Preliminary Validation of MonacSim

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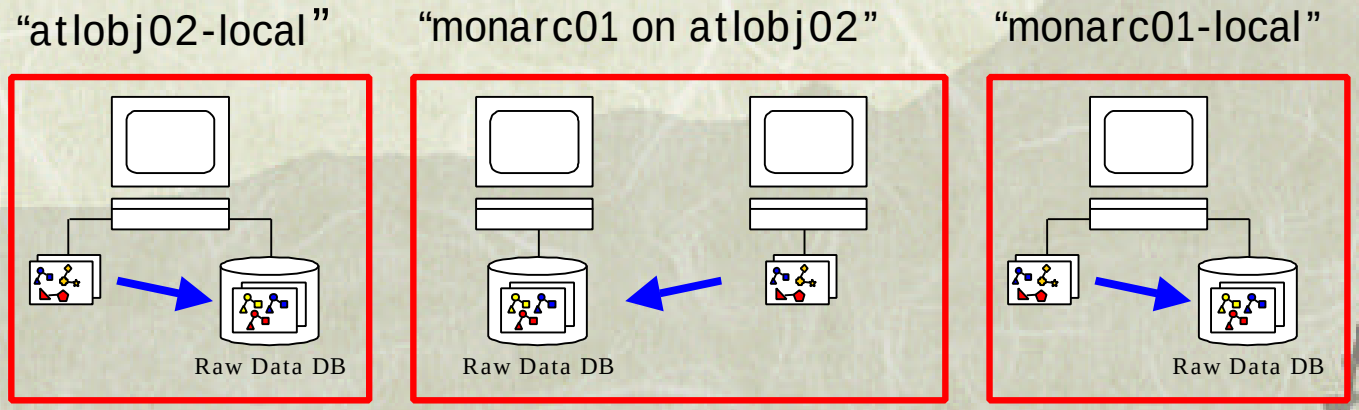
MonarcSim Validation

- Joint effort of Simulation WG and Testbeds WG
- Validate the time responses of various components in the discrete event simulation (esp. ODBMS and LAN/WAN)
  - measure the behaviors distributed ODBMS application
  - normalize and extract "standard" sets of simulation parameters from measurements
  - compare the results with simulation

Local and AMS test config



DB on local disk
2 x 300MHz

13.05 SI95/CPU

DB on ams server
server : atlobj02
client : monarc01

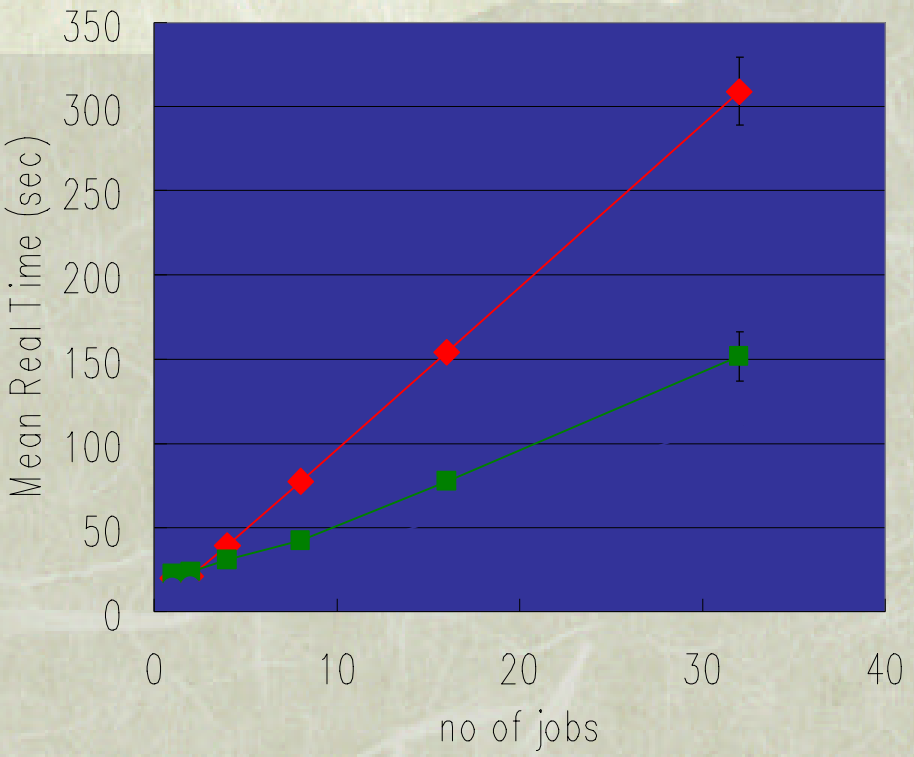
DB on local disk
4 x 400MHz

17.4 SI95/CPU

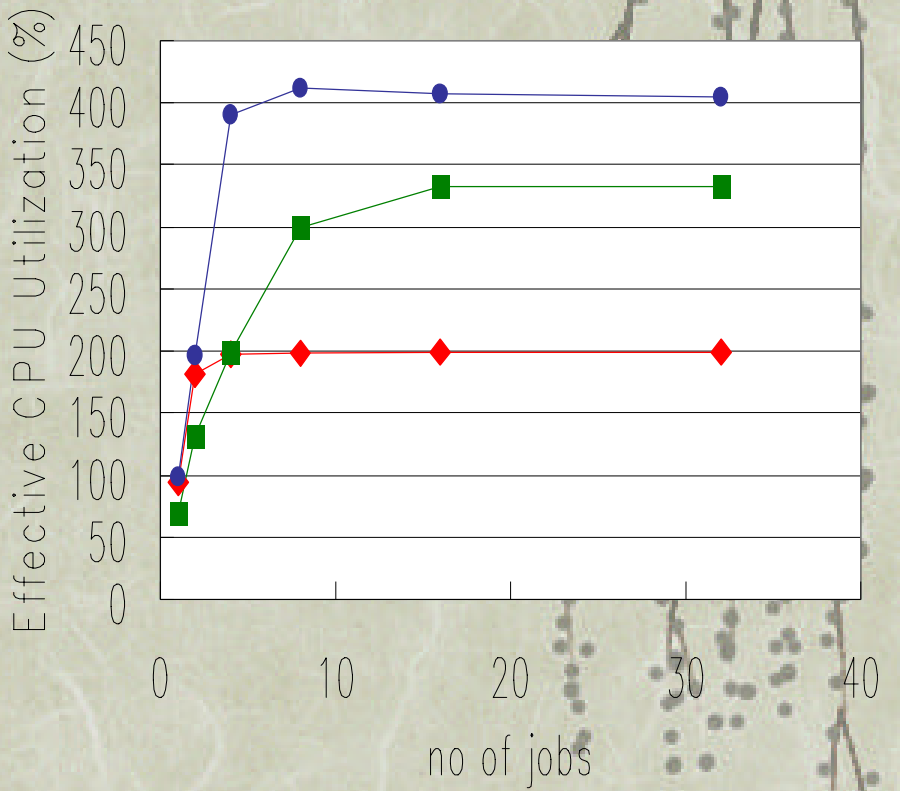
- Local disk I/O speed is measured by read() and write() system calls.
- Network speed is measured by FTP.

Measurements

job execution time



Aggregated CPU%



Local job parametars

- monarc01 local - 1 job

  CPU : 17.4 SI95 Disk Read : 207 MB/s

  1 job = 14.23 sec, CPU% = 99.1%

- atlobj02 local - 1 job

  CPU : 13.05 SI95 Disk Read: 31 MB/s

  1 job = 19.93 sec, CPU% = 94.5%

- Assumption:

  $T_{job} = T_{diskread} + T_{process}$

  $T_{process}(monarc01) / T_{process}(atlobj02) = 13.05 / 17.4$

  $T_{diskread}(monarc01) / T_{diskread}(atlobj02) = 31 / 207$

Deduced local parameters

- Calculated CPU time

  $T_{process}$(monarc01)= 14.06 sec --> CPU% 99.0%

  $T_{process}$(atlobj02) = 18.74 sec --> CPU% 94.0%

- CPU cycles per event

  Event size = 10.8 MB, # of events = 5

  CPU(monarc01) = 17.4

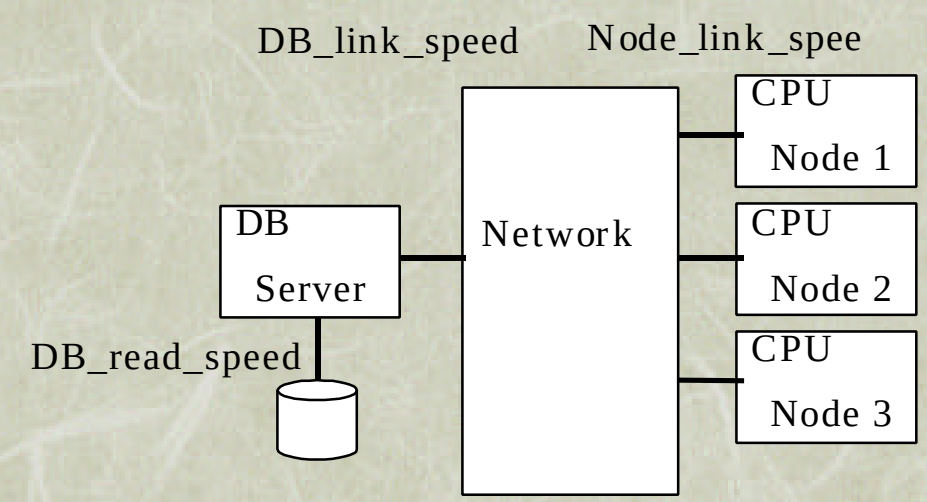
  --> Process_Time = (14.06 sec x 17.4)/ 5 events

  = 48.91 [SI95*s]

  --> Input to simulation

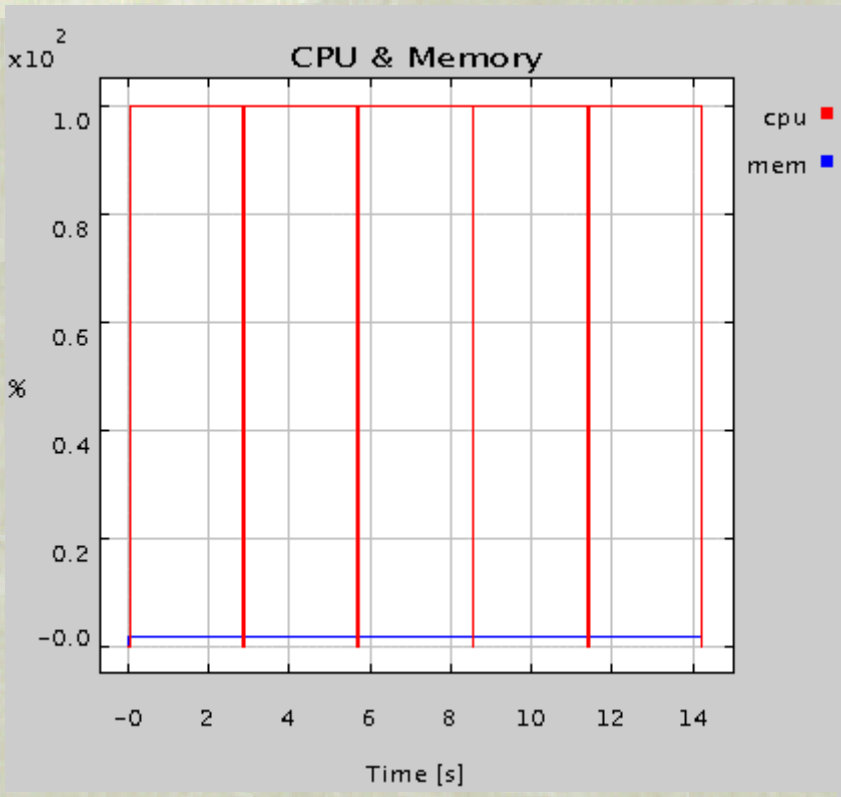
Other parameters

- monarc01 is 4 CPU SMP machine
- atlobj02 is 2 CPU SMP machine
- assume local test on SMP machine can be simulated with Iosif's high speed network

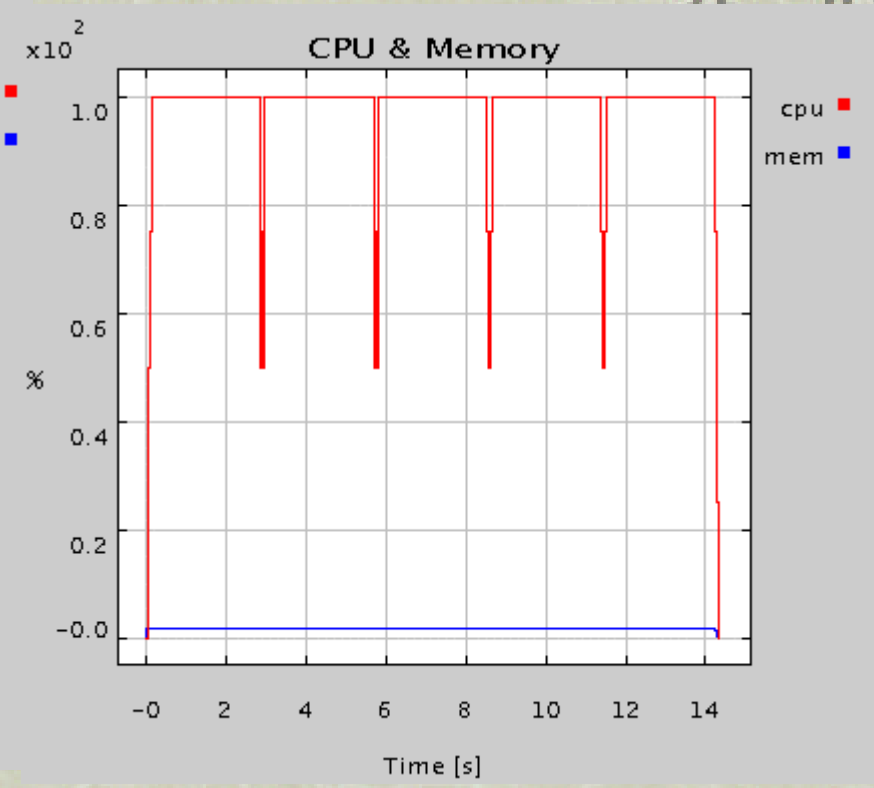


Simulation results

1 job

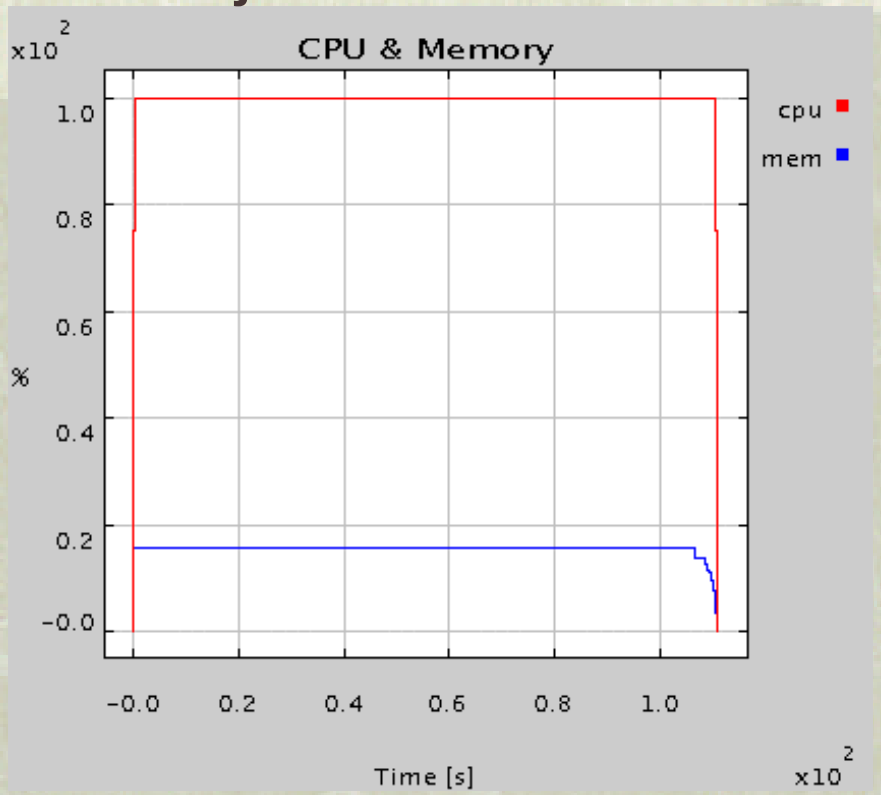


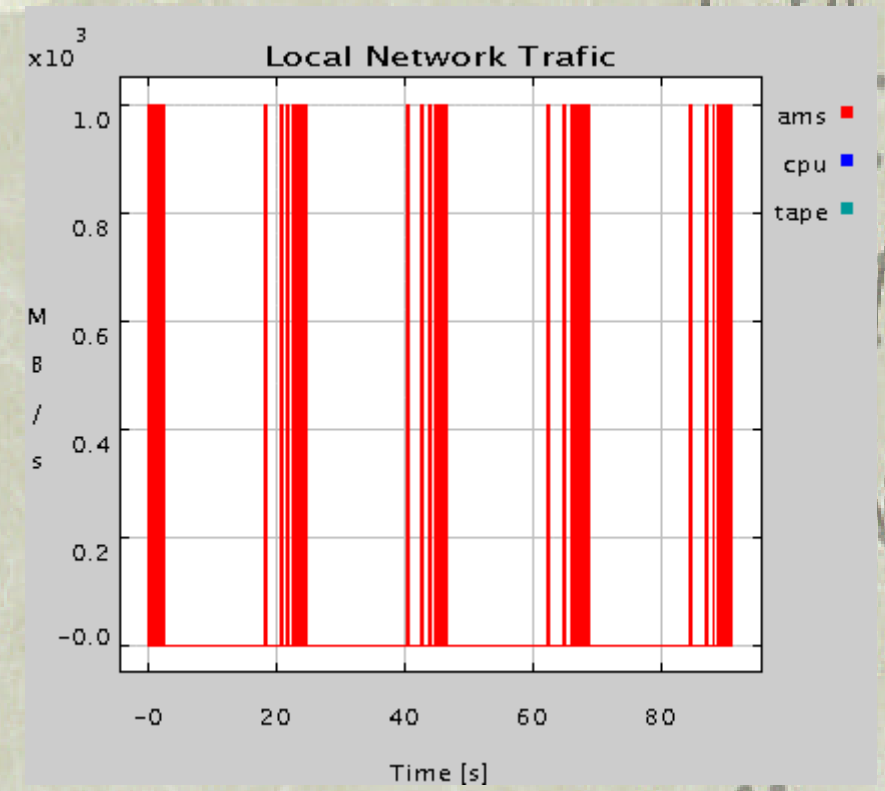
4 jobs



Simulation results (cont'd)

32 jobs





Jobs vs time (32jobs)

Simulation

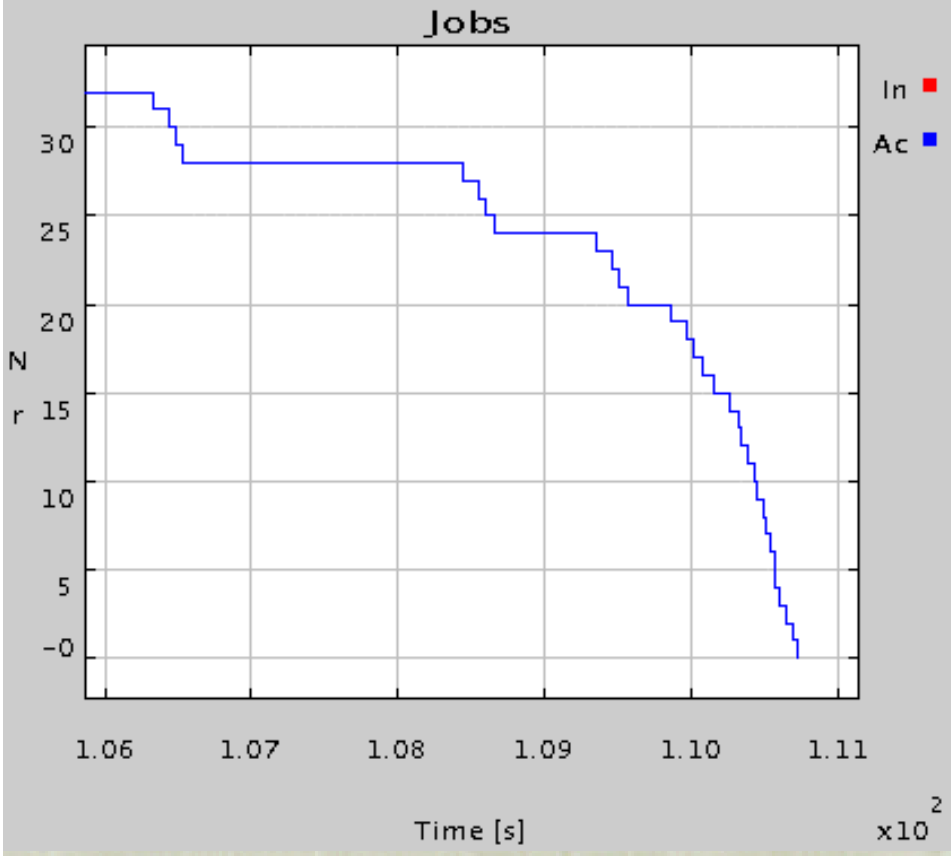
ave. = 109.5 sec

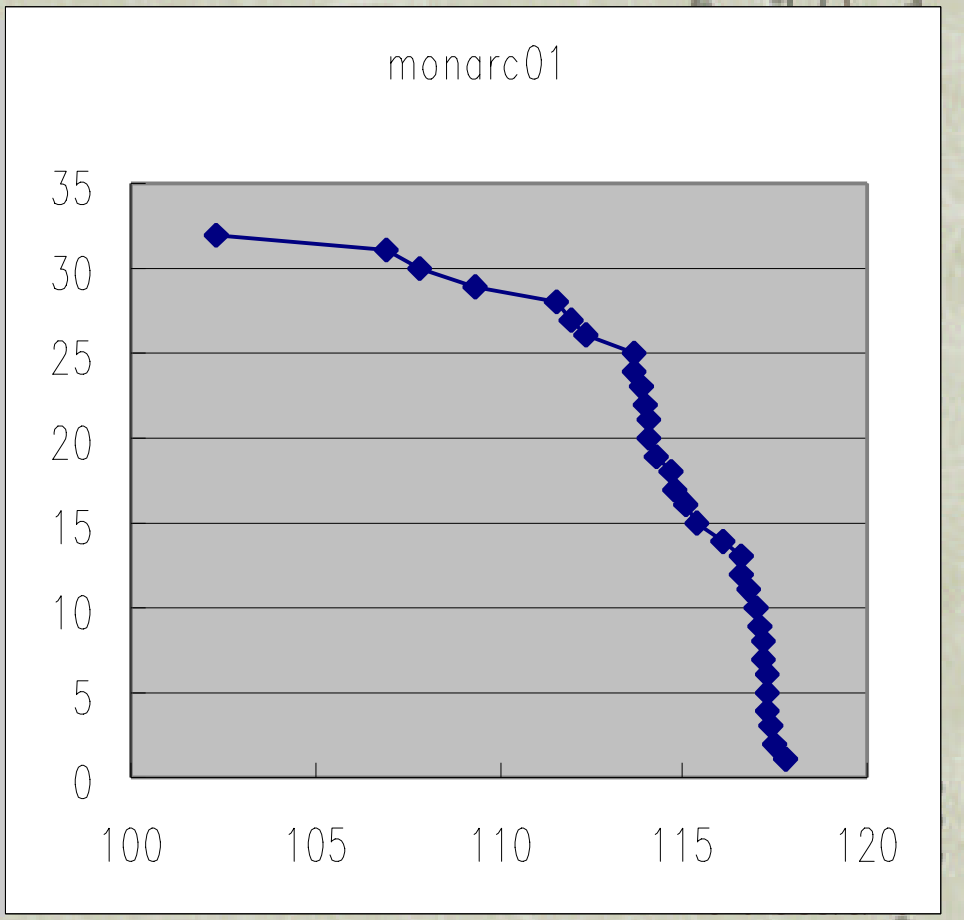
rms = 1.3 sec

Measurement

ave. = 114.3 sec

rms = 3.5 sec





Summary

- simple modeling of testbed local and ams configuration is made
- 4 CPU and 2 CPU SMP machines can be reasonably simulated with Iosif's model
- simulation roughly reproduces many aspects of the testbed measurements
  - job profile, CPU and I/O time
- still many fine-tunings are necessary
  - rms in job time, network utilization, etc