CS4254

Computer Network Architecture and Programming

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### Introduction

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Outline

•Internet Layers

•Internet Data Packet transmission and Addressing

•Network Protocols

•A glimpse at the OSI model and Internet protocol suite

Internet Layers

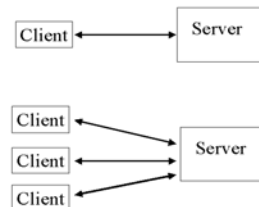| Layer	Description
Application	Supporting network applications (HTTP, FTP, DNS, …)
Transport	Transporting application-layer *messages* between client and server sides of an application (TCP and UDP)
Network	Routing *datagrams* from one host to another (IP protocol: IPv4 and IPv6)
Data Link	Move entire *frames* from one network element to an adjacent network element (Ethernet, PPP, …)
Physical	Move individual *bits* within the frame from one network element to an adjacent network element (coaxial cable, fiber optic, …)

TCP/IP Data Packet Transmission and Addressing
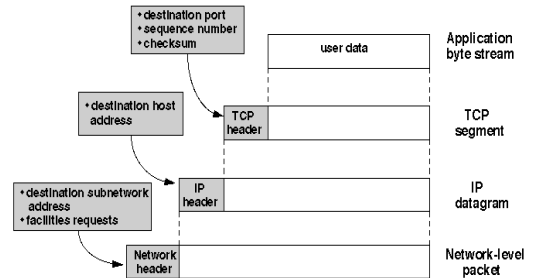
Network Protocols

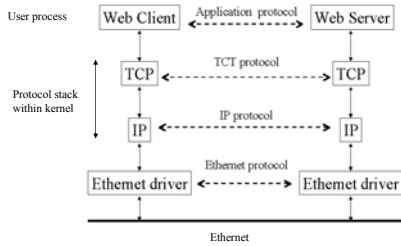•Programs to communicate across a computer network

➢Invent a *protocol* (an agreement of how these programs will communicate)

➢Which program is expected to initiate communicate and when responses are expected

•Example: Web Server and Web client

•Other examples?

•Other modes of communication?

Servers and Clients

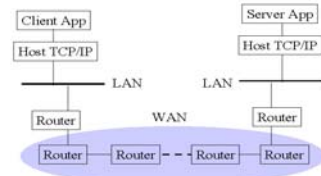# Multiple Layers of Network Protocols

Client and Server on same Ethernet

User process

Web Client — Application protocol — Web Server

Protocol stack within kernel

TCP ←— TCT protocol —→ TCP

IP ←— IP protocol —→ IP

Ethernet driver ←— Ethernet protocol —→ Ethernet driver

Ethernet

Multiple Layers of Network Protocols

Client and server on different LANs connected through a WAN

Client App   Server App

Host TCP/IP   Host TCP/IP

LAN   LAN

Router   WAN   Router

Router — Router — — Router — Router

Layers in OSI Model and Internet Protocol Suite

OSI: Open Systems Interconnection model for computer communications

ISO: International Organization for Standardization

#	OSI Layer	Internet	
7	Application	Application	User process, application details
6	Presentation		
5	Session		← Socket interface
4	Transport	TCP UDP	
3	Network	IPv4 / IPv6	kernel, communication details
2	Datalink	Device Drivers	
1	Physical		