

# Hyperledger Mentorship Project Presentation

November 2020



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blockchain  
technologies

# Build a university course on Hyperledger Fabric using Hyperledger Umbra

## › Introduction

- › **Name:** Rafael Belchior
- › **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



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# 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)

# Enterprise Blockchain Technologies

- › Goals:
  - › I) Understand theory on blockchain: what is it (Lab 1, Lab2), and which problems it can solve (Lab 3)

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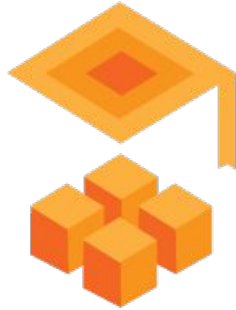
Module	Lab Number	Topic	Contents	Support files
I	Lab 01	Fundamentals on Distributed Systems	<ul style="list-style-type: none"><li>-Introduction on distributed systems</li><li>-Introduction on state machine replication</li><li>-Introduction on consensus</li><li>-RAFT algorithm</li></ul>	

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I	Lab 02	Fundamentals on Cryptography and Security	<ul style="list-style-type: none"><li>-Background on Cryptography: symmetric and asymmetric cryptography, and digital signatures</li><li>-Background on Security: authentication, authorization, accountability</li><li>-RSA algorithm</li></ul>	RSA implementation
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I	Lab 03	A Primer on Blockchain	-Introduction to blockchain -Public vs private blockchains	Blockchain4Students
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## blockchain 4students



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- › Course Goals:
  - › 1) Understand theory on blockchain: what is it (Lab 1, Lab2), 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)

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I	Lab 04	Introduction to Hyperledger Fabric	<ul style="list-style-type: none"><li>-The Hyperledger Ecosystem</li><li>-A Technical Viewpoint on Fabric</li><li>-A Use Case for Education: Blockchain4Students QUC</li></ul>	
II	Lab 05	Hyperledger Fabric: Infrastructure and Chaincode	<ul style="list-style-type: none"><li>- The B4S QUC System</li><li>- Smart Contracts &amp; Chaincode</li><li>- Setting up B4S</li></ul>	Blockchain4Students Fabric Version
II	Lab 06	Hyperledger Fabric: Full-stack dApp	<ul style="list-style-type: none"><li>-Blockchain Network</li><li>-B4S Web App 6 User interface</li></ul>	Blockchain4Students Fabric Version + Blockchain Client

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## › Course Goals:

- › 1) Understand theory on blockchain: what is it (Lab 1, Lab2), 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)



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II	Lab 07	Hyperledger Umbra: Introduction	-Introduction to Hyperledger Umbra -Simple scenario setting	Support Code
II	Lab 08	TBD	TBD	Support Code

hyperledger-labs / umbra

Watch 6 Unstar 12 Fork 16

<> Code Issues 3 Pull requests 1 Actions Projects Security Insights Settings

master 4 branches 0 tags

Go to file Add file Code

**raphaelvrosa** Merge pull request #10 from banoris/up/EventV2\_fuzz\_report ... 091d3a4 17 days ago 55 commits

- build Setup dockprom repo for grafana dashboard 2 months ago
- docs docs: Add info for environment event, umbra-agent, and umbra-monitor 2 months ago
- examples Refactor Event class, add report, and new RPC to query topology at um... 2 months ago
- umbra Refactor Event class, add report, and new RPC to query topology at um... 2 months ago
- .gitignore Integrate umbra-agent, umbra-monitor, and Environment plugin 2 months ago
- Dockerfile-umbra-agent Integrate umbra-agent, umbra-monitor, and Environment plugin 2 months ago
- LICENSE Initial commit 2 years ago
- README.md Defines settings for umbra VM in docs 9 months ago
- setup.py Integrate umbra-agent, umbra-monitor, and Environment plugin 2 months ago

**About**

This lab is to make running Hyperledger distributed ledgers under the Mininet platform.

Readme

Apache-2.0 License

**Releases**

No releases published  
[Create a new release](#)

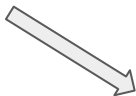
**Packages**










No packages published  
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## > Project Deliverables:

- > Guide
- > Instructors Guide
- > Support Code



	RafaelAPB docs: add related courses information	
	.github	chore: add github templates
	ISSUE_TEMPLATE	chore: add github templates
	source	docs: add contributing instructions, v0.2-alpha
	support	chore: move labs
	CONTRIBUTING.md	docs: add contributing.md
	LICENSE	Initial commit
	README.md	docs: add related courses information
	ebt.png	docs: add course logo

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🔑 master ▾ [university-course](#) / [source](#) / **Lab01** /

Go to file

Add file ▾



**RafaelAPB** lab: review labs 1-6

33dbbbe 5 days ago **History**

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Guide

lab: review labs 1-6

5 days ago



Instructors Guide

lab: review labs 1-6

5 days ago



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figures	feat: add lab03	4 months ago
assignment.tex	lab: review labs 1-6	5 days ago
header_table.tgn	feat: add lab03	4 months ago
hyperledger.png	feat: add lab03	4 months ago
lab1.bib	feat: add lab03	4 months ago

```
106 \section{Distributed Systems}
107 \label{sec:ds}
108 A Distributed System is a system comprised of software and hardware components that are connected on a network, coordinating their actions via message exchange.
109
110 \begin{figure}[h!]
111 \centering
112 \includegraphics[scale=0.25]{figures/itsystem.png}
113 \caption{Enterprise IT system \cite{Wong2014}}
114 \label{fig:internet}
115 \end{figure}
116
117 Nowadays, most modern enterprise information systems are distributed systems, popularized due to the Internet's growth.
118
119
120 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., bet
```

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university-course / support / Lab06 /



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



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## › **Project Execution & Accomplishments:**

› All deliverables planned, except Lab 8.

› Difficulties: coordinate the efforts of contributors, technical difficulties

› Key is communication and synergies

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› **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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**Contributors** 5



# Enterprise Blockchain Technologies

## › 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