

CS-529: Spring 2011, Third Programming Assignment

Parallelizing a Web Server

Due: June 5, 2011

Your last programming assignment in this semester is to write a parallel version of the Boa web server (<http://www.boa.org/>). The source code of a sequential version of the web server is available with the Cyclone benchmarks suite, which you can download from the svn tree of the project by doing:

```
svn --username anonymous co  
https://source.seas.harvard.edu/svn/cyclone/trunk/cyclone
```

The source code of the web server is available under `tests/boa-0.94.8.3` and tests are available under: `tests/boa-0.94.8.3/tests`.

The Boa web server was initially designed as a single-task web server, where the processing of “concurrent” client requests was performed in an event-driven manner by splitting the requests into stages and multiplexing request stages in the same task, running on one processor. Boa would allow parallelism by forking additional processes only for processing CGI scripts. Boa was conceived at the time of its development as a web server suitable for embedded systems.

You are asked to provide a parallel implementation of Boa that exploits parallelism at the level of concurrent client requests (which can be converted to tasks, i.e. each task can process one client request) and possibly (after you explore whether it makes sense in terms of performance and/or programming complexity) at the level of individual requests (i.e. by splitting individual client requests into more than one tasks and execute them by preserving dependencies between them).

The paper that introduced OpenMP tasks (discussed in class) provides a skeleton of a Boa web server implementation in OpenMP, which parallelizes the server at the level of client requests. You are asked to provide your own OpenMP parallelization of Boa (you may reuse the skeleton provided in the paper, extend it or change it completely). You are also asked to parallelize the web server in two additional programming models, Cilk and SMPs. As always, you will need to evaluate the performance of the three parallel implementations of the web server and compare the results.