**Northeastern University – Silicon Valley**

CS 6620 Cloud Computing

**Midterm Exam** [100 points]

This is an open book exam. Pen and paper preferred. Scan answers to PDF. Duration: 150 min.

Answer all questions, with brief but complete explanations. K*eep your answers concise and to the point. Please write legibly. Write your name on Page 1. Please use Dagrams to explain design. Avoid copy-paste. Do not refer to the Web resources, refer only to class notes and textbook.*

Consider the basic e-commerce web application you’ve learned about. Provide a basic architectural diagram for this web app, identifying all key business components you need to provide.

1. If this e-commerce web app from #1 is built as a Java Web App, and you can use only VMs your IT department is hosting but not the Amazon AWS or any other public cloud, how would you design the infrastructure for this app? How would you deploy the app? What are the disadvantages of this approach if you want to rapidly grow your e-com startup? **[15 points]**
2. Explain how IaaS can be used to host ththe same e-commerce web app. Which components of AWS will you use for this design? What are the advantages of this cloud model? **[7 points]**
3. Why do you need a Load Balancer in an IaaS cloud? Why do you need it in a SaaS platform? What are the different functions it serves in each case? How is it different from a Message Queue? **[8 points]**
4. In a public cloud, what is multi-tenancy? Explain using an example. How do you design for isolation in multitennacy using VPN, VPC and VLAN? Please explain the differences among these three. **[15 points]**
5. In the context of the above e-commerce web app, what is meant by State of the app? What are REST web services and provide an example of how they are used for this app. What are Microservices and how are they different in this context? Which one would you prefer in your design? **[15 points]**
6. How is Serverless cloud computing useful for hosting this e-commerce web app? How is it diferent from the IaaS and SaaS models from the above questions? What are its advantages and disadvantages? **[15 points]**
7. What is the diference between an API and an API Gateway? Why do you need the latter? **[10 points]**
8. What are the different models of hosting a structured (SQL) Database as a part of a web app for multiple tenants on a SaaS (App) platform? Discuss the relative davantages and drawbacks of each. Which AWS storage service would you use for this hosting? **[15 points]**