CIS*4010 Fall 2020 Final Exam

Cloud Architecture Design Task

Background

There is a Computer Science department at a major university that accepts at least 200 new students per year. Each student is assigned a user login id when they enter their program. Currently the department is hosting their own servers on premise but like that Cloud hosting might be the ticket! Your job is to write a proposal for a Cloud architecture that fits their requirements.

Requirements

- Can be on any public Cloud platform. Preferrable if the storage and compute can be in Canadian data centres.
- Price is important – obviously one of the criteria for selecting the Cloud platform is price.
- Functionality includes:
    - VMs will come in two flavours: Windows (latest version) and Linux (Debian, latest version). If the latest versions are not available then it should be discussed why the Cloud platforms VM offers are sufficient for the department's teaching mission.
    - Linux VMs should be able to deploy Docker containers but should also have a selection of software that includes programming languages such as C, C++, Java, Python, Perl, Go, Scala, etc. as well as the RDMS's MySQL and Postgres. Faculty will wish to have various software packages installed and this should be easy for the system administrators to handle.
    - Windows VMs should be able to deploy Docker containers but also should support Visual Studio and the same set of languages and databases that Linux provides. Faculty will wish to have various software packages installed and this should be easy for the system administrators to handle.
    - Each student should be able to authenticate with their student central login ID and password and they should have their own Linux and Windows files.
    - Student files should be maintained for as long as the student is taking courses and for 1 year after their last enrollment.
        - File storage should take advantage of the Cloud platforms different types of storage for lowest cost and greatest availability.
    - Obviously, everything should have a backup (particularly student accounts)
    - The load on the compute systems must be balanced so that the system expands to maintain appropriate response times when many students are using the

system (think the night before an assignment is due) while releasing unneeded resources to save money.
- Monitoring of the system for load, security, and costs should be provided to the system administrators.

Design Document Format

Your Cloud architecture and services document should address each requirement and provide all criteria used to select items such as Cloud platform, Cloud services, storage and compute strategies, monitoring services, and security. You should also provide alternatives for some items if there are multiple choices that are appropriate and should be considered by the client.

Submission Instructions

Put all of your answers in a single document and submit your document in PDF format to the appropriate Dropbox on CourseLink. This document should not be any more than 10 pages long. Any material after page 10 will not be read. Most responses will be from 5-10 pages in length.