Website Communication

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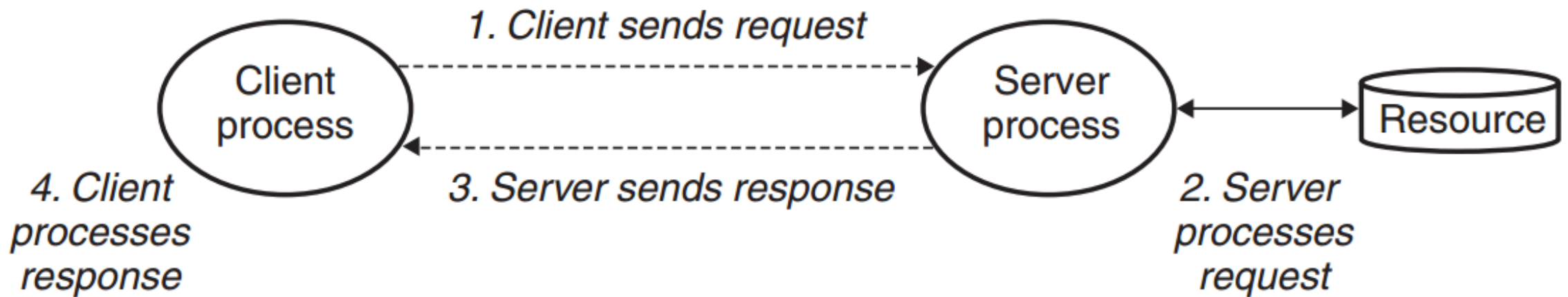
The Client-Server Programming Model

Figure 11.1 A client-server transaction.

DNS

- Easier to remember the server's address.
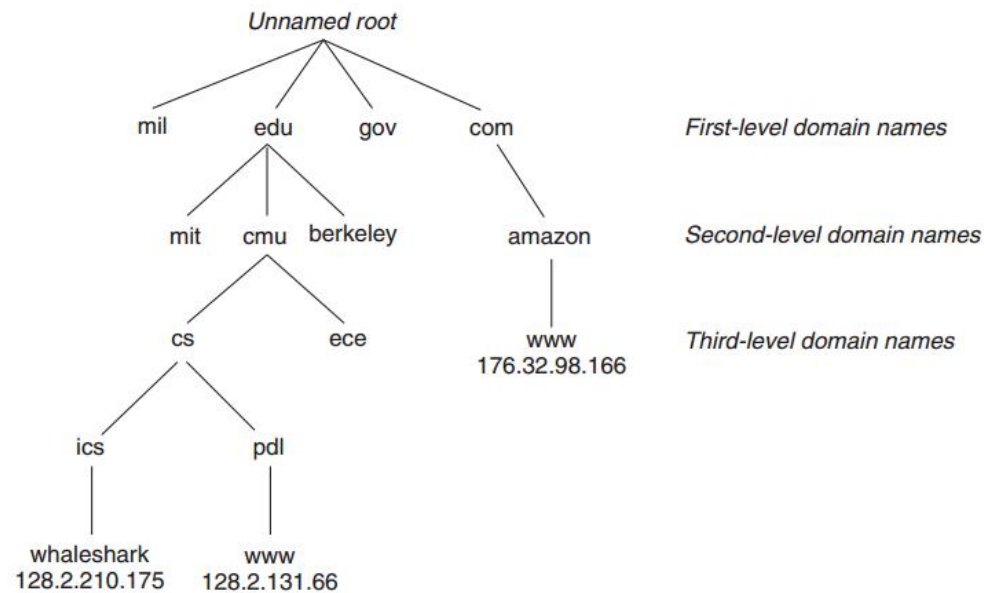- whaleshark.ics.cs.cmu.edu.

Figure 11.10   Subset of the Internet domain name hierarchy.

The 8 steps in a DNS lookup:

1. A user types 'example.com' into a web browser and the query travels into the Internet and is received by a DNS recursive resolver.

2. The resolver then queries a DNS root nameserver (.).

3. The root server then responds to the resolver with the address of a Top Level Domain (TLD) DNS server (such as .com or .net), which stores the information for its domains. When searching for example.com, our request is pointed toward the .com TLD.

4. The resolver then makes a request to the .com TLD.

5. The TLD server then responds with the IP address of the domain's nameserver, example.com.

6. Lastly, the recursive resolver sends a query to the domain's nameserver.

7. The IP address for example.com is then returned to the resolver from the nameserver.

8. The DNS resolver then responds to the web browser with the IP address of the domain requested initially.

TCP/IP

- Guarantee the packets are successfully arrived the destination without error or missing.

HTTP

HyperText Transfer Protocol (HTTP), the Web's application-layer protocol.

HTTP is Implemented in client-server programming model.

HTTP uses TCP as its underlying transport protocol.

non-persistent and persistent connections

- non-persistent connections, a brand-new connection must be established and maintained for each requested object and the TPC connection is terminated after a request.

- persistent connections, connection is established for a request and subsequent of requests and responses between a same server-client is sent in one persistent TCP connection, and over a period of idle time it'll be closed.

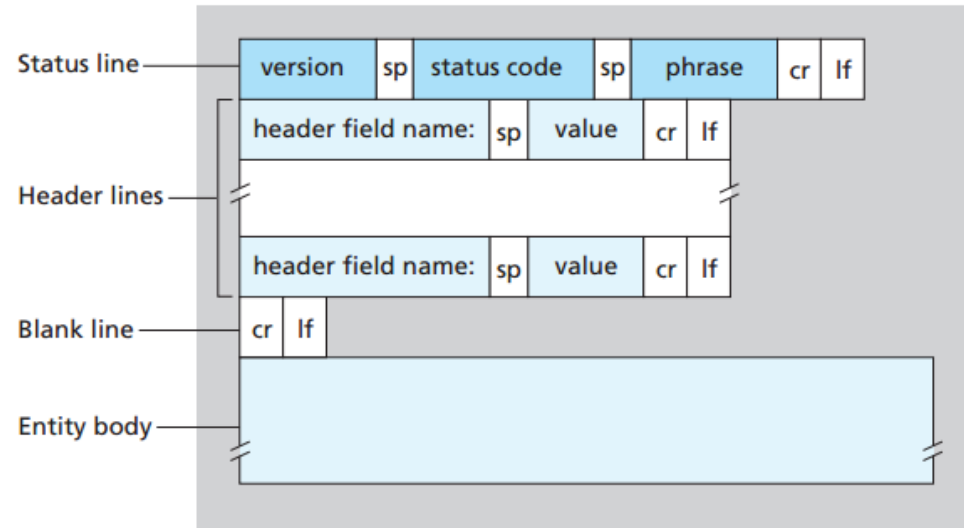# HTTP req & res format

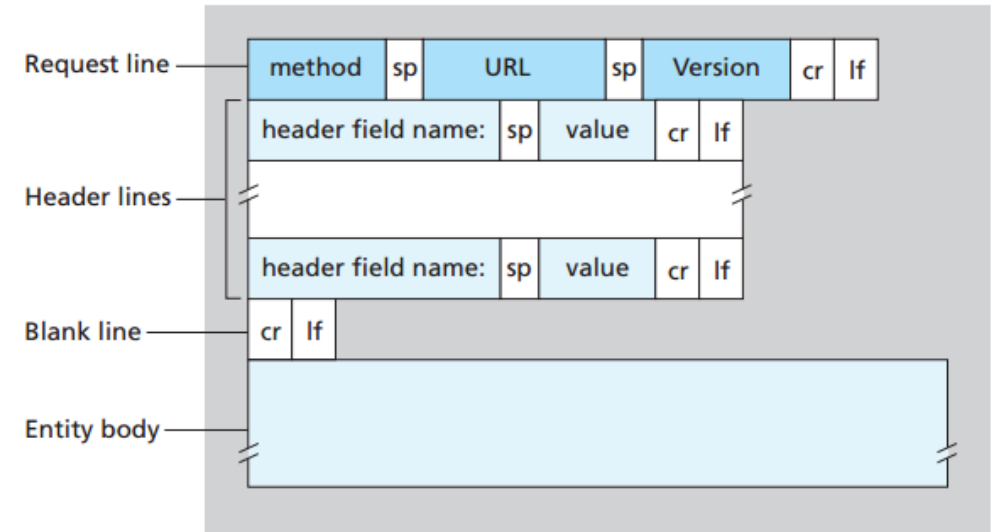Figure 2.9 ♦ General format of an HTTP response message

Figure 2.8 ♦ General format of an HTTP request message

How does a website work

The browser goes to the DNS server, and finds the real address of the server that the website lives on (you find the address of the shop).

The browser sends an HTTP request message to the server, asking it to send a copy of the website to the client (you go to the shop and order your goods). This message, and all other data sent between the client and the server, is sent across your internet connection using TCP/IP.

If the server approves the client's request, the server sends the client a "200 OK" message, which means "Of course you can look at that website! Here it is", and then starts sending the website's files to the browser as a series of small chunks called data packets (the shop gives you your goods, and you bring them back to your house).

The browser assembles the small chunks into a complete web page and displays it to you (the goods arrive at your door — new shiny stuff, awesome!).
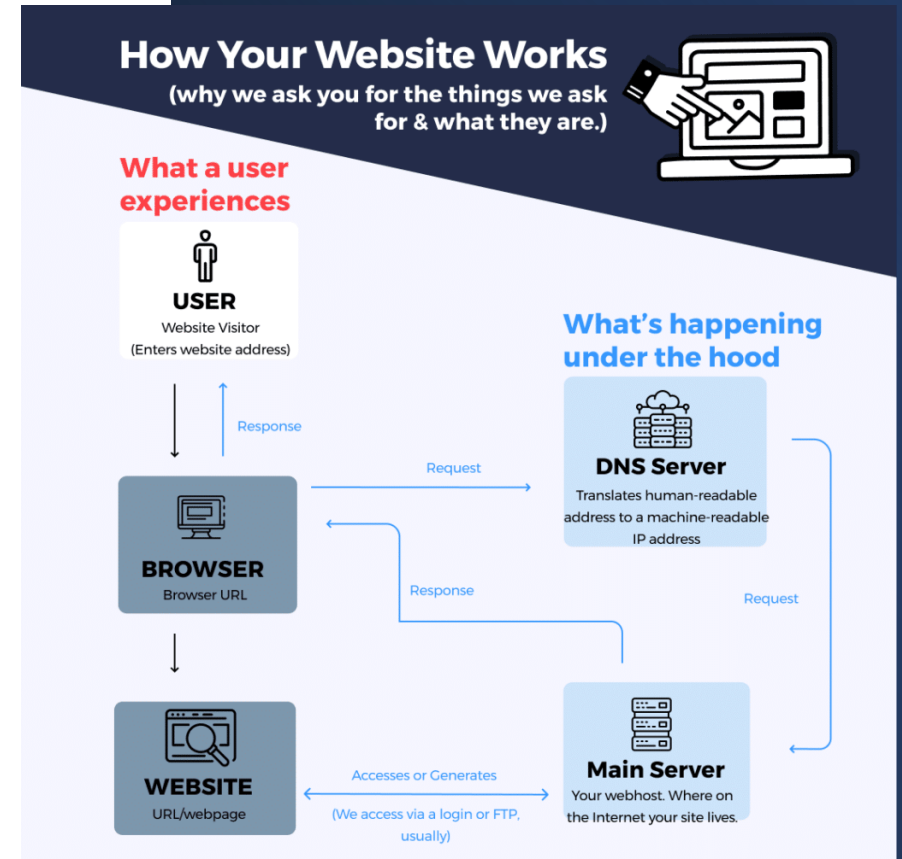
Socket

- A socket is an end point of a connection. Each socket has a corresponding socket address that consists of an Internet address and a 16-bit integer port2 and is denoted by the notation **address:port.**

- the client's socket address is assigned automatically by the kernel, the server's socket address is typically some well-known port that is permanently associated with the service. For example, Web servers typically use port 80, and email servers use port 25.
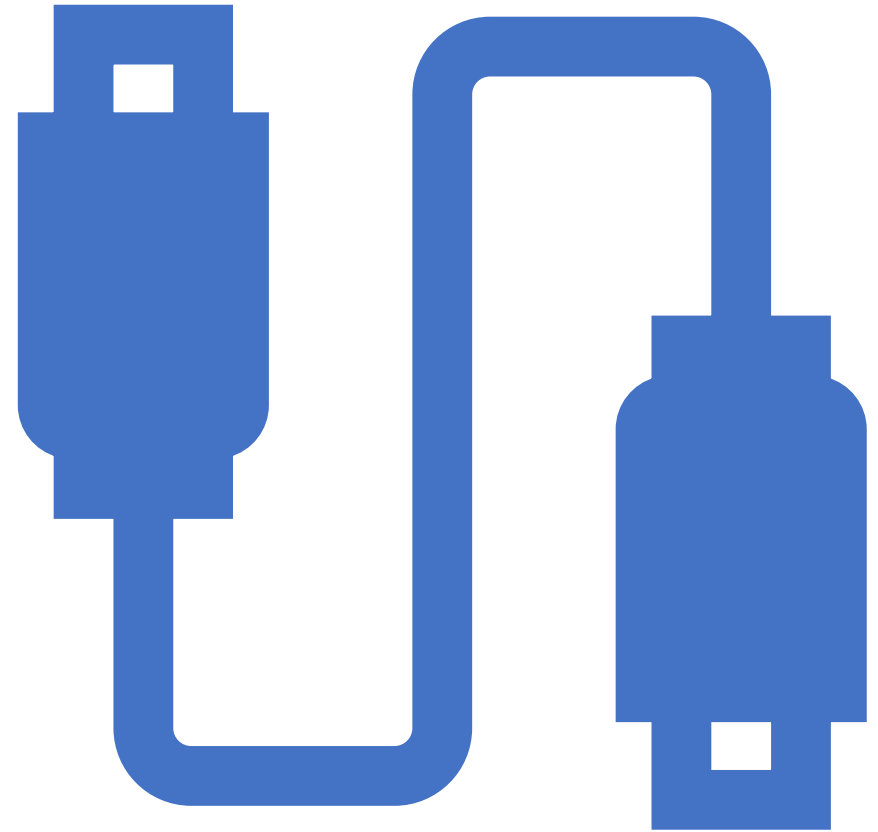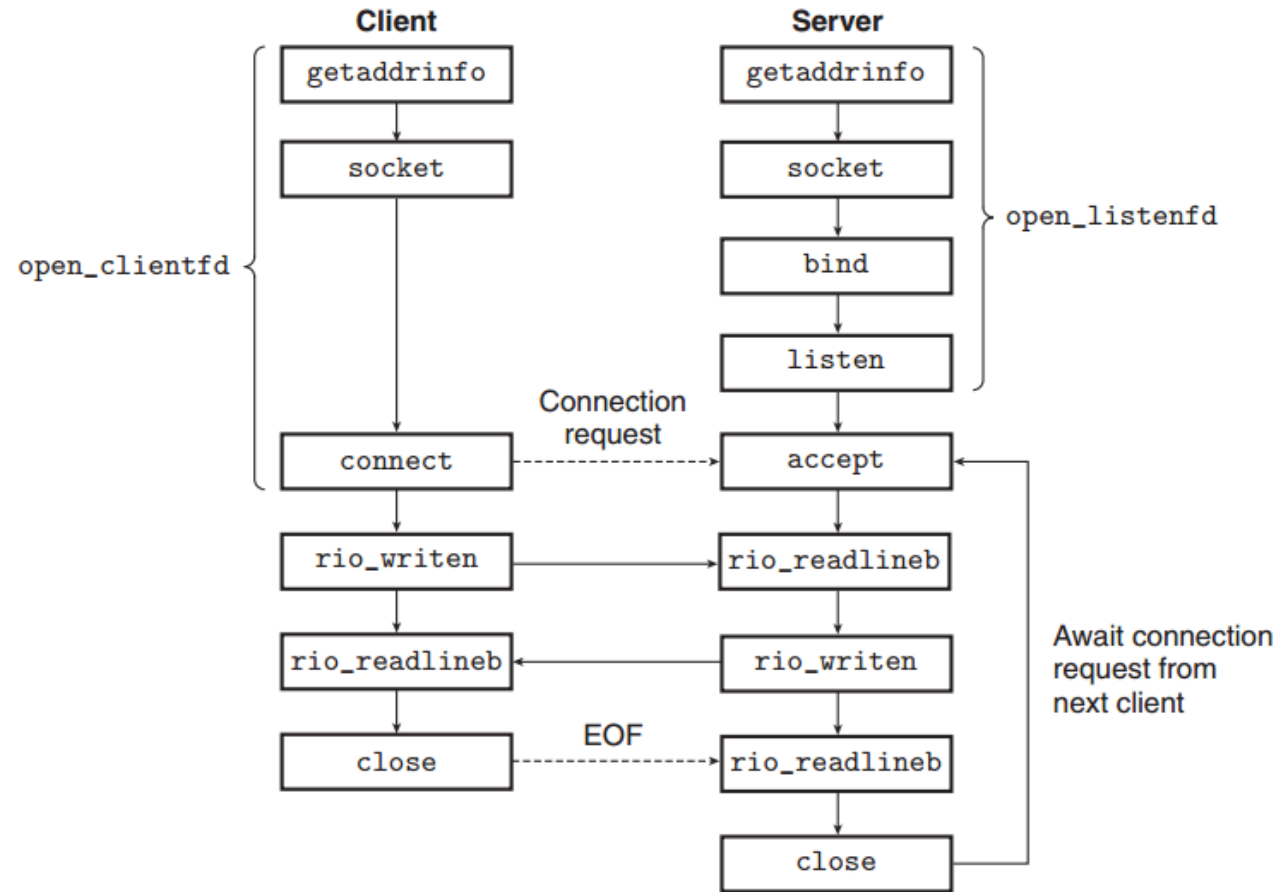
Socket methods in C and Linux

Figure 11.12   Overview of network applications based on the sockets interface.

References

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- Randal-E.-Bryant-David-R.-OHallaron-Computer-Systems.-A-Programmers-Perspective-3rd-ed.-2016-Pearson.
- Kurose, J., & Ross, K. (2022). *Computer networking*. Harlow: Pearson.