Using automated planning to enable autonomic properties in computer systems

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USING AUTOMATED PLANNING TO ENABLE AUTONOMIC PROPERTIES IN COMPUTER SYSTEMS
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RESEARCH QUESTION

• In today’s complex heterogeneous systems, autonomic properties (self-management, self-maintenance, self-protection) are very desirable.

• Typically, such autonomic properties implemented in systems tend to exhibit “reactive” rather than “deliberative” behaviour.

• In many applications (For example - AUVs, Traffic Control) there is a need for systems that can sense, interpret and “deliberate” with knowledge of their actions, goals and environment in order to produce plans to meet their service level requirements.

THE ROLE OF APS...

Road traffic support systems embodying AI techniques tend to be “reactive” rather than “deliberative” (aka self-aware)

Goals, States, Actions, Service Levels, ...

sense interpret act sense interpret deliberate act

...great potential for exploitation of deliberative AI via the integration of recent advances in APS

CHARACTERISTICS OF AC

• Self-Configuring
• Self-Healing
• Self-Optimising and
• Self-Protecting

AIM

• This project aims to perform ground-breaking research in order to show the potential of Automated Planning technology in embodying systems with self-management.

• We aim to take traditional control system architecture, situated in the area of traffic control, and embed it with deliberative planning components.

METHODOLOGY

• We will evaluate it by comparing its behaviour to a traditional control system, and assessing the effort and challenges required to embody such symbolic reasoning within a real time environment.

• We explore the use and potential exploitation of deliberative AI techniques, in particular recent advances in Automated Planning.

RESEARCH SIGNIFICANCE

• Autonomic control systems are an important class of control systems, because of the desirable properties that they offer: self-manage, self-configure, self-protect and self-optimise.

• Creating generic technology that enables control systems to automatically reason with knowledge of their controls, in order to generate plans and schedules to manage themselves, would be a major breakthrough in the realisation of autonomic properties in such systems.

Keywords autonomic systems, automated planning and scheduling, control systems