Communication

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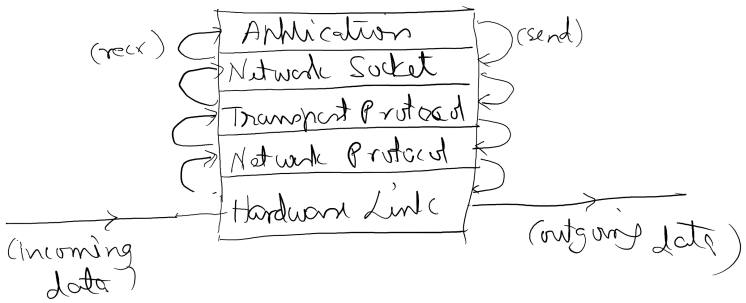
Network Communication: It is a mechanism provided by the platform which enables a program running on one machine to exchange data with another program running on a remote machine physically linked to the first machine with some type of networking hardware. An operating support offers support for network communication by providing implementations for:

1. **Network Protocol** - It is a hardware link type (WiFi, 4G) independent interface for identifying each machine known as a *host* on the network and for handling transfer of data between such hosts. The *internet protocol* (IP v4/6) is a popular network protocol which identifies each host using a unique (32/128 bit) integer known as its IP address and allows this host to exchange data using structured blocks (with maximum size of 65535 bytes) known as IP packets.
2. **Transport Protocol** - It is a network protocol based interface for identifying a communicating process known as a *peer* executing on a particular host and for handling transfer of data between such peers. The *transmission control protocol* (TCP) is a popular IP based transport protocol which identify each peer using a unique *endpoint* consisting of a 16-bit integer known as the *port* address along with the IP address of the host and provides support for a *reliable connection-oriented* data-transmission between peers.
3. **Network Socket** - It is a programming interface which enables an application to consume the implementation of transport protocol provided by the system. A *stream socket* is built on top of a connection oriented transport protocol like TCP to support sending and receiving of data as a sequence of bytes.

Distributed System: It is a software consisting of different parts with each executing within its own process on a separate machine and interacting with other parts using network communication. It is generally implemented using one or more *server* processes each publishing its operations on a *well-known* network endpoint so that they can be consumed by a *client* process from a *random* network endpoint. A distributed system is commonly used for centralizing (or decentralizing) resources over the network and such large-scale centralization (or decentralization) over the internet is called *cloud* (or *grid*) computing.



Hyper Text Transmission Protocol (HTTP)**:** It is a standard TCP/IP based communication scheme (application protocol) for sharing resources over the network with each such resource referred by its *uniform resource identifier* (URI) which includes the *path* of that resource along with the *endpoint* of its provider (server). HTTP offers a simple *request-response* model for *stateless* (one request handling per connection) communication which involves following two steps

1. Client sends a request based on the URI to the server as
   <VERB> <uri-path> HTTP/<version>\r\n
   <Header-1>: <value_1>\r\n
   <Header-2>: <value_2>\r\n
   …
   \r\n
   <body-content>

2. Server sends a response based on the request to the client as
   HTTP/<version> <status-code> <status-text>\r\n
   <Header-1>: <value_1>\r\n
   <Header-2>: <value_2>\r\n
   …
   \r\n
   <body-content>

Standard HTTP Request Verbs (CRUD actions)

POST - *Create* the resource identified in the request path from the content of the request body.
GET - *Read* the resource identified in the request path and send it in the response body.
PUT- *Update* the resource identified in the request path from the content of the request body.
DELETE - *Delete* the resource identified in the request path.

Standard HTTP Response Status Codes

2nn - request was handled successfully with resource written to the response body.
3nn - redirect request to another URI specified in the status text.
4nn - request has an error such as invalid verb or path or body content.
5nn - request handling failed due to some internal error.