TRACK：INTERNET SOFTWARE TECHNOLOGIES

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1. INTRODUCTION TO THE TRACK

This track explored the general field of the Software-based technologies in use or planned over Internets and Intranets. Indeed, over the past 10 years, the field underwent considerable changes. In the late 80's, the Internet software -we understand by this the software that runs on end-systems, where the final services are delivered, or on associated server systems- was composed, from an architectural point of view, of essentially three layers.

They were:

- the transport software (also known as the TCP/IP suite)

- what could be called the middleware software, that is the intermediate software, not directly visible to the end-user, lying somewhere between the transport and the application software (example being the Domain Name Service -DNS- software)

- and finally the application software.

The latter was restricted to essentially three applications: remote login (Telnet), file transfer (FTP) and e-mail.

Then, came the web … With the introduction of this new application, the landscape changed drastically. First, a new application: web browsing rapidly became the main Internet application.

This was enriched by the deployment of a series of techniques -available from the inception of the web- to allow not only passive consultation of information, but also transaction between client and server systems. This included the handling of forms as specified by the initial standard for describing web pages (HTML) and later on the specification of a standard way for a server to recuperate the data input on an electronic form (Common-Gateway Interface: CGI).

The next stage in the development of Internet software technologies was the release by SUN of JAVA (and its script version, JavaScript) a new language to write in particular small programs to be associated with web pages. These programs could be carried by web pages travelling from the server to the client system, to be interpreted and executed by the client system -that is, in practice the web browser. This opened a new class of application were part of the usual transaction process (for example, checking the validity of certain data entered by the user in the form field) could be directly performed by the client without triggering multiple exchanges between the two parties.

Then, a new wave of application arrived, significantly distinct from the previous one, as not targeted to the computer-literate users: audio and audio-applications. Though the initial quality was extremely poor, the first implementations gave a clear indication of the wide scope of this field: ranging from two-way communication between pairs (audio, video-phony) to one-way broadcast applications (the Internet audio and "TV channels").

More recently, the Internet applications tackled another major field of computing activities, that of distributed computer. The technique called mobile agents allows pieces of programs to travel through an itinerary of computers, execute functions, possibly meet at certain points or return to their origin after completion of their circuit. The areas of potential use are vast, and many are still to be discovered.

1.1 Overview of the Track

The Internet Software Technologies track was composed of three distinct though connected topics: Distributed Computing using Software Topics Agents, Transaction Technologies, and Advanced Web.

The first course focused on a promising technique for supporting distributed computing: the use of agents written in Java. This method is applied to the specific field of Distributed Physics Analysis. The class comprised 3 lectures where the agent technology were introduced and the Java programming presented. Then, students moved to exercises where they wrote physics analysis algorithms in Java, and agent-based job submission systems, then finally merged their outcome into a global system.

The second course "Web-based Transaction Technologies" described the mechanisms and techniques for supporting client-server interactions based on web forms. It started with a presentation of the HTML language, then carried on with scripting languages (JavaScript) and the CGI interface. Two hours of exercises where students developed a simple transition system based on forms and associated CGI programs complemented the 4 hours of lectures.

The third course was devoted to a selection of more advanced web-based software topics. This included a presentation of the XML language as well as the SMIL language for the support of synchronised multimedia documents.

1.2 Introduction to XML and SMIL

(Based on view material from M. Podgorny at CSC99)

1.3 When the web was invented at CERN in the late eighties, the inventor, Tim Berners Lee designed at the same time to technique by which a client system can dialogue with a remote server (the HTTP protocol) and the way in which pages can be described. The language by which web pages are described was called HTML. HTML is a mark up language. This is a methodology to encrypt data with information about itself.

Like HTML, XML relies on rules to specify tags and the use of tag-processing applications that knows how to deal with the tags. XML is in practice a subset or a more general language called SGML. The specifications are being developed by the World Wide Web Consortium (W3C), supervised by the XM working group.

The most important difference between HTML and XML is that while HTMPO is a well defined and closed set of tags, XML is a meta-language for defining other mark-up languages: it specifies the standards with which you can define your own mark-up language. Therefore, XML may allow each specific industry to develop its own tag set to meet its unique needs. As a side result, XML may be used to describe documents intended to be mainly displayed on a screen (such a "web documents" to be displayed by a web browser) but also documents primarily intended to be printed.

XML is gaining momentum in the Internet software community and well as with major application software manufacturers.

Various other languages are XML-derived languages. An example is RDF, the Resource Description Framework, a standard for exchange what is called "meta-data" and enable better searching on the web.

Another example is SVG, the Scalable Vector Graphics language which allows the description of two-dimensional graphics in SGML. When available, browsers will no longer have to load and display byte-consuming images when simple schematics and figures are to be represented.

The Synchronised Multimedia Integration Language, SMIL, enables simple authoring of TV-like multimedia presentations such a training courses on the web. When you use a CD-ROM, it is frequent that you display sequences of different media which are synchronised together (such as a piece of text, synchronised when displayed with a sound to be played out, followed a few second later by an animation,...). To author such sequences, CD-ROM authors use specific languages, which allows to specify syntonisation between the various media components of the document. SMIL is a similar type of language, but designed to author documents which are aimed at being accessed over the Internet.