

CIS*4150: Research Project Goal

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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

The project aims to investigate the current state of distributed testing while evaluating 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. Review academic resources on current state of distributed testing. Seek large and small scale open-source software programs for research.
2. Analyze the architecture of the programs to select components for distributed testing.
3. Configure a controlled distributed testing environment for test execution.
4. Execute 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.