Chapter XI

MESH: A Model-Based Approach to Hypermedia Design

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INTRODUCTION

A Brief History of the Hypermedia Concept

The term hypermedia denotes an approach to computer data organization in a manner similar to the functioning of the human brain. In essence, human cognition is organized as a semantic network in which related concepts are linked together. New information we come across is integrated into our mind’s semantic structures of existing knowledge. These structures allow for the stored information to be accessed by association.

A precursor of current hypermedia systems was mentioned as early as in 1945, i.e. long before the introduction of the modern computer, by (Bush, 1945). He described an imaginary device called Memex as “a sort of mechanized private file and library, ...in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory”. One of the key concepts of Memex was said to be its ability to link items together such that they could be accessed by association, rather than through indexing.

In 1965, Nelson came up with the term hypertext, which he defined as “a body of written or pictorial material interconnected in a complex way that it could not be conveniently represented on paper. It may contain summaries or maps of its contents and their interrelations; it may contain annotations, additions and footnotes from scholars who have examined it” (Nelson, 1965).

Generally, the concept of hypertext can be seen as the structuring of standard text with the addition of links that allow for navigation through this text in a non-linear order; each portion of the text can anchor a link that leads to a related text fragment when the anchor is ‘stimulated’. In parallel to the human brain, hypertext organizes data (i.e. text fragments) into a network structure, with semantic relationships being established through links. These links allow for navigating through and accessing data by association. Hence, the purpose of the links is not only to model data interrelations; they also represent a navigational path throughout the resulting network structure. Therefore, hypertext differs from other data
organization techniques in that directives about how to navigate through the information space are included within the data themselves.

Most so-called first generation hypertext systems were implemented on mainframes and were strictly text-only (Halasz, 1988). Generally, the anchors were represented by underlining the relevant text portion, with the stimulus being provided by ‘clicking’ the anchor. As PC’s inundated the computer market in the eighties, the term hypermedia became a synonym for hypertext, emphasizing the said data organization methodology being enhanced with multimedia capabilities. In such second generation hypermedia systems, the chunks of data not only consisted of text, but also pictures, animations, video and audio fragments or even virtual reality objects. As a consequence, links anchoring and the stimuli to provoke link access have become more diverse, befitting the corresponding media type. The principle, however, remains the same, according to a more up-to-date definition by (Smith and Weiss, 1988): “an approach to information management in which data is stored in a network of nodes connected by links. Nodes can contain text, graphics, audio, video as well as source code or other forms of data”.

The components of current hypermedia systems comprise a user interface, an authoring environment to create and manage both node content and structure and a hypermedia engine with an associated storage system for the possibly heterogeneous multimedia data.

The appeal of hypermedia is based upon its ability to store complex, cross-referenced bodies of information, which can be browsed according to the user’s personal preferences. The latter, along with the resemblance to human cognition, makes hypermedia highly suitable as a tool for end user exploring and learning. Or, as put in (Bieber, 1993): “Hypertext systems provide a non-sequential and entirely new method of accessing information unlike traditional information systems which are primarily sequential in nature. They provide flexible access to information by incorporating the notions of navigation, annotation, and tailored presentation”.

Many hypermedia systems have been conceived, some of which did not even outgrow the stadium of obscure experimental systems in research labs. Some were special-purpose built to be applied in a clear-cut field; others were general-purpose ‘shells’ to accommodate various areas of data. Among the most publicly known (commercial) implementations are certainly Hypercard, which comes free with every Macintosh computer sold since 1987 and the Microsoft Windows Help System. However, the environment that really brought hypermedia to the public eye is undoubtedly the World Wide Web (Berners-Lee and Cailliau, 1994), promoting the hypertext paradigm as the primary access mode to all Internet-connected networks across the globe. Unfortunately, the latter WWW presents a genuine enlargement to many shortcomings that exist to some degree in all current hypermedia implementations.

**Where Current Hypermedia Applications Fall Short**

Indeed, along with increasing popularity and worldwide adoption of hypermedia, limitations and downright deficiencies became painfully apparent. The concepts inherent to hypermedia led to inconveniences that prohibited satisfactory information retrieval by the end user as well as adequate hyperbase maintenance. Whereas non-linear navigation resulted in disoriented end users, the disorderly network of links involved an unacceptable amount of ‘manual’ work to keep the hypermedia structure up-to-date (Ramaiah, 1992).
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