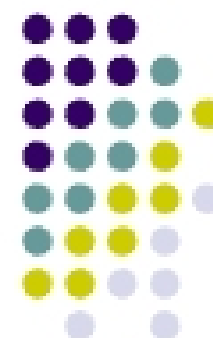


Chapter 2 Applications and Layered Architectures

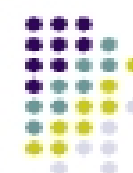


Protocols, Services & Layering
OSI Reference Model
TCP/IP Architecture
How the Layers Work Together
Berkeley Sockets
Application Layer Protocols & Utilities



1

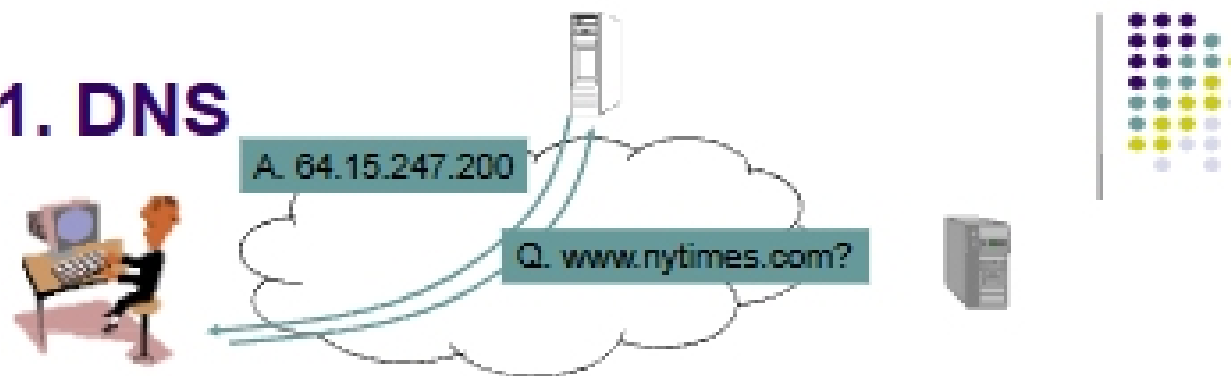
Layers, Services & Protocols



- The overall communications process between two or more machines connected across one or more networks is very complex
- **Layering** partitions related communications functions into groups that are manageable
- Each layer provides a **service** to the layer above
- Each layer operates according to a **protocol**
- Let's use examples to show what we mean

2

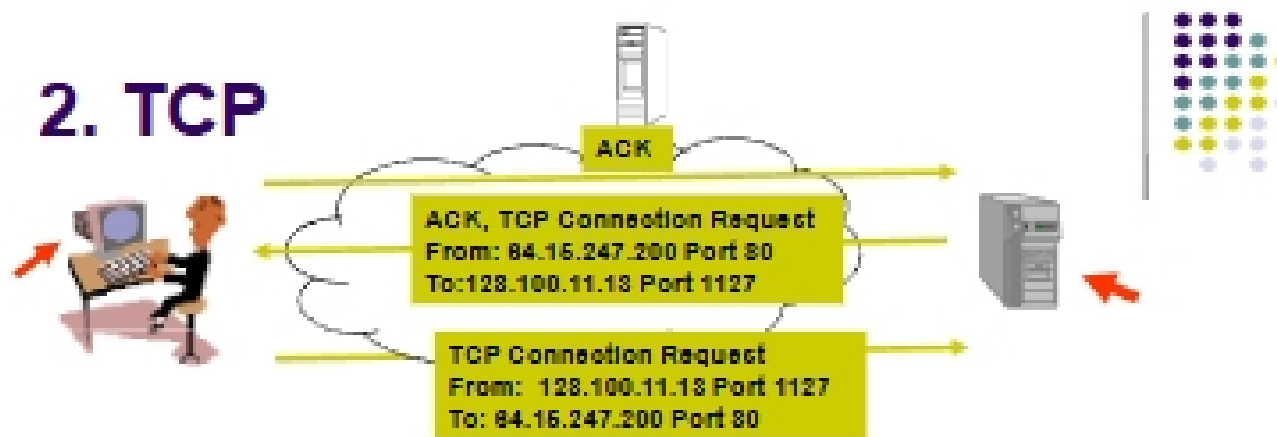
1. DNS



- User clicks on <http://www.nytimes.com/>
- URL contains Internet name of machine (www.nytimes.com), but not Internet address
- Internet needs Internet address to send information to a machine
- Browser software uses Domain Name System (DNS) protocol to send query for Internet address
- DNS system responds with Internet address

3

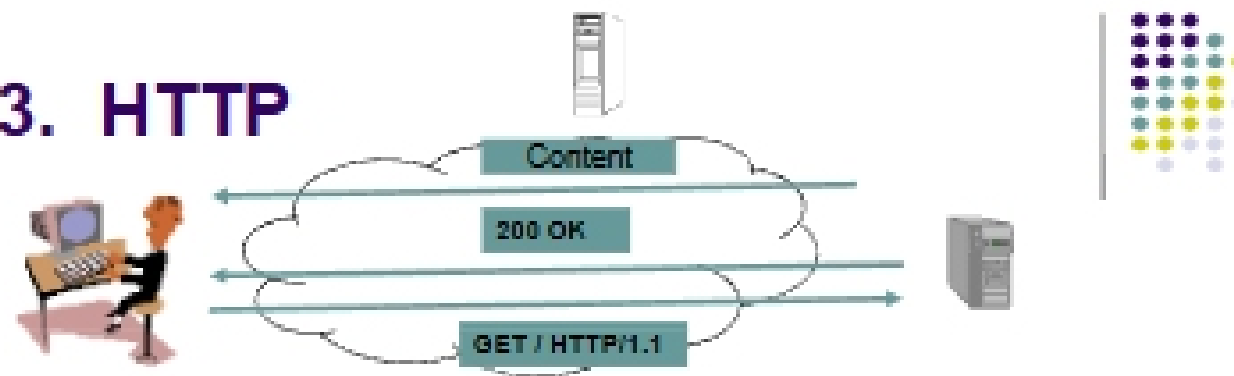
2. TCP



- Browser software uses HyperText Transfer Protocol (HTTP) to send request for document
- HTTP server waits for requests by listening to a well-known port number (80 for HTTP)
- HTTP client sends request messages through an "ephemeral port number," e.g. 1127
- HTTP needs a Transmission Control Protocol (TCP) connection between the HTTP client and the HTTP server to transfer messages reliably

4

3. HTTP



- HTTP client sends its request message: "GET ..."
- HTTP server sends a status response: "200 OK"
- HTTP server sends requested file
- Browser displays document
- Clicking a link sets off a chain of events across the Internet!
- Let's see how protocols & layers come into play...

5

Protocols

- A *protocol* is a set of rules that governs
 - how two or more communicating entities in a layer are to interact
 - Messages that can be sent and received
 - Actions that are to be taken when a certain event occurs, e.g. sending or receiving messages, expiry of timers

The purpose of a protocol is to provide a service to the layer above

6