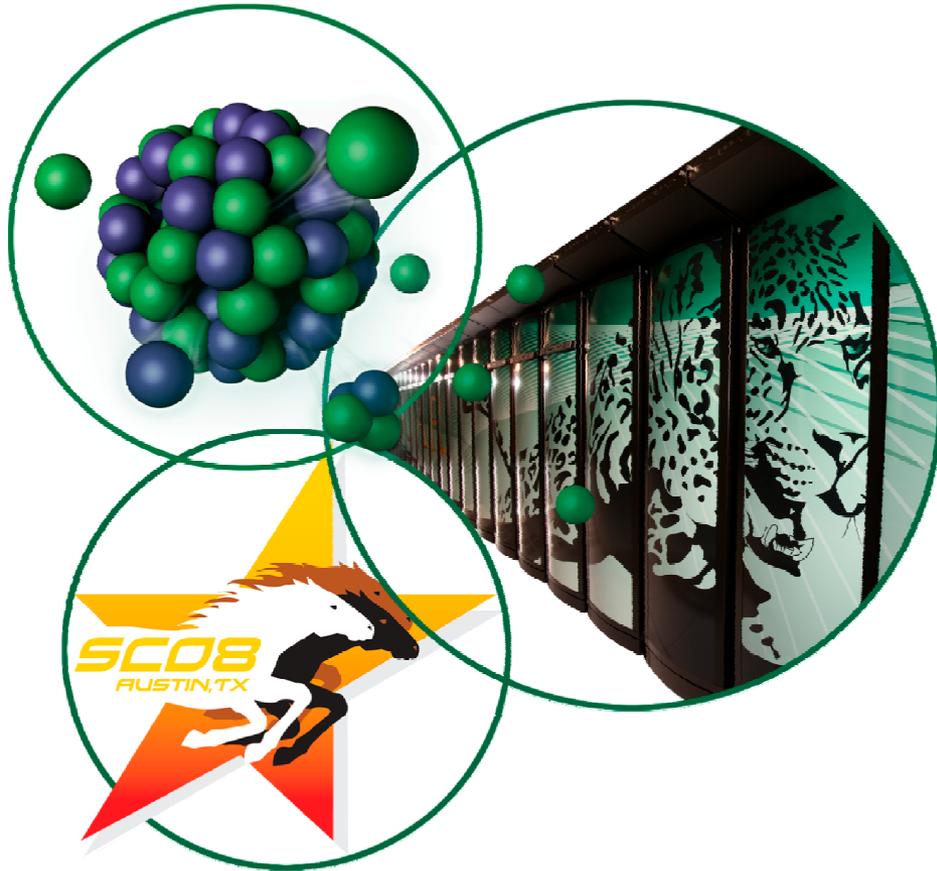


Component PAPI: Measuring Multiple Counter Domains

Presented by

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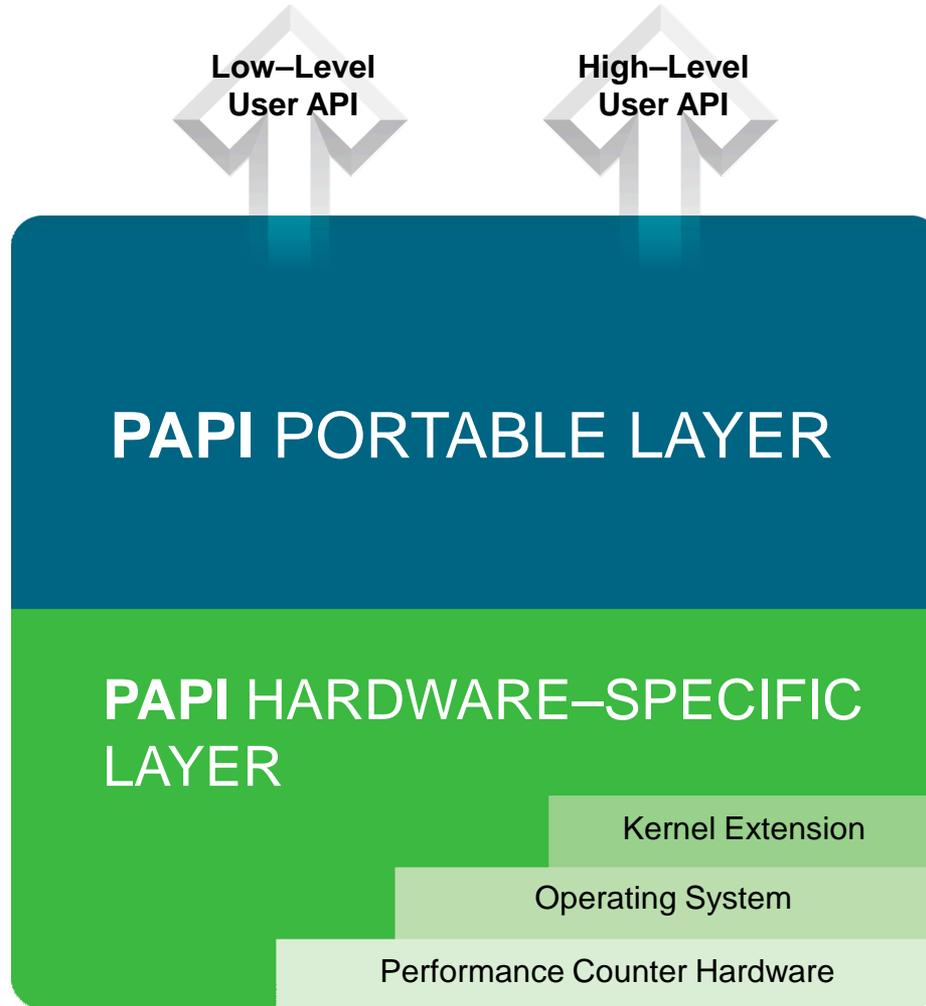


Motivation

- **Increasing CPU speeds and densities places greater importance on**
 - Thermal health and management
 - Power consumption
- **Higher processor counts make communications metrics more critical:**
 - Bandwidth
 - Latency
 - Dropped packets
 - Bytes transferred
- **Industry–standard interfaces don't exist to measure these metrics**
- **Hybrid machines require simultaneous access to multiple processor–counter substrates**

Monolithic “PAPI Classic”

Portable hardware-independent code and hardware-specific code...

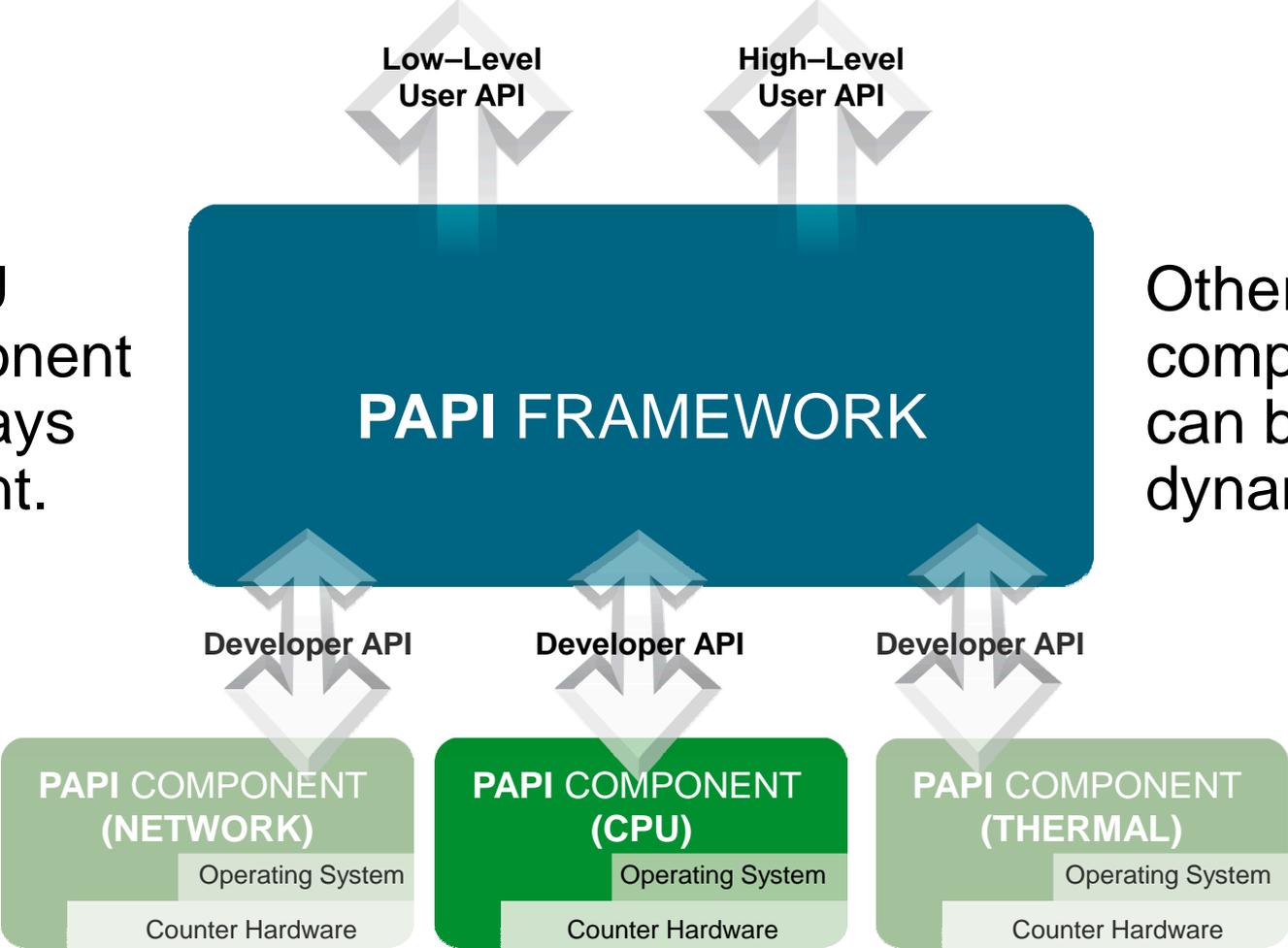


are linked with low-level libraries and drivers to form a monolithic library.

Component PAPI

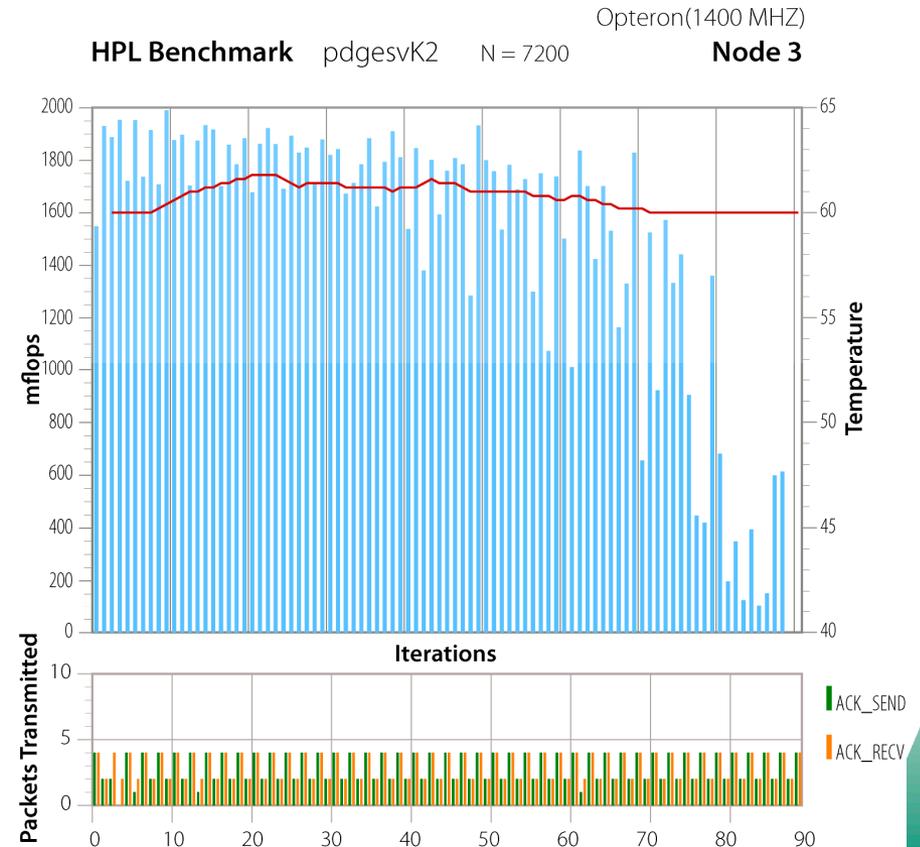
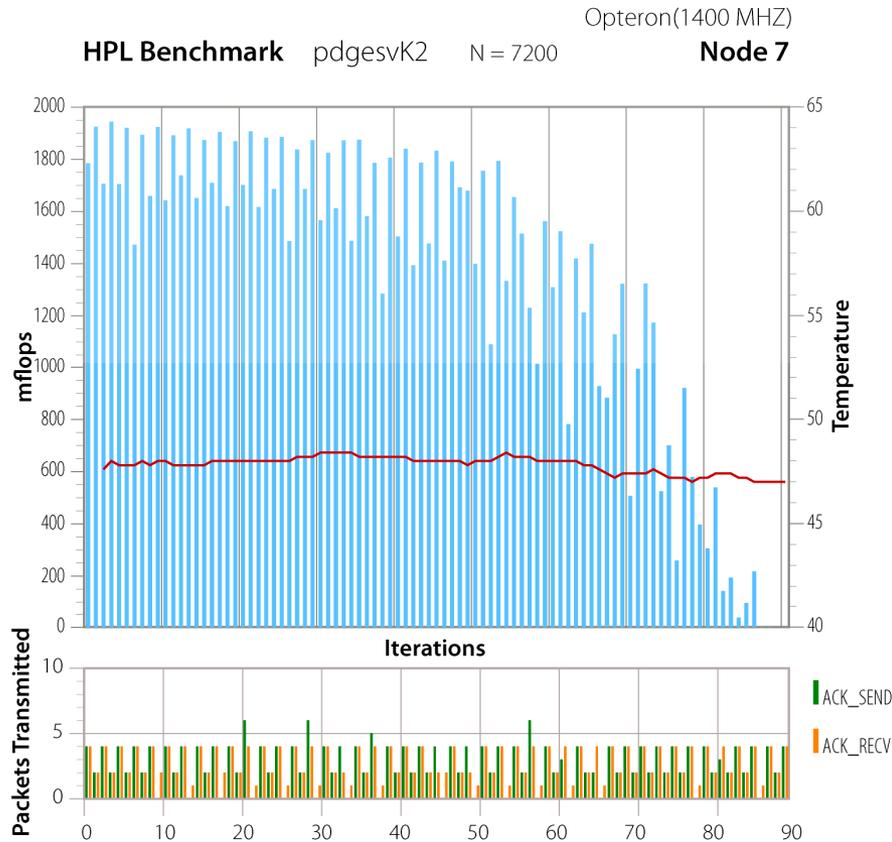
A CPU component is always present.

Other components can be added dynamically.



Multiple measurements

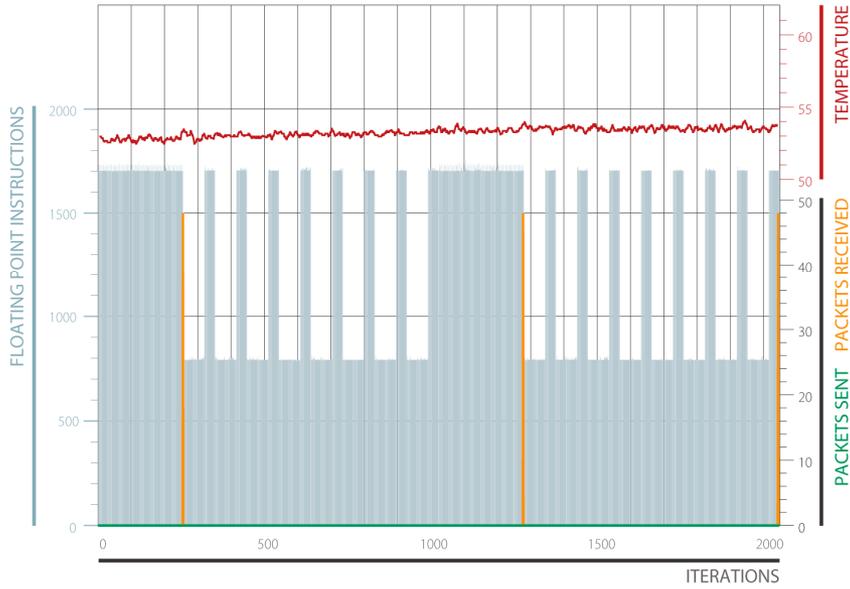
- HPC HPL benchmark on Opteron with three performance metrics
 - FLOPS; temperature; network sends/receives
 - Temperature is from an on-chip thermal diode



Two different nodes show different characteristics.

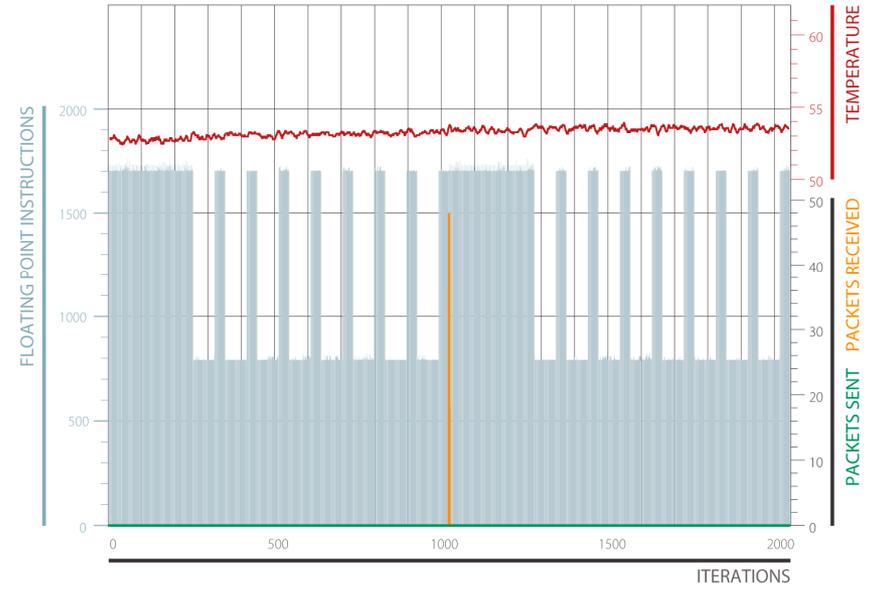
HPC Challenge FFTE: fft235

Node 4



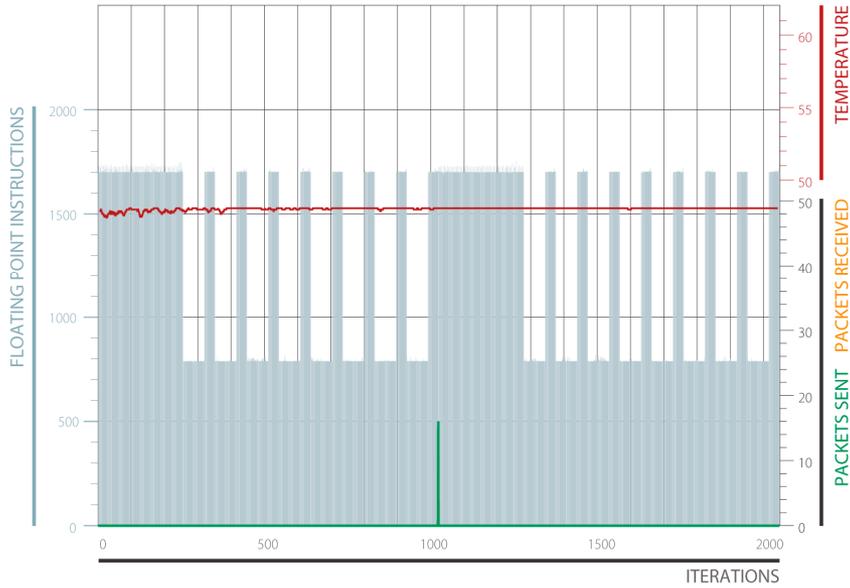
HPC Challenge FFTE: fft235

Node 5



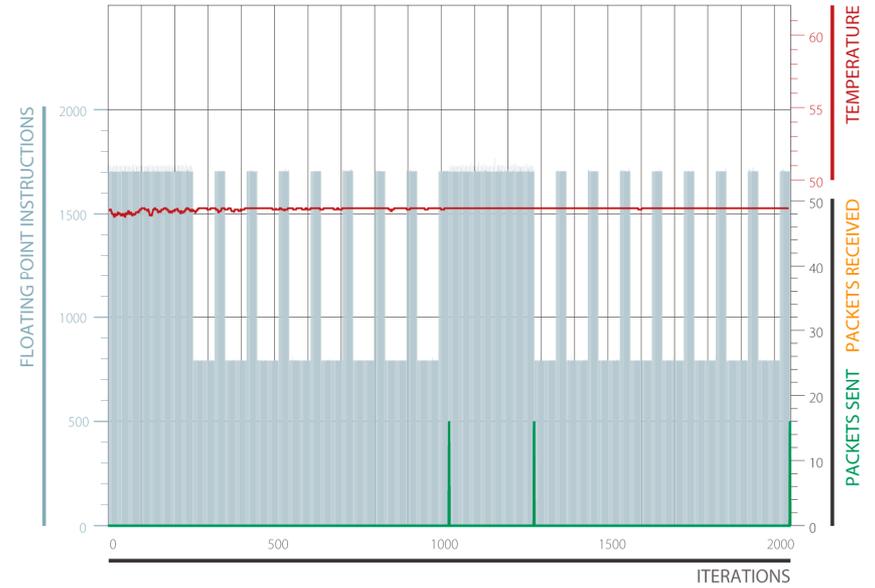
HPC Challenge FFTE: fft235

Node 6



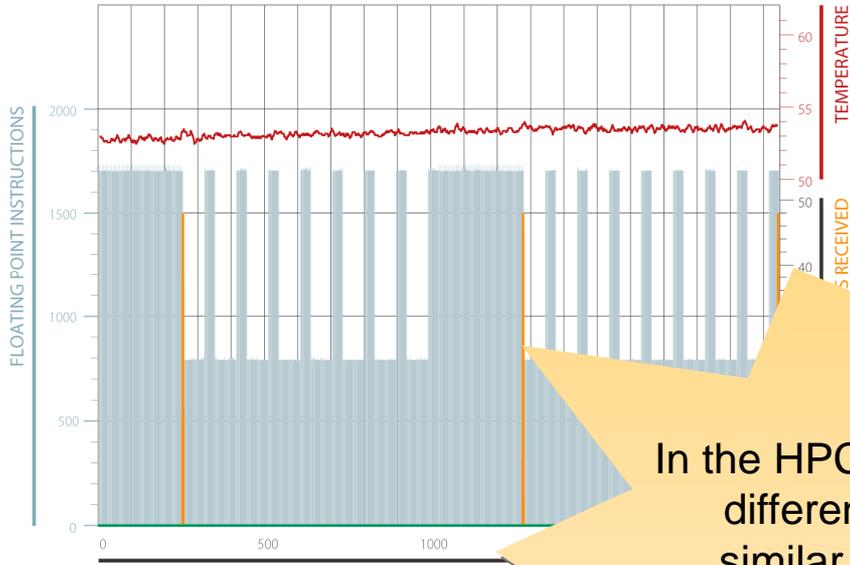
HPC Challenge FFTE: fft235

Node 7



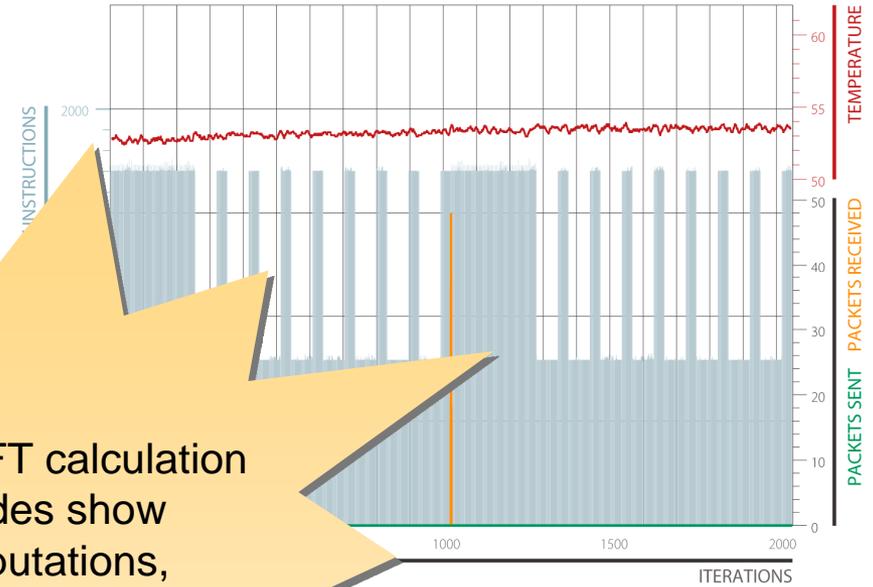
HPC Challenge FFTE: fft235

Node 4



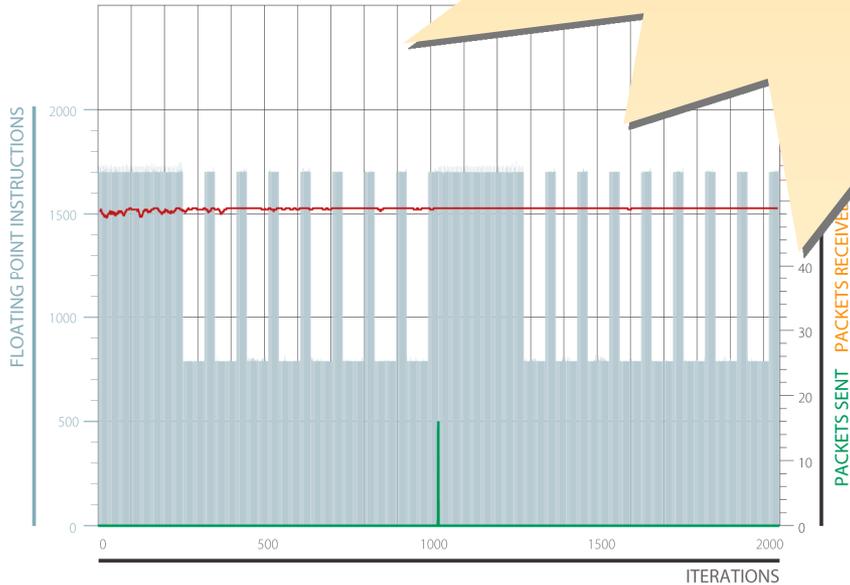
HPC Challenge FFTE: fft235

Node 5



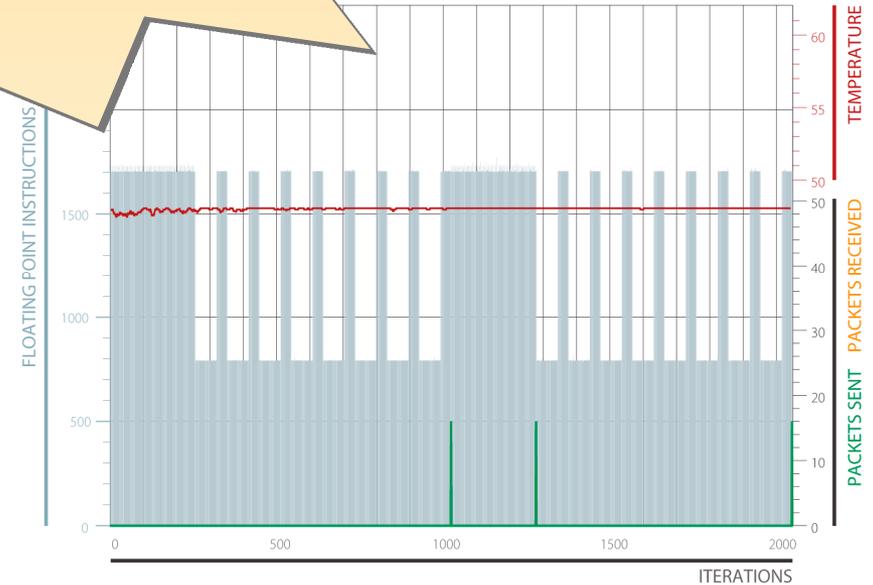
In the HPCC FFT calculation
different nodes show
similar computations,
but different
communication patterns

HPC Challenge FFTE: fft235

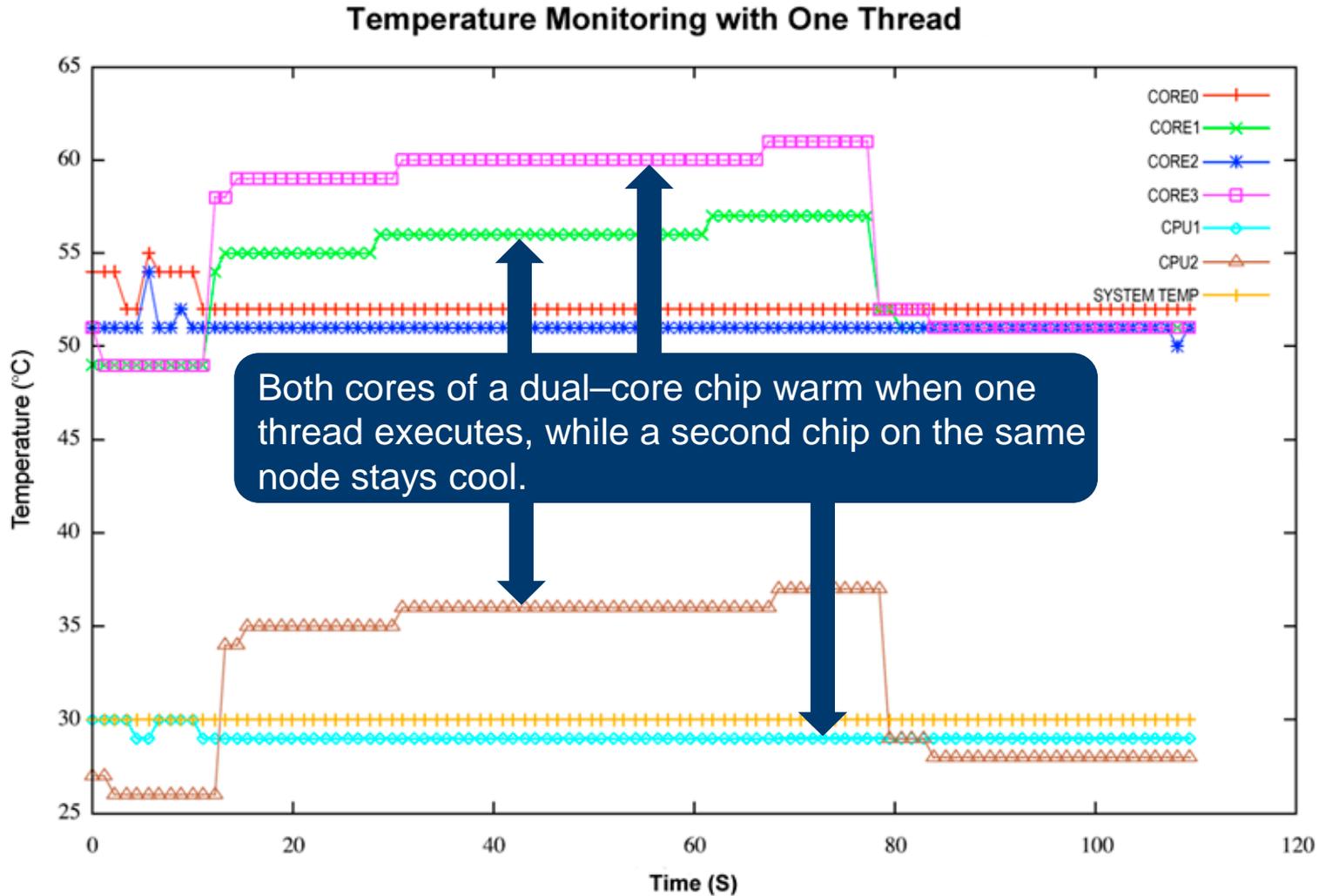


HPC Challenge FFTE: fft235

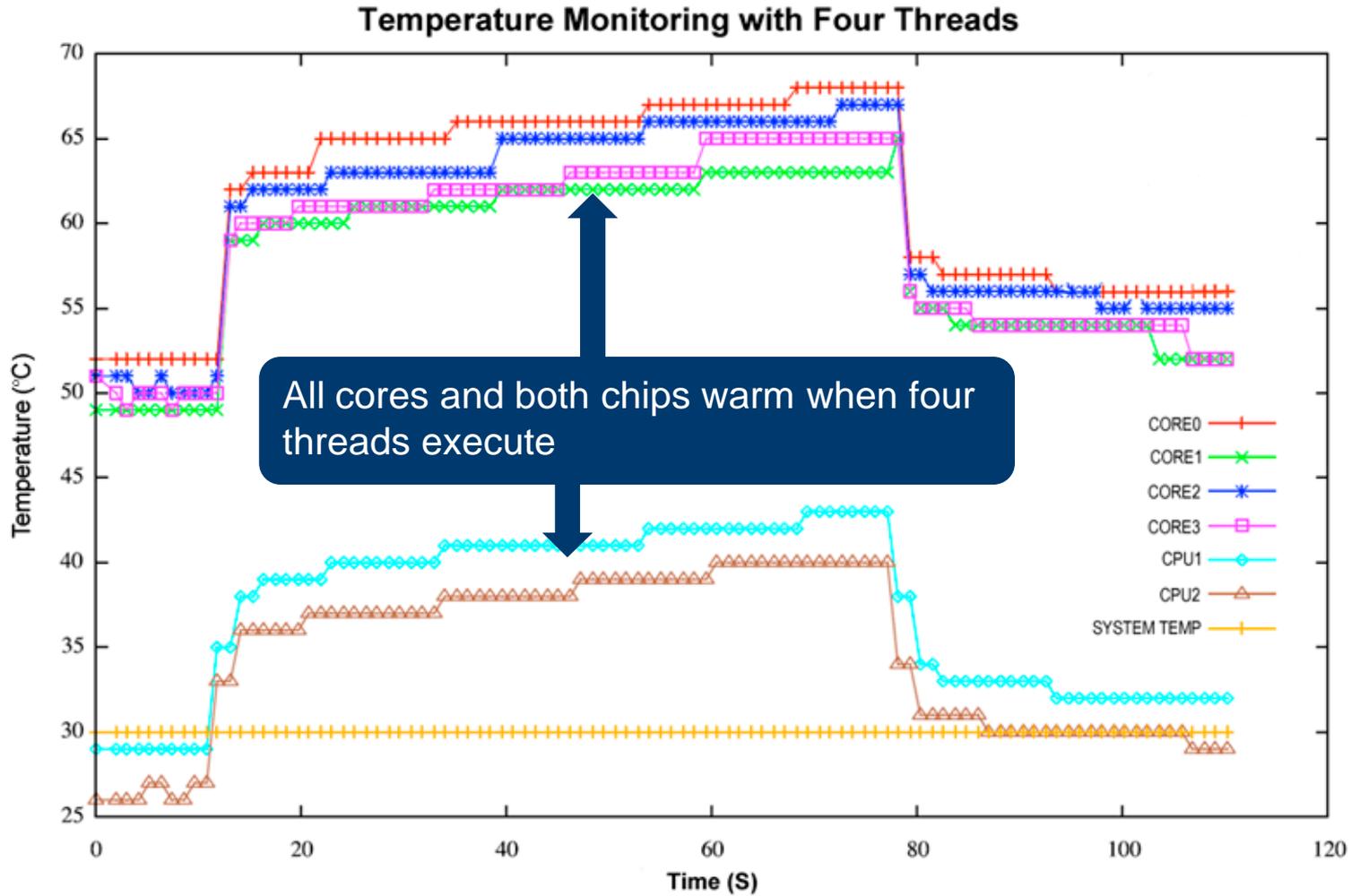
Node 7



PAPI-C Multicore temperature measurement



PAPI-C Multicore temperature measurement



Conclusions

- **Monolithic PAPI 3.6.1 released July 2008**
 - CPU counters only
 - Maintenance support
- **Component PAPI 3.9.1 released November 2008**
 - Up to 16 simultaneous components
 - Ongoing development
 - Components for
 - ACPI
 - LM-Sensors
 - Myrinet MX
 - More...

Contact

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For more information

<http://icl.cs.utk.edu/papi/>

- Software and documentation
- Reference materials
- Papers and presentations
- Third-party tools
- Mailing lists