Exploring the Efficiency & Cost-Effectiveness of Distributed Computing for Test Execution

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Research Topic

Distributed computing. As modern software systems become increasingly complex, finding ways to accelerate software testing – without sacrificing efficiency – is crucial in rapidly delivering high-quality software products to users.

Research Question

To what extent can test execution leverage distributed computing to improve efficiency and speed, considering factors such as memory and CPU usage, execution time, the trade-offs between vertical and horizontal scaling, and cost-effectiveness at scale?

Goal

- To investigate the current state of distributed testing
- Evaluate whether distributed computing can be leveraged to enhance testing speed and efficiency for modern day software systems with, both, smaller and larger code-bases.

Approach

1. Conduct literature reviews on current state of distributed testing.
2. Seek large and small scale open-source software programs with unit test suites.
3. Configure a controlled distributed testing environment for test execution.
4. Execute automation unit tests for the programs under, both, distributed and single machines. Record data relevant to speed, efficiency, and cost implications (e.g., resource usage).
5. Analyze results to determine the overall effectiveness of distributed testing in improving speed and efficiency, while assessing the cost-effectiveness of managing multiple machines.

Hypothesis

- Large code-base test suites run under distributed testing will significantly be faster and more efficient for large code-bases, justifying the management of multiple machines worthwhile.
- Conversely, this approach will prove inefficient and unnecessary for smaller code-bases. The overhead of managing a distributed environment will outweigh the performance advantages.