

DYNAMIC COLLABORATIVE DOCUMENTATION AT THE BROOKHAVEN NATIONAL LABORATORY COLLIDER-ACCELERATOR DEPARTMENT*

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Abstract

Centralization of information pertaining to accelerators can benefit accelerator operation and development. Further, retention and the changeable nature of information present challenges to accelerator operation, particularly in instances of turnover. MediaWiki is free, server-based software licensed under the GNU General Public License that uses PHP to render data stored in a MySQL database as interactive web documents, and is designed to produce a collaborative document known as a wiki. The MediaWiki engine was implemented at BNL, and this paper describes the first year of use by the Operations, Controls, and RF groups at the Collider-Accelerator Department, including code modifications, common practices, and use as a training tool.

INTRODUCTION

Accelerator operation and system development is faced with several obstacles when it comes to information communication, organization, transfer, change, and loss. Varying timescales of information change, the amount of information to consider, and personnel turnover further complicate information retention. In searching solution to these challenges, several key considerations are identified: user navigation, maintenance, organization, and technical expertise.

A potential solution is to use what has become known as a *wiki*. Wikis are dynamic, collaborative documents that are produced through an interactive website, allowing users to easily add and edit content. Wikis are increasingly used to create knowledge bases at organizations because of their ease of use. For the purposes of this article, the term "wiki" will refer to the individual instantiations of a wiki database engine producing a coherent web site.

BASIC REQUIREMENTS

MediaWiki is free server-based software licensed under the GNU General Public License. Originally built to support Wikipedia, this software package is now used to run many wiki-based websites. Consisting of 103,000 lines of code, the engine uses PHP to render documents stored in a MySQL database, and supports image and

media embedding. The image rendering software makes use of ImageMagick, and a math rendering engine allows on the fly rendering of LaTeX formatted material, making use of LaTeX, dvips, and convert. Because it is open source, the MediaWiki engine is under constant development, with some development subsidized by the Wikimedia foundation and a large and very active developer network. Quarterly releases of the MediaWiki engine are routine.

The user interface to the wiki is any HTML, javascript, and CSS compliant web browser. Cookies must be enabled to retain login information, and they are destroyed when the user session has ended.

The Collider-Accelerator Department has employed three separate instantiations of the MediaWiki engine, in the RF, Controls, and Operations groups. Currently, the C-AD runs PHP 5.2.0, MySQL 4.0.27, which are projected to support MediaWiki growth for some time. All groups began with MediaWiki version 1.5.8, with the Controls and Operations group upgrading to 1.9.3. The underlying MySQL databases are backed up daily as part of routine backups, and the database can be restored using standard MySQL techniques. For added security, the wiki engines are not accessible beyond the C-AD firewall.

FEATURES

The MediaWiki engine comes with several built in features to aid in organizing and entry of information. The full details of the MediaWiki engine and development are outlined elsewhere[1]. A few key features are highlighted.

History

The wiki database stores every revision ever made to any page in the wiki. This provides a powerful tool for looking at how information has evolved over time, what contributions users have made, and when the contributions were made, providing information about the timescale of the information.

Search

Full text search of all stored article information is included standard with the MediaWiki installation. The search is limited to article text contained in defined namespaces, with the search text stored in a separate table of the database.

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Booster F3 Extraction Kicker

(Difference between revisions)

Revision as of 06:42, February 20, 2007 (edit) Scannell (Talk | contribs | block)

Current revision (09:42, March 15, 2007) (edit) (undo) Niedziela (Talk | contribs | block) [rollback]

- Previous diff

Line 9:

```

=History=
*2/16/2007 - Sending a standby command to any of the Booster extraction bump power supplies or the F3 kicker causes the A1 bump output to drop to zero (readback ~140A). Lowering the setpoint of A1 is required before the supply can be restored. JLN

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=History=
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+
+ =Known issues=
+ *A MAL indication on the F3 line delay may be caused by a communications error with the associated [[GP|B]] box. Resetting the GP|B box is a good first step in fixing this MAL indication.
+ [[User:Niedziela|JLN]]

```

Figure 1- Example of history comparison performed for changes on one of the articles in the Operations Wiki.

Organizational Tools and Special Pages

Lists and functions built into MediaWiki allow the user to readily access items that would be of interest while editing. Among these are lists of pages that are needed, pages that are uncategorized, pages that are short of content, and indexing. Further aiding organization of information are namespaces, which are areas of the database that are designated for a particular purpose.

User Tools

User functionalities are standard, including discussion pages for every article, observation of recent changes, and user-customizable watch lists. Every user with a login is afforded options in viewing the site, and organizing their tasks.

WikiText

MediaWiki provides the end user with an interface to develop articles that makes use of a pared down form of markup. One of the key benefits to the different markup is that it makes the raw text that the user would interact with easier to read, edit, and understand, and relieving the user of needing HTML or CSS knowledge. Further, all editing is done through the web browser, eliminating the need for external editors.

Description

Part of the ATR transport line for Fast Extracted Beam exiting the AGS, it is immediately upstream of the V Line, W Line, and Z Line.

Map of U Upstream

Map of U Downstream

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[[Category:Transfer Lines]]

== Description ==

Part of the [[ATR]] transport line for [[Fast Extracted Beam]] exiting the [[AGS]], it is immediately upstream of the [[V Line]], [[W Line]], and [[Z Line]].

[http://www.cadops.bnl.gov/AGS/Operations/Maps/images/maps/petcontrol.gif Map of U Upstream]

[http://www.cadops.bnl.gov/AGS/Operations/Maps/images/maps/uline.gif Map of U Downstream]

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Figure 2- Illustration of wikitext in the Operations Wiki article about the U transfer line

ORGANIZATION

The key power of any wiki lies in the database, and the ability to link documents in the database for quick access and direction. Further, the different wikis can be cross-linked allowing groups to maintain information, allowing it to be used by others, creating an interlinked knowledge network.

The main goals of the wiki projects at the C-AD is to make the wiki a center point for group-specific knowledge. Efforts are underway in Operations to update all web documents under Operations ownership, and bring them into the Operations wiki. The RF wiki is being used as a repository for information regarding the low-level RF system and upgrade, the RHIC stochastic cooling development, and notes on the RHIC high level RF. The aim of the Controls wiki is to serve as an auxiliary web documentation system, allowing users to share common web contents.

Table 1: Statistics for the three wiki instantiations as of June 2007.

	Page Views	Unique Articles	Unique Users	Number of Edits
Controls	7553	111	14	1463
RF	17481	102	9	1059
Operations	41861	369	18	5597

Users

Control of the editing body is maintained by requiring all users to have a valid login and password before they can perform any edits. Anonymous browsing of the wiki content is allowed, but anonymous editing is strictly disallowed, and updates are subject to constant surveillance.

Articles

Most of the pages in the C-AD wikis are in the form of articles, similar to that of an encyclopedia. The articles start with a description of the article subject, and then include information about the role of the subject in the context of the C-AD, information about diagnostic equipment, failure modes, contact personnel, and history of events relating to the subject.

Main Page

The main page is the entry point to the wiki, and is set up to provide structure and direction for wiki users. On the main page of any C-AD wiki, a user finds links to current electronic logs, current events, outstanding issues that have faced the group, help on using the wiki, and current information from machine specialists about operating conditions.

Templates

There are two types of templates used in wiki production. First, templates are bits of code that are able to be included on pages, but are not themselves stand alone articles. Templates are employed to highlight areas of concern like articles requiring attention, markup, or deletion, and in building complex pages, such as the Operations Wiki Main Page.

Another form of template that is used is that of a pre-formatted document that sets up an article shell so that basic elements of an article exist. These are used to facilitate article creation and enforce style.

DEVELOPMENT

Information Organization

Categorization of articles is made extremely simple in MediaWiki. The main namespace of the Operations wiki consists of 369 articles, which have been parsed into 47 categories. Article categorization is determined by article subject, with the largest categories found in the Accelerator Concepts (44 articles), RHIC (44), Applications (33), and Operations Tools (29). Guidance on what articles are appropriate for which categories is provided by the wiki administrator, and multiple category assignment is allowed.

Creative use of the namespace features of the wiki has been realized in the development of the Permit Link System description. The RHIC permit link system permits (or forbids) beam operation based on property protection concerns. The system is comprised of many different modules, each module having up to eight permit inputs that are capable of disallowing beam operations. Additionally, not all eight permits on the module need to be used, and individual permit inputs can be enabled or disabled[3]. A description of the different permit modules comprising the individual machine links has been built within the Operations wiki, which uses a namespace to contain individual permit module descriptions to provide user information about the permit configuration. In this way, the individual pages of the permit namespace are kept separate from the main article content. Here they are allowed to be part of the knowledge base, but are protected from general editing.

Dissemination of changing information is a point of particular vulnerability for Operations. Centralizing this changing information in the wiki format has met with success, as the RHIC and Injector machine specialists have generated space within the Operations wiki. Further, all groups employing a wiki use several pages for the explicit purpose of displaying information that frequently changes or needs regular updating.

Another success has been the development of the RHIC cycle checklist for Operations. RHIC machine parameters change daily during startup, ramp up, and (to a lesser extent) production running. Creating a central list of tasks to be performed during a RHIC cycle and allowing it to be readily edited as the parameters change helps to eliminate miscommunications and save time.

Training

Because of the background and experience required to perform in an accelerator environment, independent investigation by new employees promotes employee development and wiki growth. The Operations Group has encouraged new machine operators to develop particular wiki subject areas in depth. This enhances their introductory training by placing them in contact with system experts, advances their familiarity with accelerator

systems, and increases their operational experience. Analogous to the peer review process, an operator takes on or is assigned a topic, performs research and contributes an article to the wiki. Senior staff reviews content repeatedly until the article is within accepted guidelines.

Cross-Group Collaboration

The MediaWiki engine allows inclusion of information stored in other databases, allowing a cross-wiki effort between groups. The Controls group maintains HTML documents for all applications, and an effort to link the Controls and Operations wikis via this interwiki linking to make it possible for both Controls and Operations to contribute to completeness of these pages.

CHALLENGES

User Involvement

Because of the collaborative nature of wikis, and the desire to use them as tools of information transfer, all group members need to be actively engaged in the use of the wiki as an information resource, and in the editing of the wiki content.

One necessary component of any wiki development is that its use be pushed by one of the primary maintainers, someone who will encourage use and development of articles and content, and will actively patrol and motivate new users. The wiki thrives through use, but a single person or group of individuals who support the growth, and encourage new users to learn how to use the wiki and its many functions must drive use initially.

Protection

Wikis are designed to be open documents and to make entry and editing of information easy. Making it difficult to edit pages is counter to the spirit of the collaborative effort, and detrimental to success of the project. However, there are many cases to be made for page protection in the event of information that should not change, complex page structure that could easily be damaged, and user control of certain information. These cases are limited, and typically handled by granting the user in control of that particular document advanced privileges.

REFERENCES

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- [3] D.S. Barton, et. al. The RHIC Control System. (2003) Nuclear Instruments and Methods in Physics A. Vol .499, Issues 2-3.