BlockChain Architecture (5 Days)

By Dr. Vishwanath Rao

Learning Objective

In this module, you will be introduced to the Blockchain technology and learn about its working and properties.

Lab Setup

Windows 10 / Linux / Mac OS - Memory – Minimum 16 GB RAM
Processor – Intel Core i3 CPU @2.00 GHz or later
Storage – 30 GB HDD/SDD or later
Chrome (latest version) / Mozilla with firebug (latest version)

Day 1

Origin And Working Of Blockchain
How does our current financial system work?
What can be the possible solution?
What is a distributed system?
What is Blockchain?
How does a Blockchain work?

Properties of Blockchain Evolution of Blockchain
Cryptocurrency And Blockchain
Anonymity and Pseudonymity in Cryptocurrency Programmable Money
What is inside a block?
Hash Functions and Merkle Trees
Components of Blockchain Ecosystem Cryptography and Consensus Algorithms
Types of Blockchain

Side Chains: another type of Blockchain
Blockchain Implementations Blockchain Platforms
Hands-On:

Working of a Blockchain
Bitcoin Platform
What is Bitcoin?
Why use Bitcoins?
Bitcoin Trading: Buying, selling and storing Bitcoins Bitcoin Ecosystem
Structure of a Bitcoin Transaction
Scripting language in Bitcoin
Applications of Bitcoin script
Nodes in a Bitcoin Network
Hands-On:

Bitcoin Mining
Bitcoin Economics
What is Bitcoin Mining?
Types of Mining
Mining and Consensus
Assembling and selecting chains of blocks Mining and the hashing race
Mining Pools
Hands-On:
Installing Bitcoin Mining software Mining Bitcoin on your PC

Day 2

Introduction To Ethereum
Learning Objective: In this module, you will learn about Ethereum and how it uses the Blockchain technology to create a vast variety of decentralized applications with the help of Smart Contracts.
Topics:
What is Ethereum?
Introducing Smart Contracts Cryptocurrency in Ethereum Mining in Ethereum

Consensus Mechanism in Ethereum
Platform Functions used in Ethereum Technologies that support Ethereum
Ethereum Programming Language
Components for development of Ethereum DApps Editors and tools
Frontend Development Ethereum Test Networks ERC Tokens
Hands-On:
Setting up Metamask and MIST Wallet

Basic Solidity
Learning Objective: In this module, you will learn to develop your own Smart Contracts using Solidity on the Remix IDE.
Topics:
Introducing Solidity Sample Code
Layout of Source File Structure of a Contract State Variables Functions Types
Reference Types
Units
Special Variables and Functions

Day 3

Expressions and Control Structures
Function Calls
Error Handling
Visibility for Functions and State Variables
Hands-On:

Remix browser
Coding experience on Solidity language
Advanced Solidity
State Modifiers Inheritance
Constructors
Libraries
Importing Smart Contracts Events and Logging
Error Handling and Exceptions Common Pitfalls
Gas Limit and Loops
Sending and Receiving Ether Recommendations
Contract ABI

Setting up the development environment
Hands-On:
Creating an interactive GUI for your smart contract using Web3.js And Truffle

Day 4

Developing A DApp Using Truffle
Developing a DApp
Compile and Deploy the Smart Contract Publish the DApp
Connecting to DApp
Ganache Output for Transaction Migration

Hands-On:
Connect the contract to an interactive GUI based on web3.js Deploy the using Metamask
Deploying a DApp that runs on a test network

Hyperledger
Introduction to Hyperledger
Hyperledger architecture
Consensus
Hyperledger API and Application Model
Network Topology
Exploring Hyperledger frameworks
Business Network Deployment on Hyperledger Composer Playground
Hands-On:
Create and Deploy a Business Network on Hyperledger Composer Playground Test the business network definition
Transfer the commodity between the participants

Day 5

Setting Up Development Environment Using Hyperledger Composer
Setting up Development Environment using Composer Developing business networks
Testing business networks
Introduction to Hyperledger Fabric
Hyperledger Fabric Model
Various ways to create Hyperledger Fabric Blockchain Network
Hands-On:

Set up Hyperledger Fabric Blockchain using Hyperledger Composer locally
Develop a business network Deploy and Test business networks
Create And Deploy Your Private Blockchain On MultiChain
What Is MultiChain?
Privacy and Permissions in MultiChain
Mining in MultiChain
Multiple configurable Blockchains using MultiChain Setting up a Private Blockchain
Setting up a private Blockchain
Hands-On:
Create a private Blockchain

Connect to your Blockchain
Create a new asset and sending it between nodes Perform mining between nodes
Prospects Of Blockchain
Blockchain prospering our world
Blockchain transforming business and professionalism Discussing practical use-cases of Blockchain
Real case scenarios of Blockchain
How governments around the world are using Blockchain?