UNIT III – PERFORMANCE AND REGRESSION

Factors – Methodology – Tools – Challenges. Regression Testing: Types – Methods. Internationalization Testing – Ad-hoc Testing: Buddy and Pair Testing – Exploratory Testing– Iterative Testing – Agile and Extreme Testing. Usability and Accessibility Testing.

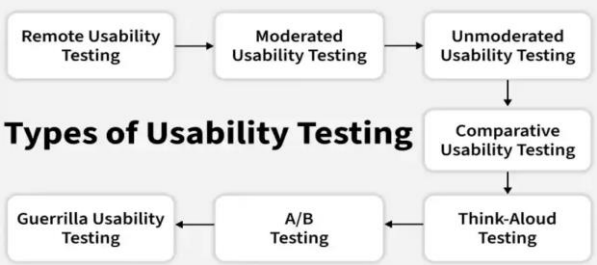
Usability and Accessibility Testing:

Usability Testing

Usability Testing is a software testing technique that checks how easy and user-friendly a software application is. Real users perform tasks to identify usability problems and improve the overall user experience.

- Checks how easily users can use the software.
- Performed by real users to find usability issues.
- Improves user experience and customer satisfaction.

Types of Usability Testing



- **Remote Usability Testing**: Users test the software from their own location, and feedback is collected online.
- **Moderated Usability Testing**: A moderator guides users through tasks and observes their actions in real time.
- **Unmoderated Usability Testing**: Users complete tasks on their own without a moderator, while their actions are recorded.
- **Comparative Usability Testing:** Two or more versions of a product are tested to find which one is easier to use.
- **Think-Aloud Testing:** Users explain their thoughts while performing tasks to help identify usability issues.
- **A/B Testing:** Different versions of a design are shown to users, and their behavior is compared to find the better option.
- **Guerrilla Usability Testing:** Random users are asked to perform simple tasks in public places to get quick and low-cost feedback.

Workflow of Usability Testing

The **workflow of usability testing** is a step-by-step process used to check how easily users can use a product and complete their tasks.

1. **Plan the Test:** Set the testing goals, choose the testing method, and prepare the schedule and resources.
2. **Recruit Participants:** Select users who represent the target audience.
3. **Design Tasks:** Create simple, realistic tasks for users to perform during the test.
4. **Set Up the Test Environment:** Prepare the devices, tools, prototypes, and recording equipment.
5. **Conduct the Test:** Observe users as they complete the tasks and collect their feedback.
6. **Analyze Results:** Review the findings to identify usability problems and improvement areas.
7. **Report Findings:** Document the results and suggest improvements.
8. **Improve the Product:** Make the necessary changes and repeat testing if needed.

Usability Testing Tools

- **Hotjar:** Provides heatmaps, session recordings, and user feedback to understand user behavior.
- **Crazy Egg:** Uses heatmaps and scroll maps to identify usability issues.
- **Lookback:** Supports live and recorded usability testing with real users.
- **UserTesting:** Collects feedback from real users through usability tests and surveys.
- **Optimal Workshop:** Offers tools for card sorting, tree testing, and improving website navigation.
- **Google Analytics:** Tracks user behavior and website usage to identify usability problems.

Advantages of Usability Testing

- **Early Defect Detection:** Finds usability issues early, saving time and development costs.
- **Better User Experience:** Makes the software easier to use, improving customer satisfaction and conversion rates.
- **Lower Support Costs:** Reduces the need for customer support by making the software more user-friendly.

Disadvantages of Usability Testing

- **Time and Cost:** Testing with many users can be expensive and time-consuming.
- **Participant Selection:** Finding the right target users can be difficult.
- **Limited Coverage:** May not identify all edge cases or complex scenarios.

Steps of Usability Testing

Step 1: Identify the Target Users

Select users who represent the intended audience of the software.

Step 2: Define Testing Objectives

Set clear goals and decide what aspects of the software will be evaluated.

Step 3: Observe Users
Watch users perform assigned tasks and record their actions and feedback.

Step 4: Analyze the Results
Review the observations to identify usability issues and areas for improvement.

Step 5: Improve and Retest
Make the necessary changes based on the findings and test the software again to verify the improvements.

Accessibility Testing

Accessibility Testing is a type of software testing that ensures an application can be used by people with disabilities, such as those with visual, hearing, motor, cognitive, or age-related impairments. It is a part of usability testing and checks whether the application works properly with assistive technologies.

- **Provides Equal Access:** Ensures digital products can be used by everyone by identifying and removing accessibility barriers.
- **Enhances User Experience:** Improves usability, supports accessibility standards, and makes the software easier to use for a wider range of users.

Assistive technology refers to tools that help people with disabilities use software applications.

Some common examples include:

- **Speech Recognition Software:** Converts spoken words into text or commands.
- **Screen Reader Software:** Reads the text and interface elements displayed on the screen.
- **Screen Magnification Software:** Enlarges screen content for users with low vision.
- **Specialized Keyboards:** Makes typing easier for users with motor disabilities.
- **Switch and Eye-Tracking Devices:** Help users with severe motor disabilities control and navigate the application.

Importance of Accessibility Testing

Accessibility testing helps create software that is inclusive, easy to use, and accessible to everyone. Its key benefits include:

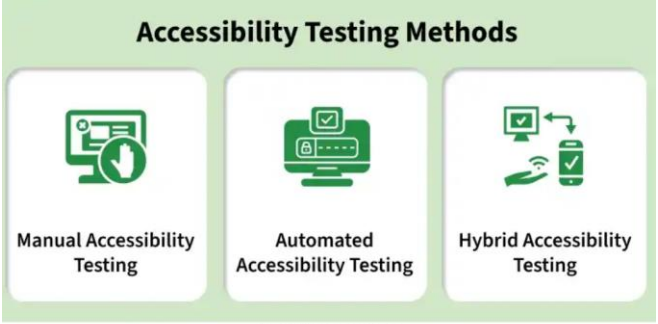
- **Legal Compliance:** Helps meet accessibility laws and standards, reducing the risk of legal issues.
- **Equal Access:** Ensures people with visual, hearing, motor, or cognitive disabilities can use the application effectively.
- **Better User Experience:** Improves navigation, readability, and usability for all users.
- **Larger User Base:** Makes the software accessible to more people, including users with disabilities.

- **Better SEO:** Using accessible design practices, such as proper headings and alternative text, can improve search engine rankings.
- **Enhanced Brand Reputation:** Demonstrates a commitment to inclusivity, building customer trust and confidence.
- **Competitive Advantage:** Accessible software attracts a wider audience and stands out from competitors.
- **Long-Term Compatibility:** Following accessibility standards helps keep the software usable as technologies and guidelines evolve.

Accessibility Testing Methods

Accessibility Testing can be performed in 3 ways:

- ❖ **Manual Accessibility Testing**
- ❖ **Automated Accessibility Testing**
- ❖ **Hybrid Accessibility Testing**



Accessibility Testing Methods

1. Manual Accessibility Testing

Manual accessibility testing evaluates the application from the viewpoint of users with disabilities. Testers perform different tasks to identify accessibility issues that may affect usability.

Common manual checks include:

- Checking brightness, contrast, and high-contrast mode.
- Verifying captions and transcripts for audio and video.
- Testing font resizing and browser zoom up to 200%.
- Navigating the application using only the keyboard.
- Ensuring form fields have proper labels.
- Disabling CSS to verify the content structure.
- Testing skip navigation links.

2. Automated Accessibility Testing

Automated accessibility testing uses specialized tools to detect common accessibility problems quickly, such as missing alternative text, incorrect headings, poor color contrast, and ARIA errors.

Common tools include:

- **WebAnywhere:** Browser-based screen reader.
- **HERA:** Tool for checking WCAG compliance.
- **Vischeck:** Simulates different types of color blindness.
- **JAWS:** Screen reader used to validate application accessibility.

Automated testing is fast but should be combined with manual testing for complete accessibility evaluation.

3. Hybrid Accessibility Testing

Hybrid accessibility testing combines both manual and automated testing methods. Automated tools detect technical issues, while manual testing verifies the actual user experience.

This approach provides more complete, accurate, and standards-compliant accessibility testing.

Digital Accessibility Testing Standards:

1. Web Content Accessibility Guidelines (WCAG)

- Developed by the **W3C**.
- Provides guidelines for making websites accessible.
- Has three levels: **A (Basic), AA (Recommended), and AAA (Highest).**

2. Section 508

- A **U.S. law** that requires government websites and software to be accessible.
- Follows **WCAG** guidelines.

3. Americans with Disabilities Act (ADA)

- A **U.S. law** that protects the rights of people with disabilities.
- Encourages digital accessibility based on **WCAG**.

4. European Accessibility Act (EAA)

- A **European Union (EU)** law for accessible digital products and services.
- Covers websites, mobile apps, and online services.

5. EN 301 549

- A **European accessibility standard** for information and communication technology (ICT).
- Based on **WCAG** and **Section 508**.

6. Accessible Rich Internet Applications (ARIA)

- A set of techniques that improves the accessibility of dynamic web content.
- Helps **screen readers** and other assistive technologies work more effectively.

Accessibility Testing Tools

- **WAVE:** Checks web pages for accessibility issues and identifies **WCAG** errors directly in the browser.
- **QA Wolf:** Automates accessibility testing to improve usability and ensure accessibility compliance.
- **SortSite:** Scans websites for accessibility issues, broken links, browser compatibility, and other errors.

- **JAWS:** A screen reader that helps visually impaired users access websites and applications.
- **QualityLogic:** Provides automated and manual accessibility testing with detailed compliance reports.