# Assignment 4 - Question 1: Analysis and Integration of Database Automation Tools

## 1.1 Overview and Key Features

### GitHub Actions

GitHub Actions is a powerful CI/CD tool provided by GitHub. It allows developers to automate their workflows with simple YAML configuration files directly in their repositories.  
  
Key Features:  
- Integrated with GitHub repositories  
- Supports matrix builds across different OS and languages  
- Triggers based on Git events (push, pull request, etc.)  
- Marketplace for reusable Actions  
- Native support for secrets and environment variables

### Flyway

Flyway is a lightweight, open-source database migration tool. It is ideal for implementing version control in database development and integrating database changes in CI/CD pipelines.  
  
Key Features:  
- Version control for database schemas  
- Supports SQL and Java-based migrations  
- Works with many databases (MySQL, PostgreSQL, Oracle, etc.)  
- Command-line interface and integration with build tools  
- Repeatable, undo, and baseline migrations support

## Comparison Table

|  |  |  |  |
| --- | --- | --- | --- |
| Criteria | GitHub Actions | Flyway |  |
| Ease of Use | Easy with YAML workflow syntax | Straightforward CLI and SQL-based |  |
| CI/CD Integration | Native GitHub support | Requires scripting or manual trigger |  |
| Supported Databases | N/A (not a DB tool) | MySQL, PostgreSQL, Oracle, SQL Server, etc. |  |

## 1.2 Integration Strategy

To integrate GitHub Actions and Flyway into a CI/CD pipeline:  
  
1. Define a GitHub Actions workflow file (e.g., `.github/workflows/db-deploy.yml`).  
2. Configure the job to run on push/PR to the main branch.  
3. Include a step that installs Flyway CLI.  
4. Set up Flyway with environment variables for DB credentials.  
5. Use a Flyway command to apply migrations (`flyway migrate`).  
6. Add a step to run `dbtests.py` to validate schema changes.  
  
This ensures database changes are automated, tested, and version-controlled along with code deployments.

* **Screenshots:**
* Run Ansible Playbook:

**A screenshot of a computer screen

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* dbtests.py showing validation passed:

A screenshot of a computer screen

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