

B.E.

Sixth Semester Examination, Dec.-2009

Network Programming (IT-302E)

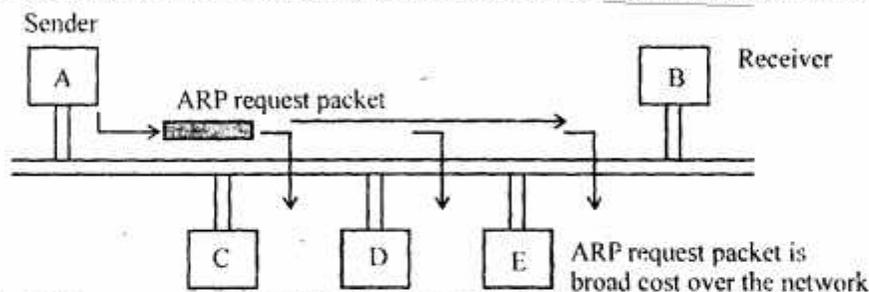
Note : Attempt any *five* questions.

Q. 1. What is Address Mapping (ARP)? How it takes place? Discuss ARP packet? How Encapsulation takes place in ARP? How RARP work if we know physical address of a machine?

Ans. ARP (Address Resolution Protocol) :

- (i) A internet consists of various types of networks and the connecting devices like routers.
- (ii) A packet start from the source host, passes through many physical networks and finally reaches the destination host.
- (iii) At the network level, the host and routers are recognised by their IP address.
- (iv) ARP is used for associating an IP address to its MAC address. For a LAN, each device has its own physical or station address as its identification. This address is imprinted on the NIC.
- (v) The router A who wants to find the MAC address of some other routers, sand an ARP request packet.

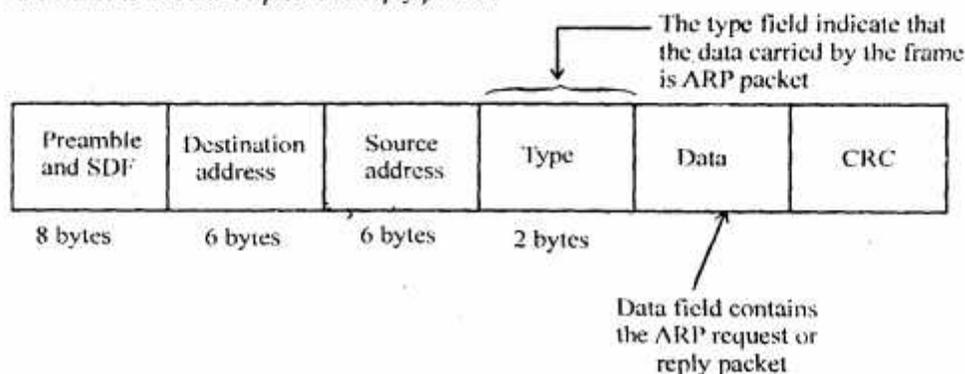
This packet consist of IP and MAC address of the sender A and the IP address of the receiver (B).



- (vi) The ARP response packet contains the IP and physical address of the receiver (B). This packet is delivered only to A using A's physical address in the ARP request packet.

Encapsulation :

- (i) An ARP packet (request or reply) is encapsulated directly into the data link frame.
- (ii) An ARP packet being encapsulated in ethernet frame. The type field indicates that the data carried by the frame is an ARP request and reply packet.



RARP :

- (i) RARP (Reverse Address Resolution Protocol) is part of the TCP/IP protocol suit. It allows a computer particularly a diskless workstation, to obtain an IP address from a server. When a diskless TCP/IP workstation is booted on a network, it broadcast a RARP request packet on the local network.
- (ii) This address packet is broadcast on the network. For all to receive because the work station does not know the IP address of the server that can supply it with an address.
- (iii) It include its own physical network address in the request so the server will know where return a reply
- (iv) The server that receive the request looks in a table and matches the MAC address with an IP address and the returns the IP address to diskless workstation.

Q. 2. Discuss the following with the help of example :

- (i) **Finger**
- (ii) **Trace RT**
- (iii) **Route**
- (iv) **Net State**
- (v) **Ping**
- (vi) **IPC Config.**

Ans. (i) Finger : Finger protocol and the finger user information protocol are simple network protocol for the exchanging of human oriented status and user information.

Finger is based on the transmission protocol using TCP. The local host opens a TCP connection to a remote host of the finger port. An RUIP (Remote User Information & Program) become available on the remote end of the connection to process of the request. The local host the RUIP a one line query based upon the finger query specification and wait for the RUIP respond

(ii) Trace RT : The track route is a computer network tool used to show the route taken by packets across an IP network. An IPv6 variant trace route 6, is also widely available.

The trace route tool is available on practically all unix-like operating systems. Variety with similar functionality are also available, such as trace path on modern Linux installation and trace rt on microsoft windows operating systems windows-NT based operating system also provide path ping which provide similar property.

(iii) Route : A route is commonly defined as a chaotic and disorderly retreat or withdrawal of troops from a battle field resulting in the victory of the opposing party or following defect, a collapse of discipline.

A must command if you do any networking. This one allows you to modify and added to your routing tables. The routing is what makes it happen. It is what specifies where package are sent to reach place. It is the first place to look when you run into problems like "host unreachable or not found" in an network environment.

(iv) Net State : Net State (Network Statics) is a command line tool that display network connection (both incoming and outgoing) routing tables and a number of network interface statics. It is available on unix, unix-like

It is used for finding problems in the network and to determine the amount of traffic on the network as performance measurement.

(v) Ping : Ping is a computer network administration utility used to test wheather a particular host is reachable across an Internet Protocol (IP) network and to measure the round trip time for packet sent from the local host to a destination computer including the local host's own interface ping operate by sending internet control message protocol echo request packet to the target host and wants for an ICMP response, sometime casually called a pong.

(vi) **IP Config** : IP config (internet protocol configuration) in microsoft windows is a console application that displays all current TCP/IP network configuration values and refreshes dynamic host configuration protocol DHCP and domain name system DNS setting.

The standard path is % wind IR%\System 32\ipconfig.exe (which usually resolve to C: \windows\system 32\ipconfig.exe.

Q. 3. What is Socket? How they are created for TCP and UDP? How we can define address of socket? Discuss various I/O function used in TCP and UDP Socket? Also differentiate TCP and UDP sockets.

Ans. Sockets :

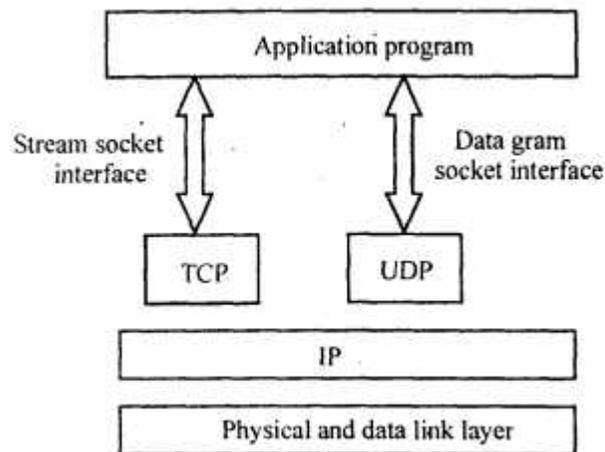
- (i) The sockets interface was originally based on unix. It defines a set of system calls or procedure.
- (ii) The communication structure that we need to socket programming is called as a socket. A socket act as a end point.
- (iii) Two process can communicate only if they have at each end.

Various Field in Socket Structure ;

- (i) **Family** : This field is used to defining the protocol groups.
- (ii) **Type** : This field is used to defining the type of socket such as stream socket, packet, socket or raw socket.
- (iii) **Protocol** : This field is usually set to zero for TCP and UDP.
- (iv) Local socket address.
- (v) Remote socket address.

Stream Socket : This is designed for connection oriented protocol such as TCP. The TCP uses a pair of stream socket for connecting one application program to other across the internet.

Datagram Socket : This type of socket is designed for the connectionless protocol such as UDP. UDP uses a pair of datagram socket for sending a message from one application program to another across the internet.



Step Followed for the Socket Programming :

Server Side :

- (i) Server create a socket and check for errors using socket.
- (ii) Again address to the newly created by socket using BIND.
- (iii) Use the LISTEN to allocate space to queue the incoming calls.
- (iv) Execute an accept for blocking the waiting incoming connection.

Client Side :

- (i) Create a socket using socket.
- (ii) Use connect to initiate connection process.
- (iii) Establish the connection.

Q. 4. Discuss various Design Issues and Algorithms related to the server? Give details.

Ans. Connections Less Iterative Server :

- (i) Let us now discuss connectionless, iterative client server communication using UDP and datagram sockets.
- (ii) The server that uses UDP is usually connectionless iterative. So, the server serve one request at a time.
- (iii) A server gets the request received in a packet form UDP, it process the request and gives the response to UDP to send it to the client.
- (iv) The server does not pay any attention to the other packet.
- (v) The other packets are stored in a queue waiting for the service. They are processed one by one.
- (vi) The server users one single part for this purpose the well known part.
- (vii) All the packets arriving at this part will wait in line to be served.

Server Function :

- (i) Create a socket
- (ii) Bind
- (iii) Repeat.

Connection Oriented Server :

- (i) The connection oriented concurrent client server communication uses TCP and stream socket. The server using TCP are normally concurrent. That means a server is serving many clients at the sometime.
- (ii) The type of communication is connection oriented once a connection is established. It remains open until entire stream of bytes is processed. After that the connection is terminated.
- (iii) The server must have one buffer for each connection. The bytes from the client are stored in buffer and handled currently by the server.
- (iv) In order to provide this type of server, the concept of parent and child server is used.

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Q. 5. What is Routing? Discuss Role of Routing sockets in network routing. How Routing sockets are implemented, discuss with the help of example? Is Routing socket used in broadcasting to mobile network? Justify.

Ans. Routing Algorithm :

- (i) One of the important functions of the network layer is to route the packets from the source machine to destination machine.
- (ii) The major area of network layer design includes the algorithm which choose the routes and the data structure which are used.
- (iii) Routing algorithm is part of network layer software. It is responsible for deciding the output line over which a packet is to be sent.
- (iv) Such a decision is dependent on whether the subnet is a virtual circuit or it is datagram switching.

Properties of Routing Algorithm :

- (i) Correctness
- (ii) Robustness
- (iii) Stability
- (iv) Fairness
- (v) Optimally.

Broad Casting Routing : In certain application the host has to send packets to many or all other hosts. Sending a packet to all destinations simultaneously is called as broadcasting.

(i) Simple Broad Casting : In this method the source will simply send a distinct packet to each destination.

This methods has two drawback :

- (a) It wastes the bandwidth.
- (b) The source has to have a complete list of all destination.

(ii) Flooding :

- (a) Flooding is another method used for broad casting. The problem with flooding is that it has a point routing algorithm.
- (b) So, it consumes a lot of band width and generates too many packets.

(iii) Multidestination Routing : In this algorithm each packet will contain a list of destination or a bit map which indicates the designed destination.

When such a packet arrives at a router, the router first checks all the destinations. Then it decides the set of output lines that will be required.

Q. 6. (a) Differentiate echo services of TCP and UDP.

Ans.

| UDP | TCP |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| (i) Simple, high speed low-functionally wrapper that interlaces applications to the network layer and does little else. | Full featured protocol that allows applications to send data reliable without worrying about network layer. |
| (ii) Connectionless data is sent without set up. | Connection-oriented connection must be established prior to transmission |
| (iii) Message-based data sent in discrete packages by the application. | stream-based data is sent by the application with no particular structure. |
| (iv) Unreliable, best efforts delivery without acknowledge. | Reliable delivery of messages all data is acknowledge. |
| (v) Very low overhead | Low but higher than UDP. |
| (vi) Transmission speed very high. | High but not as high as UDP. |
| Well known application and protocols : Multimedia, application, DNS, Boot P, DHCP, IFTP, SNMP, RIP, NFS. | FTP, Telnet, SMTP, DNS, HTTP, POP, NNTP, IMAP, BGP, IRC, NFS. |

Q. 6. (b) Discuss IP datagram format in detail.

Ans.

| | | | |
|------------------------|----------|------------------|-------------------------------|
| VER | HLEN | D.S.type service | Total length 16 bits |
| Identification 16 bits | | Flag 3 bits | Fragment taken offset 13 bits |
| Time to live | Protocol | Header checksum | |
| Source IP address | | | |
| Destination IP address | | | |
| Option + padding | | | |

(i) **VER (Version)** : This field defines the version of IP.

(ii) **HLEN (Header Length)** : This field defines the length of datagram header in 4 byte.

(iii) **Differential Services** : This field defines the class of the datagram for quality of service purpose.

(iv) **Total Length** : This field defines the total length of the IP datagram.

(v) **Time to Live** : This is 8 bit long field which control the maximum number of routers.

(vi) **Protocol** : This fields define the higher level protocol which uses the services of the IP layer.

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- (vii) **Header Checksum** : A checksum in IP packets errors on the header only.
- (viii) **Source Address** : This field is used for defining the IP address of the source.
- (ix) **Destination Address** : This field is used for defining the IP address of destination.
- (x) **Option** : Option are not required for every datagram. They are used for network testing and debugging.

Q. 7. Write short note on the following :

- (i) **UDP Datagram format**
- (ii) **RPC Transmission**
- (iii) **Debugging Techniques**
- (iv) **Communication Semantics.**

Ans. (i) UDP Datagram Format :

| | |
|-------------|------------------|
| Source port | Destination port |
| Length | UDP checksum |
| Data | |

Source Port : Source port is optional field, when meaningful, it indicates the port of the sending process and may be assume to be the part to which reply should be address at the absence of any other information.

Destination Port : Meaning within the context of a particular Internet destination address.

Length : The minimum length is 8 bytes, the length of the header alone.

UDP Checksum : The checksum is performed on a pseudo header consisting of information obtained from the IP header as well as the UDP header.

(ii) RPC Transmission : This document explains how to remotely or locally, connect to a transmission session programmatically using the RPC protocol.

If you are looking to control a transmission session non-programmatically you can either use the transmission remote.

The current and in progress specification can be found here, [trunk/doc/rpc-spec.txt](#).

(iii) Debugging Techniques : The log is generally the first thing to try when debugging. It lets you append text to the games log file. The stuff it writes can be viewed while the game is running, type "show log in console to open the log window. To start the game with log window already displayed and the windowed start UT 2004.exe with windowed-log parameters. The tag parameters gives the beginning of your message a more meaningful name.

(iv) Communication Semantics : Several approaches to the semantics of agent communication have been purposed so far none of them is really suitable for dealing with autonomy, which is a decisive prosperity of artificial agent and is most distinct in open multiagent system. As a response to this issue, we have introduced so called empirical semantics and empirical rational semantics approach to the semantics and programmatic of formal agent communication languages.