**Smart Contracts:-**

Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary’s involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met.

Chaincode, also referred to as smart contracts, is software that you can use to read and update data on the blockchain ledger. Chaincode can turn business logic into an executable program that is agreed to and verified by all members of the blockchain network. Business logic includes the definition of assets that are traded between parties. It also consists of the terms and conditions that are required for a transaction to be executed. Turning these rules into code on a blockchain allow businesses to streamline business processing and auditing and reduce large amounts of manual processing and paperwork.

As an example, imagine that a network of car dealerships, insurance companies, and government regulators decides to use blockchain to track vehicle ownership. The chaincode might require that all vehicles have a valid registration and vehicle identification number in order to be added to the network. When a vehicle is sold, the chaincode requires that the funds are placed in escrow until the vehicle is registered to its new owner by a regulator. After the new registration completes, the new owner is recorded, and the funds are transferred automatically.

**How It Works:-**

Smart contracts work by following simple “if/when…then…” statements that are written into code on a blockchain. A network of computers executes the actions when predetermined conditions have been met and verified. These actions could include releasing funds to the appropriate parties, registering a vehicle, sending notifications, or issuing a ticket. The blockchain is then updated when the transaction is completed. That means the transaction cannot be changed, and only parties who have been granted permission can see the results.

Within a smart contract, there can be as many stipulations as needed to satisfy the participants that the task will be completed satisfactorily. To establish the terms, participants must determine how transactions and their data are represented on the blockchain, agree on the “if/when...then…” rules that govern those transactions, explore all possible exceptions, and define a framework for resolving disputes.

Chaincode can be written in multiple languages, and the IBM Blockchain Platform supports chaincode written in Go and Node.js. Chaincode allows users query and change data that is stored in the blockchain by using APIs that the Fabric Chaincode interface provides. Data on the blockchain is stored in key-value pairs in the world state of the channel [ledger](https://hyperledger-fabric.readthedocs.io/en/release-1.2/ledger/ledger.html). Chaincode uses get commands to retrieve values and use put commands to create or update values. Using these basic operations, you can build functions that define the business rules of your network. These functions can be invoked by your applications and surfaced to end users of the network. To continue using the vehicle network example, you can create a function that allows a car dealership to use a PUT command to add a car to the ledger if they can provide a valid vehicle ID number.

Then the smart contract can be programmed by a developer – although increasingly, organizations that use blockchain for business provide templates, web interfaces, and other online tools to simplify structuring smart contracts.

**Benefits of smart contracts**

* **Speed, efficiency and accuracy**

Once a condition is met, the contract is executed immediately. Because smart contracts are digital and automated, there’s no paperwork to process and no time spent reconciling errors that often result from manually filling in documents.

* **Trust and transparency**

Because there’s no third party involved, and because encrypted records of transactions are shared across participants, there’s no need to question whether information has been altered for personal benefit.

* **Security**

Blockchain transaction records are encrypted, which makes them very hard to hack. Moreover, because each record is connected to the previous and subsequent records on a distributed ledger, hackers would have to alter the entire chain to change a single record.

* **Savings**

Smart contracts remove the need for intermediaries to handle transactions and, by extension, their associated time delays and fees.

**References: -**

[**https://www.ibm.com/in-en/topics/smart-contracts**](https://www.ibm.com/in-en/topics/smart-contracts)

[**https://cloud.ibm.com/docs/blockchain-sw?topic=blockchain-sw-develop-smart-contracts**](https://cloud.ibm.com/docs/blockchain-sw?topic=blockchain-sw-develop-smart-contracts)