Lecture 1: Introduction

Multiagent Systems

http://www.csc.liv.ac.uk/~mjw/pubs/imas/
Five ongoing trends have marked the history of computing:

- Ubiquity;
- Interconnection;
- Intelligence;
- Delegation; and
- Human-orientation.

Programming has progressed through:

- Sub-routines;
- Procedures & functions;
- Abstract data types;
- Objects; and
- Agents.
Lecture 1: An Introduction to Multiagent Systems

1.1 Spacecraft Control

When a space probe makes its long flight from Earth to the outer planets, a ground crew is usually required to continually track its progress, and decide how to deal with unexpected eventualities. This is costly, and if decisions are required quickly, it is simply not practicable. For these reasons, organisations like NASA are seriously investigating the possibility of making probes more autonomous — giving them richer decision-making capabilities and responsibilities.

This is not fiction: NASA’s DS1 is doing it now! http://www.csc.liv.ac.uk/~mjw/pubs/tmas/
Searching the Internet for the answer to a specific query can be a long and tedious process. So, why not allow a computer program — an agent — to do searches for us? The agent would typically be given a query that would require synthesising pieces of information from various different Internet information sources. Failure would occur when a particular resource was unavailable, (perhaps due to network failure), or where results could not be obtained.

1.2 Internet Agents

An Introduction to Multiagent Systems
An agent is a computer system that is capable of independent action on behalf of its user or owner.

A multiagent system is one that consists of a number of agents,

which interact with one another.

In order to successfully interact, agents need ability to cooperate, coordinate, and negotiate.

http://www.csc.liv.ac.uk/~mjw/pubs/papers/
Two key problems:

1. How do we build agents that are capable of independent, autonomous action in order to successfully carry out the tasks that we delegate to them?

2. When the other agents cannot be assumed to share the same interests/goals, particularly when the other agents are not assumed to cooperate, coordinate, or negotiate with other agents in order to successfully carry out the tasks that we delegate to them, how do we build agents that are capable of interacting with other agents?
Agents as a paradigm for software engineering:

Some Views of the Field

An Introduction to Multiagent Systems
Multiagent systems provide a novel tool for simulating social processes, which may help shed some light on various kinds of social processes. Agents as a tool for understanding human societies.
Isn’t it all just Social Science? •
Isn’t it all just Economics/Game Theory? •
Isn’t it all just AI? •
Isn’t it all just Distributed/Concurrent Systems? •

3 Objections to MAS