

# Embodied Data Objects:

## Tangible Interfaces to Information Appliances

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# Current Frustrations

- Networked printers
- Projectors that don't always work
- Different file formats, platforms
- Incompatibilities
- **Technology gets in the way**



... 20 minutes ago ...





# Why?

- General purpose computer:  
‘One size fits all’
- Overly complex for simple tasks
- “Intrusive, overbearing” - Don Norman
- ‘Data’ is an abstract entity
- Too many things can go wrong
  - Not always obvious, how to fix them

# Whereas ...

- Interacting with everyday appliances is natural and intuitive
  - Toasters, radio
- Less frustrating than computers
- Easy to correct errors
- Can we exploit users' familiarity with everyday objects?



# Information Appliances

- Task-specific devices
- Computation is invisible
- Low attentional requirements
- E.g.: Fuel gauge showing distance till empty
- E.g.: Apple iPod

# Why not ...





# Embodied Interaction

- “Designers of interactive systems have come to understand that interaction is intimately connected with the setting in which it occurs.”
  - - Paul Dourish



# Tangible Interfaces

- “Seamless interfaces between people, bits and atoms” - Hiroshi Ishii
- “Giving physical form to digital information” - MIT Tangible Media Group
- Graspable media

# Ubiquitous Computing

- Placing computation in the environment
- “The most profound technologies are those that disappear.”
- “...They weave themselves into the fabric of everyday life until they are indistinguishable from it.”
- - Mark Weiser, 1991.



# Our System

- Tangible interfaces to users' data:  
Embodied Data Objects (EDO)
- Active information:  
Information that knows what to do in a particular context
- Intentionality and context-awareness:  
Respect and act upon the user's intention

# Embodied Data Objects

- Data you can carry along
- Data as physical objects: physical icons
  - 35mm slide, leaf, business card, football (!)
- Stackable
- Store, copy, carry, print, recycle





Print



Recycle



Share



Data



Store



Carry



Copy



# Active Information

- Data on EDOs is not just 'data'
- *Information that knows what to do with itself based on context*
- A printer prints
- A projector projects
  - Capture intentionality



# Implementation

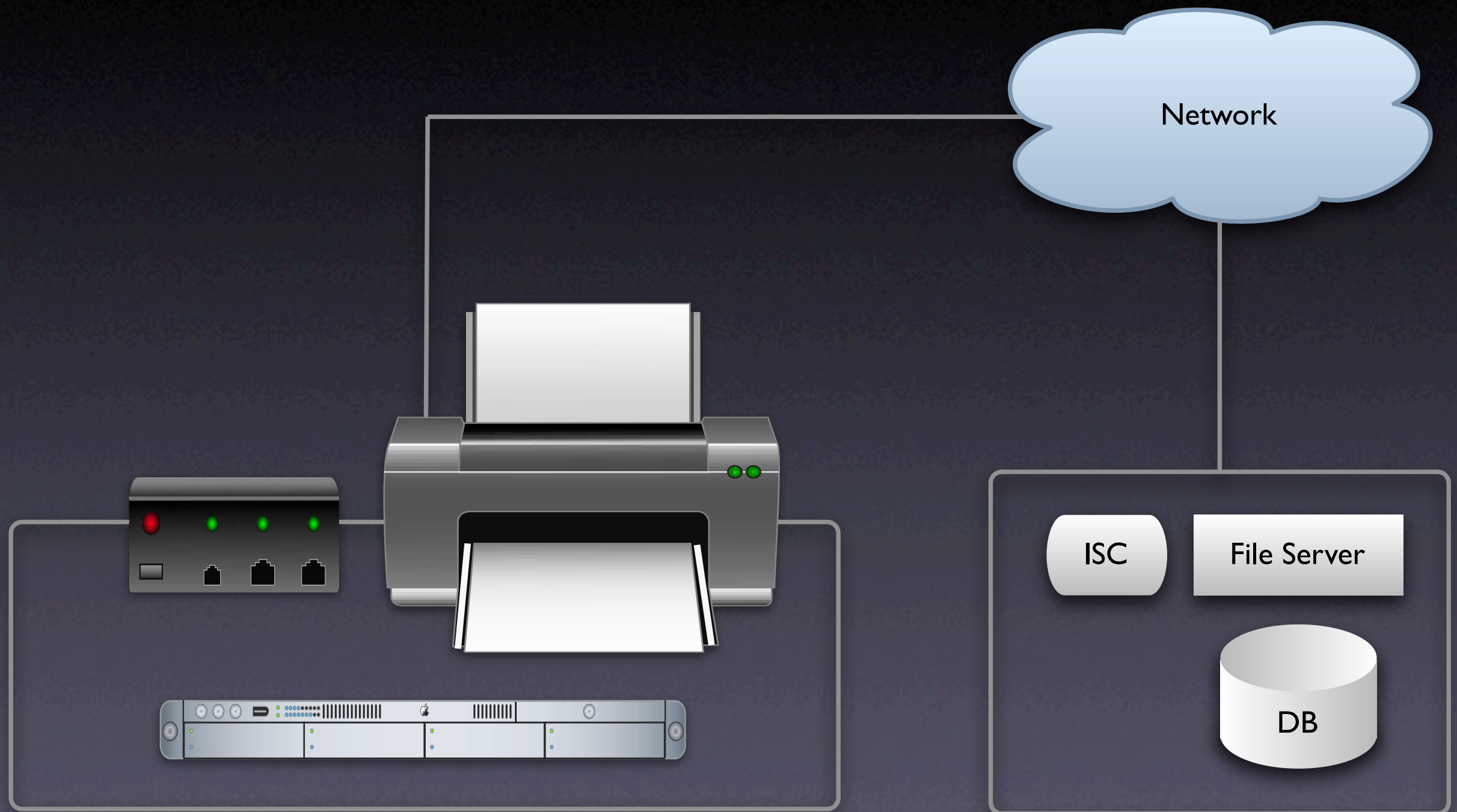
- a Printer, a Projector
- Hidden laptop (invisible computer!)
- RFID tags as data objects
  - Chosen over bar codes, mag stripes & Bluetooth
  - Activate on proximity

# Architecture

- Service-Oriented Devices
  - Laptop + RFID reader + peripheral
- Data Manipulation Devices
  - Laptop + 2 RFID readers
- Infrastructure Servers
  - File server + database + inter-server communication module



# Architecture



# Implementation Notes

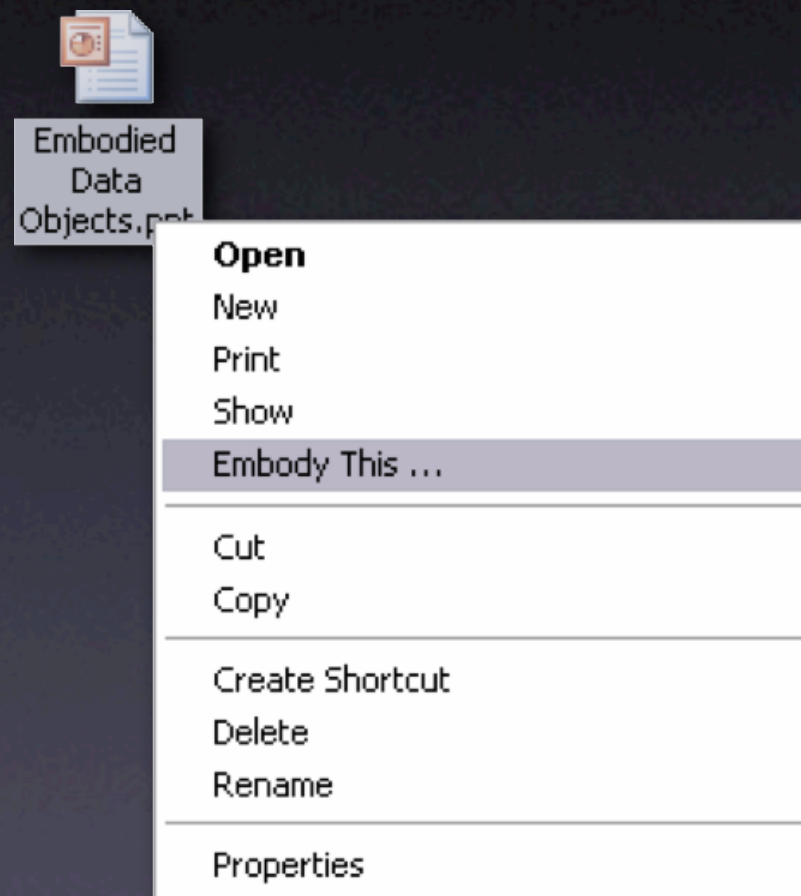
- Texas Instruments S-6350 RFID reader
  - Passive RFID reader
  - Range: 6"
- Communication over SOAP / HTTP
  - Issue: time delay



# Photos



# Screenshots





# Future Work

- Extended dialogue with appliance
- Evaluate with real users
  - Challenges
- Publish toolkit code for more devices