Developer Operations
Assignment 2

Objective

The objective of the second assignment is to demonstrate the deployment and automated management of a load-balanced auto-scaling web application in your AWS Academy account.

Core assignment specification

Your demonstration should include the following:

1. Creation and configuration of a "master" instance of a web application. You may choose any web application, ideally one that relies on a third party or backend service. Note: any backend services/databases chosen should require minimal resources, e.g. use of **nano** instances and small amounts of storage. At a minimum you should implement auto-scaling of the application server and discuss issues relating to the scaling of a backend if you don't implement one.
2. Creation of a custom AMI based on your master instance, to be used by EC2 auto-scaling within your VPC infrastructure.
3. Creation of a VPC with subnets into which your application will be deployed. Creation of suitable security groups.
4. Creation of an elastic load balancer. Creation of a launch template based on your custom AMI. Creation of an auto-scaling group based on your launch template and linked to your load balancer.
5. Configuration of dynamic scaling policies (using simple or step scaling) based on CloudWatch alarms to cause an increase in resources when required and also a decrease in resources when conditions return to normal. You must justify your choice of metric(s) in your report.
6. Generation of test traffic to the load balancer – e.g. using curl/wget or a web testing tool.
7. Show that the load is distributed across more than one web server – e.g. by viewing web server or other logs. Include screenshots and a brief explanation in your report.
8. Use of your own script to monitor custom metrics on your servers and push these to CloudWatch. For example this could be web server or other server logs, or OS activity (CPU, memory, disk, number of processes, etc).

Additional functionality (at least one)

The above is the core assignment specification. In addition you are expected to explore one or more other tasks. The following are some examples of additional tasks:

- Use one or more security services.
- Automate the basic specification, or part of it, using Python/boto.
- Install/Integrate a database on EC2 instance(s) in private subnet(s) with an App Frontend.
- Capture your configuration using your own customised Cloud Formation script
- Use AWS Lambda functions in your architecture solution.
- Implement a secure load balancer
- Scaling based on SQS

Deliverables

- **Report** providing a description of implementation
  - You should introduce the document with your own customised architecture diagram and an explanation of this in your own words. You can create this diagram using *draw.io*. This link includes AWS icons: https://www.draw.io/?splash=0&libs=aws4
  - Mark each step of the core functionality clearly in the report with appropriate headings/numbering. Use screenshots and briefly explain what is happening at each step. Do NOT provide a click by click description of setting up your configuration.
  - Provide a table of contents; label, refer to and describe each screenshot included.
  - Provide details on any additional functionality that you implemented.
- Any associated **scripts**.
- Completion of **Excel template** outlining extent of completion of each step (second worksheet tab in Excel file provided on Moodle).
- **Demonstration/review** in Week 10 remotely. Schedule to be published later.

Upload format

ZIP archive containing report in PDF format, completed Excel template and any associated scripts.

Marking scheme:

- 60% Core functionality – as specified
- 20% Additional functionality – to your own specification (at least one "extra")
- 20% Document and presentation quality

Late submissions will be subject to a penalty of 10% plus a further 2% per day after the deadline.

WARNING re durability of AWS Academy accounts

The Learner Lab AWS accounts provided by AWS Academy have no durability guarantees. It is possible that your account could we wiped/reset at any time – this has happened in the past where students have done certain activities that raise an alarm (for example running too many instances at the same time). For this reason, it is very important that you are able to recreate your AWS configuration in a new account if needed. Please make your own notes and screenshots as you are working on the assignment.