# GitHub Repo:

# [louisemacbride/IaC\_Ass1\_Repo: This is repo for Assignment 1. (github.com)](https://github.com/louisemacbride/IaC_Ass1_Repo)

# Conclusion:

For this assignment, I have designed and created an automated process using an AWS CloudFormation Template for developing a mini network for a small company using a private application server. During the design stage, many elements of the DevOps Framework were considered to ensure network would be secure, highly available and reusable. This is essential for future use of the template in case the company expands and plans to add more servers to their network.

There are many advantages to using the DevOps framework when developing software such as streamlining processes, greater business scalability and Automated Quality Assurance. (www.objectivity.co.uk, n.d.) By using AWS and its many features we can achieve these benefits effortlessly. A high quality of software can be guaranteed when using the DevOps approach and is seen as a core objective, resulting in failure of the DevOps approach, should high standards of quality not be maintained. (Kumar Yamjala, 2017) The quality of the software will be checked continuously throughout the process as a result of the continuous integration approach that is taken when developing the software. By using AWS, teams can choose which Operating Systems they would prefer to use and easily customise these to their needs. Companies may choose to use a Linux OS because of its security, and it is open source, or may decide to choose a windows OS because it is easier to navigate and more user friendly. (IONOS Digitalguide, 2019)

During the design process of this network, I began by deciding what the company requires and how that could be implemented. I understood that they required a private application server which would need a Bastion Host server in a public subnet, having access to the internet to be able to access the company’s private app server. I decided to start by creating a VPC for the company to host these servers. This will provide the business with growth ability to add more resources as needed and as a VPC is an isolated network, the company will have higher security and full control over who can access these resources. (www.ibm.com, 2019) Inside the VPC, I decided to create a public subnet and a private subnet, this is to host the bastion host with access to the internet in the public subnet and allow traffic to pass through to the private subnet that contains the EC2 app server. When deciding on IP Addresses to assign to the VPC, Subnets and servers, many elements were taken into consideration such as the size of the network, the possibility of growth and whether it was being assigned to a public or private resource. An IPv4 CIDR block was assigned to the VPC, with IP address 10.0.0.0/16. The IP address is a private address, meaning it cannot be accessed by the internet directly, but used by the resources in the VPC to communicate with each other. (docs.aws.amazon.com, n.d.) 16 was chosen as the CIDR block as this accounts for the number of IP addresses available to us for use in this VPC. By choosing 16, this means there will be 65,531 addresses available for use. (P, 2015) This allows for large scalability within the company should they experience high levels of growth. Once the IP address has been assigned to the VPC, this is used to choose the IPv4 CIDR Block of the subnets and instances within the network. The subnets were assigned with 10.0.0.0/24 and 10.0.1.0/24. Having 24 at the end reduces the number of addresses available within those subnets, but still leaves more than enough that this company may need for growth. As the VPC has a private IP address assigned to it, I attached an internet gateway to the VPC to allow for access to the internet by the public subnet. For the purpose of reliability in the network, an Elastic IP address was also assigned to the public instance to allow the instance to be seen by the outside network.

I decided to assign the subnets to two availability zones, this is to allow for high availability of the applications in a region. By separating the subnets into two availability zones, there are advantages such as a highly resilient network and isolating the availability zones from failures within other availability zones. Although a complete failure of an availability zone is rare, having multiple availability zones in a VPC means a company’s applications can withstand this. (docs.aws.amazon.com, n.d.)

To provide security to the network, security groups were created for each the public subnet and private subnet. Creating a security can allow the company to determine who they will allow access the servers. In this template I have allowed the user to input a custom IP address of the workstations that will need access to the server. As this is a bastion host, access to the global public is not needed and so taking the approach of allowing only certain workstations access is a much safer and more secure option. The port selected here is 22 as this is the port for SSH access to Linux servers. SecurityGroupEgress is also defined to allow internet access outwards from the server.

This network has been created to allow for future scalability and addition of resources as the company needs. There are elements of reusability such as separating out the templates for creation of the resources and using parameters and mapping within the templates. This will make it convenient in the future if the company needs to make changes to just one resource such as the addition of a new server, without needing to relaunch the VPC, subnets and security again. The user can simply add in the resource and assign it to a subnet depending on their needs. The use of parameters allows for the user to select resources that already exist in the system, and define custom needs, such as an IP address. The use of mapping lets users customise the specifications of their resources, depending on parameters they may have chosen or defined in the template launch process.

# References

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# Appendices:

Graphical user interface, text, application, email

Description automatically generated

Fig 1. Testing first template with resources

Graphical user interface, text, application, email

Description automatically generated

Fig. 2 showing creation of VPC.

Graphical user interface, text, application, email

Description automatically generatedFig. 3 Launch of all resources in 1 template

Graphical user interface, text, application, email

Description automatically generated

Fig. 4 Final Launch of template with VPC, subnets and route table

Graphical user interface, text, application

Description automatically generated

Fig. 5 Final Launch of Security Groups

Graphical user interface, text, application

Description automatically generatedFig.6 Final Launch of EC2 Instances and ElasticIP

Graphical user interface, text, application, email

Description automatically generated

Fig. 7 Bastion Host with elastic IP and Security Group.