

PATTERN DEFINITION TO REFINE NAVIGATION STRUCTURE IN HYPERMEDIA/WEB APPLICATIONS

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ABSTRACT

When building Hypermedia/Web Applications, (different) designers are often faced with the same problems over and over again. Those recurring problems soon yield elegant solutions, which can be conveniently described as design patterns. In this paper we present two patterns for (Adaptive) Web Applications that refine the navigation structure of the application, based on use of the web application. Both patterns are inspired by existing Web Design practice. The patterns defined here are the so-called *Related Child* and *Direct Path pattern*. The first pattern links (child) nodes that are related (in a local context) while keeping track of the global context; the second provides a direct navigation path to relevant information. Both patterns aim to increase usability of the application, by reducing the amount of clicks needed to reach relevant information and thus make easier the navigation through the application.

KEYWORDS

Web Engineering, Design pattern

1. INTRODUCTION

When building Hypermedia/Web Applications, some common problems have to be faced. Smart and resourceful web designer have found elegant solutions to some of these recurring problems, and are soon copied by other designers. Such solutions, and the description of the problem, can be described as design patterns. The aim of design patterns is to collect good and consistent solutions for well known problems, thus avoiding for web designer to 're-invent' the wheel each time the problem arises. Using these well documented and tested solutions, development costs decreases and the quality and usability of the web application is improved.

Patterns were originally described in architecture, "describing a problem which occurs over and over again in our environment, then describing the core of the solution to that problem, in such a way that you can use that solution a million of times over..."(Alexander, C. et al, 1977). Although since many years used and well established in software engineering design (Gamma, E. et al., 1994), specific patterns for hypermedia (Rossi, G., 1997, German, D.M. et al, 2000 for an extensive overview), and certainly adaptive hypermedia applications (i.e. patterns for solving adaptation problems in hypermedia systems) are being studied only quite recently (Koch, N. et al, 2002, Rossi, G. et al, 2001 and others).

It is the intention of this paper to define two hypermedia patterns, inspired by existing practice in web design, for the designer to improve their original design after some user feedback (of any form: questionnaire, study browsing access log, ...) has been obtained. Both patterns could also be applied in the context of adaptive hypermedia, provided the relevant feedback is gathered *automatically*, and the suggested changes are also done automatically. In this case, patterns could be applied to provide one user (i.e. personalization) or all users with a better navigation topology, depending on the browsing feedback considered (e.g. of one particular user, or all users). In the next two sections, we will describe the two patterns, the *Related Child pattern* and the *Direct Path pattern*. Both can be classified, depending on which taxonomy is used (see German, D. M. et al., 2000 for an overview of taxonomies) as structural or navigational patterns, as they both aim to improve the navigation structure throughout the web application. Finally we present some conclusions.

2. RELATED CHILD PATTERN

Intent

Link related child nodes in a local context to both facilitate easier browsing within the local context, yet keeping an overview of the global browsing session.

Motivation

In many websites, the user is presented with links to a small amount of (related) items. Although the pages may have proven to be related (by studying the user access log, questionnaires ...), at design time the designer may not have perceived them as related, and thus not linked them among each other. This forces the user to visit one item, go back to the parent page, visit the next item, go back to the parent page, etc...

Forces

- Some items, related within a certain context, offered from a global context
- Users lose track of their global navigation context, when browsing through a set of related pages within a local context

Solution

Adjust the navigation structure to include (previous/next) links between the related child pages, and a link to the page the user originates from (and on which the related links were found). In this way, the user is facilitated in visiting the group of related nodes easily, without losing global context of his browsing session.

Examples

Examples of existing practice in web design include online photo albums (<http://entertainment.msn.com/photos/>), where the items within an album are linked using previous/next links and a back-to-index link preserves global context. Other examples are comment and follow-up systems (e.g. article site <http://linxtoday.com/>).

Consequences

Reduces the amount of clicks to visit n related child nodes by $n-1$ and reduces user disorientation by maintaining the global context (e.g. the originating parent page) of the related child nodes.

Related Patterns

Direct guidance (De Bra, P., 1999) in adaptive hypermedia involves leading the user to the best webpage next to read (may be different page for different users). It could be compared to guiding the user to the next related child node, although it is applied differently (e.g. which is the 'next' page is dynamically decided). Another related (hypermedia) pattern is the navigational context (Rossi, G. et al, 1997), in which a 'collection of nodes' is presented to the user differently depending on the current context.

3. DIRECT PATH PATTERN

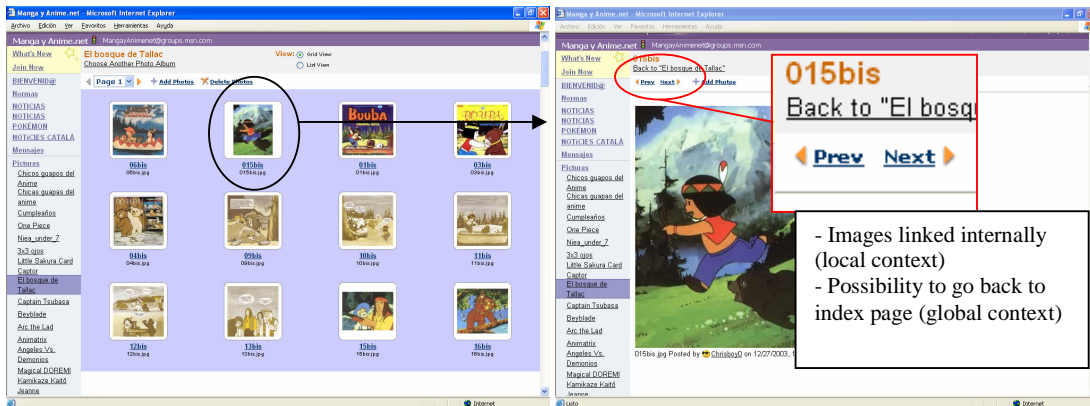


Figure 1 – Photo album (example of the Related Child Pattern)

Intent

Provide a direct link whenever a direct path has been followed by a *majority* of users, instead of forcing the user to follow each time the same set of navigation tracks.

Motivation

The navigation structure of large websites may become a complex maze. It is therefore, from a designer's point of view, a challenging task designing well-suited navigations. It is difficult to anticipate during the design whether a lot of visitors will follow a same (direct) path and which path this will be. This is certainly true because this can be valid only during a certain timeframe (e.g. visitors may follow a direct path to a download section of a website only when a security update has been released recently). From the users' point of view, it is their expectation to find the information they access frequently in a quick and easy manner.

Forces

- In a lot of cases, the visitor has one (or few) specific requirement(s) when visiting the website, and thus browses directly from the homepage to the information/functionality fulfilling this requirement
- Organization of information can be complex, forcing a user to follow a possibly lengthy or non-trivial path to this desired information

Solution

Create a direct link from the homepage to a certain page when a significant amount of visitors follows a direct path from the homepage to that page (for example in x% off all sessions, for x% of users, ...). The given threshold can be checked by examining the access logs of the web server.

Note that the original navigation path is not replaced by the direct link, but instead a shortcut mechanism is provided by the direct link.

Example

As an example we refer to 'SNCB/NMBS' (<http://www.b-rail.be>), the website of the Belgian railways. Most users who visit this website want to access the section containing the timetables for domestic and international trains, and/or the section providing an online train ticket service. For this reason, it was decided to add a direct link on their homepage to both the timetables and the ticket service (see Figure 2).

A second example is the website of 'Proximus' (<http://www.proximus.be>), the website of the wireless division of Belgium's largest telecom company. A direct link was placed on the homepage to the most visited online service Proximus provides (i.e. sending an SMS), to accommodate those users entering the homepage and following the 'popular' navigation path to that service.

Consequences

- Reduces the amount of clicks to relevant information

- Much requested information can be retrieved quick and easy
- Much requested information is immediately visible for visitors of the website.

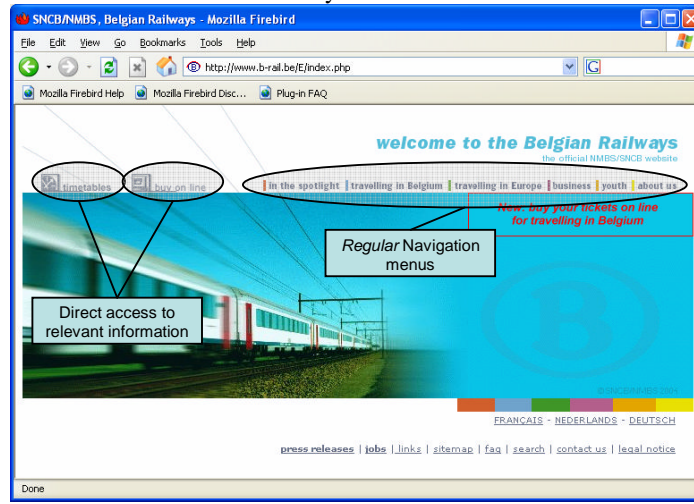


Figure 2 – Example of the Direct Path pattern

Related Patterns

The Direct Path pattern relates to the Adaptive Anchor Selection pattern (Koch, N. et al, 2002) that adapts the navigation topology to the current user interests and/or preferences. A number of anchors are selected from a predefined list of anchors that suits best the needs of the user. The Direct Path pattern we present in this paper only creates a shortcut link to accommodate users that follow ‘popular’ paths.

4. CONCLUSION

When building Hypermedia/Web Applications some recurrent problems arise. In this paper, we have defined two design patterns: the *Related Child pattern*, which aims to link related child nodes in a local context yet keeping overview of global context, and the *Direct Path pattern*, which aims to provide direct access to much requested information, instead of forcing the user to follow each time the (longer) prescribed navigation path. Both patterns are inspired by existing web design practice, and aim to adjust the navigation structure of the application to increase the usability by making browsing through the application easier and better tailored to the user’s (browsing) needs.

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