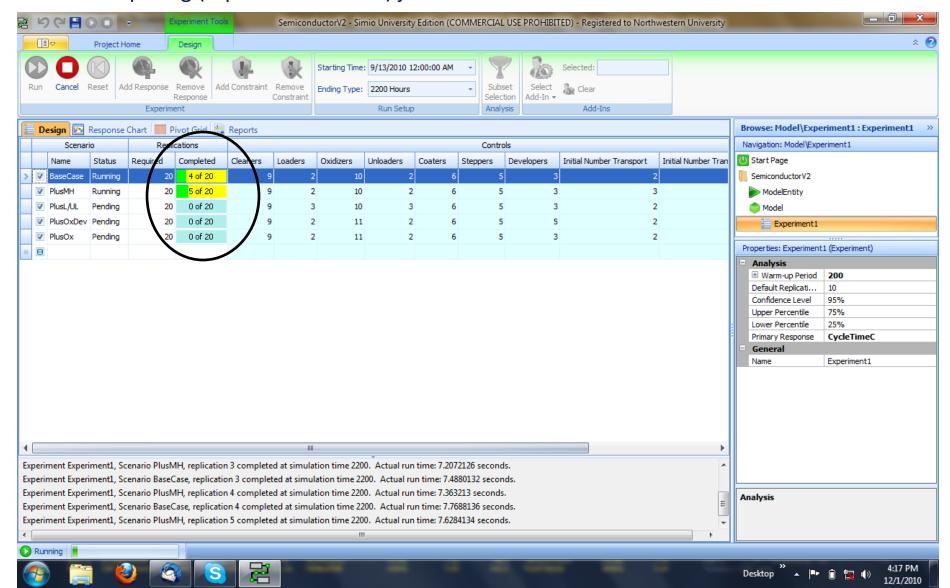# Simulation optimization = death of the single long run experiment

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(don't hate me I'm only the messenger)
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Simio recognizes that my laptop has a dual core and therefore distributes replications across processors. And since all that has to be retained to extend runs is the ending random number seed, incrementally adding replications is seamless. They are setting up to make cloud computing (reps and instances) just as seamless.

Characteristics of OvS problems worth solving

- Moderate to high dimensional decision variables
- Lots of feasible solutions (maybe uncountably infinitely many)
- A nontrivial amount of stochastic noise that may vary across the feasible space

- This implies we need to simulate a lot of solutions a lot and we don't know how much until we simulate them

Characteristics of (many) OvS algorithms

- Work with sets of solutions simultaneously
  - R&S, COMPASS, Nested Partitions, Stochastic Branch & Bound, Stochastic Model Reference Adaptive Search,…

- Refine/estimate more precisely as the algorithm progresses
  - All of the above plus sample path optimization, response surface methods, stochastic approximation

Single-run killers

- For all practical purposes, one processor per instance
  - Your error reduction rate is limited by processor speed rather than the number of processors available
- Extending runs requires retaining the entire system state and the overhead of reinitializing
- Single-run error analysis is hard to automate