



Network Protocol Testing Tool And Protocol testing scenarios and environments

BIC LAB

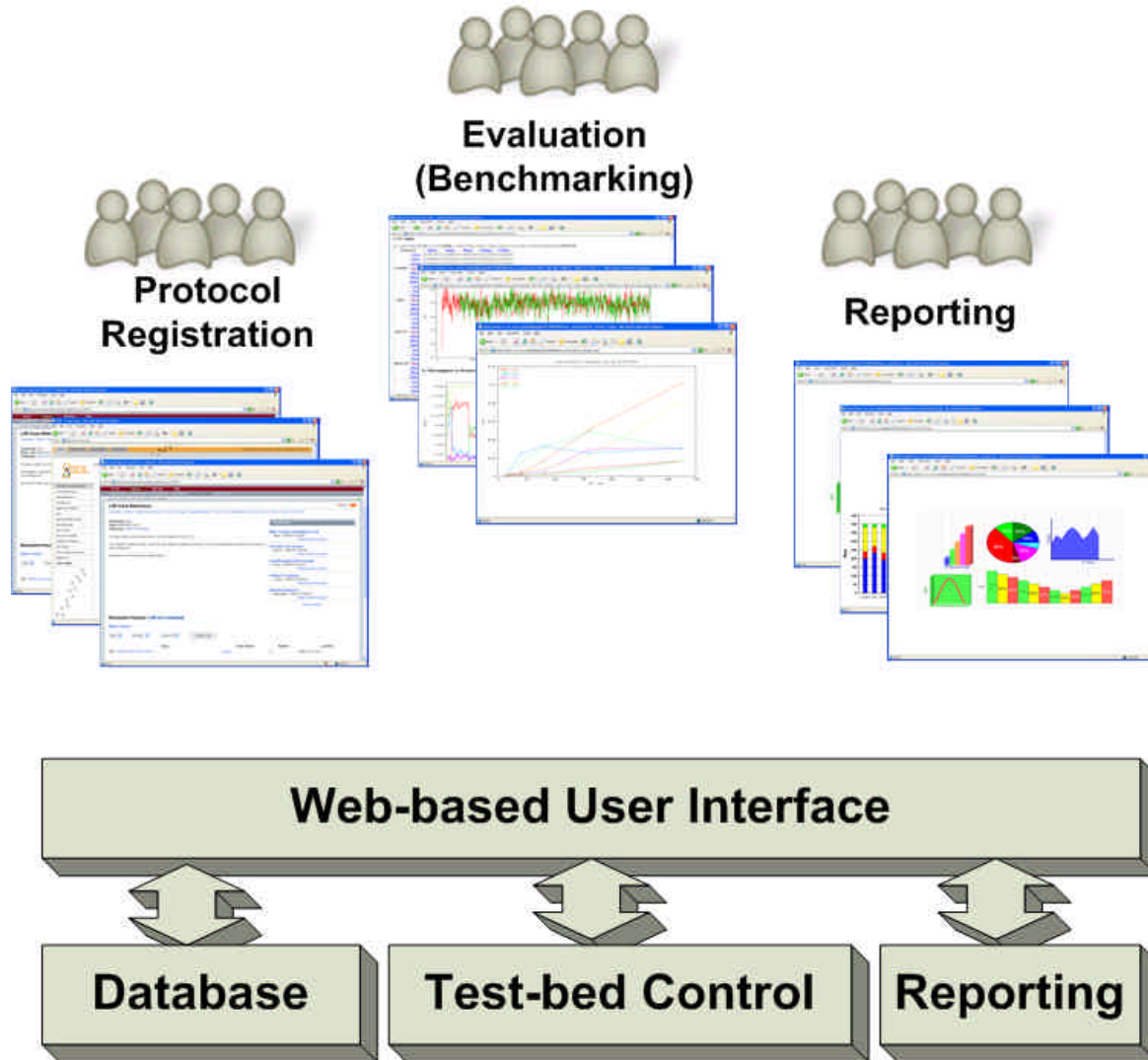
Department of Computer Science
North Carolina State University



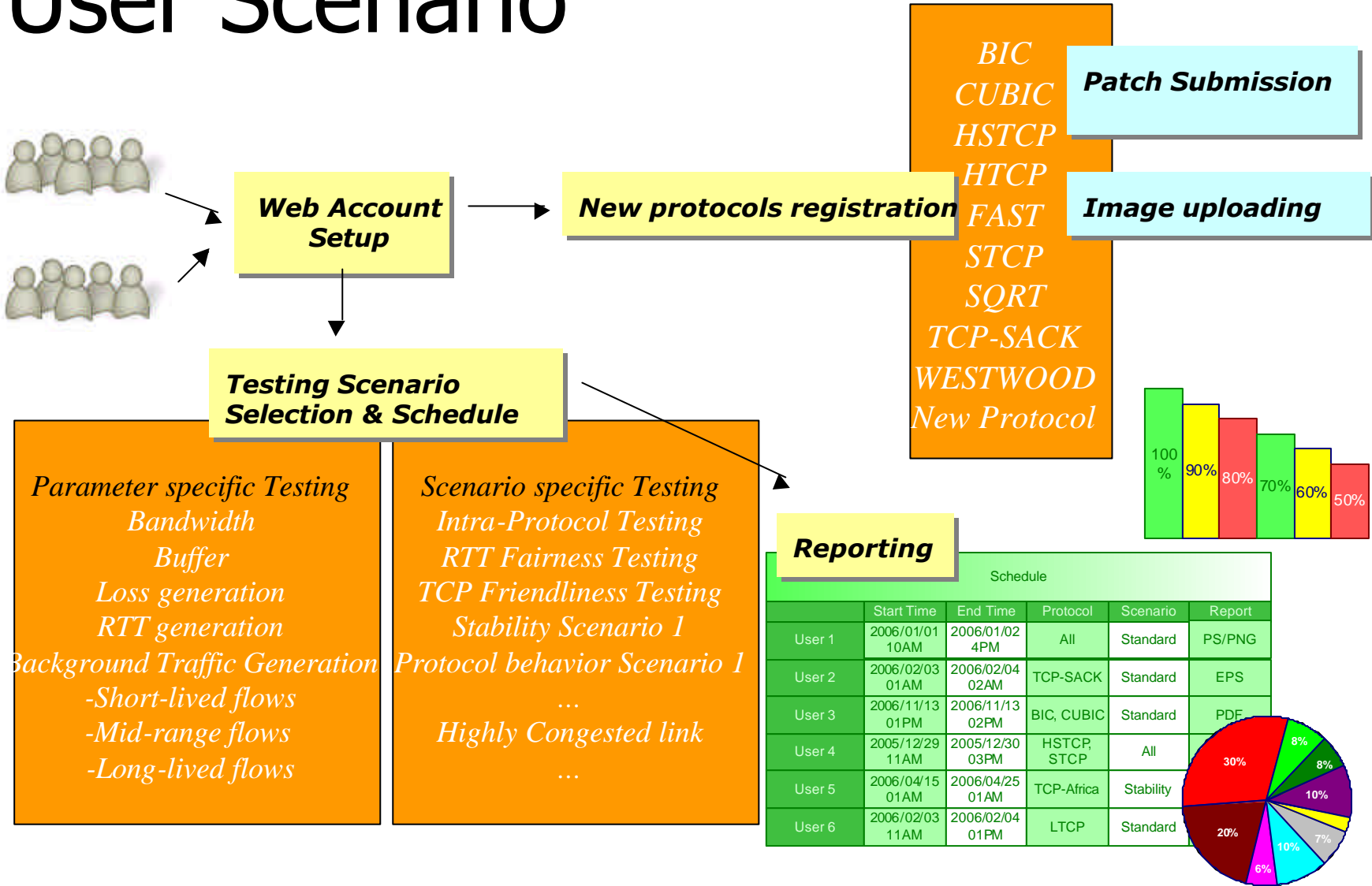
Why?

- ❑ Theoretical and simulation study may have many pitfalls (needs verification !)
- ❑ Different results for different setups (No standard benchmarking metrics)
- ❑ **No existing realistic evaluation suites** for TCP Congestion Control Algorithms
- ❑ Needs for a standard protocol benchmarking test-bed which research (develop) community easily accept results based on it
- ❑ **Needs for user friendly evaluation suites** which supports diverse scenarios

Overview



User Scenario





Consideration

- ❑ Diverse benchmarking scenarios.
- ❑ More evaluation parameters (metrics).
- ❑ More fine-grained control in reporting and scenario generation.
- ❑ Integration with more realistic traffic generators (harpoon, tmix, etc.)
- ❑ User friendly GUI



Parameters

- ❑ Buffer size (1MB to 32 MB)
- ❑ RTT (20 ms to 300ms or 500ms)
- ❑ Number of high speed flows
 - ❑ 4, 8, 16, 32, 64, 128 flows
- ❑ RTT Distribution
 - ❑ Same, uniform, exponential
- ❑ Type of background traffic
 - ❑ 10's different situations
 - ❑ Varying degree of fluctuations -- lognormal, Pareto
 - ❑ The amount
 - ❑ UDP (0 to varying degree; with what distribution)



Full test vs. subset

- ❑ Full and exhaustive testing
 - ❑ Required, but not useful for protocol development
- ❑ Subset -- some extreme cases
 - ❑ Quick turnarounds and check quick validity testing
 - ❑ Drive it to very extreme cases -- fix a few parameters to extreme values and vary the others.
 - Small buffers
 - Long RTTs
 - # of Flows (very small to large ones)
 - RTT distribution
 - ❑ For instance,
 - 1MB, 320ms, but vary the number of flows with or without RTT distribution.



Testing scenarios

- ❑ Stability test cases
- ❑ TCP friendliness
- ❑ RTT-fairness
- ❑ Intra-protocol fairness
- ❑ Convergence



Stability

- ❑ It is not convergence to equilibrium in a fluid model. It is very limited.
 - ❑ Can we study its stochastic behaviors?
 - ❑ Variations/CoV
 - What is impact of rate variance?
 - Utilization/Packet Loss/application goodput



TCP/UDP friendliness

- ❑ Vanilla test
 - ❑ Run one TCP flow w/ window limit (?)
 - ❑ With one high speed flow of the same RTT
 - ❑ Measure fairness index or throughput ratio.
- ❑ More sophisticated/useful one
 - ❑ In the presence of high speed flows (varying amount), run short-lived or long-lived flows with window limits.
 - ❑ Measure response time/transaction time/goodput.
 - ❑ Run UDP flows with some real-time constraints
 - Measure ping delays and transaction delays.



RTT-fairness test

- ❑ Two flows with different RTTs
- ❑ Measure their fairness index/throughput ratio.



Q & A

Thank you for your participation
