

Hyperledger configuration for project management in construction

Title	Hyperledger configuration for project management in construction
Status	PROJECT COMPLETED
Difficulty	MEDIUM

Description

The strategic objectives of this project is to design distributed ledger (DLT) management system (blockchain) using Hyperledger for construction and engineering projects. DLT has the potential to improve the overall efficiency and effectiveness of project management by providing an immutable record of transactions. The challenge is to model the commercial processes in order to make use of smart contracts, event triggering and other features. If successfully applied, these could significantly improve the construction process, most notably with work-flow improvements associated with speedier payments, better quality management and scheduling and the opportunity to use Lean management techniques. Configuring and implementing Hyperledger in this highly process oriented and contract driven commercial environment requires a working knowledge of the details of the industry.

Additional Information

No additional information is available at this time.

Learning Objectives

The learning objectives are ambitious in that they require successful modelling of commercial process of the sort seen in construction and engineering projects. Students successfully completing this internship will be able to configure a Hyperledger system to work (in a limited manner) to support project management. They would need to fully understand the commercial situation and how to make use of smart contracts to automate payment, inspection and other crucial processes.

Expected Outcome

The expected outcome of this internship are a dissertation for an undergraduate degree in Construction Management. Additionally, academic publication and conference papers are expected to come out of the research.

Relation to Hyperledger

Hyperledger Fabric would be the main tool used for this project.

Education Level

Students will be enrolled in an accredited programme in Construction Project Management of Quantity Surveying at Oxford Brookes University.

Skills

Managerial skills to understand the fine details of the commercial interactions that take place within a construction projects. Working knowledge on how to create a simple mobile-based interface, basic smart contract writing and hyperledger peer-to-peer skills.

Future plans

The current plans are to launch a thread for DLT education withing an existing programme in Construction Management.

Preferred Hours and Length of Internship

The project would take the hours assigned to a final year students' Dissertation Module. This is currently a Level 6 double Honours Component module with 30 credits and 15 ECTS Credits (lasting a full year). This requires a minimum of 300 hours of directed study.

Mentor(s) Names and Contact Info

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Mentee

[Nguyen Tung Anh](#)

Project Deliverables

- ✓ Confirm that Hyperledger Fabric (hlf) is a suitable blockchain platform for use on c&e projects and that Hypeledger Composer ("Composer") is suitable for creating the business model and managing the network.
 - ✓ Written confirmation (in the form of an outline) that hlf is a suitable blockchain platform for use on c&e projects and that Hypeledger Composer ("Composer") is suitable for creating the business model and managing the network.
 - ✓ **Academic output:** Outline for a paper that describes the selection and architecture requirements and design specifications based on a comparative analysis.
 - ✓ Final design for the commercial process used for this project.
 - ✓ **Academic output:** Outline for a paper that describes the membership management system.
 - ✓ **Academic output:** Outline of a paper that justifies the use of Composer as the optimum tool for defining commercial models for C&E projects.
- ✓ Design and confirm a system architecture and network configuration for a blockchain solution that is able to support C&E projects.
- ✓ Establish a set of functions of C&E assembly and administrative processes that are suitable for the application of hlf.
- ✓ Using an established set of business process modelling tools, define a pilot project that will be used to test the system.
- ✓ Design and testing programme that can be used to fully evaluate the utility and reliability of a hlf network for the pilot project.

Project Milestones

- ✓ Make literature research, design and confirm system architecture and network configuration for a blockchain solution that is able to support C&E projects. Nguyen Tung Anh 18 Jul 2019
 - ✓ Project kick-off, initial communication, share ideas and project organisation. 03 Jun 2019
 - ✓ Establish working practices, set communication schedule, agree on outputs/targets and milestones. 14 Jun 2019
 - ✓ Perform an analysis based on literature review to consider the systems, architectures and configuration tested in projects and compare these to the working model. 25 Jun 2019
 - ✓ Literature review analysis to include the basic concepts on the automation of C&E projects, hlf and Composer. 28 Jun 2019
 - ✓ Final outline system design, architecture and configuration. 01 Jul 2019
 - ✓ Define the nodes and members of the system. 05 Jul 2019
 - ✓ Finalise the membership system (as refined based on this paper) and apply business logic using Composer and chaincode in Fabric. 10 Jul 2019
 - ✓ Based on the above work, produce an outline schematic for current architecture blockchain system of C&E. Start to code the architecture with a trial network setup. 12 Jul 2019
 - ✓ 1st Evaluation and report. 18 Jul 2019
- ✓ Establish a set of functions of C&E assembly and administrative processes that are suitable for the application of hlf. Nguyen Tung Anh 29 Aug 2019
 - ✓ Install hlf on trial network and configure. 15 Aug 2019
 - ✓ Based on specification and requirements for system, define assets model file (.cto) 23 Jul 2019
 - ✓ Based on outline for membership management, define access control list for participants (.acl) 26 Jul 2019
 - ✓ Implement business logic (smart contract) and query definition (logic.js and query.qry).
 - ✓ 2nd Evaluation and report. 29 Aug 2019

✓

- Using an established set of business process modelling tools, define a pilot project that will be used to test the system. Nguyen Tung Anh
10 Oct 2019
 - ✓ Generate REST API for business network.
 - ✓ Creating client application (.py).
 - ✓ Design test protocol and roll-out to network.
 - ✓ 3rd Evaluation and report. 10 Oct 2019
- ✓ Design and testing programme that can be used to fully evaluate the utility and reliability of a hlf network for the pilot project. Nguyen Tung Anh
15 Nov 2019
 - ✓ Evaluate pilot project and provide improvements.
 - ✓ Final evaluation and report. 15 Nov 2019

Project Plan



Project-plan.pdf

Summary report



Final-report.pdf

