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Enhancing the PSI framework in Linux Kernel for predictive and accurate workload analysis

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In any system the overall system congestion behavior mainly revolve around CPU work-load, memory-pressure and IO-wait.
The Pressure Stall Information (PSI), introduced to monitor resource contention by tracking CPU, memory, and I/O pressure, provides real-time insights into system performance bottlenecks.
But the problem is, it just gives the overall average load value in the system during certain intervals.
For the end user it is still difficult to predict the workload share at task level.
This paper explores advancements in the PSI framework within the Linux kernel to enhance predictive work-load analysis.

By extending the PSI framework with advanced predictive algorithms by monitoring resource usage at task level, we aim to accurately forecast workload patterns and resource demands.
This enhancement enables more efficient resource allocation, improved system responsiveness, and proactive performance tuning.
The proposed modifications to PSI are validated through extensive experimentation results, demonstrating significant improvements in workload prediction accuracy and overall system performance.

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