



**University
of Victoria**

CENG/ELEC/SENG 499 - Spring 2014

Improvement for SHOAL: A Dynamic Web Cache Publishing Tool

Progress Report #1

January 31, 2014

Project Number: #09
Project Title: Improvement of SHOAL - A Dynamic Web Cache Publishing Tool
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1.0. Project Description

SHOAL is an open source, web cache publishing tool developed by the UVic Department of High Energy Physics (HEP), to assist with the execution of high energy physics applications. Some of these applications require resources provided by CERN (European Organization for Nuclear Research). In order for these resources to be accessed more quickly and efficiently, they are cached on some proxy servers (Squid servers) that are geographically closer to UVic than CERN. SHOAL was created to manage the creation and deletion of said proxies. Currently, SHOAL produces acceptable performance. However, in order for the software to be used by different organizations to support heavier workload, the application needs to be performance tuned. Our project aims to re-architect the software in order to improve its performance and graphical user interface through the following:

1. Employing a new web framework tailored for performance.
2. Implementing a new algorithm to speed up computationally expensive operations.
3. Implementing new solutions to distribute workload more efficiently among different SHOAL servers.
4. Implementing a map view on the user interface to dynamically display the location data. of active Squid servers.

Performance improvements and higher scalability will allow SHOAL to be used by other research organizations besides the UVic HEP group.

2.0 Project Summary

2.1. Background

The UVic High Energy Physics (HEP) group utilizes resources provided by CERN (European Organization for Nuclear Research) to run a number of high energy physics applications. In order for these resources to be accessed quickly, they are cached on several proxy servers geographically closer to UVic. These proxy servers are created and removed dynamically depending on the usage load. SHOAL, a dynamic web cache application developed by UVic HEP, provides a mechanism to track the creation and removal of these proxy servers.

Our project aims to improve the existing features and implement new features for SHOAL. These improvements will allow the tool to be used by organizations outside of UVic HEP.

2.2 Problem Definition

The current implementation of SHOAL employs a simple Python framework, Web.py. This implementation produces acceptable results; however, there is room for improvement in terms of performance, scalability and user interface design. Specifically, we aim to increase the number of requests the server can serve per second, average the time it takes to do geographical distance calculation and introduce new changes to the look and feel of the web interface.

2.3 Proposed Solution

In order to achieve the aforementioned goals, we plan to take the following approach:

1. Employ a new Python framework tailored for performance. Tornado Python web server is being considered as a replacement for Web.py.
2. Implement a new algorithm and utilize caching to speed up computationally expensive operations, among which is the geographical distance calculational.
3. Implement a new web interface for tracking proxy servers using Twitter Bootstrap and the Javascript library for data-driven documents D3.js.

2.4 External Resources

SHOAL Paper

<http://arxiv.org/pdf/1311.0058v1.pdf>

SHOAL Poster

<https://particle.phys.uvic.ca/~igable/chep2013/shoal-chep2013-poster.pdf>

SHOAL GitHub Repository:

<https://github.com/499/shoal>

499 Group Website
<http://499.github.io/shoal/>

3.0 Milestones

ID	Task Name	Start Date	End Date	Duration	Assigned To	Percent Complete
1	Replace Web.py with the Tornado web server.	2014-01-28	2014-03-18	1 Month, 3 Weeks	M. Chester Y. Nguyen	0%
2	Implement a new algorithm to speed up computationally expensive operations.	2014-01-28	2014-03-18	1 Month, 3 Weeks	M. Chester, Y. Nguyen	0%
3	Improve the web GUI	2014-02-04	2014-02-18	1 Month, 2 Weeks	E. Afable, H. Lu, A. Katahoire	0%
4	Idea Pitch	2014-01-27	2014-01-28	2 Days	E. Afable, M. Chester, A. Katahoire, H. Lu, Y. Nguyen	100%
5	Progress Report #1	2014-01-28	2014-01-31	4 Days	E. Afable, H. Lu, M. Chester, Y. Nguyen, A. Katahoire	100%
6	Progress Presentation preparation	2014-02-18	2014-02-21	4 Days	E. Afable, H. Lu, M. Chester, Y. Nguyen, A. Katahoire	0%
7	Progress Report #2	2014-03-04	2014-03-07	4 Days	E. Afable, H. Lu, M. Chester, Y. Nguyen, A. Katahoire	0%
8	Public Demo Preparation	2014-03-20	2014-03-27	1 Week, 1 Day	E. Afable, H. Lu, M. Chester, Y. Nguyen, A. Katahoire	0%
9	Final Report	2014-03-25	2014-04-04	2 Weeks	E. Afable, H. Lu, M. Chester, Y. Nguyen,	0%

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4.0 Progress to Date

The progress of the project so far is summarized below:

- Background study of the SHOAL project
- Created and outlined the milestones
- Created a project website
- Created a Github repository for the project
- Idea pitch presentation

We plan to achieve the following milestones for the following month (before we submit an updated project report, Project Report #2):

- Begin implementation of the Tornado framework
- Present the geographical location of the proxy Squid servers with sample data sets