

# PLATAFORMIZAÇÃO DA CLOUD FOUNDATION COM BACKSTAGE

Desvendando os Segredos da Eficiência na Nuvem  
com Developer Experience



Conecta  
Cloud



AZURE FLORIPA



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CLOUD NATIVE  
COMMUNITY GROUPS  
Santa Catarina





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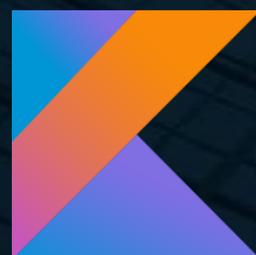
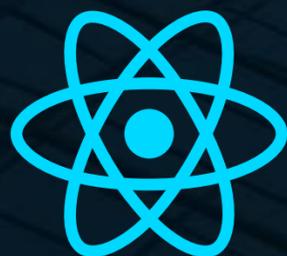


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# WHO AM I?

SOFTWARE ARCHITECT - CI&T

COORDENADOR DE PÓS GRADUAÇÃO- SSC



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Most Valuable  
Professional

Microsoft

MCT



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# WHO AM I?

DevOps Engineer & Cloud Solutions Architect  
Platform Engineer | Azure Floripa Organizer



# VISÃO E DESAFIOS



**VISÃO** Criar uma plataforma unificada para gerenciar infraestruturas de cloud.

**DESAFIOS** Complexidade crescente das arquiteturas de cloud.

Necessidade de consistência e eficiência entre múltiplas equipes.

Planejar de forma eficiente como se integrar a nuvem



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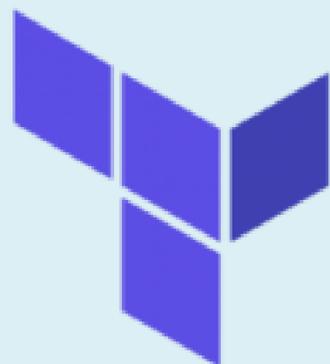


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# FERRAMENTAS MÁGICAS



**Tf**



**Azure**



**Backstage.io**



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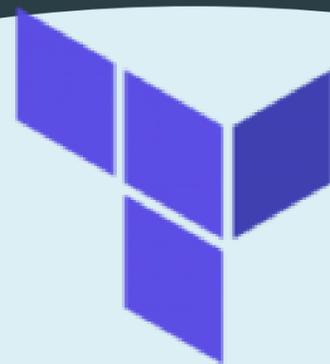


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# A ESCOLHA DO FERRAMENTAL



**Infraestrutura como Código (IaC)**

**Suporte Multi-Cloud**

**Automação e Eficiência**

**Integração com o Azure e Backstage**



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# A ESCOLHA DO FERRAMENTAL



**Híbrido e Multi-Cloud**

**Segurança e Conformidade**

**Inteligência Artificial e Machine  
Learning**

**Ferramentas de Desenvolvimento e  
DevOps**



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# A ESCOLHA DO FERRAMENTAL



**Plataforma Open-Source (React/Node)**

**Criação de templates dinâmicos para desenvolvimento de Infra/Code/Devops**

**Facilita a unificação e governança centralizada**





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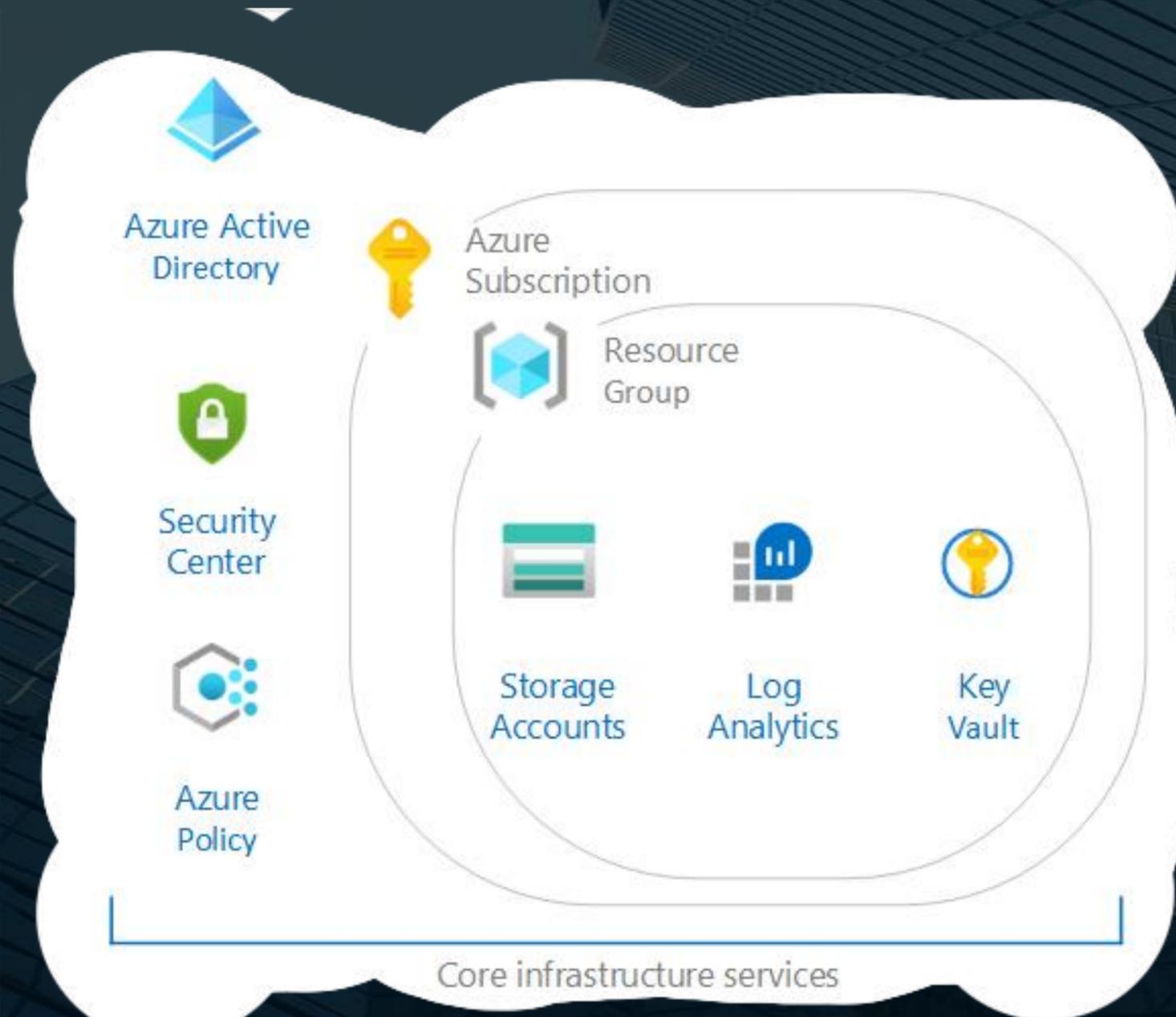


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# FUNDAÇÃO DO CAF





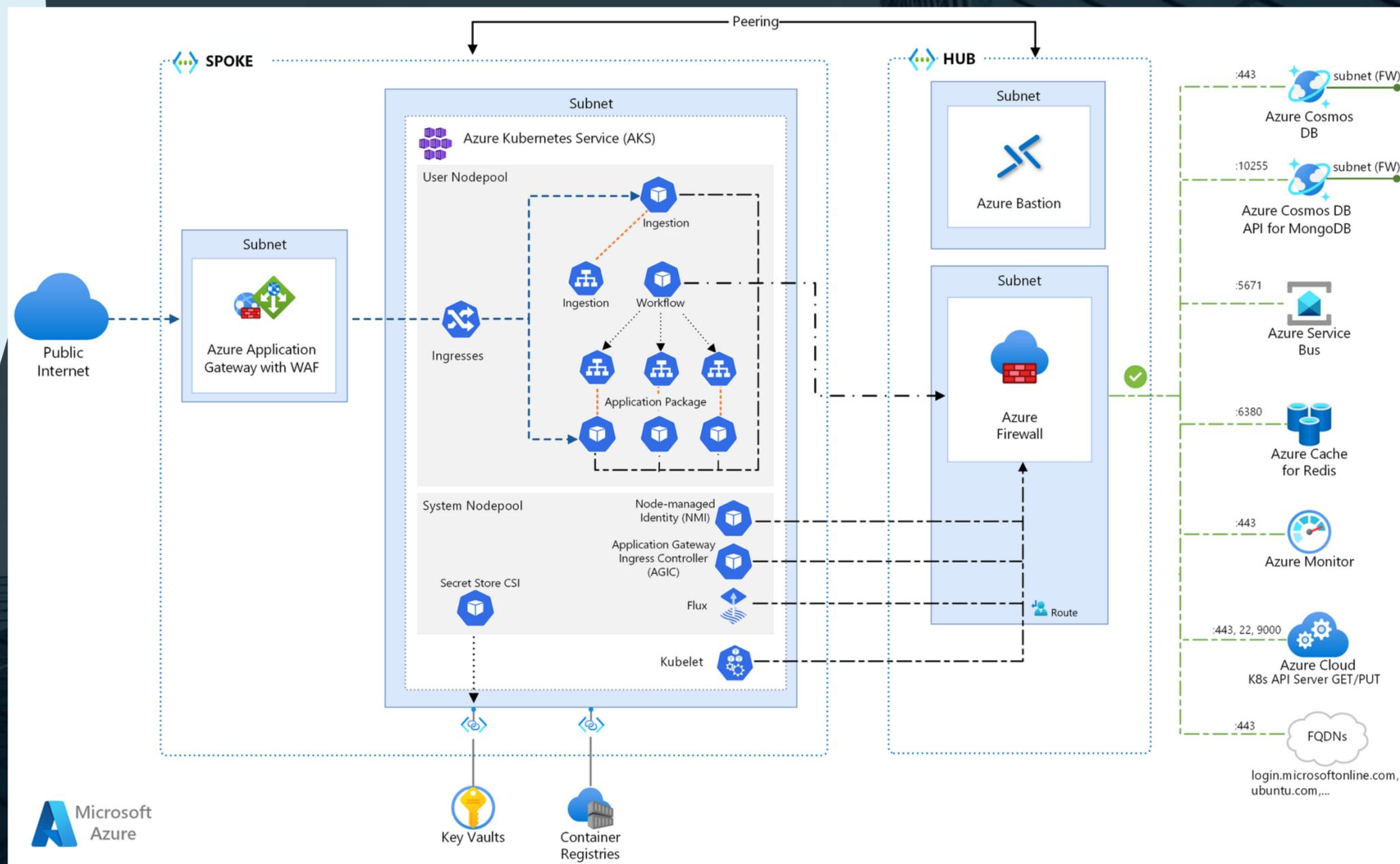
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# ARQUITETURA REFERENCIAL AKS



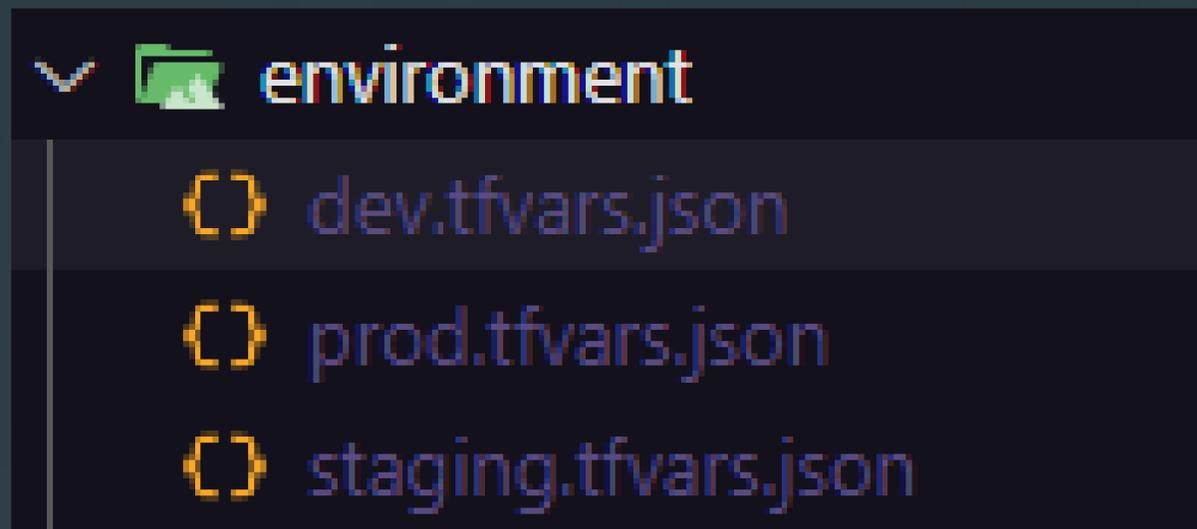
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# TFVARS

```
{
  "location": "East US",
  "tenantId": "7f6fda11-0fba-415f-a315-af2ce7e26a68",
  "spoke": {
    "name": "dev-spoke",
    "address_space": ["10.0.0.0/16"],
    "subnet_address_space": ["10.0.0.0/24"]
  },
  "hubs": [
    {
      "name": "dev-aks",
      "address_space": ["10.1.0.0/16"],
      "subnet_address_space": ["10.1.1.0/24"],
      "allow_ports": ["443", "8080", "22"]
    },
    {
      "name": "dev-db",
      "address_space": ["10.2.0.0/16"],
      "subnet_address_space": ["10.2.1.0/24"],
      "allow_ports": ["1433", "4022", "135", "1434"]
    },
    {
      "name": "dev-misc",
      "address_space": ["10.3.0.0/16"],
      "subnet_address_space": ["10.3.1.0/24"],
      "allow_ports": ["443", "8080", "22"]
    }
  ],
  "vpn_client_address_space": ["172.16.0.0/26"]
}
```



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```
# Resource Groups for Hubs
module "hubs_resource_group" {
  source = "./modules/resource_group"
  for_each = { for hub in local.hubs : hub.name => hub }
  name = "rg-${each.value.name}"
  location = local.env_vars.location
  tags = {
    environment = var.environment
  }
}

# Virtual Networks for Hubs
module "hubs_networks" {
  source = "./modules/virtual_network"
  for_each = { for hub in local.hubs : hub.name => hub }
  name = "${each.value.name}-vnet"
  address_space = each.value.address_space
  location = local.env_vars.location
  resource_group_name = module.hubs_resource_group[each.key].name
  action_group_id = module.hubs_resource_group[each.key].action_group_id
  tags = { environment = "hub" }
}

# Subnets for Hubs
module "hub_subnets" {
  source = "./modules/subnet"
  for_each = { for hub in local.hubs : hub.name => hub }
  name = "${each.value.name}-subnet"
  virtual_network_name = module.hubs[each.key].name
  address_prefixes = each.value.subnet_address_space
  resource_group_name = module.hubs_resource_group[each.key].name
}
```

```
# Resource Group for Spoke
module "spoke_resource_group" {
  source = "./modules/resource_group"
  name = "rg-${local.spoke.name}"
  location = local.env_vars.location
  tags = {
    environment = var.environment
  }
}

# Virtual Network for Spoke
module "spoke_network" {
  source = "./modules/virtual_network"
  name = "${local.spoke.name}-vnet"
  address_space = local.spoke.address_space
  location = local.env_vars.location
  resource_group_name = module.spoke_resource_group.name
  action_group_id = module.spoke_resource_group.action_group_id
  tags = { environment = "spoke" }
}

# Subnet for Spoke
module "spoke_subnet" {
  source = "./modules/subnet"
  name = "GatewaySubnet"
  virtual_network_name = module.spoke_network.name
  address_prefixes = local.spoke.subnet_address_space
  resource_group_name = module.spoke_resource_group.name
}
```

# RESOURCE GROUPS VNET E SUBNET



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# NSG

```
# Network Security Groups (NSG) Configuration
module "nsg" {
  source      = "./modules/nsg"
  location   = local.env_vars.location
  allow_ports = local.allow_ports
  vpn_client_address_space = local.vpn_client_address_space
  hubs = {
    for hub in local.hubs : hub.name => {
      name                = hub.name
      resource_group_name = module.hubs_resource_group[hub.name].name
      address_space       = hub.address_space
      subnet_address_space = hub.subnet_address_space
      allow_ports         = hub.allow_ports
    }
  }
  spoke = {
    name                = local.spoke.name
    resource_group_name = module.spoke_resource_group.name
    address_space       = local.spoke.address_space
    subnet_address_space = local.spoke.subnet_address_space
    allow_ports         = local.spoke.allow_ports
  }
}
```



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# NSG

```
resource "azurerm_network_security_group" "hub_nsg" {
  for_each = var.hubs

  name           = "${each.key}-${var.spoke.name}-nsg"
  location       = var.location
  resource_group_name = each.value.resource_group_name

  security_rule {
    name           = "Allow_Internal_Inbound"
    priority       = 2001
    direction      = "Inbound"
    access         = "Allow"
    protocol       = "*"
    source_port_ranges = each.value.allow_ports[0]
    destination_port_range = "*"
    source_address_prefix = var.spoke.address_space[0]
    destination_address_prefix = each.value.subnet_address_space[0]
  }

  # Add more rules as needed
}
```



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```
resource "azurerm_network_security_group" "spoke_nsg" {
  name           = "${var.spoke.name}-nsg"
  location       = var.location
  resource_group_name = var.spoke.resource_group_name

  security_rule {
    name           = "Allow_From_Hubs"
    priority       = 1001
    direction      = "Outbound"
    access         = "Allow"
    protocol       = "*"
    source_port_range = "*"
    destination_port_ranges = [for hub in var.hubs : hub.allow_ports[0]]
    source_address_prefixes = [for hub in var.hubs : hub.subnet_address_space[0]]
    destination_address_prefixes = var.spoke.address_space
  }

  security_rule {
    name           = "Allow_VPN_to_Spoke"
    priority       = 2002
    direction      = "Inbound"
    access         = "Allow"
    protocol       = "*"
    source_port_range = "*"
    destination_port_range = "*"
    source_address_prefixes = var.vpn_client_address_space
    destination_address_prefixes = var.spoke.address_space
  }

  security_rule {
    name           = "Deny_all_to_Spoke"
    priority       = 4096
    direction      = "Inbound"
    access         = "Deny"
    protocol       = "*"
    source_port_range = "*"
    destination_port_range = "*"
    source_address_prefix = "*"
    destination_address_prefix = var.spoke.address_space[0]
  }
}
```

**NSG**



```
# Role Assignments
module "role_assignment" {
  source = "./modules/role_assignment"
  role_assignment = local.role_assignment
  depends_on    = [module.spoke_subnet, module.hub_subnets, module.nsg]
}
```

```
resource "azuread_group" "this" {
  count          = length(var.role_assignment)
  display_name  = var.role_assignment[count.index].group
  owners        = [data.azurerm_client_config.this.object_id]
  security_enabled = true
}

resource "azurerm_role_assignment" "this" {
  count          = length(var.role_assignment)
  scope          = var.role_assignment[count.index].scope
  principal_id   = azuread_group.this[count.index].object_id
  role_definition_name = var.role_assignment[count.index].role_definition_name
  depends_on    = [azuread_group.this]
}
```

# ROLES ASSIGNMENTS



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# ROLES

# ASSIGNMENTS

```
locals {
  spoke_nsg_role_assignments = flatten([
    for group, group_name in var.groups : [
      {
        role_definition_name = var.role_names["reader"]
        group                = upper("SSC_${group_name}_${module.nsg.spoke_nsg_name}_${var
.role_names["reader"]}")
        scope                = module.nsg.spoke_nsg_id
      },
      {
        role_definition_name = var.role_names["backup_reader"]
        group                = upper("SSC_${group_name}_${module.nsg.spoke_nsg_name}_${var
.role_names["backup_reader"]}")
        scope                = module.nsg.spoke_nsg_id
      },
      {
        role_definition_name = var.role_names["contributor"]
        group                = upper("SSC_${group_name}_${module.nsg.spoke_nsg_name}_${var
.role_names["contributor"]}")
        scope                = module.nsg.spoke_nsg_id
      }
    ]
  ])

  role_assignment = concat(
    local.hub_nsg_role_assignments,
    local.hub_rg_role_assignments,
    local.hub_network_role_assignments,
    local.spoke_rg_role_assignments,
    local.spoke_network_role_assignments,
    local.spoke_nsg_role_assignments
  )
}
```



# PEERING E VPN

```
# VNet Peering from Hubs to Spoke
module "hub_to_spoke_peerings" {
  source = "./modules/vnet_peering"
  for_each = { for hub in local.hubs : hub.name => hub }
  name = "${each.value.name}-to-spoke"
  virtual_network_name = module.hubs[each.key].name
  remote_virtual_network_id = module.spoke_network.id
  resource_group_name = module.hubs_resource_group[each.key].name
}

# VNet Peering from Spoke to Hubs
module "spoke_to_hub_peerings" {
  source = "./modules/vnet_peering"
  for_each = { for hub in local.hubs : hub.name => hub }
  name = "spoke-to-${each.value.name}"
  virtual_network_name = module.spoke_network.name
  remote_virtual_network_id = module.hubs[each.key].id
  resource_group_name = module.spoke_resource_group.name
}
```

```
# Public IP for VPN Gateway
module "vpn_public_ip" {
  source = "./modules/public_ip"
  name = "vpn-public-ip"
  resource_group_name = module.spoke_resource_group.name
  location = local.env_vars.location
  action_group_id = module.spoke_resource_group.action_group_id
}

# Application Registration for VPN Gateway Authentication
module "application_registration" {
  source = "./modules/application_registration"
}

# VPN Gateway
module "vpn_gateway" {
  source = "./modules/vpn_gateway"
  name = "vpn-gateway"
  location = local.env_vars.location
  resource_group_name = module.spoke_resource_group.name
  subnet_id = module.spoke_subnet.id
  public_ip_id = module.vpn_public_ip.id
  vpn_client_protocols = ["OpenVPN"]
  vpn_client_address_space = local.vpn_client_address_space
  aad_tenant = local.tenantId
  aad_audience = module.application_registration.aad_audience

  depends_on = [module.role_assignment]
}
```



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APIs

Docs

Create...

Tech Radar

Settings

## Create a New Component β

Create new software components using standard templates

REGISTER EXISTING CO

### Available Templates

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PERSONAL

★ Starred 0

MY COMPANY

All 3

CATEGORIES

TAGS

### Templates

documentation  
Documentation Template

DESCRIPTION  
Create a new standalone documentation project

OWNER  
backstage/techdocs-core

TAGS  
recommended techdocs mkdocs



CHOOSE

website  
React SSR Template

DESCRIPTION  
Create a website powered with Next.js

OWNER  
web@example.com

TAGS  
recommended react



service  
Spring Boot gRPC Service

DESCRIPTION  
Create a simple microservice using gRPC and Spring Boot Java



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# BACKSTAGE TEMPLATES



```

apiVersion:
  scaffolder.backstage.io/v1beta3
kind: Template
metadata:
  name: pull-request
  title: Pull Request Action template
spec:
  owner: backstage/techdocs-core
  type: service

```



```

apiVersion:
  scaffolder.backstage.io/v1beta3
kind: Template
metadata:
  name: docs-template
  title: Documentation Template
tags:
  - recommended
  - techdocs
  - mkdocs
spec:
  owner: backstage/techdocs-core
  type: documentation

```

```

apiVersion:
  scaffolder.backstage.io/v1beta3
kind: Template
metadata:
  name: springboot-template
  title: Spring Boot gRPC Service
tags:
  - recommended
  - java
  - grpc
spec:
  owner: service@example.com
  type: service

parameters:
  ...
steps:
  ...
output:
  links:
    ...

```





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# BACKSTAGE TEMPLATES

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## Create a New Component

Create new software components using standard templates

### Documentation Template

1 Fill in some steps

Name\*  
my-new-service  
Unique name of the component

Description\*  
This service does amazing things  
A description for the component

Owner  
my-awesome-team  
Owner of the component

BACK NEXT STEP

2 Choose a location



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# BACKSTAGE TEMPLATES

## Task Activity $\alpha$

Activity for task: 93a3e961-d4ca-4162-a631-b8e2191e51a1

- Fetch Base
- Fetch Docs
- Publish
- Register
- Results

```
1 2021-07-22T18:20:05.000Z Beginning step Fetch Base
2 2021-07-22T18:20:05.000Z info: Fetching template content from r
3
```



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# TFVARS DINAMICOS

```
{
  "location": "${{ values.location }}",
  "tenantId": "${{ values.tenantId }}",
  "spoke": {
    "name": "dev-${{ values.project_name }}",
    "address_space": ["${{ values.spoke_address_space }}"],
    "subnet_address_space": ["${{ values.spoke_subnet_address_space }}"]
  },
  "hubs": [
    {% set comma = joiner() -%}
    {% for hub in toObject(values.hubs) -%}
    ${{ comma() }}{
      "name": "dev-${{ values.hub.name }}",
      "address_space": ["${{ values.hub.address_space }}"],
      "subnet_address_space": ["${{ values.hub.subnet_address_space }}"],
      "allow_ports": [
        {% set subcomma = joiner() -%}
        {% for port in toObject(values.allow_ports) -%}
        ${{ subcomma() }}
        ${port}
      ]
    }
  ],
  "vpn_client_address_space": ["172.16.0.0/26"]
}
```

```
{
  "location": "East US",
  "tenantId": "7f6fda11-0fba-415f-a315-af2ce7e26a68",
  "spoke": {
    "name": "dev-spoke",
    "address_space": ["10.0.0.0/16"],
    "subnet_address_space": ["10.0.0.0/24"]
  },
  "hubs": [
    {
      "name": "dev-aks",
      "address_space": ["10.1.0.0/16"],
      "subnet_address_space": ["10.1.1.0/24"],
      "allow_ports": ["443", "8080", "22"]
    },
    {
      "name": "dev-db",
      "address_space": ["10.2.0.0/16"],
      "subnet_address_space": ["10.2.1.0/24"],
      "allow_ports": ["1433", "4022", "135", "1434"]
    },
    {
      "name": "dev-misc",
      "address_space": ["10.3.0.0/16"],
      "subnet_address_space": ["10.3.1.0/24"],
      "allow_ports": ["443", "8080", "22"]
    }
  ],
  "vpn_client_address_space": ["172.16.0.0/26"]
}
```



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# RESULTADO

```
sh
```

 Copy code

```
terraform apply -var="environment=dev" -auto-approve
```

```
module.role_assignment.azuread_group.this[23]: Creation complete after 24s [id=b7b7a668-87eb-4afd-871e-cf827f94f982]
module.role_assignment.azuread_group.this[50]: Creating...
module.role_assignment.azuread_group.this[26]: Creation complete after 24s [id=9cb04bc7-215a-408e-b7d8-cfefaa1b83e8]
module.role_assignment.azuread_group.this[57]: Creating...
module.hub_to_spoke_peerings["dev-db"].azurerm_virtual_network_peering.this: Creation complete after 2m40s [id=/subscriptions/6e76e162-7650-4308-9000-000000000000/resourceGroups/dev-db-vnet/virtualNetworkPeerings/dev-db-to-spoke]
module.role_assignment.azuread_group.this[29]: Creating...
module.role_assignment.azuread_group.this[15]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[8]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[28]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[30]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[42]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[59]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[65]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[50]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[57]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[29]: Still creating... [10s elapsed]
module.role_assignment.azuread_group.this[15]: Still creating... [20s elapsed]
module.role_assignment.azuread_group.this[8]: Still creating... [20s elapsed]
module.role_assignment.azuread_group.this[28]: Still creating... [20s elapsed]
module.role_assignment.azuread_group.this[42]: Still creating... [20s elapsed]
module.role_assignment.azuread_group.this[30]: Still creating... [20s elapsed]
module.role_assignment.azuread_group.this[59]: Still creating... [20s elapsed]
module.role_assignment.azuread_group.this[15]: Creation complete after 24s [id=31088bc0-a83f-4e30-ba3a-62b97adf1b9a]
module.role_assignment.azuread_group.this[61]: Creating...
module.role_assignment.azuread_group.this[65]: Still creating... [20s elapsed]
```





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# RESULTADO

```
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [12m10s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [12m20s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [12m30s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [12m40s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [12m50s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [13m0s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [13m10s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [13m20s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [13m30s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [13m40s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [13m50s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [14m0s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [14m10s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [14m20s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [14m30s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [14m40s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Still creating... [14m50s elapsed]
module.vpn_gateway.azure_rm_virtual_network_gateway.this: Creation complete after 14m55s [id=/subscriptions/6e76e
gateway]
```

**Apply complete! Resources: 182 added, 0 changed, 0 destroyed.**



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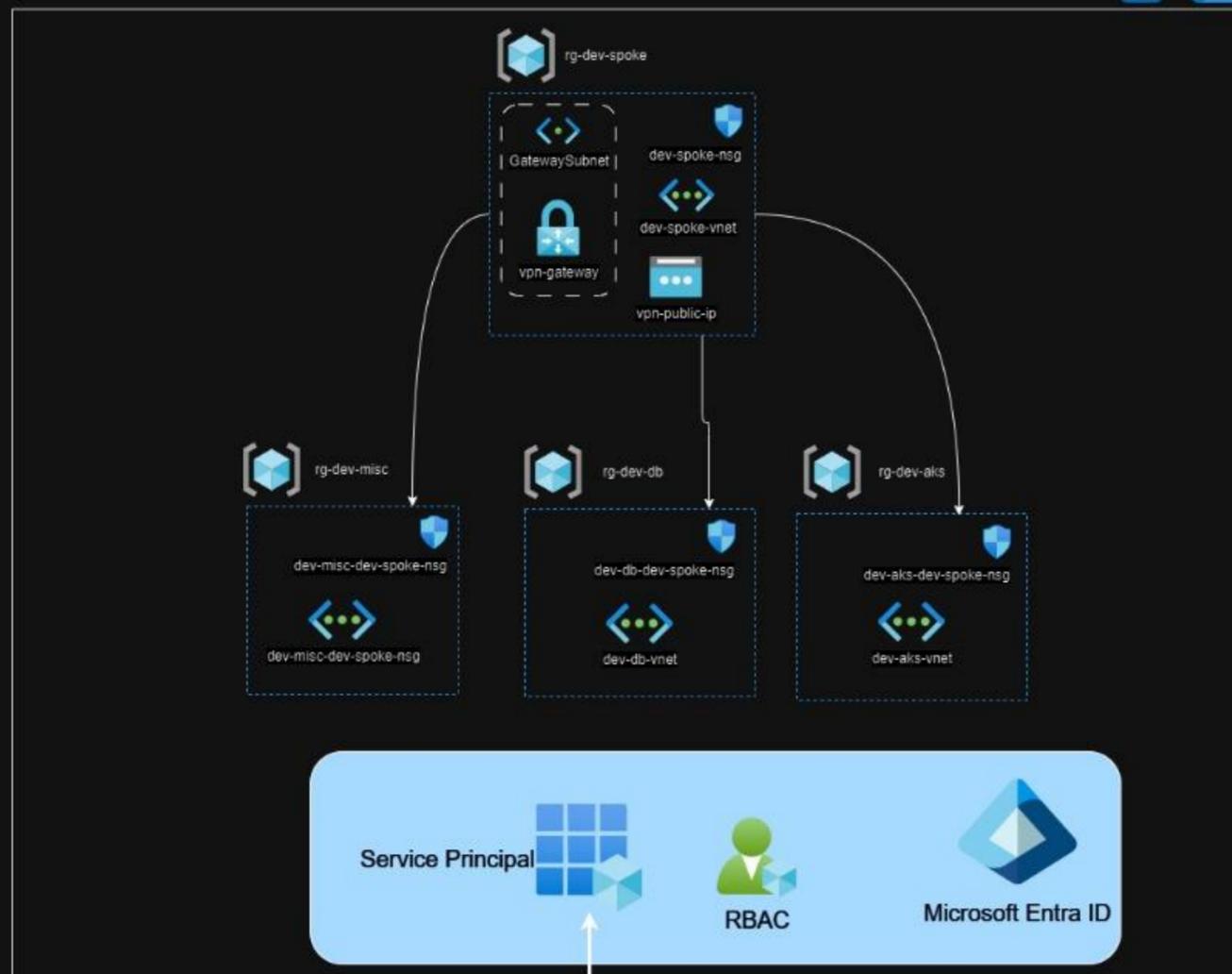
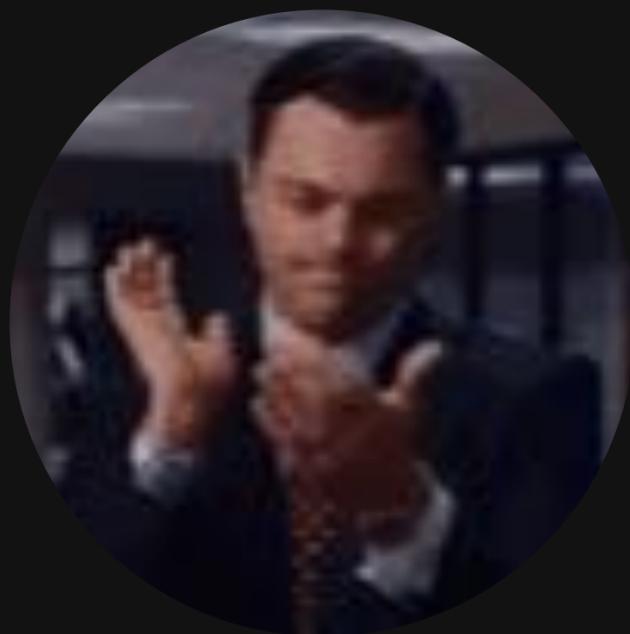


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## Ambiente: DEV



Usuário

Backstage

GitHub Actions

Terraform



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# RESULTADO

Tempo médio de criação de recursos individuais:

- 3 hubs x (criação de grupo de recursos + criação de rede virtual + criação de sub-rede + criação de NSG + criação de peering) =  $3 \times (5 + 5 + 5 + 5 + 5 + 6 \text{ horas}) = 3 \times (25 + 360) = 3 \times 385 = 1155$  minutos
- Criação de sub-rede para o spoke =  $5 + 6 \text{ horas} = 365$  minutos
- Criação de NSG para o spoke =  $5 + 6 \text{ horas} = 365$  minutos
- Criação de peering para cada hub =  $3 \times (5 + 5 + 6 \text{ horas}) = 3 \times (15 + 360) = 3 \times 375 = 1125$  minutos
- Criação de IP público =  $5 + 6 \text{ horas} = 365$  minutos
- Criação de registro de aplicativo =  $5 + 6 \text{ horas} = 365$  minutos
- Criação de gateway VPN =  $5 + 6 \text{ horas} = 365$  minutos

Tempo de processamento de atribuições de função:

- 3 hubs x (atribuição de função) + 1 atribuição de função para o spoke =  $(3 + 1) \times 1 + 6 \text{ horas} = (4 + 360) = 364$  minutos

Tempo total estimado =  $1155 + 365 + 365 + 1125 + 365 + 365 + 365 + 364 = 4519$  minutos

Estimativa do Custo de Oportunidade em Reais (BRL)

Cálculo do Valor do Tempo Economizado

1. Diferença no Tempo de Provisionamento:

$$\Delta t = 4519 \text{ minutos} - 25 \text{ minutos} = 4494 \text{ minutos}$$

2. Conversão da Diferença para Horas:

$$\Delta t_{\text{horas}} = \frac{4494 \text{ minutos}}{60} \approx 74,9 \text{ horas}$$

3. Taxa Horária de um Engenheiro DevOps:

- Com um salário mensal de R\$12.000,00 e assumindo 160 horas de trabalho por mês:

$$\text{Taxa Horária} = \frac{R\$12.000,00}{160 \text{ horas}} = R\$75,00/\text{hora}$$

4. Cálculo do Valor do Tempo Economizado:

$$\text{Custo de Oportunidade} = \Delta t_{\text{horas}} \times \text{Taxa Horária}$$

$$\text{Custo de Oportunidade} = 74,9 \text{ horas} \times R\$75,00/\text{hora}$$

$$\text{Custo de Oportunidade} = R\$5.617,50$$





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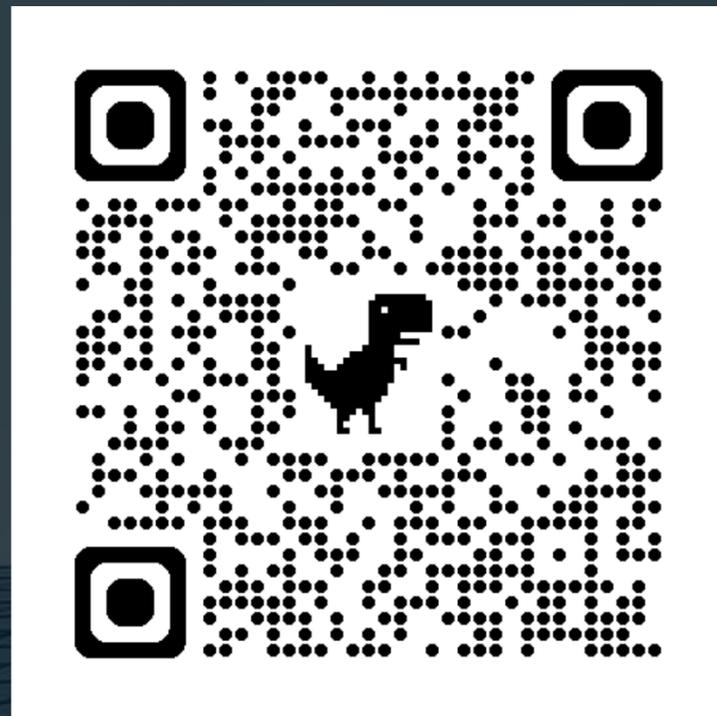
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# RESULTADOS

**Aumento na Produtividade**  
**Redução de Erros Humanos**  
**Aceleração no Time-to-Market**  
**Satisfação do Cliente**



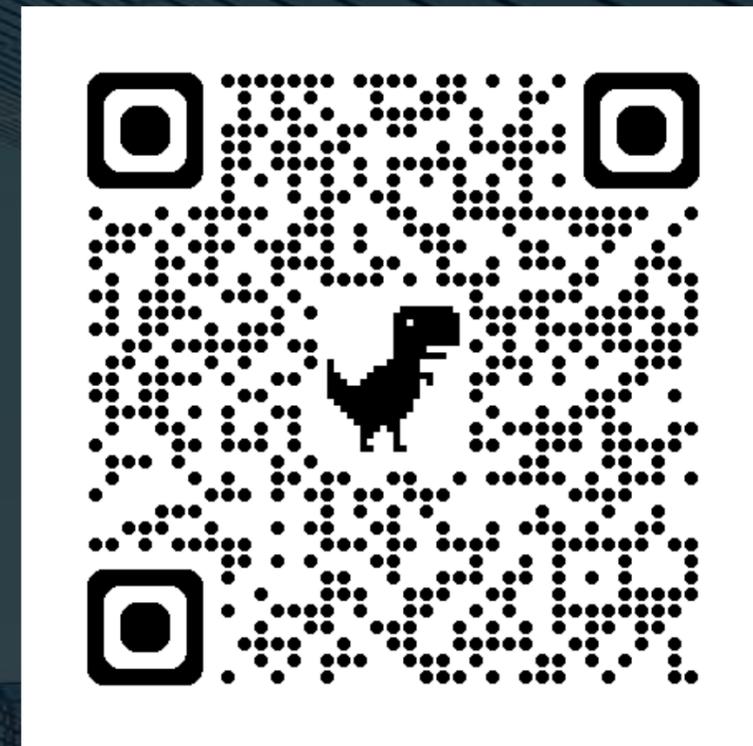
**OBRIGADO!**



**Repositório**



**Rafael**



**Claudio**