Process Scheduling using Machine Learning

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Project Overview

- Modify MINIX3 scheduler with SVM algorithm to order processes in most efficient way.

- **Hypothesis**: Using RankSVM, with training data provided by custom tests, more efficient process scheduling will be achieved than the existing round robin scheduler in MINIX3.
Changes to Proposed Solution

- Using LibSVM instead of RankSVM
  - Several bugs encountered, algorithm did not converge

- Simulation of the round robin scheduler
  - Enabled more flexibility in creating custom tests

- Optimize quantum rather than scheduling order
  - For uni-processor, SJF is always ideal, quantum is harder to determine
Implementation

- Generated test and training data for seven different ordering types:
  - Smallest jobs first, Largest jobs first, Alternating sizes, Bell curve, Small and large even distributions, and random distribution

- Implemented round robin scheduling at six different quantum and compared to the default Minix3 quantum (100ms).

- Target metric: composite of average wait time and latency due to context switches
Demonstration
Results

- Using self-verification, 8.8% decrease in average wait time and latency
- With unknown test data, 4.6% decrease in avg. wait time and latency after optimization
- SVM prediction time: <1ms
Questions
Thank you

BIBLIOGRAPHY


