Name: Michelle Beard
StudentID: 1178110

Exercise #1

1. List two commercial examples for each cloud service model.
    a. IaaS
        i. Google Cloud Platform <https://cloud.google.com/>
        ii. Docker < https://www.docker.com/>
    b. PaaS
        i. Heroku < https://www.heroku.com/>
        ii. Google App Engine < https://cloud.google.com/appengine/>
    c. SaaS
        i. Slack <https://slack.com>
        ii. Atlassian Suite < https://www.atlassian.com/>

2. Associate each item below with the cloud service model that best matches the item.
    a. IaaS: <a, b, g, h, k, m>
    b. PaaS: <d, e, f, l>
    c. SaaS: <c, i, j>
3. What is the major advantage of containers over virtual machines? What is the major advantage of virtual machines over containers?
    a. Containers share the same host OS and kernel (can run any software that runs on that kernel). For example it is not possible for a Windows container to run on a Linux host and vice versa. This results in lightweight kernels that can startup in a few seconds.
    b. Virtual machines with different operating systems can run on a single server. This allows administrators and developers to run multiple VMs in a single server. However, it is up to the system administrators to manage each VM host operating system (security patches, software provisioning, etc.).

Exercise #2

- ProjectID: stone-door-180117

Exercise #3

3. Your first cloud application
    a. URL: https://stone-door-180117.appspot.com/
    b. What did I not understand? I thought this was a pretty easy exercise except for some out of date instructions due to changes in how applications are deployed in the Google App Engine environment. I do have a question regarding the best way to follow the MVC pattern

with Google App Engine, especially in the app.yaml file. For example, if I want to separate my routes from business logic, I would place the logic in a controller's module and store the routes in a single app.py script and import all my business logic in that file. I see that as an easy way to update my routes by only changing one file instead of touching all my controller modules to update the routes. Is that feasible solution and common in the Google App Engine space?

Exercise #4

- https://github.com/mooshu1x2/cloud_computing/tree/master/01/docstats

Exercise #5

- Question: What is a pros/cons for a horizontal scaling system? Vertical scaling system?
- Answer:
  - Horizontal: Refers to adding more compute resources by purchasing new machines.
    - Pros: Adding a new node (physical machine) is relatively inexpensive.
    - Cons: Ensure your application can horizontally scale (cannot rely on data stored in a specific location in memory on a server).
  - Vertical: Refers to scaling up on hardware and resources on same physical machine.
    - Pros: Can execute large problem sizes on machine (e.g. graph processing requires the graph to be held in memory – parallelism difficult across machines).
    - Cons: Expensive approach since increasing the system resources on a dedicated compute node.