The Domain Name System

Thursday, 21 September 2023 Join Zoom call

There are perhaps 100 or more application layer protocols; they are common enough that you may be involved in developing one at some point.[1] While we cannot cover them all, our examination of DNS in this lesson—as well as our upcoming exploration of HTTP/1.1 and HTTP/2—should give us a good overall idea of the key concerns and design decisions behind any other application layer protocols.

Many are surprised to learn that DNS is an application layer protocol, and that to resolve a URL into an IP address we must make a network request to a DNS server (identified by its IP address!).[2] This lesson will elucidate how this is possible, and give us a stronger understanding of one of the major services that makes the Internet user friendly.

Pre-class Work

For some background on DNS, please read the "DNS—The Internet's Directory Service" chapter of K&R, or watch sections 5.8-5.10 of ICN.

In order to send a DNS message—just like any network application message—we must know the protocol well enough to construct the message correctly. But that's not quite enough! We also require a

means of transmitting the message, by having our operating system wrap it in the necessary transport, network and link layer meta data, and to actually transmit the resulting frames over the network. The standard mechanism for achieving this is the socket.[3]

As a pre-class exercise, please follow the instructions belowe to build a simple DNS client, both as our first introduction to socket programming, and to further improve our understanding of this important application layer protocol.

See further instructions or **download solution**

Further Resources

The most illustrative RFCs related to DNS are RFC 1034 and RFC 1035.

For an approachable and fascinating history of DNS, see the paper Development of the Domain Name System.

Recording

The class recording will be available here shortly after the class has finished.

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