

## CS 5523 Lecture 1: Overview of Distributed Systems

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- *Course administration and web page*
- *Quick review of uniprocessor operating systems*
- *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, Stevens I and Stevens II, HC I and HC II)*
- *Programming requirements*
- *Topics and schedule*
- *Access list forms*

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## Quick review of uniprocessor operating systems

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- *Process control*
- *Memory management*
- *Device management*

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## What is a distributed system?

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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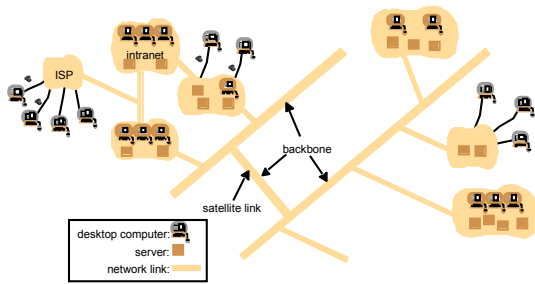
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Figure 1.1 (CDK)  
A typical portion of the Internet



Instructor's Guide for Conrad, Delfino and Kuehling Distributed Systems: Concepts and Design Edn. 3  
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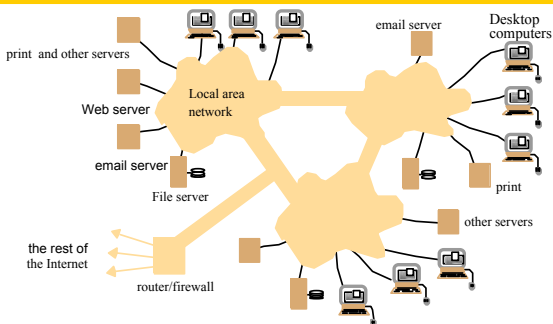
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Figure 1.2 (CDK)  
A typical intranet



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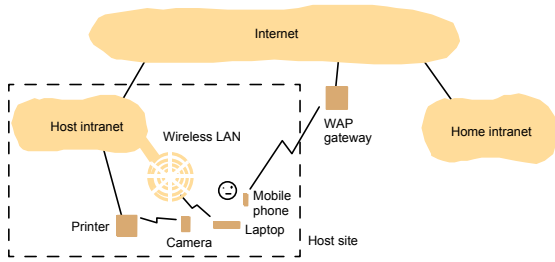
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Figure 1.3 (CDK)  
Portable and handheld devices in a distributed system




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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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Figures 1.5 and 1.6 (CDK)  
Computers vs. Web servers in the Internet

Date	Computers	Web servers	Percentage
1979, Dec.	188	0	0
1989, July	130,000	0	0
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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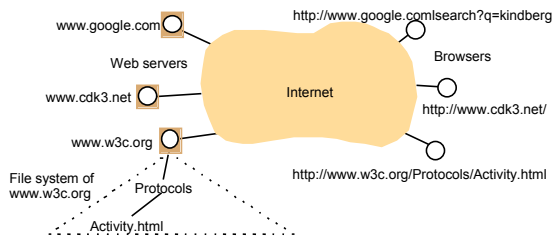
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Figure 1.4 (CDK)  
Web servers and web browsers



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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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■ Assumes reliable delivery (in practice TCP sockets).

■ 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 for distributed systems

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■ Heterogeneity

■ Openness

■ Security

■ Scalability

■ Failure handling

■ Concurrency

■ Transparency

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**Figure 1.7 (CDK)  
Transparencies**

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*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:**

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- Read CDK Chapter 1
- Look at Exercises 1.6, 1.7, 1.9, 1.12
- BE prepared to discuss assigned questions from Chapter 1
- Start reading CDK Chapter 2
- Look over Laboratory 1

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