Building a Blockchain Library for OCaml

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Project Overseers: Marcelo Fiore & Timothy Jones

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1 Work Completed

Using the Tools

Before starting this project, I had no experience using OCaml, Irmin[1] or Lwt[2]. I spent some time learning OCaml as a language and how to write idiomatic, thread-safe code. I have also now become very familiar with Ezirmin which provides a simplified API to Irmin.

This work was completed in the first half of Michaelmas, in accordance with my initial work schedule.

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[1]Irmin is a library which uses a Git backend to provide a immutable block store

[2]Lwt is a library used to handle threading in OCaml

Building a Distributed Ledger

My proposal suggested that I would have built the functionality for adding data to the blockchain by the end of Michaelmas. Whilst I was one to two weeks behind with this work, it has now been built and is functioning.

Consensus Protocol

In my project proposal, I declared that I would need to do some research on which consensus algorithm would be the most suitable for using in my project. I suggested options including Proof of Work, Proof of Stake, Paxos and Raft.
I have completed extensive research on these protocols and decided that I would like to combine the Proof of Work algorithm with a leader based approach such as the one employed by Raft. This will be done by using Proof of Work to periodically reallocate a leader in a group of nodes.
There have been a few difficulties faced with using Ezirmin which have delayed progress on building consensus into the project. I have also come to realise that this is by far the most substantial piece of work required for this project - more so than suggested in my proposal.
I therefore running roughly 2-3 weeks behind with this work.

Dissertation

Work on the written dissertation has been going well. I have completed a first draft of an Introduction and Preparation section and am running roughly 2 weeks ahead of schedule with this. This should go some way to making up for the delay in building the consensus module.

2   Changes to the Original Proposal

There is still work to be done, as outlined in my original project proposal, however there are a couple of things which have changed slightly.
In working with Ezirmin, I have discovered a bug that has set me back slightly. I am working with KC - my supervisor and the library's author - in order to work around this.
I now believe that building of my evaluation program will not take as long as suggested in my propoasl (the first 6 weeks of lent). Whilst, I will be

starting work on this after I suggested in my proposal, I believe that due to my greater proficiency with OCaml and scripting languages, it should only take around 3 weeks to complete.