



Agents & the GRID

A Brief Overview

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What are Agents?

- Software components designed to perform a variety of tasks, typically:
 - ◆ To integrate with other software, especially legacy systems (*interact, interoperate, transact*)
 - ◆ To represent the interests of the owner (*communicate, compete, negotiate*)
- And they typically exhibit the characteristics of:
 - ◆ Autonomy
 - * They can operate in the background without constant user interaction and intervention
 - ◆ Proaction
 - * They can understand the goal of the user and act to achieve it
 - ◆ Interaction
 - * They interact with many different data sources and services to perform their goals
 - ◆ Communication, ...
- Agents are primarily a way of *thinking* about software



Agent Technologies

- A layered communication stack:
 - ◆ Interaction Protocols
 - * Flexible model for representing interaction patterns; *call-for-proposals, english-auction, ...*
 - ◆ Communicative Acts
 - * Application-independent framework for expressing intent; *query, perform, inform, ...*
 - ◆ Semantic Data Representation
 - * Languages for encoding semantic content; *data, schemas, ontologies, ...*
 - ◆ Network communication
 - * Encodings for distributed communication
- Areas of current and future research:
 - ◆ Policies
 - ◆ Conversations and Relationships
 - ◆ Contracts
 - ◆ Methodologies, ...



A Brief History of Agents





Issue I: Integrating GRIDs

- Agentcities was:
 - ✦ a distributed network of agent-based systems, services and applications
 - ✦ a deployment environment for next-generation services
 - ✦ a service model in which services can be dynamically discovered, composed, reused, ...
 - ✦ a new interaction model for users and business based on delegating tasks to agents
- The mission was:

“To develop and deploy a global, open environment in which services can be dynamically, autonomously and intelligently composed to achieve user and business goals.”
- The GRID perspective:
 - ✦ Build different, competing implementations of GRID specifications (*harmonisation*)
 - ✦ Deploy many different GRIDs and services within them (*globalisation*)
 - ✦ Develop technologies to integrate these GRIDs and promote service discovery and access across them (*interoperation*)



Issue 2: Semantics

- Semantics is about adding machine-understandable meaning to:
 - ✦ **Data:** *This is what this data means and this is its context*
 - ✦ **Actions:** *This is what is intended to be done and how it is to be achieved*
- Semantic markup of data is necessary:
 - ✦ When describing the capabilities of services and resources (*service descriptions*)
 - ✦ When describing the data of the services and resources (*semantic content language*)
 - ✦ When describing contextual information about both of the above (*ontologies*)
- Semantic markup of actions is necessary:
 - ✦ When describing an individual operation to be performed (*action*)
 - ✦ When describing communication between entities (*interaction protocol*)
 - ✦ When describing a sequence of operations to be orchestrated (*workflow*)