**Operation of a digital relay**

Digital relay architecture is:

* Input Module
* CPU
* Memory
* Multiplexer and Analog to digital converter
* Output module
* Digital input/Communication module

**Input Module**

The Power system operates with analog parameters. The high-powered analog signals are stepped down with current transformer and Potential transformer. It is fed to the numeric relay using lowpass filter. The low pass filter is used to eliminate the noisy signal in the system due to corona or induction effect from a nearby high voltage line.

**CPU**

Central Processing Unit (CPU) is the brain of the system, which processes all data protection algorithm and digital inputs and their filtering.

**Memory**

Numerical relay has two memories, RAM and ROM. Random Access Memory (RAM) is responsible for retaining the input data to the relay and processing the data during compilation.

Read-Only Memory (ROM) is the storage unit of the relay. It stores the software needed and other data related to event and disturbance. The Storage unit is a must feature because it helps in analyzing and troubleshooting any event during the occurrence of a fault.

**Multiplexer and Analog to digital converter**

The CPU can only process digital data but the input from the current transformer and potential transformer are analog. Hence the Analog to digital converter is used to convert the signal to digital data. In case multiple analog signals need to be converted a multiplexer is used for selecting the required analog input for conversion.

**Output Module**

The output module is the digital contacts that are actuated when a trip command is given by the CPU. These digital contacts are pulses that are generated as a response signal. The response time can be changed according to the application of the relay.

**Digital input/Communication module**

As of in a computer, a relay also has serial and parallel ports for connecting the relay with control and communication systems in the substation. The Auxiliary relays can be connected to the digital output contacts to extend the tripping command.

The digital relays are mostly used in the generating stations and substations for automated protection. These relays can protect various components such as feeder, Motor, Generator, Transmission line, Transformers and Bus bars.