**Lecture 5 Notes**

Slide 4

* A Public ledger is also called as a distributed ledger.
* It is a database, consensually shared and synchronized across multiple sites, institutions, or geographies.
* It is accessible by multiple people.
* It allows transactions to have public "witnesses".
* The participant at each node of the network can access the recordings shared across that network and can own an identical copy of it.
* Any changes or additions made to the ledger are reflected and copied to all participants in a matter of seconds or minutes.
* When a buyer and a seller engage in a transaction, the blockchain verifies the authenticity of their accounts.
* This is done by using the public ledger and by checking if the funds are available then proceeds with the transactions.
* However, if the funds are either not available in the buyer’s account
* or Funds promised to another party, then the sale is prevented effectively making double buying impossible.

Slide 5

If u c the diagram in the slide,

* The example is taken from bitcoin blockchain network
* There exist 6 uers available are A, B,C,D,E.F,
* Each user is having their own ledger.

Slide 6

* Next, we are discussing a small example of how the public ledger will get updated with each transaction data.
* In this scenario there exist 2 customers, Alice and Bob
* Both Alice and Bob will be having their own ledgers.
* If alice is having 100 Bit coins in his wallet. This information should get updated in the Bobs public ledger.
* If Alice transfers a 60 bit coins to bob that information should be also updated in the bobs ledger.
* In our example we are taken only 2 nodes,
* if their exist n nodes all the n nodes should get update with each transaction data.

Slide 7

let’s discuss briefly the history of the ledger.

* Public ledger evolved in 3 flavors to say single entry ledger, double entry ledger and triple entry ledger
* The story of blockchain is tightly coupled with the story of accounting.
* Historically, humans started off with no way to prove ownership and
* we began with a single entry accounting system.
* The single entry accounting system for the first time in human history allowed us to prove ownership of the asset.
* The ledger was associated with an owner. The single entry accounting worked for centuries.
* The issue with single entry accounting is that it mandated that there was a single authority.
* which is the reason why there was the necessity for a king or a queen to control the ledger.

Slide 8

Next we are discussing about double entry ledger

In order to have trade, at the international level, we needed to have at least two authorities.  
So, for example, for England to do trade with France,

* we had the owner of the ledger, the single entry ledger,
* in England for instance, doing trade with the king or queen of France, who also had their ledger. And so, we needed a new form of accounting,
* and that’s where double entry accounting came in, which was in use up until very recently, within the last 40 years.

Slide 8

Next we are discussing about the important ledger i.e. triple entry ledger.

* Blockchain is the very first implementation of triple entry accounting,
* where we have an asset being recorded on the ledger in the context of a transaction.
* The third entry and triple entry accounting is cryptography,
* where we have a cryptographic account of the transaction stored permanently and immutably on the ledger.
* That’s what the ledger is. A ledger is a collection of transactions.

Slide 10

* It is not a collection of assets. Assets are part of a transaction, but the ledger records the transaction.
* In blockchain, the differentiator is that no one owns the ledger, or all of the participants own the ledger.
* The ledger is distributed. It is, in other words, decentralized. So, there’s a copy of the ledger that exists on every node that exists on the network.
* Said simply, the **ledger is a distributed immutable record of a collection of transactions.**  
  Bitcoin is the most popular asset.
* It was the first asset to be recorded as a transaction on a blockchain ledger, and it remains the most popular, at least in terms of market share.
* As we move to more modern blockchains, we start to look at blockchains such as Ethereum, which not only records the asset on the blockchain,
* they also allow you to have a permanent and immutable collection of code, known as a smart contract, that runs on the blockchain.
* So, the ledger stores the assets, the transactions that are on the blockchain, and it also holds the code.
* A distributed ledger can be described as a ledger of any transactions or contracts maintained in decentralized form across different locations and people.
* Cyber attacks and financial fraud can be reduced using distributed ledgers.

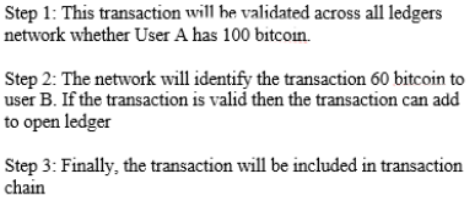
Slide 11

shows the transaction procedure of cryptocurrency in three different stages as shown in the following slides.

* A transaction is a transfer of Bitcoin value that is broadcast to the network and collected into blocks.
* In this diagram we can c that
* A transaction typically references previous transaction outputs as new transaction inputs and dedicates all input Bitcoin values to new outputs.
* Bitcoin transaction defined as a chain of digital signatures.

Slide 11

In the 2nd stage of transaction of bit coins involved 3 sub steps like



Slide 12

And in the 3rd stage of the transcation

* the transaction will get approved and executed
* After approval they can be added to chain

Slide 13

Okay now we discuss about few types of public ledger for differet applications.

To say few

* Public Blockchain Ledger and Private blockchain ledger
* Public ledger blockchain is totally open to all and anybody can join the system.
* Each member on the chain has full power to access, read and write transactions.
* Since it is decentralized and wholly distributed, every node gives verification to approve any transaction.
* Data can not be altered or manipulated once it is placed on the block.
* Public blockchains are also called permissionless blockchains.
* Being totally open to everyone is the biggest drawback of this type of ledger, since it offers complete transparency with little privacy.
* Time taken to reach consensus by the network is high because of the numerous nodes present, therefore resulting in high computational power.
* Few popular examples of public ledgers are  Bitcoin, Ethereum, etc

**Another type is Private blockchain Ledger**

It is Also called permissioned blockchains,

* they have limitations on who is participating in the network.
* A user is granted access only by the network initiator or by a predefined set of rules.
* Once a user is given entrance to the network,
* it can perform the same duties as that of other users.
* Again, the degree of permissions is decided by the one who initiated the network.

Slide 14

Bothe the public ledgers are having some pros and cons

Lets differentiate these two ledgers

|  |  |
| --- | --- |
| **Permission-less blockchain ledger** | **Permissioned blockchain ledger** |
| Open to everyone hence anyone can participate in the network | Only users who have been granted permission by network starter can join |
| More transparency, less privacy | More security, limited permissions |
| High computing power due to a greater number of users | Efficient and well organized due to limited number of users |
| E.g:- Bitcoin, Ethereum | E.g:- Hyperledger Fabric, Corda |

Slide 15

Finally we are discussing few advantageous of Public ledger

* It Reduces operational inefficiencies for various applications
* It Reduce the amount of time a transaction takes to complete, are automated
* It Reduce the maintenance cost of all entities.
* It allows Easy flow of information
* It allows Easy to follow for accountants when they conduct reviews of financial statements
* It Remove the possibility of fraud occurring on the financial books of a company