Dynamic Adaptability in Support of Extreme Scale

DASES

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Goals

Generalized → Customized
resource management

Fixed → Dynamically Adaptable
OS/runtime services

Enhanced Performance

Challenges

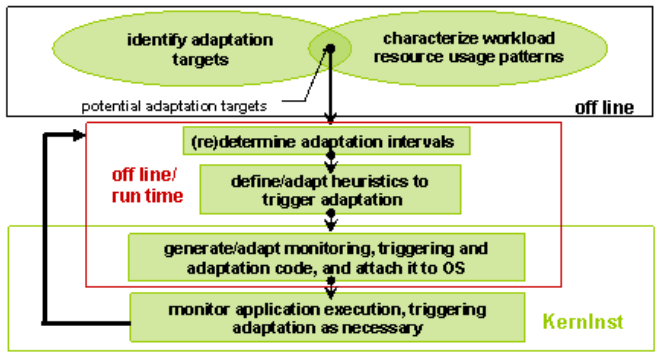
Determining

- What to adapt
- When to adapt
- How to adapt
- How to measure effects of adaptation

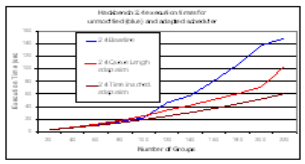
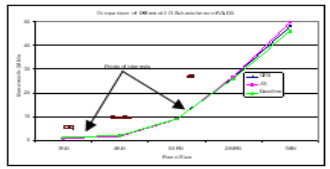
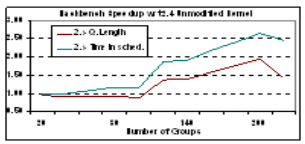
Deliverables

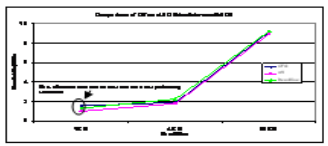
- Develop mechanisms to dynamically sense, analyze, and adjust common performance metrics, fluctuating workload situations, and overall system environment conditions
- Demonstrate, via Linux prototypes and experiments, dynamic self-tuning/provisioning in HPC environments
- Develop a methodology for general-purpose OS adaptation

Methodology

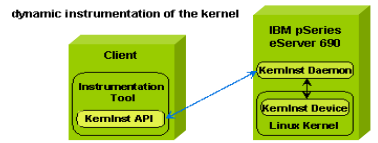


Sample Adaptations



KernInst



- KernInst and Kperfmon provide the capability to perform dynamic monitoring and adaptation of commodity operating systems.
- University of Wisconsin's KernInst and Kperfmon make the problem of run-time monitoring and adaptation more tractable.

Example Adaptations

Customization of

- process scheduling parameters and algorithms, e.g., scheduling policy for different job types (prototype in process)
- file system cache size and management
- disk cache management
- size of OS buffers and tables
- I/O, e.g., checkpoint/restart
- memory allocation and management parameters and algorithms

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