A SOFTWARE DEVELOPMENT PROCESS FOR BDI MULTIAGENT SYSTEMS

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Statement of Originality

The thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to the final version of my thesis being made available worldwide when deposited in the University’s Digital Repository, subject to the provisions of the Copyright Act 1968.

Aaron Hector
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Abstract

Multiagent systems are an increasingly popular approach to software engineering, offering a fundamentally different design technique for software development based around the creation and deployment of autonomous software components.

One of the leading models for the development of agent-based software is the Belief-Desire-Intention (BDI) model. This model provides a method for developing software based around the concepts used in human reasoning. BDI provides not just a useful model for developing software agents, but promises a whole new paradigm for software development, occurring at a higher level of abstraction than traditional techniques.

In order to effectively develop BDI systems, a software development process is required that takes advantage of the concepts and abstractions offered by the BDI model. This thesis presents the Newcastle University Multi-Agent Process (NUMAP), a modular development process for BDI multi-agent systems. The process is practical, usable, and intuitive, operating at a level of abstraction suited to BDI agent development, focusing on the use of concepts associated with human reasoning throughout the development lifecycle.

A support tool for use with NUMAP is also presented, assisting developers as they progress through each phase of the process. This support tool offers code template generation for popular agent implementation platforms, and provides a novel dependency tracking mechanism.

A new evaluation framework is presented for assessing the completeness of development processes for multiagent systems, and NUMAP is assessed in comparison with other leading design processes, showing advantages in terms of its coverage of agent modelling concepts, and in terms of its usage and practicality.