"AGENTS ARE EVERYWHERE!"

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A decade ago this claim would have evoked images from the Cold War—and probably gotten this column classified! Today, it describes one of the hottest technical areas on the Internet.

Applications such as information access, information filtering, electronic commerce, workflow management, and intelligent manufacturing are becoming ever more prevalent over the Web. What these applications have in common is a need for mechanisms to manage distributed information—to help advertise it, find it, present it, and update it. Since the Web is an open system, where heterogeneous information sources may appear and disappear arbitrarily, these mechanisms must be extensible and flexible.

In the months and years ahead, we predict that agents will become an essential part of most Web-based applications, serving as the "glue" that makes a system as large as the Web manageable and viable. In this column, we will keep you abreast of the latest developments in agent technology in the context of webs, both Internet and intranet. We will review products, services, research projects, industry trends, and relevant standards. To keep our feet on the ground, we will try to feature at least one working system in each column.

AGENTS

So, what exactly is an agent? Must it be intelligent? Adaptive? Itinerant? There are almost as many opinions about this as there are agents,[1] leading to frequent flare-ups in several Internet forums (see the listservs below). Everyone agrees that agents are software components with certain essential qualities. The debate is about what those qualities are. We think agents must be active and persistent; they must perceive, reason, act, and communicate. Others think they must also be autonomous, goal-directed, reactive, or declaratively programmed. Still others limit agents to the role of representing a user or database. You might wonder what these abstract concepts have to do with practical systems. In some cases, very little; in other cases, a lot. We will talk about these properties and roles in later columns.

NONE BUT THE LONELY

An additional quality that we feel agents must have is sociability. Although there are lots of agents in the Web, they are almost universally asocial. Most agents today are designed to perform some task for a user,[2] such as filtering e-mail, finding prices for music CDs, and buying flowers. But they are completely unaware of each other. An agent may find the best price for a bouquet by querying or visiting all the Internet florist sites, as General Magic envisions for a Telescript agent,[3] but there is no way to communicate this information to another agent on the same quest. Having social agents that interact with each other will move the Web from a pure client-server paradigm to a distributed, or better yet, cooperative paradigm. You will be hearing a lot from us on this theme.

SYSTEM OF THE BIMONTH

An impressive start at a group of social agents is Warren, developed by Katia Sycara and colleagues at CMU's Robotics Institute.[4] Warren is a system of intelligent agents for helping you manage your financial portfolio. It coalesces market data, financial report data, technical models, analysts' reports, and breaking news with current prices from a stock ticker. For example, while one agent finds and plots the current price of your favorite stock, another monitors the newswire for anything mentioning the company. All the information is already available in some form on the Web—Warren simply integrates it by having a specialized agent responsible for each resource, and then presenting it to, or alerting, a user. The agents operate on your behalf for months, whether you are logged on or not. Check it out!

RESOURCES

For those interested in probing deeper into agent technology, there are two lively mailing lists: agents (majordomo@cs.umbc.edu) and DAI-List (DAI-List-request@ece.sc.edu). There is also a Usenet newsgroup, comp.ai (we promised ourselves not to mention comp.ai.philosophy, so we won't), and several good URLs: Try the University of Maryland Baltimore County, NCSU, and IBM. ■

REFERENCES

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URLs for this page
Warren • www.cs.cmu.edu/~softagents/warren/
Software Agents Mailing List FAQ • www.ee.mcgill.ca/~belmarc/agent_faq.html
UMBC AgentWeb • www-cs.umbc.edu/agents/
NCSU Database Lab's Agent! Agent! • www.dblab.csc.ncsu.edu/agents/
IBM Intelligent Agent Center • www.raleigh.ibm.com/iag/iaghome.html

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