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Semantic-based Repository of Agent Components

DISSERTAÇÃO DE MESTRADO

Dissertation presented to the Programa de Pós-Graduação em Informática of the Departamento de Informática, PUC-Rio as partial fulfillment of the requirements for the degree of Mestre em Informática

Advisor: Carlos José Pereira de Lucena

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Resumo

Jimenez, Merlin Parra; Advisor. Lucena, Carlos José Pereira de. **Repositório de Agentes baseado em Semântica**. Rio de Janeiro, 2012. 94p. Dissertação de Mestrado - Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

A adoção de abordagens de desenvolvimento orientada a agentes de software traz inúmeros benefícios, tais como o suporte à análise, ao projeto e a implementação de sistemas de software. Postulamos que um ambiente de desenvolvimento robusto para a construção de sistemas orientados a agentes de software será reforçado por meio de métodos avançados de reuso. O reuso na engenharia de software leva à redução de custos e tempo envolvidos no desenvolvimento dos projetos. Além disso, promove melhorias relacionadas à adaptação a diferentes exigências e necessidades dos engenheiros de software, melhorando qualidade dos sistemas desenvolvidos. No entanto, a pesquisa relacionada ao reuso de agentes ainda é escassa. Consequentemente, o problema da organização e do armazenamento de artefatos orientados a agentes ainda não atende as necessidades dos engenheiros de software. Portanto, o processo de recuperação de agentes ainda é um importante desafio a ser superado na engenharia de software orientada a agentes. Neste contexto, esta dissertação propõe uma metodologia e um protótipo de repositório baseado em tecnologias da web semântica que suportam estratégias de reuso, fundamentais ao processo de desenvolvimento de sistemas orientados a agentes. A metodologia proposta inclui (i) um meta-modelo flexível para representar os agentes e as suas características comuns e variáveis. Tais características são modeladas por meio de uma ontologia e um modelo de características (em inglês *feature model*), (ii) uma taxonomia específica de domínio para classificar os agentes de acordo com o seu domínio de aplicação, (iii) uma taxonomia para classificar os diferentes tipos de agentes, (iv) um serviço de subscrição (RSS) para anunciar a atualização dos agentes associados a categorias específicas, (v) um sistema de recomendação, apoiado por a ontologia e as taxonomias propostas, que permite aos usuários descobrir agentes reutilizáveis inter-relacionados, e (vi) métodos avançados de busca e navegação. Finalmente, avaliamos o repositório construído. O resultado da nossa avaliação

mostra que o método proposto promove uma melhoria em relação à relevância da recuperação dos artefatos orientados a agentes.

Palavras-chave

Reuso de agentes, componentes baseadas em agentes, artefatos orientados a agentes, repositório de agentes, recuperação de informação baseada em semântica, engenharia de software orientada a agentes.

Abstract

Jimenez, Merlin Parra; Advisor. Lucena, Carlos José Pereira de. **Semantic-based Repository of Agent Components.** Rio de Janeiro, 2012. 94p. MSc Dissertation - Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

The adoption of a software agent-oriented development approach brings a number of benefits such as the support of analyses, design and implementation of software systems. We posit that a robust development environment for the construction of agent-oriented software systems will be enhanced by advanced reuse methods. Reuse in software engineering leads to the reduction of cost and time involved for developing projects, improvement of software quality, and easy adaptation to different requirements and needs of software engineers. However, research addressing agent reuse is meager and does not tackle the problem of organizing and storing agent-oriented artifacts according to the software engineers' needs. Therefore, the agent retrieval process turns into an important challenge to be overcome in agent-oriented software engineering. In this context, this thesis proposes a methodology and a repository prototype based on semantic web technologies that supports reuse for developing agent systems. The proposed methodology includes (i) a flexible meta-model for representing the agents and their common and variable features, which are represented by means of ontology and feature model, (ii) a domain-specific taxonomy to classify agents according their application domain, (iii) a taxonomy to classify the different behaviors of agents, (iv) a subscription service, *RSS*, to announce updates to the agents that are associated to specific categories, (v) a recommendation system, supported by the ontology and the taxonomies, that allows end-users to discover reusable interrelated agents and learn new information or agents as needed, and (vi) enhanced search and browsing methods for agents. Finally, we evaluate the constructed repository. The outcome of this evaluation shows that the proposed reuse method is an improvement in terms of the relevance of retrieved agent-oriented artifacts.

Keywords

Software agent reuse, agent component, agent-oriented artifact, agent repository, semantic information retrieval, agent-oriented software engineering.

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Abbreviation and Acronym List

AOSE	Agent-oriented software engineering
CB	Component-based
IR	Information retrieval
RSS	Really Simple Syndication
RSs	Recommendation systems
RSSEs	Recommendation systems for software engineering
WWW	World Wide Web