**Student Name:** **Weight: 40%**

**Student ID:** **Marks:** **/110**

# Project: WIT Cloud Transformation

## Introduction

The Western Institute of Technology (WIT) is a polytechnic college similar to SAIT, NAIT, and BCIT. Currently, WIT operates a data centre at its main campus in Calgary, along with several individual servers at its branch sites in Edmonton and Lethbridge.

However, the existing data centre is aging, prompting the IT department to explore cloud computing options and develop a hybrid system. Their objective is to identify which services can be migrated to the cloud and determine the optimal setup.

WIT is interested in the following considerations and features for their new system:

* Saving money
* How users should be organized and authenticated
* Which services should stay on-premises, and which should go to the cloud
* Minimizing requirements of their on-premises windows servers
* How to connect the data centre to the cloud securely
* How to secure all student and employee data
* How to monitor everything and how to build in fault tolerance and data recovery
* How to enable students to register from anywhere in the world quickly and easily

You and your three colleagues have been assigned the task of creating a test project to demonstrate how these services could function within the WIT environment. Additionally, based on your tests, you are expected to provide recommendations. Your responsibilities include building test models for the described services, incorporating necessary security, fault tolerance, monitoring, and disaster recovery measures, and estimating the monthly cost associated with implementing these services.

By fulfilling these requirements, you will showcase the viability of the proposed cloud-based solutions for WIT while addressing their specific needs and concerns. Additionally, your recommendations will guide the IT department in making informed decisions regarding infrastructure upgrades and cloud adoption.

## Project Deliverables

1. Working in groups of four, as directed by your instructor, review the scenario and the *Project Details* section below.

* Complete the following deliverables:
* **Diagrams:** Based on WIT’s requirements, create a single group document with diagrams for the following:
* Entra ID Layout
* Network Drawing
* Management Groups/subscription group/resource group/resources layout
* This should include RBAC permissions
* Recommended cloud connection

**Demonstration:** Create a video of no more than 20 minutes. It should demonstrate the operations, configurations and features of your recommended solution as defined in the rubric. All group members must participate equally in the demonstrations.

Submit one copy of the drawings and video per group. There is no written document

* **Team Log:** To help ensure that each group member contributes equally, you must create and maintain a weekly team log. If a member of the team complains to the instructor at the end of the project that other members did not do a fair share of work, the weekly team log will be used to evaluate the contributions.
* The log should be a single, shared document.
  + The log is due every Monday morning at 9:00 am, starting Week 10.
  + Update the log it every time you do project work. Don’t summarize several days of work at a time.
  + The log should be organized simply, with the date, duration, who did the work and what they did.

For example:

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Duration** | **Who** | **Work Completed** |
| 2 Oct | 2 hrs | Ahmed | Researched Azure-to-Azure disaster recovery architecture using these documents/sites:   * Article 1 * Article 2 |
| 3 Oct | 1.5 hrs | Yu | Created layer 1 Visio drawing for internal network |
| 3 Oct | 1 hr | Lisa | Team progress meeting – I demonstrated the virtual machine scale set and suggested we use E5 size |

## Project Details

#### WIT Organization

The college has four school and four departments.

* School of IT
* School of Business
* School of Health
* School of Hospitality
* IT Department
* Facilities Department
* Administrative Department
* Academic Services Department

The following diagram lists the staff and students associated with each area.



#### 

#### Services to Test

* File shares and Blob Storage
* Forms and documents – owned by administrative services
  + Ensure tiering is setup to reduce storage requirements on local servers
* Lecture videos – owned by academic services
* An email is sent to one of the Academic admin staff when a video is uploaded
* Videos should automatically change tiers based on how often they’re accessed, with infrequently accessed videos being archived
* Websites
* Informational (similar to SAIT) – owned by academic services
* Student registration with a database – owned by academic services
  + You can use this as a sample app - <https://learn.microsoft.com/en-us/samples/azure/azure-quickstart-templates/web-app-sql-database/>
* Specialized apps
* A specialized app, written in-house, is used for entering marks. You are not writing the app code you are demonstrating how apps in the cloud can be used to do this.
* You can use the app found in this series of tutorials <https://learn.microsoft.com/en-us/azure/aks/tutorial-kubernetes-prepare-app?tabs=azure-cli>
* You must explain how it would meet WIT’s needs in the demo
* It has to run on its own server.
* It has a set of backend databases.
* It needs to auto-scale during end of semester.
* It needs to be reachable from the internet.
* It’s owned by academic services.



© 2023, Southern Alberta Institute of Technology.  
This figure was designed with icons from Microsoft Azure.

**Note:** They want to learn more about using containers, so demonstrate how the AKS service and Docker could be used. You can use copied code but not copied architecture.

* Testing and development
* The IT techs should have an area for testing and development of all resources but within a budget limit of $5,000 per month.
* School of IT Instructors
* Instructors in the School of IT should be able to create their own VMs. The selection should be limited to Windows 2019 servers and one type of Ubuntu. Use templates. The school of IT instructors should **not** be able to create VMs that don’t use the template (hint, this will require both RBAC and Policies)
* IT Services
* Backups of all data, including VMs, websites, and the web app
* Regional replication
* Monitoring for the specialized app
* Security
* Network and server monitoring

#### Additional Details

* All data and apps must reside in Canada.
* The existing IT group will be responsible for pricing out hardware and evaluating it against your recommendations, so you don’t need to define any hardware.
* Each department should get a separate bill for the services they own.
* All data and services should be secured, backed up and replicated.
* Recommend how the main campus should connect to the cloud.
  + You can give more than one option but list the pros and cons of each.
  + You do not need to demo this, but should speak to the steps to set it up
* You don’t need to add all users, but you need test users to demonstrate each function.

If you have any additional questions about WIT and its goals, submit your questions via email.

#### Demo Tips

1. You don’t need to show the step-by-step configuration, only the working result

* For each service, make sure to speak to
  + Overview of the service and how it works
  + how you setup RBAC,
  + security considerations,
  + replication considerations, and
  + backup considerations
* Speak to how that service would meet the needs of WIT

## Marking Criteria

| **Criteria** | **Needs Improvement** | **Good** | **Excellent** | **Total** |
| --- | --- | --- | --- | --- |
| **Grade Includes Diagrams and Demo** | | | | |
| Identities and organizational structure | The organization structure, subscriptions, user management, groups, passwords, management groups, and administrative units are poorly defined or not implemented effectively. (3 marks) | The organization structure, subscriptions, user management, groups, passwords, management groups, and administrative units are properly defined and implemented. (6 marks) | The organization structure, subscriptions, user management, groups, passwords, management groups, and administrative units are well-designed, clearly defined, and efficiently implemented. (10 marks) | /10 |
| RBAC | The implementation of role-based access control (RBAC) lacks proper design, role assignments, locks, and resource permissions. (3 marks) | RBAC is implemented with well-defined blueprints, roles, locks, and resource permissions that align with the system requirements. (6 marks) | RBAC is effectively implemented with comprehensive blueprints, roles, locks, and resource permissions that align with the system requirements and adhere to the principle of least privilege. (10 marks) | /10 |
| Subscriptions, billing and tags | Subscriptions, billing, and tags are not properly managed, resulting in confusion or inaccuracies in tracking and cost allocation. (1 mark) | Subscriptions, billing, and tags are properly managed and accurately reflect the services used, facilitating tracking and cost allocation. (3 marks) | Subscriptions, billing, and tags are efficiently managed, accurately reflecting the services used, and facilitating effective tracking, cost allocation, and resource optimization. (5 marks) | /5 |
| Connection to the cloud | The connection between the main campus and branch campuses to the cloud lacks proper design or security measures, posing potential risks or limitations. (1 mark) | The connection between the main campus and branch campuses to the cloud is well-designed and includes essential security measures, ensuring reliable and secure connectivity. (3 marks) | The connection between the main campus and branch campuses to the cloud is excellently designed, incorporating robust security measures, and providing optimal reliability and secure connectivity. (5 marks) | /5 |
| **Grade Is based on Demo Only** | | | | |
| Forms and Documents File Shares | File shares for forms and documents lack proper automatic tiering and connection to the branch office, impacting performance and accessibility. (3 marks) | File shares for forms and documents include automatic tiering and establish a reliable connection to the branch office, ensuring improved performance and accessibility. (6 marks) | File shares for forms and documents have seamless automatic tiering and establish a robust connection to the branch office, ensuring optimal performance, accessibility, and data availability. (10 marks) | /10 |
| Video file share with an email notification | Video file share lacks the functionality to send email notifications to academic services admin staff when a video is uploaded, hindering effective communication and collaboration. (3 marks) | Video file share includes the functionality to send email notifications to academic services admin staff when a video is uploaded, facilitating communication and collaboration. (6 marks) | Video file share seamlessly sends email notifications to academic services admin staff when a video is uploaded, enhancing communication and collaboration between staff members. Video’s are archived based on usage (10 marks) | /10 |
| Webapp connected to a SQL database | The webapp connected to the SQL database for the student registration website and informational website is inadequately implemented or lacks key features. (3 marks) | The webapp connected to the SQL database for the student registration website and informational website is implemented effectively with essential features. (6 marks) | The webapp connected to the SQL database for the student registration website and informational website is implemented flawlessly, encompassing all required features and ensuring optimal performance. (10 marks) | /10 |
| Kubernetes/Docker App demonstration | The implementation of the Kubernetes/Docker App lacks proper deployment, scaling, or functionality, resulting in limited usability or performance issues. (3 marks) | The Kubernetes/Docker App is properly deployed, scaled, and demonstrates essential functionality, ensuring usability and performance. (6 marks) | The Kubernetes/Docker App is flawlessly deployed, optimally scaled, and exhibits all required functionality, guaranteeing excellent usability and high-performance. (10 marks) | /10 |
| Instructor VMs and templates | Instructors' ability to create their own VMs and the availability of templates are limited or inefficiently managed. (1 mark) | Instructors can create their own VMs with the provided templates, ensuring efficient resource allocation and management. (3 marks) | Instructors can effortlessly create their own VMs with a variety of templates, enabling efficient resource allocation and seamless management. (5 marks) | /5 |
|  |  |  |  |  |
| Pricing and budget on test and development for techs | The pricing and budget for test and development resources are not well-defined or exceed the allocated budget, resulting in inefficiencies or financial constraints. (1 marks) | The pricing and budget for test and development resources are adequately defined, aligning with the allocated budget and ensuring efficient resource utilization. (3 marks) | The pricing and budget for test and development resources are accurately defined, optimizing resource utilization while strictly adhering to the allocated budget. (5 marks) | /5 |
| **Grade is based on descriptions during the above demos** | | | | |
| Backups and replication | Backup and replication strategies for data are inadequately implemented or lack comprehensive coverage, potentially leading to data loss or extended downtime. (2 marks) | Backup and replication strategies for data are properly implemented, ensuring data protection and minimal downtime in case of failures. (4 marks) | Backup and replication strategies for data are flawlessly implemented, ensuring comprehensive data protection and minimal downtime in case of failures. (7 marks) | /7 |
| Monitoring of the specialized app | The specialized app lacks effective monitoring capabilities, hindering timely issue detection and troubleshooting. (1 mark) | The specialized app includes basic monitoring capabilities for issue detection and troubleshooting. (2 marks) | The specialized app incorporates comprehensive monitoring capabilities for timely issue detection, efficient troubleshooting, and enhanced performance management. (3 marks) | /3 |
| Security | Security measures are insufficiently implemented, leading to vulnerabilities and inadequate protection of data and resources. (3 marks) | Security measures are appropriately implemented, ensuring protection of data and resources from potential threats. (6 marks) | Security measures are effectively implemented, encompassing comprehensive protection mechanisms to safeguard data and resources against potential threats. (10 marks) | /10 |
|  |  |  |  |  |
| Weekly Team logs | Team logs are incomplete, inconsistent, or not regularly updated, hindering the evaluation of individual contributions and team progress. (1 mark) | Team logs are regularly updated and provide sufficient information to evaluate individual contributions and team progress. (3 marks) | Team logs are diligently maintained, consistently updated, and provide comprehensive information to evaluate individual contributions and track team progress effectively. (5 marks) | /10 |
| **Total** | | | | **/110** |