Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Your grade will be based on the best 3 answers of these four problems.

Attach your answers in this word document.

Email me your answers and make sure I receive your email before you leave.

Problem 1. Cloud Computing. Netflix Selects Amazon Web Services to Power Mission-Critical Technology Infrastructure. 5/7/business wire. <http://phx.corporate-ir.net/phoenix.zhtml?c=176060&p=irol-newsArticle&ID=1423977&highlight=>  
“Netflix is leveraging many different AWS services today for a variety of mission-critical workloads, including:

* **Delivering content to members faster and on more devices**: Netflix is utilizing the Amazon Elastic Compute Cloud (Amazon EC2) and Amazon Simple Storage Service (S3) to transcode and store the movie subscription service's growing movie content library for delivery on new platforms, including the Nintendo Wii and the Apple iPad. The flexibility and scalability of AWS allows Netflix to utilize vast numbers of servers to transcode and store TV episodes and movies into new formats quickly, and AWS pay-as-you-go pricing ensures that Netflix pays only for resources used. Netflix can do all of this without being exposed to the costs and burden of maintaining large amounts of infrastructure that go underutilized.
* **Maintaining a highly available and resilient member-facing website:**Netflix runs several of its website application functions on AWS, and is rapidly migrating more of these components to AWS. The important functions migrating to AWS include the delivery of movie and member metadata within the Netflix website. Using this data, Netflix is able to continue developing a more accurate recommendation engine, ensuring that Netflix members receive the TV episodes and movies they want, when they want them.
* **Analyzing data to improve streaming quality:** Netflix is using Amazon Elastic Map Reduce to analyze streaming sessions and extract business metrics around performance, viewing patterns and more, which enables Netflix to continue to improve the quality of streaming.”

1. What instances would you recommend to Netflix to reserve for the transcoding and storing of TV episodes? What will be the price for three years of operation? Make your own simplified assumptions.
2. Assume Netflix has contracts with TV program producers at different countries and perform transcoding at different regions, then exchange the different formats based on the subscriptions among regions. What are specific charges in their system which we did not consider important in our hw4?
3. Why Netflix does not use CDN such as Akamai for their streaming services? Named two main reasons.

Problem 2. Wireless Sensor Networks (WSN).

1. What is the in-network processing?
   1. Explain how it can save power consumption in WSN.
   2. Given an example where it can improve the performance of WSN in terms of measurement accuracy.
2. What is the unique communication pattern in WSN that was different from unicast, broadcast, and multicast?
3. Assume every sensor has GPS device built-in and can report their locations to all its neighbors or the sink node, propose a cluster formation algorithm that will take advantages of this new information. Provide two versions: a centralized version where the sink node decides the membership of clusters, and a distributed version. Mention the basic steps to be considered in each of these two algorithms. Be concise.

Problem 3. Content Switch

1. What impact on the performance of a content switch?
2. How can we speed up the performance of a content switche?
3. What is TCP delayed binding? Name two ways to improve it?
4. Why the current browser cannot pipeline (send concurrently) the embedded requests through the same TCP connection?

Problem 4. Answer only three of the following eight questions related to the semester projects.

1. Wireless Sensor Network Adaptations by George Mudrak:
   1. What additional parameters George considered in his research which I did not cover in class?
2. Boxgrinder and OpenStack, by Abdullah Sheneamer and Hitham Ennajah:
   1. How many different platforms Boxgrinder support?
   2. What programming language was Boxgrinder written?
   3. What is the relationship between Boxgrinder and OpenStack?
3. Disaster Relief by the Pound, by Robin Kimzey adn Cliff McCullough:
   1. What is Pound?
   2. Does it support high availability?
4. Protocol Dispute: Choosing the right tools for an API, by Tyler Sparks:
   1. Between JSON and XML, which one is faster?
   2. Between JSON and XML, which one is more extensible?
5. RDF: Building Block for the Semantic Web, by James Ellenberger.
   1. List the four technologies used to encode semantic webs.
   2. What are the three components of a RDP based semantic web statement?
6. SNMP auto LVS balancing, by Jason Liptak:
   1. What information was collected by SNMP on real servers?
   2. What is the main advantage of using SNMP in this project?
7. Bandwidth Mitigation Strategies for Real-time Client-Server Applications at the Application Network Layer, by Daniel Michaelson:
   1. What strategy is the most effective in this project?
8. Securing Web Services with SAML, by Carl Foster:
   1. In SAML, what are the two basic ways web services interact?
   2. What is SSO service?