

# CLOUD HOSTED ROUTER

EXPANDINDO O USO DO  
ROUTEROS COM  
GNS3 E AWS.

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MUM Brazil 2017 - Maceió, AL.

# PIETRO SCHERER

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Atualmente é Administrador de Redes na  
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# BELLUNO TECNOLOGIA

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Há mais de 7 anos no mercado;  
Especialista em Provedores de Internet;  
Call Center e Gestão de Redes;  
Presente em mais de 20 estados do Brasil;  
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# AGENDA

- Porque falar de CHR?
- O que é CHR?
- Licenciamento;
- Exemplos:
  - GNS3;
  - Amazon Web Services.

# Porque falar sobre CHR?

- Apesar de não ser uma novidade da MikroTik, nem todos conhecem;
- Tem como principal característica a virtualização;
- Multiplataforma;
- Facilita o deploy do RouterOS;
- Facilmente utilizável em ambientes de testes;
- Possibilita levar o RouterOS para a nuvem.

# O QUE É CHR?

De acordo com a Wiki, o Cloud Hosted Router é uma versão do RouterOS, destinada para máquinas virtuais. Tem suporte a x86 e x64, roda na maioria dos Hypervisors atuais (VirtualBox, VMware, Hyper-V, etc), e possui um método de licenciamento um pouco diferente das outras versões. Ainda assim, o CHR não deixa de possuir quase todas as funções do RouterOS.

# LICENCIAMENTO

The image shows a screenshot of a software interface for license management. It consists of two overlapping windows:

- License Window:** This window is titled "License" and contains the following fields and buttons:
  - System ID:
  - Level:
  - Next Renewal At:
  - Deadline At:
  - Limited Upgrades
  - Buttons: OK, Generate New ID, Renew License
- Renew License Window:** This window is titled "Renew License" and contains the following fields and buttons:
  - Account:
  - Password:
  - Level:  (with a dropdown arrow)
  - Buttons: Start, Stop, Close

# LICENCIAMENTO

The image shows two overlapping windows from a Mikrotik management interface. The top window, titled 'License', contains the following fields and buttons:

- System ID:
- Level:
- Next Renewal At:
- Deadline At:
- Limited Upgrades
- Buttons: OK, Generate New ID, Renew License

The bottom window, titled 'Renew License', contains the following fields and buttons:

- Account:
- Password:
- Level:  (with a dropdown arrow)
- Buttons: Start, Stop, Close

At the bottom of the 'Renew License' window, there is a status bar with the text 'done'.

```
[admin@MikroTik] > /system license renew account=mum_brazil password=***** level=p1
```



# Exemplos de uso

- The Dude;
- VPN Server;
- CAPsMAN;
- User Manager;
- Hotspot Server;
- Ambiente de testes (GNS3, eve, etc);
- Cloud (AWS, Azure, etc).

{ MUM Brazil 2016 - Anderson Matozinhos e Guilherme Ramires  
[http://mum.mikrotik.com/presentations/BR16/presentation\\_3687\\_1482132273.pdf](http://mum.mikrotik.com/presentations/BR16/presentation_3687_1482132273.pdf) }

# GNS3

- GNS3 ou Graphical Network Simulator é um software capaz de simular ambientes de rede, com suporte a multi plataforma (MS-Windows, GNU/Linux e MacOS).
- Além de possuir muitas funções, é possível utilizar uma grande variedade de fabricantes, tal como Cisco, Juniper, Brocade. E claro, MikroTik :)

# GNS3

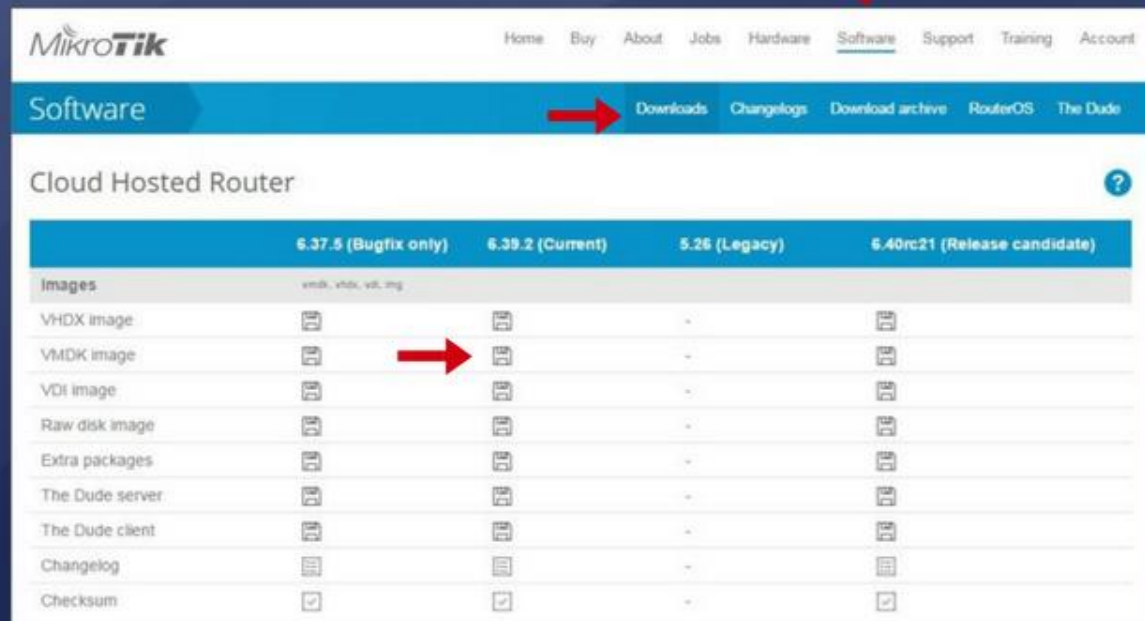
- Instalação fácil para qualquer SO;

<https://docs.gns3.com/>

- Utilização do CHR com Virtualbox e/ou Qemu;

- Facilidade para construção de ambientes virtuais.

# GNS3 - CHR com Qemu



MikroTik

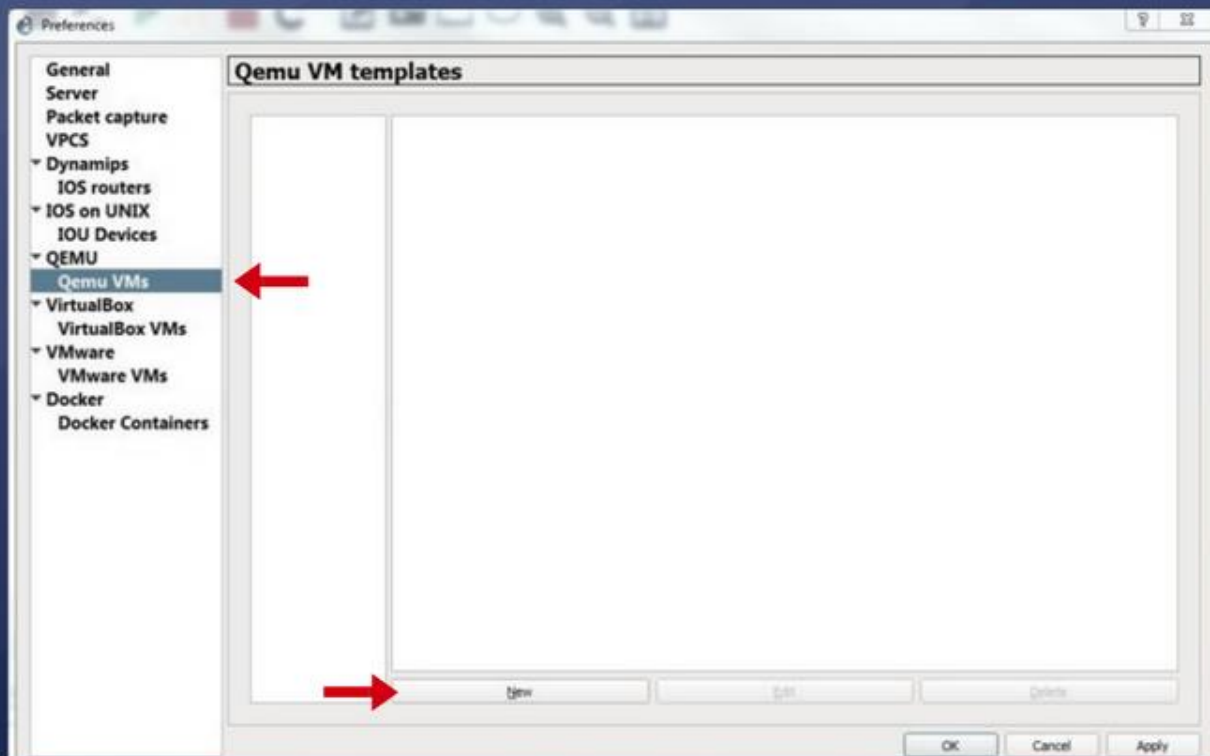
Home Buy About Jobs Hardware Software Support Training Account

Software Downloads Changelogs Download archive RouterOS The Dude

## Cloud Hosted Router

	6.37.5 (Bugfix only)	6.39.2 (Current)	5.26 (Legacy)	6.40rc21 (Release candidate)
<b>Images</b>	vmdk, vhdx, vdi, img			
VHDX image			-	
VMDK image			-	
VDI image			-	
Raw disk image			-	
Extra packages			-	
The Dude server			-	
The Dude client			-	
Changelog			-	
Checksum	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-	<input checked="" type="checkbox"/>

# GNS3 - CHR com Qemu



# GNS3 - CHR com Qemu

New QEMU VM template

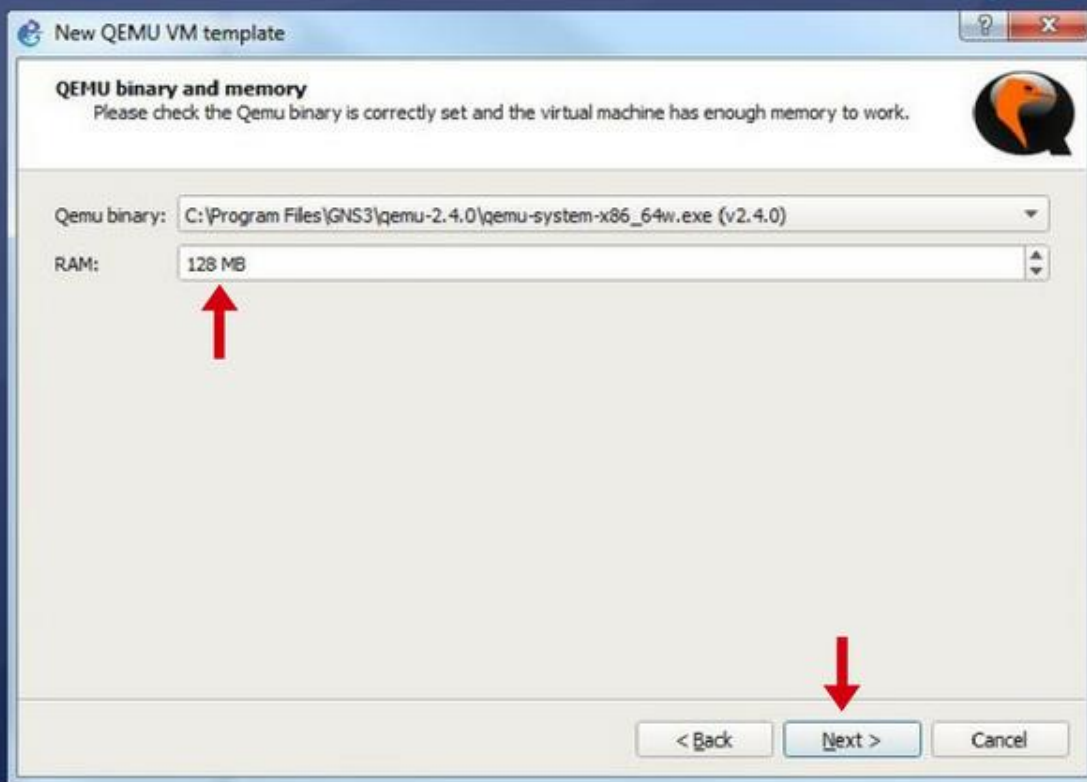
**QEMU VM name**  
Please choose a descriptive name for your new QEMU virtual machine.

Name: MikroTik

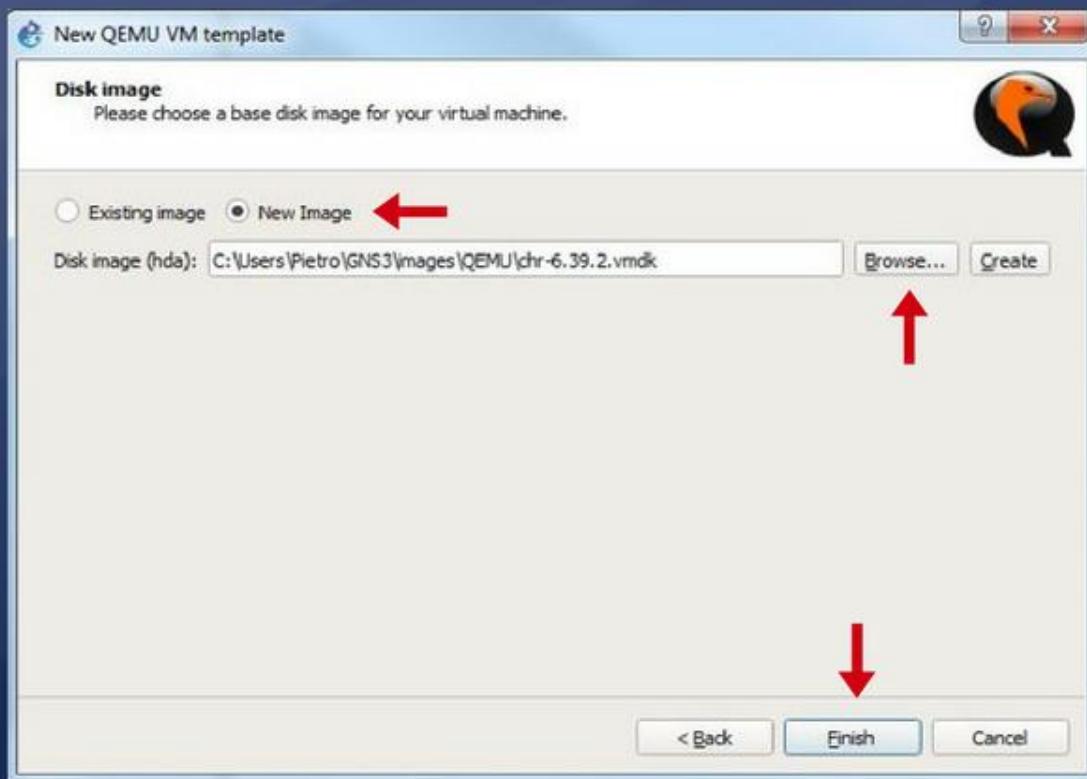
This is a legacy ASA VM

< Back Next > Cancel

# GNS3 - CHR com Qemu

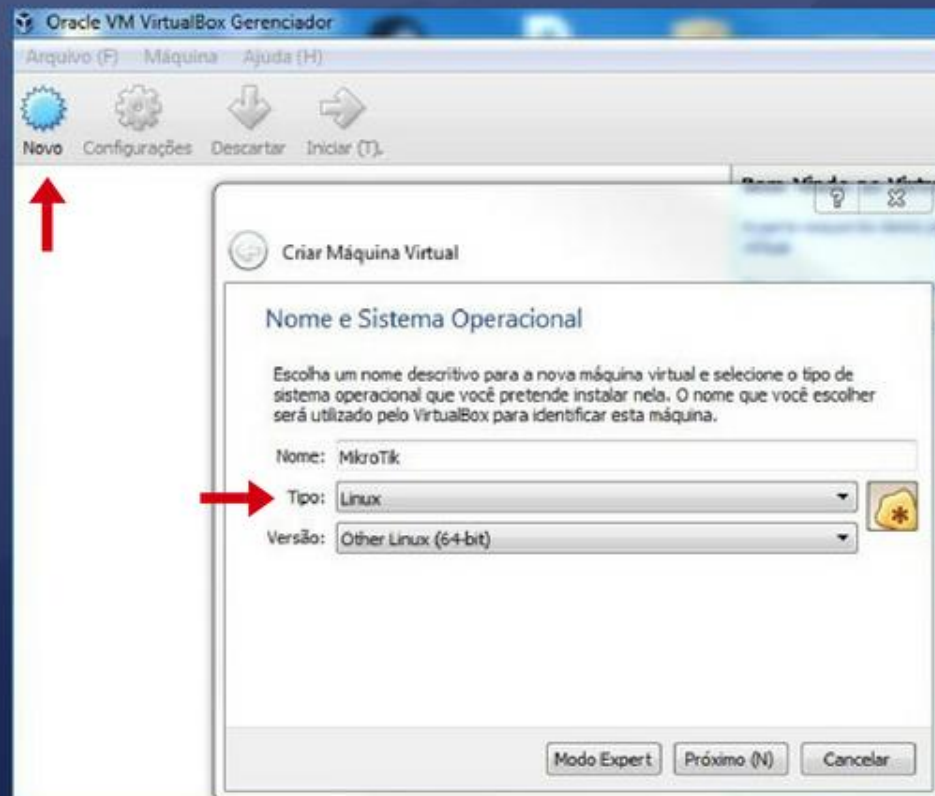


# GNS3 - CHR com Qemu

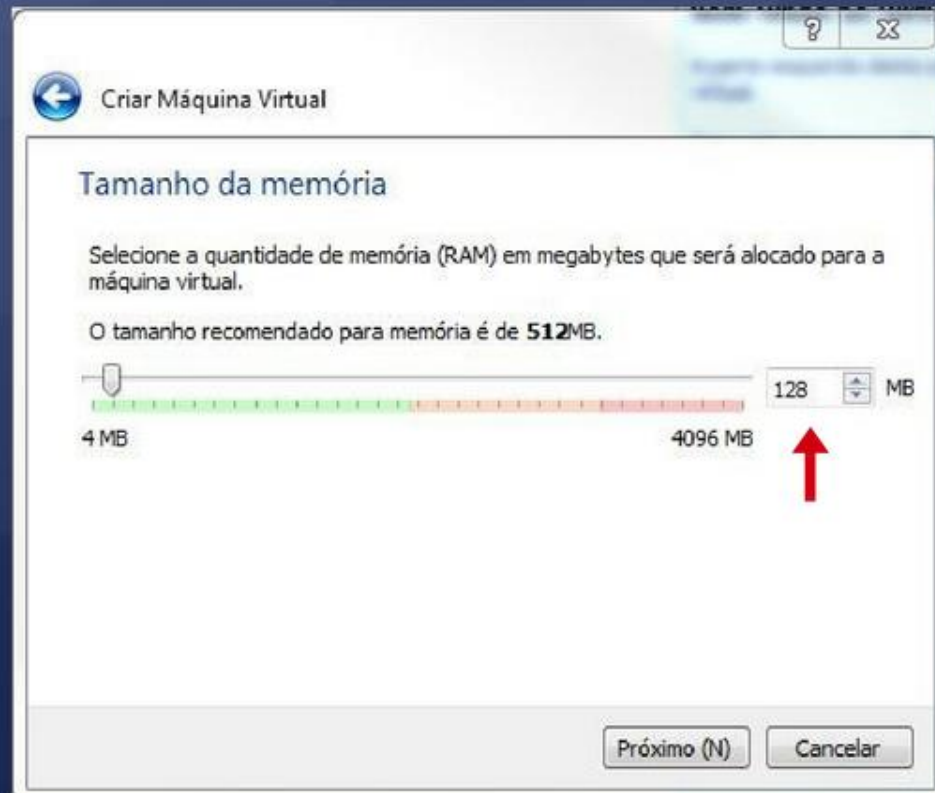




# GNS3 - CHR com Virtualbox



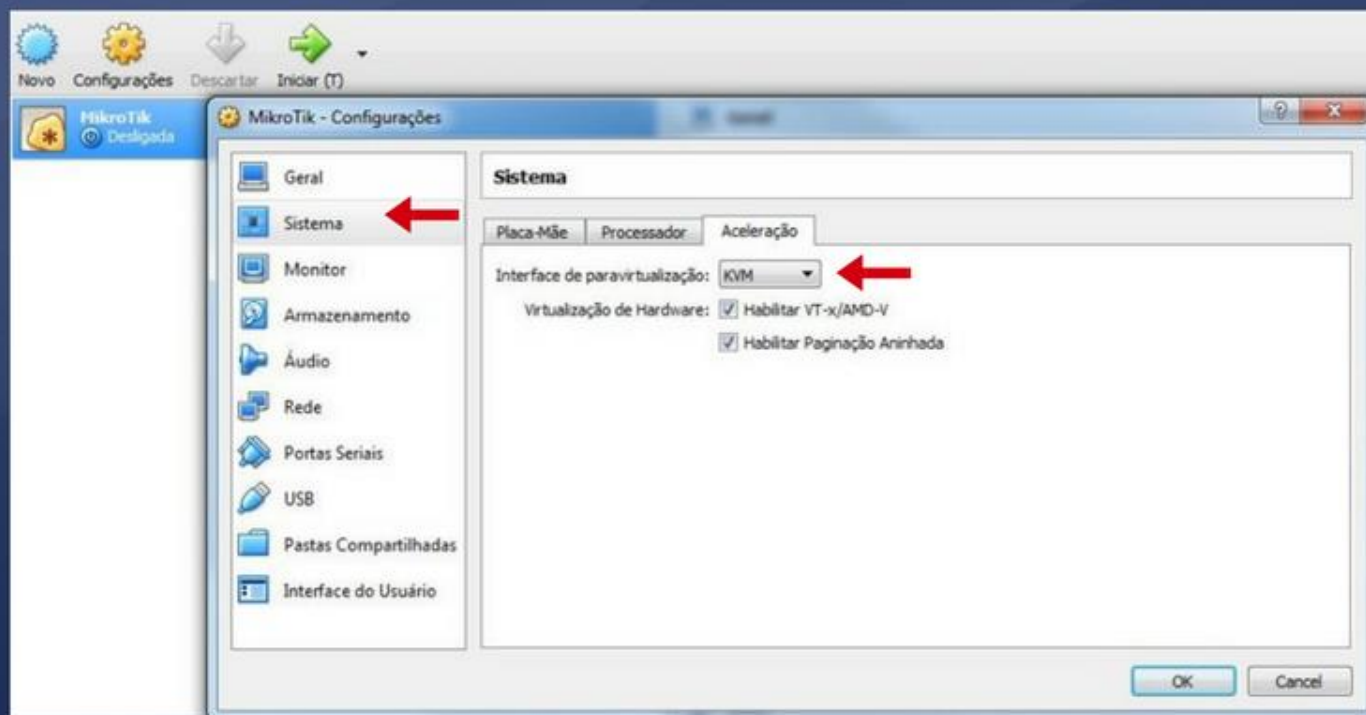
# GNS3 - CHR com Virtualbox



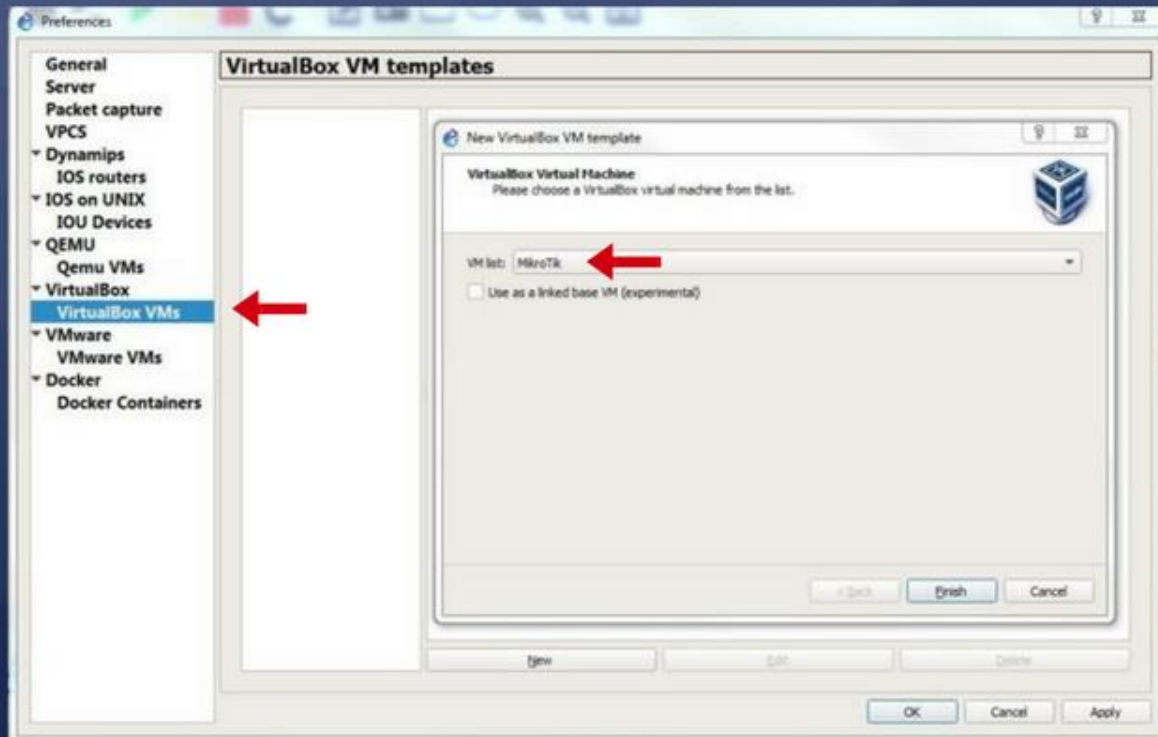
# GNS3 - CHR com Virtualbox



# GNS3 - CHR com Virtualbox\*



# GNS3 - CHR com Virtualbox



# GNS3

## Principal diferença entre o uso com Qemu e VirtualBox:

- Usando o Qemu, precisamos configurar apenas uma imagem, para rodar várias instâncias do RouterOS no GNS3.
  - Com VirtualBox, precisamos duplicar as VMs criadas, uma para cada instância do RouterOS no GNS3
- \* No caso do VirtualBox, precisamos reinicializar os endereços MAC ao clonar a VM.



# AMAZON WEB SERVICES

- Amazon Web Services ou AWS é um serviço da Amazon que oferece computação em nuvem. Possui servidores distribuídos em diversos cantos do mundo, com uma grande variedade de serviços.
- Além de sua grande estrutura mundial, possui um número muito elevado de disponibilidade, o que torna o serviço muito confiável.
- Possui um console de administração intuitivo, com muitas funcionalidades.

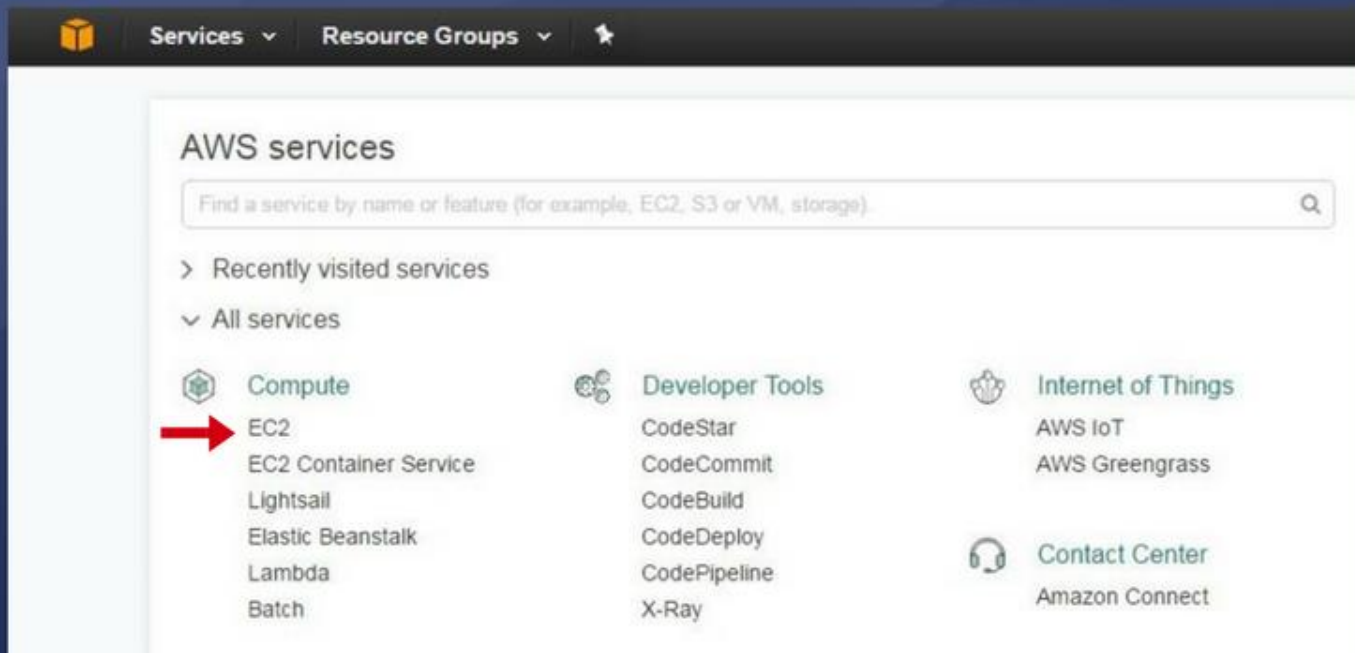
# AMAZON WEB SERVICES

- Em sua estrutura EC2, é possível utilizar diversos sistemas operacionais, em diferentes configurações de recursos. O Marketplace, como é conhecido, possui para escolha a versão CHR do RouterOS.
- O preço para utilização do CHR é apenas o da instância na AWS, necessitando inserir uma licença válida do CHR (BYOL).



# AMAZON WEB SERVICES

## Configurando CHR



# AMAZON WEB SERVICES

## Configurando CHR

The screenshot shows the Amazon Management Console interface. At the top, there are navigation tabs for 'Services' and 'Resource Groups'. The left sidebar contains a navigation menu with categories like 'EC2 Dashboard', 'INSTANCES', and 'IMAGES'. The main content area is titled 'Resources' and lists the following EC2 resources in the South America (São Paulo) region:

9 Running Instances	8 Elastic IPs
0 Dedicated Hosts	8 Snapshots
9 Volumes	0 Load Balancers
14 Key Pairs	12 Security Groups
0 Placement Groups	

Below the resource list, there is a section titled 'Create Instance' with the text: 'To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.' A blue button labeled 'Launch Instance' is visible, with a red arrow pointing to it from the right.

# AMAZON WEB SERVICES

## Configurando CHR

The screenshot displays the AWS Management Console interface for configuring an Amazon Machine Image (AMI). The top navigation bar includes 'Services', 'Resource Groups', and user information for 'Belluno Tecnologia' in 'São Paulo'. The main content area is titled 'Step 1: Choose an Amazon Machine Image (AMI)' and includes a progress indicator with seven steps: '1. Choose AMI', '2. Choose Instance Type', '3. Configure Instance', '4. Add Storage', '5. Add Tags', '6. Configure Security Group', and '7. Review'. Below the title, there is a search bar containing 'mikrotik' and a list of search results. The first result is 'Cloud Hosted Router' by MikroTik, which is highlighted. A red arrow points to the 'AWS Marketplace' tab in the left sidebar. The product details for 'Cloud Hosted Router' include a star rating, a 'Free tier eligible' badge, and a 'Select' button.

Services ▾ Resource Groups ▾

Belluno Tecnologia ▾ São Paulo ▾ Support ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 1: Choose an Amazon Machine Image (AMI)

Cancel and Exit

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Quick Start

My AMIs

**AWS Marketplace** ←

Community AMIs

Categories

All Categories

Software Infrastructure (1)

Q mikrotik X

1 to 1 of 1 Products >>

**Cloud Hosted Router** Select

MikroTik

★★★★★ (1) | 6.34.1 | Sold by MikroTik

Bring Your Own License - AWS usage fees

Free tier eligible

Linux/Unix, Other 6.34.1 | 64-bit Amazon Machine Image (AMI) | Updated: 4/7/16

Use the CHR for protecting your cloud servers using RouterOS firewall which supports Layer7 filtering, dynamic address lists and more, for running your own VPN service or ...

More info

# AMAZON WEB SERVICES

## Configurando CHR

Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types Current generation Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

Note: The vendor recommends using a t2.micro instance (or larger) for the best experience with this product.

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
<input checked="" type="checkbox"/>	General purpose	t2.micro <small>Free tier eligible</small>	1	1	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
<input type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes

Cancel Previous **Review and Launch** Next: Configure Instance Details

# AMAZON WEB SERVICES

## Configurando CHR

The screenshot shows the AWS Management Console interface for EC2 instances. The top navigation bar includes 'Services', 'Resource Groups', and user information for 'Belluno Tecnologia' in 'São Paulo'. The left sidebar shows navigation options like 'EC2 Dashboard', 'Events', 'Tags', 'Reports', 'Limits', 'INSTANCES', 'Images', and 'AMIs'. The main content area displays a table of instances with columns for Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, and Public DNS (IPv4). A red arrow points to the instance named 'MIKROTIK'.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
...	...	t2.large	sa-east-1c	running	2/2 checks ...	None	...
...	...	t2.medium	sa-east-1c	running	2/2 checks ...	None	...
...	...	t2.medium	sa-east-1c	running	2/2 checks ...	None	...
...	...	t2.small	sa-east-1c	running	2/2 checks ...	None	...
...	...	t2.micro	sa-east-1a	running	2/2 checks ...	None	...
MIKROTIK	...	t2.medium	sa-east-1c	running	2/2 checks ...	None	...
...	...	m4.xlarge	sa-east-1c	running	2/2 checks ...	None	...



# AMAZON WEB SERVICES

## EXTRAS

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- Após a instalação do CHR e poder usufruir de todas as funcionalidades do RouterOS, é possível utilizar em conjunto, as diversas funções do serviço EC2 da Amazon.
- Entre as opções, podemos melhorar a segurança no acesso ao nosso CHR através do acesso por meio de chaves SSH e firewall, gerenciar endereços IP, snapshots, etc.

# AMAZON WEB SERVICES

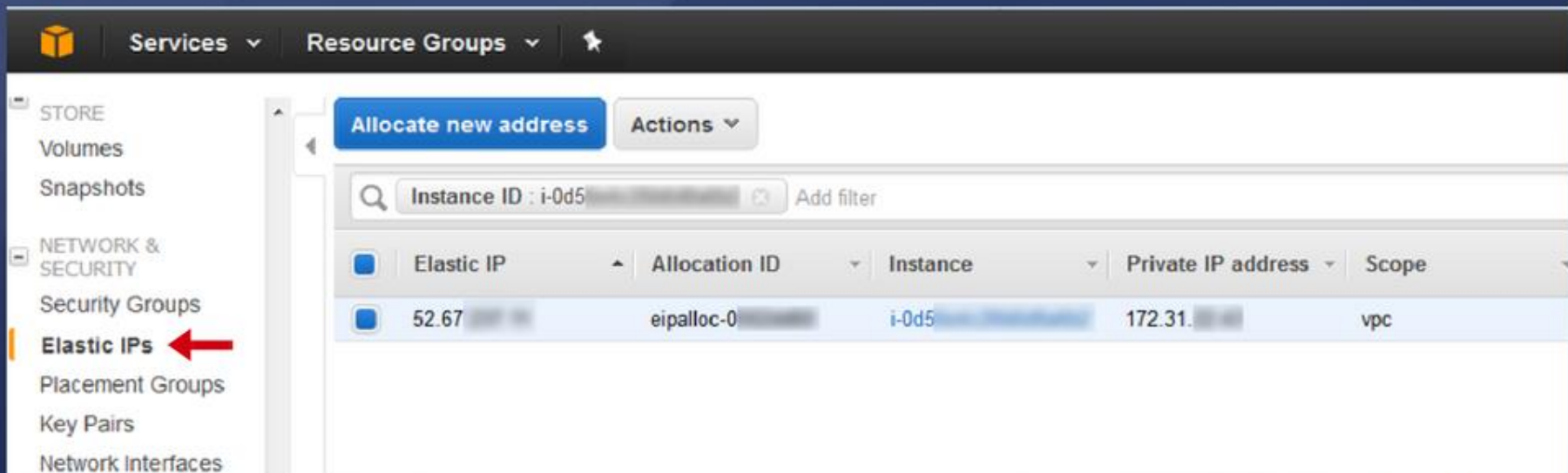
## ELASTIC IPS

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- Cada instância EC2 na AWS recebe um IPv4 público, que é mapeado (1:1) para um IPv4 privado. Este IP é dinâmico, e muda a cada vez que a instância for desligada, e ligada novamente.
- Por incrível que pareça, em tempos de esgotamento de IPv4, ainda é possível obter um endereço IPv4 público exclusivo.

# AMAZON WEB SERVICES

## ELASTIC IPS



The screenshot displays the AWS Management Console interface. The left-hand navigation pane shows the 'Elastic IPs' option under the 'NETWORK & SECURITY' category, which is highlighted with a red arrow. The main content area features a search bar with the filter 'Instance ID : i-0d5'. Below the search bar is a table listing Elastic IP addresses. The table has columns for 'Elastic IP', 'Allocation ID', 'Instance', 'Private IP address', and 'Scope'. One entry is visible in the table.

Elastic IP	Allocation ID	Instance	Private IP address	Scope
52.67.100.100	eipalloc-01234567	i-0d5	172.31.100.100	vpc



# AMAZON WEB SERVICES

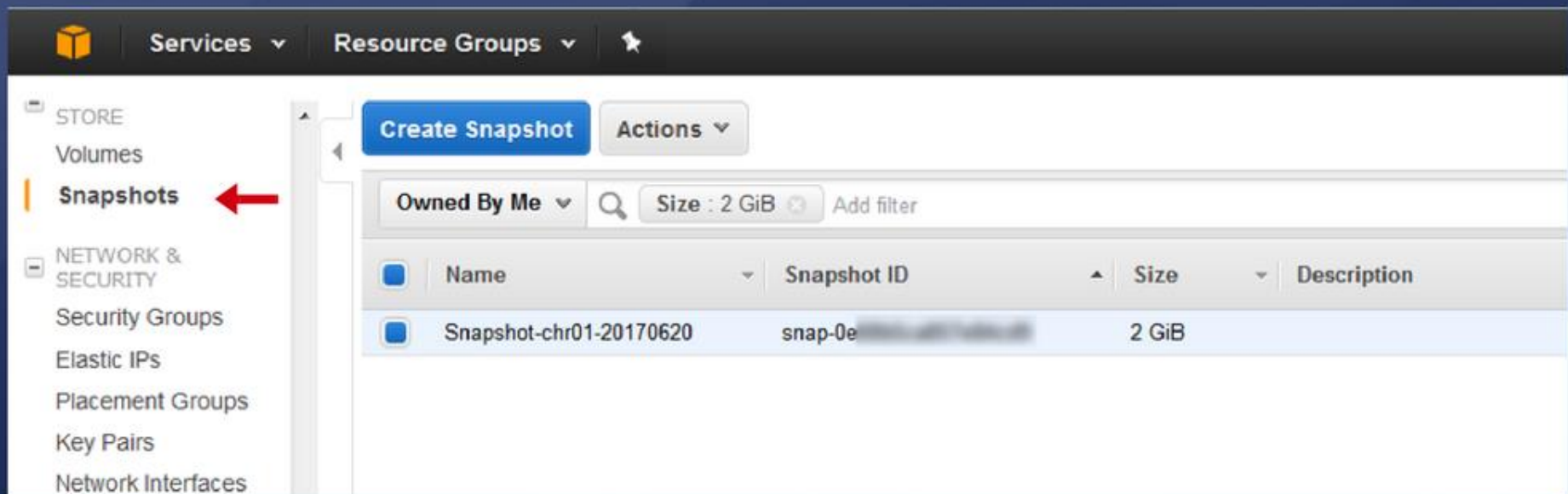
## SNAPSHOTS

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- Além dos backups (.backup e .rsc) de nosso CHR, podemos manter Snapshots da instância que está rodando o CHR na Amazon.
- Como o próprio termo já diz, os Snapshots contém uma imagem fiel da instância ao momento que for criado, e pode ser agendado para ser gerado automaticamente de acordo com a necessidade.

# AMAZON WEB SERVICES

## SNAPSHOTS



The screenshot displays the AWS Management Console interface. At the top, there is a navigation bar with 'Services', 'Resource Groups', and a star icon. On the left, a navigation pane lists categories: 'STORE' (Volumes, Snapshots), 'NETWORK & SECURITY' (Security Groups, Elastic IPs, Placement Groups, Key Pairs, Network Interfaces). A red arrow points to the 'Snapshots' link under the 'STORE' category. The main content area shows a 'Create Snapshot' button and an 'Actions' dropdown. Below this is a filter section with 'Owned By Me', a search icon, and a filter for 'Size : 2 GiB'. A table lists the snapshots:

<input type="checkbox"/>	Name	Snapshot ID	Size	Description
<input type="checkbox"/>	Snapshot-chr01-20170620	snap-0e[REDACTED]	2 GiB	

# AMAZON WEB SERVICES

## CHAVES SSH

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- Para reforçar a segurança, a Amazon oferece o acesso às instâncias EC2 por meio de chaves SSH.
- Um par de chaves é criado ao momento da criação da instância, e precisa ser obrigatoriamente baixado e armazenado em um local seguro e acessível.
- A chave pública é armazenada pela própria Amazon, enquanto a chave privada é armazenada pelo administrador.

# AMAZON WEB SERVICES

## CHAVES SSH


### Select an existing key pair or create a new key pair ✕


A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Create a new key pair ▾

**Key pair name**  
chr01

 **Download Key Pair**

 You have to download the **private key file** (\*.pem file) before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

**Cancel** **Launch Instances**

# AMAZON WEB SERVICES

## CHAVES SSH

The screenshot shows the AWS Management Console interface. On the left, there is a navigation menu with categories like INSTANCES, IMAGES, ELASTIC BLOCK STORE, NETWORK & SECURITY, and LOAD BALANCING. The main content area displays the 'Connect To Your Instance' dialog box for an instance named 'MIKROTIK'. The dialog offers two options for connection: 'A standalone SSH client' (selected) and 'A Java SSH Client directly from my browser (Java required)'. It provides a list of steps to access the instance, including opening an SSH client, locating the private key file, and connecting to the instance using its Public DNS. An example terminal command is provided: `ssh -i [keyfile] mikrotik.pem root@[public-dns]`. A 'Close' button is located at the bottom right of the dialog.

Services - Resource Groups

Launch Instance Connect Actions

Name MIKROTIK Instance Type t2.medium Add filter

Name	Instance ID	Instance Type	Availability Zone	Instance State
MIKROTIK	i-05564c28660ba032	t2.medium	sa-east-1c	running

### Connect To Your Instance

I would like to connect with

- A standalone SSH client
- A Java SSH Client directly from my browser (Java required)

**To access your instance:**

1. Open an SSH client. (find out how to [connect using PuTTY](#))
2. Locate your private key file (██████████-mikrotik.pem). The wizard automatically detects the key you used to launch the instance.
3. Your key must not be publicly viewable for SSH to work. Use this command if needed:  

```
chmod 400 ██████████-mikrotik.pem
```
4. Connect to your instance using its Public DNS:  

```
ec2-██████████-sa-east-1.compute.amazonaws.com
```

**Example:**

```
ssh -i "██████████-mikrotik.pem" root@██████████-sa-east-1.compute.amazonaws.com
```

Please note that in most cases the username above will be correct, however please ensure that you read your AMI usage instructions to ensure that the AMI owner has not changed the default AMI username.

If you need any assistance connecting to your instance, please see our [connection documentation](#).

Close



# AMAZON WEB SERVICES

## CHAVES SSH

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- Para o acesso SSH:

```
ssh -i "chr01.pem" admin@ec2-xx-xx-xx-xx.sa-east-1.compute.amazonaws.com
```

- Utilizando PuTTY:

Necessária a conversão da chave privada (.pem), para uma chave privada utilizável pelo PuTTY (.ppk)

Manual da Amazon em:

[https://docs.aws.amazon.com/pt\\_br/AWSEC2/latest/UserGuide/putty.html](https://docs.aws.amazon.com/pt_br/AWSEC2/latest/UserGuide/putty.html)

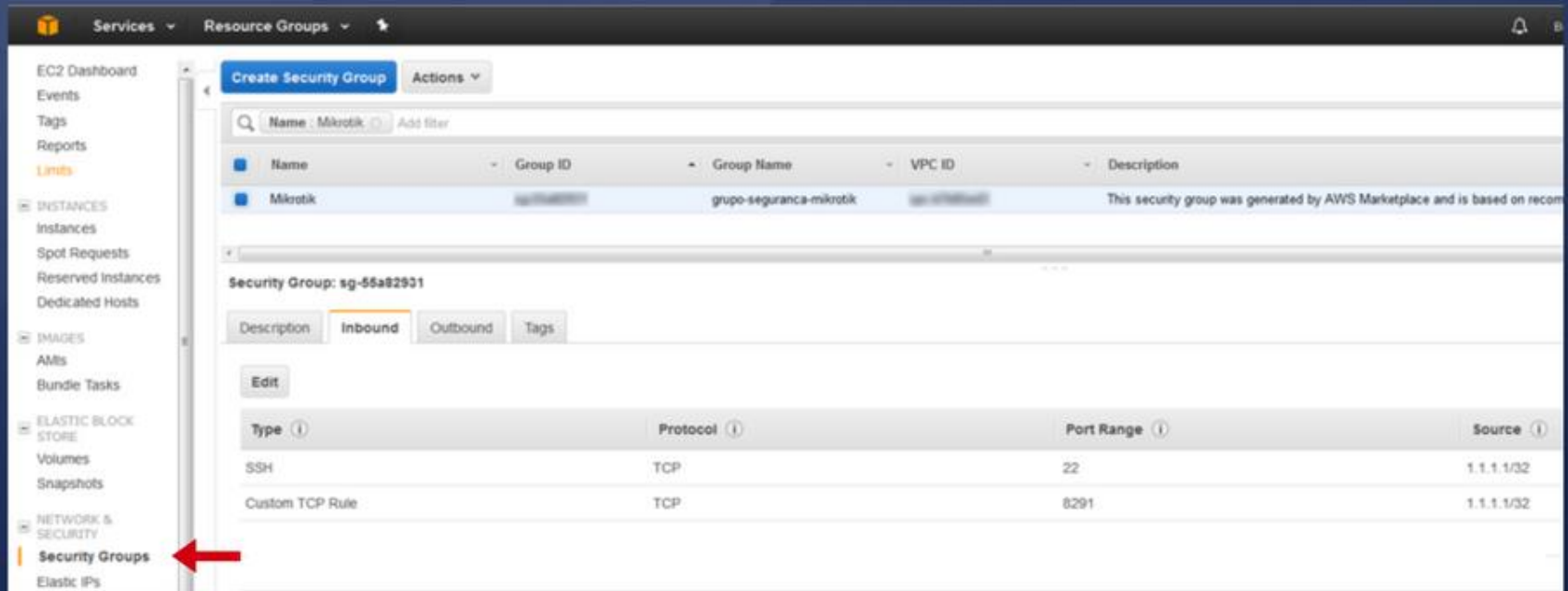
# AMAZON WEB SERVICES

## FIREWALL

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- Para aumentar a segurança e proteção às instâncias EC2, e consequentemente ao nosso CHR, podemos utilizar o firewall da própria Amazon.
- É possível configurar grupos de segurança, atrelando-os a determinadas instâncias.
- Muito flexível na configuração, tratando regras de inbound e outbound.

# AMAZON WEB SERVICES FIREWALL



The screenshot displays the AWS Management Console interface for Security Groups. The left-hand navigation pane shows the 'Security Groups' link highlighted with a red arrow. The main content area shows a list of security groups, with one named 'Mikrotik' selected. Below the list, the details for the 'Mikrotik' security group are displayed, including its ID (sg-55a82931) and a table of inbound rules.

**Security Group: sg-55a82931**

Description | **Inbound** | Outbound | Tags

Edit

Type	Protocol	Port Range	Source
SSH	TCP	22	1.1.1.1/32
Custom TCP Rule	TCP	8291	1.1.1.1/32



# DÚVIDAS?

Pietro Scherer - Belluno Tecnologia  
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# belluno

— CALL CENTER E GESTÃO DE REDES —

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# OBRIGADO!

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