ASSIGNMENT – GITHUB

1. Introduction to GitHub. What is GitHub, and what are its primary functions and features? Explain how it supports collaborative software development?
   GitHub is as a platform for hosting code, facilitating version control and collaborative efforts. It enables seamless project collaboration regardless of location

a. **Version Control**:

   - Repositories
   - Commits
   - Branches
   - Pull Requests

b. **Collaboration Tools**:

   - Issues and Project Boards
   - Organizations and Teams
   - Wikis and GitHub Pages
   - Notifications and Social Features

   (Everhour, 2024)

2. What is GitHub repository and explain how to create a repository and the elements that should be included in it.
   It is a storage space or directory that holds all your project's files and each file's revision history. The repository helps you communicate and manage your project's work inside it. (Everhour, 2024)

   This is how a github repo is created;

a. Click the drop-down menu in the upper-right corner of any page, then select 'new repository.'
b. Write a short, memorable name for your repository, such as "Human-ox."
c. Also, you can add a description of your repository. For example, "My new repository on GitHub."
d. Choose repository visibility.
e. Select 'Initialize this repository using README.'
f. Now, click 'create repository. (Everhour, 2024)

3. Explain the concept of version control in the context of git. How does GitHub enhance version control for developers?
   Version control, also known as source control, is the practice of tracking and managing changes to software code. (Atlassian , 2024)
   GitHub allows developers to collaborate more effectively and efficiently via tools that are easy to understand and tweak. (Everhour, 2024)

4. Branching and Merging in GitHub. What are branches in GitHub, and why are they important? Describe the process of creating a branch, making changes, and merging it back into the main branch.
   Branches - A branch represents a parallel version of a repository. It remains in the repository without affecting the primary branch. This way, you can improve the code without altering the 'live' version. (Everhour, 2024)
   The process of creating a branch;
   - If you want to create a branch and checkout the branch simultaneously, use the git checkout command. The switch -b specifies the name of the branch. Note that after command completion, Git has moved HEAD to the new branch.
     git checkout -b <branch name>

     git branch

   (Varonis, 2024)
   - How to make changes to a branch
     1. Ensure you're on the correct branch
        git branch
     2. Make your code changes:
        Edit your project files using Vscode
     3. Commit changes with a message
        git commit -m "commit message"
        (Varonis, 2024)
   - How to merge a branch into main
     $ git checkout main
     $ git pull
     $ git checkout validator
     $ git merge main
     $ git push
     (Togaware , n.d.)
5. Pull Requests and Code Reviews. What is a pull request in GitHub, and how does it facilitate code reviews and collaboration? Outline the steps to create and review a pull request.
   - A pull request flows from a branch and lets you inform other team members about changes you pushed to a branch in a repository.
   - Once you open a pull request, you can discuss and review the potential changes with collaborators before adding follow-up commits before your changes merge into the base branch.
     (Everhour, 2024)

6. GitHub Actions. Explain what GitHub Actions are and how they can be used to automate workflows. Provide an example of a simple CI/CD pipeline using GitHub Actions.
   - GitHub Actions is a continuous integration and continuous delivery (CI/CD) platform that allows you to automate your build, test, and deployment pipeline. You can create workflows that build and test every pull request to your repository, or deploy merged pull requests to production. (GitHub, 2024)

- Workflows are defined by a YAML file checked in to your repository and will run when triggered by an event in your repository, or they can be triggered manually, or at a defined schedule.

- Workflows are defined in the .github/workflows directory in a repository, and a repository can have multiple workflows, each of which can perform a different set of tasks. For example, you can have one workflow to build and test pull requests, another workflow to deploy your application every time a release is created, and still another workflow that adds a label every time someone opens a new issue. (GitHub, 2024)

7. Introduction to Visual Studio. What is Visual Studio, and what are its key features? How does it differ from Visual Studio Code?
    - Visual studio - It's a comprehensive integrated development environment (IDE) that you can use to write, edit, debug, and build code.
      Main features
        - Code Editing & IntelliSense
        - Debugging
        - Project Management
        - Building & Running Code (Microsoft , 2024)

Feature	Visual studio	Visual studio code
Type	Full-fledged Integrated Development Environment (IDE)	Text Editor (Code Editor)
Platform	Runs on Windows and Mac	Runs on Windows, Mac and Linux
Size	Relatively large; over 40 GB on Windows and 6 GB on Mac	Lightweight; does not require more than 200 MB on any platform.

(Techvify Software, 2024)

8. Integrating GitHub with Visual Studio. Describe the steps to integrate a GitHub repository with Visual Studio. How does this integration enhance the development workflow?

Clone from GitHub:

1. Open Visual Studio.
2. Go to **File > Open > Project or Code**.
3. In the "Local path" field, choose the location on your computer where you want to clone the repository.
4. Click the **"Clone"** button.
5. Provide the URL of your GitHub repository when prompted.

(Microsoft , 2024)

How the integration enhances workflow development.

- **Simplified Version Control:** Visual Studio provides a user-friendly interface to manage your code versions stored in GitHub. You can easily commit changes, view history, and collaborate with teammates directly within the IDE.

9. Debugging in Visual Studio. Explain the debugging tools available in Visual Studio. How can developers use these tools to identify and fix issues in their code?
    - Breakpoints: Pause program execution at specific lines to inspect variables and call stacks.
    - Stepping: Execute code line-by-line (stepping over, into, and out of functions) for granular control.
    - Data visualization: View variable values, memory contents, and the call stack during a debugging session.
    - Live editing: Edit code while paused and continue debugging with changes reflected (supported for certain languages)
      (Microsoft , 2024)

10. Collaborative Development using GitHub and Visual Studio. Discuss how GitHub and Visual Studio can be used together to support collaborative development.
    - Version control: Visual Studio integrates with GitHub to clone, commit, and push code changes to a central repository on GitHub. This allows developers to track changes, revert to previous versions, and see who made what modifications.

    - Pull requests: Developers working on their local copies (forks) can submit pull requests on GitHub. This proposes their code changes for review and merging into the main project repository. Visual Studio facilitates creating and reviewing pull requests with comments and code diffs.

    - Issue tracking: Both platforms allow reporting and managing bugs or feature requests (issues). Developers can use Visual Studio to link code changes to relevant issues in GitHub for better traceability.

      (Microsoft , 2024)

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