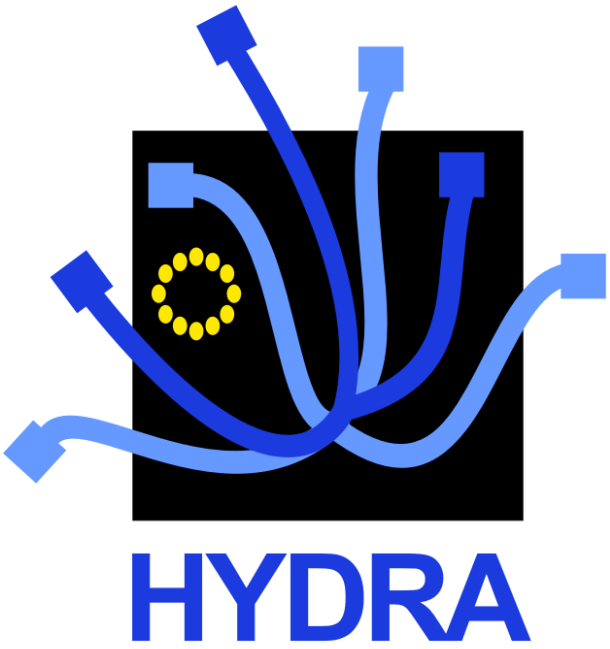

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Website:
http://www.hydramiddleware.eu/

Content

Vision of Hydra

The vision of the Hydra project is to create the most widely deployed middleware for networked mobile and embedded systems that will allow producers to develop cost-effective and innovative applications for new and already existing devices.

Hydra will be the enabling link between all kinds of different mobile and embedded networked devices. The middleware will thus be the source for ambient intelligent networks and will bring not only connectivity but also intelligent interaction to the connected devices.

Besides the core middleware the Hydra project will provide developer kits that will be the instrument to create innovative and outstanding applications and that will feature access to the entire capabilities of the Hydra middleware. In this way proactive ambient intelligence will come true and will bring added value to application providers as well as end users of Hydra based applications and Hydra enabled devices.

The Hydra project will develop a SDK (Software Development Kit), a DDK (Device Development Kit) and an IDE (Integrated Development Environment) to support software as well as hardware developers in their work to produce cost effective and innovative ambient intelligence applications and to grant easy access to all Hydra middleware functionalities.

Middleware

In a distributed computing system, middleware is defined as the software layer that lies between the operating system and the applications on each site of the system.

The functionality of middleware is:

1. Hide distribution of individual components of a system
2. Hide heterogeneity (of software, hardware, protocols)
3. Provide high level programming interfaces to developers
4. Supply a set of common services

Interoperable

- middleware based on a Service Oriented Architecture for resource constrained devices, to which the underlying communication layer is transparent.

Heterogeneous

- the Service Oriented Architecture will provide access to data, information and knowledge across heterogeneous platforms, including external web services and data repositories.

Intelligent

- by incorporating Service Orchestration, Semantic Model Driven Architecture, Reflective Properties, included support for distributed as well as centralised Ambient Intelligence Architectures.

Secure

- will allow for secure, trustworthy, and fault tolerant applications through distributed security and social trust components.

Cost-effective and inclusive

- will be deployable on both new and existing networks of wireless and wired devices, and support model-driven development.

Sustainable

- will build business modelling framework for analysis of business sustainability of the developed applications.

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Concept of the Hydra Middleware

The Hydra middleware is based on a semantic model-driven architecture which provides interoperable access to data, information and knowledge across heterogeneous platforms and support true ambient intelligence for networked devices. At the core of the middleware is an ontology where devices, their capabilities, security constraints, etc are represented, allowing Hydra to be easily configured and extended with new devices and services.

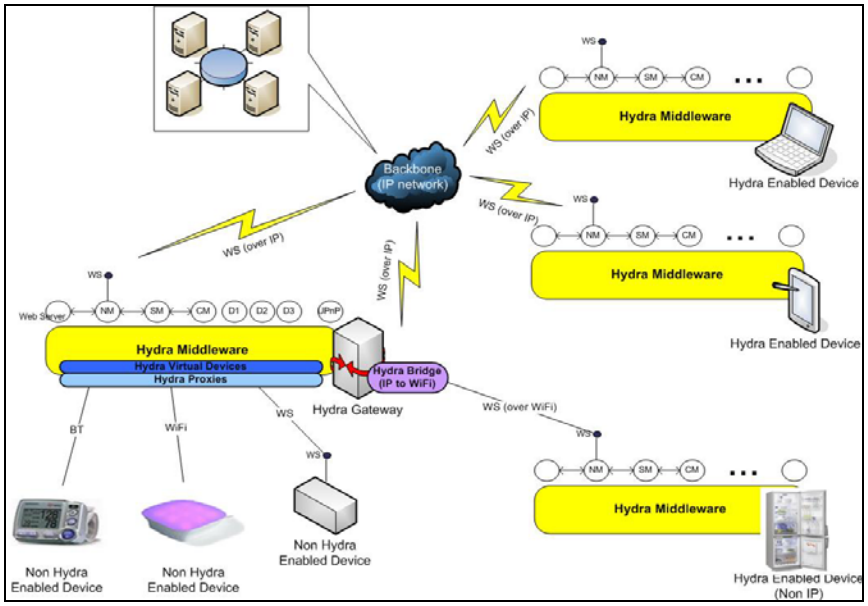
A basic idea in the Hydra middleware is that each device becomes available as a web service, which is achieved through the device ontology and techniques for automatic code generation. The middleware contains functionality for P2P networking, security, context awareness, device discovery, diagnostics, semantic web services and much more.

The Hydra middleware can either run natively, embedded in the physical device or as part of a proxy representing the device, should the physical device be too resource constrained.

The middleware will be accompanied by two toolkits addressing two different developer communities:

- *Solution providers*, such as developers of building automation system and eHealth solutions, who needs to interface with and access devices as part of their applications. It will allow them to develop cost-effectively innovative semantic model driven applications with embedded ambient intelligence features.
- *Device manufacturers* who want to make their devices interoperable and enable them to participate in an ambient intelligent environment. If manufacturers enable their devices to use the Hydra middleware they increase usage and demand for their devices.

An open source reference implementation will demonstrate the applicability and quality characteristics of the Hydra middleware.



[Read More]

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Approach to scenario development in Hydra

A scenario is used to envision future demands and demonstrates a probable picture of the future that provides coherent, comprehensive, internally consistent descriptions of plausible futures based on trends and other technological, social and economic changes.
The main purpose of Scenario Thinking is to challenge the opinions people might probable have of the future, or their maps, and to afford people the flexibility to change those maps. One well known Scenario Thinking method is the IDON method that provides a detailed step-by-step framework that is based in the present. This method has been used within the project for developing appropriate and realistic user application scenarios for each defined domain and consists at least of two main parts: Scenario Development and Scenario Thinking/ Deployment.

The first part focuses in developing scenarios by using experts and bases on knowledge and systematic analysis. The main purpose of this part is to create four mind-challenging scenarios for each user domain by mixing inevitable occurrences and changes with fiction.

In the Scenario Thinking/ Deployment part, technical experts and project decision makers interpret the scenarios and extract a framework for the functional as well as trust and security requirement specifications.

Scenario

A scenario is an account or synopsis of a projected course of actions, events or situations. Scenario development is used in policy planning, organizational development and, generally, when organizations wish to test strategies against uncertain future developments.

The core of the IDON technique is to examine a set of wider environmental factors ambiguities and uncertainties in order to resolve, which role they are likely to play in the unfolding of scenarios.

The first phase of the IDON method consists of three steps: Gathering environmental factors, grouping them according to their degree of uncertainty and deciding their relative position.

The next phase in IDON deals only with the factors with high uncertainty and direct impact on future trends. The uncertain factors are reformulated as “either / or” questions (flip/flop) and grouped according to connections and associations. Finally they are combined into four distinct possible futures extrapolated from the thinking done by the group.

The outcome of this Scenario Thinking process is 12 equally plausible scenarios for the future use of Hydra middleware in 2015 in three different domains: Building Automation, Healthcare and Agriculture.

[Read More]

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Building Automation Scenarios

The scenarios focus on the domain of building automation and facility management for commercial and residential buildings and were created on the basis of the above introduced IDON Scenario Thinking methodology. The development was guided by the following question:

How do we develop and deploy intelligent, ubiquitous and secure networked products and services in buildings and facilities in 2015?

All four scenarios were created from two clusters: "Interconnectivity" (in contrast to interoperability) and "Universal focus" (pointing to either end-users or developer users).

Walking the Dog

This scenario addresses the complexity of networks and the increasing number of devices to be networked, which poses a range of special problems for the developers. The scenario is set in public utility services, where a large number of proprietary commercial systems are deployed and controlled from a single control centre. The manufacturers must open parts of their systems for interconnectivity and at the same time maintain exclusive control over other parts in light of product liability, warranty issues, property rights and for the purpose of product differentiation.

The Beehive

This scenario deals with the development of interoperable building and industrial infrastructures. In facility and plant management, the main focus is on automatic interoperability of various manufacturers' systems and configurability and accessibility by the management company's staff. The actors in this scenario are manufacturers and system integrators developing interoperable systems for facility management based on Hydra middleware.

Easy does it!

Highly interoperable systems capable of delivering intelligent ad-hoc applications relying on extremely simple user interfaces is the theme for the third scenario. The end-users are technology illiterate, elderly and chronically ill citizens. The scenario is set in an integrated social institution where apartments for senior citizens are integrated with homes for assisted living and full scale nursing homes. Actors in this scenario are the employees of companies working as system developers and facility managers responsible for the maintenance of technical installations.

Daredevils

This scenario focuses on end-users, who want to have affordable, networked devices, from which they can set up integrated applications. The actors are the typical manufacturers of home control systems for private homes, e.g. alarm systems, heat control, media and information networks and similar systems. The challenge for the developer-user is to make the systems configurable and modifiable by the end-user, while still maintaining product integrity.

[Read More]

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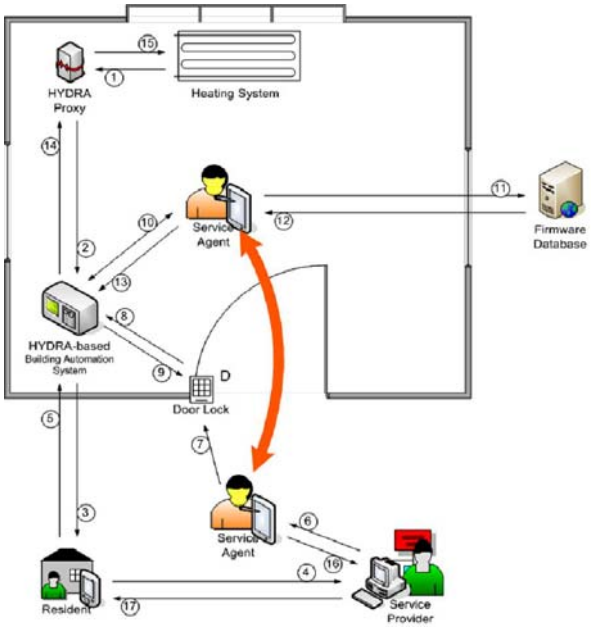
Description of the 1st Demonstrator

The resident is living in a new flat in the "Krøyers Plads" housing complex in Copenhagen. In addition to the usual set of automatic lamps, computer and wireless network, the flat is also equipped with an automatic heating system.
While the resident is at his office, he receives an alert from his "Hydra Building Automation System" (HBAS) that the heating system has broken down. Since the temperature has reached sub zero level, HBAS categorized it as an emergency situation and tries to contact the resident until he replied to the alert.
Since the resident is having a contract with the service provider of the heating system to send out a service agent to repair the system in case of a break down, the resident sends a repair order to the service provider. The service provider sends out a service agent to the flat. The service provider has transferred the appropriate credentials to enter the house and to repair the heating system to the service agent's PDA.

When the service agent arrives at the complex, he authenticates himself to the door and is given access to the resident's flat after the validation was successful. The service agent checks the logs present in the heating system to identify the errors and uses the online help of the service provider to fix the problem. After finishing his work, the service agent leaves the flat and the HBAS system informs the resident that the heating system is working again and the service agent has left the flat.

This technical scenario which has been derived from the Beehive scenario is focussing on three different user types playing different roles in the system:



• End-user: in the scenario, the end-user is the resident, who is informed when an error occurs at home and who has the possibility of contacting the external provider (service provider) to solve it.
• External Provider: the service provider's responsibility is to provide the contracted service in full compliance with the SLA and regulatory standards. In this case, the service provider has to send a service agent to solve the problem at the resident's house.
• Service Agent: in charge of solving the problem and inform the service provider and the end-user about every action performed.

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Outlook for the next months

Internal project events

- **Project meeting in Reading**
  10th – 12th March 2008
  All project partners are participating in this meeting. The first day is an internal training on Semantic interoperability. The second day focuses in the preparation of the pre-review in April. On the 12th of March a project board meeting has been scheduled.
- **Pre-Review Meeting in Brussels**
  4th April 2008
  The next pre-review meeting of Hydra takes place in April and is located in Brussels. During the meeting all participating partners will discuss the progress of project results and planned activities in the future. EU Officer will check the current status of the Hydra project and comment on this.

Already confirmed conference / exhibition participations

- **CeBIT in Hannover**
  4th – 9th March 2008
  The CeBIT is the biggest IT exhibition in the world. Fraunhofer FIT and SIT will show HYDRA during the CeBIT exhibition 4 - 9 March 2008 in Hannover, Germany. The exhibit will demonstrate security and context related issues from the Building Automation domain. A press release in German has been issued. [Read More]
- **Internet of Things in Zurich**
  26th – 28th March 2008
  In-Jet is going to attend the conference in order to get new insights and gather information as well as contacts with respect to the project. [Read More]
- **International Conference on Software Reuse**
  25th – 29th May 2008
  The University of Aarhus will attend this conference in Beijing. [Read More]
- **ICT – MobileSummit**
  10th – 12th June 2008
  Fraunhofer SIT and SIT will participate in an exhibition in Stockholm and present an extended and improved version of the building automation demonstrator. [Read More]

Planned Conference Participations

- **Tenth International Conference on Ubiquitous Computing**
  21st – 24th September 2008
  Fraunhofer FIT and SIT plan to attempt this conference and are preparing a paper on the basis of WP 7 (Trust, Privacy and Security). This paper is due until 4th April 2008. [Read More]
- **European Conference on Software Architecture**
  29th September – 1st October 2008
  The University of Aarhus is preparing a paper with focus on software architecture which will be submitted until 14th April 2008. [Read More]

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Imprint

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