



# IBM Cloud 用戶實作研習營

## IBM Cloud Virtual Private Cloud (VPC) 使用教學

2019/8/7



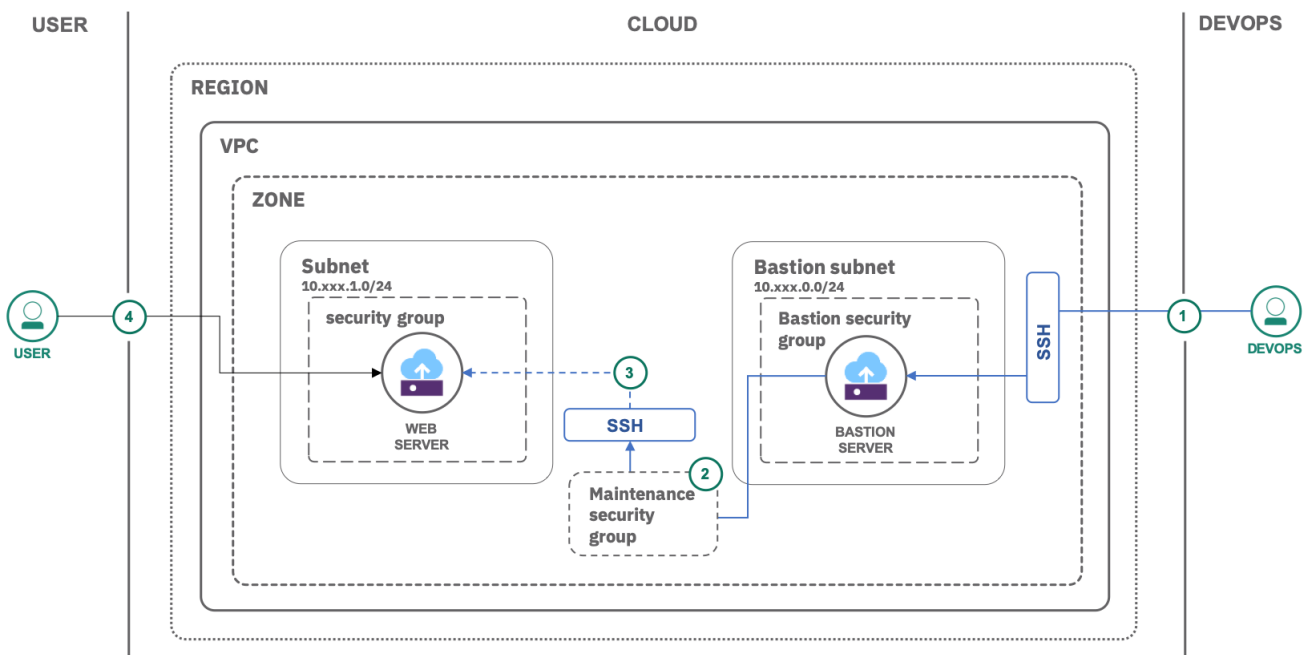
# Securely access remote instances with a bastion host

- This tutorial walks you through the deployment of a bastion host to securely access remote instances within a virtual private cloud. Bastion host is an instance that is provisioned in a public subnet and can be accessed via SSH. Once set up, the bastion host acts as a **jump** server allowing secure connection to instances provisioned in a private subnet.
- To reduce exposure of servers within the VPC you will create and use a bastion host. Administrative tasks on the individual servers are going to be performed using SSH, proxied through the bastion. Access to the servers and regular internet access from the servers, e.g., for software installation, will only be allowed with a special maintenance security group attached to those servers

## Objectives

- Learn how to set up a bastion host and security groups with rules
- Securely manage servers via the bastion host

## Architecture



- After setting up the required infrastructure (subnets, security groups with rules, VSIs) on the cloud, the admin (DevOps) connects (SSH) to the bastion host using the private SSH key.
- The admin assigns a maintenance security group with proper outbound rules.
- The admin connects (SSH) securely to the instance's private IP address via the bastion host to install or update any required software e.g., a web server
- The internet user makes an HTTP/HTTPS request to the web server.



# Create a Virtual Private Cloud

In this section, you will create your own IBM Cloud account, and then get access to a IBM Cloud Lab account which contains pre-provisioned clusters. Each lab attendee will be granted access to one cluster.

## Login to IBM Cloud

1. Create your own IBM Cloud account. Ex: wk1201908000@dayrep.com
2. After the email verification, confirm by logging in to <https://cloud.ibm.com>

## Create a Virtual Private Cloud

In this section, you will create the VPC and the bastion host.

1. Navigate to the [VPC overview](#) page and click on **Create a VPC**.
2. Under **New virtual private cloud** section:
  - o Enter **wk1000vpc-pubpriv** as name for your VPC.
  - o Select a **Resource group**.
  - o Optionally, add **Tags** to organize your resources.
3. Select **Create new default (Allow all)** as your VPC default access control list (ACL).
4. Uncheck SSH and ping from the **Default security group**.
5. Under **New subnet for VPC**:
  - o As a unique name enter **wk1000vpc-secure-bastion-subnet**.
  - o Select a location.
  - o Enter the IP range for the subnet in CIDR notation, i.e., **10.xxx.0.0/24**. Leave the **Address prefix** as it is and select the **Number of addresses** as 256.
6. Select **Use VPC default** for your subnet access control list (ACL).
7. Leave the **Public gateway** to **Detached**. Enabling the public gateway would enable public Internet access to all virtual server instances in the VPC. In this tutorial, the servers do not require such connectivity.
8. Click **Create virtual private cloud**.



IBM Cloud

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All virtual private clouds

New virtual private cloud

Name

vpc-pubpriv

Resource group

Default

Tags

Examples: envdev, version-1

Default security group

☐ Allow SSH
 ☐ Allow ping

Classic access

☐ Enable access to classic resource

New subnet for VPC

Name

vpc-secure-bastion-subnet

Location

Dallas

Frankfurt

London

Sydney

Tokyo

IP range

10.240.128.0/24

Address prefix

10.240.128.0/18

Number of addresses

256

Address space

10.240.128.0 to 10.240.191.255

Subnet access control list

Use VPC default

Public gateway

Detached

Attached

Order summary

United States

Virtual private cloud

provided

Estimated monthly

\$0.00

Create virtual private cloud

View docs

Get sample API call

Terms

Virtual Server

Virtual Private Cloud

Block Storage

Need help?

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IBM Cloud

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VPC on Classic

Virtual private cloud

REGIONS

Dallas

Status	Name	Resource group	Subnets	Default ACL	Default Security Group
Available	vpc-pubpriv	Default	1	allow-all-network-acl-584c8078-59bf-4725-b99b-644ef6595677	agorizing-edge-ipv4glass-elastic-colony

What do you want to do next?

Since you've already created a virtual private cloud, you can add other services.

To confirm the creation of the subnet, go to the [Subnets](#) page and wait until the status changes to **Available**.

IBM Cloud

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VPC on Classic

Subnets for VPC

REGIONS

Dallas

Status	Subnets	Virtual private cloud	Location	IP Range	Public Gateway
Available	vpc-secure-bastion-subnet	vpc-pubpriv	Dallas 3	10.240.128.0/24	--

What do you want to do next?

Since you've already created a subnet, you can add other services.



# Create and configure bastion security group

Let's create a security group and configure inbound rules to your bastion VSI.

1. Navigate to **Security groups** and click **New security group**. Enter **wk1000vpc-secure-bastion-sg** as name and select your VPC.
2. Now, create the following inbound rules by clicking **Add rule** in the inbound section. They allow SSH access and Ping (ICMP). **Inbound rule:**

**Protocol Source type Source Value**

**TCP Any 0.0.0.0/0 Ports 22-22**

**ICMP Any 0.0.0.0/0 Type: 8, Code: Leave empty**

3. Click **Create security group** to create it.

The screenshot shows the 'Security groups for VPC' page in the IBM Cloud console. On the left sidebar, 'Security groups' is highlighted. The main area shows a table with one security group: 'agorizing-edge-spyglass-elastic-colony'. The 'New security group' button is highlighted in the top right corner.

The screenshot shows the 'New security group for VPC' form. The 'Name' field is 'vpc-secure-bastion-sg', 'Virtual private cloud' is 'vpc-pubpriv', and 'Resource group' is 'Default'. The 'Inbound rules' section shows two rules: ICMP (Type: 8, Code: Any) and TCP (Ports 22-22). The 'Add rule' button is highlighted.

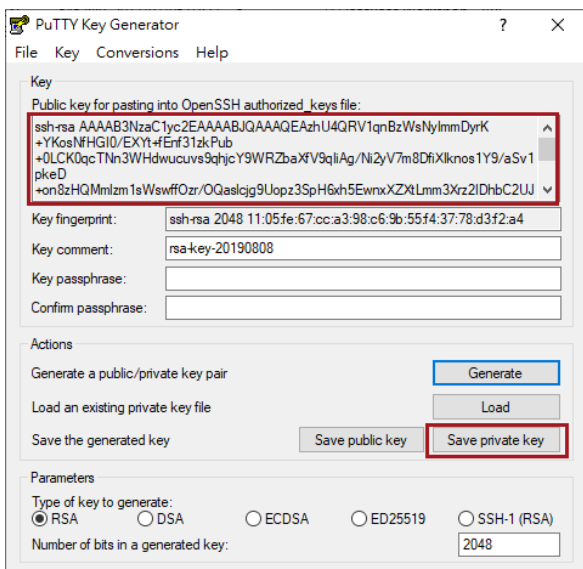
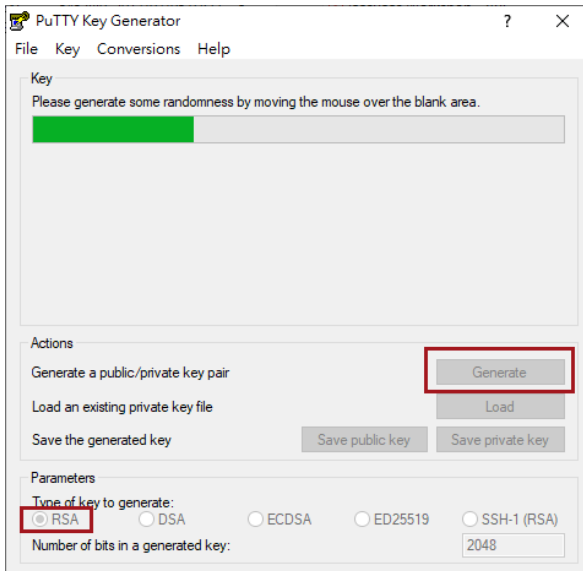
## Create a bastion instance

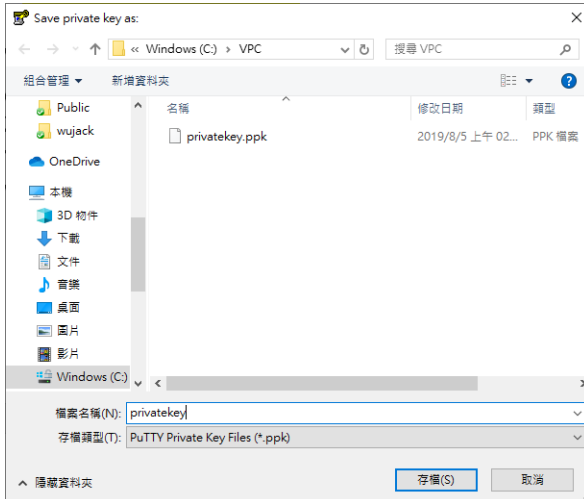
With the subnet and security group already in place, next, create the bastion virtual server instance.

1. Under **Subnets** on the left pane, select **wk1000vpc-secure-bastion-subnet**.

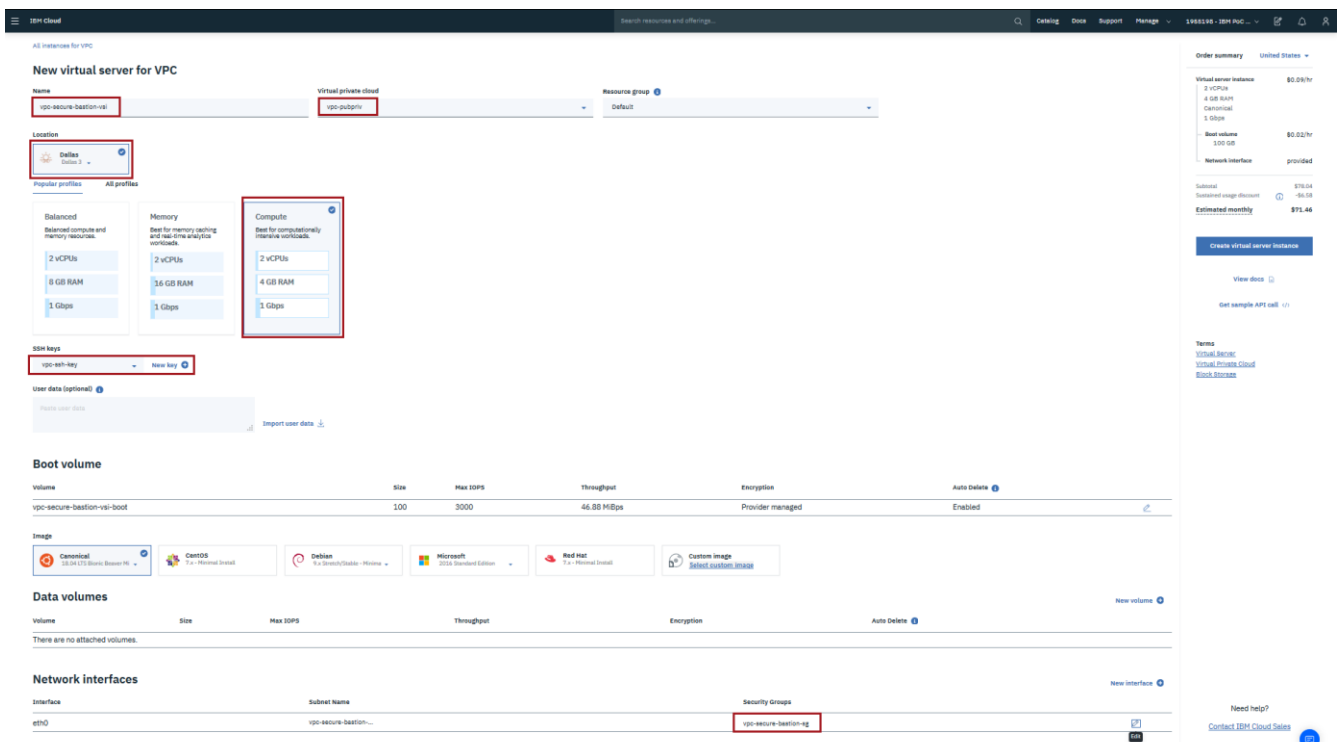


2. Click on **Attached resources** and provision a **New instance** called **wk1000vpc-secure-bastion-vsi** under your own VPC and resource group.
3. Select a **Location** and make sure to later use the same location again.
4. Select **Compute** (2 vCPUs and 4 GB RAM) as your profile.
5. Use Putty Key Generator to create public key and private key, then copy public key content for VSI provision.





6. To create a new **SSH key**, click **New key**
  - o Enter **wk1000vpc-ssh-key** as key name.
  - o Leave the **Region** as is.
  - o Copy the contents of your existing local SSH key and paste it under **Public key**.
  - o Click **Add SSH key**.
7. Select **Ubuntu Linux** as your image. You can pick any version of the image.
8. Under **Network interfaces**, click on the **Edit** icon next to the Security Groups
  - o Make sure that **wk1000vpc-secure-bastion-subnet** is selected as the subnet.
  - o Uncheck the default security group and mark **wk1000vpc-secure-bastion-sg**.
  - o Click **Save**.
9. Click **Create virtual server instance**.





## Add SSH key

Add an SSH key that you'll use to access your virtual server instance. [View docs](#)

**Name**  
vpc-ssh-key

**Resource group**  
Default

**Region**  

Dallas

Frankfurt

London

Sydney

Tokyo

**Public key** [How do I get a public key?](#)

```
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQEA2Z2NcsjDx67xKRrHSn/8de4Ptx
/BbZCIVrEALe1I6Jf9MIZP67PNYoevPor7kyj3+LWNuGUakl9k
/xmOm498wcDk6fM+Q1x7cQg5f8T1SEKQuv7t6P8op1bGEN0bx3p
/o7wBBOv73zRbaHzor822bux36wRfEub861TSOGOD1nh7yftPaokQrh5nVe4npLeuuFCYe
qS8nmIp2xYgENvxBHUrmtbSKnzVrmc7KU6cd
/yHLLKnhuIMq9nBs1UoNkmFMwj+vr97ctFHgaAR+
/CFPqSzvDBATDNPjMkl4pJTIgs7u5h1Gv9Ff5CeLwy7z7o0v4rpQ== rsa-key-20190805
```

API </> Cancel Add SSH key

## Edit network interface

**Interface name**  
eth0

**Subnet**  
vpc-secure-bastion-sul

**Security groups**

☐ agonizing-edge-spyglass-elastic-colony
 ☒ vpc-secure-bastion-sg

Cancel Save

10. Once the instance is created, click on **wk1000vpc-secure-bastion-vsi** and **reserve** a floating IP.

IBM Cloud

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Virtual server instances for VPC

REGIONS

Dallas

Powered On

vpc-secure-bastion-vsi

vpc-subpriv

10.240.128.8

—

...

Items per page: 10 | 1-1 items

Data updated 3 seconds ago

What do you want to do next?

Since you've already created a virtual server instance, you can add other services.

8





IBM Cloud

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Overview

Monitoring

All instances for VPC

vpc-secure-bastion-vsi

Powered On

Dallas 3

View docs

Data updated 2 seconds ago

Instance details

Name	vpc-secure-bastion-vsi
Virtual private cloud	vpc-pubpriv
Resource group	Default
ID	172e80bb-c49f-4d61-9dec-cc2e01862610
Created	August 5, 2019 3:11:37 AM
Location	Dallas 3
Profile	cc1-2x4
Size	2 vCPU   4 GB   1 Gbps
Image	18.04 LTS Bionic Beaver Minimal Install ubuntu-18.04-amd64
Provisioned SSH keys	vpc-ssh-key

Boot volume

Name	Size	Max IOPS	MBps	Encryption	Auto Delete
vpc-secure-bastion-vsi-boot	100	3000	46.88	Provider managed	Enabled

Data volumes

Attach volume

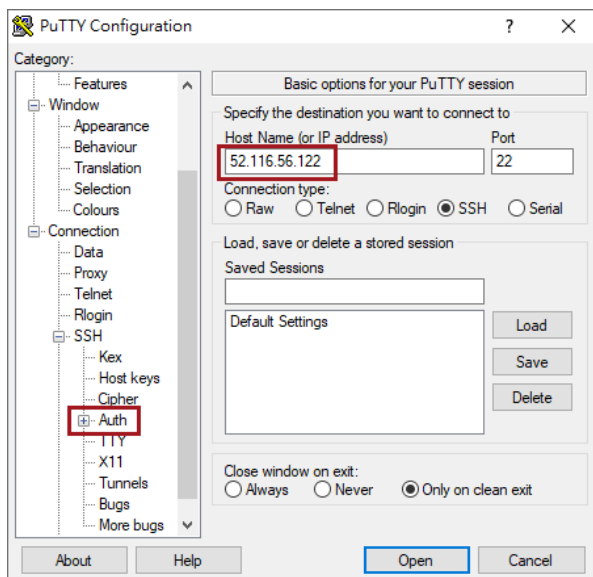
Name	Size	Max IOPS	MBps	Encryption	Auto Delete
There are no volumes attached to this instance.					

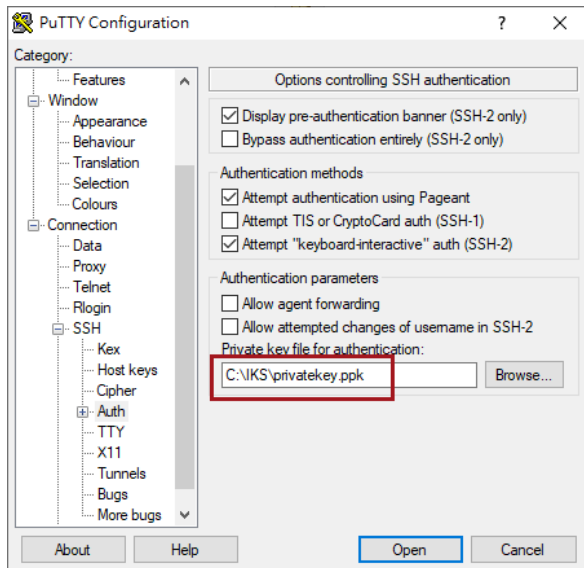
Network interfaces

Interface	Subnet Name	Private IP	Floating IP	Security Groups
eth0	vpc-secure-bastion---	10.240.128.8	52.116.56.122	vpc-secure-bastion-sg

## Test your bastion

Once your bastion's floating IP address is active, try connecting to it using ssh client with private key. (ex: Putty)





```

root@vpc-secure-bastion-vsi: ~
System information as of Sun Aug  4 19:15:44 UTC 2019

System load:  0.32      Processes:      105
Usage of /:   0.9% of 98.06GB   Users logged in:  0
Memory usage: 3%          IP address for eth0: 10.240.128.8
Swap usage:   0%

Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

0 packages can be updated.
0 updates are security updates.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@vpc-secure-bastion-vsi:~#
    
```

## Configure a security group with maintenance access rules

With access to the bastion working, continue and create the security group for maintenance tasks like installing and updating the software.

1. Navigate to **Security groups** and provision a new security group called **wk1000vpc-secure-maintenance-sg** with the below **outbound** rules

**Protocol Destination type Destination Value**

TCP	Any	0.0.0.0/0	Ports 80-80
TCP	Any	0.0.0.0/0	Ports 443-443
TCP	Any	0.0.0.0/0	Ports 53-53
UDP	Any	0.0.0.0/0	Ports 53-53



- DNS server requests are addressed on port 53. DNS uses TCP for Zone transfer and UDP for name queries either regular (primary) or reverse. HTTP requests are on port 80 and 443.
- Next, add this **inbound** rule which allows SSH access from the bastion host.

Protocol	Source type	Source	Value
TCP	Security group	wk1000vpc-secure-bastion-sg	Ports 22-22

- Create the security group.

All security groups for VPC

### New security group for VPC

Name:

Virtual private cloud:

Resource group:

Rules

#### Inbound rules

Protocol	Source type	Source	Value
TCP	Security group	vpc-secure-bastion-sg	Ports 22-22

#### Outbound rules

Protocol	Destination type	Destination	Value
UDP	Any	0.0.0.0/0	Ports 53-53
TCP	Any	0.0.0.0/0	Ports 53-53
TCP	Any	0.0.0.0/0	Ports 443-443
TCP	Any	0.0.0.0/0	Ports 80-80

Order summary United States

Security group provided

Estimated monthly \$0.00

Create security group

View docs

Get sample API call

Terms

Virtual Server

Virtual Private Cloud

Block Storage

- Navigate to **All Security Groups for VPC**, then select **wk1000vpc-secure-bastion-sg**.
- Finally, edit the security group and add the following **outbound** rule.

Protocol	Destination type	Destination	Value
TCP	Security group	vpc-secure-maintenance-sg	Ports 22-22

Rules

Attached interfaces

All security groups for VPC

**vpc-secure-bastion-sg**

ID: 2d364f0a-e870-42c3-a554-000001845644

#### Inbound rules

Protocol	Source type	Source	Value
TCP	Any	0.0.0.0/0	Ports 22-22
ICMP	Any	0.0.0.0/0	Type: 8, Code: Any

#### Outbound rules

Protocol	Destination type	Destination	Value
TCP	Security group	vpc-secure-maintenance-sg	Ports 22-22

## Use the bastion host to access other instances in the VPC



In this section, you will create a private subnet with virtual server instance and a security group. By default, any subnet created in a VPC is private.

If you already have virtual server instances in your VPC that you want to connect to, you can skip the next three sections and start [adding your virtual server instances to the maintenance security group](#).

## Create a subnet

To create a new subnet,

1. Click **Subnets** under **Network** on the left pane, then **New subnet**.
  - o Enter **wk1000vpc-secure-private-subnet** as name, then select the VPC you created.
  - o Select a location.
  - o Enter the IP range for the subnet in CIDR notation, i.e., **10.xxx.1.0/24**. Leave the **Address prefix** as it is and select the **Number of addresses** as 256.
2. Select **VPC default** for your subnet access control list (ACL). You can configure the inbound and outbound rules later.
3. Switch the **Public gateway** to **Attached**.
4. Click **Create subnet** to provision it.

The screenshot shows the IBM Cloud console interface. On the left, the 'Subnets' link under the 'Network' section is highlighted. The main area displays a table of existing subnets for a VPC in the Dallas region. Below the table, a 'What do you want to do next?' section suggests adding other services. The bottom part of the image shows the 'New subnet for VPC' form with the following details:

- Name:** vpc-secure-private-subnet
- Virtual private cloud:** vpc-pubpriv
- Location:** Dallas (Dallas 3)
- IP range:** 10.240.129.0/24
- Address prefix:** 10.240.128.0/18
- Number of addresses:** 256
- Address space:** 10.240.128.0 to 10.240.191.255
- Subnet access control list:** VPC Default(allow-all-network-acl-584cd078-5f8f-4225-8b9b-644ef6595677)
- Public gateway:** Attached (selected)

On the right side of the form, there is an 'Order summary' section showing the estimated monthly cost of \$0.00 and a 'Create subnet' button.

## Create a security group



To create a new security group:

1. Click **Security groups** under Network, then **New security group**.
2. Enter **wk1000vpc-secure-private-sg** as name and select the VPC you created earlier.
3. Click **Create security group**.

**Security groups for VPC**

REGIONS: Dallas

[New security group](#)

Name	Default	Resource Group	Virtual private cloud	Rules	Attached Interfaces
agonizing-edge-spyglass-elastic-colony	<input checked="" type="checkbox"/>	—	vpc-pubpriv	2	0
vpc-secure-bastion-sg	<input type="checkbox"/>	—	vpc-pubpriv	3	1
vpc-secure-maintenance-sg	<input type="checkbox"/>	—	vpc-pubpriv	5	0

Data updated 8 seconds ago

---

**New security group for VPC**

Name:

Virtual private cloud:

Resource group:

**Rules**

**Inbound rules** [Add rule](#)

Protocol	Source type	Source	Value
The inbound rules list is empty. All inbound traffic will be blocked. To create inbound rules, click <a href="#">Add rule</a> .			

**Outbound rules** [Add rule](#)

Protocol	Destination type	Destination	Value
The outbound rules list is empty. All outbound traffic will be blocked. To create outbound rules, click <a href="#">Add rule</a> .			

**Order summary**

Security group: provided

Estimated monthly: \$0.00

[Create security group](#)

[View docs](#)

[Get sample API call](#)

**Terms**

[Virtual Server](#)

[Virtual Private Cloud](#)

[Block Storage](#)

## Create a virtual server instance

To create a virtual server instance in the newly created subnet: Click on **Attached resources** and provision a **New instance** called **wk1000vpc-secure-private-vsi** under your own VPC and resource group.

1. Click on the private subnet under **Subnets**.
2. Click **Attached resources**, then **New instance**.
3. Enter a unique name, **wk1000vpc-secure-private-vsi**, select the VPC you created and resource group as earlier.
4. Select a **Location** and make sure to later use the same location again.
5. Select **Compute** (2 vCPUs and 4 GB RAM) as your profile. To check other available profiles, click **All profiles**.
6. For **SSH keys** pick the SSH key you created earlier for the bastion.
7. Select **Ubuntu Linux** as your image. You can pick any version of the image.
8. Under **Network interfaces**, click on the **Edit** icon next to the Security Groups
  - o Select **wk1000vpc-secure-private-subnet** as the subnet.
  - o Uncheck the default security and group and activate **wk1000vpc-secure-private-sg**.





## Edit network interface

Interface name

eth0

Subnet

vpc-secure-private-sut

Security groups

- ☐ agonizing-edge-spyglass-elastic-colony
- ☐ vpc-secure-bastion-sg
- ☐ vpc-secure-maintenance-sg
- ☒ vpc-secure-private-sg

Cancel

Save

## Add virtual servers to the maintenance security group

For administrative work on the servers, you have to associate the specific virtual servers with the maintenance security group. In the following, you will enable maintenance, log into the private server, update the software package information, then disassociate the security group again.

Let's enable the maintenance security group for the server.

1. Navigate to **Security groups** and select **wk1000vpc-secure-maintenance-sg** security group.

The screenshot shows the IBM Cloud console interface. On the left, the 'Security groups' menu item is highlighted. The main panel displays a table of security groups for the 'Dallas' region. The 'vpc-secure-maintenance-sg' group is highlighted with a red box. Below the table, the 'Attached interfaces' section is shown, with an 'Edit interfaces' button highlighted with a red box.

Name	Default	Resource Group	Virtual private cloud	Rules	Attached Interfaces
agonizing-edge-spyglass-elastic-colony	<input checked="" type="checkbox"/>	Default	vpc-publicity	2	0
vpc-secure-bastion-sg	<input type="checkbox"/>	Default	vpc-publicity	3	1
vpc-secure-maintenance-sg	<input type="checkbox"/>	Default	vpc-publicity	5	0
vpc-secure-private-sg	<input type="checkbox"/>	Default	vpc-publicity	0	0

Attached interfaces

Instance name	Interfaces	Subnet	Attached security groups
---------------	------------	--------	--------------------------

2. Click **Attached interfaces**, then **Edit interfaces**.



- Expand the virtual server instances and activate the selection next to **primary** in the **Interfaces** column.

Rules

Attached interfaces

All security groups for VPC

vpc-secure-maintenance-sg  
ID: 24364f0e-a870-42c3-b564-000001845488

View docs

Attached interfaces

Editing items

Instance name	Interfaces	Subnet	Attached security groups
vpc-secure-bastion-vsi	eth0	vpc-secure-bastion-subnet	vpc-secure-bastion-sg
vpc-secure-private-vsi	eth0	vpc-secure-private-subnet	vpc-secure-private-sg

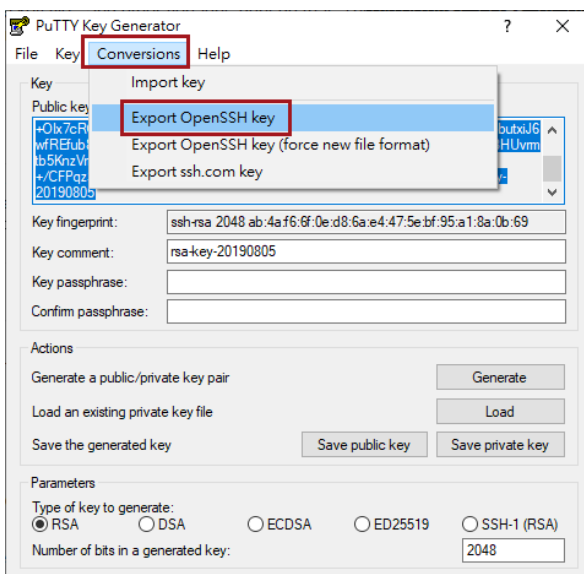
Cancel Save

- Click **Save** for the changes to be applied.

## Connect to the instance

To SSH into an instance using its **private IP**, you will use the bastion host as your **jump host**.

- Obtain the private IP address of a virtual server instance under **Virtual server instances**.
- Use PuTTY to connect the bastion **floating IP** address you used earlier
- Use PuTTY Key Generator to export OpenSSH key file



- Copy the key content and create private key file on the bastion host





```

Lister - [C:\VPC\openssh]
-----BEGIN RSA PRIVATE KEY-----
MIIEogIBAAKCAQEA2zNcsjDx67xKRrHSn/8de4Ptx/BbZC1VrEEALeII6Jfb9MZP
57PNYcevPor7kyjJ+LWNUgUakl9k/xfmOm498wDtk6fM+OIx7cRQgBrFBT1iSEk
QuV7t6fP6cp1bGEN0bx3p/cYIwBB0vV73zRbaHzcr82pbutxiJ6wFREfub861TSO
GOD1nh1y7fTpAokQrh5nVe4npLeuuFCYaq5Bnm1p2xYgENvxBHUrmtb5KnzVrmc
7KU6cd/yrH1LKnhuIMq9nBs1UoNKMfMwj+vr97cTFHgsAR+/CFPqzSzvDBATDNPj
Mk1L4pjTlgs7u5hlGv9Ffd5CeLwy7z7c0v4rpQIBJQKCAQEA1BvJAscgaCVG8X8R
xg09byHKL5Xc4s/SGnEby/mXUQypYDL3uDs3vputwnmVOesgrvc2P1ImtelwR38
bKtaSkMChghlyfQGf7rn252gRRgBS4B1P2ixagwKvE5aiXfxjSI2DASmM2WEJ4ZEc
WispAWkffbr52p8VXE+MAXpF311coDKJRW0ma9wIdnnu31G9TizA4XIQ1x/goAJg
N39109dxPb17MQIypK5fbp0/vtjxzeZATmEqdXbV6GhVc35jvKjU81w689ng1eu
7myJz02KxKbKhk0tpBr4vgKl9qcJ310v7zJ+7MVbwadowJQXxKTPk0q+nbIykPj2
knak5QKBgQD80k+XPueIn01SG9yFKd9dj9Ld/8Mi9YzG1fcYcG39rAIWR0gLW92r
UCovBTjnl1nPoaIq+TbxuVy3u8kk4URE4E2c7GRmelzp792bd+k+PIfy/FC03WQ7
s/T6W9qJ1EX3XYkOx3Q2Y4Ihvy5hyUzoUDuUX4f1eTN/s1leSQ/gwKBgQDeepoR
sLfdGd911co6PDr3GzyAWm24j4DZxJIkxtWj4YShvZKb0txMrBW7GKXdo3+0IOAd
BIyPA6z0HdhgjMXg3ZDnSCqYXG5M1CcCldzsBsVSt6t+mmgo0iKKImGtSC8NETk2
cp7Tqp8F0bqVQGTg29SpFPGDp4f7Y2RcWCAxtwKBGCIvT74B10jynBIDw94oQMd0
T02RQ+IhLrMLuZuE0Jfmz91/QRZKroCp99zXMTQNIk1bCB01Ixm/G14EnqQecQJj
gBwf8eRVuYdlmzLA9f6v4+J4WSMnteismcFfmWealHcNR2ry0QBuT9sL/1LSjdo
0WxQM6NnSG7dPc9xPD/vAoGBAMBqCLVakS3s3PBKMLvhEGcCzIqvEskiKj/MmhH4
Erc/1U2dCSzSCqMtC+AWgZ0XyGRvkwU0Xen1/V2BmIraUzbTO00CSnT21ARbdjw
UF1to70p01+oIruFTk50Kva6+EKohIId8SXD/yegoV584Z/gt+wtYfVSnx6Z1RGY
UxttAoGAUEgaUfuUL/Vx1V52XfHgNh+35iE6pA3tn1Ir4ve4b8Ya1AmQHgyVwR7e
7GF0UcQKMid/1i1BWTvnsSEtUKJ04UYVP0yzPTr+XNMN/Ik5AoN1MF68cQ0h8mxW
mKTQLgeP8/mtBq+gHgzcVZP3IhXu/ikQ0UEfzTS7q8rAoda+erY=
-----END RSA PRIVATE KEY-----

```

**vi privatekey**

```

root@vpc-secure-bastion-vsi:~
root@vpc-secure-bastion-vsi:~# vi privatekey

```

- After paste the key content to the privatekey file, then press Esc and input: “:wq!” command to save the file and quit vi

```

root@vpc-secure-bastion-vsi:~
-----BEGIN RSA PRIVATE KEY-----
MIIEogIBAAKCAQEA2zNcsjDx67xKRrHSn/8de4Ptx/BbZC1VrEEALeII6Jfb9MZP
57PNYcevPor7kyjJ+LWNUgUakl9k/xfmOm498wDtk6fM+OIx7cRQgBrFBT1iSEk
QuV7t6fP6cp1bGEN0bx3p/cYIwBB0vV73zRbaHzcr82pbutxiJ6wFREfub861TSO
GOD1nh1y7fTpAokQrh5nVe4npLeuuFCYaq5Bnm1p2xYgENvxBHUrmtb5KnzVrmc
7KU6cd/yrH1LKnhuIMq9nBs1UoNKMfMwj+vr97cTFHgsAR+/CFPqzSzvDBATDNPj
Mk1L4pjTlgs7u5hlGv9Ffd5CeLwy7z7c0v4rpQIBJQKCAQEA1BvJAscgaCVG8X8R
xg09byHKL5Xc4s/SGnEby/mXUQypYDL3uDs3vputwnmVOesgrvc2P1ImtelwR38
bKtaSkMChghlyfQGf7rn252gRRgBS4B1P2ixagwKvE5aiXfxjSI2DASmM2WEJ4ZEc
WispAWkffbr52p8VXE+MAXpF311coDKJRW0ma9wIdnnu31G9TizA4XIQ1x/goAJg
N39109dxPb17MQIypK5fbp0/vtjxzeZATmEqdXbV6GhVc35jvKjU81w689ng1eu
7myJz02KxKbKhk0tpBr4vgKl9qcJ310v7zJ+7MVbwadowJQXxKTPk0q+nbIykPj2
knak5QKBgQD80k+XPueIn01SG9yFKd9dj9Ld/8Mi9YzG1fcYcG39rAIWR0gLW92r
UCovBTjnl1nPoaIq+TbxuVy3u8kk4URE4E2c7GRmelzp792bd+k+PIfy/FC03WQ7
s/T6W9qJ1EX3XYkOx3Q2Y4Ihvy5hyUzoUDuUX4f1eTN/s1leSQ/gwKBgQDeepoR
sLfdGd911co6PDr3GzyAWm24j4DZxJIkxtWj4YShvZKb0txMrBW7GKXdo3+0IOAd
BIyPA6z0HdhgjMXg3ZDnSCqYXG5M1CcCldzsBsVSt6t+mmgo0iKKImGtSC8NETk2
cp7Tqp8F0bqVQGTg29SpFPGDp4f7Y2RcWCAxtwKBGCIvT74B10jynBIDw94oQMd0
T02RQ+IhLrMLuZuE0Jfmz91/QRZKroCp99zXMTQNIk1bCB01Ixm/G14EnqQecQJj
gBwf8eRVuYdlmzLA9f6v4+J4WSMnteismcFfmWealHcNR2ry0QBuT9sL/1LSjdo
0WxQM6NnSG7dPc9xPD/vAoGBAMBqCLVakS3s3PBKMLvhEGcCzIqvEskiKj/MmhH4
Erc/1U2dCSzSCqMtC+AWgZ0XyGRvkwU0Xen1/V2BmIraUzbTO00CSnT21ARbdjw
UF1to70p01+oIruFTk50Kva6+EKohIId8SXD/yegoV584Z/gt+wtYfVSnx6Z1RGY
UxttAoGAUEgaUfuUL/Vx1V52XfHgNh+35iE6pA3tn1Ir4ve4b8Ya1AmQHgyVwR7e
7GF0UcQKMid/1i1BWTvnsSEtUKJ04UYVP0yzPTr+XNMN/Ik5AoN1MF68cQ0h8mxW
mKTQLgeP8/mtBq+gHgzcVZP3IhXu/ikQ0UEfzTS7q8rAoda+erY=
-----END RSA PRIVATE KEY-----
:wq!

```

- Copy the private host IP and use below command to connect private host.



Virtual server instances for VPC

REGIONS  
Dallas

New instance

Status	Name	Virtual private cloud	Private IP	Floating IP
Powered On	<a href="#">vpc-secure-bastion-vsi</a>	<a href="#">vpc-pubpriv</a>	10.240.128.8	52.116.56.122
Powered On	<a href="#">vpc-secure-private-vsi</a>	<a href="#">vpc-pubpriv</a>	10.240.129.9	—

Items per page: 10 | 1-2 items

Data updated 3 seconds ago

What do you want to do next?  
Since you've already created a virtual server instance, you can add other services.

**`ssh root@private_IP -I privatekey`**

root@vpc-secure-bastion-vsi: ~

```
root@vpc-secure-bastion-vsi:~# ssh root@10.240.129.9 -i privatekey
```

7. If you get the bad permissions msg.. You can use below command to change the private key file privilege.

root@vpc-secure-bastion-vsi: ~

```
root@vpc-secure-bastion-vsi:~# ssh root@10.240.129.9 -i privatekey
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@           WARNING: UNPROTECTED PRIVATE KEY FILE!           @
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Permissions 0644 for 'privatekey' are too open.
It is required that your private key files are NOT accessible by others.
This private key will be ignored.
Load key "privatekey": bad permissions
root@10.240.129.9: Permission denied (publickey).
root@vpc-secure-bastion-vsi:~#
```

**`chmod 700 privatekey`**

root@vpc-secure-bastion-vsi: ~

```
root@vpc-secure-bastion-vsi:~# chmod 700 privatekey
```



```
root@vpc-secure-bastion-vsi:~# ssh root@10.240.129.9 -i privatekey
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-30-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of Mon Aug  5 15:19:31 UTC 2019

System load:  0.0               Processes:    98
Usage of /:   0.9% of 98.06GB   Users logged in:  0
Memory usage: 3%               IP address for eth0: 10.240.129.9
Swap usage:   0%

Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

0 packages can be updated.
0 updates are security updates.

Last login: Mon Aug  5 15:09:21 2019 from 10.240.128.8
root@vpc-secure-private-vsi:~#
```

## Install software and perform maintenance tasks

Once connected, you can install software on the virtual server in the private subnet or perform maintenance tasks.

1. Use below command to update the software package information:

***apt-get update***

```
root@vpc-secure-private-vsi:~# apt-get update
Get:1 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic InRelease [242 kB]
Get:3 http://security.ubuntu.com/ubuntu bionic-security/multiverse Sources [2744 B]
Get:4 http://security.ubuntu.com/ubuntu bionic-security/universe Sources [151 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:7 http://security.ubuntu.com/ubuntu bionic-security/restricted Sources [1504 B]
Get:8 http://archive.ubuntu.com/ubuntu bionic/universe Sources [9051 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/main Sources [117 kB]
Get:10 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [464 kB]
Get:11 http://security.ubuntu.com/ubuntu bionic-security/main Translation-en [160 kB]
Get:12 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [4296 B]
Get:13 http://security.ubuntu.com/ubuntu bionic-security/restricted Translation-en [2192 B]
Get:14 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [576 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic/multiverse Sources [181 kB]
Get:16 http://security.ubuntu.com/ubuntu bionic-security/universe Translation-en [189 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic/restricted Sources [5324 B]
Get:18 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [4008 B]
Get:19 http://archive.ubuntu.com/ubuntu bionic/main Sources [829 kB]
Get:20 http://security.ubuntu.com/ubuntu bionic-security/multiverse Translation-en [2060 B]
Get:21 http://archive.ubuntu.com/ubuntu bionic/main amd64 Packages [1019 kB]
Get:22 http://archive.ubuntu.com/ubuntu bionic/main Translation-en [516 kB]
Get:23 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [9184 B]
Get:24 http://archive.ubuntu.com/ubuntu bionic/restricted Translation-en [3584 B]
Get:25 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [8570 kB]
Get:26 http://archive.ubuntu.com/ubuntu bionic/universe Translation-en [4941 kB]
Get:27 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [151 kB]
Get:28 http://archive.ubuntu.com/ubuntu bionic/multiverse Translation-en [108 kB]
Get:29 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse Sources [5452 B]
```

2. Install the desired software, e.g., Nginx.

***apt-get install -y nginx***



```
root@vpc-secure-private-vsi: ~
root@vpc-secure-private-vsi:~# apt-get install -y nginx
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  fontconfig-config fonts-dejavu-core libfontconfig1 libgd3 libjpeg8
  libjpeg-turbo8 libnginx-mod-http-geoip libnginx-mod-http-image-filter
  libnginx-mod-http-xslt-filter libnginx-mod-mail libnginx-mod-stream
  libtiff5 libwebp6 libxpm4 nginx-common nginx-core
Suggested packages:
  libgd-tools fcgiwrap nginx-doc ssl-cert
The following NEW packages will be installed:
  fontconfig-config fonts-dejavu-core libfontconfig1 libgd3 libjpeg8
  libjpeg-turbo8 libnginx-mod-http-geoip libnginx-mod-http-image-filter
  libnginx-mod-http-xslt-filter libnginx-mod-mail libnginx-mod-stream
  libtiff5 libwebp6 libxpm4 nginx
0 upgraded, 18 newly installed, 0 to remove and 229 not upgraded.
Need to get 2461 kB of archives.
After this operation, 8202 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libjpeg-turbo8
amd64 1.5.2-0ubuntu5.18.04.1 [110 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-dejavu-core all 2
.37-1 [1041 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic/main amd64 fontconfig-config all 2
.12.6-0ubuntu2 [55.8 kB]
```

3. Create index.html and Install the desired software, e.g., Nginx.

```
echo "I'm the frontend server" > /var/www/html/index.html
service nginx start
```

```
root@ABC-SECURE-BITSTREAM-ACT:~# echo "I'm the frontend server" > /var/www/html/index.html
root@ABC-SECURE-BITSTREAM-ACT:~# service nginx start
```

## Create a frontend security group

To create a new security group for the frontend:

1. Click **Security groups** under Network, then **New security group**.
2. Enter **wk1000vpc-pubpriv-frontend-sg** as name and select the VPC you created earlier.
3. Add the following **inbound** rule using Add rule.

Protocol	Source type	Source	Value	Description
TCP	Any	0.0.0.0/0	Ports 80-80	This rule allows incoming connections on port 80 to the frontend server.

4. Edit interface and expand the private virtual server instance and activate the selection next to **primary** in the **Interfaces** column
5. Click **Create security group**.



VPC on Classic

Getting started

Overview

Compute

Virtual server instances

SSH keys

Custom images

Network

VPCs

Subnets

Floating IPs

Public gateways

Access control lists

Security groups

VPCs

Security groups for VPC

REGIONS

Dallas

New security group

Name	Default	Resource Group	Virtual private cloud	Rules	Attached Interfaces
agonizing-edge-spyglass-elastic-colony	✓	–	vpc-pubpriv	2	0
vpc-secure-bastion-sg	–	–	vpc-pubpriv	3	1
vpc-secure-maintenance-sg	–	–	vpc-pubpriv	5	2
vpc-secure-private-sg	–	–	vpc-pubpriv	0	1

Data updated 18 seconds ago

All security groups for VPC

New security group for VPC

Name

Virtual private cloud

Resource group

vpc-pubpriv-frontend-sg

vpc-pubpriv

Default

Rules

Inbound rules

Protocol	Source type	Source	Value
TCP	Any	0.0.0.0/0	Ports 80-80

Outbound rules

Protocol	Destination type	Destination	Value
----------	------------------	-------------	-------

Edit interfaces

Instance name	Interfaces	Subnet	Attached security groups
> vpc-secure-bastion-vsi	0/1	–	–
< vpc-secure-private-vsi	1/1	–	–
	eth0	vpc-secure-private-subnet	2

Order summary

United States

Security group

provided

Estimated monthly

\$0.00

Create security group

View docs

Get sample API call

Terms

Virtual Server

Virtual Private Cloud

Block Storage

6. Once the instance is created, click on **wk1000vpc-secure-private-vsi** and **reserve** a floating IP.

VPC on Classic

Virtual server instances for VPC

REGIONS

Dallas

New instance

Status	Name	Virtual private cloud	Private IP	Floating IP
● Powered On	vpc-secure-bastion-vsi	vpc-pubpriv	10.240.128.8	52.116.56.122
● Powered On	vpc-secure-private-vsi	vpc-pubpriv	10.240.129.9	–

Items per page: 10 | 1-2 items

Data updated 4 seconds ago

What do you want to do next?

Since you've already created a virtual server instances, you can add other services.



Overview  
Monitoring

All instances for VPC

**vpc-secure-private-vsi** Powered On

Dallas 3

Data updated 2 seconds ago

### Instance details

Name	vpc-secure-private-vsi
Virtual private cloud	vpc-priv
Resource group	Default
ID	34d5a4bf-86ad-47b4-9e8d-0e9e2a98fbbd
Created	August 5, 2019 8:52:39 PM
Location	Dallas 3
Profile	cc1-2x4
Size	2 vCPU   4 GB   1 Gbps
Image	18.04 LTS Bionic Beaver Minimal Install ubuntu-18.04-amd64
Provisioned SSH keys	vpc-ssh-key

### Boot volume

Name	Size	Max IOPS	MiBps	Encryption	Auto Delete
vpc-secure-private-vsi-boot	100	3000	46.88	Provider managed	Enabled

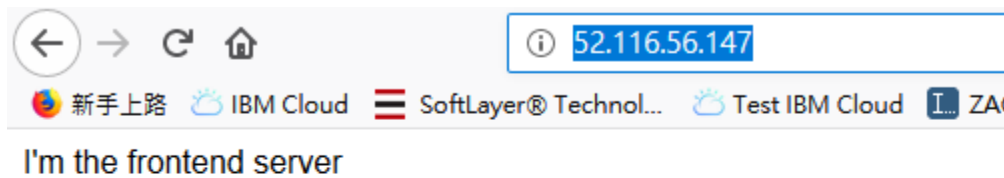
### Data volumes

There are no volumes attached to this instance.

### Network interfaces

Interface	Subnet Name	Private IP	Floating IP	Security Groups
eth0	vpc-secure-private-	10.240.129.9	<span>Reserve</span>	vpc-secure-private-sg vpc-secure-maintenance-sg

- Use browser to navigate the private host floating IP to see the index.html you created.



## Disable the maintenance security group

Once you're done installing software or performing maintenance, you should remove the virtual servers from the maintenance security group to keep them isolated.

- Navigate to **Security groups** and select **wk1000vpc-secure-maintenance-sg** security group.
- Click **Attached interfaces**, then **Edit interfaces**.
- Expand the virtual server instances and uncheck the selection next to **primary** in the **Interfaces** column.
- Click **Save** for the changes to be applied.

Rules  
Attached interfaces

All security groups for VPC

**vpc-secure-maintenance-sg**

ID: 2d364f0e-8b7d-42c3-8554-000001b45488

View docs

### Attached interfaces

Editing items

Instance name	Interfaces	Subnet	Attached security groups
vpc-secure-bastion-vsi	0/1 <input type="checkbox"/> eth0	vpc-secure-bastion-subnet	2
vpc-secure-private-vsi	0/1 <input type="checkbox"/> eth0	vpc-secure-private-subnet	2



## Remove resources

1. You can delete the security group directly and you would get the warning.



### Cannot delete vpc-pubpriv-frontend-sg

Before you can delete this security group, make sure that all network interfaces are detached, the security group isn't the default for any VPC, and the security group isn't referred to by any other security group rules.

2. In the VPC management console, click on **Floating IPs**, then on the IP address for your VSIs, then in the action menu select **Release**. Confirm that you want to release the IP address.

#### Floating IPs for VPC

REGIONS  
Dallas

Reserve floating IP

Status	Address	Location	Associated Device	
Associated	52.116.56.147	Dallas 3	vpc-secure-private-vsi - eth0	...
Associated	52.116.56.122	Dallas 3	vpc-secure-bastion-vsi - eth0	Unassociate Release Copy UUID
Associated	52.116.56.22	Dallas 3	Public gateway on vpc-pubpriv	

Items per page: 10 | 1-3 items

Data updated 24 seconds ago

3. Next, switch to **Virtual server instances** and **Delete** your instances. The instances will be deleted and their status will remain in **Deleting** for a while. Make sure to refresh the browser from time to time.

#### Virtual server instances for VPC

REGIONS  
Dallas

New instance

Status	Name	Virtual private cloud	Private IP	Floating IP	
Powered On	vpc-secure-bastion-vsi	vpc-pubpriv	10.240.128.8	52.116.56.122	...
Powered On	vpc-secure-private-vsi	vpc-pubpriv	10.240.129.9	-	Stop Reboot Delete

Items per page: 10 | 1-2 items

What do you want to do next?  
Since you've already created a virtual server instance, you can add other services.

4. Once the VSIs are gone, switch to **Subnets**. If the subnet has an attached public gateway, then click on the subnet name. In the subnet details, detach the public gateway. Subnets without public gateway can be deleted from the overview page. Delete your subnets.
5. After the subnets have been deleted, switch to **VPC** tab and delete your VPC.



---

When using the console, you may need to refresh your browser to see updated status information after deleting a resource.