration      = aws_launch_configuration.lcautoscaling.name
  max_size                  = 5
  min_size                  = 2
  health_check_grace_period = 300
  health_check_type         = "ELB"
  force_delete              = true
  target_group_arns         = [aws_lb_target_group.tg.arn]
}
resource "aws_autoscaling_policy" "scaleup" {
  name                   = "scaleup"
  scaling_adjustment     = 1
  adjustment_type        = "ChangeInCapacity"
  cooldown               = 300
  autoscaling_group_name = aws_autoscaling_group.autoscalingg.name
  policy_type            = "SimpleScaling"
}

resource "aws_autoscaling_policy" "scaledown" {
  name                   = "scaledown"
  scaling_adjustment     = -1
  adjustment_type        = "ChangeInCapacity"
  cooldown               = 300
  autoscaling_group_name = aws_autoscaling_group.autoscalingg.name
  policy_type            = "SimpleScaling"
}
resource "aws_instance" "ec2privada" {
  ami           = var.ami
  instance_type = var.instance_type
  vpc_security_group_ids = [aws_security_group.db.id]
  subnet_id       = aws_subnet.private_b.id
  availability_zone = "${var.region}d"
  tags = {
    Name = "ec2privada"
  }
}
```

6. Arquivo Ec2_setup.sh

```
#!/bin/bash
yum update -y
yum install -y httpd
echo 'Hello from Terraform' > /var/www/html/index.html
service httpd start

sudo yum install -y epel-release
sudo yum install -y stress
```

Banco de dados Empresa

1. Modelagem Lógica (brModelo 3.31):



2. Modelagem Física:

```
CREATE DATABASE empresa
   WITH
   OWNER = postgres
   ENCODING = 'UTF8'
   LC_COLLATE = 'en_US.UTF-8'
   LC_CTYPE = 'en_US.UTF-8'
   TABLESPACE = pg_default
   CONNECTION LIMIT = -1;

create table departamentos(
   iddepartamento int,
         nomedepartamento varchar(100),
         divisao varchar(100),
         primary key(iddepartamento)
);
insert into departamentos values (1,'Automotivo','Auto e Hardware');
insert into departamentos values (2,'bebês','Casa e Afins');
insert into departamentos values (3,'beleza','Casa e Afins');
insert into departamentos values (4,'Roupas','Casa e Afins');
insert into departamentos values (5,'Computadores','Equipamentos eletrônicos');

create table localizacao (
   idregiao int,
         localizacao varchar(20),
         pais varchar(20),
         primary key(idregiao)
);
insert into localizacao values (1,'Leste','Brasil');
insert into localizacao values (2,'Sul','Brasil');

insert into localizacao values (3,'Nordeste','Brasil');

insert into localizacao values (4,'Centro-oeste','Brasil');

insert into localizacao values (5,'Norte','Brasil');

insert into localizacao values (6,'North','EUA');

insert into localizacao values (7,'South','EUA');

insert into localizacao values (8,'east','EUA');


create table cliente (
    idcliente int,
            iddepartamento int,
            idregiao int,
            nome varchar (100),
            email varchar (100),
            sexo varchar(10),
            primary key(idcliente),
            foreign key (iddepartamento) references departamentos (iddepartamento),
            foreign key (idregiao) references localizacao (idregiao)
);
insert into cliente values (1,1,8,'Sérgio','sergio@mail.com','Masculino');
insert into cliente values (2,2,7,'Bárbara','barbara@mail.coml','Feminino');
insert into cliente values (3,2,1,'Juca','Juca@mail.com','Feminino');
insert into cliente values (4,1,5,'Alice','Alice@mail.com','Feminino');
insert into cliente values (5,3,3,'Jasmine','Jasmine@mail.com','Feminino');
insert into cliente values (6,4,8,'ALine','Aline@mail.com','Feminino');
insert into cliente values (7,4,4,'Francisca','Francisca@mail.com','Feminino');
insert into cliente values (8,4,2,'Martha','Martha@mail.com','Feminino');
insert into cliente values(9,4,2,'Peter','Peter@mail.com','Masculino');
insert into cliente values(10,4,2,'John','John@mail.com','Masculino');
insert into cliente values(11,4,2,'frank','frank@mail.com','Masculino');
```

```
create table pagamentos (
    idpagamento int,
            idcliente int,
            valor int
);
insert into pagamentos(idpagamento) select random()*100 from generate_series(0,1000000);
insert into pagamentos(idcliente) select random()*100 from generate_series(0,1000000);
insert into pagamentos(valor) select random()*100 from generate_series(0,1000000);
```

3. **Usuário com permissão de Select:**

```
CREATE USER SERGIO WITH PASSWORD '123456';
GRANT SELECT ON ALL TABLES IN SCHEMA PUBLIC TO SERGIO;
```

4. **Triggers para auditorias:**

DEPARTAMENTOS

```
create function public.contardepartamentos()
     returns trigger as $$
                declare contador bigint;
                        begin
                          select count(*) from departamentos into contador;
                          raise notice 'Existem % registros em departamento',contador;
                          return old;
                          end;
$$ language 'plpgsql'
create trigger contardepartamentos
after delete
on public.departamentos
for each statement
execute procedure public.contardepartamentos()
```

CLIENTES

```
create function public.contarcliente()
     returns trigger as $$
                declare contador bigint;
                        begin
                          select count(*) from cliente into contador;
                          raise notice 'Existem % registros em cliente',contador;
                          return old;
                          end;
$$ language 'plpgsql'

create trigger contarcliente
after delete
on public.cliente
for each statement
execute procedure public.contarcliente()
```

LOCALIZAÇÃO

```
create function public.contarlocalizacao()
     returns trigger as $$
                declare contador bigint;
                        begin
                          select count(*) from localizacao into contador;
                          raise notice 'Existem % registros em localizacao',contador;
                          return old;
                          end;
$$ language 'plpgsql'
create trigger localizacao
after delete
```

```
on public.localizacao
for each statement
execute procedure public.contarlocalizacao()
```

PAGAMENTOS

```
create function public.contarpagamentos()
   returns trigger as $$
          declare contador bigint;
               begin
                 select count(*) from pagamentos into contador;
                 raise notice 'Existem % registros em pagamentos',contador;
                 return old;
                 end;
$$ language 'plpgsql'

create trigger pagamentos
after delete
on public.pagamentos
for each statement
execute procedure public.contarpagamentos()
```

INSERT

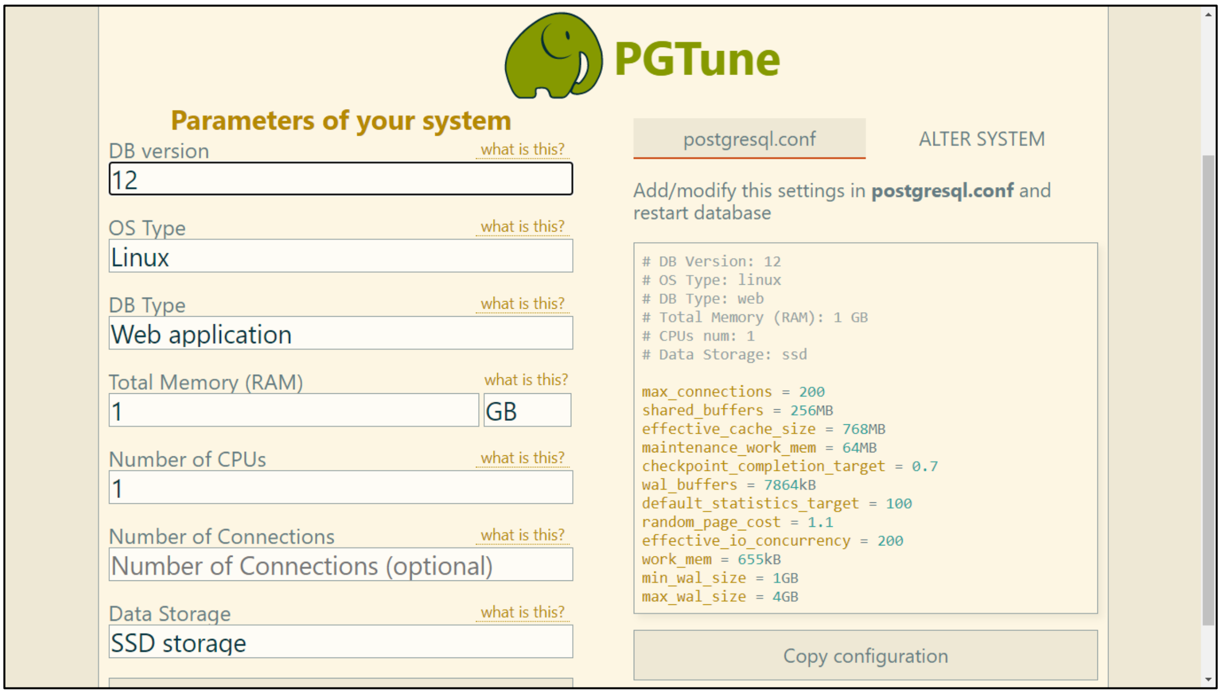
```
alter table cliente add column datacadastro time without time zone;
alter table cliente add column dataalteracao time without time zone;

create function data_cadastro()
returns trigger as $$
begin
   new.datacadastro = now();
```

```
      return new;
end
$$ language 'plpgsql';

create trigger data_cadastro_novo_cliente
  before insert
      on cliente
      for each row
      execute procedure data_cadastro();
```

UPDATE

```
create function data_atualiza()
  returns trigger as $$
      begin
        new.dataalteracao = now();
            return new;
  end
      $$ language 'plpgsql';

create trigger data_atualiza_cliente
    before update
      on cliente
      for each row
      execute procedure data_atualiza();
```

5. PG_TUNNING:



Parameters of your system

DB version: 12

OS Type: Linux

DB Type: Web application

Total Memory (RAM): 1 GB

Number of CPUs: 1

Number of Connections: Number of Connections (optional)

Data Storage: SSD storage

Add/modify this settings in **postgresql.conf** and restart database

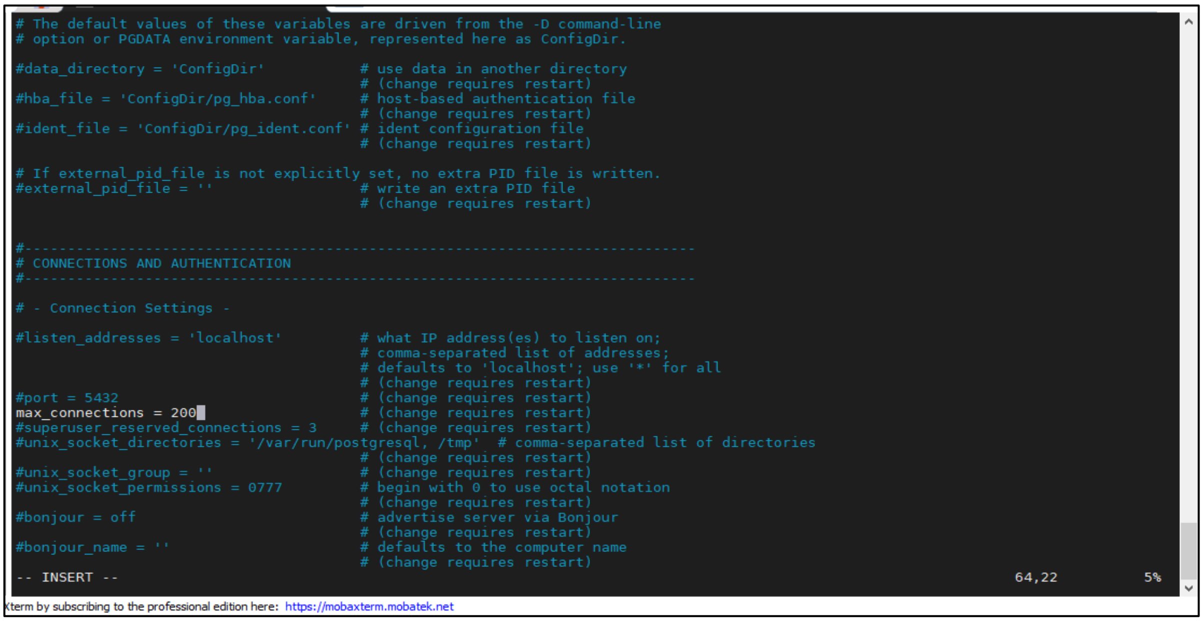
```
# DB Version: 12
# OS Type: linux
# DB Type: web
# Total Memory (RAM): 1 GB
# CPUs num: 1
# Data Storage: ssd

max_connections = 200
shared_buffers = 256MB
effective_cache_size = 768MB
maintenance_work_mem = 64MB
checkpoint_completion_target = 0.7
wal_buffers = 7864kB
default_statistics_target = 100
random_page_cost = 1.1
effective_io_concurrency = 200
work_mem = 655kB
min_wal_size = 1GB
max_wal_size = 4GB
```

ALTERAÇÕES:

```
find / -name postgresql.conf
/var/lib/pgsql/12/data/postgresql.conf
vim postgresql.conf
```

PARÂMETROS:

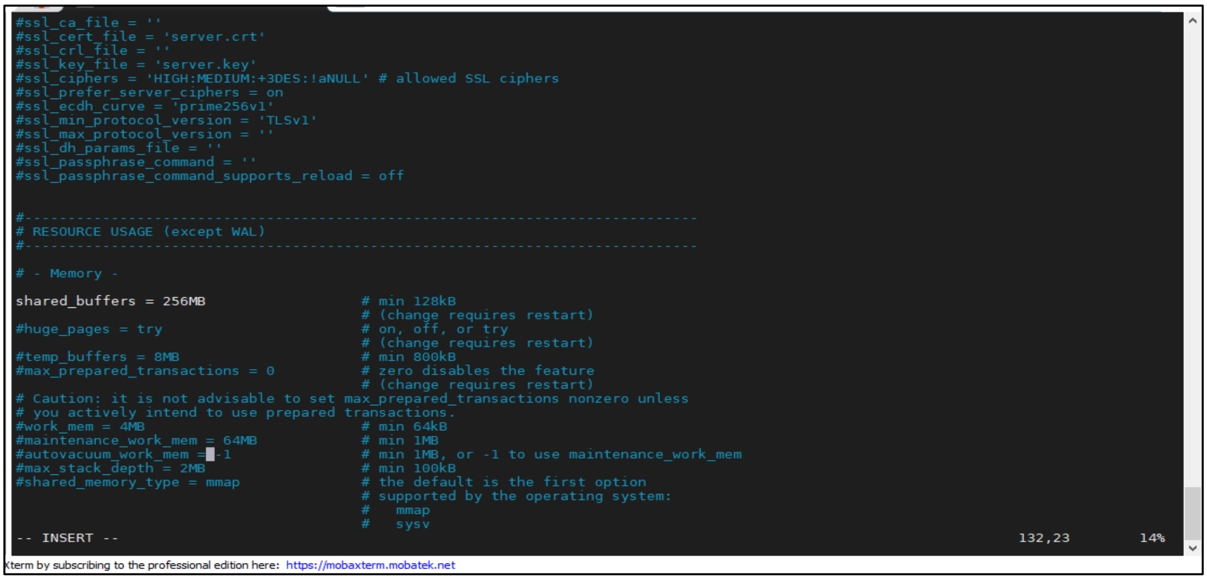
max_connections = PostgreSQL usa o parâmetro max_connections para limitar o número de conexões (e recursos que são consumidos pelas conexões) para prevenir que o comportamento de conexão descontrolada sobrecarregue os recursos de implantação.



```
# The default values of these variables are driven from the -D command-line
# option or PGDATA environment variable, represented here as ConfigDir.

#data_directory = 'ConfigDir'           # use data in another directory
                                        # (change requires restart)
#hba_file = 'ConfigDir/pg_hba.conf'     # host-based authentication file
                                        # (change requires restart)
#ident_file = 'ConfigDir/pg_ident.conf' # ident configuration file
                                        # (change requires restart)

# If external_pid_file is not explicitly set, no extra PID file is written.
#external_pid_file = ''                 # write an extra PID file
                                        # (change requires restart)


#------------------------------------------------------------------------------
# CONNECTIONS AND AUTHENTICATION
#------------------------------------------------------------------------------

# - Connection Settings -

#listen_addresses = 'localhost'         # what IP address(es) to listen on;
                                        # comma-separated list of addresses;
                                        # defaults to 'localhost'; use '*' for all
                                        # (change requires restart)
#port = 5432                            # (change requires restart)
max_connections = 200                   # (change requires restart)
#superuser_reserved_connections = 3     # (change requires restart)
#unix_socket_directories = '/var/run/postgresql, /tmp'  # comma-separated list of directories
                                        # (change requires restart)
#unix_socket_group = ''                 # (change requires restart)
#unix_socket_permissions = 0777         # begin with 0 to use octal notation
                                        # (change requires restart)
#bonjour = off                          # advertise server via Bonjour
                                        # (change requires restart)
#bonjour_name = ''                      # defaults to the computer name
                                        # (change requires restart)
-- INSERT --                                                                  64,22         5%
```

Xterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net

shared_buffers = Define a quantidade de memória que o servidor de banco de dados usa para os buffers de memória compartilhada.



```
#ssl_ca_file = ''
#ssl_cert_file = 'server.crt'
#ssl_crl_file = ''
#ssl_key_file = 'server.key'
#ssl_ciphers = 'HIGH:MEDIUM:+3DES:!aNULL' # allowed SSL ciphers
#ssl_prefer_server_ciphers = on
#ssl_ecdh_curve = 'prime256v1'
#ssl_min_protocol_version = 'TLSv1'
#ssl_max_protocol_version = ''
#ssl_dh_params_file = ''
#ssl_passphrase_command = ''
#ssl_passphrase_command_supports_reload = off


#------------------------------------------------------------------------------
# RESOURCE USAGE (except WAL)
#------------------------------------------------------------------------------

# - Memory -

shared_buffers = 256MB                  # min 128kB
                                        # (change requires restart)
#huge_pages = try                       # on, off, or try
                                        # (change requires restart)
#temp_buffers = 8MB                     # min 800kB
#max_prepared_transactions = 0          # zero disables the feature
                                        # (change requires restart)
# Caution: it is not advisable to set max_prepared_transactions nonzero unless
# you actively intend to use prepared transactions.
#work_mem = 4MB                         # min 64kB
#maintenance_work_mem = 64MB            # min 1MB
#autovacuum_work_mem = -1               # min 1MB, or -1 to use maintenance_work_mem
#max_stack_depth = 2MB                  # min 100kB
#shared_memory_type = mmap              # the default is the first option
                                        # supported by the operating system:
                                        #   mmap
                                        #   sysv
-- INSERT --                                                                  132,23        14%
```

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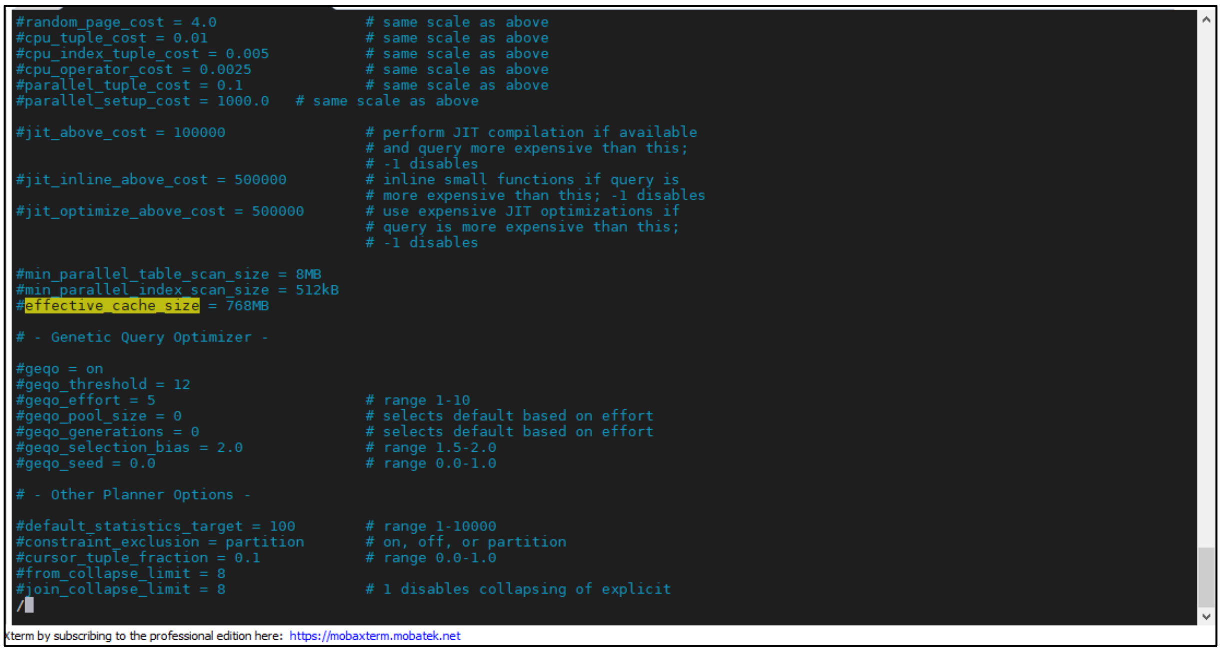
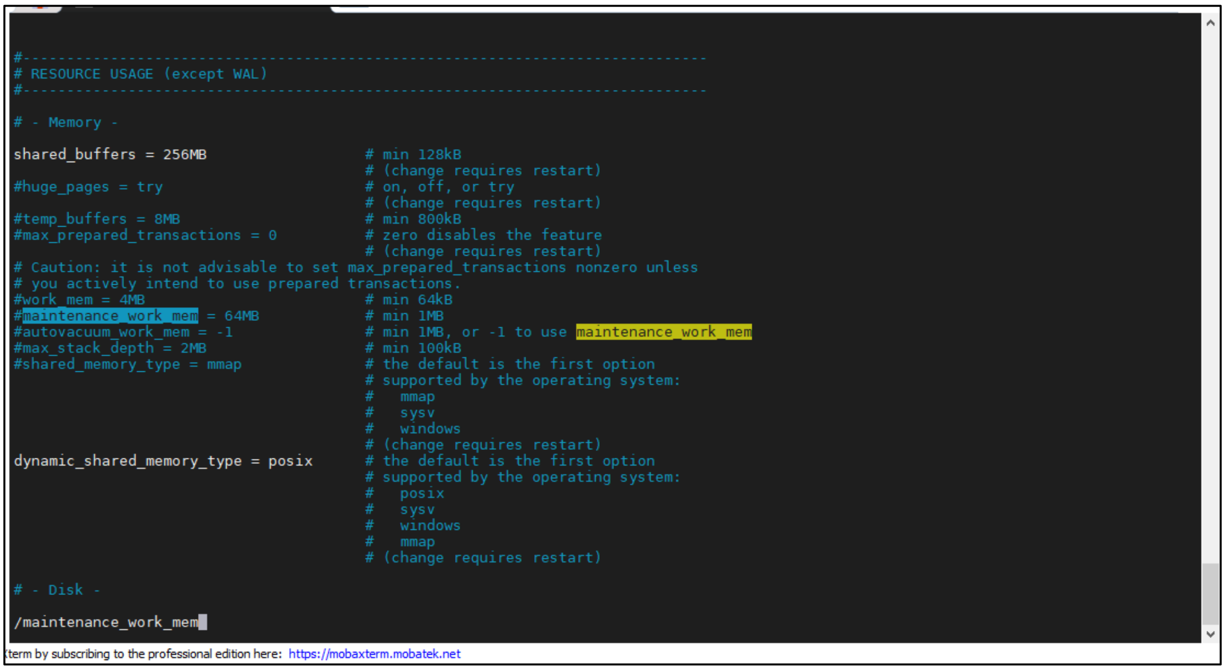
effective_cache_size = Define a suposição do planejador sobre o tamanho efetivo do cache do disco que é disponibilizado para uma única query. Isso é fatorado em estimativas do custo de usar um índice. Um valor mais alto faz com que seja mais provável que os scans de índices sejam utilizados, um valor mais baixo faz com que seja mais provável que scans sequenciais sejam utilizados.



```
#random_page_cost = 4.0                 # same scale as above
#cpu_tuple_cost = 0.01                  # same scale as above
#cpu_index_tuple_cost = 0.005           # same scale as above
#cpu_operator_cost = 0.0025             # same scale as above
#parallel_tuple_cost = 0.1              # same scale as above
#parallel_setup_cost = 1000.0   # same scale as above

#jit_above_cost = 100000                # perform JIT compilation if available
                                        # and query more expensive than this;
                                        # -1 disables
#jit_inline_above_cost = 500000         # inline small functions if query is
                                        # more expensive than this; -1 disables
#jit_optimize_above_cost = 500000       # use expensive JIT optimizations if
                                        # query is more expensive than this;
                                        # -1 disables

#min_parallel_table_scan_size = 8MB
#min_parallel_index_scan_size = 512kB
#effective_cache_size = 768MB

# - Genetic Query Optimizer -

#geqo = on
#geqo_threshold = 12
#geqo_effort = 5                        # range 1-10
#geqo_pool_size = 0                     # selects default based on effort
#geqo_generations = 0                   # selects default based on effort
#geqo_selection_bias = 2.0              # range 1.5-2.0
#geqo_seed = 0.0                        # range 0.0-1.0

# - Other Planner Options -

#default_statistics_target = 100        # range 1-10000
#constraint_exclusion = partition       # on, off, or partition
#cursor_tuple_fraction = 0.1            # range 0.0-1.0
#from_collapse_limit = 8
#join_collapse_limit = 8                # 1 disables collapsing of explicit
/
```

Xterm by subscribing to the professional edition here: https://mobaxterm.mobatek.net

maintenance_work_mem = Especifica a quantidade máxima de memória a ser utilizada por operações de manutenção, como vacuum, Create Index e ALTER TABLE ADD FOREIGN KEY.



```
#------------------------------------------------------------------------------
# RESOURCE USAGE (except WAL)
#------------------------------------------------------------------------------

# - Memory -

shared_buffers = 256MB                  # min 128kB
                                        # (change requires restart)
#huge_pages = try                       # on, off, or try
                                        # (change requires restart)
#temp_buffers = 8MB                     # min 800kB
#max_prepared_transactions = 0          # zero disables the feature
                                        # (change requires restart)
# Caution: it is not advisable to set max_prepared_transactions nonzero unless
# you actively intend to use prepared transactions.
#work_mem = 4MB                         # min 64kB
#maintenance_work_mem = 64MB            # min 1MB
#autovacuum_work_mem = -1               # min 1MB, or -1 to use maintenance_work_mem
#max_stack_depth = 2MB                  # min 100kB
#shared_memory_type = mmap              # the default is the first option
                                        # supported by the operating system:
                                        #   mmap
                                        #   sysv
                                        #   windows
                                        # (change requires restart)
dynamic_shared_memory_type = posix      # the default is the first option
                                        # supported by the operating system:
                                        #   posix
                                        #   sysv
                                        #   windows
                                        #   mmap
                                        # (change requires restart)

# - Disk -

/maintenance_work_mem
```

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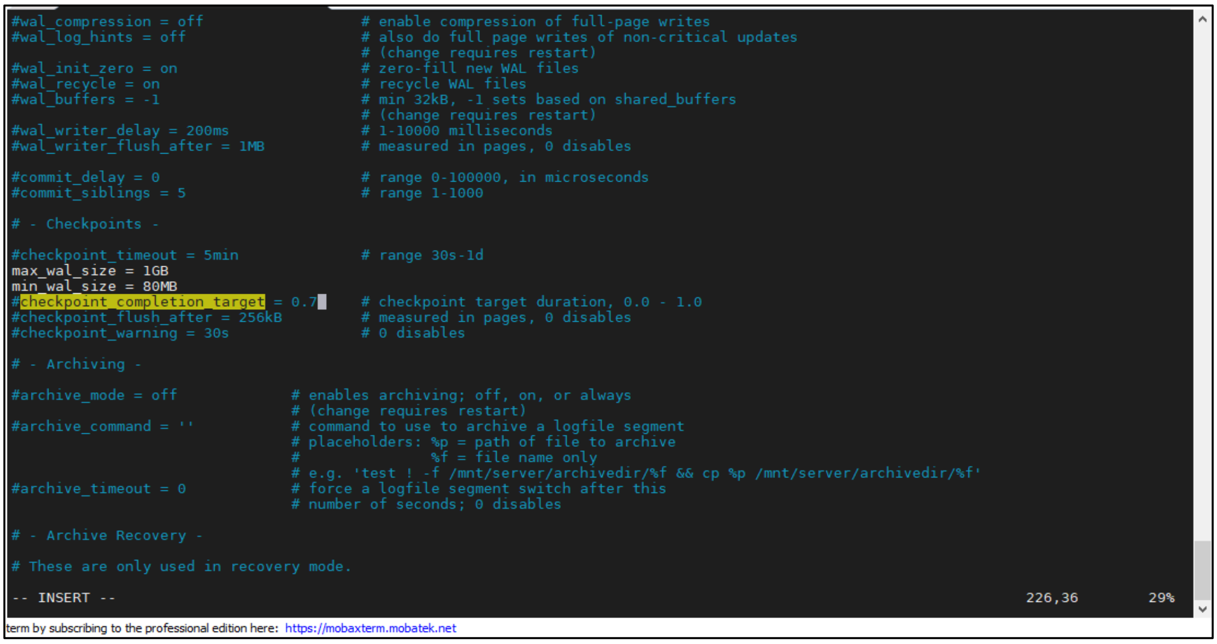
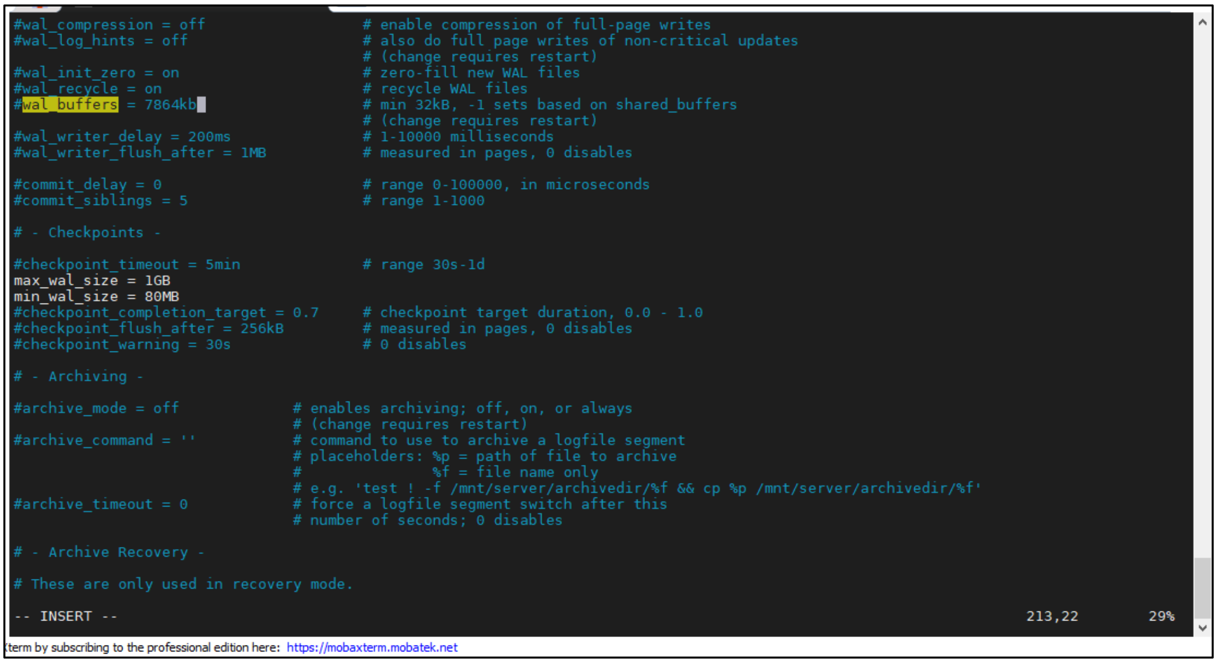
checkpoint_completion_target = Para evitar o flooding do sistema I/O com uma grande quantidade de escritas em páginas, a escrita de buffers sujos é espalhada durante um período de tempo específico. Esse período de tempo é controlado pelo parâmetro checkpoint_completion_target.



```
#wal_compression = off                  # enable compression of full-page writes
#wal_log_hints = off                    # also do full page writes of non-critical updates
                                        # (change requires restart)
#wal_init_zero = on                     # zero-fill new WAL files
#wal_recycle = on                       # recycle WAL files
#wal_buffers = -1                       # min 32kB, -1 sets based on shared_buffers
                                        # (change requires restart)
#wal_writer_delay = 200ms               # 1-10000 milliseconds
#wal_writer_flush_after = 1MB           # measured in pages, 0 disables

#commit_delay = 0                       # range 0-100000, in microseconds
#commit_siblings = 5                    # range 1-1000

# - Checkpoints -

#checkpoint_timeout = 5min              # range 30s-1d
max_wal_size = 1GB
min_wal_size = 80MB
#checkpoint_completion_target = 0.7     # checkpoint target duration, 0.0 - 1.0
#checkpoint_flush_after = 256kB         # measured in pages, 0 disables
#checkpoint_warning = 30s               # 0 disables

# - Archiving -

#archive_mode = off             # enables archiving; off, on, or always
                                # (change requires restart)
#archive_command = ''           # command to use to archive a logfile segment
                                # placeholders: %p = path of file to archive
                                #               %f = file name only
                                # e.g. 'test ! -f /mnt/server/archivedir/%f && cp %p /mnt/server/archivedir/%f'
#archive_timeout = 0            # force a logfile segment switch after this
                                # number of seconds; 0 disables

# - Archive Recovery -

# These are only used in recovery mode.

-- INSERT --                                                                                                         226,36        29%
```

term by subscribing to the professional edition here: https://mobaxterm.mobatek.net

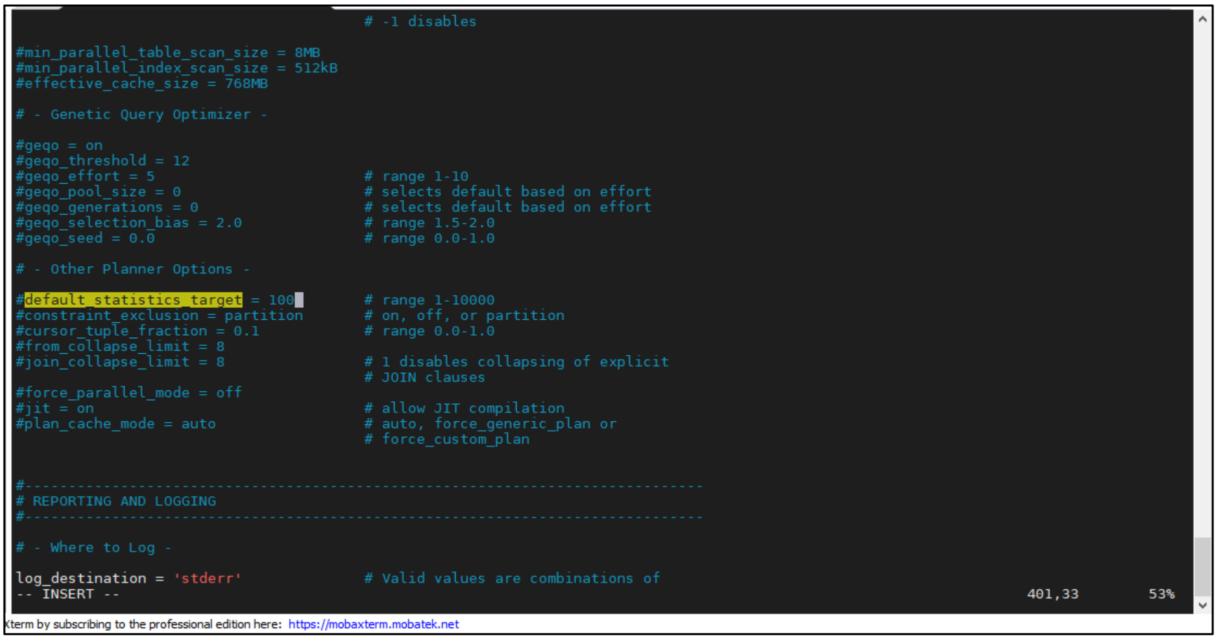
wal_buffers = WAL é a abreviação de Write Ahead Log. Wals são usados em quase todos os modernos sistemas de RDBMS para prover transações duráveis e atômicas. Simplificando, qualquer transação realizada no banco de dados é primeiro gravada como um arquivo WAL e, em seguida, aplicada aos arquivos de dados da tabela real no disco. Arquivos Wal são estritamente sequenciais. O parâmetro wal_buffers nada mais indica do que a quantidade de memória compartilhada usada para dados Wal que ainda não foi escrita no disco.



```
#wal_compression = off                  # enable compression of full-page writes
#wal_log_hints = off                    # also do full page writes of non-critical updates
                                        # (change requires restart)
#wal_init_zero = on                     # zero-fill new WAL files
#wal_recycle = on                       # recycle WAL files
#wal_buffers = 7864kb                   # min 32kB, -1 sets based on shared_buffers
                                        # (change requires restart)
#wal_writer_delay = 200ms               # 1-10000 milliseconds
#wal_writer_flush_after = 1MB           # measured in pages, 0 disables

#commit_delay = 0                       # range 0-100000, in microseconds
#commit_siblings = 5                    # range 1-1000

# - Checkpoints -

#checkpoint_timeout = 5min              # range 30s-1d
max_wal_size = 1GB
min_wal_size = 80MB
#checkpoint_completion_target = 0.7     # checkpoint target duration, 0.0 - 1.0
#checkpoint_flush_after = 256kB         # measured in pages, 0 disables
#checkpoint_warning = 30s               # 0 disables

# - Archiving -

#archive_mode = off             # enables archiving; off, on, or always
                                # (change requires restart)
#archive_command = ''           # command to use to archive a logfile segment
                                # placeholders: %p = path of file to archive
                                #               %f = file name only
                                # e.g. 'test ! -f /mnt/server/archivedir/%f && cp %p /mnt/server/archivedir/%f'
#archive_timeout = 0            # force a logfile segment switch after this
                                # number of seconds; 0 disables

# - Archive Recovery -

# These are only used in recovery mode.

-- INSERT --                                                                                                         213,22        29%
```

term by subscribing to the professional edition here: https://mobaxterm.mobatek.net

default_statistics_target = Define o alvo estatístico padrão para colunas de tabelas sem o alvo específico definido via ALTER TABLE SET STATISTICS.



```
                                        # -1 disables

#min_parallel_table_scan_size = 8MB
#min_parallel_index_scan_size = 512kB
#effective_cache_size = 768MB

# - Genetic Query Optimizer -

#geqo = on
#geqo_threshold = 12
#geqo_effort = 5                        # range 1-10
#geqo_pool_size = 0                     # selects default based on effort
#geqo_generations = 0                   # selects default based on effort
#geqo_selection_bias = 2.0              # range 1.5-2.0
#geqo_seed = 0.0                        # range 0.0-1.0

# - Other Planner Options -

#default_statistics_target = 100        # range 1-10000
#constraint_exclusion = partition       # on, off, or partition
#cursor_tuple_fraction = 0.1            # range 0.0-1.0
#from_collapse_limit = 8
#join_collapse_limit = 8                # 1 disables collapsing of explicit
                                        # JOIN clauses
#force_parallel_mode = off
#jit = on                               # allow JIT compilation
#plan_cache_mode = auto                 # auto, force_generic_plan or
                                        # force_custom_plan


#------------------------------------------------------------------------------
# REPORTING AND LOGGING
#------------------------------------------------------------------------------

# - Where to Log -

log_destination = 'stderr'              # Valid values are combinations of
-- INSERT --                                                                                                   401,33        53%
```

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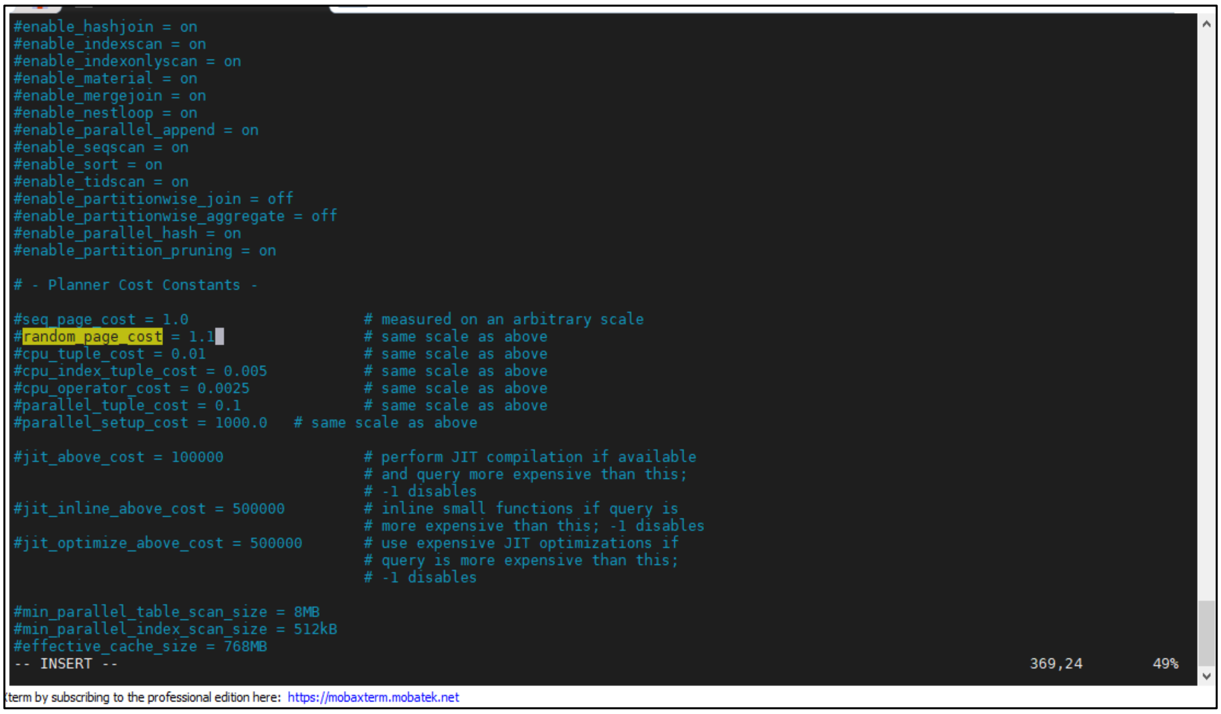
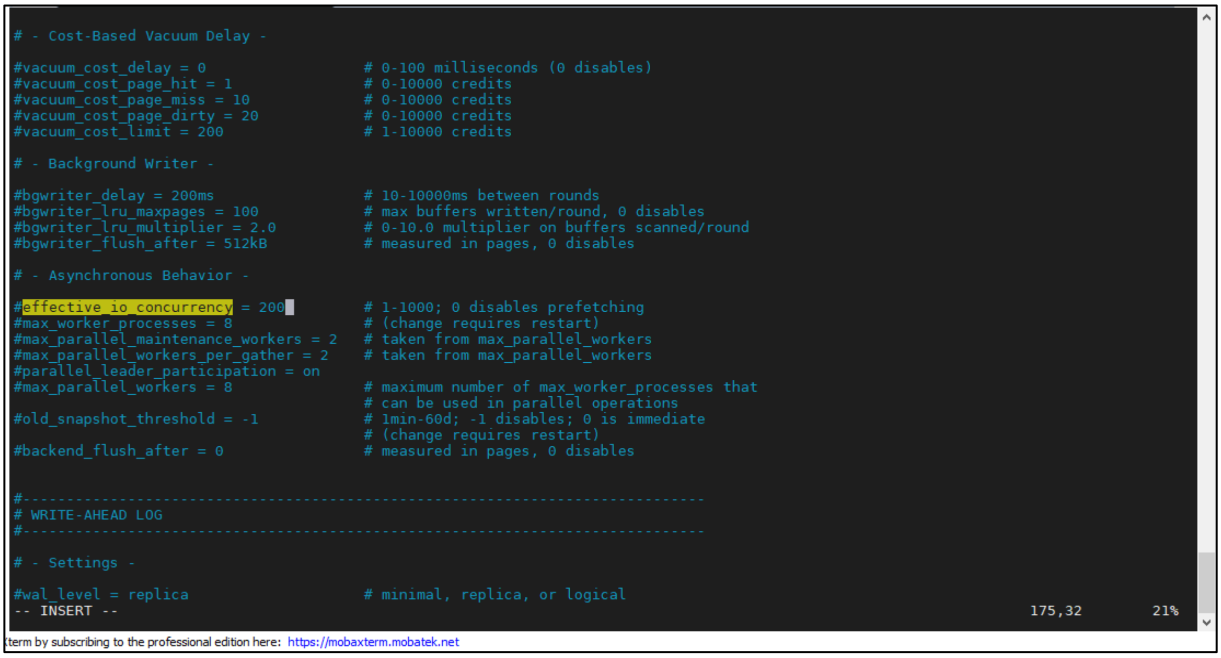
random_page_cost = Define a estimativa do custo de uma página de disco buscada não sequencialmente.



```
#enable_hashjoin = on
#enable_indexscan = on
#enable_indexonlyscan = on
#enable_material = on
#enable_mergejoin = on
#enable_nestloop = on
#enable_parallel_append = on
#enable_seqscan = on
#enable_sort = on
#enable_tidscan = on
#enable_partitionwise_join = off
#enable_partitionwise_aggregate = off
#enable_parallel_hash = on
#enable_partition_pruning = on

# - Planner Cost Constants -

#seq_page_cost = 1.0                    # measured on an arbitrary scale
#random_page_cost = 1.1                 # same scale as above
#cpu_tuple_cost = 0.01                  # same scale as above
#cpu_index_tuple_cost = 0.005           # same scale as above
#cpu_operator_cost = 0.0025             # same scale as above
#parallel_tuple_cost = 0.1              # same scale as above
#parallel_setup_cost = 1000.0   # same scale as above

#jit_above_cost = 100000                # perform JIT compilation if available
                                        # and query more expensive than this;
                                        # -1 disables
#jit_inline_above_cost = 500000         # inline small functions if query is
                                        # more expensive than this; -1 disables
#jit_optimize_above_cost = 500000       # use expensive JIT optimizations if
                                        # query is more expensive than this;
                                        # -1 disables

#min_parallel_table_scan_size = 8MB
#min_parallel_index_scan_size = 512kB
#effective_cache_size = 768MB
-- INSERT --                                                                                                   369,24        49%
```

term by subscribing to the professional edition here: https://mobaxterm.mobatek.net

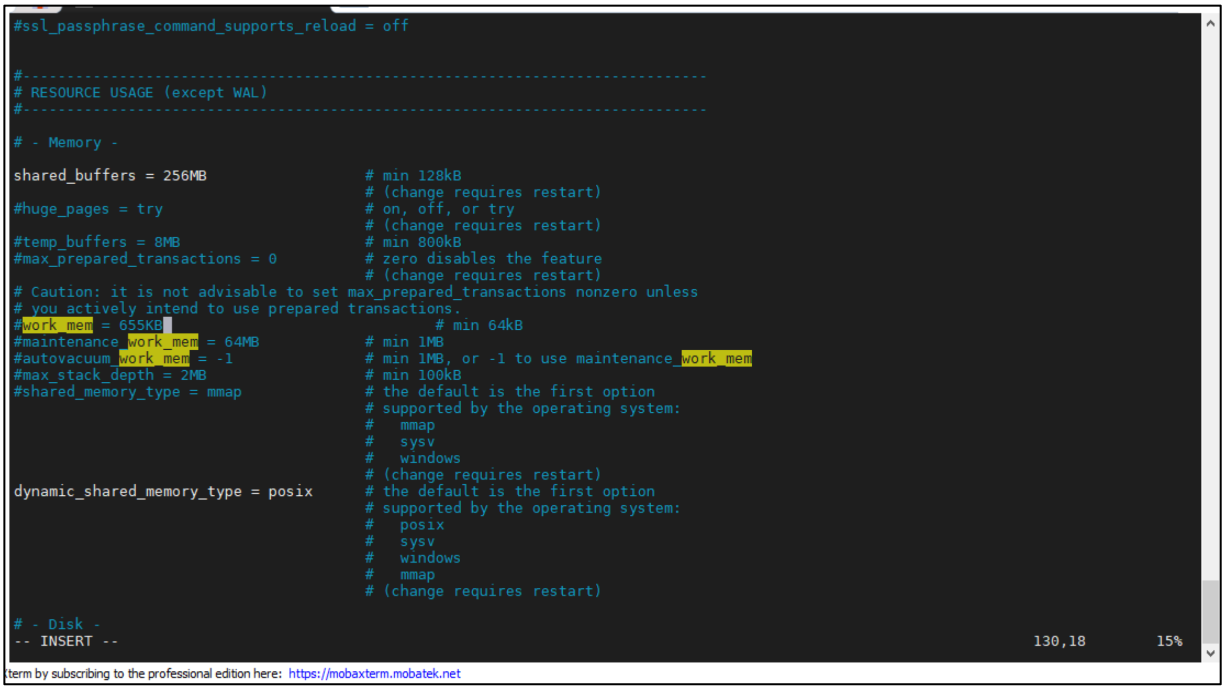
effective_io_concurrency = Define o número de operações simultâneas de E / S de disco que o PostgreSQL espera que possam ser executadas simultaneamente.



```
# - Cost-Based Vacuum Delay -

#vacuum_cost_delay = 0                  # 0-100 milliseconds (0 disables)
#vacuum_cost_page_hit = 1               # 0-10000 credits
#vacuum_cost_page_miss = 10             # 0-10000 credits
#vacuum_cost_page_dirty = 20            # 0-10000 credits
#vacuum_cost_limit = 200                # 1-10000 credits

# - Background Writer -

#bgwriter_delay = 200ms                 # 10-10000ms between rounds
#bgwriter_lru_maxpages = 100            # max buffers written/round, 0 disables
#bgwriter_lru_multiplier = 2.0          # 0-10.0 multiplier on buffers scanned/round
#bgwriter_flush_after = 512kB           # measured in pages, 0 disables

# - Asynchronous Behavior -

#effective_io_concurrency = 200         # 1-1000; 0 disables prefetching
#max_worker_processes = 8               # (change requires restart)
#max_parallel_maintenance_workers = 2   # taken from max_parallel_workers
#max_parallel_workers_per_gather = 2    # taken from max_parallel_workers
#parallel_leader_participation = on
#max_parallel_workers = 8               # maximum number of max_worker_processes that
                                        # can be used in parallel operations
#old_snapshot_threshold = -1            # 1min-60d; -1 disables; 0 is immediate
                                        # (change requires restart)
#backend_flush_after = 0                # measured in pages, 0 disables


#------------------------------------------------------------------------------
# WRITE-AHEAD LOG
#------------------------------------------------------------------------------

# - Settings -

#wal_level = replica                    # minimal, replica, or logical
-- INSERT --                                                                                                      175,32        21%
```

term by subscribing to the professional edition here: https://mobaxterm.mobatek.net

work_mem = Especifica a quantidade de memória a ser usada por operações internas de classificação e tabelas de hash antes de gravar em arquivos de disco temporários.



```
#ssl_passphrase_command_supports_reload = off


#------------------------------------------------------------------------------
# RESOURCE USAGE (except WAL)
#------------------------------------------------------------------------------

# - Memory -

shared_buffers = 256MB                  # min 128kB
                                        # (change requires restart)
#huge_pages = try                       # on, off, or try
                                        # (change requires restart)
#temp_buffers = 8MB                     # min 800kB
#max_prepared_transactions = 0          # zero disables the feature
                                        # (change requires restart)
# Caution: it is not advisable to set max_prepared_transactions nonzero unless
# you actively intend to use prepared transactions.
#work_mem = 655KB                               # min 64kB
#maintenance_work_mem = 64MB            # min 1MB
#autovacuum_work_mem = -1               # min 1MB, or -1 to use maintenance_work_mem
#max_stack_depth = 2MB                  # min 100kB
#shared_memory_type = mmap              # the default is the first option
                                        # supported by the operating system:
                                        #   mmap
                                        #   sysv
                                        #   windows
                                        # (change requires restart)
dynamic_shared_memory_type = posix      # the default is the first option
                                        # supported by the operating system:
                                        #   posix
                                        #   sysv
                                        #   windows
                                        #   mmap
                                        # (change requires restart)

# - Disk -
-- INSERT --                                                                                                      130,18        15%
```

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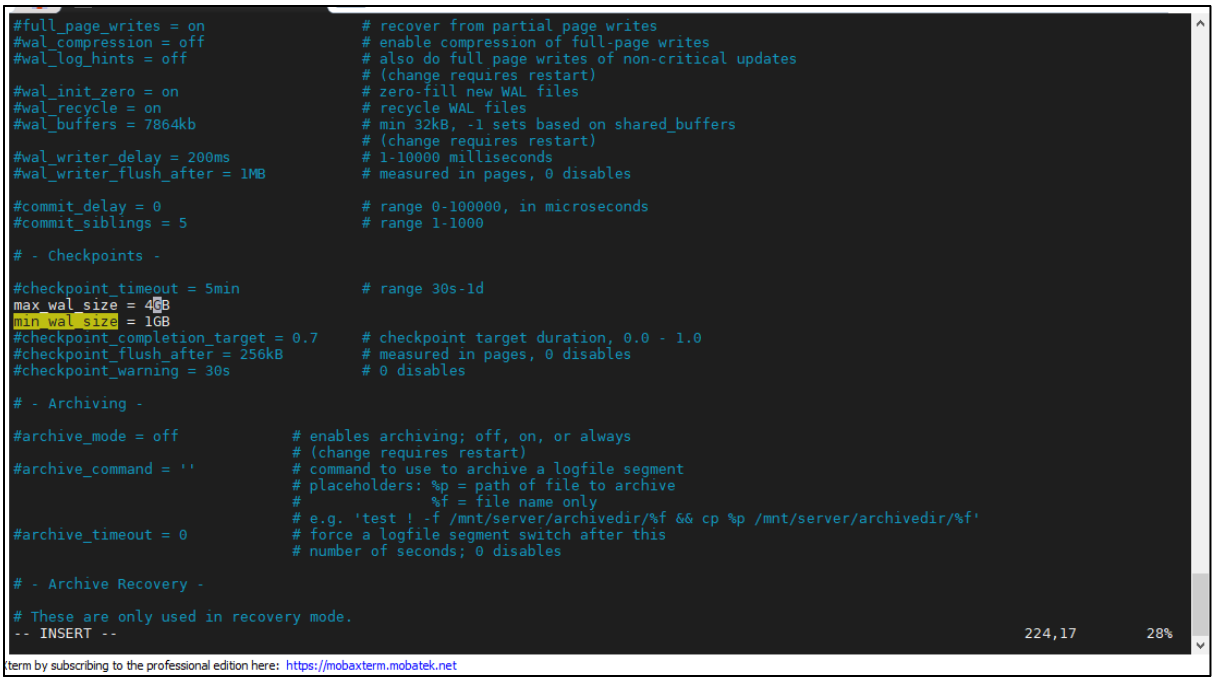
min_wal_size = Contanto que o uso do disco WAL permaneça abaixo dessa configuração, os arquivos WAL antigos são sempre reciclados para uso futuro em um ponto de verificação, em vez de removidos. Isso pode ser usado para garantir que espaço suficiente do WAL seja reservado para lidar com picos no uso do WAL, por exemplo, ao executar grandes trabalhos em lote.

max_wal_size = Tamanho máximo para permitir que o WAL cresça durante os checkpoints. Este é um limite flexível; O tamanho do WAL pode exceder max_wal_size em circunstâncias especiais, como carga pesada, um archive_command com falha ou uma configuração alta de wal_keep_size.



```
#full_page_writes = on                  # recover from partial page writes
#wal_compression = off                  # enable compression of full-page writes
#wal_log_hints = off                    # also do full page writes of non-critical updates
                                        # (change requires restart)
#wal_init_zero = on                     # zero-fill new WAL files
#wal_recycle = on                       # recycle WAL files
#wal_buffers = 7864kb                   # min 32kB, -1 sets based on shared_buffers
                                        # (change requires restart)
#wal_writer_delay = 200ms               # 1-10000 milliseconds
#wal_writer_flush_after = 1MB           # measured in pages, 0 disables

#commit_delay = 0                       # range 0-100000, in microseconds
#commit_siblings = 5                    # range 1-1000

# - Checkpoints -

#checkpoint_timeout = 5min              # range 30s-1d
max_wal_size = 4GB
min_wal_size = 1GB
#checkpoint_completion_target = 0.7     # checkpoint target duration, 0.0 - 1.0
#checkpoint_flush_after = 256kB         # measured in pages, 0 disables
#checkpoint_warning = 30s               # 0 disables

# - Archiving -

#archive_mode = off             # enables archiving; off, on, or always
                                # (change requires restart)
#archive_command = ''           # command to use to archive a logfile segment
                                # placeholders: %p = path of file to archive
                                #               %f = file name only
                                # e.g. 'test ! -f /mnt/server/archivedir/%f && cp %p /mnt/server/archivedir/%f'
#archive_timeout = 0            # force a logfile segment switch after this
                                # number of seconds; 0 disables

# - Archive Recovery -

# These are only used in recovery mode.
-- INSERT --                                                                                            224,17        28%
```

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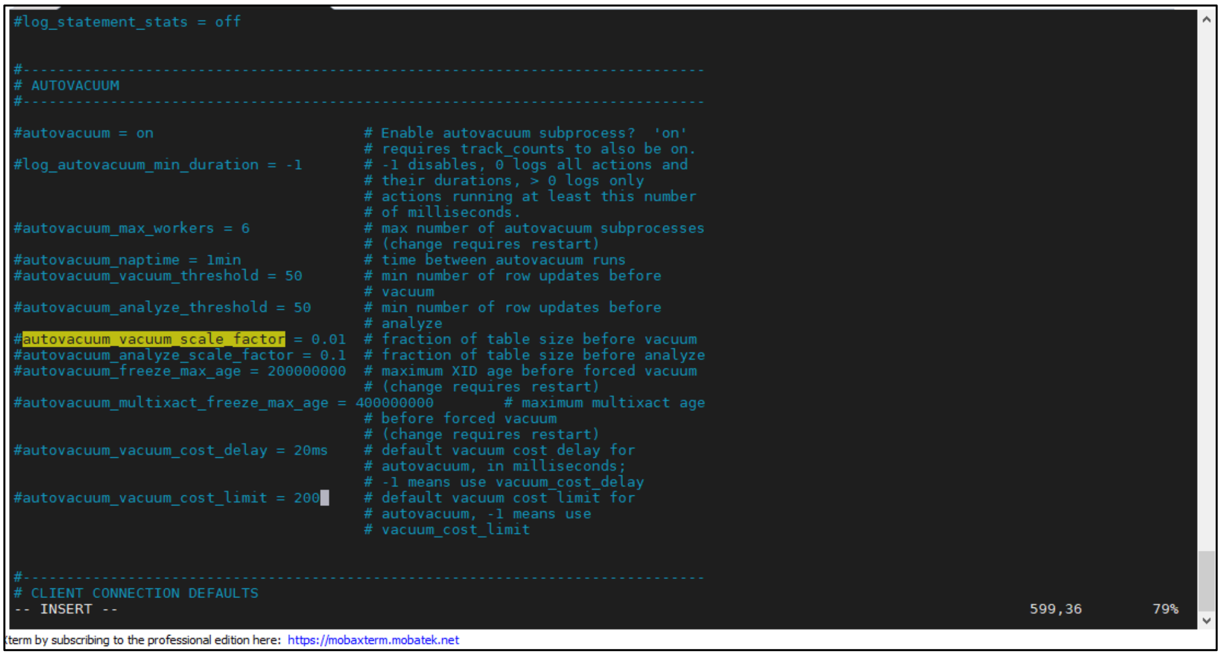
AUTOVACUUM:

Variável	PG Default	Melhores Práticas
autovacuum_max_workers	3	5 ou 6
maintenance_work_mem	64MB	system ram * 3/(8*autovacuum max workers)
autovacuum_vacuum_scale_factor	0.2	Para grandes tabelas, tente 0.01
autovacuum_vacuum_threshold	50	Manter Default
autovacuum_vacuum_cost_limit	200	Manter Default
autovacuum_vacuum_cost_delay	20ms	Manter Default



```
#log_statement_stats = off


#------------------------------------------------------------------------------
# AUTOVACUUM
#------------------------------------------------------------------------------

#autovacuum = on                        # Enable autovacuum subprocess?  'on'
                                        # requires track_counts to also be on.
#log_autovacuum_min_duration = -1       # -1 disables, 0 logs all actions and
                                        # their durations, > 0 logs only
                                        # actions running at least this number
                                        # of milliseconds.
#autovacuum_max_workers = 6             # max number of autovacuum subprocesses
                                        # (change requires restart)
#autovacuum_naptime = 1min              # time between autovacuum runs
#autovacuum_vacuum_threshold = 50       # min number of row updates before
                                        # vacuum
#autovacuum_analyze_threshold = 50      # min number of row updates before
                                        # analyze
#autovacuum_vacuum_scale_factor = 0.01  # fraction of table size before vacuum
#autovacuum_analyze_scale_factor = 0.1  # fraction of table size before analyze
#autovacuum_freeze_max_age = 200000000  # maximum XID age before forced vacuum
                                        # (change requires restart)
#autovacuum_multixact_freeze_max_age = 400000000        # maximum multixact age
                                        # before forced vacuum
                                        # (change requires restart)
#autovacuum_vacuum_cost_delay = 20ms    # default vacuum cost delay for
                                        # autovacuum, in milliseconds;
                                        # -1 means use vacuum_cost_delay
#autovacuum_vacuum_cost_limit = 200     # default vacuum cost limit for
                                        # autovacuum, -1 means use
                                        # vacuum_cost_limit


#------------------------------------------------------------------------------
# CLIENT CONNECTION DEFAULTS
-- INSERT --                                                                            599,36        79%
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```

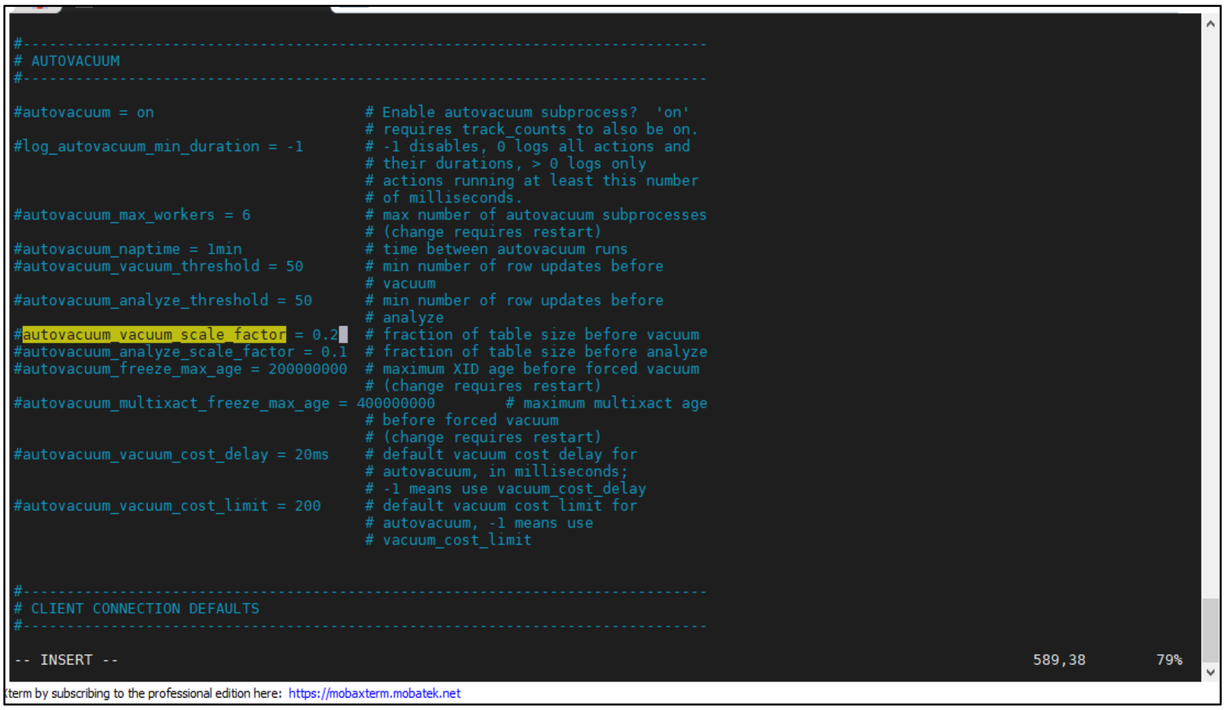

```
#------------------------------------------------------------------------------
# AUTOVACUUM
#------------------------------------------------------------------------------

#autovacuum = on                        # Enable autovacuum subprocess?  'on'
                                        # requires track_counts to also be on.
#log_autovacuum_min_duration = -1       # -1 disables, 0 logs all actions and
                                        # their durations, > 0 logs only
                                        # actions running at least this number
                                        # of milliseconds.
#autovacuum_max_workers = 6             # max number of autovacuum subprocesses
                                        # (change requires restart)
#autovacuum_naptime = 1min              # time between autovacuum runs
#autovacuum_vacuum_threshold = 50       # min number of row updates before
                                        # vacuum
#autovacuum_analyze_threshold = 50      # min number of row updates before
                                        # analyze
#autovacuum_vacuum_scale_factor = 0.2   # fraction of table size before vacuum
#autovacuum_analyze_scale_factor = 0.1  # fraction of table size before analyze
#autovacuum_freeze_max_age = 200000000  # maximum XID age before forced vacuum
                                        # (change requires restart)
#autovacuum_multixact_freeze_max_age = 400000000        # maximum multixact age
                                        # before forced vacuum
                                        # (change requires restart)
#autovacuum_vacuum_cost_delay = 20ms    # default vacuum cost delay for
                                        # autovacuum, in milliseconds;
                                        # -1 means use vacuum_cost_delay
#autovacuum_vacuum_cost_limit = 200     # default vacuum cost limit for
                                        # autovacuum, -1 means use
                                        # vacuum_cost_limit


#------------------------------------------------------------------------------
# CLIENT CONNECTION DEFAULTS
#------------------------------------------------------------------------------

-- INSERT --                                                                            589,38        79%
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```

Alterando para tabela específica:

ALTER TABLE pagamentos

SET (autovacuum_vacuum_scale_factor = 0.01);