From

Cable-Runs

To

Client-Server

A Lightning Tour of Network Technology

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March 1995

The ISO 7-Layer Model

7	Application	
6	Presentation	
5	Session	
4	Transport	TCP, UDP
3	Network	IP
2	Link	Frames
1	Physical	Cables

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Ethernet

10M bits/sec bus

Carrier-Sense Multiple Access with Collision Detection (CSMA/CD)

Cable *Segments* with *Transceivers*

Link segments with *Repeaters*

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Ethernet Rules

10-Base-5	500m max, 100 connections
10-Base-2	185m max, 30 connections
10-Base-T	100m max, point-to-point
FOIRL	1000m max, point-to-point
10-Base-FL	2000m max, point-to-point

Max. 4 repeaters in line with short links

Max 3 repeaters in line with full-length links

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Addresses, Bridging, Routing

Ethernet ‘MAC’ address: 48 bits

08:00:20:12:12:FD

IP network address: 32 bits

134.83.128.7

Bridges: work at link (MAC) layer

- **Simple to use but poor traffic isolation**

Routers: work at network (IP) layer

- **More complex to use but better control**

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Protocols

IP provides an *Unreliable Datagram Service*

UDP provides the same service to the user

TCP provides a *Reliable Byte-Stream Service*

Added value: Remote Procedure Call (RPC)
Remote Operations (ROS)

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Some Familiar Applications

telnet	Simple TCP connection
ftp	TCP connection per file
NFS	Remote Procedure Call
WWW	TCP connection per page/image/file
passwd	Remote Procedure Call

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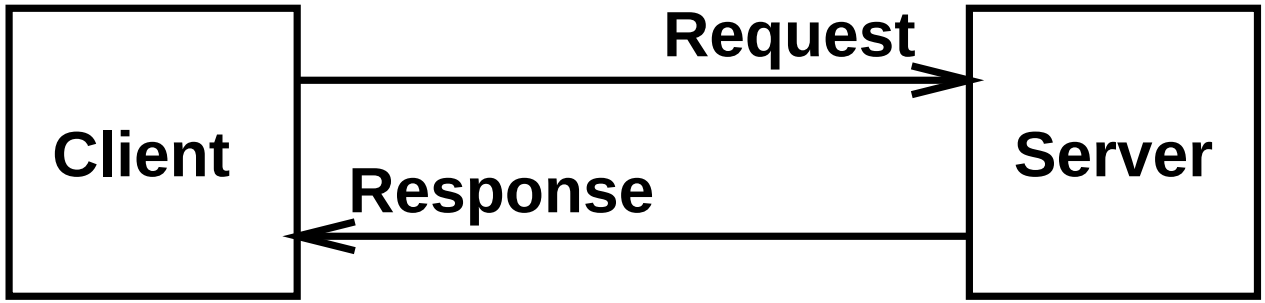
Client-Server Systems



Issues:

- Partitioning the work
- Communication load
- Crash recovery

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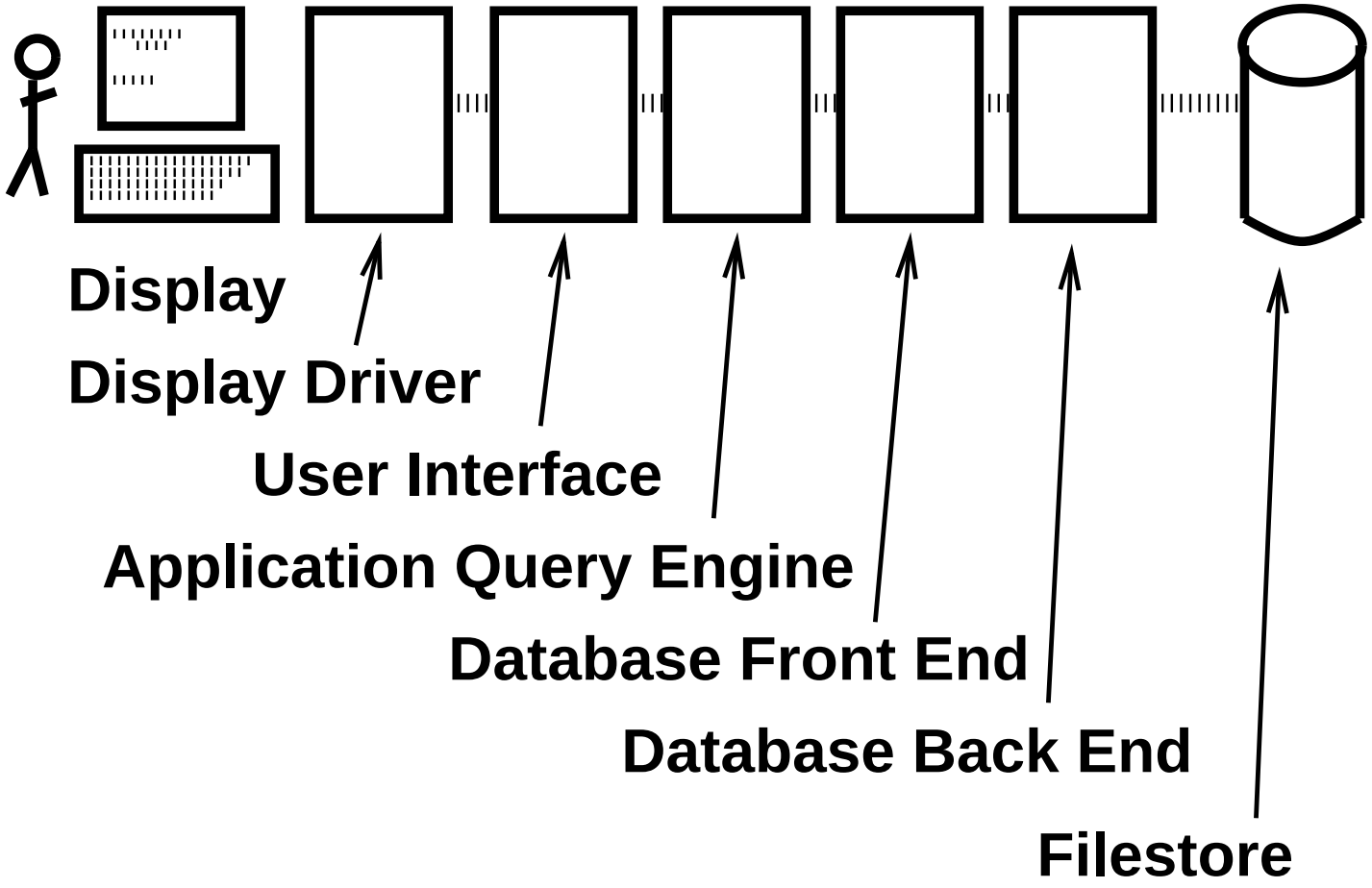
Example: Database Access



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Performance

Round-trip-time

e.g. 64 Byte packets Uxbridge to:

Runnymede	**4ms**
Central London	**6ms**
Edinburgh	**14ms**

(Light would take 4ms)

Bandwidth:

SuperJANET is 10-20Mbits/sec

Modems typically 10-20 kbits/sec

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Books

Computer Networks

A S Tanenbaum, PHI

Internetworking with TCP/IP

D Comer, PHI

Data Communications, Computer Networks,...

F Halsall, Addison-Wesley

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