Distributed Web Applications with IPFS

ICWE Tutorial

Protocol Labs (http://ipn.io)

TUTORIAL SUMMARY

IPFS, the InterPlanetary File System, is the distributed and permanent Web, a protocol to make the Web faster, more secure, open and available. IPFS could be seen as Git meets a BitTorrent swarm, exchanging objects within one Git repository. In other words, IPFS provides a high throughput content-addressed block storage model, with content-addressed hyperlinks. This forms a generalised Merkle DAG, a data structure upon which one can build versioned file systems, blockchains, and even a Permanent Web. IPFS combines a Distributed Hash Table, an incentivised block exchange, and a self-certifying namespace. IPFS has no single point of failure, and nodes do not need to trust each other.

In this tutorial, participants will be able to learn about the IPFS Application Stack, namely: libp2p, the networking layer of IPFS used in order to support multi transport protocols and routing mechanisms; bitswap, the data exchange protocol that enables peers to request and offer blocks of data; Merkle DAG, a Merkle Tree type data-structure where blobs of data are referenced by their cryptographically hash, so that they can be validated with regards to integrity and discovered in the network; API, the interface used by other applications to use IPFS. This tutorial will have a presentation and hands on components, ending up with a discussion in order to help the attendees to understand how IPFS can be used for more specific use cases.

Distributed Web Applications with IPFS is a full day (6 hours) tutorial.

LEARNING OUTCOMES

- How to use IPFS to build a distributed Application.
- Understand how to use libp2p enables IPFS.

TARGET AUDIENCE

General interest in cryptography, distributed systems and p2p protocols is recommended. Familiarity with JavaScript of Go are bonus.

CURRICULUM

During the course of this Tutorial, participants will learn how IPFS was designed and the reasons behind its architecture decisions and build an Web Application using IPFS. The topics covered are:

- Merkle Data Structures
- Distributed Hash Tables
- Peer Routing strategies
- Peer Discovery strategies

This tutorial will be built and customised for the ICWE2016 audience, taking into consideration participants experience with the subject and interest.

THE PRESENTER

David Dias is a P2P Software Engineer and Researcher at Protocol Labs (http://ipn.io/), the company behind IPFS. Before I've worked on the security and web development industry at ^lift security.

David holds a P2P Masters in Science, having built the first P2P DHT using WebRTC specifically for the Web Platform for job execution distribution.

David's speaking history with regards to P2P, security and distributed systems has been the following:

- Dec 2015 | Linux Foundation Node.js Interactive Conference - Stellar Module Management, using IPFS for code package distribution
- May 2015 | Data Terra Nemo, the P2P Conf - webrtc-explorer, distributed browser computing platform using volunteered shared resources
- Feb 2015 | OpoJS - Resource Discovery for the Web Platform on top of a P2P Overlay Network powered by WebRTC
- Apr 2014 | JSConf Brazil - Securing Node.js Applications by the community and for the community Currently I'm also an invited Professor at the University of Lisbon, having developed a new post graduation course on modern web development.

Other relevant previous work:

- Developed a 2 day WebRTC Training for O'Reilly Fluent Conf 2015
- Invited Professor at the University of Lisbon, 2015-2016
- Node Security researcher
- Part of the european research project SynergyVM while a researcher on the distributed systems group at INESC-ID