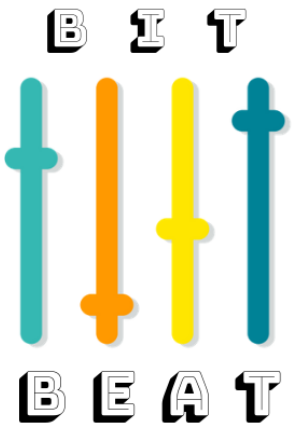
Build an Amazon Virtual Private Cloud (Amazon VPC) Using the VPC Wizard

README



World Domination One Beat At A Time

BitBeat is a new start-up 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 with additional infrastructure services for a new segment of the company. Be aware that there are multiple ways to complete this task. In order to simplify the process, you will use the VPC Wizard in the AWS Management Console to complete this task.

Because we are not able to complete the lab with our AWS Educate permissions, this assignment is now optional. You have until the final day of class to complete this optional assignment. If you choose to proceed, I'd like you answer the "Test Your Knowledge" questions at the end of the document. You can simply answer the questions and load your answers in the assignment dropbox. I will take a look at these at the end of the semester. If you complete this, you can receive four (4) extra credit points for your overall point count. Again, this is optional. Please let me know if you have questions.

BEFORE GETTING STARTED

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

Activity time: 60 min

Requirements: You must have an AWS Educate account.

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
https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Scenario1.html

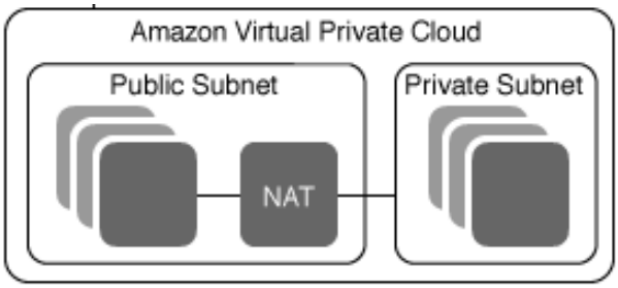
VPC with public and private subnets (NAT)
https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Scenario2.html

VPC with public and private subnets and AWS Site-to-Site VPN access
https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Scenario3.html

VPC with a private subnet only and AWS Site-to-Site VPN access
https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Scenario4.html

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

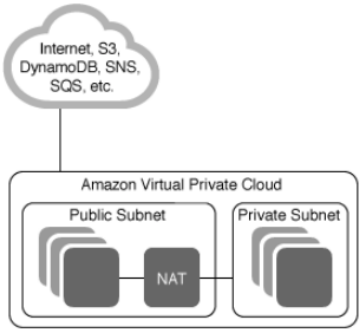
- Build a VPC using the Amazon Web Services (AWS) VPC Wizard tool
- Create subnets and route tables and explain their role within a VPC
- ~~Create a NAT instance~~
- Summarize the difference between NAT instance and NAT Gateway
- Explain what a main route table is and associated yes or no in the AWS 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 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 any ability to re-recreate it if you do 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.)*

It should take a brief moment for your new BitBeat 200 VPC to create. While the VPC is being created, notice the resources being created within the dialoged 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 to note you have a **VPC ID** and a **main route table** that have been created for you.
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 simply clicking the up/down arrow tick in the VPC ID column header.
7. Notice you have two route tables with two separate route table ID's 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 use the Use a NAT instance link. Do not use the NAT gateway link in this activity.

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.

DO YOU REMEMBER When using the VPC Wizard you selected the Use a NAT instance link instead of using a NAT Gateway? What is the difference between a NAT Instance and a NAT Gateway?

NAT Instance - https://docs.aws.amazon.com/vpc/latest/userguide/VPC_NAT_Instance.html
NAT Gateway - https://docs.aws.amazon.com/vpc/latest/userguide/vpc-nat-gateway.html
Comparison of NAT Instance and NAT Gateway
https://docs.aws.amazon.com/vpc/latest/userguide/vpc-nat-comparison.html

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 out 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.