Build a university course on Hyperledger Fabric using Hyperledger Umbra

Introduction

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- **Location:** Lisbon, Portugal
- **University:** Técnico Lisboa
- **Mentor(s):** Dave Huseby
- **Hyperledger Project:** Fabric, Umbra

PhD student at Técnico Lisboa, Blockchain Interoperability

https://rafaelapb.github.io/
Enterprise Blockchain Technologies

› An extensible standalone university-level blockchain course

› Currently two modules:
  › Module I introduces enterprise blockchain (labs 1-4)
  › Module II focuses on Hyperledger Fabric v2.2 (labs 5-8)
Goals:

1) Understand theory on blockchain: what is it (Lab 1, Lab 2), and which problems it can solve (Lab 3)
<table>
<thead>
<tr>
<th>Module</th>
<th>Lab Number</th>
<th>Topic</th>
<th>Contents</th>
<th>Support files</th>
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</thead>
</table>
| I      | Lab 01     | Fundamentals on Distributed Systems | -Introduction on distributed systems  
-Introduction on state machine replication  
-Introduction on consensus  
-RAFT algorithm | |
## Enterprise Blockchain Technologies

<table>
<thead>
<tr>
<th></th>
<th>Lab 02</th>
<th>Fundamentals on Cryptography and Security</th>
<th>RSA implementation</th>
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<tr>
<td></td>
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<td>- Background on Cryptography:</td>
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<td>symmetric and asymmetric</td>
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<td>cryptography, and digital signatures</td>
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<td>accountability</td>
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<td>- RSA algorithm</td>
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Lab 03

A Primer on Blockchain

- Introduction to blockchain
- Public vs private blockchains

Blockchain4Students

HYPERLEDGER
Blockchain Technologies for Business
> **Course Goals:**

> 1) Understand theory on blockchain: what is it (Lab 1, Lab 2), and which problems it can solve (Lab 3)

> 2) Hyperledger Fabric intro (Lab 4). Chaincode and infrastructure (Lab 5). Full-stack blockchain decentralized applications (Lab 6)
<table>
<thead>
<tr>
<th>Lab</th>
<th>Title</th>
<th>Topics</th>
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</table>
| I Lab 04 | Introduction to Hyperledger Fabric | - The Hyperledger Ecosystem  
-A Technical Viewpoint on Fabric  
-A Use Case for Education: Blockchain4Students QUC |
| II Lab 05 | Hyperledger Fabric: Infrastructure and Chaincode | - The B4S QUC System  
-Smart Contracts & Chaincode  
-Setting up B4S |
| II Lab 06 | Hyperledger Fabric: Full-stack dApp | -Blockchain Network  
-B4S Web App 6 User interface |

Blockchain4Students Fabric Version

Blockchain4Students Fabric Version + Blockchain Client

HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS
Course Goals:

1) Understand theory on blockchain: what is it (Lab 1, Lab 2), and which problems it can solve (Lab 3)

2) Hyperledger Fabric intro (Lab 4). Chaincode and infrastructure (Lab 5). Full-stack blockchain decentralized applications (Lab 6)

3) Umbra (Lab 7 and Lab 8 - planned)
<table>
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<tr>
<th>Lab 07</th>
<th>Hyperledger Umbra: Introduction</th>
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<tbody>
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<td>Introduction to Hyperledger Umbra</td>
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<td>Simple scenario setting</td>
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<td>Lab 08</td>
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Project Deliverables:

- Guide
- Instructors Guide
- Support Code
A Distributed System is a system comprised of software and hardware components that are connected on a network, coordinating their actions via message exchange.

Nowadays, most modern enterprise information systems are distributed systems, popularized due to the Internet's growth.

Servers communicate with other servers using protocols, such as the HTTP protocol, based on the TCP/IP protocol. Communication can also happen locally (i.e., between...
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JRafaelSoares and RafaelAPB chore: Review Lab06 guide

- b4s
  - chore: Review Lab06 guide
- bin
  - feat: add lab06 draft
- chaincode
  - feat: add lab06 draft
- config
  - feat: add lab06 draft
- test-network
  - feat: add lab06 draft
- README.md
  - chore: Review Lab06 guide
- install-prerequisites.sh
  - feat: add lab06 draft
Project Execution & Accomplishments:
All deliverables planned, except Lab 8.

Difficulties: coordinate the efforts of contributors, technical difficulties

Key is communication and synergies
Insights Gained: Open-source is a great way to work and unite efforts. Leverage existing knowledge and try to provide a basis for others to build on top of that.

Work in a team and explore synergies! Thanks to the contributors and supporters:
- JRafaelSoares
- CatarinaPedreira
- Maramih
- Dhuseby
- Raphaelvrosa
- banoris
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Why should you leverage this course?
- Consolidate concepts
- Teaching and dissemination
- Boilerplate for implementation

Recommendations for future work:
- Add other Hyperledger technologies: Cactus, Besu, Indy,...
- Add theory
Questions?

Get the course!

Rafael Belchior