Why Feedback Implementations Fail: The Importance of Systematic Testing

Joseph L. Hellerstein
Google, Inc.
Seattle, Washington USA
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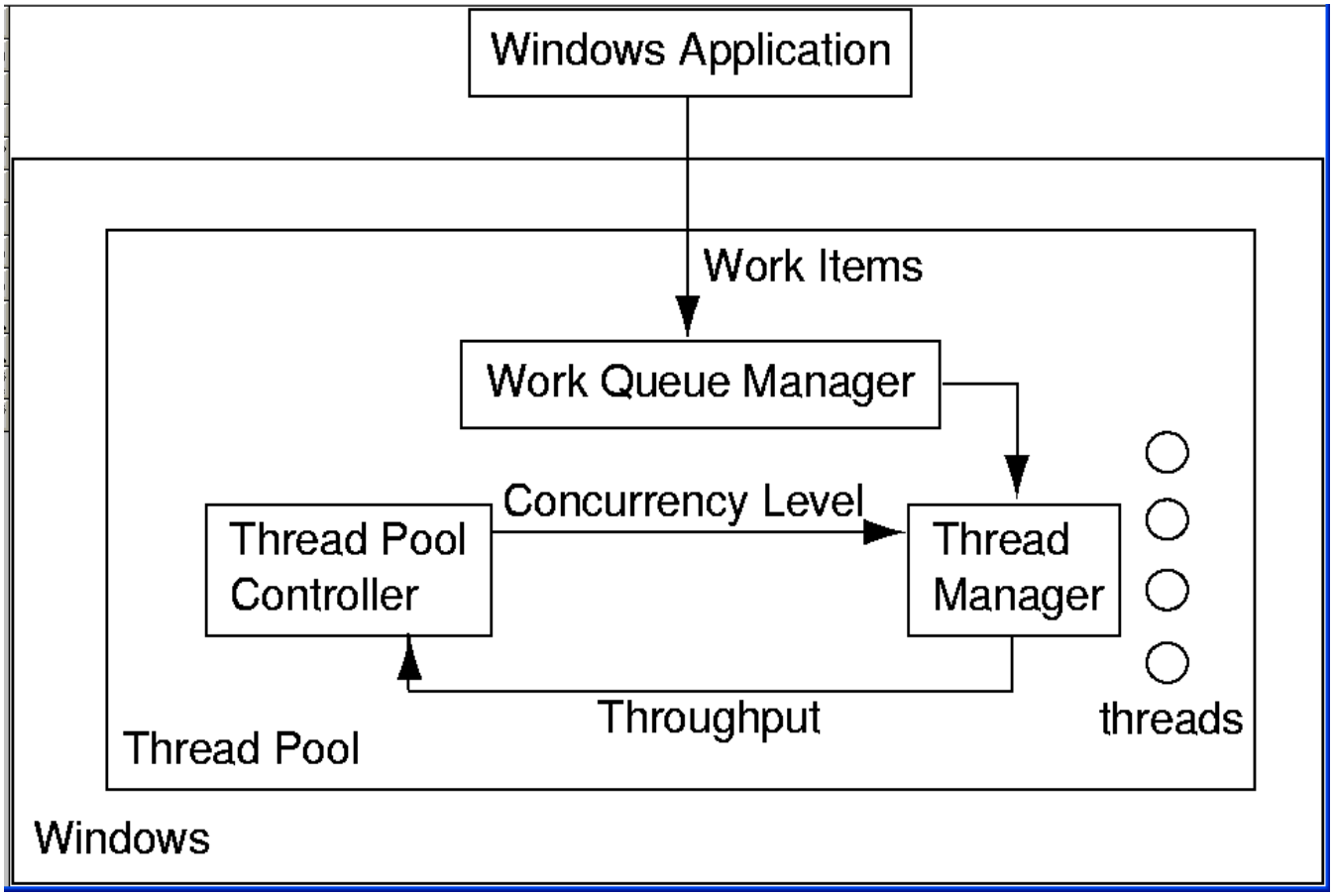
Case Study: .NET Thread Pool



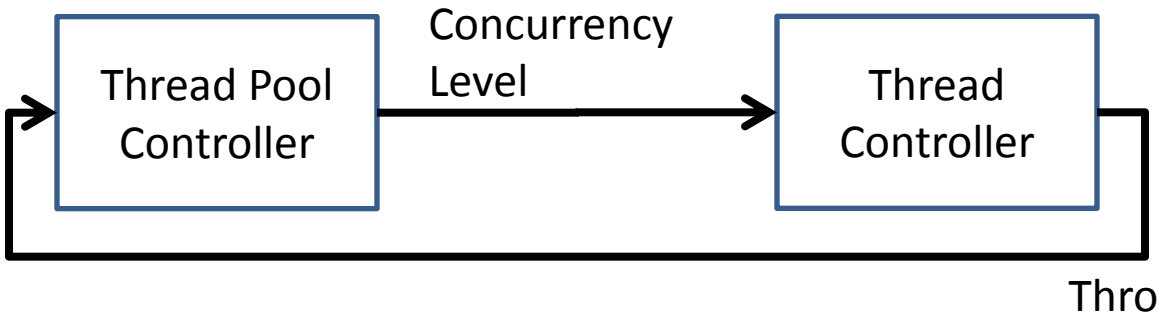
Scenario

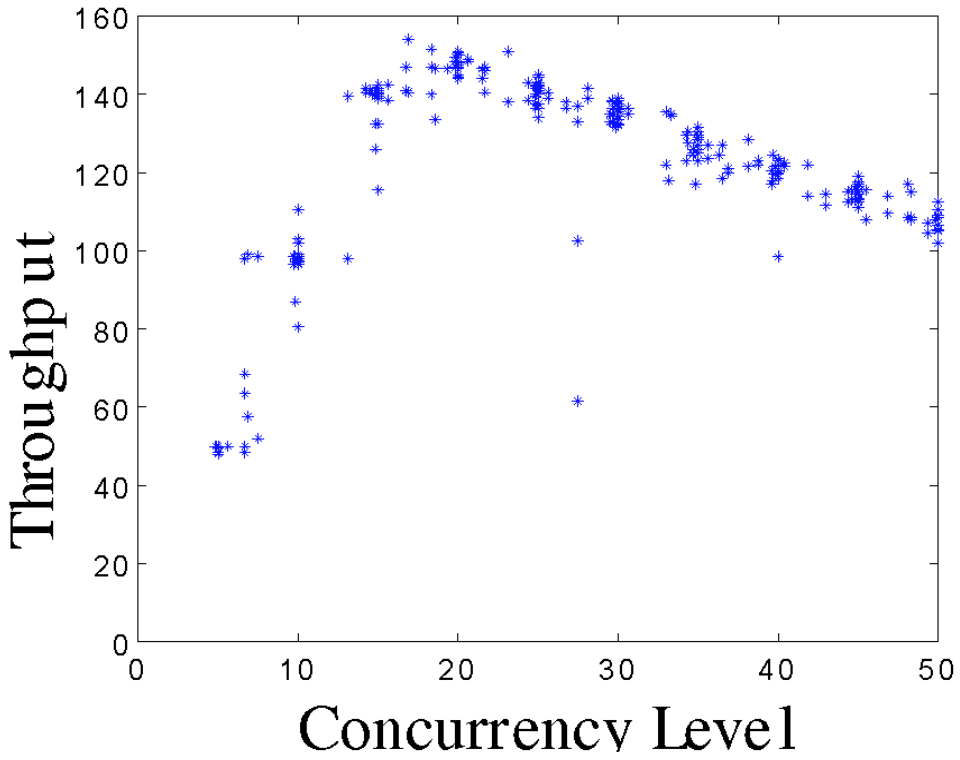
- Application submits work items (WI).
- Thread Manager attaches WI to an available task.
- Thread Pool Controller adjusts the number of tasks to maximize throughput.

Testing requires

- Coverage of possible WI scenarios
- Criteria for scenario evaluation
- Efficient test execution

Approach to Testing the .NET Thread Pool Controller





- Observation: WI scenarios are irrelevant—only care about concurrency-throughput (TC) curve.
- Implications
  - Need coverage of TC curves
  - Evaluate controller based on max throughput of the TC curve
  - Only require generating many TC curves

Generalization

- Key idea
  - Identify a simple scenario representation
  - Express coverage and evaluation in terms of the scenarios identified
- Google cluster manager
  - Considers priority and job class (e.g., batch, interactive)
  - Scenario expressed in terms of what's running in the cluster and what's to be scheduled
  - Consider combinations of priority and job class
- Stream processing system
  - Scenarios depend on pipeline configurations

Conclusions

- Build controllers so that simple scenarios are possible