



ARCaDE ARChitecture for Data Engineering

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Reality

Devices in every aspect of life
limited by communication/computation/power
very small sensors (MEMS, Smart Dust)

Too much configuration required to get them working

Don't leverage capabilities of each other

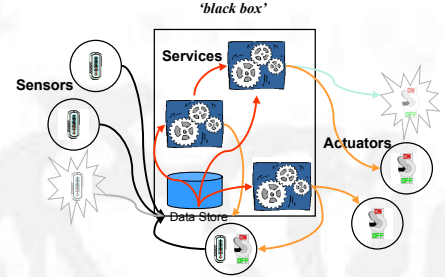
Device Categories

- Small Sensors** Extremely limited capabilities
- PDAs, mobile web servers, personal devices.** Intermittent connectivity, and limited memory, power and computation
- Home Server** Powerful and Constant Connectivity. Acts as a gateway between other devices.
- Utility** Scalability and reliability of services in a wide area network

Vision

We want devices to be *invisible*
zero configuration
no maintenance

User interacts with Services
services float in the infrastructure
dynamically interact with each other



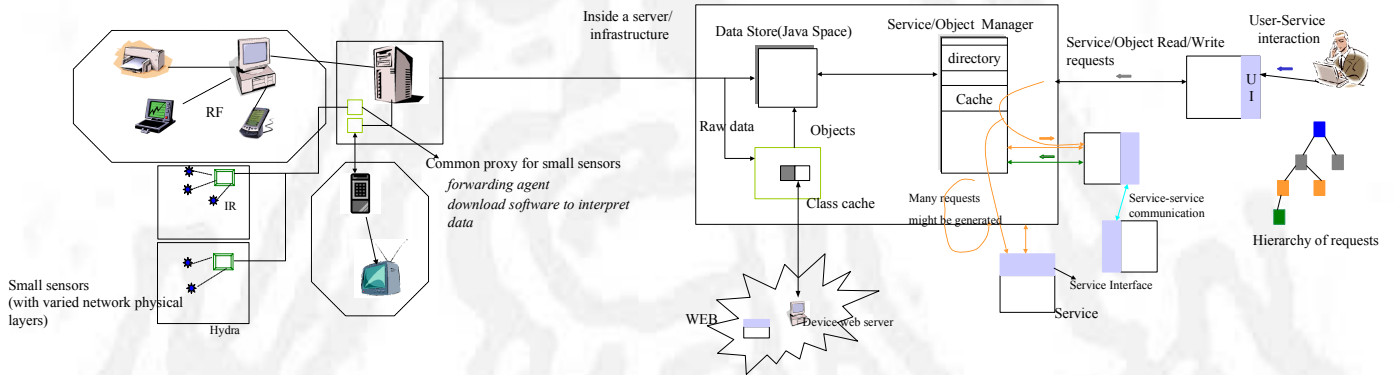
Objectives

- Networking extremely thin sensors
transport issues
making sense of data
- Model for service composition
- Scalable, light weight solution since too many sensors
- Dynamic discovery between services and sensors

Issues

- Data format, destination of data, multiple destinations
- Service Discovery mechanism (Jini, UPnP, SDS)
- Semantics of data, Lifetime of data/ service
- Data store implementation (Java Space/TSpaces)
- Disconnected Operations

Architecture



Current Implementation

- Send data to a nearby gateway
Data embedded with a URL #URL#data#
- Proxy converting raw data to objects with semantics
Stored in a relational data-base presently
- User Interface through an applet which queries data-base and dynamically generates the content
- Services controlling the life time of data.

Applications

- Integrating data from multiple devices
highly available information
triggering devices based on information
- Service browser adapting to environment
- Specific examples
energy usage of various devices, plant monitoring, virtual neighbor, self maintaining devices, ubiquitous remote control, personal area network