

SE480 – Software Architecture I Autumn 2018 Homework 1 Due Date: September 16, 2018 11:59PM 100 points possible. Will be scaled to 10% of final grade. Submit your answers to D2L by September 16, 2018 11:59PM. Late homework will not be accepted.

This assignment will require you to read Adrian Cockcroft's presentation Globally Distributed Cloud Applications at Netflix and Malan and Bredemeyers paper Software Architecture: Central Concerns, Key Decisions (also available on D2L).

- 1. (20 points) Malan and Bredemeyer (M&B) outline several important architectural decisions that need to be made for a system. They refer to the first one as System Priority Setting which means that for complex systems an architect needs to decide where to excel. Based on Adrian Cockcroft's presentation, what are the areas that Netflix has decided to excel in? Explain your answer.**

Ans: the areas the Netflix decide to excel in are business, market, technology and challenges and impediments. For the business, Adrian Cockcroft talks about their business strategies, they are using Amazon web service as their cloud provider, and then Netflix uses their own technologies to improve the performance of their streaming pipeline based on basic features of AWS. For market, it shows how their applications features to attract and meet customers' needs like personalization driven for their members, and how many supplier for devices could use Netflix services. For the technology, there are a timeline since 2009 to 2011 to show up how the technology trends go, for examples big Data, AWS cloud, NoSql and so on, and how Netflix deployed on AWS like logs, content, API and so on. For the challenges and impediments, Adrian Cockcroft talks about failure modes and effects, how the current architecture pattern for availability to solve impediments in real world problem, including their design pattern and testing diagrams.

- 2. (20 points) Based on M&Bs notion of System Properties and Cross-Cutting Concerns, can you identify any cross-cutting concerns? Describe ONE of them. What evidence (reason to believe) do you have that this is cross-cutting?**

ANS: based on the M & B paper, we simply can understand that a cross-cutting concerns are those concerns which could affect not just isolated part of an architectures, they will affect entire part of architectures. For example, one of cross-cutting concerns is security, I believe most of system will be considering security concerns, what's security concern? For example, prevent unauthorized access to systems, it simply can be understood as the house door only allow correct key to open it. And the security concern will affect the whole systems, because when the architects to design the system architecture, they want the system go fast and users could use fewer steps to use their systems, but for the security concerns, architects, developers will not let users do simple and fast avoid security impacts. And the security concern will be still existing in every

part of system architecture. That's why I believe the security is one of cross-cutting concerns.

- 3. (20 points) In the past, Netflix required nearly all teams to exclusively use Java for service and component development (although there have been recent moves towards a polyglot ecosystem). Evaluate the requirement that all teams use Java from the perspective of M&B's minimalist architecture principle. What are the advantages and disadvantages of a monolingual ecosystem? Why do you think Netflix is moving towards polyglot development? Do you agree with their decision?**

ANS: From the M & B's minimalist architecture principle, there are three principles for minimalist architecture principle. If the Netflix all teams use java for service and component, for the first principle that it's not easy for Netflix to defer it to a person or team. For the second principle, it doesn't meet the requirement that qualities of properties of systems will have board impact across the system. For the last principle, Netflix meet the requirement of minimalist architecture when all its teams are using java for service.

The advantages of a monolingual ecosystem, I believe that it's that it's much easier for all the teams in Netflix to communicate with each other and help system to work together to fix bugs, code products as quick as possible, the disadvantages will be that the Netflix ecosystem is not open, so those users which are not using java related platform will not consider about Netflix. Why the Netflix moves to polyglot development, I think first the growing of non-java is fast, like python and other programming languages. Netflix will not ignore those users for more profits. Secondly, polyglot development will trigger those developer to rethink the process of design and maintenance for the Netflix Stream pipeline. And my answer is yes, I totally agree with their decision.

- 4. (20 points) Netflix was an early adopter of, and continues to embrace, the public cloud (Amazon AWS), whereas some companies like Apple & Dropbox are moving away from the public cloud. List at least three advantages of using the public cloud, and three reasons of moving away from the public cloud. Do you agree with Netflix's decision to remain with the public cloud (provide detailed reasoning)?**

Ans: three advantages of using the public, first, Netflix will not need to spend a lot to build their private data center, it's a lot of cost savings, secondly, Netflix can enjoy AWS's top technologies without develop their own technologies. Thirdly, public cloud will not limit Netflix's hardware performance based on their own hardware.

Three reasons of moving away from the public cloud. Firstly, it will be security issues, since AWS is associated with plenty of companies and Netflix data transfer are mostly based on wireless transfer, it's less secure. Secondly, Netflix can't customize their own cloud services since they are using Amazon's web services, so base features of cloud

service are designed by Amazon. Thirdly, the stability of your own company is based on the public cloud provider, for examples, the Netflix is using AWS, so when Amazon web server down, it will make Netflix down. There are no correct answers for picking up public cloud or using private cloud. But for Netflix company, I will agree with Netflix to remain with the public cloud, because Netflix is a streaming company which provide streaming services for tv shows, the security concern will be not their main concern, the streaming speed is the key, so Netflix could use Amazon's technologies for cloud to support its streaming speed. And incomes of Netflix is mainly by the amount of users, so Netflix will concentrate to increase the number of users not to spend lots of money to build their own private cloud data center.

5. (20 points) What was your most important take-away (i.e. lesson learned) from Cockcroft's presentation?

Answer: the most important things I learn from Cockcroft's presentation, I believe it's the architecture pattern of Netflix they using right now to solve different issues in real world, like how Netflix improve the availability, for examples, Netflix is using three balanced availability zone to solve outage problem, to solve when the client is at a large latency, how to improve this client's experience by design a good architecture pattern to achieve the goal. By studying the case of Netflix, we understand how a cloud-application company like Netflix develop their architecture design based on their own conditions.