

Intelligent (Software) Agents

Software Agents

- Agent Based Systems are an evolving software paradigm that strives to create software that can possess human characteristics, such as autonomy, adaptability, sociality, judiciousness, mobility and reactivity. • Intelligent agents are software programs that continuously perform the following functions:
 - 1. perception of dynamic conditions in the environment;
 - 2. reasoning to interpret
 - 3. perceptions,
 - 4. solve problems,
 - 5. draw inferences, and determine actions

Intelligent Agents

- **Intelligent Agent (IA):** Computer program that helps a user with routine computer tasks.
- **Other Names:**
 - Software agents
 - Wizards
 - Knowbots
 - Intelligent software robots
 - Softbots
- **Agent:** Someone employed to act on one's behalf.

Definitions of Intelligent Agent

- “***Intelligent agents*** are software entities that carry out some set of operations on behalf of a user or another program, with **some degree of independence or autonomy** and in so doing, **employ some knowledge or representation** of the user’s goals or desires.” (“The IBM Agent”)

Intelligent Agent Characteristics

- **Autonomy** (empowerment)

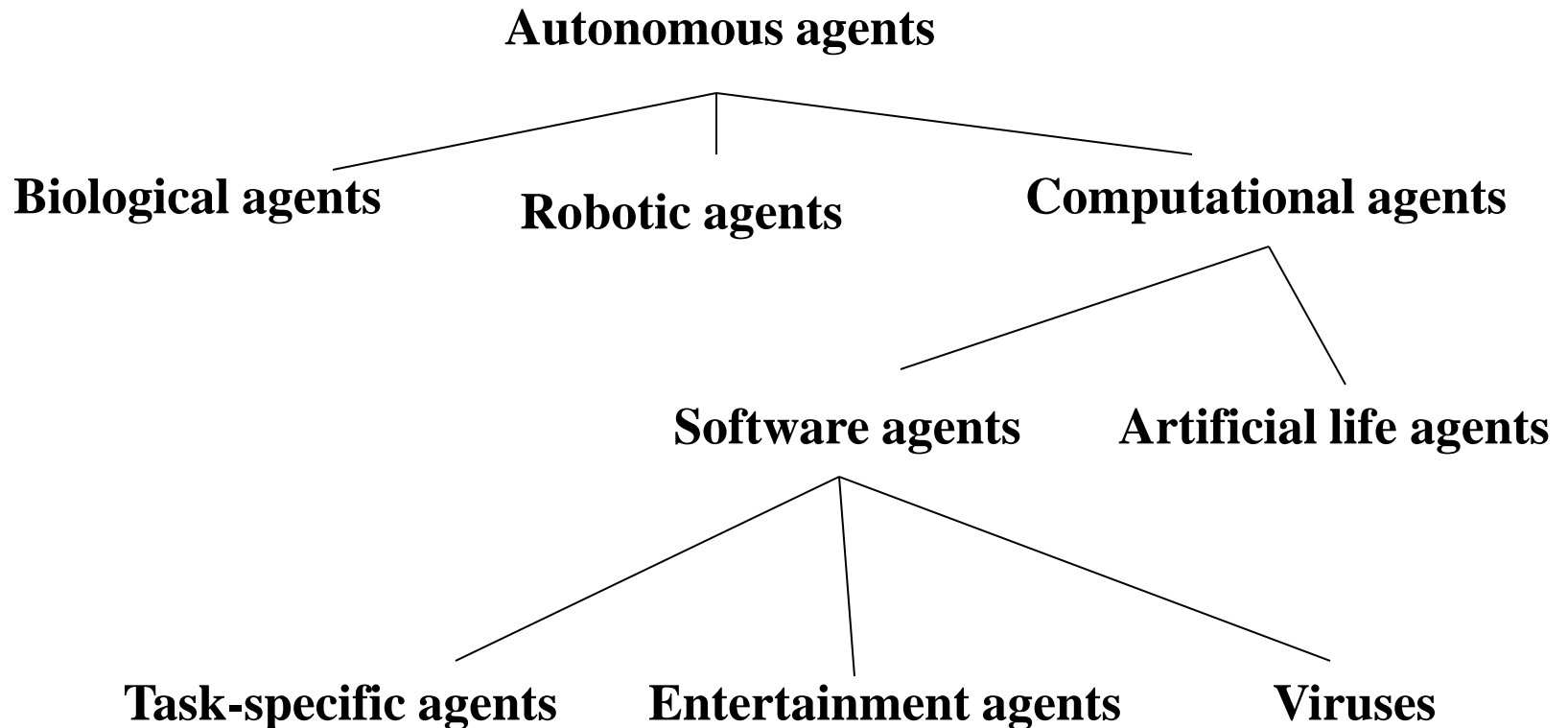
Agent takes initiative, exercises control over its actions

- **Goal-oriented**
- **Collaborative**
- **Flexible**
- **Self-starting**

- **Mobility** (operates in the background)

- **Mobile agents**

Agent Classification and Types



Why Intelligent Agents?

Information Overload!!

- **Data doubles annually (in large enterprises)**
 - Can analyze only about 5%
 - Most efforts: discover patterns, not meaning, not what to do
 - Reduces decision making capabilities by 50%
- **Much caused by the Internet/Web**
 - How to filter data
 - How to identify relevant sources of data
- **Intelligent agents can assist searching (information)**
- **Save time: agents decide what is relevant to the user**

Classification by Application Area

- **Assist in workflow and administrative management**
- **Collaborate with other agents and individuals**
- **Support electronic commerce**
- **Support desktop applications**
- **Assist in information access and management**
- **Process mail and messages**
- **Manage systems and networks**

Internet-based Software Agents

Software Robots or Softbots

Major Categories:

- **E-mail agents (mailbots)**
- **Web browsing assisting agents**
- **Frequently asked questions (FAQ) agents**
- **Intelligent search (or Indexing) agents**
- **Internet softbot for finding information**
- **Network Management and Monitoring**

Electronic Commerce Agents

- **Need identification**
- **Product brokering**
- **Merchant brokering**
- **Negotiation**
- **Purchase and delivery**
- **Product/service evaluation**

Other Agents

- **Operating systems agents**
- **Spreadsheet agents**
- **Workflow and administrative management agents**
- **Software development agents**
- **Data mining / Web mining agents**
- **Monitoring and alerting agents**
- **Collaboration agents**

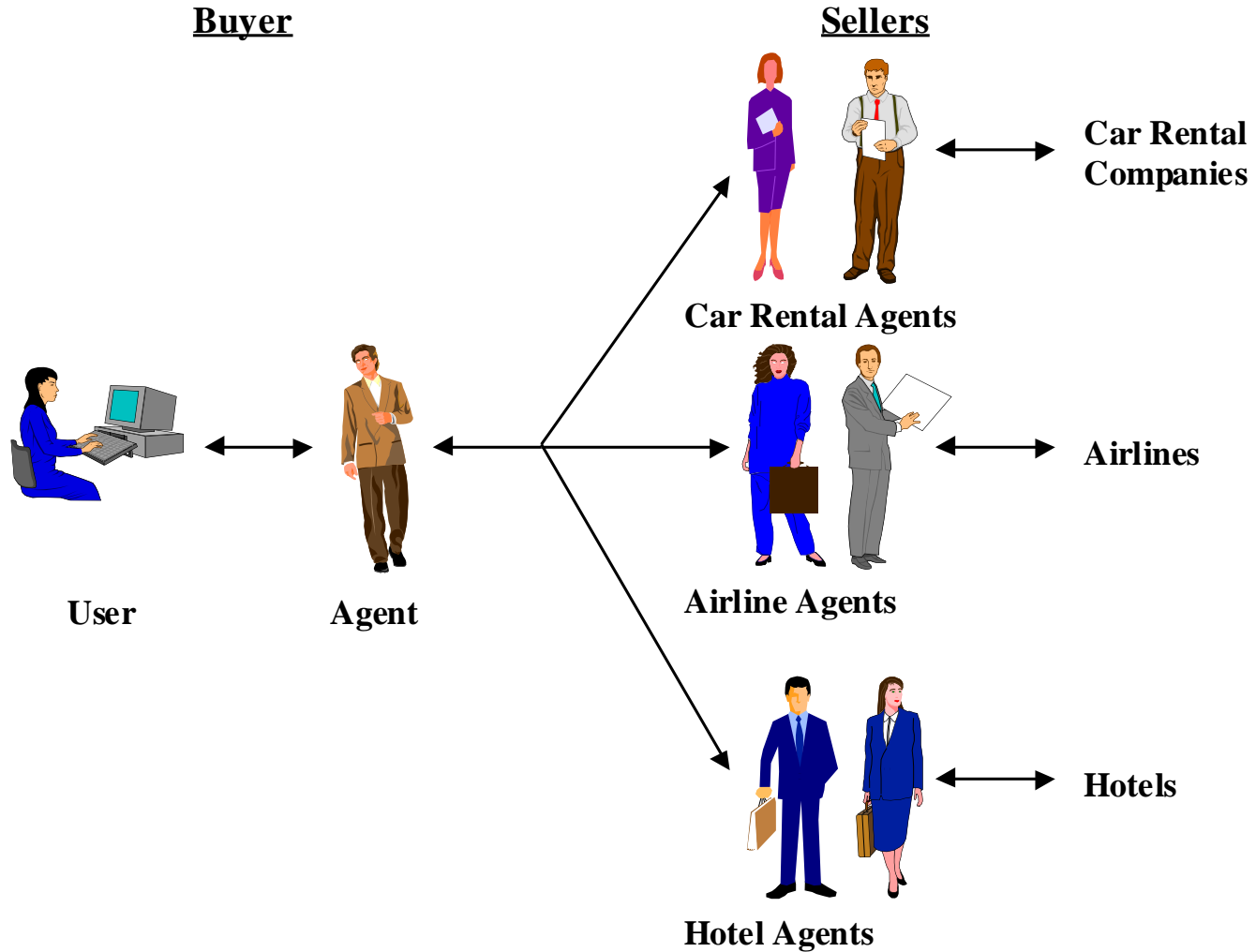
Monitoring and Alerting: NewsAlert

- **Monitors data by *personalized* rules**
- **Automatically delivers *alerts* to the user's desktop into personalized newspapers**
- **Organizes alerts by user-specified subject areas**
- **Provides *smart tools* so users can investigate the context of an alert and communicate findings to others**

Distributed AI, Multiagents, and Communities of Agents

- Software agents must *communicate, cooperate and negotiate* with each other
- Refine requests and queries through *evolving dialogue*
- Intelligent agents work together in multiple agent systems
- Agents can *communicate, cooperate and/or negotiate*
- Easy to build agents with small specialized knowledge
- Agents need to *share* their knowledge

A Multi-Agent System for Travel Arrangements



Intelligence Density Dimension

- Flexibility
- Embeddedability
- Ease of use
- Speed / reliability of response time