Research Road Map - Blockchain, Technology, opportunities, Challenges and Future Directions

Blockchain has emerged as a new model with various design opportunities of complex systems ranging from healthcare, financial transactions, supply chains, to digital identities bringing a new socio economic paradigm. Blockchain is transforming the way systems are designed in various contexts. From its theoretical and practical perspective Blockchain has emerged from decentralized to centralized with its rapidly growing infrastructure framework employing a diverse and heterogeneous set of design frameworks. Therefore, for researchers it is important to understand the basic architecture, types, application areas of the Blockchains. This helps the researchers to building up conceptual framework for Blockchain ecosystem including its application areas and architecture frameworks. This document presents the basic building blocks of Blockchains, its technology stack and a broader research framework for researchers to apply it for solving complex problems for social good.

The Blockchains

Starting with basic concepts, lets try to understand its core components, history and read through the first paper introduced by

Conceptual Framework of Blockchains - Classic paper

https://bitcoin.org/bitcoin.pdf
Bitcoin

Blockchain Conceptual papers

https://core.ac.uk/download/pdf/301372278.pdf
https://www.inderscienceonline.com/doi/pdf/10.1504/IJWGS.2018.095647
https://ieeexplore.ieee.org/abstract/document/8525392
https://link.springer.com/article/10.1007/s12599-017-0506-0
https://www.sciencedirect.com/science/article/abs/pii/S0268401219303688

Core components of a Blockchain System

https://medium.com/mobindustry/designing-a-blockchain-architecture-types-use-cases-and-challenges-9894fb7b58e

Blockchain Research Frameworks

Blockchain Technology Stack

Research and Commercial platforms for Blockchains

IBM

https://www.ibm.com/au-en/blockchain?p1=Search&p4=43700052660644293&p5=b&gclid=EAIaIQobChMI9Pnp-Yfe8QIV-5VLBR3YeAAWEAMYASAAEgIgSvD_BwE&gclsrc=aw.ds.
Microsoft
https://azure.microsoft.com/en-au/solutions/blockchain/#updates-announcements
AWS
https://aws.amazon.com/blockchain/

Selecting a Blockchain platform

- **A good paper to read**
- https://academic.oup.com/jamia/article/26/5/462/5419321
- **Must read web article**
- https://101blockchains.com/hyperledger-vs-corda-r3-vs-ethereum/
- **Choosing the right Blockchain platform**
- https://www.bot.or.th/Thai/PaymentSystems/FinTech/Documents/Blockchain_the_Series_4_Session_2.pdf
- https://www.kaleido.io/blockchain-blog/enterprise-blockchain-protocols-a-technical-analysis-of-ethereum-vs-fabric-vs-corda
- **The Difference Between Ethereum Vs Hyperledger**

https://medium.com/@harish_6956/hyperledger-development-companies-know-the-difference-between-ethereum-vs-hyperledger-f4b31b9273e6

Types of Blockchain Systems

https://101blockchains.com/permissioned-vs-permissionless-blockchains/

Software Development Platforms for Blockchain based on Permissionless (Public) , Permissioned (Private) and Hybrid Models

Application Areas of Blockchain

Smart contracts

Consensus Algorithms for Blockchain Systems

https://ieeexplore.ieee.org/abstract/document/9397089

Proof of Work and Proof of Stake

Curated list of Blockchain Research Papers

Blockchain papers with code:

https://www.paperswithcode.com/search?&q=Blockchain

GitHub Repos

https://github.com/PlyTools/awesome-blockchain-papers

Applications list with Blockchain
https://github.com/machinomy/awesome-non-financial-blockchain
Blockchain and Identity
https://github.com/peacekeeper/blockchain-identity
Blockchain, papers, languages and applications
https://github.com/yjjnls/awesome-blockchain
scientific thinking- Blockchain

https://github.com/blockchain-research/Paper

Top papers
https://github.com/baozjian/Top-Blockchain-paper
https://github.com/bellaj/Blockchain

Blockchain Research
https://github.com/BlockchainCommons/Research