Global Communication Language for Networks*

With the advancement in the field of communications and computer hardware, there is a growing need for having portable, continuous and interactive access to information. Although the developments in wireless communication hardware hold promise for this, the biggest hurdle in this field is the existence of different protocols which are used in data communication process. This has raised a need for a user-friendly, transparent and universal communication language.

Telescript is an interpreted language that works independently any and all protocols and transports. The developers of Telescript, General Magic of USA plans to push Telescript as a standard for any type of network interaction from personal E-mail to interaction over commercial data networks.

Like Postscript language from Adobe which has revolutionised printing by using programs to contrast the layout of text and graphics on a page, Telescript is machine independent and can run on printers of different capabilities for speed and resolution. Telescript promises to bring the same interoperability to the networking field. Like Postscript it is also an interpreted language independent of hardware platforms and operating systems running it.

Advantages of Telescript

At present, a lot of time is taken by messages to travel across the network during a communication process. Information travels in the form of small packets across the network to a computer and vice-versa taking twice the network travel time.

Telescript allows user to bundle his messages, requests and preferences into an intelligent program that travels to a distant computer in the network; gets answers to the queries and returns with answers to the host computer. This results in only two trips across the network and saves time, bandwidth and involves less cost.

The major difference between other software communication systems and Telescript is that Telescript is computationally as powerful as C or BASIC and has built-in intelligence about how to interact with other systems. Other networking protocols such as Novell's IPX or Internet's IP merely pass packets of data between computers and require a software for manipulating the bits as they arrive. Computer with Telescript can understand any Telescript program that it receives on

* Extracted from :
Wayner, Peter. Agents away. *Byte*, May 1994, 113-18

the network because of built-in intelligence in the program for making decisions based on preferences. These packets of Telescript code (Telescript programs) are called Telescript agents. Of course, this would require a network of computers running Telescript interpreters. One such network called AT&T Personal Link is expected to be established shortly in USA.

How Telescript Works?

There are two types of Telescript–high Telescript and low Telescript. High Telescript is a modern, high-level object-oriented language having simple and clean semantics and is similar to an object-oriented version of Lisp. Telescript code is a dynamically bound code at run time. The Telescript interpreter handles garbage collection and memory management and provides security since such a program (agent) can change or damage the host system like a virus. High Telescript is sent to a locally resident Telescript software which consists of a converter and an interpreter.

Low Telescript is a simple stack-based language running on Telescript interpreter similar to Forth and PostScript. High Telescript is designed for programmers while low Telescript is easier to be handled by the computer having small interpreter size and minimises the memory usage by agents and gives easy portability to the interpreter. Low Telescript interpreter requires run code which can be generated by computer and thus it is easier to create these without caring for semantic errors. Its stack-based nature is easier for computer to parse but difficult to humans to read.

In a network the system that provides service requires only low Telescript while the client machine needs the high Telescript capability. Both these languages are used without showing the actual language like the PostScript code. The language can be used through interface and pre-created skeletal agents for collecting the parameters for the agent.

When the Telescript engine receives a new agent, it converts it into low Telescript and executes the GO command sending the bundled agent to its destination.

Another version of GO command is sent where an agent or sub agent creates its version and sends them to all possible ways.

The Telescript engine saves an agent by bundling up the agent's low Telescript code, the program counter, the stack and any of the memory-based objects owned by the agent. This information is stored into one big file and then sent over using appropriate network transports.

The destination of the agent can be specified into one of the following four ways.

The first two methods involve providing a name or providing an address as 16-byte generated tags unique to a particular place. The name consists of the authority and identity of the place while the address consists of the authority and location of the place. This method provides flexibility for the changes in the nature of network as more and more new services are introduced on the network.

Third way is that the agent finds destination by asking from a directory the machine offering the particular class of cheapest service. In the fourth method, the interpreter provides details of information by specifying how to find address.

Security of Systems

Running Telescript on an interpreter enables machine independence, ease of porting, and security.

The security aspect assumes importance as the world-wide network is also open to a lot of unwanted programmes. Telescript interpreter can check the identity of each computer sending the request and allows authorised users to access information.

Agents, being small intelligent programs, are similar to viruses except that these contain the identity which is required for execution. After interpreting these agents, the Telescript acts as an intermediate layer that examines and executes each instruction and can stop any agent trying to do unwanted activity.

Another security feature is the incorporation of Teleclicks. Teleclicks are equivalent of money coupons on the network which limit the action of an agent. While creating an agent, it is given a certain amount of Teleclicks to do its job depending upon the expected CPU time to be used. This feature can stop unauthorised use of resources of host as well as over spending by the client.

The third aspect of security is identity. Each Telescript agent is sealed with a cryptographically secure signature. Telescript host can verify the security of the agent from the signature and this will also help in billing for its services.

As on today Telescript offers a broad vision in network communication and despite its initial limitations, it has the potential to become world standard in this field. AT&T personal Link network will demonstrate the capabilities of Telescript and its real potential will be known when many more network providers make use of this technology.

(Ashok Kumar)

"You, O Books, are the golden vessels of the temple,.... burning lamps to be held ever in the hand."

— Richard De Busy