Project Proposal

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Name Michael Sledge

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Working Title Creating a fast, scalable Web Server

1 Aims and Objectives

To create a basic but fast and scalable web server with basic HTTP support for serving requested files to clients, using asynchronous I/O. The server should scale to hundreds or even thousands of clients without significantly noticeable slow down from a client's point of view given sufficient hardware.

Synchronous I/O requires a separate thread for each parallel connection each of which will sleep while waiting on I/O operations, Having a large number of threads to handle a large number of connections leads to a lot of overhead in memory and CPU time due to switching between threads each doing only a small amount of work at a time the waiting on other resources. A system using asynchronous I/O does not have this overhead as a single thread can handle a great number of connections removing the need for lots of context switching.

This project will be an interesting challenge, I expect to gain experience building a complex application and working with networking and I/O systems, additionally implementing specifications (e.g. HTTP).

Extensions may include ability to configure which files are served e.g. denying access to certain files, more complete HTTP support, simple caching.

2 Relevance

The internet and world wide web are large parts of the roles computers play in our everyday lives, it is a major use of computers in the world today. Creating a web server covers multiple aspects of my computer science course such as networking, interacting with the operating system for I/O.

3 Resources required

No special resources required.

4 Weekly Timetable

	Monday	Tuesday	Wednesday	Thursday	Friday
09:00	HCI				Comparative
09:30	Seminar				Programming
10:00	project	project		project	Lecture
10:30	project	project		project	
11:00	project	project		project	
11:30			project		
12:00			project		
12:30			project		
13:00					
13:30	project				project
14:00	project	project	project	project	project
14:30	project	project	project	project	project
15:00		project	project	project	project
15:30	project				
16:00	project	Comparative Pro-		HCI	
16:30	project	gramming Lab		Lecture	Web Computing
17:00		Web Computing			Lecture
17:30		Laboratory			

I expect to spend some time on the project during evenings occasionally.

5 Background Reading

- Inside NGINX: How We Designed for Performance & Scale, `https://www.nginx.com/blog/inside-nginx-how-we-designed-for-performance-scale/`
- Lazy Asynchronous I/O For Event-Driven Servers `https://www.usenix.org/legacy/event/usenix04/tech/general/full_papers/elmeleegy/elmeleegy_html/html.html`
- Boost application performance using asynchronous I/O `https://www.ibm.com/developerworks/library/l-async/`
- The C10K problem `http://www.kegel.com/c10k.html`
- Synchronous and Asynchronous I/O, `https://msdn.microsoft.com/en-gb/library/windows/desktop/aa365683%28v=vs.85%29.aspx?f=255&MSPPError=-2147217396`