First Demonstrator of HYDRA Middleware
Architecture for Building Automation

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HYDRA project

- Networked Embedded System Middleware for Heterogeneous Physical Devices in a Distributed Architecture
- Start: 1st July 2006
- Duration: 4 Years
- 13 Partners from 9 countries (9 companies, 3 universities, research institute)
- Leader: C International Ltd.

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HYDRA vision and outputs

• Vision of the project
  The vision of the HYDRA project is to (eventually) create the most widely deployed middleware for intelligent networked embedded systems that will allow producers to develop cost-effective and innovative embedded applications for new and already existing devices.

• Output of the project
  • Middleware
  • SDK - that will allow to develop applications on the middleware
  • DDK – Device Development Kit

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The Hydra addresses two different types of users:

- Developer users
- End-users

Both types of users are involved and studied in the project.
User Domains

- Building Automation – Intelligent buildings, integration of control systems that provide a high level of “building intelligence”, plug-and-play interoperability of Building Automation components, transformation technologies into web-enabled applications,

- Healthcare - Assisted living, monitoring (remote monitoring), care of the elderly, ill persons, making patients more informed

- Agriculture - Food safety application,

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HYDRA Middleware architecture

• Set of Managers

- Application Elements
  components that are usually deployed on hardware which is performance-wise capable of running the application that the solution-provider creates (they are configured to work with other software in order to support specific application by specific developer)

- Device Elements
  components that are usually deployed inside HYDRA-enabled devices
Semantics in HYDRA

• Application Ontology Manager is to provide an interface for using the ontologies
  - Device Ontology
  - Security Ontology
  - Domain Ontology
  - Managers Ontology
  - Context Ontology …
• Semantic description will define the capabilities of the devices and the security requirements of the device
• Apply semantic web services at the device level
  - Device classes and descriptions
  - Device functionality
  - Security and trust modelling
• Semantic description should allow devices to specify the type and level of security services that they both require and provide
Use Of Ontologies

- Ontologies for application and both for the application developer and the device developer
  - design time: semi-automatic code generation for devices (SDK, DDK)
    • The developer should be able to define and extend device ontologies
    • To find and create semantic descriptions of their devices
  - run-time: service execution based on models and desc. in ontologies

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Device Ontology

- One of the key components in the Hydra middleware
- Based on the FIPA Device Ontology
- Device description contains basic information about devices (device name, vendor details, hardware description and software description)
- LIMBO compiler – stubs generation based on device capabilities
- Device classification

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Security Ontology

- Based on NRL security ontology
- Application of ontology-based semantic technologies on privacy and security issues
- Security must be defined and resolved semantically (Semantic resolution of security)
- Application must provide the security requirements on a semantic level in order to resolve if devices are allowed to interact with the application or to allow the middleware to resolve the security in the process
- Device Ontology extension – Security properties
- Security ontology (Trust, Threats, Vulnerability Ontologies?)
Thank you for your attention,

For more informations, visit website
www.hydra.eu.com