

Special Section: Autonomic Software Systems

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GREATER demand for complex functionality, particularly in the aerospace industry, necessitates greater degrees of autonomy in our computer software and systems. Autonomic computing [1] and related initiatives aimed at achieving self-properties, self-healing, and ultimately self-governance are becoming more important and relevant as a result.

However, there is still much to be done to achieve the vision of self-managing systems [2]. This is particularly true in embedded systems, as highlighted by Nordstrom et al. in their article “Autonomic Healing of Model-Based Systems”. The authors highlight the need for resilience and availability of systems in complex environments, where models may not necessarily provide all the information needed for informed decision-making regarding future behavior, leaving it to be a relatively human-intensive process. The authors describe their work on facilitating self-healing, one of the original self-CHOP properties and a vital component of autonomic systems, in model-based development.

We must also have assurance regarding the decisions made in self-managing systems. The potential implications of incorrect decisions are great, but decisions must often be made by autonomous components of ground-controlled systems simply because of time constraints. In their paper “Game-Based Model Checking for Reliable Autonomy in Space”, Bakera et al. describe the game-based model checker GEAR, a useful tool for automatically proving properties of autonomic systems for increased levels of assurance. They illustrate its usage with respect to a case study involving the ExoMars Rover.

Finally, the longer-term vision of creating Autonomic Software Systems is discussed with a return to biology for further inspiration in creating a holistic self-managing environment in Next Generation Autonomic System Environment.

References

- [1] Sterritt, R., “State of the Art: Autonomic Computing,” *Innovations in Systems and Software Engineering: A NASA Journal*, Vol. 1, No. 1, Apr. 1995, pp. 79–88.
- [2] Dobson, S., Sterritt, R., Nixon, P., and Hinchey, M., “Fulfilling the Vision of Autonomic Computing,” *Computer*, Vol. 43, No. 1, Jan. 2010, pp. 35–41.

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