AutoNUMA25
vs
AutoNUMA25 MoF

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Objective

- Run the autonuma-benchmark (tag 0.1 d20e5a0) to compare:
  - AutoNUMA25 cdcfc6b
    - Based on 3.6-rc6+ 4651afb
  - AutoNUMA25 MoF
    - Based on AutoNUMA25
- Run on 2 nodes with HT enabled
- Pending run on 8 nodes
- Pending more benchmarks
  - Autonuma-benchmark not best to show the benefits of async migration

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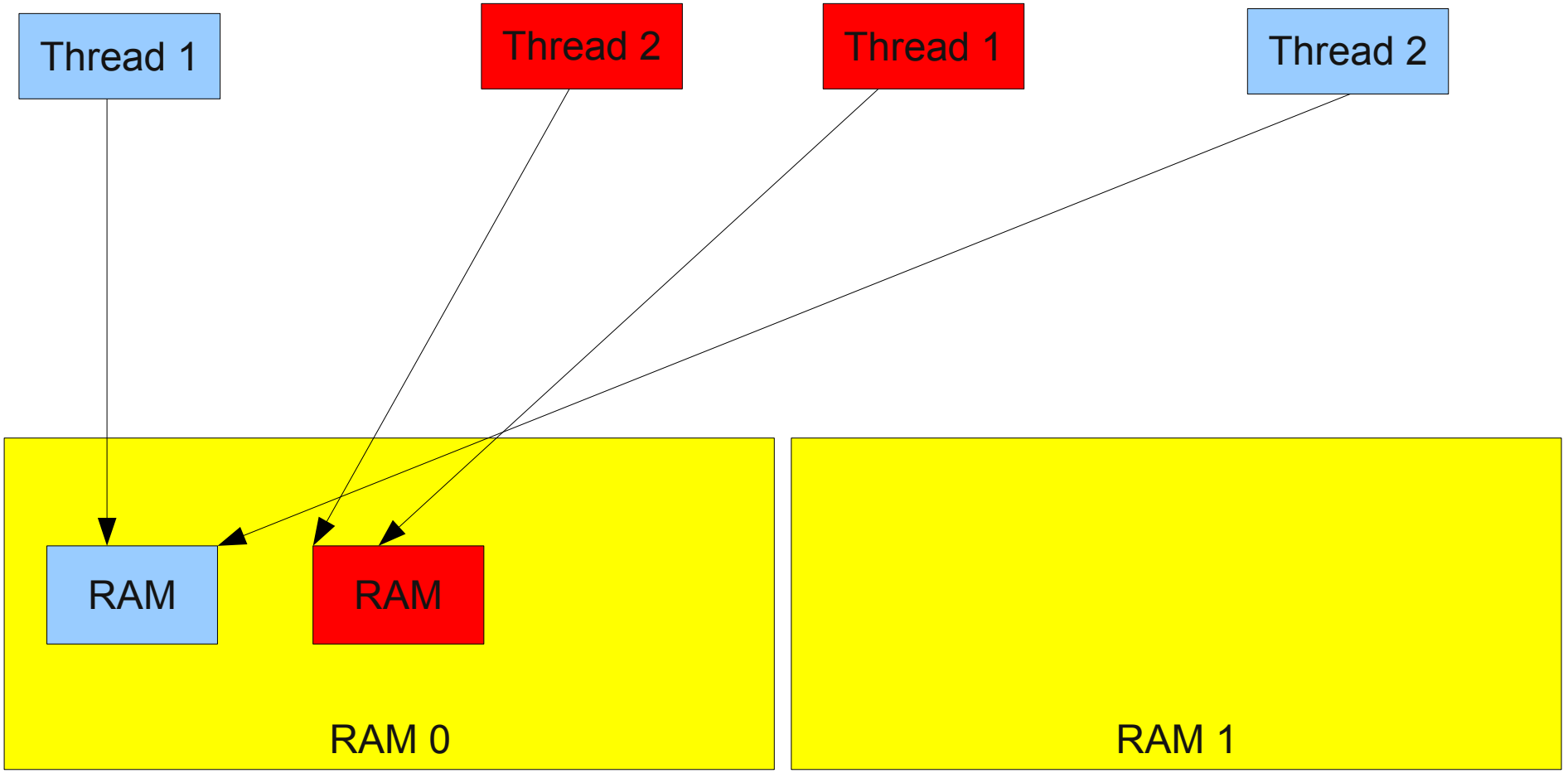
AutoNUMA-benchmark tests

- P=# of processes, T=# of threads per process, M=memory per process
- numa01
  - M=3GiB P=2, T=nr_cpus/2, all threads share all process memory
- numa01_THREAD_ALLOC
  - M=3GiB, P=2, T=nr_cpus/2, all threads use per-thread local memory
- numa02
  - M=1GiB, P=1, T=nr_cpus, all threads use per-thread local memory
- numa02_SMT
  - M=1GiB, P=1, T=nr_cpus/2, all threads use per-thread local memory
    - The kernel to get this right must not use more than one HT thread per core, and in turn it must decide to split the load over two NUMA nodes even if the load would fit in a single NUMA node
    - Testing with T=nr_cpus/4 and smaller T values, would also be interesting, but if the kernel behaves well with T=nr_cpus/2 there's a good chance it'll behave sanely with more than half of the CPUs idle too
- More will be added...

numa01 (startup)



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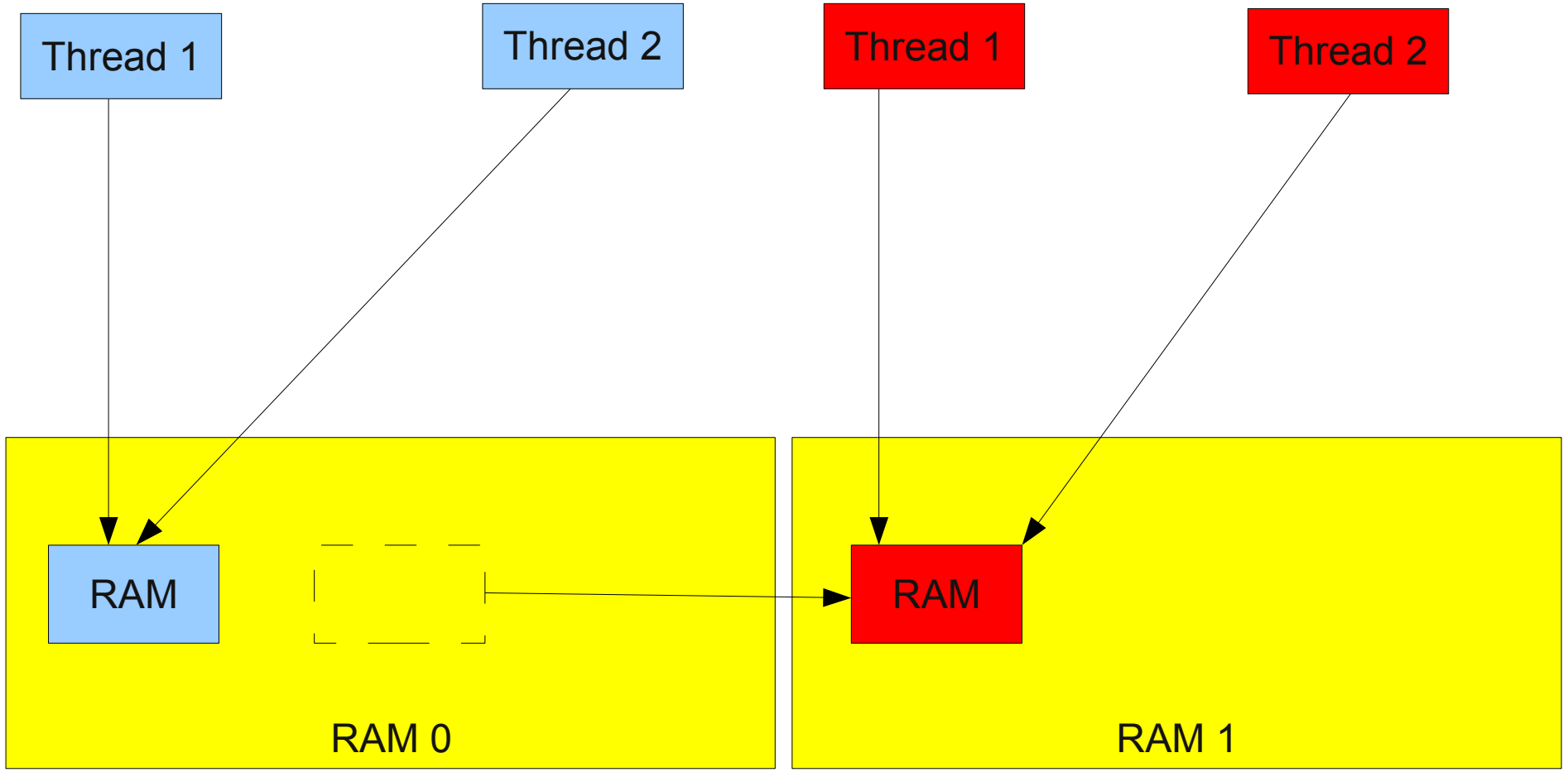
numa01 (converged)



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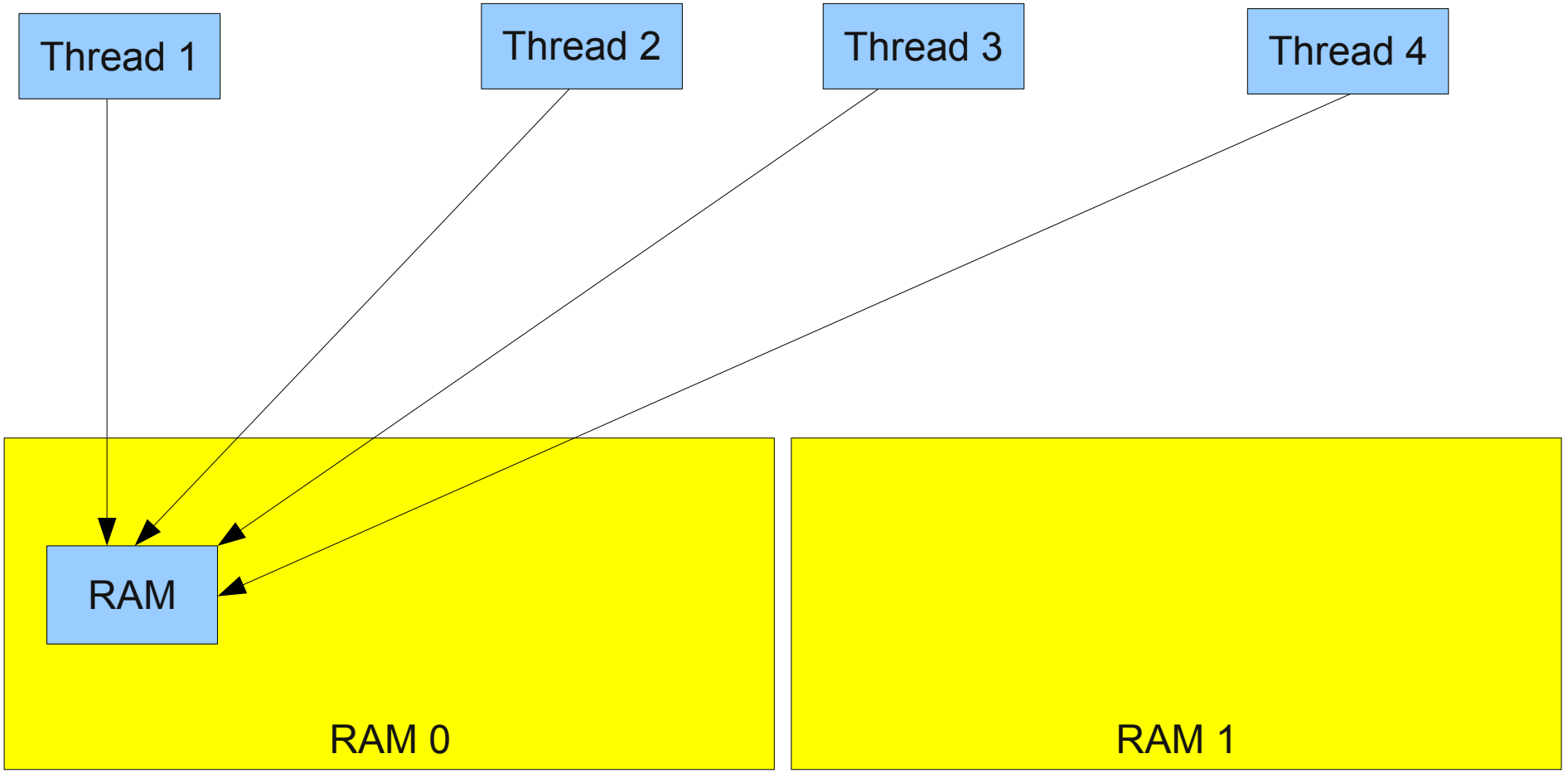
numa02 (startup)



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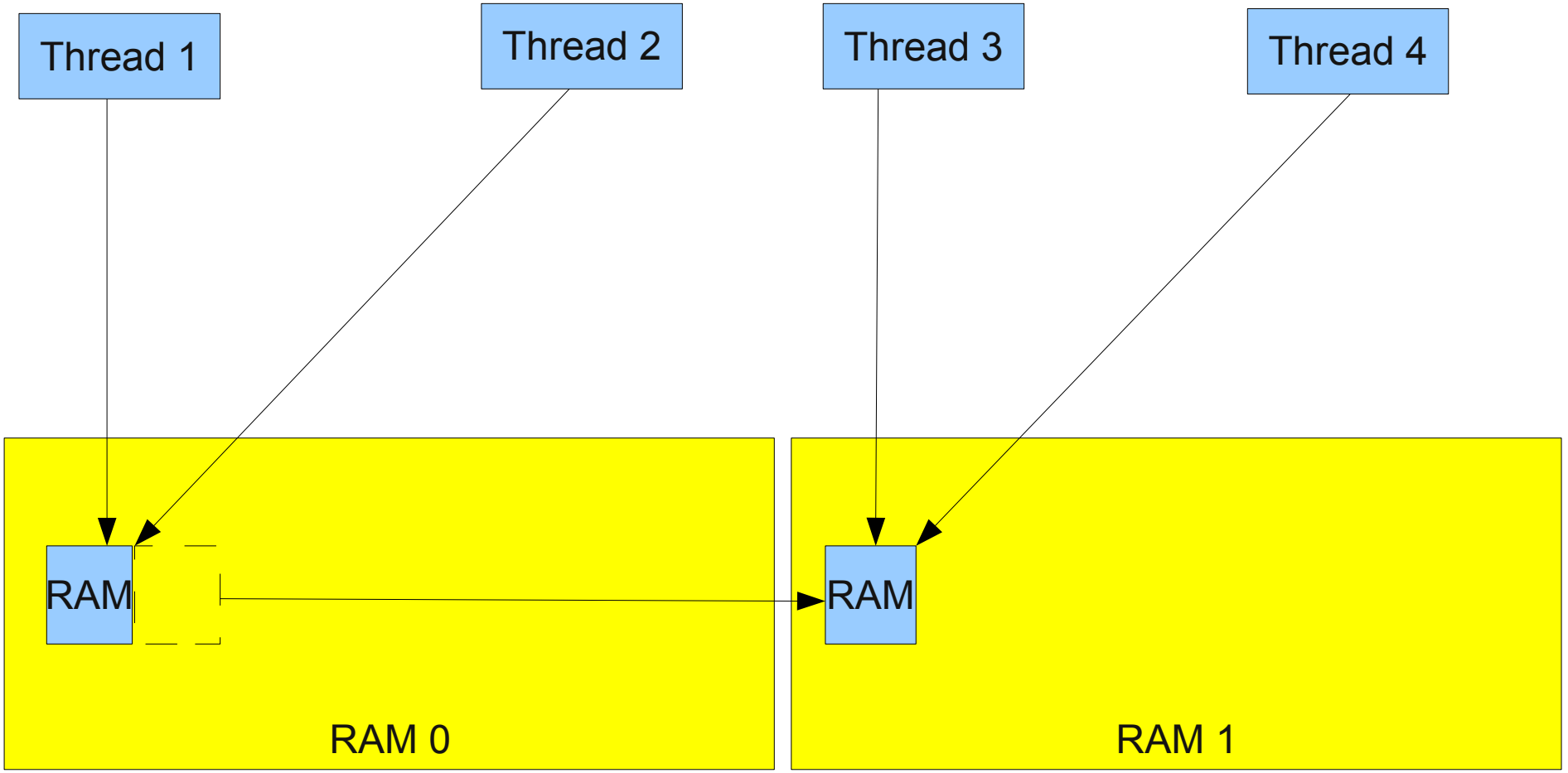
numa02 (converged)



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autonuma-benchmark

```
$ git clone git://gitorious.org/autonuma-benchmark/autonuma-benchmark.git
$ cd autonuma-benchmark
$ sudo ./start_bench.sh -s -t
```


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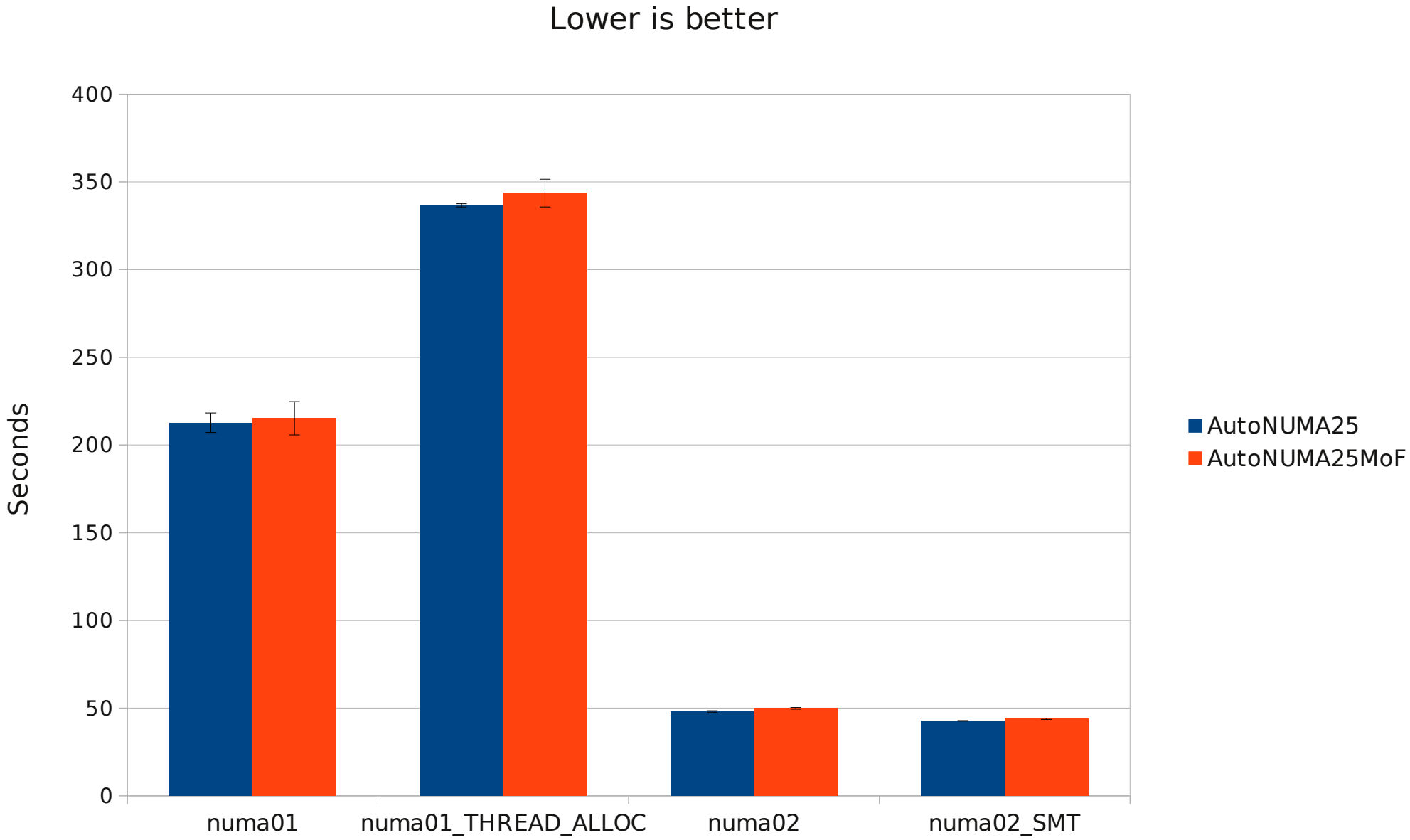
4 runs, average and stdev



2 nodes

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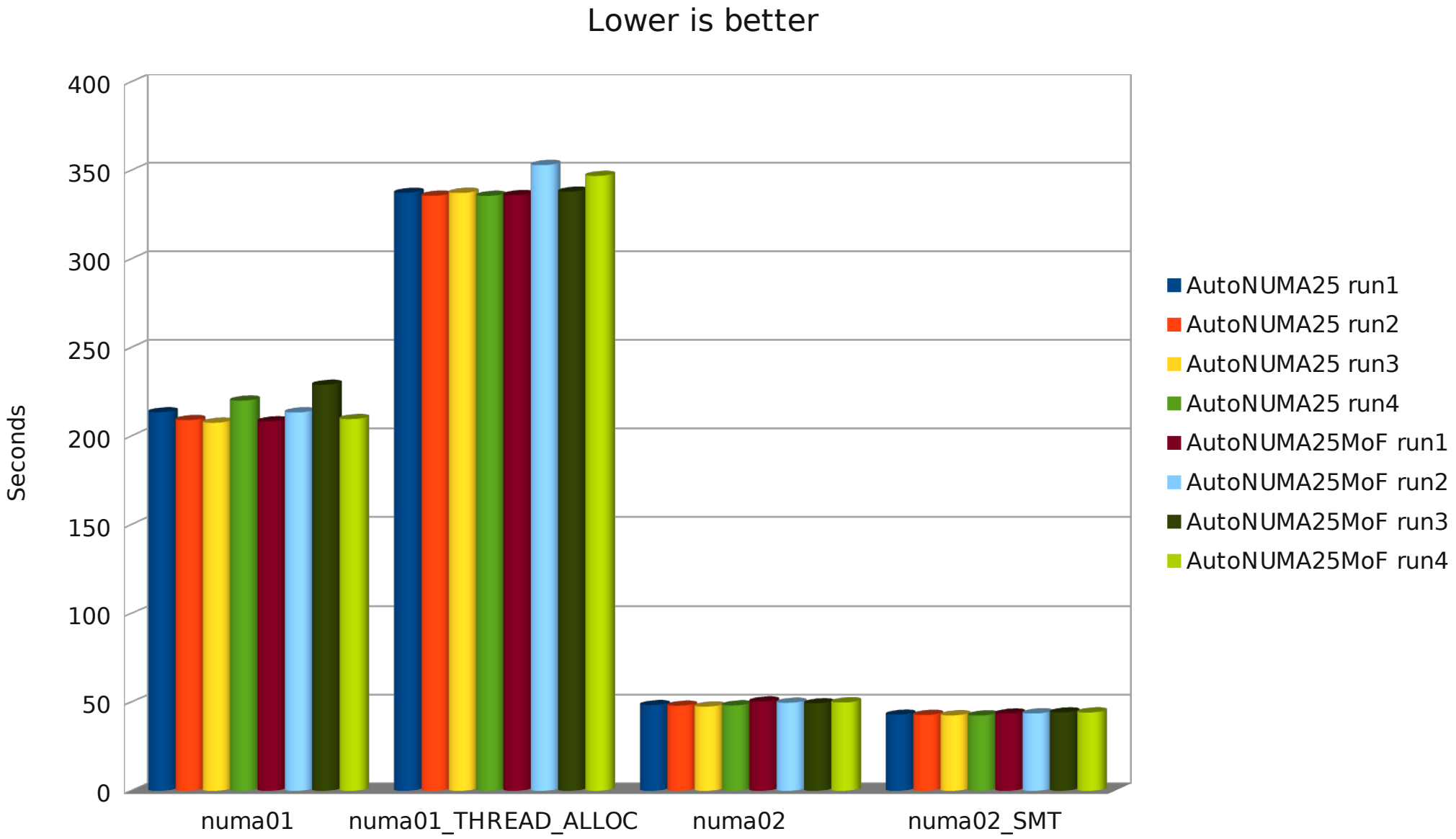
4 runs of each test, all results



2 nodes

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Raw results

Lower is better Average seconds	numa01	numa01_THREAD_ALLOC	numa02	numa02_SMT
AutoNUMA25	212.72	336.6725	48.07	42.755
AutoNUMA25MoF	215.2875	343.65	49.87	43.9425

Lower is better stddev	numa01	numa01_THREA...	numa02	numa02_SMT
AutoNUMA25	5.609628627	0.962059423	0.3879003308	0.2093641166
AutoNUMA25MoF	9.5142047312	7.9072624846	0.45563143	0.3450966048

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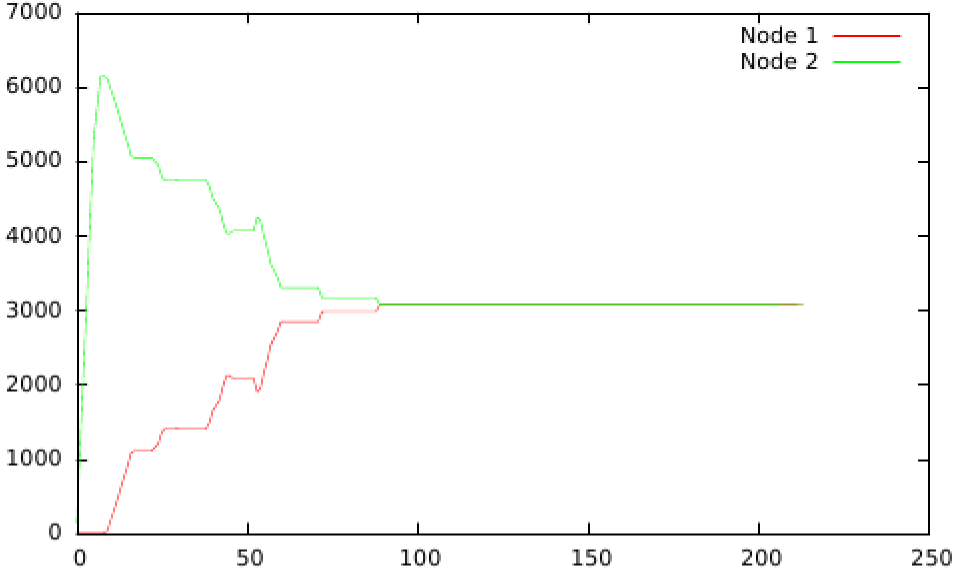
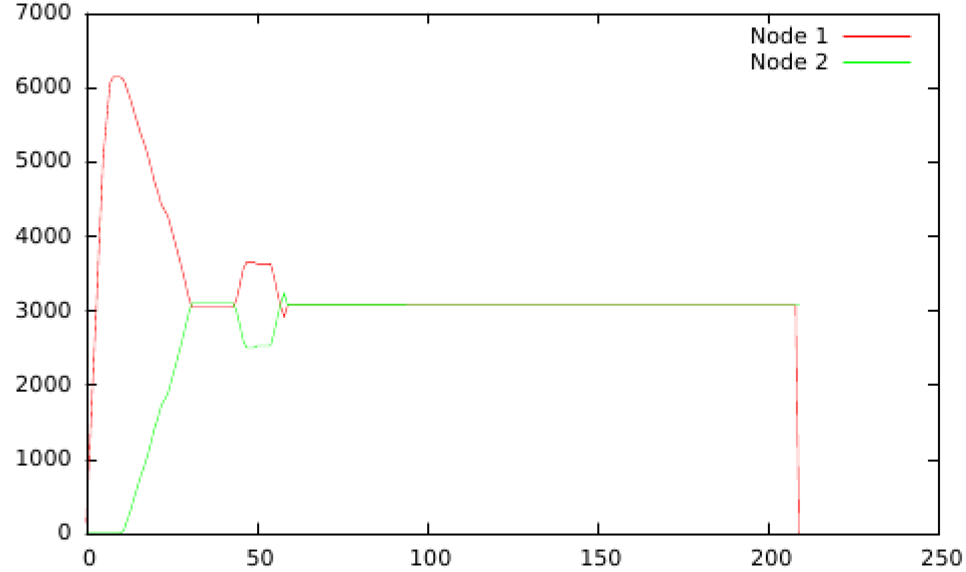
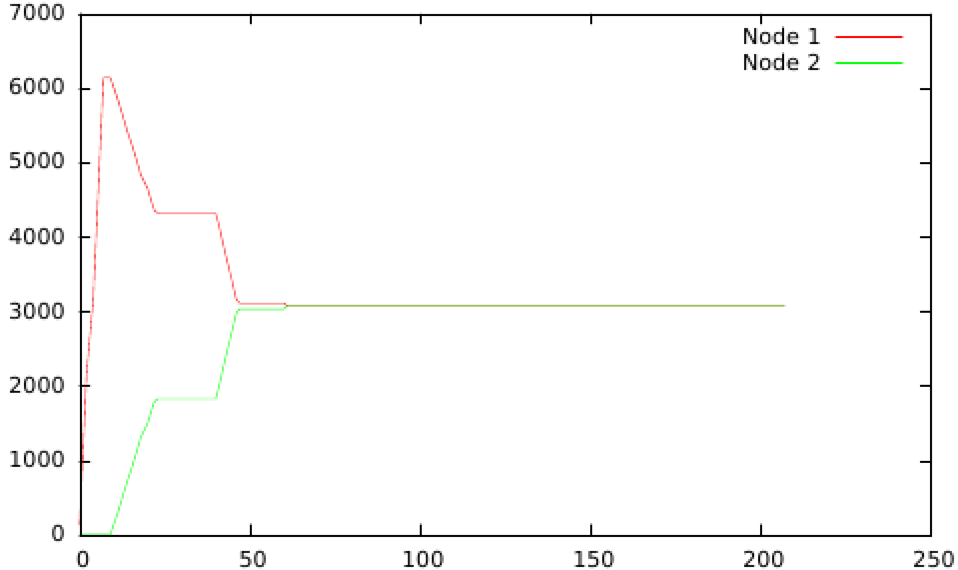
Convergence charts

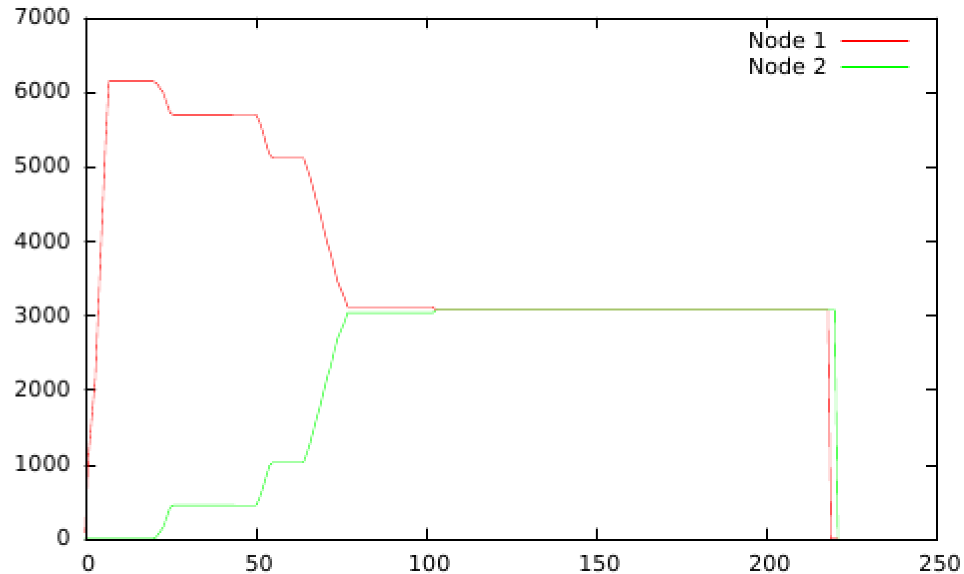
- The AutoNUMA-benchmark produces a chart for each test run (in pdf format).
  - In each chart there is one two dimensional line per NUMA node (node1, node2, etc.).
    - X=time (seconds)
    - Y=memory (MiB)
  - Each line represents how much of the test process's memory is in that NUMA node over time, for the duration of the test. Because all memory starts in one node, it illustrates how the memory migrates over time.
  - A workload converges when the memory levels are equal in all NUMA nodes
  - Note: with nr_nodes > 2, numa01 may not fully converge because half of the cpus will thrash on the memory of half of the nodes, but it should get close enough
  - In the future we plan to add a new numa01 "PER_NODE" test with P=nr_nodes and T=nr_cpus/nr_nodes

AutoNUMA25 numa01



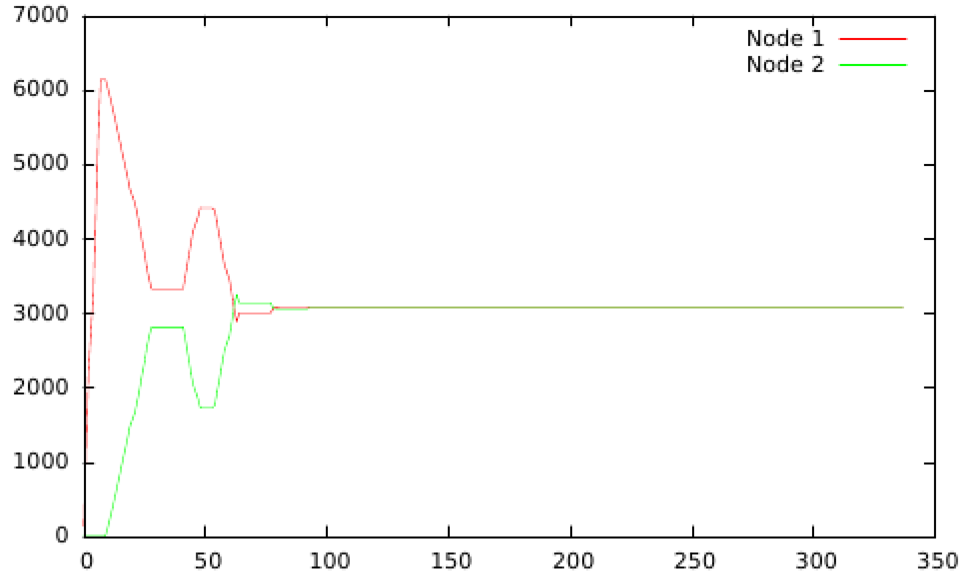


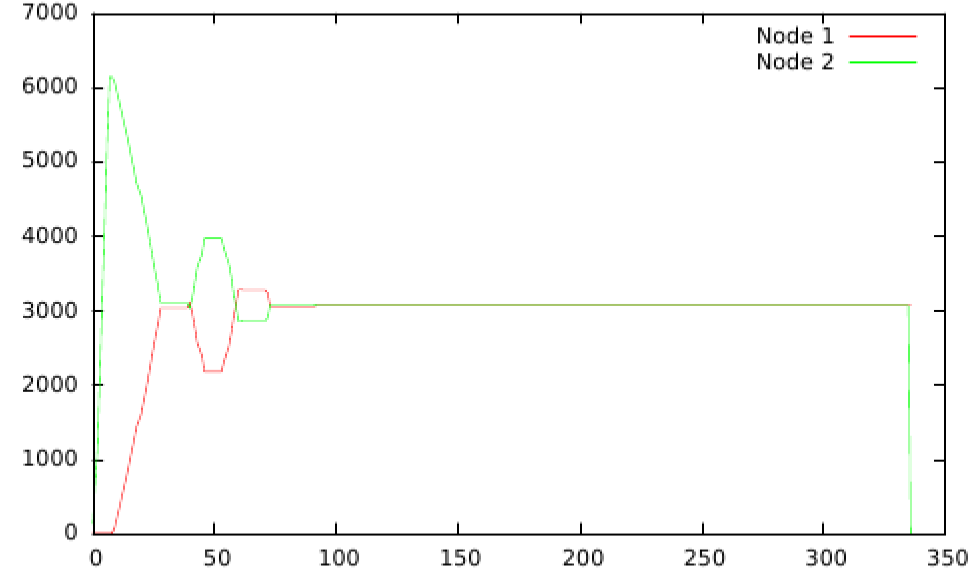


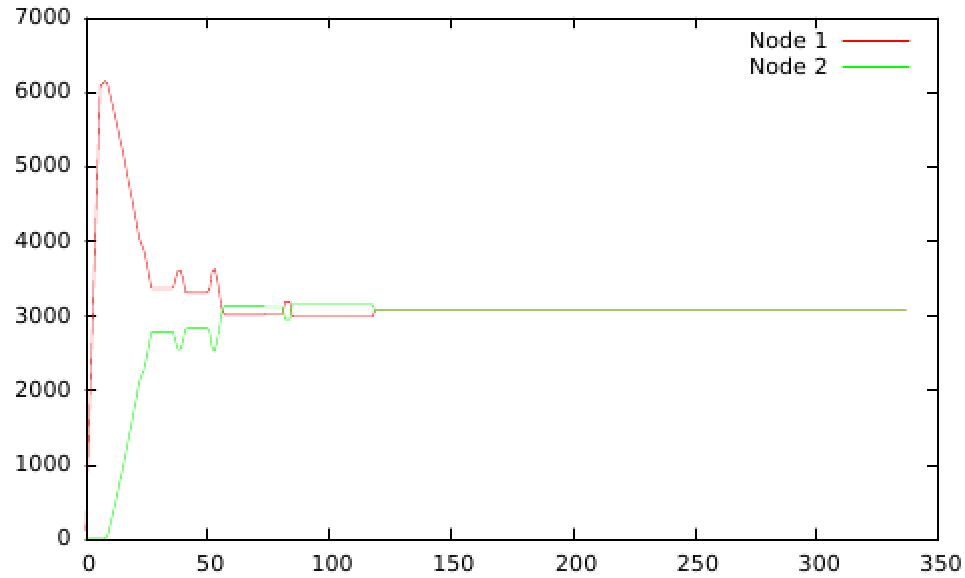


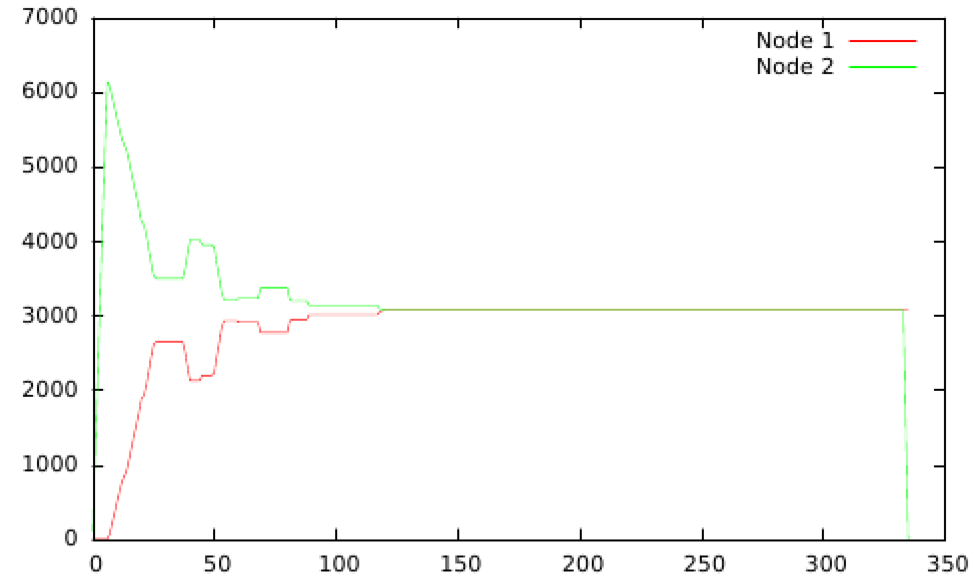
2 nodes

AutoNUMA25 numa01_THREAD..









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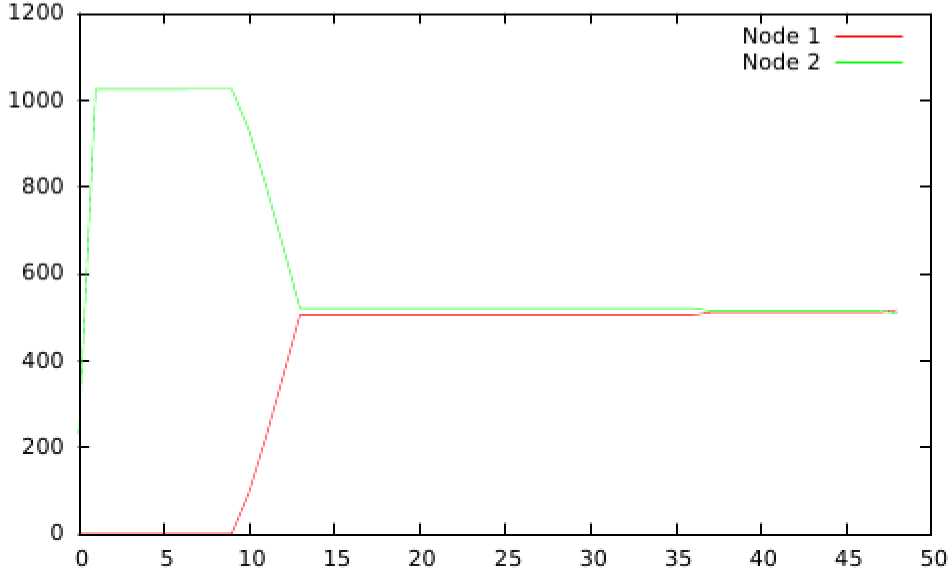
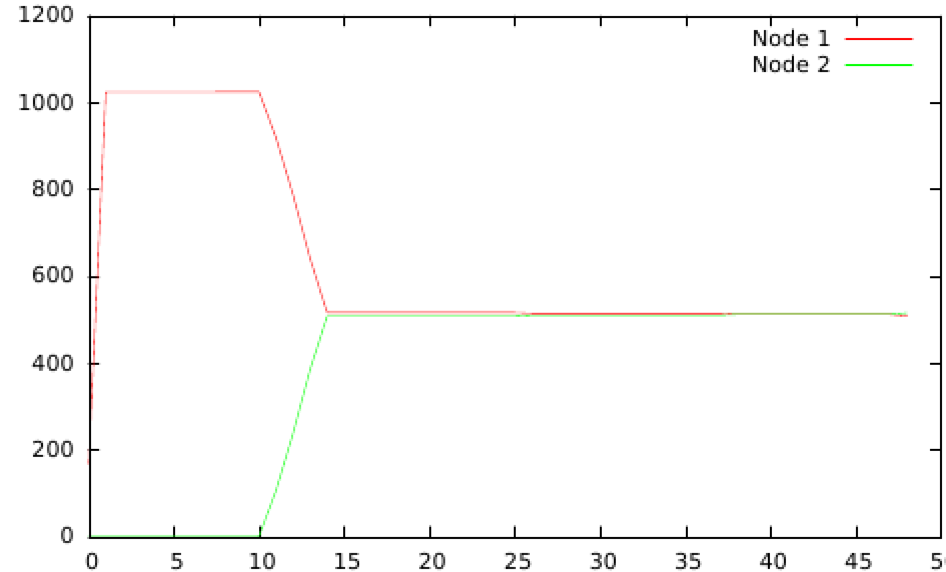
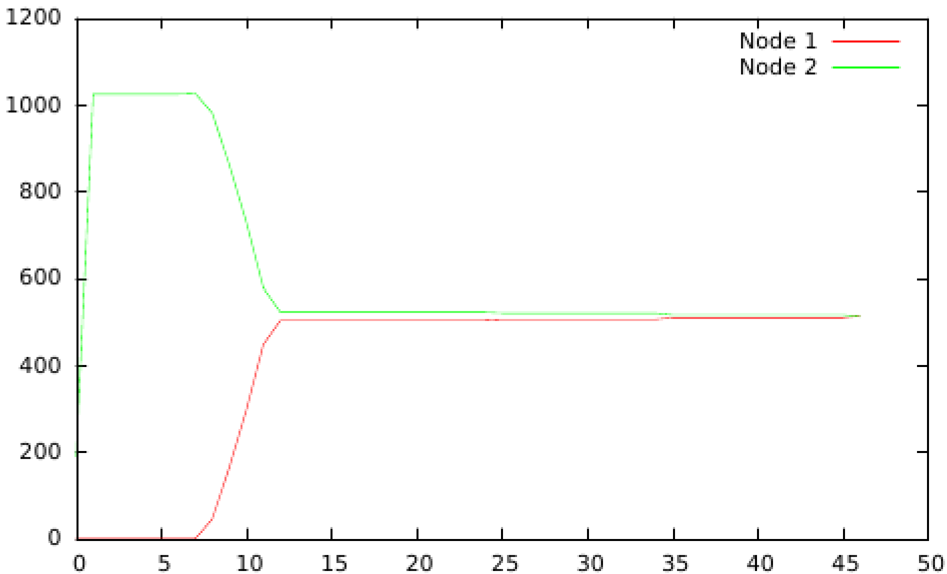
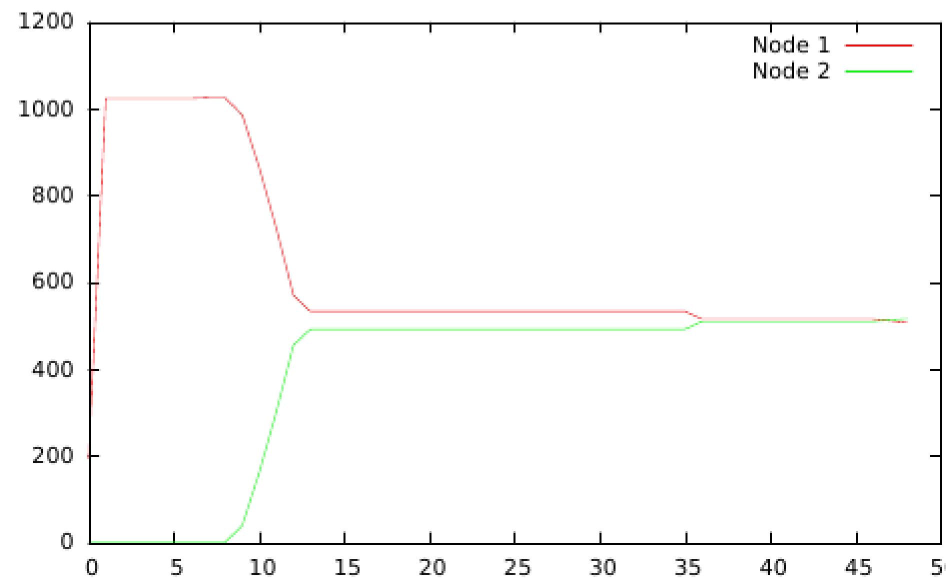
AutoNUMA25 numa02



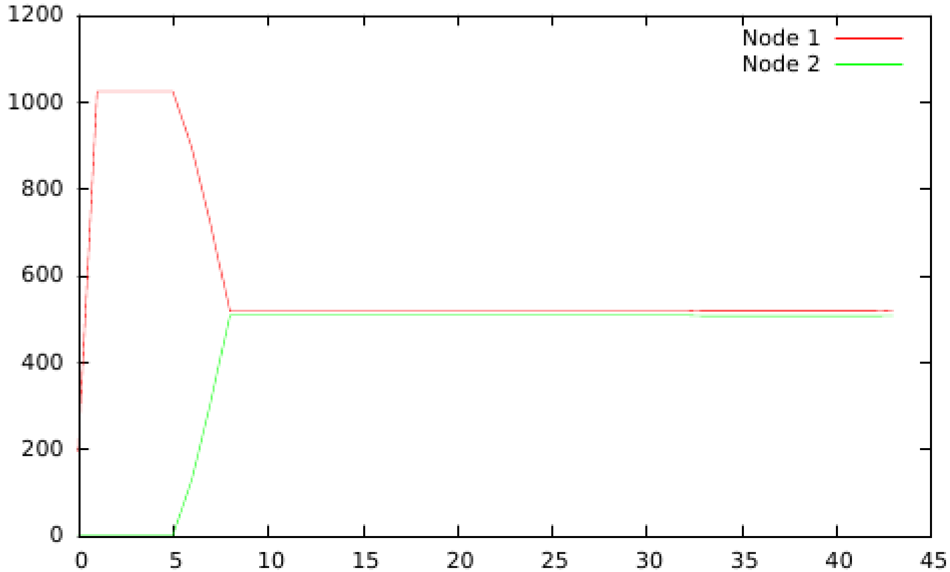


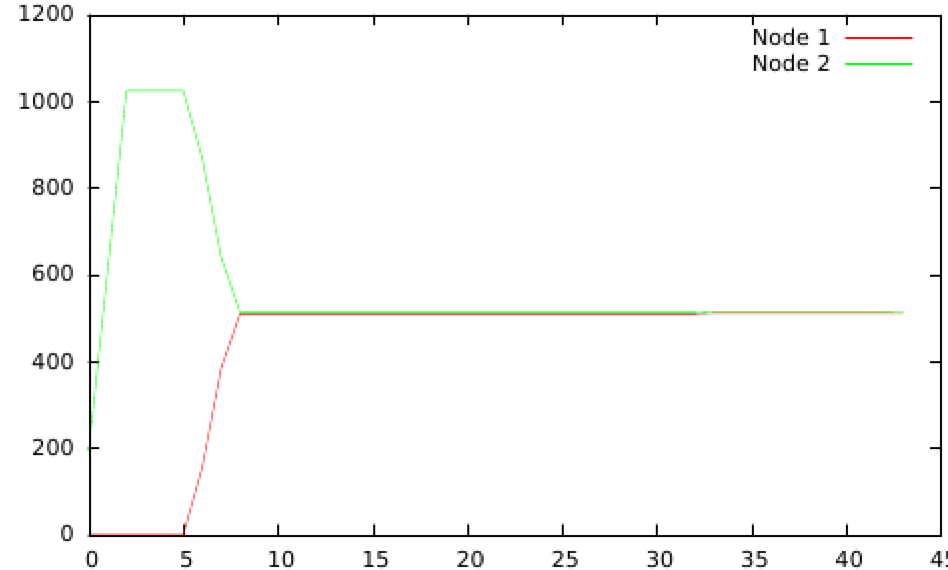


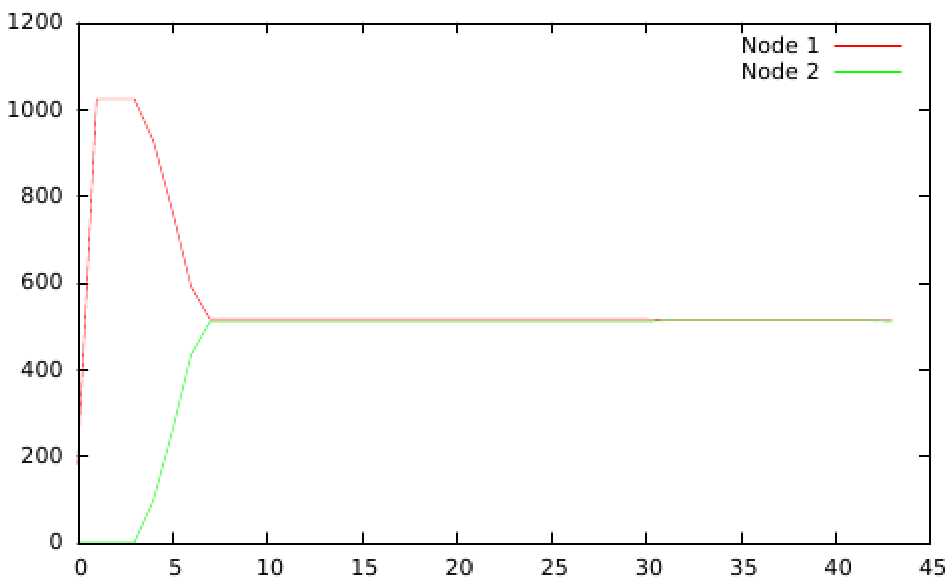


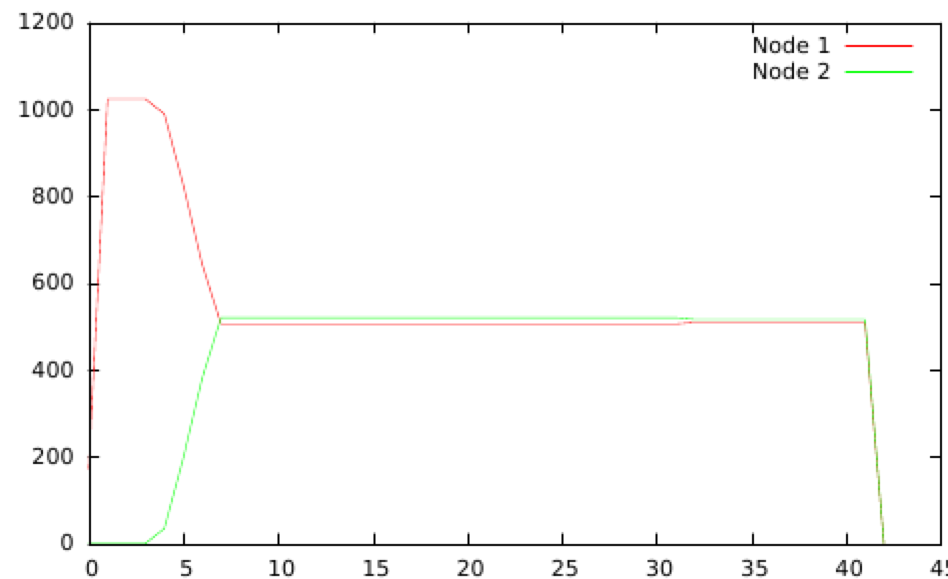
2 nodes

AutoNUMA25 numa02_SMT



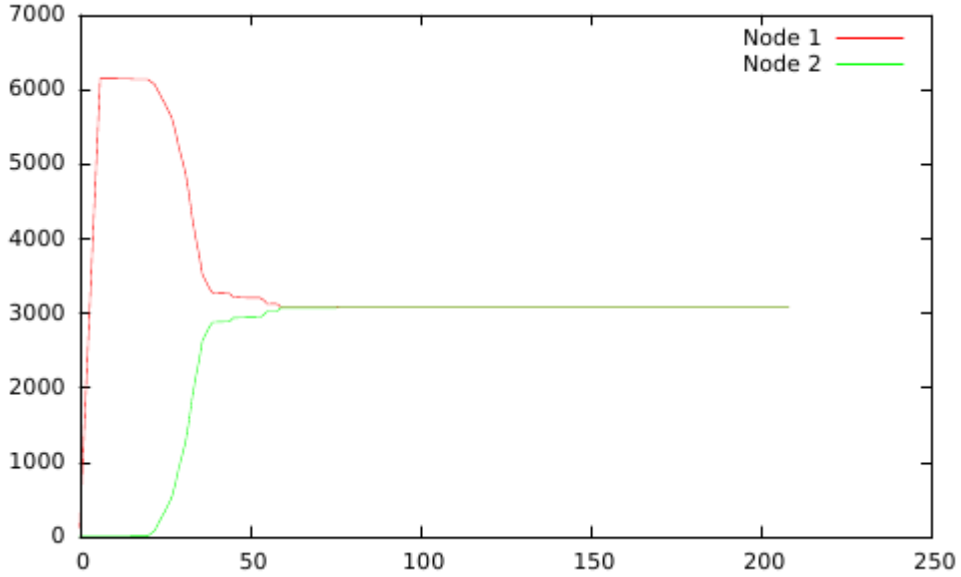


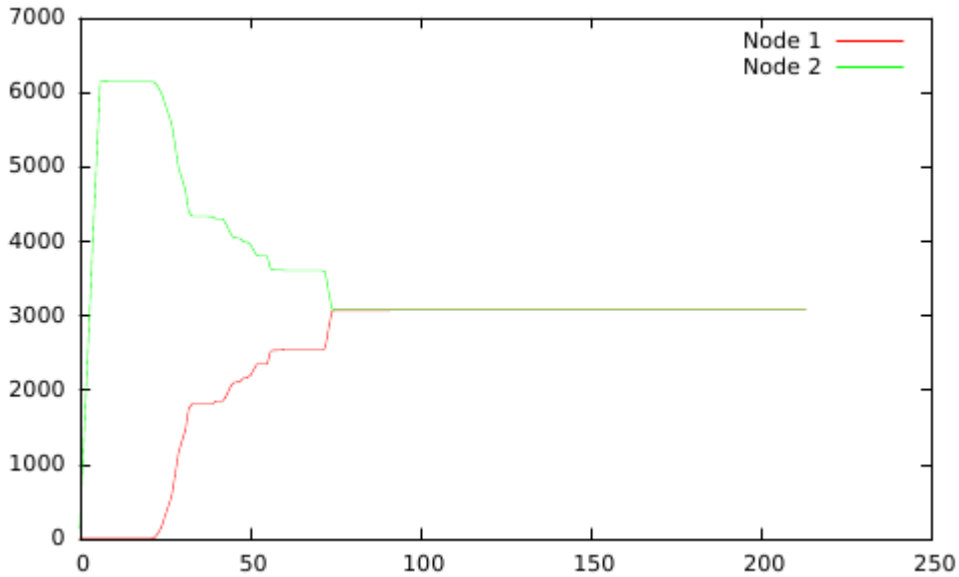


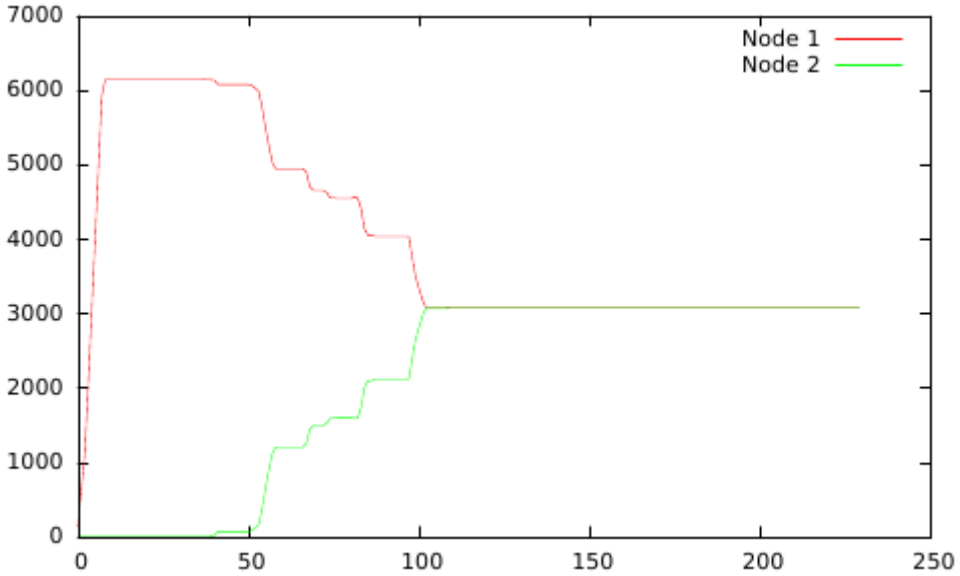


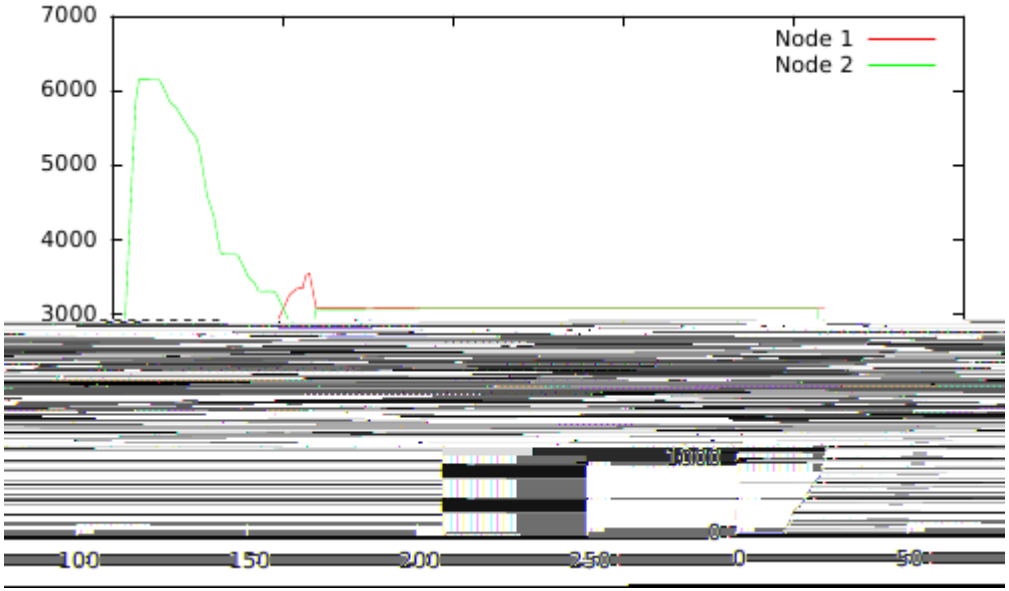
2 nodes

AutoNUMA25 MoF numa01









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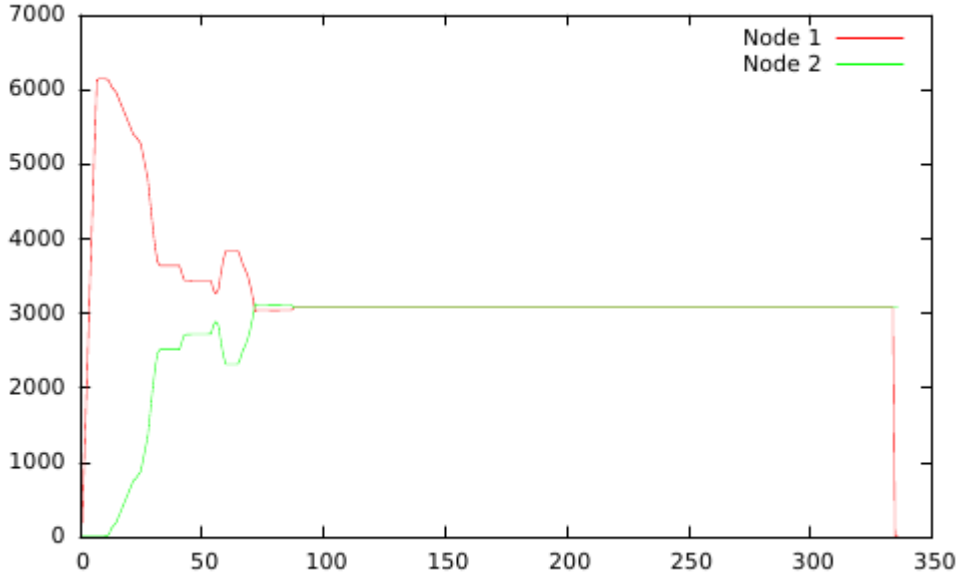
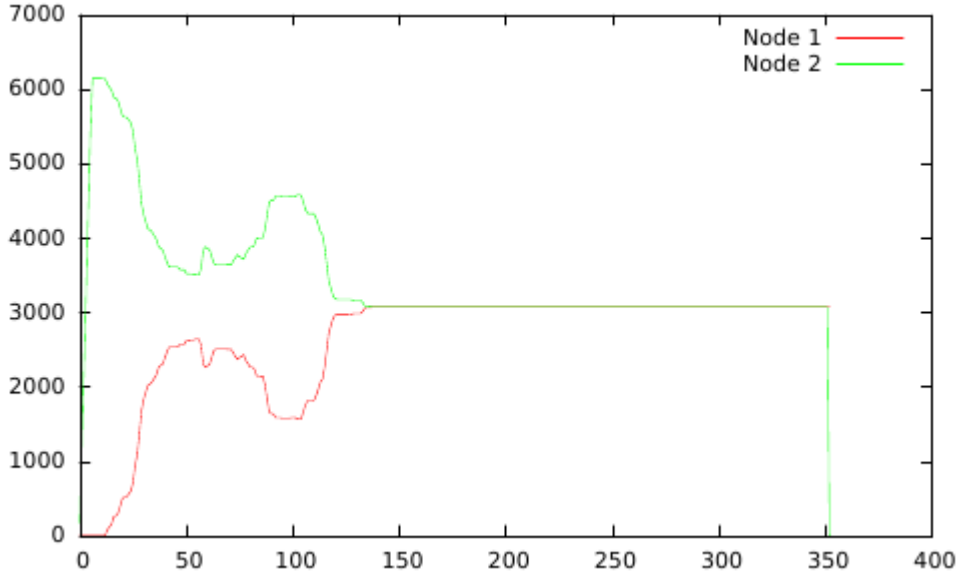
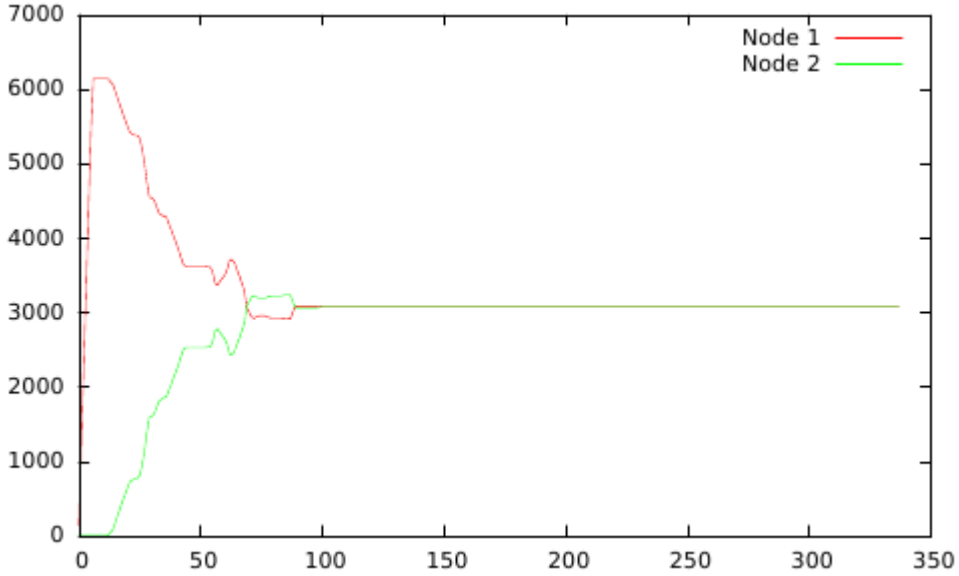
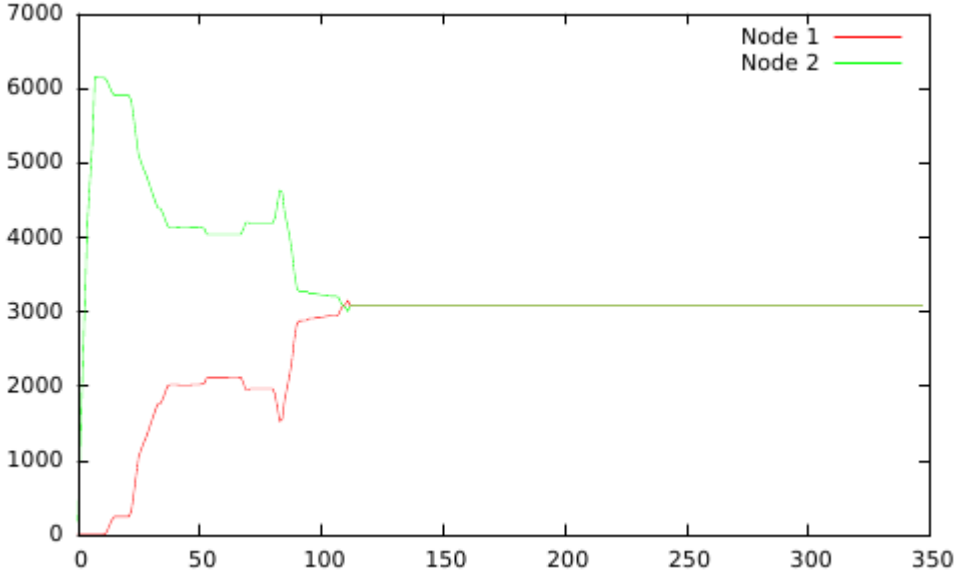
AutoNUMA25 MoF numa01_TH..









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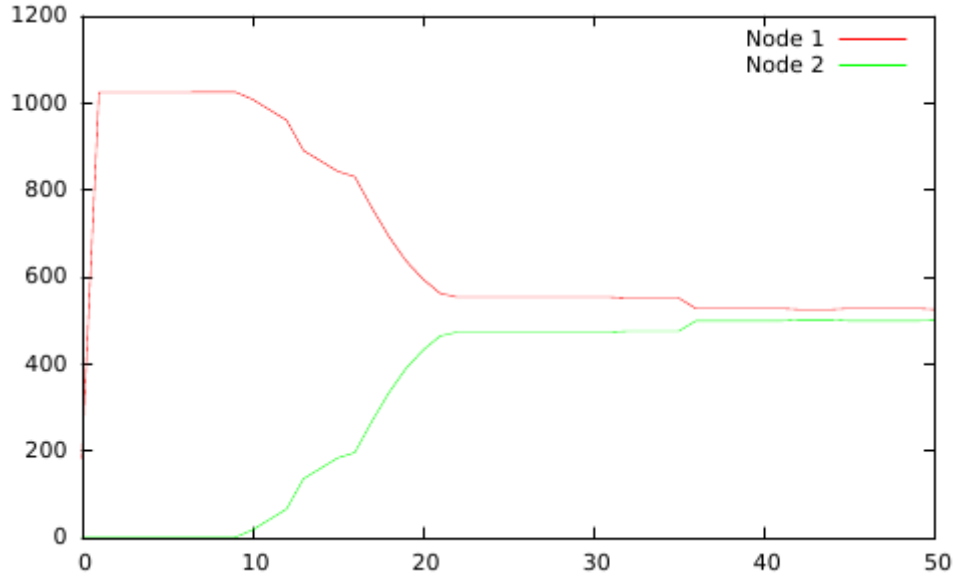
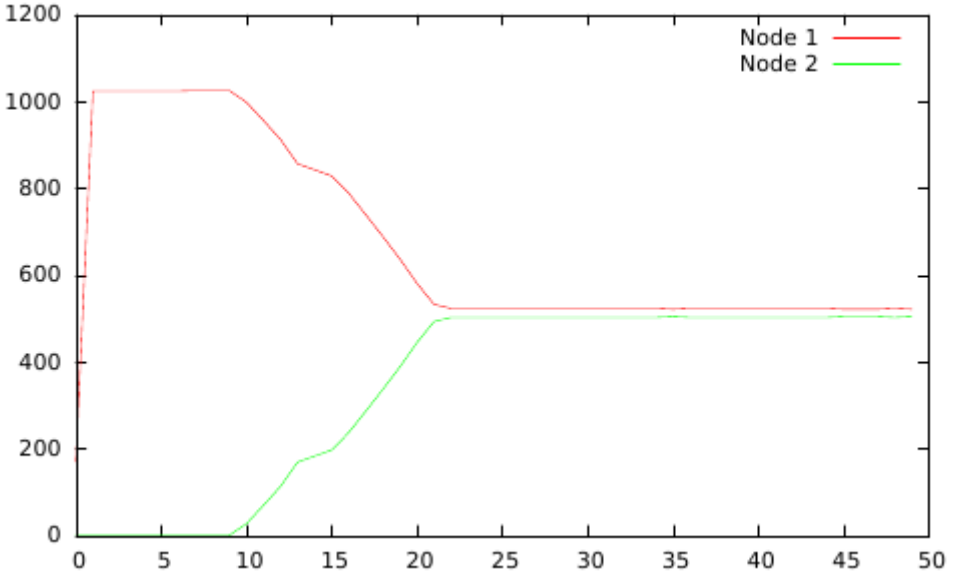
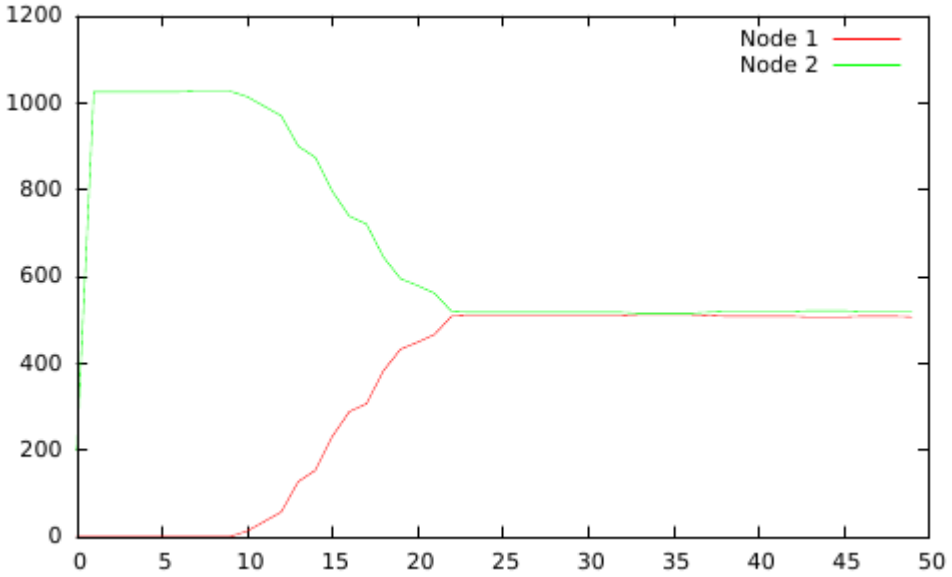
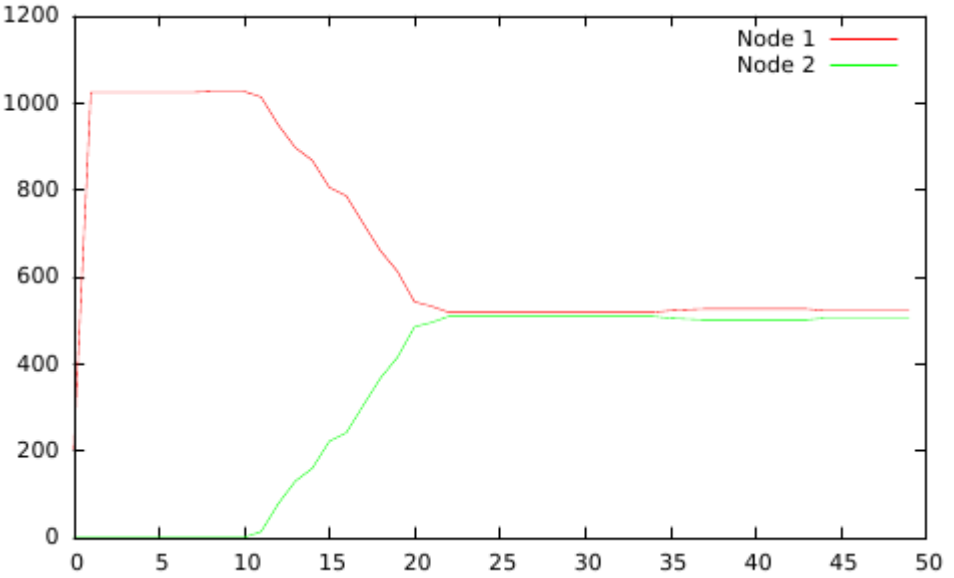
AutoNUMA25 MoF numa02









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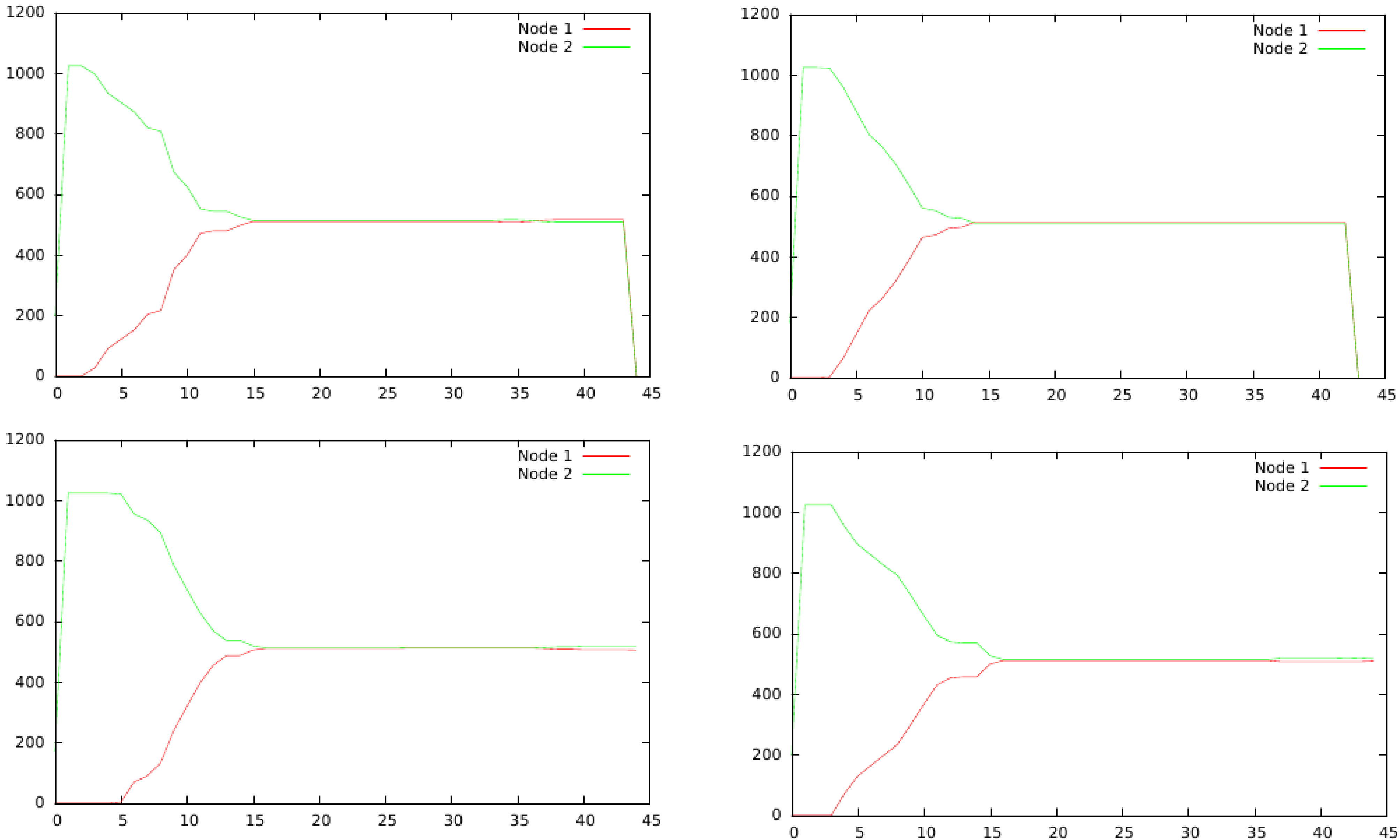
AutoNUMA25 MoF numa02_SMT



2 nodes