Introduction to Hyperledger Sovereign Identity Blockchain Solutions: Indy, Aries and Ursa (LFS172x)

Course Overview

The course will be accessible to a wide-ranging audience, walking the line between business and technology. Students will gain an understanding of:

- The problems with existing Internet identity/trust mechanisms today.
- How Hyperledger Aries, Indy and Ursa add a necessary layer of trust to the Internet.
- The possibilities enabled by this new technology.

The underlying blockchain/cryptography technology of Hyperledger Indy and the ecosystem that is building up around Hyperledger Aries agents will be described. Those with a business and slight technical bent will be able to run basic hands-on exercises (labs) and explore the possibilities this emerging technology has to offer through demos.

Course Instructors

Stephen Curran of Cloud Compass Computing, Inc. is a Software Development and DevOps veteran who dove full on into the identity on blockchain world in 2017. Working with the British Columbia Government, Stephen has helped define, build and launch the Verifiable Organizations Network (VON)—a production instance of the Linux Foundation's Hyperledger Indy, Aries and Ursa projects that makes public information about organizations (incorporations/legal entities) in BC available in the form of verifiable credentials. Stephen is a regular contributor in the Hyperledger Indy and Aries community, facilitating discussions and driving interoperability. Stephen has presented on Blockchain and the Hyperledger Indy and Aries projects many times and is a member of the Sovrin Foundation's Board of Trustees and Technical Governance Board.

Carol Howard of Cloud Compass Computing, Inc. is a technical writer with more than 14 years experience, working for both hardware and software companies writing user guides, technical references, help text, and so on. She has been helping document the BC Government initiatives (VON, Greenlight, OrgBook BC and IIWBook) and became hooked on self-sovereign identity at IIW28.

Audience

The audience for this course includes:

- Business people interested in getting started in self-sovereign identity (SSI) and the range of business capabilities enabled with Hyperledger Indy and Aries.
- Technical people who are just getting started in the Hyperledger ecosystem.

- Students interested in either the business or technical aspects of Hyperledger Indy and Aries.
- Those interested in blockchain and the classes of problems addressed by Hyperledger Indy and its “blockchain for identity” focus.

Prerequisites

The following would be “nice to have” but are not prerequisites for this course:

- *Blockchain: Understanding Its Uses and Implications (LFS170x)*
- *Introduction to Hyperledger Blockchain Technologies (LFS171x)*

Course Length

15-20 hours.

Course Learning Objectives

By the end of this course, students should:

- Understand the challenges of identity on the Internet, and that there is a fundamental element of online use that is missing: trust.
- Understand the purpose, scope and relationship between Aries, Indy and Ursa.
- Know how a distributed ledger, such as Hyperledger Indy, can be used for identity.
- Know how the underlying blockchain technology makes it possible.
- Understand that the online solution enabled by Hyperledger Indy and Aries is actually just an online version of the approach to identity that societies have used for thousands of years.
- Understand the following concepts/terms:
    - Verifiable Credential
    - DID
    - DIDComm (DID Communications)
    - Aries Agents
    - Zero Knowledge Proofs.
- Understand how foundational the technology is, and some of the possibilities that can be built today with the technology.

Course Outline

Welcome!

- Welcome!

Chapter 1. Something Is Missing

- Introduction
- Today's Internet Identity Challenges
- The Paper Credential Model (450BC-1970AD)
- Knowledge Check (Verified Certificate track only)
- Summary

Chapter 2. Adding a Layer of Trust to the Internet

- Introduction
- The Verifiable Credentials (VC) Model
- Self-Sovereign Identity (SSI)
- Decentralized Identifiers (DIDs)
- Zero-Knowledge Proof (ZKP) and Selective Disclosure
- Wallets Are Agents
- Trust Over IP (ToIP)
- Knowledge Check (Verified Certificate track only)
- Summary

Chapter 3. SSI Using Indy, Aries and Ursa

- Introduction
- In the Beginning, There Was Indy
- Indy, Aries and Ursa Working Together
- Hyperledger Ursa
- Hyperledger Indy
- Hyperledger Aries
- Knowledge Check (Verified Certificate track only)
- Summary

Chapter 4. A Blockchain for Identity

- Introduction
- Indy's Blockchain
- Hyperledger Indy and Sovrin
- So, What Goes on the Blockchain?
- Indy's "Network of Networks" Challenge
- Knowledge Check (Verified Certificate track only)
- Summary

Chapter 5. The All-Important Agent, or Rather, Agents!

- Introduction
- So Many Agents!
- Components of Agents
- Agent Messaging
- Building Agent Applications
- Knowledge Check (Verified Certificate track only)
- Summary

Chapter 6. When Things Go Wrong

- Introduction
- Recovering a Lost Mobile Agent Wallet
- Knowledge Check (Verified Certificate track only)
- Summary

Chapter 7. Possibilities

- Introduction
- Endless Possibilities, or At Least Nine Great Ones!
- Getting Involved
- Knowledge Check (Verified Certificate track only)
- Summary

Final Exam (Verified Certificate track only)

edX Platform

If you are using edX for the first time, we strongly encourage you to start by taking a free 'how to use edX' course that the team at edX has made available. In this course, you will learn how to navigate the edX platform, how to connect with other edX learners, how to answer problems on the edX platform, how grades work in edX courses, and how to complete your first course.

Click here to register for "*DemoX*" and you will be on your way. You will find the edX platform simple and intuitive.

Getting Help

For any **technical issues** with the edX platform (including login problems and issues with the Verified Certificate), please use the **Help** icon located on the upper right side of your screen.

One great way to interact with peers taking this course and resolving any **content-related issues** is via the **Discussion Forums**. These forums can be used in the following ways:

- To discuss concepts, tools, and technologies presented in this course, or related to the topics discussed in the course material.
- To ask questions about course content.
- To share resources and ideas related to Hyperledger Indy, Aries and Ursa.

We strongly encourage you to not only ask questions, but to share with your peers opinions about the course content, as well as valuable related resources. The Discussion Forums will be reviewed periodically by the Linux Foundation staff, but it is primarily a community resource, not an 'ask the instructor' service.

To learn more tips on how to use them, read the following article: *"Getting the Most Out of the edX Discussion Forums"*.

Course Timing

This course is entirely self-paced; there is no fixed schedule for going through the material. You can go through the course at your own pace, and you will always be returned to exactly where you left off when you come back to start a new session. However, we still suggest you avoid long breaks in between periods of work, as learning will be faster and content retention improved.

The chapters in the course have been designed to build on one another. It is probably best to work through them in sequence; if you skip or only skim some chapters quickly, you may find there are topics being discussed you have not been exposed to yet. But this is all self-paced and you can always go back, so you can thread your own path through the material.

Learning Aids

Besides simple exposition through text and figures, this course uses additional methods to present the learning material, including labs, demonstrations, external resources, glossary and knowledge check questions (Verified Certificate track only).

Audit and Verified Tracks

You can enroll into an audit or a verified track. In an audit track, you will have access to all ungraded course content: course readings, videos, and learning aids, but no certificates are awarded when auditing. You will not be able to access any graded content (knowledge check questions at the end of each chapter, and the final exam).

In order to receive a certificate, you will need to obtain a passing grade (please refer to the "Grading" section below), verify your identity with edX, and pay a fee. Once all edX requirements have been met, you can download your certificate from the Progress tab.

To learn more about audit and verified tracks, visit edX Help Center > Certificates.

Grading (Verified Certificate track only)

At the end of each chapter, you will have a set of graded **knowledge check questions**, that are meant to further check your understanding of the material presented. The grades obtained by answering these knowledge check questions will represent **20%** of your final grade.

The remaining **80%** of your final grade is represented by the score obtained in the **final exam**. The final exam is located at the end of the course and it consists of 30 questions.

You will have a maximum of two attempts to answer each knowledge check and final exam question (other than True/False questions, in which case, you have only one attempt). You are free to reference your notes, screens from the course, etc., and there is no time limit on how long you can spend on a question. You can always skip a question and come back to it later.

In order to complete this course with a passing grade, you must obtain a passing score (knowledge check and final exam) of minimum 70%.

Course Progress and Completion (Verified Certificate track only)

Once you complete the course (including knowledge check questions and final exam), you will want to know if you have passed. You will be able to see your completion status using the **Progress** tab at the top of your screen, which will clearly indicate whether or not you have achieved a passing score.

Professional Certificate Program

Professional Certificate programs are a series of courses designed by industry leaders and top universities to build and enhance critical professional skills needed to succeed in today's most in-demand fields.

To learn more about our Professional Certificates, visit Secure Software Development Fundamentals Professional Certificate, Blockchain for Business Professional Certificate, 5G Strategy for Business Leaders Professional Certificate, Developing Blockchain-Based Identity Applications Professional Certificate and Introduction to DevOps: Practices and Tools.

About The Linux Foundation

The Linux Foundation provides a neutral, trusted hub for developers to code, manage, and scale open technology projects. Founded in 2000, The Linux Foundation is supported by more than 1,000 members and is the world's leading home for collaboration on open source software, open standards, open data and open hardware. The Linux Foundation's methodology focuses on leveraging best practices and addressing the needs of contributors, users and solution providers to create sustainable models for open collaboration.

The Linux Foundation hosts Linux, the world's largest and most pervasive open source software project in history. It is also home to Linux creator Linus Torvalds and lead maintainer Greg Kroah-Hartman. The success of Linux has catalyzed growth in the open source community, demonstrating the commercial efficacy of open source and inspiring countless new projects across all industries and levels of the technology stack.

As a result, the Linux Foundation today hosts far more than Linux; it is the umbrella for many critical open source projects that power corporations today, spanning virtually all industry sectors. Some of the technologies we focus on include big data and analytics, networking, embedded systems and IoT, web tools, cloud computing, edge computing, automotive, security, blockchain, and many more.

The Linux Foundation Events

Over 85,000 open source technologists and leaders worldwide gather at Linux Foundation events annually to share ideas, learn and collaborate. Linux Foundation events are the meeting place of choice for open source maintainers, developers, architects, infrastructure managers, and sysadmins and technologists leading open source program offices, and other critical leadership functions.

These events are the best place to gain visibility within the open source community quickly and advance open source development work by forming connections with the people evaluating and creating the next generation of technology. They provide a forum to share and gain knowledge, help organizations identify software trends early to inform future technology investments, connect employers with talent, and showcase technologies and services to influential open source professionals, media, and analysts around the globe.

The Linux Foundation hosts an increasing number of events each year, including:

- Open Source Summit North America, Europe, and Japan
- Embedded Linux Conference North America and Europe
- Open Networking & Edge Summit
- KubeCon + CloudNativeCon North America, Europe, and China
- Automotive Linux Summit

- KVM Forum
- Linux Storage Filesystem and Memory Management Summit
- Linux Security Summit North America and Europe
- Linux Kernel Maintainer Summit
- The Linux Foundation Member Summit
- Open Compliance Summit
- And many more.

To learn more about The Linux Foundation events and to register, click here.

The Linux Foundation Training

The Linux Foundation offers several types of training:

- Classroom
- Online
- On-site
- Events-based.

To get more information about specific courses offered by the Linux Foundation, click here.

The Linux Foundation Certifications

The Linux Foundation certifications give you a way to differentiate yourself in a job market that's hungry for your skills. We've taken a new, innovative approach to open source certification that allows you to showcase your skills in a way that other peers will respect and employers will trust:

- You can take your certification from any computer, anywhere, at any time
- The certification exams are performance-based
- The exams are distribution-flexible
- The exams are up-to-date, testing knowledge and skills that actually matter in today's IT environment.

The Linux Foundation and its collaborative projects currently offer the following certifications:

- Linux Foundation Certified IT Associate (LFCA)
- Linux Foundation Certified System Administrator (LFCS)
- Linux Foundation Certified Engineer (LFCE)
- Certified Kubernetes Administrator (CKA)
- Certified Kubernetes Application Developer (CKAD)
- Certified Kubernetes Security Specialist (CKS)
- Certified Hyperledger Fabric Administrator (CHFA)

- Certified Hyperledger Fabric Developer (CHFD)
- Certified ONAP Professional (COP)
- Cloud Foundry Certified Developer (CFCD)
- FinOps Certified Practitioner (FOCP)
- OpenJS Node.js Application Developer (JSNAD)
- OpenJS Node.js Services Developers (JSNSD)

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