

# *Everything You Know is Wrong*

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# Platform Evolution

|                               | Client-Server               | 3/N-Tier  | Net Apps                 | Net Services                | Next                   | After that        |
|-------------------------------|-----------------------------|-----------|--------------------------|-----------------------------|------------------------|-------------------|
| Catch Phrase                  | The Network Is the computer | Objects   | Legacy to the Web        | The Computer Is the Network | Networking at the Edge | Network of Things |
| System Collections Components |                             |           |                          |                             |                        |                   |
| Scale                         | 100s                        | 1000s     | 1000000s                 | 10000000s                   | 100000000s             | 1000000000s       |
| When/Peak                     | 1984/1987                   | 1990/1993 | 1996/1999                | 2001/2003                   | 1998/2004              | 2004/2007         |
| Leaf Protocol(s)              | X                           | X         | +HTTP (+JVM)+XML, Portal | +RMI                        | Unknown                |                   |
| Directory(s)                  | NIS, NIS+                   | + CDS     | + LDAP (*)               | +UDDI                       | + Jini                 | + ?               |
| Session                       | RPC, XDR                    | +CORBA    | +CORBA, RMI              | + SOAP, XML                 | + RMI/Jini             | + ?               |
| Schematic                     |                             |           |                          |                             |                        |                   |



# Deutsch's 7 Fallacies of Networking

- " The network is reliable
- " Latency is zero
- " Bandwidth is infinite
- " The network is secure
- " Topology doesn't change
- " *There is one administrator*
- " Transport cost is zero

# New Challenges

- Computing without people
  - How will programs find and use programs?
- Security in a networked world
  - Social as much as technical
- Dealing with change
  - Bootstrapping, Evolving
  - Versioning
- Embedded systems are different

# Promising Directions

- Mobile objects and virtual machines
  - Raise the level of abstraction
  - Allow interface/implementation distinction
- Proximity-based security
  - If you are close, I can trust you (some)
- Self-administering systems
  - Automatic joining
  - Self-healing



# We Need *Fundamental* Research

- Question long-held beliefs
  - What is security
  - How are networks assembled
  - What is a computer
- Become more adventurous
  - Fundamental research often fails
  - Failure is an interesting result