

AGENT-BASED SOFTWARE DEVELOPMENT

A Review by Jordi Sabater

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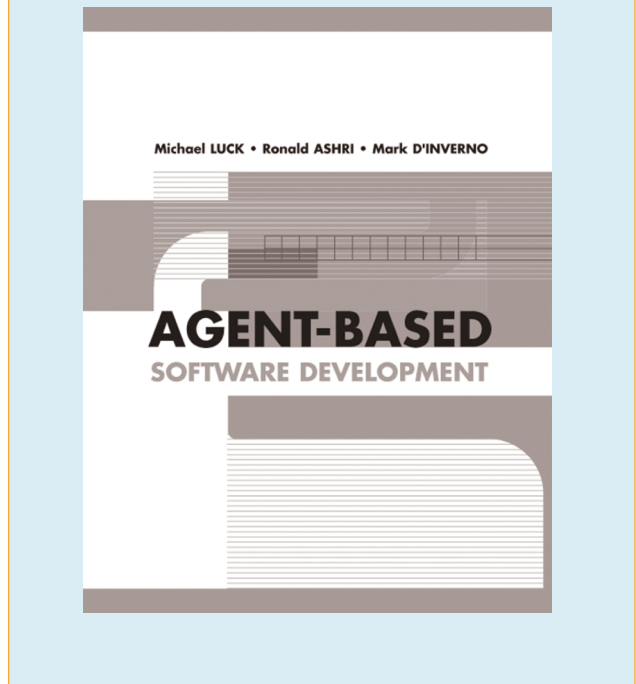
In the last few years, the field of autonomous agents and multi-agent systems has received a lot of attention. A plethora of models, toolkits, methodologies, modelling languages and so on have appeared in a very short period of time. While this is very encouraging (especially for those of us that have an interest in the area), it is also true that it becomes more and more difficult to keep a complete and coherent view of the current state of the art. We tend to focus our attention just on specific sub-topics and, given the fast evolution of the area, we lose track of the rest. This context is where books like the one I have had the pleasure to review come to help.

The book is a very well organised and easily readable overview of the state of the art in multi-agent software development. As the title suggests, it is not an essay about the philosophy behind agent technology, nor an introduction to what a multi-agent system is. Instead, it provides an overview of the tools that researchers working in the field of autonomous agents and multi-agent systems have currently available in order to develop software following this paradigm. The book leads you through all the aspects associated with agent software development: agent architectures, toolkits, methodologies, modelling languages, standards and support technologies.

After a general and short introduction in *Chapter 1* about what an agent is, highlighting different areas where agents are or can be useful, the book dedicates each chapter to a different aspect of agent software development. Each chapter is independent of the others (including its own bibliography) so the reader can easily jump to the aspects that are more relevant for her/him.

Chapter 2 is devoted to agent architectures. The authors, besides reviewing the most relevant types of agent architectures, describe real architectures that follow each approach. The chapter is not a catalogue of every known agent architecture (and this is something that can be applied to the rest of the chapters) but a summary of the main streams that have had some influence in the area.

Michael Luck, Ronald Ashri and Mark d'Inverno
ISBN 1-58053-605-0
Artech House



The next chapter (*Chapter 3*) is dedicated to agent toolkits. As the authors say, agent toolkits “can be considered as providing the operating system for agents”. Together with *Chapter 6*, they show the most technical part of agent-based software development. Each agent toolkit reviewed in this chapter is analysed from several perspectives. First, from the point of view of a single agent: what are the internals of an agent built using that toolkit? How is interaction with the environment achieved? Second, from the point of view of a multi-agent system: low level communication, protocols, communication languages and so on. Finally, from the point of view of the management services: facilities to monitor and debug the applications, tools helping in the development process, etc. Although I missed some toolkits, I think the ones analysed in this chapter cover quite well the different approaches currently available.

Chapter 4 approaches the complex subject of methodologies and modelling languages for agent-based software development. The authors propose a classification for the methodologies and then present an overview of three different approaches to the

topic: the knowledge engineering approach, the agent-oriented approach, and extensions to object-oriented methodology. As in the other chapters, the authors describe different existing methodologies that follow each approach. The last part of the chapter is dedicated to describing how the UML notation is currently used to model different aspects of multi-agent systems, like interaction protocols, social structures, and so on.

Chapter 5 summarises the different efforts of the community to standardise the different aspects of agent technology. Almost half of the chapter is dedicated to the FIPA standard, without doubt the most important initiative at this moment to create a standard for agent-based systems. The rest of the chapter is devoted to talking about standards for mobile agents and standards in closely related areas such as web services and grid computing.

In Chapter 6, the authors describe a set of technologies that can be used to support the agent approach, mainly because they are oriented (or can be used) to building distributed applications. I found this chapter a bit irregular. Although the section that talks about web services is interesting, I consider that things like the multi-tier application model or the .NET framework have too weak a link with autonomous agents and multi-agent systems to appear in this book.

One of the dangers with this type of book is that because they are so close to technological aspects, it is very easy for the content to become outdated even before the book gets to the bookstore. In this case, the authors have made a big effort to include the very latest information about the topic and this is something that will positively impact on the longevity of the book.

Even taking this into account, it is important to provide links to the sources of information to allow the reader to complement the content of the book with the latest information. This is the purpose of *Chapter 7*. This chapter is a very useful compilation of resources associated with the area of autonomous agents and multi-agent systems. Among other information, you will find the main conferences in the area and lists of web addresses with different types of information about agents. For a researcher with several years working in the area, this information may be well known. Nonetheless, and as it was in my case, I am sure you will find a web site you did not know was there, or a book you did not remember being published and wanted to buy. For those of you who do not belong to the area, or have just arrived at the fascinating world of autonomous agents and multi-agent systems, it is a very valuable source of information, and a good starting point to keep your recently acquired knowledge up to date.

The authors have managed to give the reader a general perspective of the topics associated with agent-based software development in a compact way. In fact, this is what I expect from this kind of

book. I do not want a lot of detailed information that disturbs me in order to achieving a good and complete perspective. If necessary, you can always extend your knowledge by following the provided bibliography and reading books fully dedicated to the particular topic. The important thing is that the authors show you the right fragments of each picture, and I think in this case they achieve this objective.

The book is the perfect (and I would say necessary) complement to any general book about agent theory. I am sure not to be wrong if I say that this book should be a “must have” for every PhD student taking a course on autonomous agents and multi-agent systems and also for every researcher with some interest in the area.

EUMAS 2004

The 2nd European Workshop on
Multi-Agent Systems

16–17 DECEMBER
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