

A Multi Agent System Framework for .NET

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Originality Statement

'I, Naveen Sharma hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the award of any other degree or diploma at UC or any other educational institution, except where due acknowledgement is made in the thesis. Any contribution made to the research by others, with whom I have worked at UC or elsewhere, is explicitly acknowledged in the thesis. I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.'

Signed

Date.....

Summary

This thesis presents an approach to modeling Multi Agent Systems (MAS). A framework and its implementation are presented as an extension to .NET. A number of definitions of agents are evaluated for the purpose of a broad understanding of the term software agent. Software agent has been defined in MAS context and its characteristics are identified and implemented. Motivation factors for building framework for MAS have been discussed. A number of existing technologies are discussed and evaluated. A number of agent systems previously developed are also being discussed in the middle part of the thesis. A model software agent has been defined and its characteristics are divided in two basic categories essential and optional. Its implementation has been distributed into different components throughout the MAS framework. Some of these characteristics are jointly implemented by a number of components and others responsibility rest on the individual components. Detail working of the MAS framework (i.e. what to do, when to do) is explained as guide to develop MAS using MAS framework. The protocols followed by the framework components to make communication possible between them are discussed at components level. The required information for developing MAS using MAS framework are also discussed. It answers the why, when and how questions in regards to using MAS framework. A case study on Dynamic Truck Scheduling (DTS) system is discussed, designed and implemented using the MAS framework. DTS System has been used as a prototype application to test and evaluate the framework. DTS also represents a model problem that can be answered by using MAS; complete in-depth details about the problem statement are discussed. It also discusses the design and implementation of the solution along with the test results of the framework. Possible future expansion is presented in light of a number of limitations known of the MAS framework. The code working behind the different components of the MAS framework is given in appendices. Some important standards of XML that are used to pass information between agents and MAS framework components are also given in the format of tables.

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