

The National Science Foundation (NSF) has awarded a grant to launch the Center for Autonomic Computing (CAC), a collaborative group that combines resources from universities, private companies, and federal government to make all kinds of computer systems and applications — from humble desktop computers to air traffic control systems — more reliable, more secure, more efficient, and easier to manage.

An autonomic computing system is any system that is designed to function with minimal management even as conditions and users change, according to Dr. José Fortes, director of the new center at the CAC's University of Florida site. Autonomic computing algorithms, Fortes says, can greatly reduce the growing costs of administrating computer systems and protect against loss of service in systems performing critical functions, including those managing power grids, stock markets, and hospital networks. They can also greatly improve the speed and efficiency of complex systems that utilize a large number of hardware and software components.

Autonomic behaviors are collectively known as "self-*" behaviors. "For instance, a system that stores secure information could use a self-protecting algorithm to detect and mount a defense against attacks," says Dr. Salim Hariri, director of the CAC's University of Arizona site. Similarly, a system that provides critical services could use a self-healing algorithm to identify and recover from disruptions triggered by hardware and/or software failures, Hariri says.

Without these algorithms, Dr. Fortes points out, large networks can shut down entirely due to failure of one component. For instance, on August 11, 2007, an estimated 20,000 passengers were held at LAX for up to 14 hours because of a single computer failure that prevented U.S. Customs from screening arrivals. In February of 2007, the Dow dropped 546.02 points; because the worst of the plunge happened after 2:30 p.m., trading limits were not activated.

Autonomic algorithms have an extremely wide range of applications, says Dr. Manish Parashar, director of the CAC site at Rutgers University. Autonomic algorithms can self-optimize to use resources more efficiently, improve productivity and conserve energy, Parashar says. "That's an autonomic behavior that can be applied to a wide range of systems, and it will become more and more important as global conservation efforts grow."

The CAC is organized under the auspices of NSF's successful Industry/University Cooperative Research Centers (I/UCRC) program. The growing list of its industry members includes BAE Systems, Citrix, EWA Government Systems, IBM, Intel, Merrill-Lynch, Microsoft, Motorola, Northrop-Grumman, NEC, Raytheon, Xerox, Avirtec, Imaginestics, and ISCA Technologies. The center is funded by membership fees from industry partners, university matching funds, and by the National Science Foundation's I/UCRC Program. The center's Web site is www.nsfcac.org.