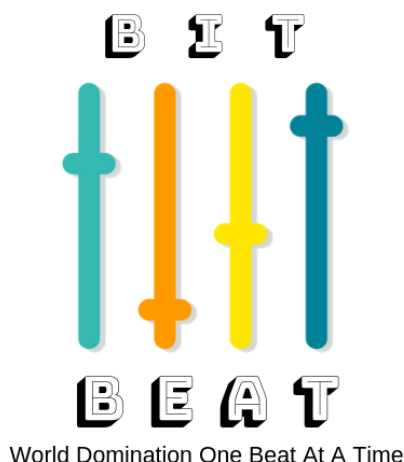


README



BitBeat is a new startup that is planning to take the record industry and the world by storm with our new product **BitBanger**, a web-based music mixer app.

As a BitBeat Cloud Support Engineer, you are hired to set up a cloud infrastructure. You have been tasked with creating a new virtual private network (VPN) with additional infrastructure services for a new segment of the company. Note, there are multiple ways to complete this task. In order to simplify the process, you will use the VPC Wizard in the Amazon Web Services (AWS) Management Console to complete this task.



BEFORE GETTING STARTED

Here's some important information to know before starting this hands-on activity.

Activity time: 60 minutes

Requirements: You must have an AWS Educate account. If you have not registered for an AWS Educate account, follow the instructions provided on [this page](#).

Getting help: If you experience any issues as you complete this activity, please ask your instructor for assistance.



DID YOU KNOW

You can also create a VPC using the VPC Wizard. Let's deepen your VPC knowledge and create a VPC using the VPC Wizard. You can use the Amazon VPC console wizard to create one of the following nondefault VPC configurations:

[VPC with a single public subnet](#)

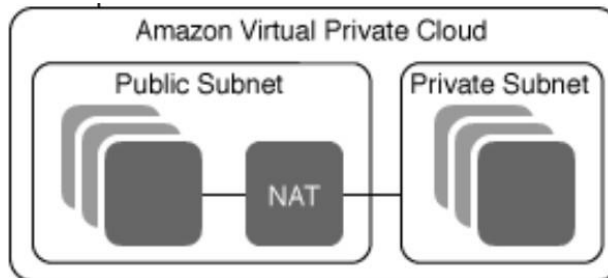
[VPC with public and private subnets \(NAT\)](#)

[VPC with public and private subnets and AWS Site-to-Site VPN access](#)

[VPC with a private subnet only and AWS Site-to-Site VPN access](#)

Task overview

You will use the VPC Wizard to create a virtual private cloud (VPC) with public and private subnets and other infrastructure services.



Task objectives

- Create a VPC
- Create a subnet
- Launch an Amazon Elastic Compute Cloud (Amazon EC2) NAT instance in a VPC
- Explore VPC configurations and attributes

Learning outcomes

- Build a VPC using the AWS VPC Wizard tool
- Create subnets and route tables and explain their role within a VPC
- Create a NAT instance
- Summarize the difference between NAT instance and NAT Gateway
- Explain what a main route table is and the associated yes or no in the AWS Management Console



Let's get started!

Use a VPC Wizard to create a VPC with public and private subnets

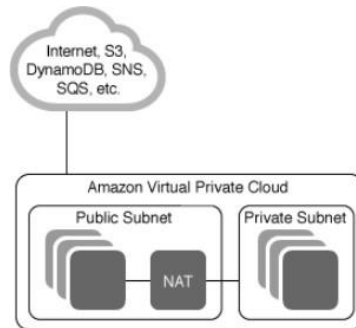
Steps:

1. Navigate to the VPC dashboard and click on the blue **Launch VPC Wizard** at the top of the page.
2. **Step 1: Select a VPC configuration.** Navigate to the left side of the page, select the option for the **VPC**

with public and private subnets. Take a moment and read the details about this option. Notice that you will be setting up a VPC with a /16 network and two /24 subnets.

Pro tip:

Do **not** delete your default VPC. You will **not** have the ability to recreate it if you delete it.



3. Click **Select**.
4. **Step 2: VPC with public and private subnets**
 - a. Give your VPC the name of BitBeat 200 VPC in the VPC name box.
 - b. Make sure your public and private subnets have the names of **public subnet 1** and **private subnet 1**.
 - c. Modify your public and private subnet's IPv4 CIDR:* to **10.0.1.0/24** and **10.0.2.0/24**.

(Note: Ignore the **⚠ Public and private subnet CIDR blocks overlap** message. It will go away once you've **correctly** modified your subnets with the correct subnet addresses.)
5. Click **Use a NAT instance instead** link, and then click **Create VPC**.

It should take a moment for your new BitBeat 200 VPC to create. While the VPC is being created, notice the resources being created within the dialogue box during creation.

The VPC Wizard automatically sets up your VPC subnets, route tables, routes, and Internet Gateway (IGW). With this selection, an Amazon EC2 NAT Instance has also been set up for you.



Reminder: When you register for an AWS account or set up an AWS Educate classroom, a **default VPC** is associated with your account and ready for its use. It's great for launching things like a personal blog or simple website. Since you want control over your infrastructure, you created a **non-default VPC** in the above steps.

Explore BitBeat 200 VPC Activity Part I

Now that you've created your VPC using the AWS VPC Wizard, let's explore the VPC and dive deeper into some of its attributes:

1. In the left navigation, click on your **VPCs**.
2. Click inside the small box and highlight the **BitBeat 200 VPC** you just created.
3. Take a moment to review the information about this VPC. Make sure you have a **VPC ID** and a **main route table**.
4. Write down or copy/paste the **VPC ID** and **main route table** information. Look for information that starts with **rtb-...** You will use this information later in this activity.
5. In the left navigation, click on **subnets** and notice your subnets have been created and named for you. Note that your **VPC ID | VPC** name is also visible under the VPC column header.
6. Again, in the left navigation, click on **route tables** then locate your **VPC ID**. You can sort your VPC ID by clicking the up/down arrow tick in the VPC ID column header.
7. Notice you have two route tables with two separate route table IDs within the **route table ID** column. These route tables have **no** and **yes** associated with them under the **main** column header.
What do you think this is for? Let's explore.



DID YOU KNOW

When you create a VPC, it automatically has a main route table. The main route table controls the routing for all subnets that are not explicitly associated with any other route table. On the **route tables** page in the Amazon VPC console, you can view the main route table for a VPC by looking for **yes** or **no** in the **main** column.





DID YOU KNOW

By default, when you create a nondefault VPC, the main route table contains only a local route. When you use the VPC wizard in the console to create a nondefault VPC with a NAT gateway or virtual private gateway, the wizard automatically adds routes to the main route table for those gateways.



1. When looking at route tables, what does the route table labeled **Main** – *Yes* mean?
2. When looking at route tables, what does the route table labeled **Main** – *No* mean?

Explore BitBeat 200 VPC Activity Part II

1. Click the **small box** that corresponds with your **route table ID** to highlight the row. Make sure you select the row with **no** in the **main** column header.
2. Click on the **routes** tab and take note of what you see.
 - a. Notice the 0.0.0.0/0 value for destination?
 - b. What looks familiar about the target route **igw-.....** ?
 - c. Where does this route go to?
3. Click on the **subnet associations** tab.
 - a. What subnet is this route table associated with? (*You may need to resize your column header to view.*)
4. Now that you've reviewed the **routes** and **subnet associations**, name the route tables. This can be done by clicking the **small box** that corresponds with your **route table**.
 - a. Hover your mouse pointer over the blank field just below the **name** header and notice a pencil icon will appear: 
 - b. After clicking the pencil icon, you will be provided a field where you can give your route table a name.
 - c. Insert the proper corresponding name(s) of public route table or private route table. (*You must click the  button to save your name. Failure to do so will not name your route table.*)
5. Repeat the above steps 1-4 again. This time select the row with the **yes** in the main column header.
 - a. Click on the **routes** tab and subnet and take note of what you see.
 - b. Click on the **subnet associations** tab.
 - c. What subnet is this route table associated with?
 - d. Make sure you name the route table appropriately.

Explore BitBeat 200 VPC Activity Part III



Reminder: When using the VPC Wizard, remember to select the [Use a NAT instance](#) link, not a NAT gateway.

1. In the left navigation, click on **Internet Gateways**.
2. Click the **small box** that corresponds with your VPC to highlight the row. Is it attached?

*(Console Tip: If you needed to detach an IGW, you would use the **Actions** → **Detach from VPC** option. Take a look at how this could be accomplished, but **do not** detach in this activity.)*



What is the difference between a NAT instance and a NAT gateway?

3. In the left navigation, click on **subnets** then highlight your public subnet.
4. Click on the **Actions** button then *Modify auto-assign IP settings*.
 - a. Notice: On this screen, you have the option to enable the auto-assign IP address setting to automatically request a public IPv4 or IPv6 address for an instance launched in this subnet. You can override the auto-IP settings for an instance at the time of launch.
 - b. Do nothing here. Make a mental note that this is where you can turn on/off auto-assign public IPs. You will use this in future cloud computing endeavors.

Great job!

Let's review

You have successfully created a VPC using the VPC Wizard option. It is important to know you have the option to manually create a VPC or you can have the VPC Wizard assist you. The VPC Wizard can save you time and auto set up many features you would have to do yourself if you choose to manually set up your VPC.

In this activity, you:

- Created a new Amazon VPC with the VPC Wizard
- Explored components and attributes of the VPC
- Explored the main route table
- Launched NAT instance

Test your knowledge

- ☐ What is a default VPC? _____
- ☐ What are some pros and cons of using the VPC Wizard?

- ☐ When creating a **non-default** or custom VPC, what information/routes is contained within the main route table? _____
- ☐ Is the non-default or custom VPCs **main** route table identified with a yes or no?

- ☐ What does the **no** under the **main** column header signify?

- ☐ Explain the difference between NAT instance and NAT gateway.

- ☐ What are some advantages and disadvantages for each NAT instance and NAT gateway? Which is preferred and why? _____

Bonus activity 1 - Architecture sketch

Using what you've learned in this activity, take a piece of paper (or use a whiteboard) and sketch out your VPC architecture. When you are done, take a picture and send it to your instructor.



Reminder

Make sure you add the following details:

1. VPC: Name, CIDR, route tables, IGW
2. Subnets: Name, CIDR, route tables
3. Other details you believe relevant and important.

Bonus activity 2 - Cloud hygiene

Now that you've completed this activity, it's time to practice good cloud hygiene and clean up your VPC and infrastructure. Make sure you delete your Amazon EC2 instance that was auto-created to support your **NAT instance** as well as delete the VPC you just created with the VPC Wizard.

Build an Amazon Virtual Private Cloud (Amazon VPC) Using the VPC Wizard Activity Guide

Assessments

Key concepts and terminology assessment

1. A default VPC is suitable for getting started quickly and for launching public instances such as a blog or simple website.
True
False
Say: A default VPC is suitable for getting started quickly, and for launching public instances such as a blog or simple website. Is this true or false? Explain your reasoning.
2. A range of IP addresses in your VPC is called an internet gateway.
True
False
Say: A range of IP addresses in your VPC is called an internet gateway. Is this true or false? Explain your reasoning.
3. A route table is a set of rules, called routes, that are used to determine where network traffic is directed.
True
False
Say: A route table is a set of rules, called routes, that are used to determine where network traffic is directed. Is this true or false? Explain your reasoning.
4. Which of the following are core concepts of Amazon VPC?
 - a. Subnet
 - b. Route table
 - c. Internet gatewayAsk: Which of the following are core concepts of Amazon VPC? Explain your reasoning.
5. You can use a network address translation (NAT) instance in a public subnet in your VPC to enable instances in the private subnet to initiate outbound IPv4 traffic to the internet or other AWS services, but prevent the instances from receiving inbound traffic initiated by someone on the internet.
True
False
Say: You can use a network address translation (NAT) instance in a public subnet in your VPC to enable instances in the private subnet to initiate outbound IPv4 traffic to the internet or other AWS services, but prevent the instances from receiving inbound traffic initiated by someone on the internet. Explain your reasoning.

Build an Amazon Virtual Private Cloud (Amazon VPC) Using the VPC Wizard Activity Guide

6. Use a network address translation (NAT) gateway to enable instances in a private subnet to connect to the internet or other AWS services, but prevent the internet from initiating a connection with those instances.
True
False
Say: Use a network address translation (NAT) gateway to enable instances in a private subnet to connect to the internet or other AWS services, but prevent the internet from initiating a connection with those instances.
Explain your reasoning.
7. When you create a default VPC, the main route table contains only a local route.
True
False
Say: When you create a default VPC, the main route table contains only a local route.
8. On the Route Tables page in the Amazon VPC console, you can view the main route table for a VPC by looking for a Yes in the Main column.
True
False
Say: On the Route Tables page in the Amazon VPC console, you can view the main route table for a VPC by looking for a Yes in the Main column.
9. One difference between a NAT gateway and a NAT instance is that a NAT gateway is managed by AWS whereas a NAT instance is managed by you.
True
False
Say: One difference between a NAT gateway and a NAT instance is that a NAT gateway is managed by AWS whereas a NAT instance is managed by you.

Build an Amazon Virtual Private Cloud (Amazon VPC) Using the VPC Wizard Activity Guide

Task assessment

1. When you want control over your infrastructure, you should use the default VPC associated with your account.

True

False

Say: When you want control over your infrastructure, you should use the default VPC associated with your account.

2. When you create a VPC, it automatically has a main route table.

True

False

Say: When you create a VPC, it automatically has a main route table. Is this true or false? Explain your reasoning.

3. On the route tables page in the Amazon VPC console, you can view the Main route table for a VPC by looking for a yes or no in any of the columns.

True

False

Say: On the route tables page in the Amazon VPC console, you can view the Main route table for a VPC by looking of a yes or no in any of the columns. Is this true or false? Explain your reasoning.

Build an Amazon Virtual Private Cloud (Amazon VPC) Using the VPC Wizard Activity Guide

4. NAT gateways are a managed NAT service that provides better availability, higher bandwidth, and requires less administrative effort.

True

False

Say: NAT gateways are a managed NAT service that provides better availability, higher bandwidth, and requires less administrative effort.

Is this true or false? Explain your reasoning.

5. For common use cases, it is recommended that you use a NAT instance rather than a NAT gateway.

True

False

Say: For common use cases, it is recommended that you use a NAT instance rather than a NAT gateway. Is this true or false? Explain your reasoning.

Performance-based assessment

Have students build an Amazon Virtual Private Cloud using the VPC Wizard.

As students create their VPCs, have them document their work with a diagram that includes labels and captions.