Creating (and Delivering) Adaptive Course Texts with AHA!

The Adaptive Hypermedia Architecture [2,4], or AHA! for short, was initially developed to create an adaptive version of a course on Hypermedia, taught at the Eindhoven University of Technology, and offered on-line to students of several Dutch and Belgian universities. Through a grant of the NLnet Foundation the *adaptation engine* has been extended to make it very general-purpose, and *authoring tools* have been developed to help course developers in the design of the *conceptual structure* of a course and in the management of the course content. Key characteristics of AHA! are:

- The structure of every course consists of *concepts*, *concept relationships* and *pages*. For every page there is a corresponding concept. When a student reads a page the system will register *knowledge* about the concept corresponding to that page. Through *knowledge propagation* relationships the page access also leads to knowledge about higher level concepts (e.g. corresponding to a section and/or chapter). AHA! can give students advice on which concepts to study now and which to leave for later through the use of *prerequisite relationships*. The AHA! engine has many more possibilities but the ones mentioned here are sufficient for most adaptive course texts.
- Concepts and concept relationships are created using a graphical tool: the *graph author*. It makes authoring as easy as clicking and drawing, and it translates the conceptual structure into *event-condition-action rules* used by the AHA! engine. Through a second tool, the *concept editor* these rules can be inspected, and modified if desired.
- Special tools exist to create *multiple choice tests* and also to create arbitrary *forms* to allow students to inspect (and perhaps modify) their student model.
- An *application management tool* is available for authors to up- and download pages and to activate the different authoring tools. All the tools have a user interface that consists of Java Applets, so an author need not install any software (other than a Java-enabled Web browser) in order to create a course.
- The adaptation offered by AHA! consists mainly of the *conditional inclusion of information* and of *link annotation* or *link hiding*. Through conditional fragments on a page or the conditional inclusion of objects an author can add extra explanations or details that are only shown to students when they have (or lack) some specific knowledge. The link adaptation consists of changes in the link color. There are three colors: *good*, *neutral* and *bad*. To indicate the status of a link. The defaults (which can be changed) for these colors are blue, purple and black, and result in *hiding* of the *bad* links.
- The presentation of a course is highly customizable, through a *layout model*. As a result different courses served by AHA! can have a very different look and feel.
- The AHA! runtime environment consists of Java Servlets. The AHA! distribution contains these servlets, the authoring applets and all the source code as well. AHA! is an Open Source project, and works with other freely available tools like the Tomcat Web server, and optionally also the mySQL database system. It runs on Windows and Linux.

Examples of AHA! applications and also documentation and tutorials are all available from the project's website, aha.win.tue.nl. Stable releases are also available through SourceForge. The authoring and delivery platforms can also be used independently. An author can for instance use the annotated MS Word format used for Interbook, and a compiler translates the course to the AHA! authoring format in order for AHA! to serve the course [3]. AHA! can also emulate the Interbook layout completely, making the on-line course virtually indistinguishable from a course served through the Interbook server. Likewise we have been working on compilers for other authoring formats and tools, including MOT (My Online Teacher) [1].

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References (font 11) [if needed, maximum 3 key references]

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2. P. De Bra, A. Aerts, B. Berden, B. De Lange, B. Rousseau, T. Santic, D. Smits, N. Stash, "AHA! The Adaptive Hypermedia Architecture," Proceedings of the ACM Hypertext Conference, August 2003, pp. 81-84.
3. P. De Bra, T. Santic, P. Brusilovsky, "AHA! meets Interbook, and more…," Proceedings of the AACE Elearn'2003 Conference, November 2003, pp. 57-64.
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