

## CS 5523 Lecture 1: Overview of Distributed Systems

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- *Course administration and web page*
- *Definition of distributed systems*
- *Implications*
- *Examples*
- *Challenges*

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## Course administration and web page

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- *Syllabus*
- *Course web page: [vip.cs.utsa.edu/classes/cs5523s2001](http://vip.cs.utsa.edu/classes/cs5523s2001)*
- *Prerequisites*
- *Textbooks (CDK, StevensI and StevensII)*
- *Programming requirements*
- *Topics and schedule*

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## What is a distributed system?

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CDK's Definition:

*A system in which hardware and software components located on networked computers communicate and coordinate their actions only by passing messages.*

- *Why have distributed systems?*
- *How does this compare with a traditional operating system such as Unix?*
- *What implications does this definition have on implementation?*

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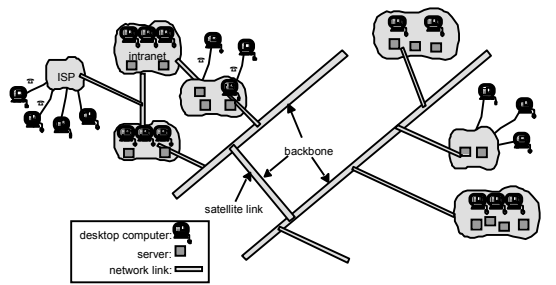
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Figure 1.1 (CDK)  
A typical portion of the Internet



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Figure 1.5 (CDK)  
Computers in the Internet

<i>Date</i>	<i>Computers</i>	<i>Web servers</i>
1979, Dec.	188	0
1989, July	130,000	0
1999, July	56,218,000	5,560,866

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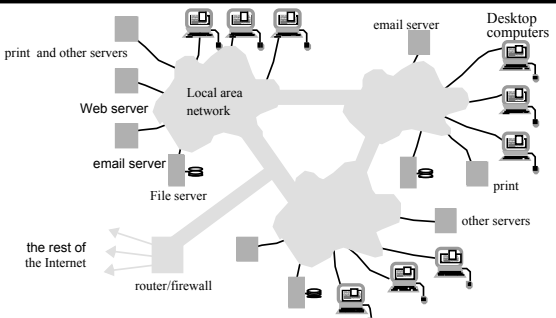
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Figure 1.2 (CDK)  
A typical intranet



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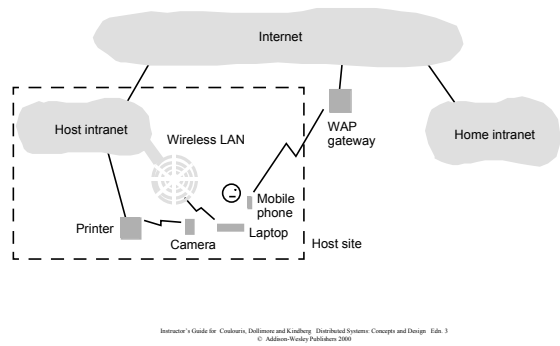
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Figure 1.3 (CDK)  
Portable and handheld devices in a distributed system



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## World Wide Web

- *Ultimate distributed system.*
- *Developed in 1989 in CERN Switzerland for document exchange among physicists.*
- *Documents have a hypertext structure.*
- *New resources are located by following these hypertext links.*
- *Uses a client-server model.*
- *A browser (client) on a user machine makes requests and handles the display. New document formats can be handled by plug-ins or helpers without changing the browser software.*
- *The web server only delivers documents and is not concerned with user interfaces or document format.*

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Figure 1.6 (CDK)  
Computers vs. Web servers in the Internet

<i>Date</i>	<i>Computers</i>	<i>Web servers</i>	<i>Percentage</i>
1993, July	1,776,000	130	0.008
1995, July	6,642,000	23,500	0.4
1997, July	19,540,000	1,203,096	6
1999, July	56,218,000	6,598,697	12

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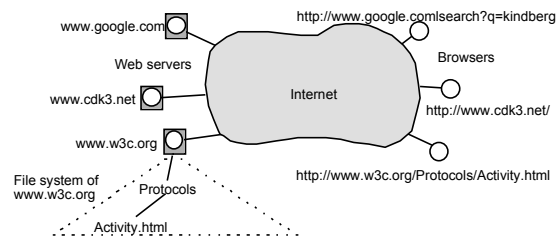
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Figure 1.4 (CDK)  
Web servers and web browsers



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## World Wide Web Components

- **HTML (HyperText Markup Language)** - specifies the format for the documents delivered by the server
- **URL (Uniform Resource Locator)** - specifies a resource that is accessible via the web.
- **HTTP (HyperText Transfer Protocol)** - specifies the interaction between browsers and web servers

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## HTML format for web documents:

- Text format so can be created using Text editor or HTML tool.
- Uses tags to specify content:
  - <P> A paragraph </P>
  - <IMG SRC="Book.gif" >
  - <A HREF="http://www.utsa.edu">UTSA</A>
- The <A HREF... > X</A> specifies a link identified by X in the text.

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## URLS:

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### ■ *Format*

*scheme: scheme-specific-location*

### ■ *Format of scheme-specific-location when scheme is HTTP:*

*http://servername[:port][pathOnServer][arguments]*

### ■ *Examples*

*http://www.utsa.edu*

*http://vip.cs.utsa.edu/classes/cs5523s2001*

*http://www.google.com/search?q=browsers*

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## HTTP:

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■ *Built using TCP socket connections.*

■ *Request-reply protocol:*

*Client initiates with a request (GET)*

*Server responds with requested document or an error*

■ *Content types identify document types for browser.*

■ *HTTP 1.0 - need a separate request for each resource*

■ *HTTP 1.1 - requests pipelined and served by a single connection.*

■ *Executables:*

*CGI (Common Gateway Interface) executes on server*

*Java Applets execute on browser*

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## Challenges

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■ *Heterogeneity*

■ *Openness*

■ *Security*

■ *Failure handling*

■ *Concurrency*

■ *Transparency*

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Figure 1.7 (CDK)  
Transparencies

*Access transparency:* enables local and remote resources to be accessed using identical operations.

*Location transparency:* enables resources to be accessed without knowledge of their location.

*Concurrency transparency:* enables several processes to operate concurrently using shared resources without interference between them.

*Replication transparency:* enables multiple instances of resources to be used to increase reliability and performance without knowledge of the replicas by users or application programmers.

*Failure transparency:* enables the concealment of faults, allowing users and application programs to complete their tasks despite the failure of hardware or software components.

*Mobility transparency:* allows the movement of resources and clients within a system without affecting the operation of users or programs.

*Performance transparency:* allows the system to be reconfigured to improve performance as loads vary.

*Scaling transparency:* allows the system and applications to expand in scale without change to the system structure or the application algorithms.

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For next time:

- Read CDK Chapter 1
- BE prepared to discuss assigned questions from Chapter 1
- Start reading CDK Chapter 2
- Look over Laboratory 1

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