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ANSA Phase III

Presentation to IBM: Net Scripting

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Abstract

This presentation has been prepared for the September 4, 1995 visit of IBM to ANSA. It provides an overview of the Net scripting concerns of the ANSAweb project.

The first half of this presentation introduces a vision of the Net as a mosaic of interconnected cyberspaces. We look at the technology matrix from which to build these cyberspaces and identify the technologies that are the focus the ANSAweb project: CORBA and the Web.

The second half takes a more detailed look at the ANSAweb work on scripting and mobile agent technologies. We survey emerging scripting technologies (Telescript, Tcl and Java) and discuss related ANSAweb work.

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ANSAweb Project
Presentation to IBM: Net Scripting

Ashley McClenaghan

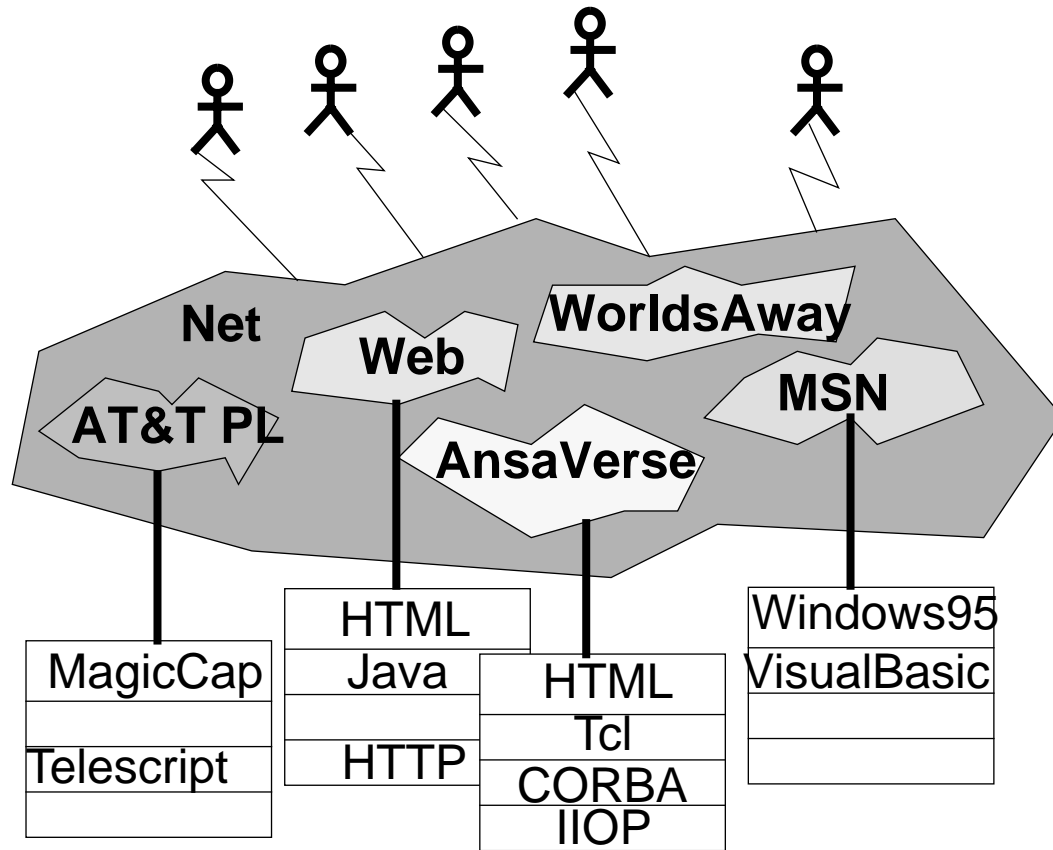
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- **Net Vision**
- **Technology Matrix**
- **ANSAweb project**
- **Mobile Agents and Net Scripting**
- **Telescript, Tcl, Java**
- **Changeling**

Net Vision (1)





Net Vision (2)

- **The Net will be a connected collection of cyberspaces**
- **Private corporate cyberspaces**
 - Eg. OSF selling a DCE based Web as a corporate infrastructure
- **Public regulated cyberspaces**
 - Eg. AT&T Personal Link
 - Eg. Fujitsu/CompuServe WorldsAway
- **Public unregulated cyberspaces**
 - Eg. Internet Web, Usenet



Net Vision (3)

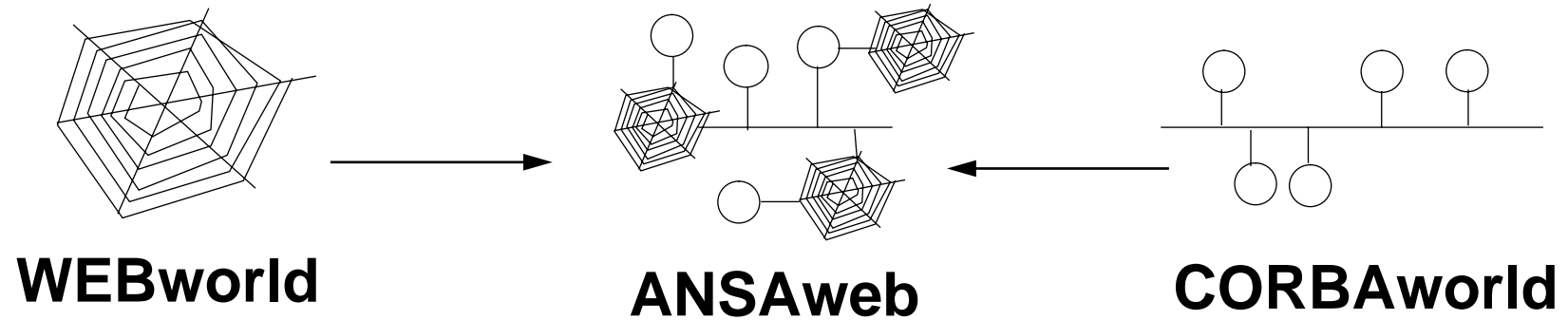
- **In the future, perhaps...**
 - **Corporate nets continue to be important**
 - **Growth of regulated nets: costly but orderly**
 - **Still some unregulated nets: cheap but anarchic**
 - **Cyberspaces will include TV, telephone, everything**
 - **Internet Web acts as a common backbone connecting the other specialized cyberspaces**



The Technology Matrix

User Interfaces	HotJava	Netscape	Mosaic	MagicCap	Windows95
User Level Models	VRML	HyperDocs		Personal Link	MS Network
Addressing	URLs	<i>URCs</i>		tickets	GUID
Languages	Java	Tcl	C/C++	Telescript	Visual Basic
OO Models	OpenDoc	CORBA		Telescript	OLE/COM
Protocols	HTTP	S-HTTP	IIOp		

ANSAweb (1)



- **General aim: promote interworking between the Web world and the CORBA world**

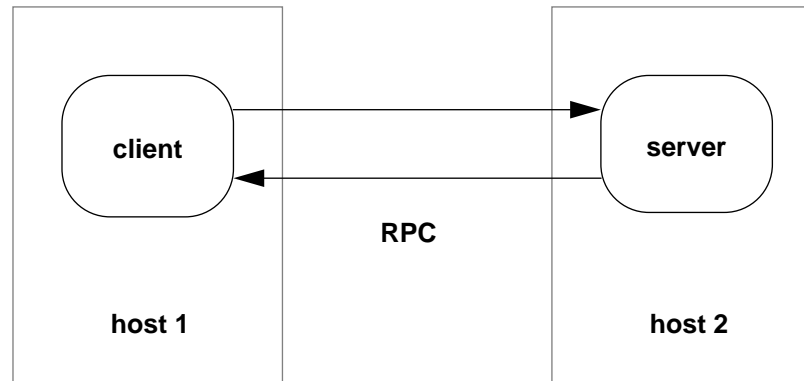


ANSAweb (2)

- **Web world**
 - Info access on global scale
 - Ubiquitous, user-friendly
- **CORBA world**
 - Systems integration on corporate scale
 - Good object oriented model, faster
- **Interworking projects**
 - ANSAweb CGI compiler (IDL --> server-side CGI stub & client-side application stub & client-side HTML template form)
 - ANSAweb protocol re-engineering (replacing HTTP with IIOP)
 - Web* (allows Tcl clients to invoke Orbix based servers)
 - DCE-Web (DCE between the Web and transport layers)

Mobile Agents (What Are They?, 1)

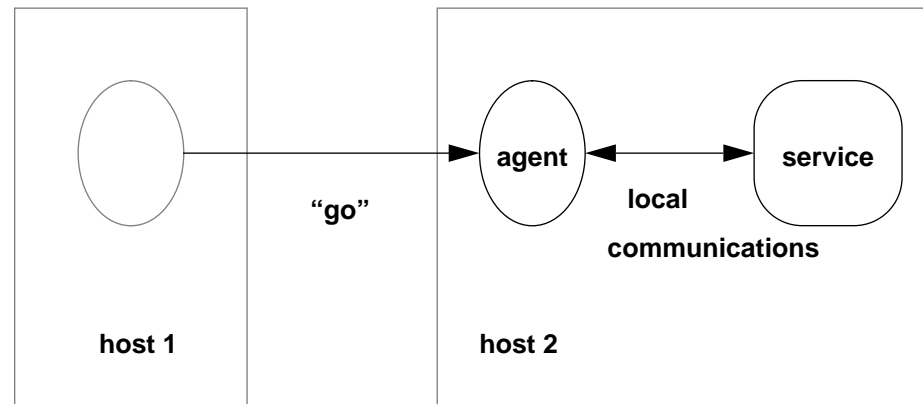
- “Intelligent agents”, “mobile scripts”, “softbots”, etc.
- Traditional RPC paradigm



- Structured with statically defined APIs and protocols

Mobile Agents (What Are They?, 2)

- **New remote programming model**



- **Interfaces and protocols introduced or upgraded on-line**



Mobile Agents (Research Areas)

- **Mobile scripts**
 - Designing scripting languages
 - Eg. Telescript, Script-X, Tcl, Java, OREXX, Obliq
 - AGENT = DATA + PROCEDURES + LIFE
 - Agents live and roam around the Net
- **Agent interaction**
 - How autonomous agents interact and find services
 - Eg. (interaction models:) OpenDoc, OLE2, DSOM, CORBA
 - Eg. (interaction languages:) KQML, Cyc
- **Agent intelligence**
 - Making agents smart
- **OMG Standardisation (Common Facilities Architecture)**



Mobile Agents (My Focus)

- **My focus: mobile agents & Net scripting**
- **Wish list:**
 - **High-level programming of Net-based applications**
 - **Script-like/dynamic**
 - **Object oriented**
 - **Safe**



Net Scripting (Executable Content)

- **Dynamic protocol installation**
 - The Net isn't static
 - Invent and distribute new protocols and interfaces
- **Remote computation**
 - Harness power of remote CPUs
 - Off-load servers, distribute load to clients
 - Support mobile agents, workflow
 - Software upgradable devices
- **Less communication**
 - Minimize communications
 - Support intermittent connectivity (eg. PDAs)
 - Remote decision making (eg. space travel, CIM systems)



Net Scripting (OO, Model Included, Introspective)

- **We want to Net to be a collection of interworking objects**
- **Include model (eg. repositories, traders) in infrastructure**
- **Introspection -- “How do I talk with that object?”**



Net Scripting (Safety)

- **Protect receiver from agent --- Possible**
 - Provide only safe, well understood primitives to agents
 - Limit resource consumption (CPU time, memory, file space)
 - Authenticate incoming agents
- **Protect agent from receiver --- Not really possible**
 - Rely on trusted sites
 - Agents carry minimal necessary rights and sensitive data
- **Protect agents from agents --- Be careful**
 - Must think about emergent behaviour
 - Eg. feature interactions, viruses



Telescript

- **General Magic's object oriented language**
- **Mobile Agents, Places, Tickets for routing, Teleclicks for payment**
- **Proprietary --- General Magic are quite secret about it**
- **Services: AT&T Personal Link Service**
- **PDA's: Sony's Magic Link, Motorola's Envoy**



Tcl

- **Tool Command Language**
- **Developed by John Ousterhout, now @ Sun Labs**
- **High-level, interpreted, wide-spread, many extension packages**
- **Safe-Tcl (developed for enabled mail and safe-scripting)**
- **Sun have plans to fold Safe-Tcl into a new Tcl release**
 - **Sun want to make it the scripting language of the Net**



Java

- **Sun's new object oriented language for programming the Net**
 - C++ like high-level syntax compiled to portable byte-code
 - Interpreters presently on Solaris and Windows NT
- **Security designed into language**
 - Security checks on byte codes, controlled access to local resources, PGP authentication on its way
- **HotJava Web browser**
 - 1st application of Java
 - Features downloadable "applets" (software objects), eg. protocol modules, MIME-type displayers, active Web pages, etc.
- **The future desktop of the Net world?**
 - Would have to re-write all existing desktop apps in Java!



Changeling (Intro)

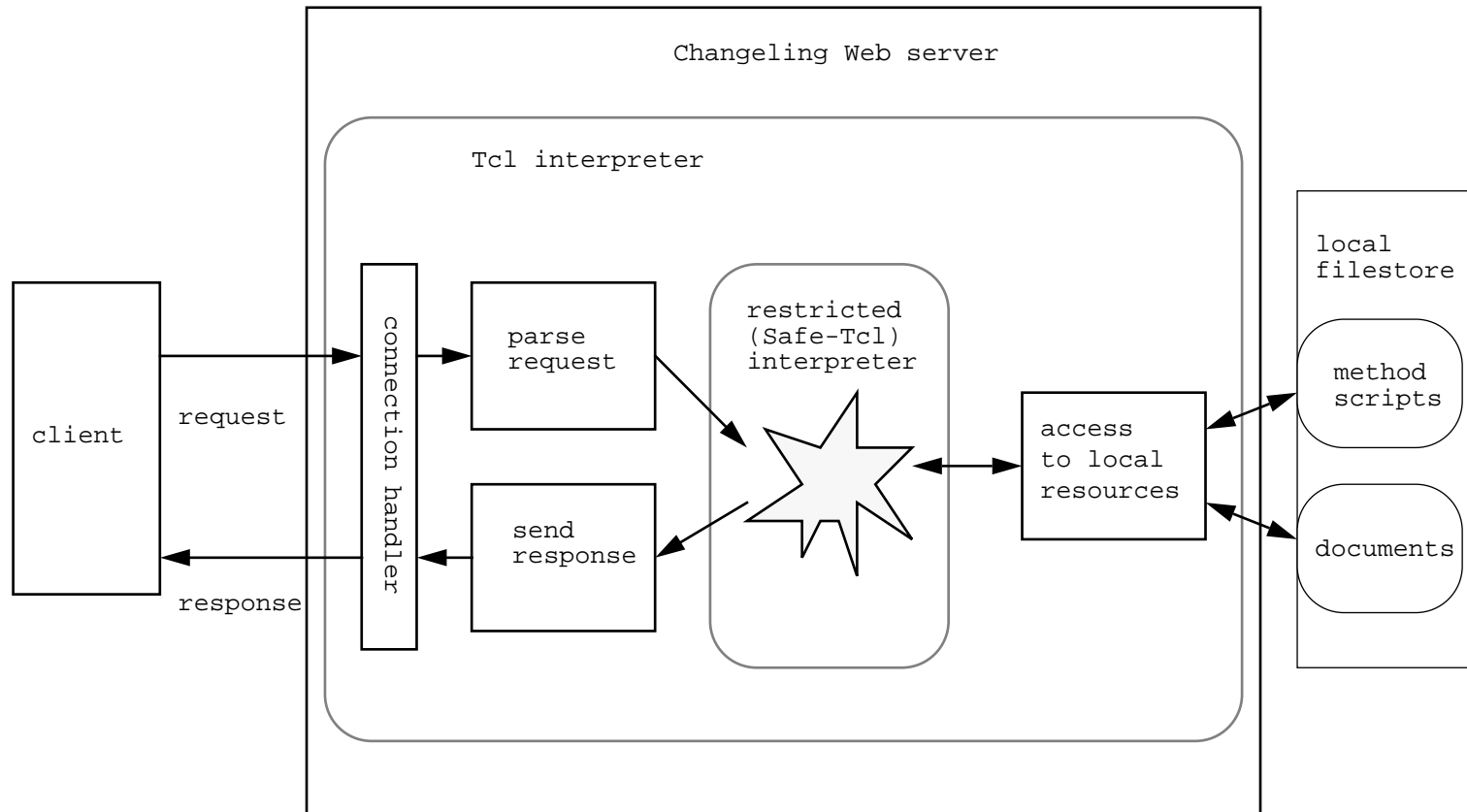
- **Aim**
 - Build a Safe-Tcl script-based Web server with an extensible set of methods
- **Present situation**
 - Web servers support only a standard set of methods (GET, POST, HEAD, PUT, etc.)
- **Purpose**
 - Learn about Net technology: safe scripting, HTTP
 - Learn about in-service software upgrades
 - No present server implements HTTP/1.0 extension methods
 - Use as a basis for prototyping other ANSAweb work



Changeling (Basic Idea)

- **Kernel management methods, eg.**
 - **INFO, INSTALL, REMOVE, REGISTER, UNREGISTER**
- **Standard library methods, eg.**
 - **GET, POST, HEAD**
- **User supplied methods**

Changeling (Architecture)





Changeling (Tutorial)

- A series of Web pages which take you through the cycle of:
 - Becoming a registered Changeling user
 - Posting then getting a document
 - Installing, invoking and removing a new method
 - Unregistering as a Changeling user