

IOWA STATE UNIVERSITY

Department of Computer Science

2009-10 Distinguished Lecture Series



Dr. John Gustafson

Intel Labs Santa Clara

<http://www.johngustafson.net/>

*Defining Computer 'Speed':
An Unsolved Challenge*

Thursday February 18, 2010

3:40pm, Howe Hall

Alliant Energy Lee Liu Auditorium

The reason we use computers is their speed, and the reason we use parallel computers is that they're faster than single-processor computers. Yet, after 70 years of electronic digital computing, we still do not have a solid definition of what computer 'speed' means, or even what it means to be 'faster.' Unlike measures in physics, where the definition of speed is rigorous and unequivocal, in computing it has no theoretical foundation that is universally accepted. As a result, computer customers have made purchases misguided by dubious information, computer designers have optimized their designs for the wrong goals, and computer programmers have chosen methods that optimize the wrong things. This talk describes why some of the obvious and historical ways of defining 'speed' haven't served us well, and the things we've learned in the struggle to find a definition that works.

Dr. John Gustafson is now Director of Intel Labs Santa Clara. John is well known in High Performance Computing (HPC), having introduced the first commercial cluster system in 1985 and having first demonstrated 1000x, scalable parallel performance on real applications in 1988, for which he won the inaugural Gordon Bell Award. That demonstration created a watershed that led to the widespread manufacture and use of highly parallel computers. It also led to a counter-argument to Amdahl's law called Gustafson's law, that some now refer to as "weak scaling." He received the IEEE Computer Society's Golden Core Award in 2007. He's also known for having led the reconstruction of the 1939 Atanasoff-Berry computer system. A graduate of Caltech and Iowa State University, John was previously CEO of Massively Parallel Technologies, CTO of ClearSpeed Technology, and Principal Investigator at Sun Labs where he won and led Sun's \$47M DARPA High Productivity Computing Systems contract. His decisions in computer design are informed by his experience as an HPC user while at Ames Lab, Sandia, and the Jet Propulsion Laboratory.