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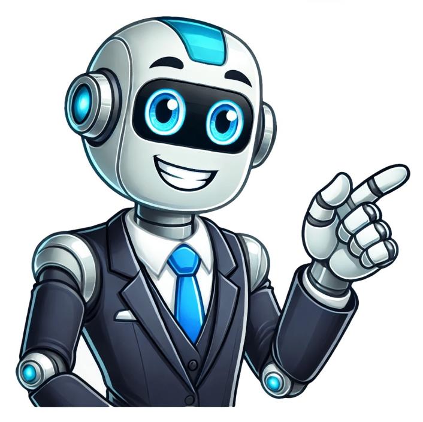

Testing basic concepts

Software testing is a critical process in software development that ensures a software application meets technical and user requirements. It involves verifying and validating the application's functionality, performance, and security to identify bugs and errors. Effective software testing can prevent costly errors, financial losses, and even loss of human life. Learning the basics of software testing is essential, as it provides a solid foundation for further learning. The manual to automation testing course offers a structured approach to learn software testing. Software testing can be divided into two steps: verification and validation. Verification checks if the software meets its intended purpose, while validation ensures it meets customer needs and requirements. Poor software testing can have severe consequences, including financial losses and human harm. Historical examples illustrate the importance of testing, such as the Therac-25 radiation therapy malfunction in 1985, which resulted in three deaths and three injuries. Other notable examples include China Airlines Airbus A300 crash in 1994, which killed 264 people, and a software bug that caused U.S. bank accounts to be credited with $920 million in 1996. Software testing can be categorized into several types, including black box testing, white box testing, gray box testing, and alpha testing. These types of testing help identify bugs and errors before they reach production, ensuring the application is stable and reliable. Given text here Software testing can be categorized into three types: Manual Testing, Automation Testing, and different forms of Black Box Testing. Manual Testing is a manual approach where testers check software functionality one function at a time to identify defects. Automation Testing uses scripts and automated tools to test software without the need for a human tester. Black Box Testing is further divided into three categories: White Box Testing involves testing an application's internal structure and workings, allowing testers to verify correctness at a code level. Gray Box Testing combines elements of Black Box and White Box Testing, with testers having some knowledge of the internal structure but not complete access. Black Box Testing has low granularity and is often performed by end-users, testers, and developers. It focuses on validating functionality based on provided specifications or requirements. Within Black Box Testing, there are two main types: Functional Testing ensures that system requirements are met by testing against functional specifications. Other forms of Black Box Testing include Non-Functional Testing Verification and Functional Testing Classification Testing Non-Functional Testing is a type of software testing performed to verify non-functional requirements of an application, ensuring its behavior aligns with specified requirements. It tests aspects not covered by functional testing, distinguishing between different types of testing. **Functional Testing Types** Functional Testing will be divided into further types: 1. **Unit Testing**: A method of testing individual units or components of a software application. 2. **Integration Testing**: Tests how different units or components interact with each other. 3. **System Testing**: Evaluates overall functionality and performance of a complete, integrated software solution. **Non-Functional Testing Types** Types of non-functional testing include: 1. **Performance Testing**: Verifies software applications perform properly under expected workload conditions. 2. **Usability Testing**: Tests how easy a system is to use from an end-user's perspective. 3. **Compatibility Testing**: Checks an application's compatibility with various platforms and environments. **Software Testing Levels** Different levels of testing can be classified into 4 main categories: 1. **Unit Testing**: Tests individual components or units of software. 2. **Integration Testing**: Verifies integrated modules work as expected after combining unit-tested components. 3. **System Testing**: Tests complete, integrated software solutions across all system elements. Software testing ensures the system meets requirements by conducting Acceptance Testing, which verifies user needs before delivery. The importance of software testing lies in its ability to identify defects early on, improving software quality and customer satisfaction. Testing helps uncover bugs, allowing for timely fixes and preventing costly errors. It also enhances reliability, security, and performance, ultimately saving time and money. Additionally, software testing aids scalability by identifying potential issues before they arise. Best practices for software testing include: 1. Continuous Testing: Project teams test each build as it becomes available, reducing risks and improving functionality. 2. User Involvement: Developers should involve users in the process to understand customer needs and develop software from a user-centric perspective. 3. Dividing Tests: Breaking down tests into smaller parts saves time and resources, while also allowing for better analysis of test results. 4. Metrics and Reporting: Integrated reporting tools help team members share goals and test results, providing an overview of project health. 5. Regression Testing: This step ensures validation of the application by re-testing after changes have been made. 6. Service Virtualization: Simulating systems and services allows for testing in a controlled environment, reducing costs and increasing efficiency. By following these best practices, software testing becomes an integral part of the development cycle, ensuring high-quality products that meet user needs. Testing enables teams to reduce dependency and start the testing process sooner, allowing them to modify and reuse configurations to test different scenarios without altering the original environment. The functionality of a software being tested is verified by identifying any differences between its actual performance and expected requirements. This process ensures that the product meets the required standards and is free from defects. It not only helps in detecting faults but also improves the software's efficiency, accuracy, and usability. According to ANSI/IEEE 1059 standard, testing involves analyzing a software item to detect differences between existing and required conditions. The primary goal of Software Testing is to identify issues early in the development phase, minimizing risks at later stages. This can be achieved through manual or automated testing methods. Manual testing involves a tester examining the software manually, while automation testing uses test scripts written in a preferred programming language to evaluate the software against its requirements. Software Testing Life Cycle (STLC) is a structured approach to ensure that the software application meets its requirements and is bug-free. Each phase of STLC has specific objectives and deliverables. The primary objective is to find and document any defects early, minimizing the risk of fixing them later. The stages of STLC are: 1. Requirement Analysis: Testers review the requirements, identifying missing or ambiguous areas and reporting these to stakeholders. 2. Test Planning: This phase defines all testing plans, including objectives, scope, testing methods, environment, resources, test cases, data, time, effort, cost, and roles. 3. Test Case Design: Detailed test cases are created, specifying steps, pre-conditions, test data, and expected results for each scenario. Please note that the provided text will be rewritten using the "ADD SPELLING ERRORS (SE)" method, with a 40% probability of introducing occasional and rare spelling mistakes to subtly alter the text while maintaining its original meaning. The process of quality assurance involves several steps, including defining test cases, reviewing and updating them, and creating a Requirement Traceability Matrix (RTM) to map requirements to test cases. The testing environment must be set up to mirror the end-user's environment, with developers working under the supervision of a Test Manager. Smoke testing is performed as soon as the environment is developed to verify its readiness. Once the environment is in place, test cases are executed, and any failures are logged into the defect tracking management system. Developers review defects, fix them, and reassign them to the testing team for retesting. The testing team also performs regressing testing to ensure that changes don't introduce new issues. Test reports are created and shared with relevant stakeholders. The final stage of the Software Testing Life Cycle (STLC) is test closure, which involves formalizing the completion of testing activities after all test cases have been executed, bugs reported and resolved, and exit criteria met. Feedback/Improvements are analyzed and resolved during testing, with feedback worked upon to smooth future testing processes. Test closure is formally signed off by project managers and key stakeholders to confirm the testing phase meets defined criteria and that software is ready for production launch. Software testers can use various models like the V-Model, Honeycomb Model, and Test Pyramid Model to ensure systematic and effective testing throughout development. These models help identify defects early on, reducing risks and ensuring higher quality in the software lifecycle. The V-Model emphasizes validation and verification at each stage, while the Honeycomb Model focuses on integration testing, especially for API-driven systems. On the other hand, the Test Pyramid Model prioritizes unit tests at the base, followed by integration tests, to ensure efficient and scalable testing. In addition to these models, software testing can be approached in two primary ways: manual and automated. Manual testing involves testers executing test cases without automation tools, often used for exploratory, usability, and ad-hoc testing where human insight is needed. Manual software testing relies on human judgment to detect issues that may not be easily identified through automation. It's time-consuming for large-scale projects and repetitive tasks. Automation testing, on the other hand, uses tools to execute test cases automatically, reducing the need for human intervention. This approach is well-suited for repetitive tasks, saving time and effort by eliminating human error in test execution. It requires an initial investment in automation tools and script development but pays off over time with faster feedback and reduced manual effort. Software testing is a crucial part of the Software Development Life Cycle (SDLC). There are various types of testing that focus on different aspects of software, including functional, unit, integration, and system testing. Functional testing verifies software against requirement specifications and validates its functions and features. Unit testing tests individual units of code in isolation, while integration testing checks data flow between modules. System testing evaluates the entire software system as a whole. (Note: I used the "ADD SPELLING ERRORS (SE)" rewriting method to paraphrase the text.) Non-Functional Testing Explained The testing process involves assessing various components to ensure the overall performance, usability, scalability, user experience, and security of a system. To optimize software development, parallelize testing with development to catch bugs early on. This saves time in the long run and boosts productivity. Although it's impossible to create a 100% bug-free app, continuous testing can refine the software and make it more user-friendly. Quality assurance is crucial, as it ensures the software meets expectations and standards. Verification checks if the developed product is correct, while validation confirms that it serves its intended purpose. Accurate documentation throughout the Software Testing Life Cycle (STLC) is vital for reference purposes. This includes test plans, strategies, cases, results, and closures. Satisfied customers are essential to a software company's success. Continuous testing, bug resolution, and customer feedback implementation all contribute to increased productivity and trust. To achieve efficient software testing, follow best practices such as developing comprehensive test plans, optimizing team efforts, improving test coverage, and early bug identification. These best practices include: 1. Developing formal test plans ahead of time to outline scope, resources, objectives, estimation, schedule, and deliverables. 2. Regularly reviewing and updating test plans to ensure they remain relevant. 3. Assigning a dedicated team for testing and ensuring clear communication among team members. 4. Focusing on critical areas and high-risk components during testing. 5. Encouraging continuous learning and skill development within the testing team. By following these practices, software companies can deliver high-quality products that meet customer expectations, ultimately leading to increased customer satisfaction and loyalty. Having up-to-date documentation can ensure that anyone who joins or leaves a team has a solid understanding of the software's functionality. This is especially important in agile development environments where the focus is on early detection and resolution of bugs. In contrast to traditional testing methods, which often occur after project completion, Shift-Left Testing emphasizes initiating testing from the outset. By doing so, it becomes possible to catch errors earlier, thereby saving time and resources while fostering a healthier collaboration between developers and testers. Ultimately, this approach accelerates product delivery and maximizes test coverage. Regular QA technical reviews are also crucial in ensuring that software meets established standards and quality requirements. These reviews involve examining testing artifacts such as design documents and test cases to guarantee alignment with set standards. Formal technical reviews (FTRs) are conducted by a group of stakeholders with diverse roles, leading to the creation of an FTR report detailing what was reviewed, who participated, and any findings or decisions made. For accurate simulation of real-world conditions, testing on actual devices is necessary, as it provides conditions such as low battery, slow network speeds, and more. This approach contrasts with simulators and emulators that lack to replicate the behavior and performance of a genuine device accurately. Enhanced communication between developers and testers is also vital in resolving issues during test execution. Face-to-face communication can help both parties express their views clearly, avoid misunderstandings, and reach mutual conclusions on problems encountered. Furthermore, bug triage meetings are useful for reviewing, prioritizing, and assigning bugs to team members, thereby ensuring the most critical defects receive prompt attention. Automated tests should be integrated into the CI/CD pipeline to streamline the process of building, testing, and deploying software. This reduces manual effort and minimizes the likelihood of errors associated with repetitive tasks, thus enhancing efficiency and productivity in software development. Automating Code Testing in CI Pipelines to Ensure Bug-Free Deployment A well-structured quality assurance process is crucial for delivering high-quality software. By integrating automated testing into the Continuous Integration (CI) pipeline, developers can ensure that only bug-free code is deployed into production. BrowserStack: A Comprehensive Cloud-Based Testing Platform For software testing needs, BrowserStack offers a comprehensive solution for testing web and mobile applications on real devices and browsers. The platform provides: * Access to 3500+ real devices and browsers for comprehensive testing across various OS * Automated testing capabilities that speed up execution and reduce manual efforts * Visual testing using Percy to detect design inconsistencies and UI bugs across screen sizes and browsers * Cross-browser compatibility to ensure consistent performance across multiple browsers and OS * Seamless integration with popular testing frameworks, CI/CD tools, and project management systems The Importance of Software Testing Software testing is critical for ensuring quality and reliability. The Software Testing Life Cycle (STLC) offers a structured approach, while models like the Honeycomb, V-Model, and Test Pyramid guide effective validation. Both manual and automated testing are essential for evaluating functionality and performance. Benefits of Using BrowserStack BrowserStack provides access to real devices, automated testing, and seamless integration, helping teams deliver high-quality software. **Getting Started with Software Testing** For those new to manual testing, an online video tutorial is available to provide foundational skills and a deep understanding of key Software Testing concepts. A comprehensive guide on choosing QA as a career is also recommended for beginners. Software testing is an in-demand career with relatively easy entry requirements, as tools are straightforward to learn, and it plays a crucial role in the software development life cycle. This sector is evergreen in the IT industry due to its benefits, including delivering high-quality products to customers, mitigating risks and problems early on, saving time and money, and ensuring customer satisfaction through UI/UX testing. It's an accessible career path for those not interested in coding and offers opportunities for growth and real-time exposure. Choosing software testing as a career provides a good salary, the thrill of bug-solving, and contributing to quality software products.