

# Chapter 5

## Enhancing Online Games with Agents

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### ABSTRACT

*Online games have grown during recent years into a popular entertainment form with a wide variety of games and player communities spread across the world. Such games have, as the most important requirements, to be ease-of-use, to induce newbies to play, and to maintain the game hard to master, to induce players to play for a long time. Moreover, given that a large set of them are based on the competition of (often numerous) teams of players and/or non-player character, then the use of smart and effective coordination techniques is indispensable for their development. Agent technologies can be considered a suitable solution for coping with the previous requirements. In fact, their learning and coordination capabilities make them the right means for both realizing online games and supporting players in all the operation that are necessary to play a game. The goal of this chapter is to describe the main reasons for which multi-agent systems are considered one of the most interesting technologies for the development of online games and for providing the most appropriate services to maintain game communities. In particular, this chapter introduces JADE, a software framework designed to aid the development of multi-agent applications, and shows how it can be used for the realization of online games that want both to be accessible through heterogeneous network and devices and to provide a smart set of services for their game communities.*

### INTRODUCTION

Multiplayer online games have become an increasingly important economic, social, and cultural

phenomenon: nowadays, millions of players are logged on from across the globe to pit their wits against one another on one the games available on the net. Players of online games are usually grouped in online communities that allow the

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players to organize a game and to share their gaming experience. Therefore, if an online game provides services for managing the communities and for helping the interaction among the players, then it typically strengthens the game community. Moreover, If a game is easy to learn, it is much more likely that the newbies decide to stay with the game and the game is more likely to reach or maintain its critical mass of players. It would be ideal if the game were easy to learn but hard to master so that it would still be fun to play it after a few years. It is possible thanks to the availability of some supports for newbies. Such supports can be provided by the other players of the game community, but often the game itself can help newbies, for example, proving tutorials and help pop-ups.

Multi-agent systems are one of the most interesting areas in software research and they have been importantly contributing to the development of the theory and the practice of complex distributed systems (see, e.g., Jennings et al., 1995; Muller, 1998; Bordini et al., 2005) and, in particular, have shown the potential to meet the requirements for the realization of multiplayer online games and for the management of game communities (van Lent et al. 1999; Hawes, 2000; Fielding et al., 2004; Johansson, 2006). In fact, their intelligent and autonomous behaviour make agents suitable to act as non-player characters, manage the virtual environment where the game is situated, and act in place of users on the basis of their preferences and their previous behaviour. Moreover, multi-agent systems provide a large set of coordination techniques useful both for coordinating the actions of a team of players and for organizing a game. Finally, multi-agent systems may help in the development and execution of a multiplayer game on a distributed and heterogeneous networked environment, because agents acting on low power devices can delegate actions to other agents on other devices, agents can move on the network from a device to another devices, and remote agents can work for their users when they are disconnected from the network.

The goal of this chapter is to describe the main reasons why Multi-agent systems are considered one of the most interesting technologies for the development of online games and for providing the most appropriate services to maintain game communities. In particular, this chapter presents JADE, a software framework for the development of multi-agent applications, that has been used for the realization of online games showing as this software framework is suitable for developing multi-player online games that are accessible through heterogeneous network and devices and that need to provide a smart set of services for their communities of players.

## **BACKGROUND**

Although there is no single definition of an agent (see, for example, [Genesereth et al, 1994; Wooldridge and Jennings, 1995; Russell and P. Norvig, 2003]), all definitions agree that an agent is essentially a special software component that has autonomy that provides an interoperable interface to an arbitrary system and/or behaves like a human agent, working for some clients in pursuit of its own agenda. In particular, an agent is autonomous, because it operates without the direct intervention of humans or others and has control over its actions and internal state, is reactive, because it perceives its environment, and responds in a timely fashion to changes that occur in the environment, is pro-active, because it does not simply act in response to its environment, it is able to exhibit goal-directed behaviour by taking the initiative. Moreover, if necessary an agent can be mobile, showing the ability to travel between different nodes in a computer network, it can be truthful, providing the certainty that it will not deliberately communicate false information, it can be benevolent, always trying to perform what is asked of it, it can be rational, always acting in order to achieve its goals, and never to prevent its goals being achieved, and it can learn, adapt-

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