# 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 |

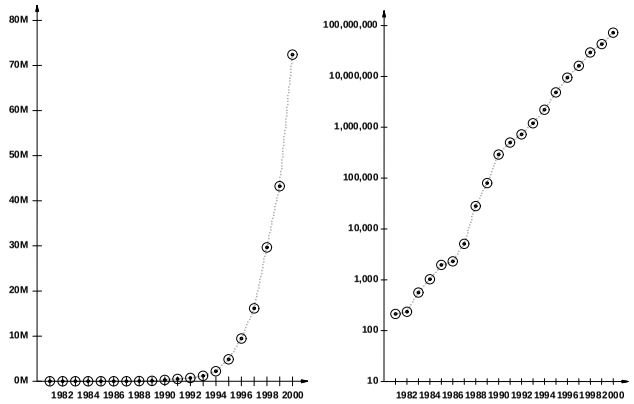
| Survey Date | Survey Host Count |
|---|---|
| 01/91 | 376000 |
| 07/91 | 535000 |
| 10/91 | 617000 |
| 01/92 | 727000 |
| 04/92 | 890000 |
| 07/92 | 992000 |
| 10/92 | 1136000 |
| 01/93 | 1313000 |
| 04/93 | 1486000 |
| 07/93 | 1776000 |
| 10/93 | 2056000 |
| 01/94 | 2217000 |
| 07/94 | 3212000 |
|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