ACIT 4850 – Enterprise Systems Integration – Assignment 1

Instructor	Mike Mulder (mmulder10@bcit.ca or Discord)
Total Marks	20
Due Dates	Feb. 16th, 2024 at midnight on D2L

This assignment is to be completed and submitted individually.

Choose one of the two following options for this assignment.

Option 1 – Continuous Integration in a Growing Startup

You have just joined the IT Team of a small but growing software start-up company. Continuous Integration and Continuous Delivery in the Software Team is currently very ad-hoc and the CTO wants to introduce more formalized tools and processes. The Software Team is using currently using GitLab.com for their private source code repositories. The production environment for their software is on AWS.

The IT Team is small and stretched thin across setting up equipment for employees, responding to internal help desk requests, managing internal tools and operating the software that the company develops. Since the team is small, they don't want to setup and manage hardware and/or software installations for a CI tool and would therefore need a SaaS option. But to maintain some consistency and good security practices, the tool would need to integrate with their internal LDAP for single sign on and management of users, be easy to configure and manage, provide some level of audit logging (i.e., ability to track usage) and have 2-factor authentication especially for admin user access. It would also be nice if the product had technical support available with a quick turn-around time to questions and address critical issues to ease the burden on your IT Team. Your team has decided that you should assess the following four CI tools:

- GitLab CI (https://about.gitlab.com/)
- Travis CI (https://www.travis-ci.com/)
- Circle CI (https://circleci.com/)
- AWS Code Pipeline (https://aws.amazon.com/codepipeline/)

This start-up is well funded but their CFO is very diligent in managing the company's budget and expenses. The cost of the CI tool must be well defined, both for the one-time costs and training plus ongoing annual costs. So, it must be very clear what these will be to get budgetary approval. It is expected that the CFO would approve up to $300USD per developer per year.

There are two separate Scrum Teams at this start-up company. One is developing a front-end application using React and the another is responsible for two backend applications in Python and Go. The front-end team want to have automated UI tests incorporated into their CI

pipelines that exercises all the web pages of their application. The backend team wants strong security analysis for their Python application since it stores sensitive user information and handles credit card transactions. The backend team is new to the Go programming language, so they also want static code analysis as part of the CI pipeline (and ideally this would not require any additional tools to be installed). The test team want to be able to easily deploy all three applications into a test environment. And the CTO wants to move to containerized applications using Docker and Kubernetes so it should provide a Cloud-based deployment platform or support integration with a Cloud-based Kubernetes service (i.e., on AWS). It should also include a Docker container registry (i.e., a place to store the built images) or integration with a 3rd party registry like DockerHub.

Option 2 – Continuous Integration in a Large Enterprise

The Software Development Team at the company you work for are planning to modernize the tools in their development environment. As a member of the Enterprise Development Support Team, your supervisor has tasked you with performing an assessment for one category of development tools and providing a recommendation on which tool to conduct a further "proof of concept" evaluation. For your assigned category, you are provided with 4 products to assess.

The general requirements for any tool in the modernized development environment includes:

- On-premise deployment (i.e., self-hosted) is necessary as the company deals has protected Intellectual Property and works with Government customers who have specific security and data privacy needs
- Cloud SaaS would be nice to have when working with external contractors who don't have access to the internal on-premise environment
- Must support single sign-on integration with Active Directory or LDAP
- Licensing costs must be minimized (and must fit into the manager's budget)
- Has the ability to be deployed in a high-availability manner (i.e., with 99.9% uptime)
- Technical support. Or there must be a significant difference in price that makes the unsupported tool more appealing.

The Software Development Team is significantly modernizing their development processes. They have just migrated from an old source code management system to GitLab and are planning to introduction Continuous Integration to the development process. Your supervisor has tasked you with researching and recommending a CI product from the following tools:

- Jenkins (https://jenkins.io/)
- GitLab CI (https://about.gitlab.com/)
- TeamCity (https://www.jetbrains.com/teamcity). Note: The software teams currently use the JetBrains IDEs which is why this product is on the list.
- Circle CI (https://circleci.com/)

The company is willing to pay a license fee for the product and any option would have to work with the GitLab source code management system and support integrations with GitLab using either plugins or webhooks. However, the Development Manager has an annual budget of $500USD per developer but most of that is being used to pay for their existing GitLab license (which uses $240USD of that budget on their current plan)

The Software Development Team has 40 developers and 4 software products in the Ruby, Java, Python and Node/JS programming languages. They would like to leverage feature branching such that each developer's branch would run through the CI pipeline when checked into GitLab. When merged into master, the integrated code would again run through the CI pipeline.

The Test Team already has a large number of automated tests that they would like integrated into the CI pipeline, or even a separate test specific CI pipeline, but they can take several hours to run. They would like the selected tool to have some ability to run their automated tests in parallel to reduce the overall time it takes to run these tests. These tests should be capable of being scheduled to run on specific days and times.

The CI tool would need to be able to integrate with their SonarQube code quality tool and Nexus 3 artifact management tool.

Assessment

Your assessment must include the following sections:

- **Overview** – Describe generally what this type of tool does
- **Requirements Summary** – Summarize the key mandatory and optional **requirements** for the tool based on the above descriptions.
- **Tool Summary** – Provide a brief summary of each of the 4 products
- **Tool Comparison** – Create a detailed comparison table that includes sections for:
    - General summary (product name, company name, years available, current version, release frequency, etc.)
    - Assessment against the requirements, i.e., does it meet the requirement, not meet the requirement or partially meet the requirement. This must include both mandatory and optional requirements.
    - Assessment against at minimum 3 categories of relevant non-functional requirements, such as:
        - Usability
        - Security – make sure to check for outstanding vulnerabilities (i.e., CVE)
        - Availability, i.e., does it provide high availability options
        - Scalability, i.e., can it scale up to more developers and software products
        - Maintainability, i.e., how easy is it to install, manage and upgrade
    - Any other criteria that would be relevant for comparison.

	Tool 1	Tool 2	Tool 3	Tool 4
General				
Manufacturer	ABC Corp	123 Corp	Big Dev Shop	321 Ltd
Current Release	1.5	4.5.67	3.4A	20.23
…				
Mandatory Requirements				
On-Premise	Yes	Yes	No	Yes
…				
Optional Requirements				
…				
Usability				
…				
And so on				

- **Recommendation** - Provide a written recommendation on which two of the four tools you would choose to conduct a further "proof of concept" evaluation. For the tools not chosen, describe why they were not chosen and whether they would be a viable alternative choice. If there are other better choices available for this category of tool, identify those and why or why not they would be better. Try to be as objective as possible in the recommendation. **Make sure to refer to your comparison to justify your recommendations.**
- **References** – Include references to any sources of information you used for your assessment (i.e., websites).

Submission

Your assessment must done in your Confluence server and exported in PDF format. It must be submitted to the D2L dropbox (Activities -> Assignments -> Assignment 1) by Feb. 16th at midnight.

Grading Summary

Description, Requirements and Summary of Each Tool	5 marks
Detailed Comparison Table	10 marks
Recommendation and Justification	5 marks
Make sure you reference any sources (i.e., websites) you used for your assessment. Marks will be subtracted for no references.	(-2 marks)
Make sure your submission is from Confluence and in PDF Format	(-4 marks)
Total	**20 marks**

The Rubric for the above grading breakdown is provided in the Assignment 1 dropbox on the Learning Hub.