



## Improved Method Provides Run-Time Parallelization of Computer Software

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**WARF: P100343US01**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method of executing a program that computes data in parallel using multiple processors.**

### Overview

Parallelization is one technique used to improve software performance and/or energy consumption by dividing the execution of a software program into multiple components that can run simultaneously on a multiprocessor computer. However, generating parallel software is a very difficult and costly method to improve performance.

Because of the shift towards multicore processors, improving single processor performance is being replaced by this parallelization technique as the primary method for improving software performance, despite the difficulty and expense. Although parallel applications are common for certain domains such as servers and scientific computation, additional types of software used to implement parallel execution are needed to meet the growing popularity of multicore processors.

### The Invention

UW–Madison researchers have developed a method that provides run-time parallelization of sequential computer software using data-associated tokens. The method offers a simple mechanism for detecting write-write, read-write and write-read data dependencies between computation tasks. It further processes the computations to achieve a parallel schedule of execution whenever possible.

### Applications

- Software service model (implemented on multicore processors)

### Key Benefits

- Achieves run-time parallelization of sequential programs
- Permits improved use of processor resources
- Permits energy conservation
- Maximizes the utilization of processors by queuing computational instructions
- Maximizes computational and energy efficiency
- Provides extremely flexible implementation of the tokens by a variety of different techniques
- Reduces the number of computational operations waiting for read tokens
- Can handle both write-dependencies and read-dependencies

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Prototype has been developed; initial testing and data collection have been performed.



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## Additional Information

### For More Information About the Inventors

- [Gurindar Sohi](#)

### Related Technologies

- [See WARF reference number P08192US02 for a mechanism that improves software performance by implementing parallelization while maintaining sequential program semantics.](#)
- [See WARF reference number P07057US for an automated method of parallelizing the execution of a sequential computer program for multiple processors.](#)

### Tech Fields

- [Information Technology : Computing methods, software & machine learning](#)

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