HUC2k Workshop on
Infrastructure for Smart Devices

The 5th Dimension

Building Blocks for Smart Infrastructures

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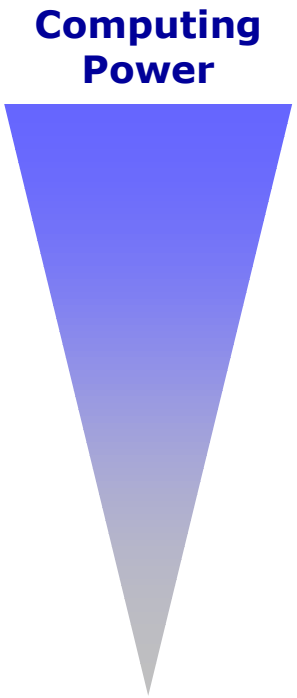
Switzerland

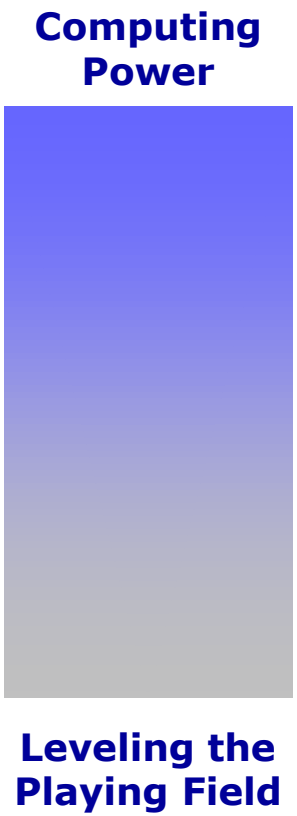
Motivation

- Ubiquitous Computing
  - Smart Environments
  - Information Appliances
  - Low Power Devices
  - Unpowered Artifacts (tagged)



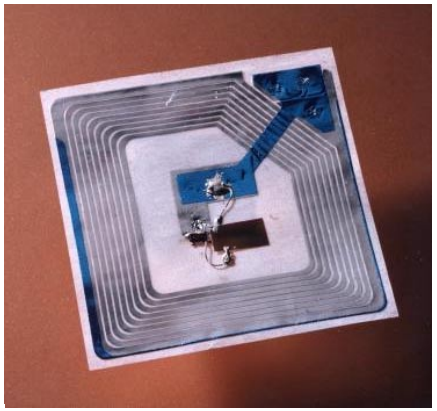
Motivation

- Ubiquitous Computing
  - Smart Environments
  - Information Appliances
  - Low Power Devices
  - Unpowered Artifacts (tagged)
- Making Smart Devices First Class Citizens

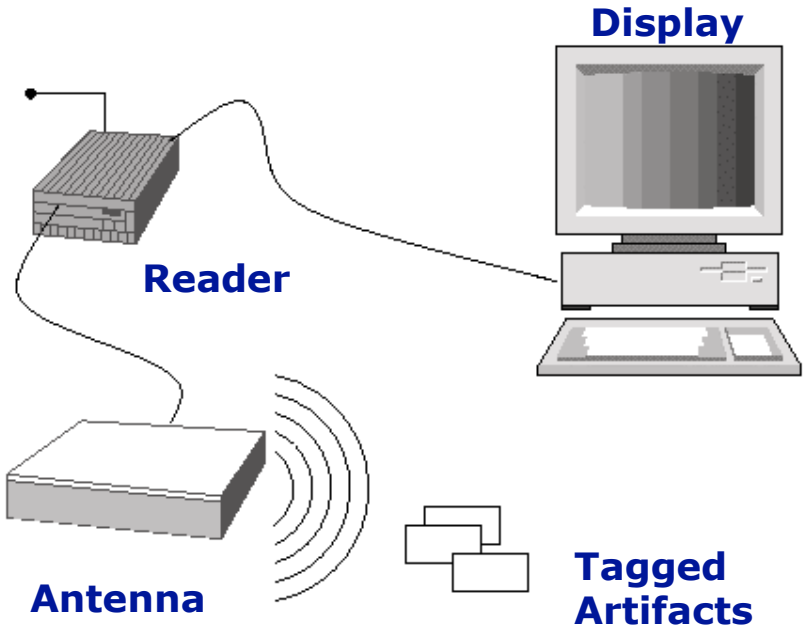


Linking

- Connecting
  - Real-World Artifact
  - Virtual Representation



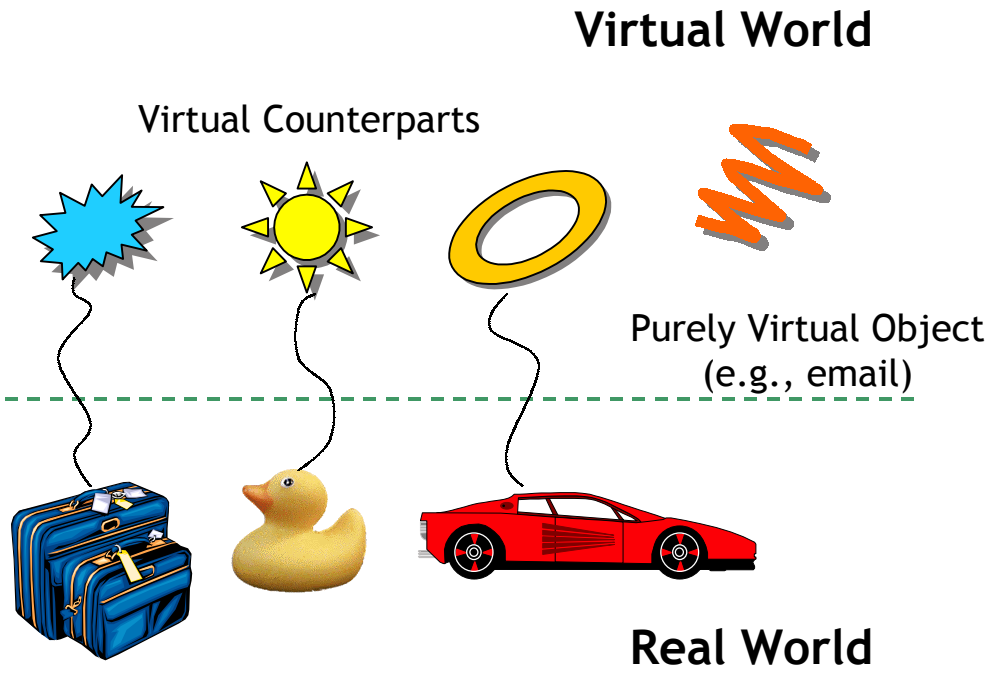
RFID Tag



- Active or Passive IDs
- Readers Identify Tags
- Network stores Artifact Data
- Displays Provide Access

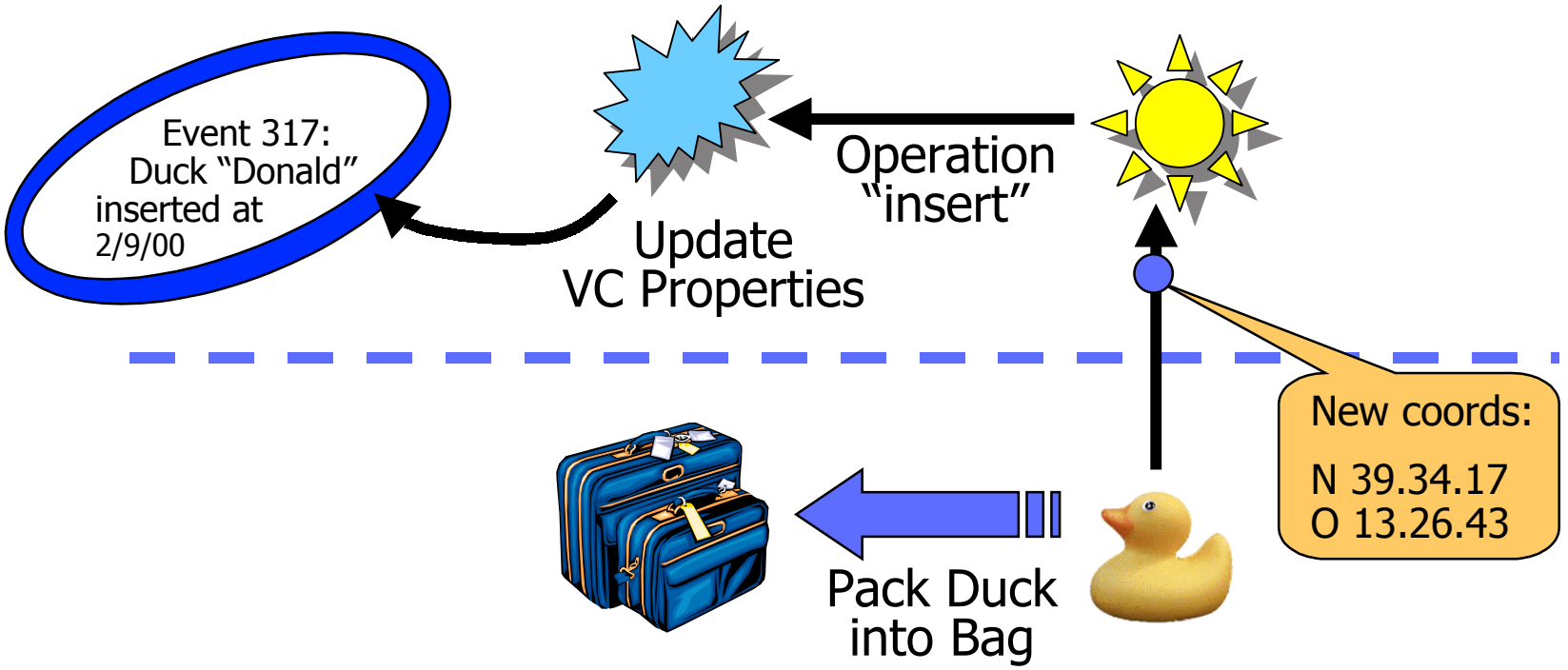
Virtual Counterparts (VCs)

- Network Representation of Artifact
  - Data + Code + Execution (Autonomous Agents)
  - Represents & Extends Artifacts
- VCs are:
  - Autonomous
  - Coupled to Artifact
  - Mobile



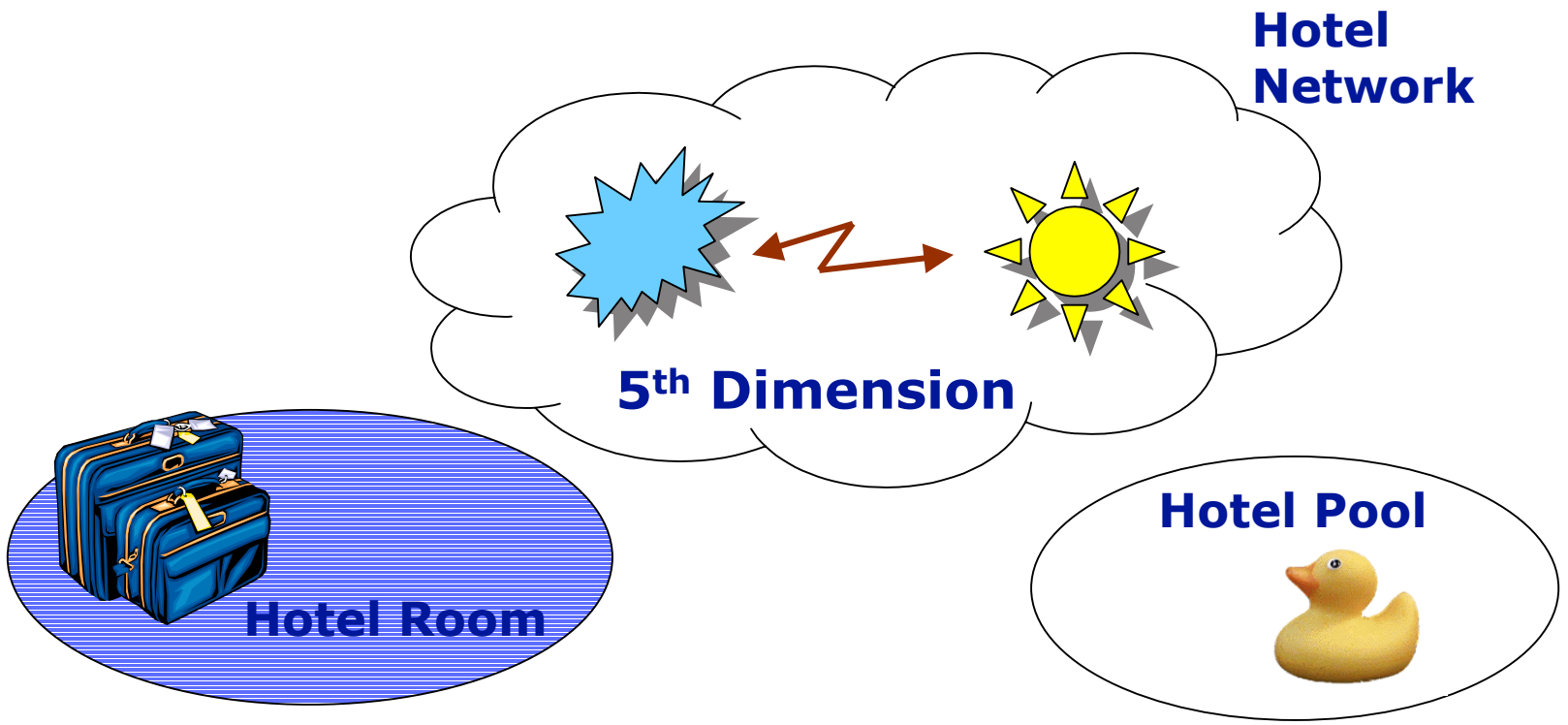
Data + Code

- Extends 4D Interaction Patterns
- Arbitrary Functionalities per Artifact



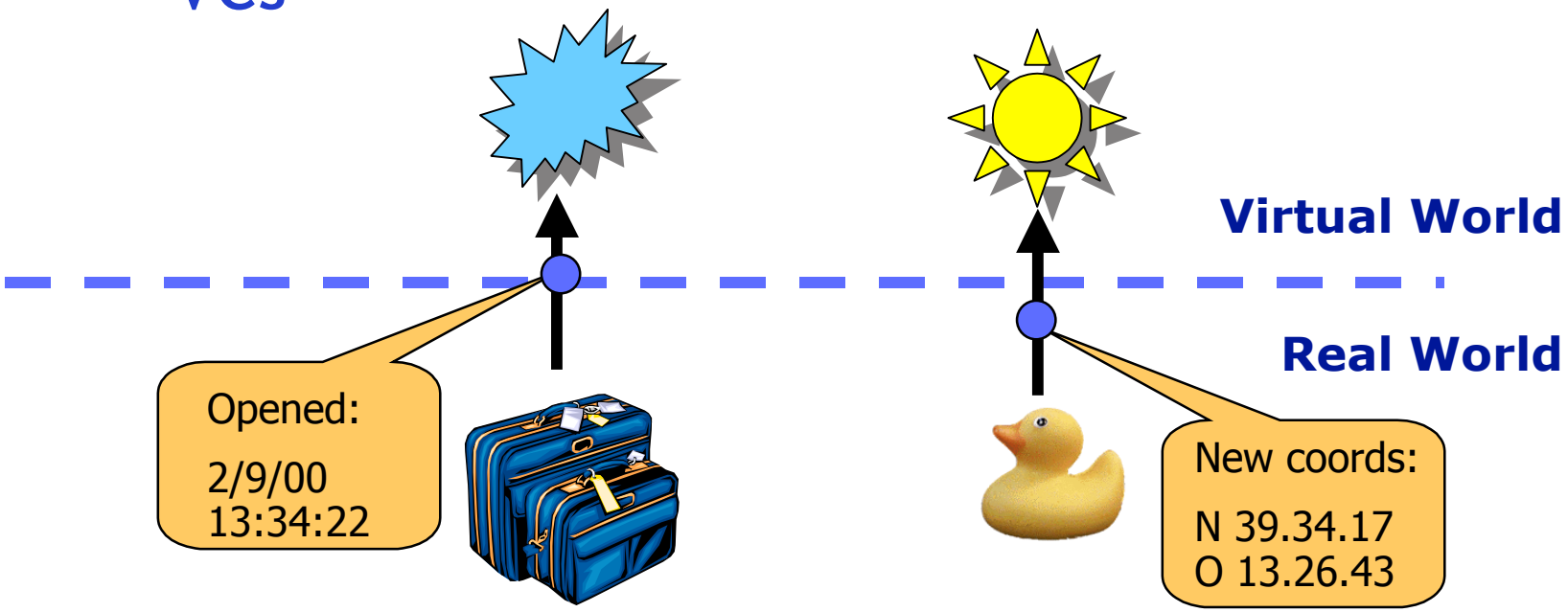
Autonomous Execution

- Decoupled Interactions
- Self-activation



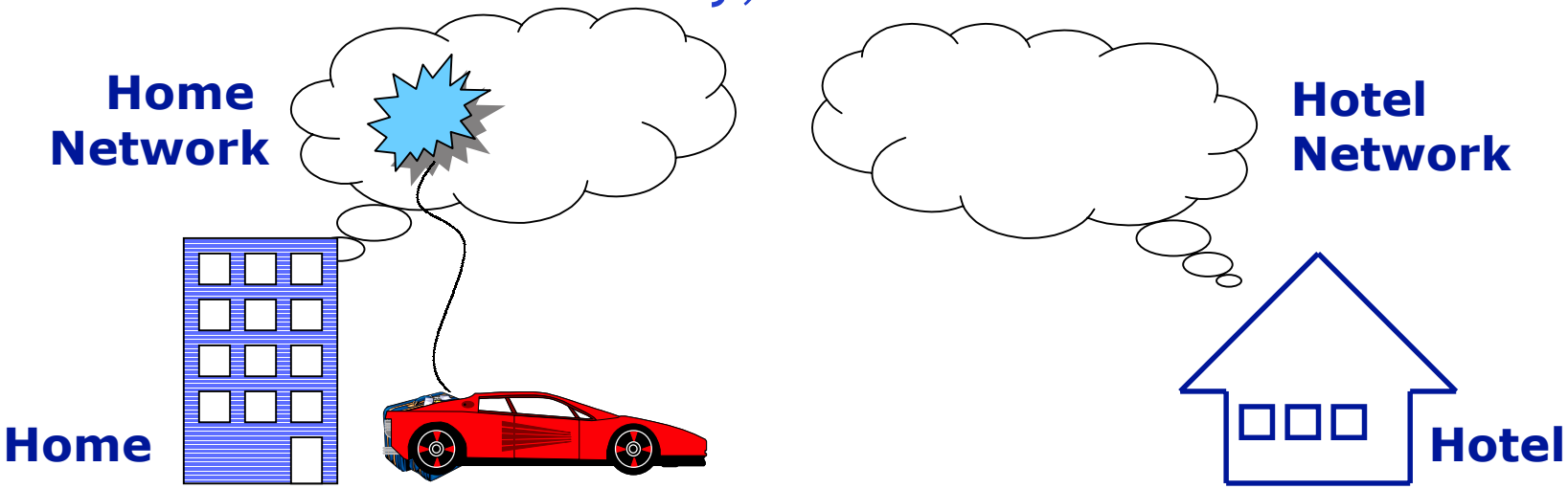
VC Runtime Environment

- Event-Driven Infrastructure
  - VCs Register Interest in Events
  - Infrastructure Relays Events to Interested VCs



Disconnected Operation

- Virtual Worlds Non-Continuous
  - Different Localities, Operators, Vendors, Trust Levels
- VC Mobility
  - VCs follow across World Boundaries
  - Ensures Connectivity, Minimizes Traffic



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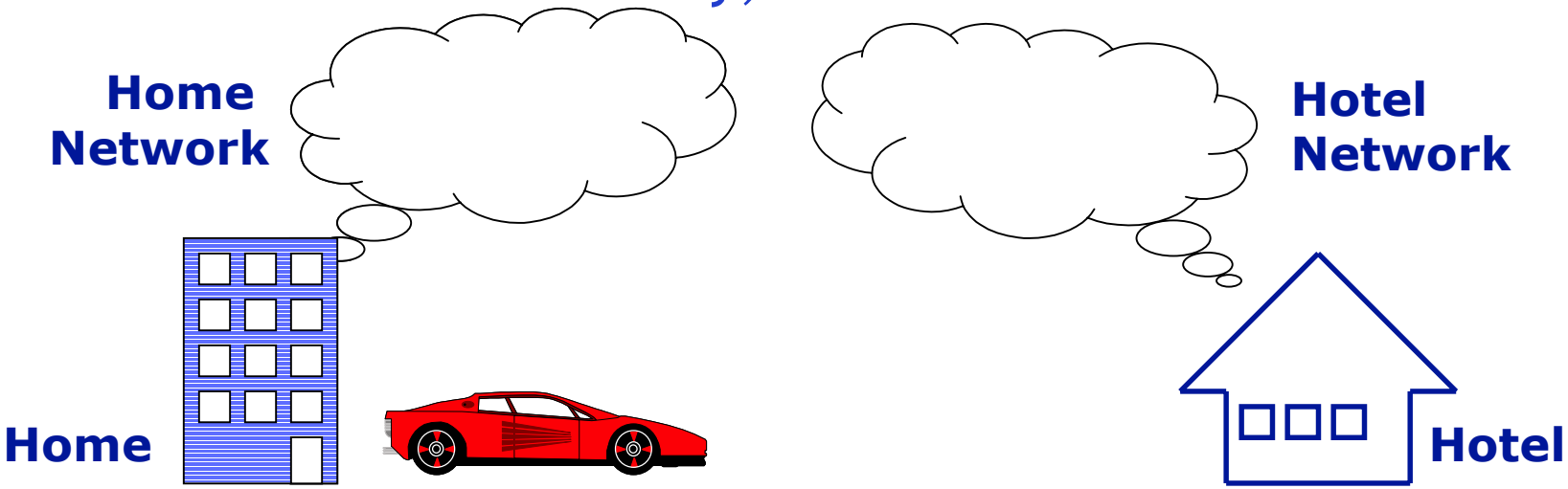

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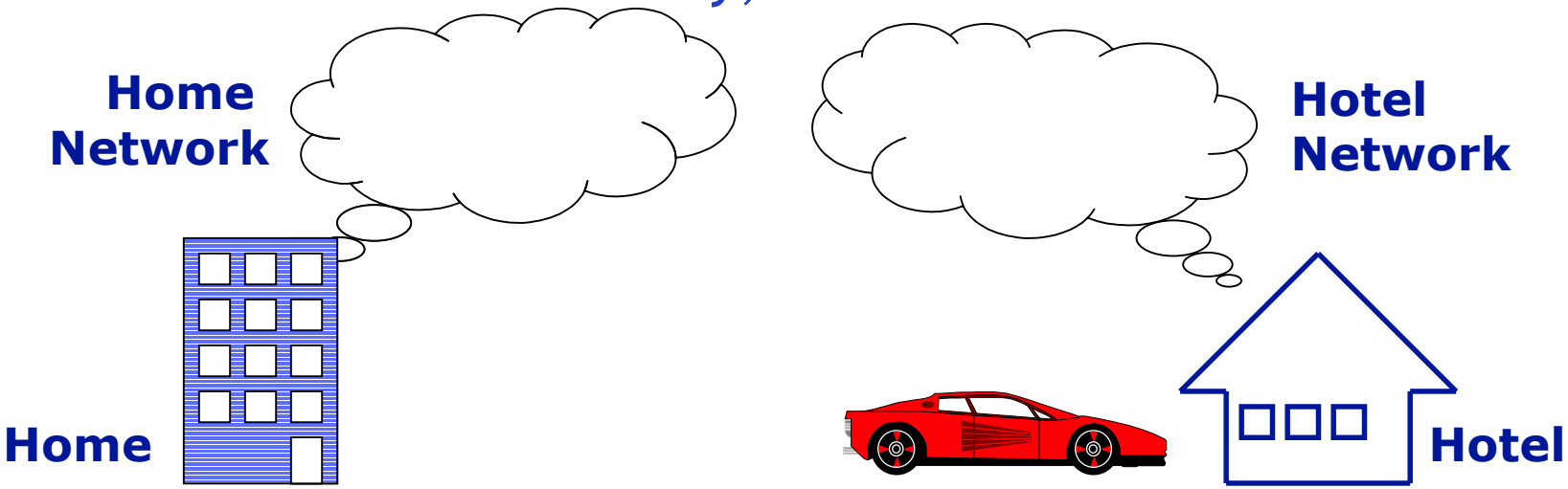

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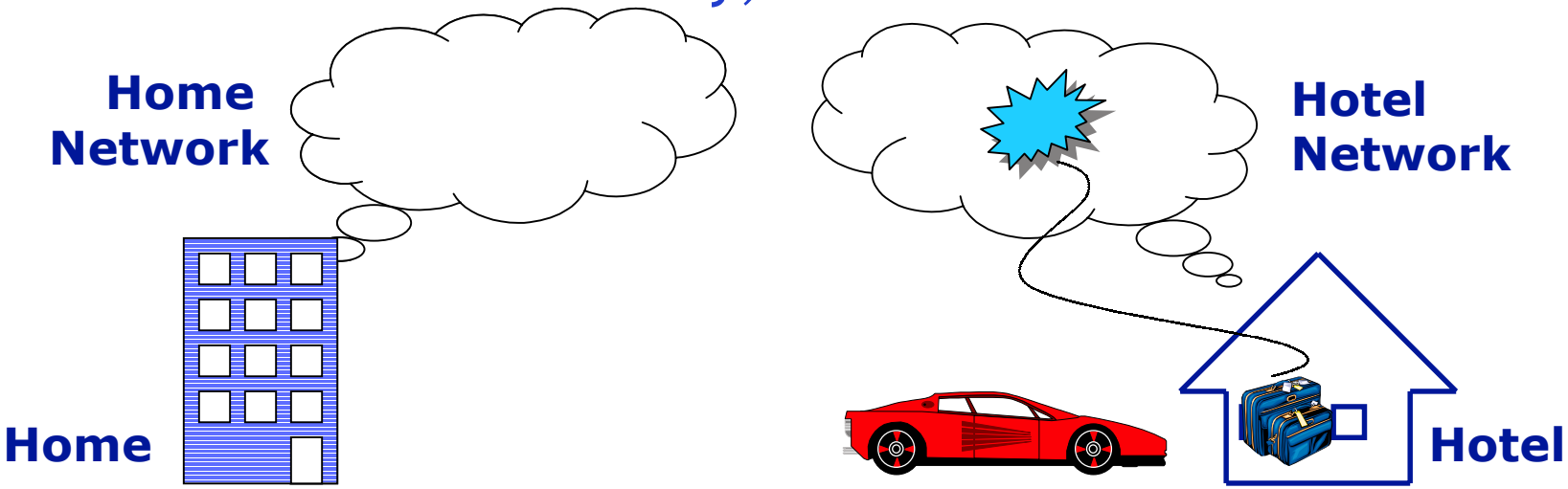
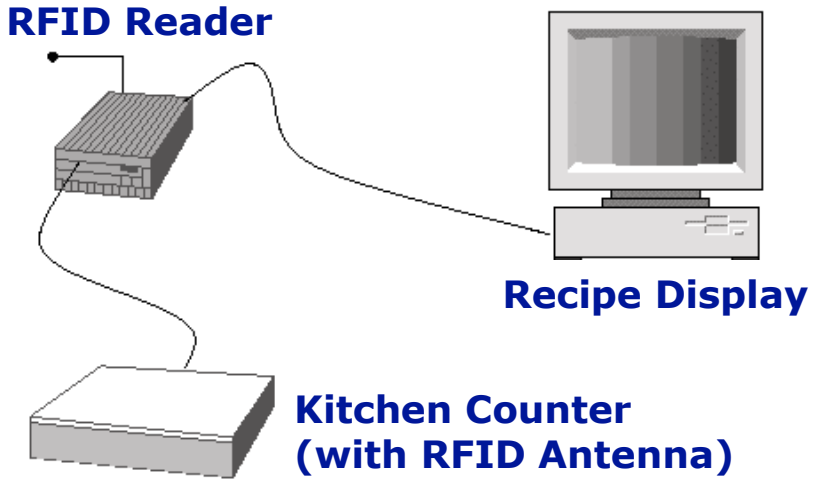


Virtual World

RFID Chef

- Virtual Cookbook
  - Suggests Recipes based on available Items
  - Reader in Countertop



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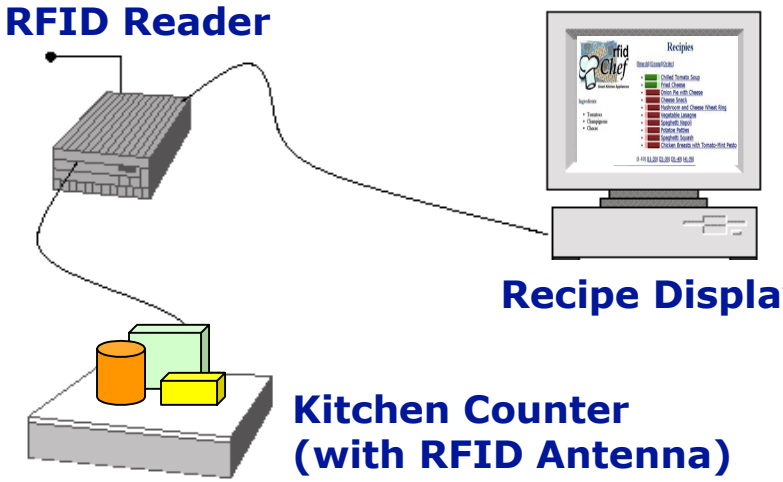

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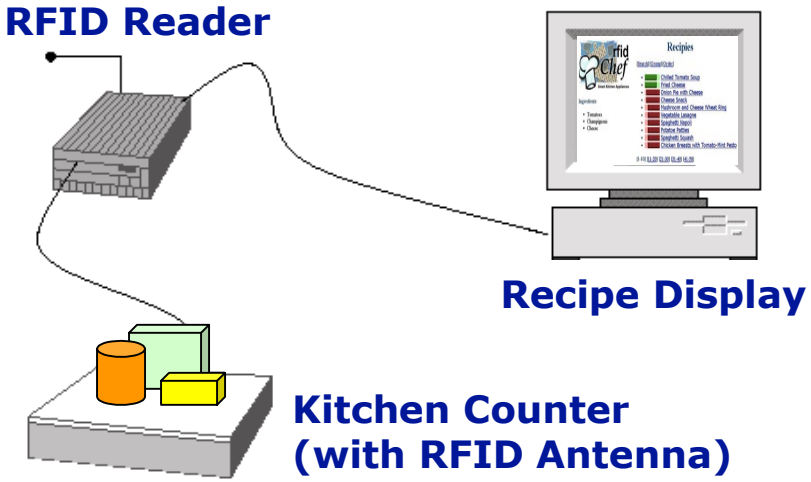

- Basic Event Infrastructure
  - *Event* „RFID nnn appears or disappears"
  - *Collisions* make objects become *invisible* for a short time
  - Requires some *corrections* of the sensor information

Issues

- Ontology?
  - Do we need Hierarchies? Object Fusion?
- Objects or Data (XML)?
  - Simplicity or Expressiveness?
- Code Mobility
  - Aren't all Networks Interconnected?
- What's in an Infrastructure?
  - Basic Services?

Discussion