Performance Co-Pilot and Large System Performance

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Understanding Performance - What’s the Problem?

- Application-centric versus system-level performance
- Big systems and the tyranny of scaling
  - lots of performance data, need all of it some of the time, cannot afford to process all of it all of the time
- Who needs to understand system performance?
  - most people in the software life-cycle
- Where is the performance data hiding?
  - everywhere
  - multiplicity of data semantics, access methods and evolution across releases
Issues for System Level Performance Management

- Scalable infrastructure, protocols and tools
- Intelligent filtering of performance data and automated reasoning
- Flexible archive logging and retrospective analysis
- Extensible framework for accessing performance data from disjoint domains
- Customization of tools
- Distributed processing with centralized monitoring and management
Scalability and Information Overload (1)
Scalability and Information Overload (2)
Getting Performance Data Out of an Application

```
trace_begin("some_tag")

trace_end("some_tag")
```

Performance Metrics Collection Daemon

Trace Performance Metrics Agent

libpcp_trace
Customization
Case Study - MPI Visualization

• Parallel applications built using the Message Passing Interface (MPI).
• All MPI services via calls to libmpi.so
• Dynamic behavior is hard to conceptualize
• Consider execution to be in several states: one for the application and one for each MPI routine
• Behavior may be characterized by frequency of state transitions and time spent per state
• Aggregate data over all parallel components
Capturing the Performance Data

Use \_RLD\_LIST magic here for libpcp\_mpi\_so

- traceend("appl")
- tracebegin("send")
- tracebegin("appl")
- traceend("send")
MPI Visualization
Concluding Comments

- Performance monitoring and management for large systems is a difficult problem
- Performance Co-Pilot offers some capabilities that help:
  - visualization
  - automated reasoning
  - flexible archive logging
  - retrospective analysis
  - extensible collection framework
  - customizable tools