Technology tools used to create the Naval Reactors History Database

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The Naval Reactors History Database is a unique online resource that provides access to publicly available digital content on the joint United States Navy/Department of Energy nuclear propulsion program. The database includes information on the program's history, including the impact of nuclear propulsion on naval operations, the evolution of reactor technology over time, and environmental issues relating to naval reactors.

The database is based on three low-cost or free technologies, which will be the focus of this presentation: Amazon Web Services for server infrastructure support; the California Digital Library's XTF open source digital content platform to support the online database; and, Facebook's Open Graph Protocol, which provides the foundation for building a community of users around this online resource.

The creation of this database using these tools demonstrates the possibilities offered by blending cloud-based services like Amazon's Elastic Compute Cloud (EC2) and open source software platforms. It also demonstrates the ability to create and maintain a robust, discipline-specific online resource at a modest cost.

Building relationships with users

One goal that I have for the Naval Reactors History Database is to build relationships with the site’s users. To do this, I’ve employed several easy-to-use tools created by Facebook:

- The Open Graph Protocol, which enables any web page to become an object in the Facebook social graph
- The Like button, which enables a user to establish a relationship with any page in the Facebook graph

As Eric Hellman of Gluejar illustrated in the below graphs, the Like button can be seen as the most popular implementation to date of the Semantic Web, which is based on the inclusion of standardized, semantic information in web pages.

The #1 application of the semantic web

Open Graph metadata and the Like button have been embedded at the top level for the Naval Reactors History Database. I’ve used these tools to drive traffic to the site, following these basic steps:

First, bringing the resource to the attention of potential users, this can be accomplished through posting information about the site in relevant online groups, by sharing information about it with friends, and by advertising in Facebook, which enables the targeted presentation of information to users with relevant interests.

Then, letting the resource's Like button effect take hold, to understand this, consider what happens when a Facebook user clicks on the Like button on the Naval Reactors History Database site:

- A story is added to the user’s Facebook News Feed describing the fact that s/he likes the site; this creates a personal recommendation for the database that’s broadcast to the user’s Facebook friends. Note that Facebook has actively worked to break the appearance of news feed stories in Facebook, by modifying the story and thumbnail image sizes, in order to decrease the click rate to sites.
- A link to the database is added in the user’s Facebook page under Likes.
- A linkage is made between the Facebook administrator for the site (identified in the Open Graph Protocol metadata) and the users who have clicked on the site’s Like button. For the Naval Reactors History Database: As the administrator, I can publish updates or questions to the users who have liked the database.

Finally, beyond the creation of Open Graph Protocol metadata at the site level, OGCP metadata is generated for subjects prominently covered in the database, as shown in the below Facebook Linter screenshot. I am still exploring how to best use this structured subject level metadata to enhance the site’s visibility to researchers.

Open source software framework

The eXtensible Text Framework (XTF) digital content platform supports the search and display of the Naval Reactors History Database. XTF was developed and is maintained by the California Digital Library. It is a fully open source platform that’s built on the Apache Lucene search toolkit. XTF is used by a wide range of institutions worldwide to support online digital collections and scholarly communication services.

XTF is a low cost, low friction infrastructure; the XTF open source platform and other open source tools (such as the Apache Tomcat server) enable the Naval Reactors History Database to be served online at a low cost — approximately the cost of a tablet computer for one year of operations.

Low cost, frictionless infrastructure

The database and its search/display platform run on an Amazon Web Services Elastic Compute Cloud (or EC2) instance. EC2 enables users to run Linux and Windows servers in one of Amazon’s data centers. EC2 represents a set of persistent resources — such as disk volumes and IP addresses — that can be used to support online services. Payment for the server and data center support is based on the utility model, and no upfront costs for server hardware are incurred.

EC2 servers can be allocated and managed via a web browser, and even mobile devices, as shown below.

Open Graph metadata

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