Information Technology and Software

Autonomic Autopoiesis

Automatically creates a replacement when a computer agent is no longer available to perform an essential function.

NASA Goddard Space Flight Center has developed agent technologies that enable higher levels of autonomy in computer systems. This technology is self-managing (self-configuring, self-healing, self-optimizing, and self-protecting). The system also features the property of autopoiesis (self-creation). When an agent automatically self-destructs due to security or other factors, the function performed by this agent is no longer in existence within the self-managing system. There is therefore a need for a mechanism that can auto-generate a replacement agent. This autopoietic agent may not necessarily be a clone of the original but can also be an alternative that provides equivalent functionality.

BENEFITS

- Replaces functionality that has been lost due to pre-programed self-destruction
- High level of system autonomy
- Allows systems to maintain their full suite of features
- Allows systems to self-replace without human intervention, a key feature in environments where real-time human control is difficult or impossible

technology solution

THE TECHNOLOGY

Highly distributed next-generation computer-based systems require self-managing environments that feature a range of autonomic computing techniques. This functionality is provided by collaborating agents, and includes an apoptotic (self-destruct) mechanism, autonomic quiescence (self-sleep), and others. The apoptotic feature is necessary to maintain system security and integrity when a component endangers the overall operation and viability of the entire system. However, the self-destruction of an agent/component may remove a key piece of functionality. The novel autopoietic functionality provides the capability to duplicate or substitute a new agent that provides the functionality of the self-destructed component.

APPLICATIONS

The technology has several potential applications:

- ⮕ Distributed computer systems that require high levels of autonomy

- ⮕ Space exploration

- ⮕ Commercial satellite systems employing distributed architectures

PUBLICATIONS

Patent No: 8983883