INTRODUCTION

Introduction

- Network everywhere;
  Give me some network examples you faced recently
- Why network?
  - Communication
  - Resource sharing
    - Printer
    - Files and storage space
    - Computational power (the earliest motivation)
- Computer networks provide reliable, efficient, and fair way of communication
  - Automatic detection and correction schemes
  - Automatic way to determine the path from a source to a destination

How Many People Use The Internet?

- There is no way to determine how many users are on the net
- All what we have are guesses and estimates, *why?*

How Big Is The Internet?

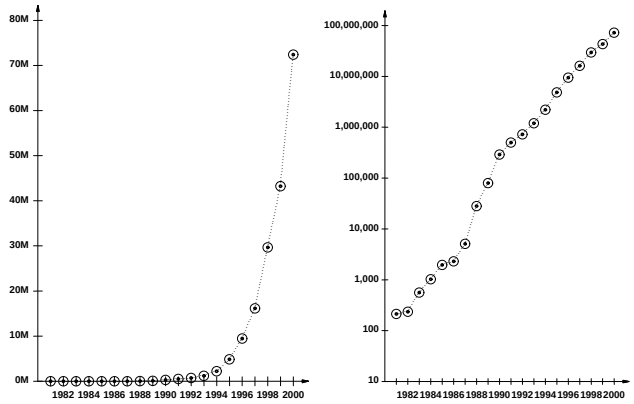
- There is no way to determine how many hosts are attached to the internet; however, you may find guesses and estimates, for example,
  - Internet Software Consortium (ISC), http://www.isc.org/, provides *Internet Domain Survey* twice a year since 1987
  - The Domain Survey attempts to discover every host on the Internet; *How?*
    - By counting the number of domain names that have been assigned an IP address
    - By counting the number of IP addresses that have been assigned a domain name
    - Is their any difference between these two methods?
  - The numbers presented in the domain survey can be fairly a good estimate of the size of the Internet; *Why estimate?*
  - The raw data from a survey is a database of IP address and corresponding host name
  - This database can be purchased from the ISC
  - The cost for the most recent database is US$2500.00

Survey Date	Survey Host Count
08/81	213
05/82	235
08/83	562
10/84	1024
10/85	1961
02/86	2308
11/86	5089
12/87	28174
07/88	33000
10/88	56000
01/89	80000
07/89	130000
10/89	159000
10/90	313000

Survey Date	Survey Host Count
01/91	376000
07/91	535000
10/91	617000
01/92	727000
04/92	890000
07/92	992000
10/92	1136000
01/93	1313000
04/93	1486000
07/93	1776000
10/93	2056000
01/94	2217000
07/94	3212000
10/94	3864000

Survey Date	Survey Host Count	Adjusted Host Count
01/95	4852000	5846000
07/95	6642000	8200000
01/96	9472000	14352000
07/96	12881000	16729000
01/97	16146000	21819000
07/97	19540000	26053000
01/98	29670000	
07/98	36739000	
01/99	43230000	
07/99	56218000	
01/00	72398092	
07/00	93047785	
01/01	109574429	
07/01	125888197	
01/02	147344723	

A summary of the internet domain survey



Linear Scale Logarithmic Scale

Internet growth measured by number of computers attached to the Internet in each year from 1981 through 2000

How Many Hosts Per Country?

- There is no correlation between a host's domain name and where it is actually located
- A host with a .CA domain name could easily be located in the U.S. or any other country
- Hosts under domains EDU/ORG/NET/COM/INT could be located anywhere
- There is no way to determine where a host is without asking its administrator
- To conclude, it is not possible to exactly
  - Know how many users there are
  - Determine the exact size of the Internet, or
  - Know where hosts are located

Why Do Computer Network Systems Seem To Be Complex?

- Computer network systems seem to be complex because there is:
  - No single standard
    - No simple and uniform terminology
    - Several organizations have created their own network standards independently, which are not all compatible
    - Many companies have created commercial networking products and services that use technologies in unconventional ways
    - Two or more networks can be interconnected using multiple existing technologies
  - So many abbreviations
  - No single basic theory (simplistic model versus complex model)
- How can one master a complex system?
  - Look behind the details
  - Concentrate on understanding concepts

Basic Network Components

- Computer communications involve:
  - Encoding data in a form of energy;
    Give examples to different forms of energy
  - Sending the energy across a transmission medium;
    Give examples to different transmission media
- What does a network include?
  - Transmission media
  - Special-purpose hardware devices to interconnect transmission media
  - Protocol software to deal with
    * Data encoding and formats
    * Error detection/correction problems
    * Transmission control

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