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In-Test Adaptation of Workload in Enterprise Application Performance Testing

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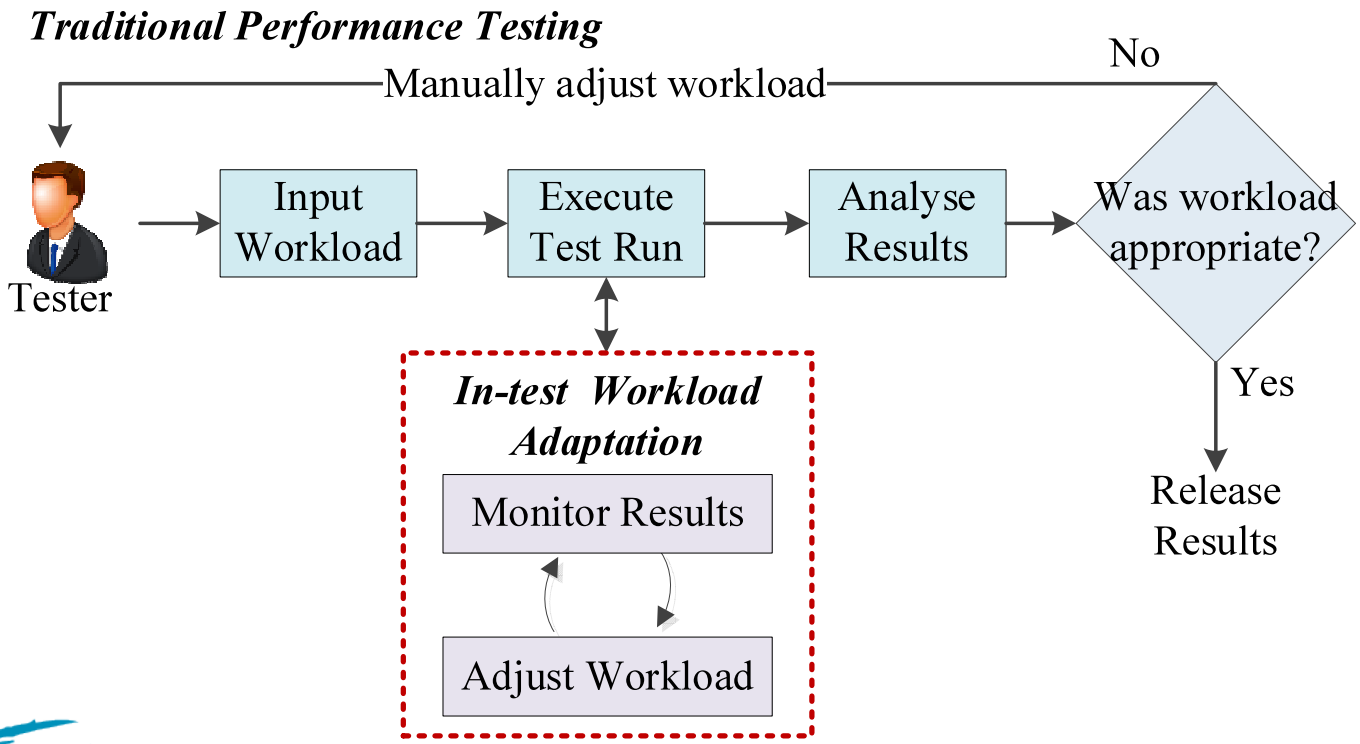
Agenda

Motivation

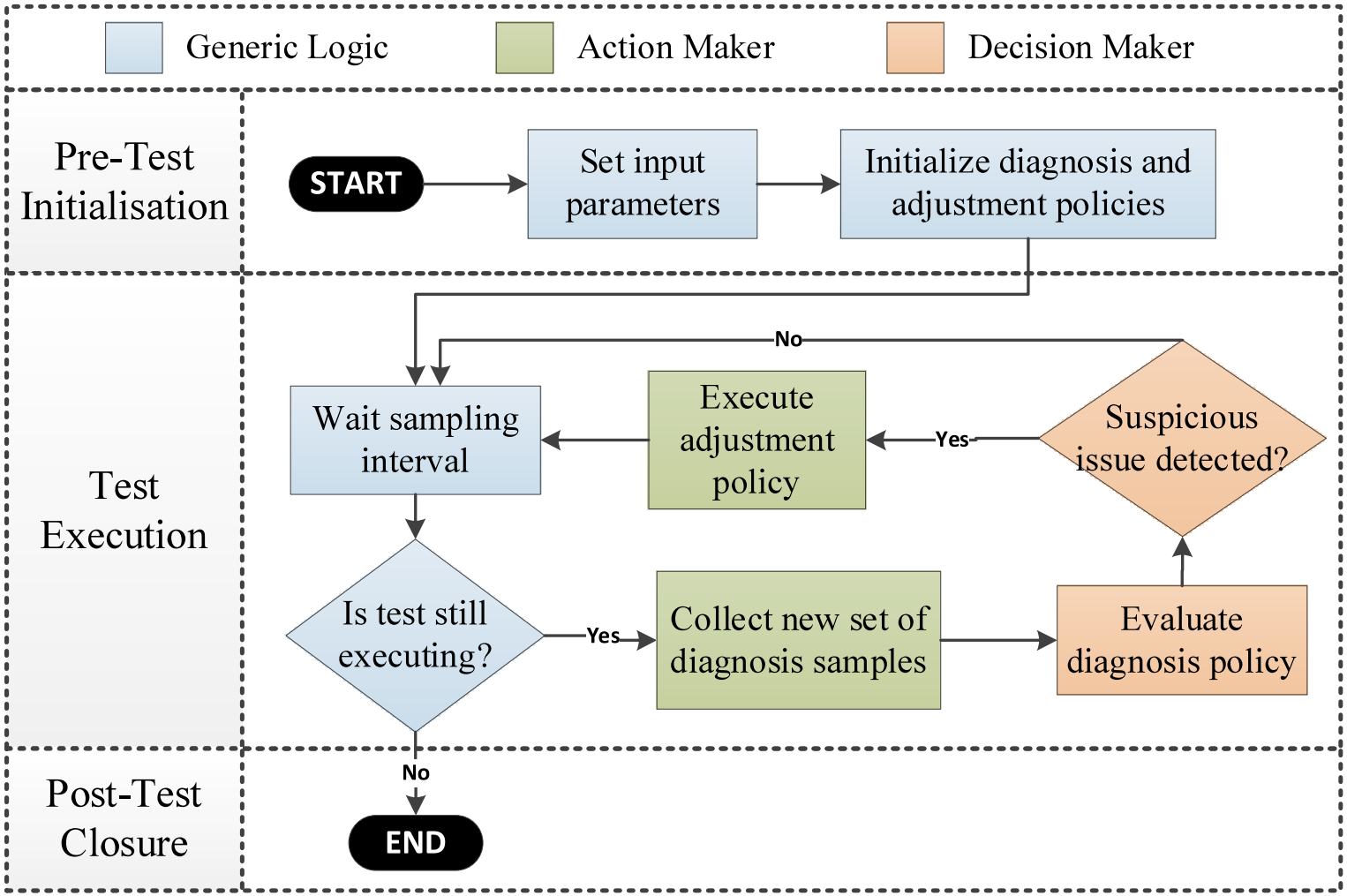
- A considerable number of the performance issues which occur in the software systems are **dependent** on the input workloads.
- Traditional Techniques are **ineffective** because:
  - rely on **static workloads**,
  - it is common to use **time-consuming** and complex iterative test methods,
  - heavily rely on **human expert knowledge**.
- They could cause:
  - the **complexity** escalation,
  - the **risk** of potentially overlooking performance issues.

Research Objective

- Automated approach to **dynamically adapt** the workload used by a testing tool
- Based on a set of **diagnostic metrics**, evaluated in **real-time**, to determine if any test workload adjustments are required for the tested application



Proposed Approach



Experimental Set-up

Testbed

- Two independent VMs located on a 24-core, 64GB RAM server:
  - **Server** (2 core, 4GB RAM):
    - JPetstore, NMon, WAIT data collector
  - **Test Controller** (2 cores, 4GB RAM):
    - JMeter, Controlling tool (Java)

Tests execution

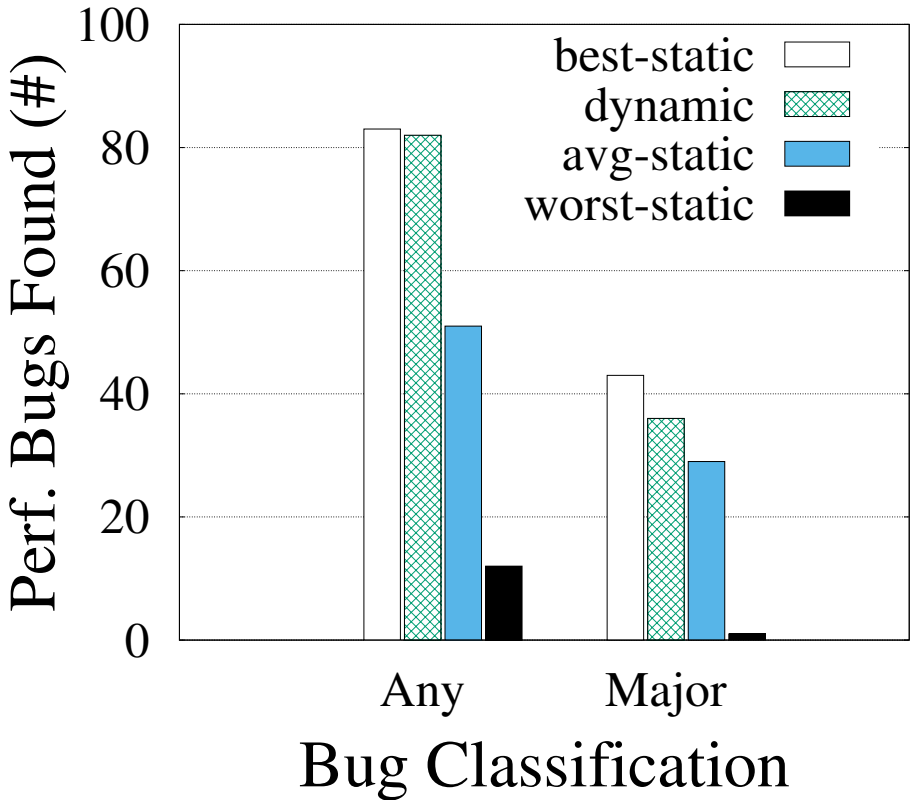
- **Static:**
  - Run a range of workloads in order to establish Static Base Line; to be compared with our solution
- **Dynamic:**
  - Tests run with our solution (prototype)

Analyzed parameters: # Bugs, Transaction Response Time, Throughput, Error rate, CPU and Memory utilisations

Results

Bugs detection

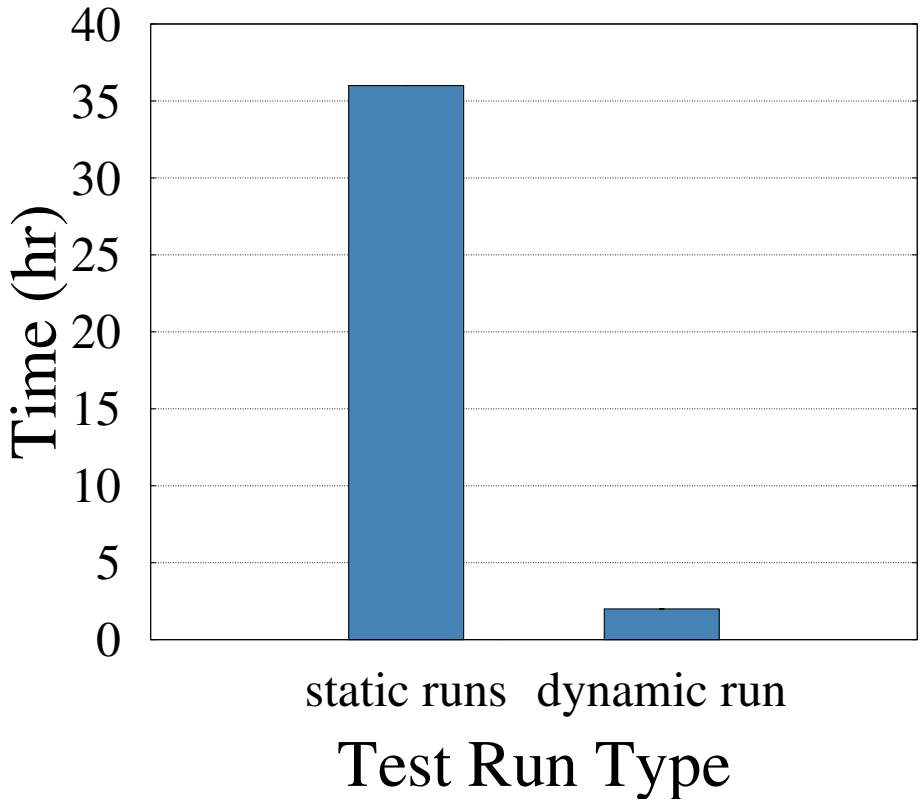
- Bugs classification (frequency occurrence based):
  - major (more than 5%)
- Comparable number of detected bugs w.r.t. the best static workload



Results

Execution time

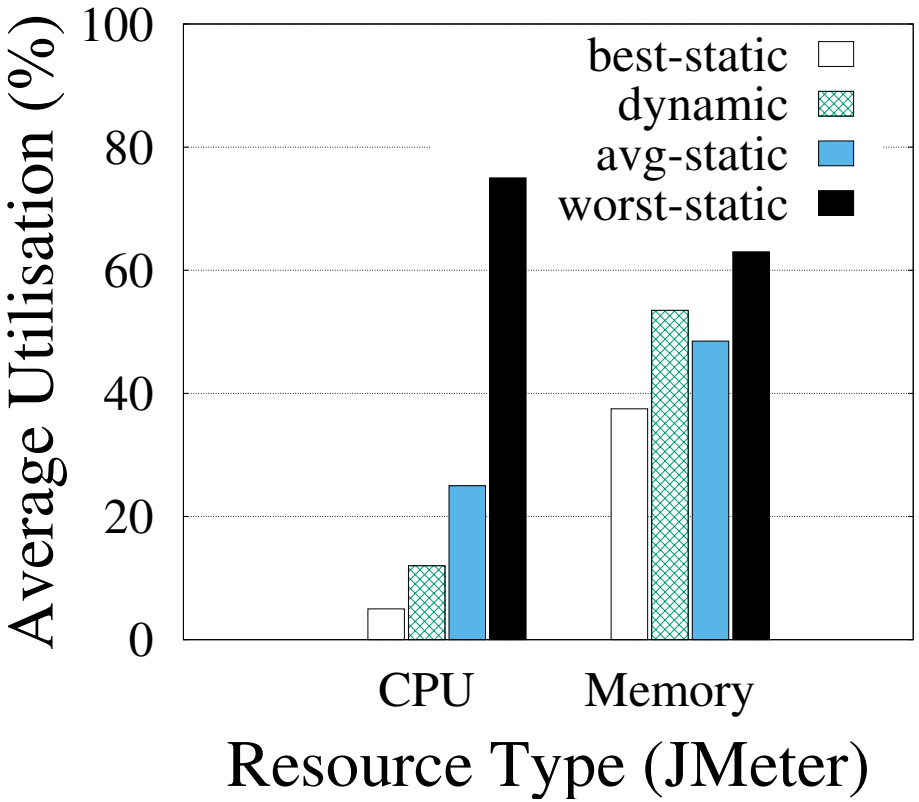
- Reduction in the duration of the performance testing activities of 94%
- Workload decision taken out from a tester hands



Results

Resource utilisation

- More CPU efficient than static workload
- Marginally more memory-intensive due to monitoring the workload behaviour



Conclusions

- Automated approach to dynamically adapt the workload so that issues (e.g. bottlenecks) can be identified more quickly, as well as with less effort and expertise
- Reduction in the duration of the performance testing activities of 94%
- The approach is able to identify almost as many relevant bugs as the best test run (from the tests using static workloads)
- Introducing a moderate level of overhead in memory (i.e., 5% increment) utilisation in the JMeter machine.

Future work

- Improve experimental validation of our approach:
  - by diversifying the tested applications,
  - the diagnosis tools used to identify the bugs,
  - the size and composition of the test environment,
  - test duration.
- Keep investigating how best to extend our technique (i.e., by exploring the idea of using different workloads, per transaction type).

Thank you for your attention.

Questions?

Science Foundation Ireland sfi For what's next

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