# AHA! Adaptive Hypermedia for All

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**Abstract:** Websites that show the same information to all visitors, often also presented in the same way, are no longer considered acceptable. Creating a Website with specific information for different user groups (or even individual users) is cumbersome and leads to a lot of redundancy. AHA! is a simple server-side extension that enables information providers to add automatic personalization, or *adaptation*, to a Website, thereby eliminating redundant and potentially inconsistent information.

## 1. Introduction

Websites are becoming the main communication channel between organizations and people. Figure 1 shows part of the starting page of the corporate website of the authors' organization: the Eindhoven University of Technology. In the past websites (or their designers) assumed that the visitor knew what he or she was looking for. They only provided *information about* certain subjects. More recent websites offer pre-configured subsets of information for different types of users, like the *information for* buttons on the TU/e website. Creating and maintaining such a website is difficult and time-consuming. At the university for instance, a lot of information for students, employees and visitors is the same or has a large overlap. However, there are two ways in which these presentations (must) differ:

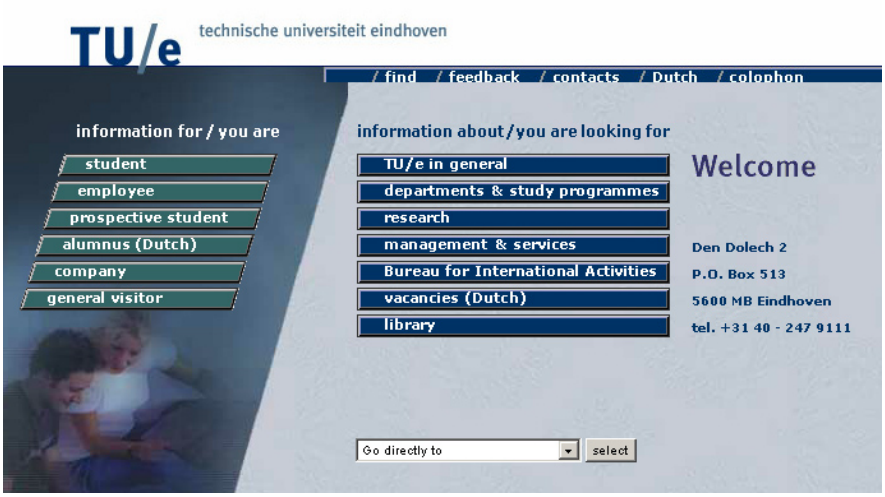
- On a page there may be a piece of information (or *fragment*) that is different for different users. The announcement of an event at the university for instance may include different instructions to register for employees, for students and for visitors. (For some events students do not have to pay, whereas employees pay a reduced rate and visitors pay full price.)
- On a page there are links to other pages. Some of these links may be appropriate only for some categories of users. So even though the information on a page may be interesting for two or more types of users different presentations are needed in order to have different links to other pages.

It is possible to offer a *static* website that is adapted to a few types of users, but this is typically done by copying pages and then editing each copy to add the parts that are specific for a user type. This leads to redundancy and unless there are strict guidelines or good tools it also leads to inconsistencies in the information that is available.
The solution to these problems is the use of *adaptive hypermedia* technology. Brusilovsky [1] provides an overview of methods, techniques and applications of adaptive hypermedia. De Bra and Wu et al [2, 3] provide a general reference model for adaptive hypermedia applications. This paper briefly describes the AHA! system (Adaptive Hypermedia Architecture), being developed through a grant of the NLnet Foundation.

## 2. Brief Overview of AHA!

A website, made adaptive with AHA!, consists of the following parts:

- The AHA! software, using Java Servlets, *filters* pages, which can be written in two formats: an AHA! XML format, in which the real page content is opaque to the system, or XHTML+AHA, a format in which HTML and AHA! tags are combined. (This uses the ability of XML parsers like Xerces to parse documents with tags from different DTDs in a single page.) When building a website AHA! will normally be used to filter pages from a local (file) server. However, AHA! can also access and filter pages from other servers. This feature is useful to offer adaptive access to a website that also exists in static form, or to offer adaptive access to pages that are generated by a database.




- A *user model* that consists of a set of *concepts* with for each concept a set of *attribute/value pairs*. Concepts can be used for any purpose the website designer desires. They can mean information topics the user *knows* about or has *interest* in, but they can also mean the system's confidence that a user is of a certain type, or user preferences for presentation, e.g. color preferences, preference for video versus text, etc.
- A *domain and adaptation model*. This consists of a structure of *concepts* with for each concept a *requirement* and a set of *generate rules* that represent connections between concepts. The requirement and generate rules connect the domain and user model. A requirement expresses that a concept (or a fragment of a page) is *desirable* if the requirement is fulfilled for the current user's model. Generate rules express how user model updates propagate from one concept (and attribute) to another. They can for instance express that reading a certain page tells the system that the user is of a certain type, or that the user is learning about a certain concept, section, chapter and book.

The visible effect of adaptation generated by AHA! is twofold:

- *Adaptive presentation*: fragments of a webpage can be *conditionally included* by associating a requirement with the fragment (and using an AHA! <if> tag with the fragment). Depending on the user model the system will decide whether the fragment should be included for this user or not.
- *Adaptive navigation*: if the requirement for a page is fulfilled (given the current user model) then links to this page will be shown using a *blue* or *purple* link anchor (depending on whether the page was visited before). If the requirement is not fulfilled the link anchor will be shown in *black*. This means that the link will be hidden. The end-user can change the choice of colors. If the "undesired" links are shown in another color they are no longer hidden. But they can still be visually distinguished from the "desired" links.

## 3. More Information

The Adaptive Hypermedia for All project (an NLnet Foundation project which develops AHA!) can be followed at the following address: http://aha.win.tue.nl/. As the development continues, new versions of the software, documentation, publications and tutorial will become available from this website.

## References

[1] Brusilovsky, P. Adaptive Hypermedia, User Modeling and User-Adapted Interaction, Vol. 11, nr. 1–2, pp. 87–110, Kluwer academic publishers, 2001.

[2] De Bra, P., G.J. Houben, and H. Wu. AHAM: A Dexter-based Reference Model for Adaptive Hypermedia. Proceedings of the ACM Conference on Hypertext and Hypermedia, pp. 147–156, Darmstadt, Germany, 1999.

[3] Wu, H., E. De Kort, and P. De Bra. Design Issues for General-Purpose Adaptive Hypermedia Systems. Proceedings of the ACM Conference on Hypertext and Hypermedia, pp. 141–150, Århus, Denmark, 2001.