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CEN 4010

Assignment 3

1) Explain the significance of configuration management for a software development team by using an example.

Configuration management is essential for software development teams as it facilitates the tracking and control of changes in software, documentation, and other project components. For instance, consider a team developing a large e-commerce application, with developers managing distinct modules such as the checkout process, user accounts, and product catalogs. Without configuration management, if one developer alters the checkout module while another simultaneously modifies the user account system, these changes may conflict. Configuration management tools, such as Git, allow the team to track a history of all changes, manage dependencies, and integrate updates seamlessly. This guarantees that, in the event of issues, specific changes can be pinpointed and reversed if necessary, thus preserving project stability and organization.

2) Describe why testing can only identify errors when they are present, not when they are absent.

The purpose of testing is to identify defects in software by subjecting it to various inputs and scenarios to uncover any errors or unexpected behaviors. However, the software may still have imperfections even if a test results in no errors. This occurs because testing can only address a limited subset of all potential inputs and execution paths. The tests did not consider the potential for certain errors to occur only under specific circumstances. While it does not guarantee that the software is error-free, successfully passing each test enhances confidence in its reliability.

3) What is regression testing? Describe how regression testing is made easier by the usage of automated tests and testing frameworks like JUnit.

Regression testing is the process of re-evaluating software following updates to confirm that recent changes have not introduced new errors or affected existing functionality. When a feature is altered or a bug is resolved, there is a risk that other components of the software may unintentionally fail because of these modifications. Tools like JUnit simplify regression testing by providing a consistent way to automatically rerun tests across the application. This speeds up the process and lets the team catch any unintended effects of new changes without having to manually check every feature. Automated regression tests act as a safety net, helping to keep the software stable as it’s developed.

4) What is stress testing? Describe what this term means to you by giving an example.

Stress testing entails assessing a software application's performance under extreme conditions to evaluate its stability and robustness. The objective is to evaluate the software's performance under stress by simulating conditions such as high user demand, elevated data volume, or restricted computational resources. For instance, on a social media platform, stress testing could entail simulating a sudden influx of one million concurrent users to evaluate the system's capacity to manage that load. This test assists the team in determining the system's breaking points and identifying potential bottlenecks or resource issues that may cause crashes, thereby ensuring the software remains reliable under high usage conditions.