Lockheed Martin Improves Speed And Reduces Power Required To Run Legacy Software Applications On Multi-Core Processors

Lockheed Martin has developed Perseus, a first of its kind software tool that helps migrate legacy software designed for single processors onto multi-core processors while simultaneously improving application performance and minimizing required power.

Many of today's weapons systems depend on legacy software designed to run on a single processor. However, the state of the art has advanced to produce multi-core processors, which contain many processors on a single chip. These types of processors are faster, use less power, and occupy less physical space.

"Leveraging new technology capabilities, such as multi-core processors, is vital to be successful in using low-cost, COTS-based platforms for military systems," said Daniel Waddington, principal investigator, Advanced Technology Laboratories (ATL).

But realizing performance gains by running legacy software on multi-core processors can pose serious challenges because the software may not be able to run faster than originally designed. The result can degrade application performance by an order of magnitude.

Perseus analyzes legacy software and develops a control plan that automatically assigns different portions of the program to individual cores on the multi-core processor. This technique, known as dynamic mapping, allows the program to run more smoothly and the system to operate more quickly.

Perseus also optimizes for power consumption by controlling the frequency of individual cores based on workload; for example, Perseus slows down cores that are not busy or performing critical tasks. Tests showed that this approach yielded up to 20 percent savings in power and 20 percent reduction in execution time over non-optimized applications.

Determining an optimal control plan is very complex and relies on many interdependent factors. Perseus uses genetic algorithms to perform this optimization.

Lockheed Martin Advanced Technology Laboratories (ATL) developed Perseus in 2007 as part of U.S. Air Force Rome Laboratory's Optimal Configuration and Deployment of Software on Multi-core Processing Architectures program. ATL developed the proof-of-concept prototype. Teammates included Drexel University.

In a related development, ATL is integrating Perseus' genetic algorithm-based optimizer into its Software Technology Initiative (STI). Funded by Lockheed Martin Information Systems & Global Services, STI is developing solutions to quickly integrate large-scale, distributed systems of newly developed, legacy and COTS software.

Click here for a brief overview of the STI program:http://www.atl.external.lmco.com/news/2005/082205.php

Headquartered in Bethesda, MD, Lockheed Martin is a global security company that employs about 140,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. The corporation reported 2007 sales of $41.9 billion.

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