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

How Big Is The Internet?

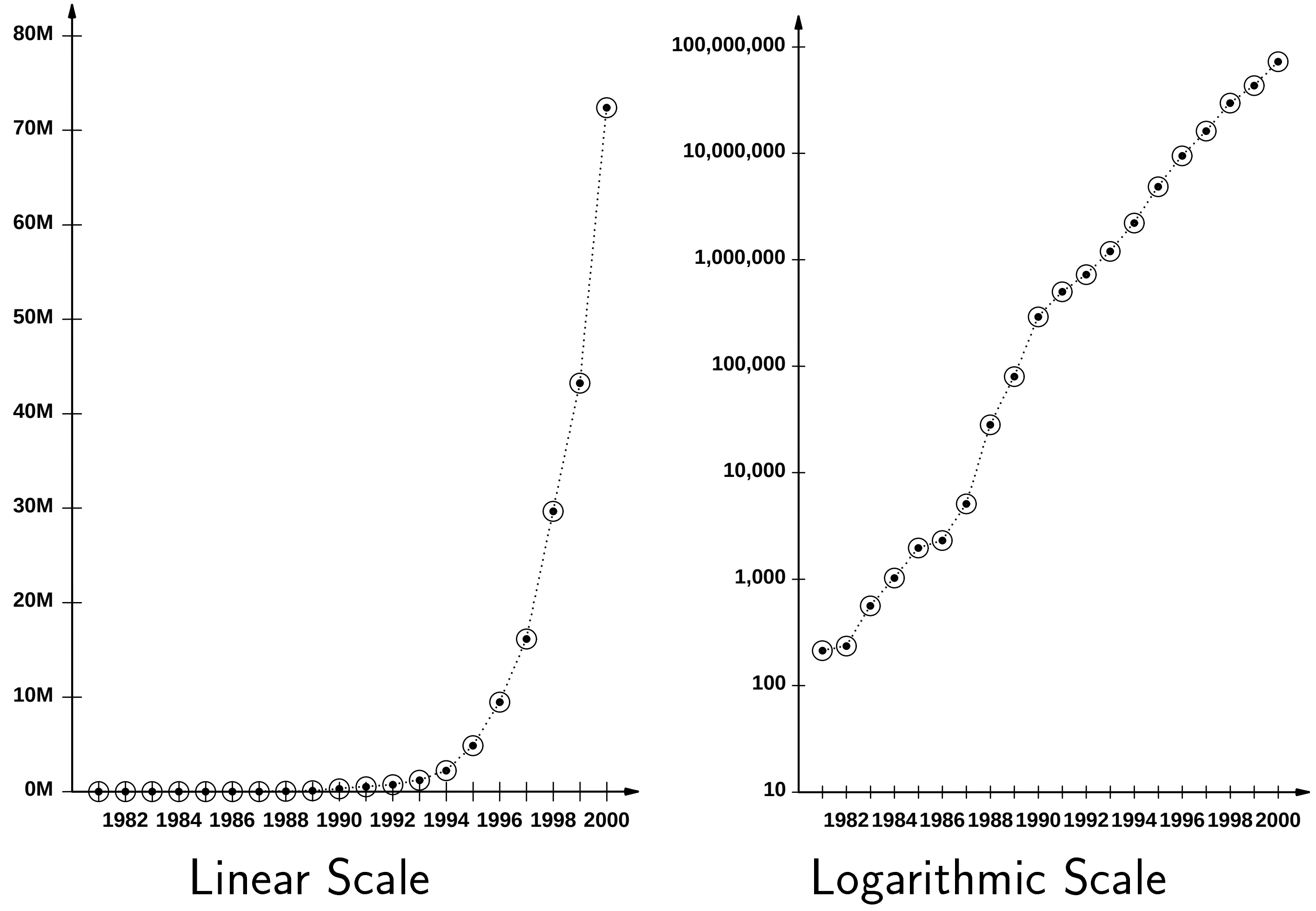
- There is no way to determine how many hosts are attached to the internet; however, you may find guesses and estimates, for example,
  - Internet Software Consortium (ISC), http://www.isc.org/, provides *Internet Domain Survey* twice a year since 1987
  - The Domain Survey attempts to discover every 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



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 network users are there
  - 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