Formal Demo Summary to appear in CHI'95 Conference Companion, Denver, May 1995

Hyper-G and Harmony: Towards the Next Generation of Networked Information Technology

Keith Andrews, Frank Kappe, and Hermann Maurer

Institute for Information Processing and Computer Supported New Media (IICM)
Graz University of Technology, A-8010 Graz, Austria.
Tel: +43-316-832551
{kandrews,fkappe,hmaurer}@iicm.tu-graz.ac.at

ABSTRACT

Current networked information systems on the Internet, whilst extremely successful, run into problems of fragmentation, consistency, scalability, and loss of orientation. The development of "second generation" networked information systems, such as Hyper-G and its Harmony client, can help overcome these limitations. Of particular note are Hyper-G's tightly-coupled structuring, linking, and search facilities, its projection of a seamless information space across server boundaries with respect to each of these facilities, and its support for multiple languages. Harmony utilises two and three-dimensional visualisations of the information space and couples location feedback to search and link browsing operations, in order to reduce the likelihood of disorientation.

KEYWORDS: hypermedia, information retrieval, information visualisation, graphical interaction, Internet.

INTRODUCTION

Whilst traditional services such as electronic mail, remote login, and file transfer still account for the bulk of traffic on the Internet, by far the fastest growth is being experienced by networked information systems like WAIS, Gopher, and above all the World-Wide Web (WWW or W3). These systems, although having transformed the way people perceive and interact with information resources on the net, belong to the first generation of information systems on the Internet [3]. They work well in particular contexts but run into difficulties when applied to hundreds of thousands of documents distributed over many thousands of servers. They provide only a single structuring mechanism, no graphical navigation aids, only rudimentary access control, little support for automatic database maintenance, no scalable document replication mechanisms for popular information, and little or no built-in support for multiple languages. Furthermore, they are "read-only", in the sense that information providers prepare data which information consumers can generally only browse. Hyper-G is a second generation [2] system designed to transcend some of these limitations.

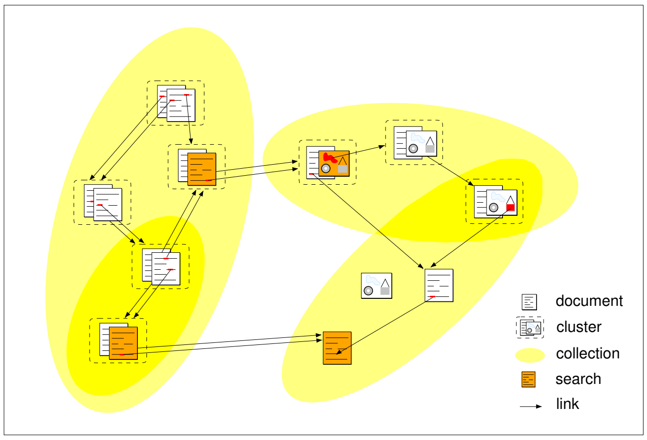

Figure 1: Hyper-G Data Model

HYPER-G

Hyper-G is a large-scale, distributed, multi-user, *structured*, hypermedia information system, which runs as a client-server application on the Internet [1]. Hyper-G is interoperable with both Gopher and W3 clients and servers, but its data model is much richer as can be seen in Figure 1. Documents may be grouped into aggregate *collections*, which may themselves belong to other collections and which may span multiple Hyper-G servers, providing a unified view of distributed resources. A special kind of collection called a *cluster* is used to form multimedia and/or multilingual aggregates.

Hyperlinks in Hyper-G connect a *source anchor* within one document to either a *destination anchor* within an-

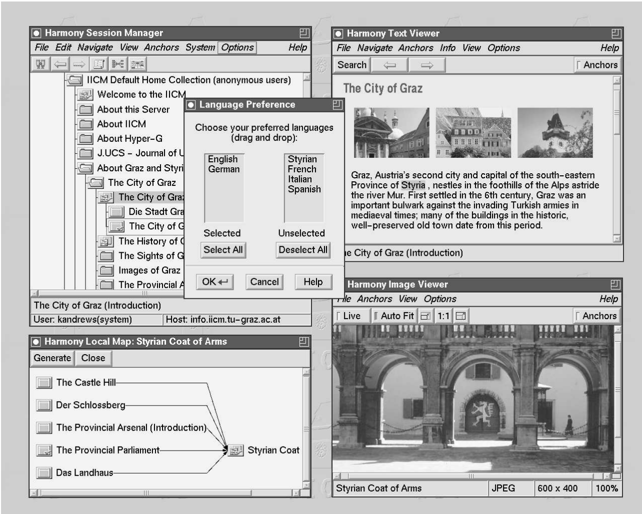

Figure 2: Harmony Client for X Windows

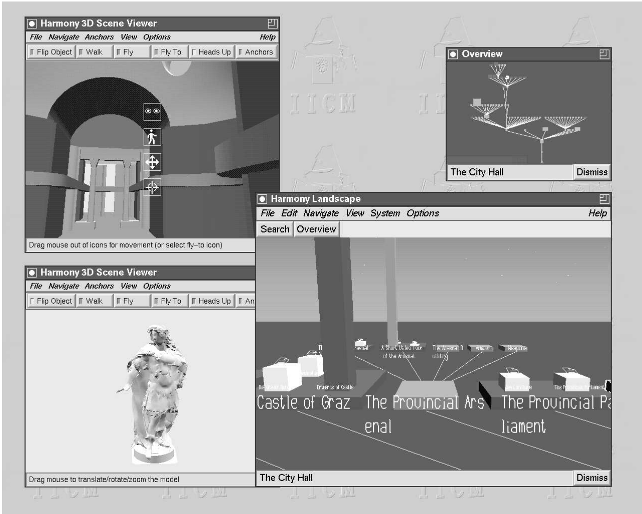

Figure 3: Harmony 3D Viewer and Landscape

other document, an entire document, or a collection. Links are not stored within documents (as in W3) but in a separate link database: links are not restricted to text documents, they can be followed backwards, updated and deleted automatically when their destination moves or is deleted (no "dangling links"), and are easy to visualise graphically. Hyper-G has fully integrated search facilities: every document and collection is automatically indexed upon insertion into the database – no extra indexing steps are required. Both attribute (author, title, keywords, etc.) and full text (content) searches are supported, including boolean combinations and term truncation. Searches may be restricted in scope to particular sets of collections which may span multiple servers.

Both anonymous and identified users are supported, with access rights assignable on a per document or per collection basis to user groups or individual users. Identified users have "home collections" within which to organise personal documents and keep pointers to resources.

HARMONY

Harmony is the Hyper-G client for X Windows on Unix platforms (see Figure 2). It has native document viewers for text, images, MPEG films, audio, 3D scenes, and PostScript, including full hyperlink activation and editing and document uploading. To help users orient themselves, Harmony provides *location feedback* – the location of documents or collections found by searching or hyperlinks is automatically displayed in the collection browser, giving users a sense of the context of an object prior to any decision to view it. As a further aid to orientation, the link neighbourhood of a document may be visualised using Harmony's *local map*. Harmony is also multilingual: its user interface adjusts dynamically to the language of first choice, documents available in multiple languages are selected in order of language preference, and searches are optionally language-dependent.

A further innovative feature of Harmony is its use of 3D visualisations (see Figure 3), both hand-crafted and automatically generated. Model description files representing arbitrarily complex scenes or objects are displayed by the Harmony 3D Scene Viewer; Harmony's Information Landscape is an interactive, three-dimensional visualisation of the collection structure.

In addition to the Harmony client descibed here, users may use any other native Hyper-G client (such as hgtv for Unix VT100-style terminals and Amadeus for MS-Windows), or any W3 or Gopher client to access information on a Hyper-G server. Further information about Hyper-G and Harmony and installation details may be retrieved by anonymous ftp from `ftp.iicm.tu-graz.ac.at` in directory `/pub/Hyper-G` or from the IICM Information Server under `http://info.iicm.tu-graz.ac.at/`.

REFERENCES

1. Andrews, K. and Kappe, F. Soaring Through Hyperspace, in *Proc. of Eurographics Symposium on Multimedia/Hypermedia in Open Distributed Environments* (June 1994), Graz, Austria, pp. 181–191. Springer.

2. Andrews, K., Kappe, F., Maurer, H., and Schmaranz, K. On Second Generation Hypermedia Systems. *Journal of Universal Computer Science 0,0* (Pilot Issue, Nov. 1994), 127–135. Available at `http://info.iicm.tu-graz.ac.at/`.

3. Fenn, B. and Maurer, H. Harmony on an Expanding Net. *Interactions 1,4* (Oct. 1994), 26–38. ACM.