

KaitoroBase

Visual Exploration of Software Architecture Documents

Moon Ting Su, Christian Hirsch
Department of Computer Science
The University of Auckland
New Zealand

Abstract

KaitoroBase is a software architecture documentation tool built within the Thinkbase Visual Wiki to provide support for non-linear navigation and visualization of Software Architecture Documents (SADs) produced using the Attribute-Driven Design (ADD) method. This involves constructing the meta-model for the SAD in Freebase which provides the foundation for the graph-based interactive visualization enabled by Thinkbase. KaitoroBase displays a graphical, high-level structure of SAD, allows for exploratory search, non-linear navigation, and at the same time connects to low-level details of SAD in a wiki.

Motivation

"Documenting the architecture is the crowning step to crafting it" [2]. Existing software architecture documentation approaches such as IEEE Std 1471-2000 [3] and Views & Beyond (V&B) [4] produce significant amounts of architectural information. This poses difficulties for new stakeholders to locate the right architectural information to perform their tasks. Thus, the readability of a Software Architecture Document (SAD) needs to be improved. Concept maps of an architecture document [5] have been used for this purpose.

SADs are usually produced by the combined uses of text-editing tools and modelling tools. However, SADs produced this way are typically not used for a number of reasons [6]. Hence, alternative approaches such as the use of wikis [6] [7] have been explored. Wiki-based SAD is structured as a set of linked short web pages, with deeper structure [6]. This provides better navigation of the document, is good for overview, but poses more difficulty in finding finer details.

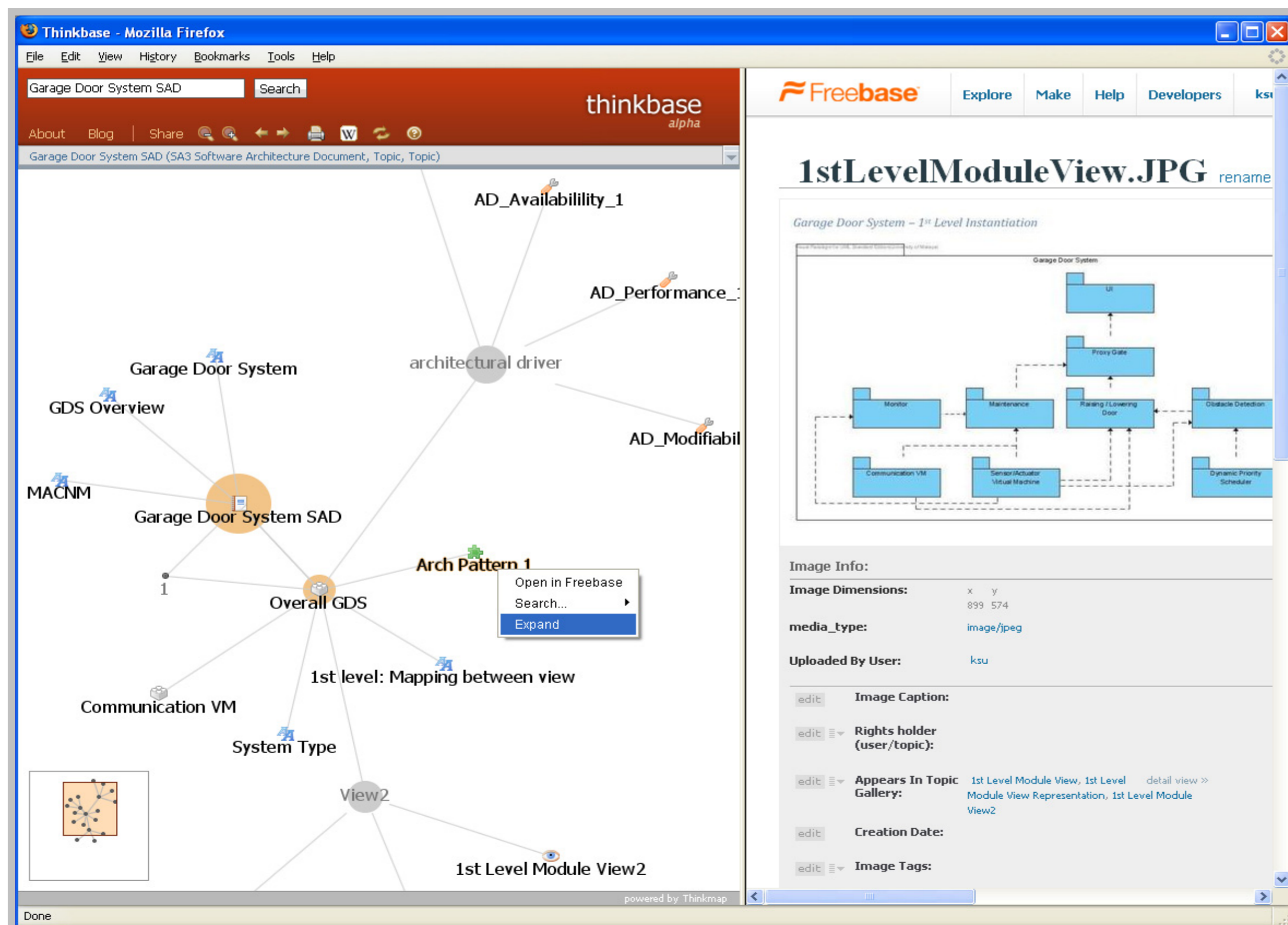
Objective

To provide support for non-linear navigation and visualization of Software Architecture Documents (SADs) by using a Visual Wiki [1].

Implementation

As a proof-of-concept, KaitoroBase a software architecture documentation tool is developed "within" the Thinkbase Visual Wiki [8]. Thinkbase is built on top of the Semantic Wiki Freebase [9] and makes use of the Thinkmap visualization framework [10].

KaitoroBase is built by modelling the SAD meta-model (extracted from the ADD method) as Freebase graph data structure which provides the foundation for the graph-based interactive visualization enabled by Thinkbase. Creating a specific SAD (for e.g. SAD for Garage Door System) in Thinkbase involves creating instances/topics of the SAD types and attaching them together based on the properties of the types.



Screenshot

The screenshot shows the user interface of KaitoroBase. The left side displays the interactive visualization of the Garage Door System SAD and the right side shows a detailed document.

Discussion

In comparison with existing SA documentation approaches, the added advantage of KaitoroBase is the graphical visualization of the structure of the entire SAD. The dynamic expansion and collapsing of each element of the SAD and graphically-grouped elements of the same type, reduce the cognitive load on the user.

Future work will look into improving the usability of the prototype, evaluating its usefulness and creating parsers to read architectural models described using specific ADL and display those architectural models in Thinkbase.

As the conclusion, KaitoroBase provides assistance in non-linear exploration and visualization of SAD by building upon the synergy produced by both a textual and a visual representation.

Features

- Non-linear exploratory navigation of SAD
 - Graph-based interactive visualization of SAD
 - Topic-centered view
 - Relationships as typed edges
 - Graphically-grouped elements
 - On-demand expansion and collapsing
 - Focus-plus-context view (visual high-level view linked to detailed documents)
- SADs based on Attribute-Driven Design (ADD) method [2]
- Non-ADL (Architectural Description Language) specific

References

- [1] C. Hirsch, J. Hosking, J. Grundy, T. Chaffe, D. Macdonald, and Y. Halysky, "The Visual Wiki: A New Metaphor for Knowledge Access and Management," Proc. of HICSS 42, 2009.
- [2] L. Bass, P. Clements, and R. Kazman, Software architecture in practice, Addison Wesley Professional, 2003.
- [3] IEEE Std 1471-2000, "Systems and software engineering - Recommended practice for architectural description of software-intensive systems," ISO/IEC 42010 IEEE Std 1471-2000, 1st edition 15 July 2007, c1-24.
- [4] P. Clements, D. Garlan, L. Bass, J. Stafford, R. Nord, J. Ivers, and R. Little, Documenting software architectures: views and beyond, Pearson Education, 2002.
- [5] H. Koning, and H. Vliet, "Real-life IT architecture design reports and their relation to IEEE Std 1471 stakeholders and concerns", ASE, vol. 13, no. 2, pp. 201-223, 2006.
- [6] F. Bachmann, and P. Merson, "Experience Using the Web-Based Tool Wiki for Architecture Documentation," Technical Note CMU SEI-2005-TN-041, 2005.
- [7] R. Farenhorst, and H. Vliet, "Experiences with a Wiki to Support Architectural Knowledge Sharing," Proc. of Wikis4SE, 2008.
- [8] Thinkbase. <http://thinkbase.cs.auckland.ac.nz/>
- [9] Freebase. <http://www.freebase.com>
- [10] Thinkmap. <http://www.thinkmap.com>

Acknowledgement

Supervisors: Prof. John Grundy, Prof. John Hosking

Sponsors: Ministry of Higher Education, Malaysia and BuildIT, New Zealand and PRéSS, University of Auckland