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Compare and contrast: test automation and manual testing

- Test automation
  - a section of software testing that makes use of softwares (other than the one that is tested) to manage the execution of test cases and the comparison of the results with the anticipated results.
  - the aim of ~~the~~ test automation is that of accelerating the entire testing process by reducing the manual effort required, improving the efficiency of the test cases and allowing for repeatable and reliable testing.
  - when testing a software, it is not necessary to automate the entire testing process. Some tests are sometimes better if not automated.
  - some key metrics to take into consideration when deciding if a test needs to be automated are: complexity, stability and frequency of execution.
  - planning is important for test automation: careful consideration is advised, as test scripts need to be designed and maintained in such a way that they can be easily updated and modified as the software tested evolves and grows in complexity.
  - one of the drawbacks of test automation is that not all testing is suitable for automation (for example, user interface testing, or exploratory testing)
  - popular tools: Selenium, JUnit, Appium, TestNG

example of test automation: Suppose we have an application used for banking. One feature that could be tested in an automated way could be that of transferring funds from one account to another. This being a rather simple and repetitive test, automating it could save the developers time.

- Manual testing
  - a hands-on approach for software testing, where human testers execute the test cases and observe whether the tests ran as expected or not.
  - using predefined test cases, or freely exploring the software's systems, testers need to apply their expertise, intuition and analytical skills in order to find potential issues in the software.
  - manual testing is useful when there is a need for flexibility and adaptability. Testers are able to quickly modify test cases based on the requirements.
  - nevertheless, manual testing has a couple of drawbacks as well: it requires significantly more time, especially when it comes to repetitive test cases. Moreover, manual testing is prone to human errors, as testers can overlook certain details or execute the tests incorrectly.
  - places where manual testing is more effective are situations where on-the-spot investigation is required, or in the case of exploratory testing. Here, testers do not have to follow predefined test cases, having the freedom to test the software as they wish.

example of manual testing: on the same application from the example on test automation, a place where manual testing could be performed is on the screen for the "transfer funds" feature. Here, the tester can check the application's responses, when the action of transfering funds is performed, by observing elements such as the accurate update of the balance, the creation of transaction records, or checking if any possible errors are handled correctly.

similarities of test automation and manual testing

- similarities → purpose: both methods focus on identifying bugs or flaws in the tested software
  ↘ ~~execution time & effort: automated tests are usually executed faster than manual tests; manual tests require constant human intervention, whereas automated tests can be run without any human intervention~~
  → setup and design: both testing methods require setting ~~upa~~ up a testing environment and designing test cases for effective testing.

differences of test automation and manual testing

- differences → execution time & effort: automated tests are usually executed faster than manual tests; manual tests require constant human intervention and are slower, whereas automated tests run faster, and without human intervention.
  → reusability: automated tests allow for test scripts and test cases that can be reused across multiple test cycles; in contrast, manual testing uses more specific test cases that do not provide the same level of reusability.