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Scalable UI Test Automation for Large-scale Web Applications

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Abstract : This research mainly concerns optimizing UI test automation for large-scale web applications. The test target application is the HHAexchange homecare management WEB application that seamlessly connects providers, state Medicaid programs, managed care organizations (MCOs), and caregivers through one platform with large-scale functionalities. This study focuses on user interface automation testing for the WEB application. The quality assurance team must execute many manual users interface test cases in the development process to confirm no regression bugs. The team automated 346 test cases; the UI automation test execution time was over 17 hours. The business requirement was reducing the execution time to release high-quality products quickly, and the quality assurance automation team modernized the test automation framework to optimize the execution time. The base of the WEB UI automation test environment is Selenium, and the test code is written in Python. Adopting a compilation language to write test code leads to an inefficient flow when introducing scalability into a traditional test automation environment. In order to efficiently introduce scalability into Test Automation, a scripting language was adopted. The scalability implementation is mainly implemented with AWS's serverless technology, an elastic container service. The definition of scalability here is the ability to automatically set up computers to test automation and increase or decrease the number of computers running those tests. This means the scalable mechanism can help test cases run parallelly. Then test execution time is dramatically decreased. Also, introducing scalable test automation is for more than just reducing test execution time. There is a possibility that some challenging bugs are detected by introducing scalable test automation, such as race conditions, Etc. since test cases can be executed at same timing. If API and Unit tests are implemented, the test strategies can be adopted more efficiently for this scalability testing. However, in WEB applications, as a practical matter, API and Unit testing cannot cover 100% functional testing since they do not reach front-end codes. This study applied a scalable UI automation testing strategy to the large-scale homecare management system. It confirmed the optimization of the test case execution time and the detection of a challenging bug. This study first describes the detailed architecture of the scalable test automation environment, then describes the actual performance reduction time and an example of challenging issue detection.

Keywords : aws, elastic container service, scalability, serverless, ui automation test
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