

FlexiNet 2.1 Roundup

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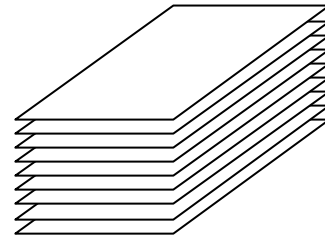
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FlexiNet 2.1 Statistics

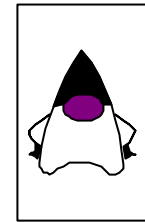


118,000 lines
of Java

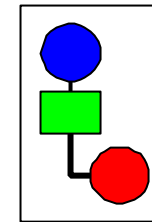
Code



80,000
words



47 Code
Fragments



87
Figures

Architecture Document



What does it contain?

- Core Framework
 - binding, naming, proxies...
- Buzzword Friendly Protocols:
 - IIOP
 - SSL
 - RMP Multicast
 - REX/TCP
 - REX/UDP
 - RRP (Request Reply Protocol)



What does it contain?(2)

- Advanced features
 - Application Level Smart and Generic Proxies
 - Simple language-level deployment
 - multi-protocol support
 - Straightforward and stable Programmer API
 - Encapsulated clusters for Mobility, Persistence and Transactions



What does it contain?(3)

- Services
 - Trader
 - Class Repository
 - Relocation service for mobile objects
 - Storage Service for persistent objects
 - Transaction Manager
- Tools
 - Enterprise Bean Box
 - SSL Certificate Generator



What does it contain?(4)

- Examples
 - remote invocation and trading
 - worked example of binder construction
 - smart proxies
 - IIOP specifics
 - transaction framework
 - mobile objects
 - performance and soak tests



In a nutshell

- FlexiNet is:
 - A binding and deployment framework
 - A number of protocols and services
 - A test bed for future experiments
- What did we learn from it?



Lessons Learnt

- How to build middleware right
 - Highly component based
 - Reflection and introspection
 - Generic 'Invocation' object
 - Expose generics to application
- Java lessons
 - Java itself is extremely flexible and powerful
 - 'Java Extras' got in the way more
 - serialization, security



The “Original” FlexiNet

- FlexiNet was conceived at a Brainstorm in July 96
- How does the resulting Framework compare?



FlexiNet

Flexible Extendible Network

DIMMA Team, APM LTD

*This is what
was waiting
for me when
I arrived at APM*



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Opportunity and Challenge

- Constantly evolving networks
 - PCs replaced by multi-media desk area networks of appliances
 - Increased used of switched networks to guarantee end-to-end QOS
- Software more independent of hardware
 - Java, Active X
- Software less dependent on Operating System
- Dynamic code download ✓
- **Can we build a completely soft, dynamically upgradable network?**

JINI?

*Original
FlexiNet
goal*

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Flexible Configuration Goals

- Allow update of any component at any time (predicted or unpredicted)
- Controllable with zero client administration effort
- Free choice of hardware components, vendors ?
- Support multiple configurations
 - plug-in, component, object architecture ✓
 - different co-existing software versions
 - multiple users ✓

*Supported
via Class
Repository*



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FlexiNet Scenario

- *Networks:*
 - Intelligence migrating out of network to general purpose platforms
 - Trend towards ubiquitous protocols (TCP/IP, HTTP)
- *Zero install clients:* all s/w/ downloaded, including the OS (nano-kernel protocols), except for minimal bootstrap code
- Code downloaded from Web-like servers (repositories) by intelligent **“Class Loaders”** ✓
- Every component has a Web page (Mngt info + media)
- Class loaders automate version management and local customization ✓
- => **Code must be adapted to local environments as it is loaded !**

Download new protocols

Not proved necessary so far (desktops only)



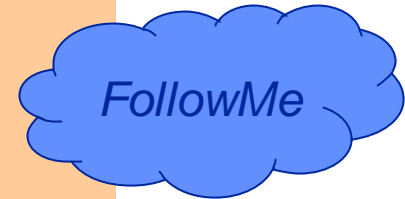
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Network Issues

- Multi-media applications require end-to-end QoS
- Mobility implies a “follow me” function
- => alternative switching schemes have to coexist
- Solution: download “Switchlets” as well as “Devicelets” and “Applets”



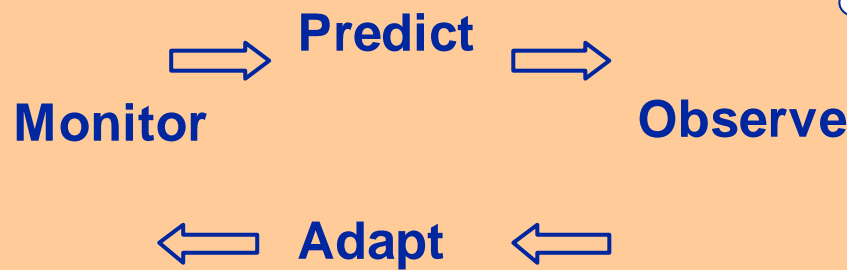
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Dynamic Adaption

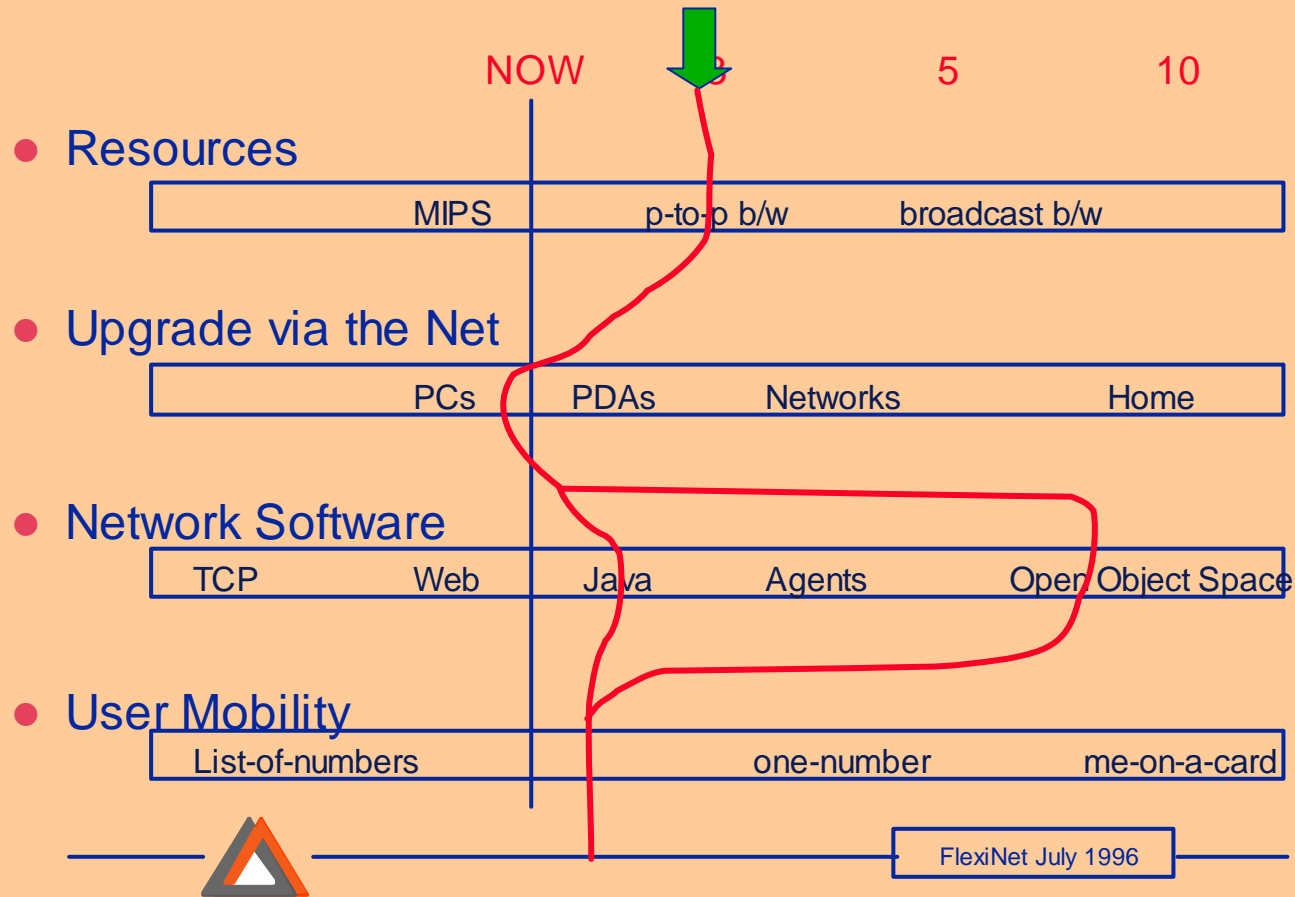
- Resources: power, bandwidth, memory
- Policies: avail. Information, cost, failures, security
- Mechanisms: caching, replication, source-selection, compression, real-time, reflection



*Not done.
But we built many
of the necessary
pieces*

FlexiNet July 1996

Time Lines



FlexiNet Research Path

- Address fundamental research questions
 - Distributed, real-time Java
 - Remote control of simple switches (for Multi-media Networks) **x**
 - Java interfaces for QoS managed protocols (RSVP vs. ATM) **✓**
- Research Prototypes
- Architecture
 - Key components
 - Key developer tools
 - deployment scenarios
- Reach markets by 2000

*Binding Framework
& binder components*

EJB Framework

3 ?

FlexiNet July 1998



FlexiNet Benefits

- Unified application and network management
- Addresses end-to-end QoS
- Handles legacy and evolution

deployment

*Within endpoints
via. Explicit
binding*



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Summary

- The FlexiNet project evolved
 - Less on network signaling
 - More on high level transparencies
- But we achieved many of the original goals
 - “deployable, distributed Java”
- Where next?
 - Up to individual sponsors
 - FlexiNet is an ideal framework for developing new protocols and middleware abstractions

