

Prospects and New Technologies

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Is there a theme?

- Not really
- Rather a sort of **Underlying Thread**
 - identified a posteriori
 - common to the topic I selected to teach

“Issues of Architecture for distributed computing”

or

“Centralization vs. decentralization”

Where do the topics come from?

- *My own expertise (Networks), experience*
- *What I heard here*

Selection try and balance / mix

- **Levels**

Overview
Details

- **Areas**

- **Usefulness**

What you need to learn
What you like to learn

Agenda

- **Introduction: Centralization vs. decentralization**
 - The breathing model, Pluses and minus
- **Networking, Recent advances: Quality of Service**
 - Needs, problems to solve
 - Options: RSVP, Diffserv, MPLS, GMPLS
 - Congestion control, Unfair competition (TCP/UDP)
- **Networking: Real-time media over the Internet**
 - Requirements
 - Technologies
- **Some trends in distributed computing techniques**
 - From Client Server to Per-to-Peer (P2P)?
 - Application communication (From HTML to XML, SOAP)
 - Data sharing/access: file sharing (Webfolders?)
- **Concluding remarks and Epilog**

Observations, Trends

**Sometimes, Observations,
or Trends will be quoted
on Cent/Decent ... and
other controversies**

Some technology controversies

- **Central servers vs. distributed algorithms**
 - e.g. in Networking: Routing, DNS, Bandwidth Brokers, ...
- **Connection-oriented vs. connection-less (or stateful vs. stateless)**
 - for networking, transactions, inter-program communications
- **Client-server vs. Peer-to-peer**
- **Raw data vs. symbolic data** (recognizable semantic)
 - Bitmap Pictures vs. graphics
 - Compressed audio vs. Midi
 - TV vs. Synthetic moving images (or Virtual Reality)
 - MPEG2 vs. MPEG4 compression; G727 vs. G729 voice compression
 - Voice vs. Text
 - Flat text vs. structured text (“XMLed”)

Principle (or platitude)

From time to time

(old) principles, facts of life

will be quoted

Underlying Thread

Centralization vs. decentralization

Philosophy ...

Pros and Cons

Centralization

- + Administration
- + Security
- + Simplicity
- Single point of failure
- Scalability (coarse gran.)

Decentralization

- Administration
- Security
- Complexity
- + Resilience
- + Scalability (fine gran.)

(De) Centralize ... what?

■ Resources

- Processing power (“cycles”)
- Programs
- Data used by programs (data storage)

■ Functions

- Security, firewalls, spam filters, ...
- Administration: User registration, statistics, ...

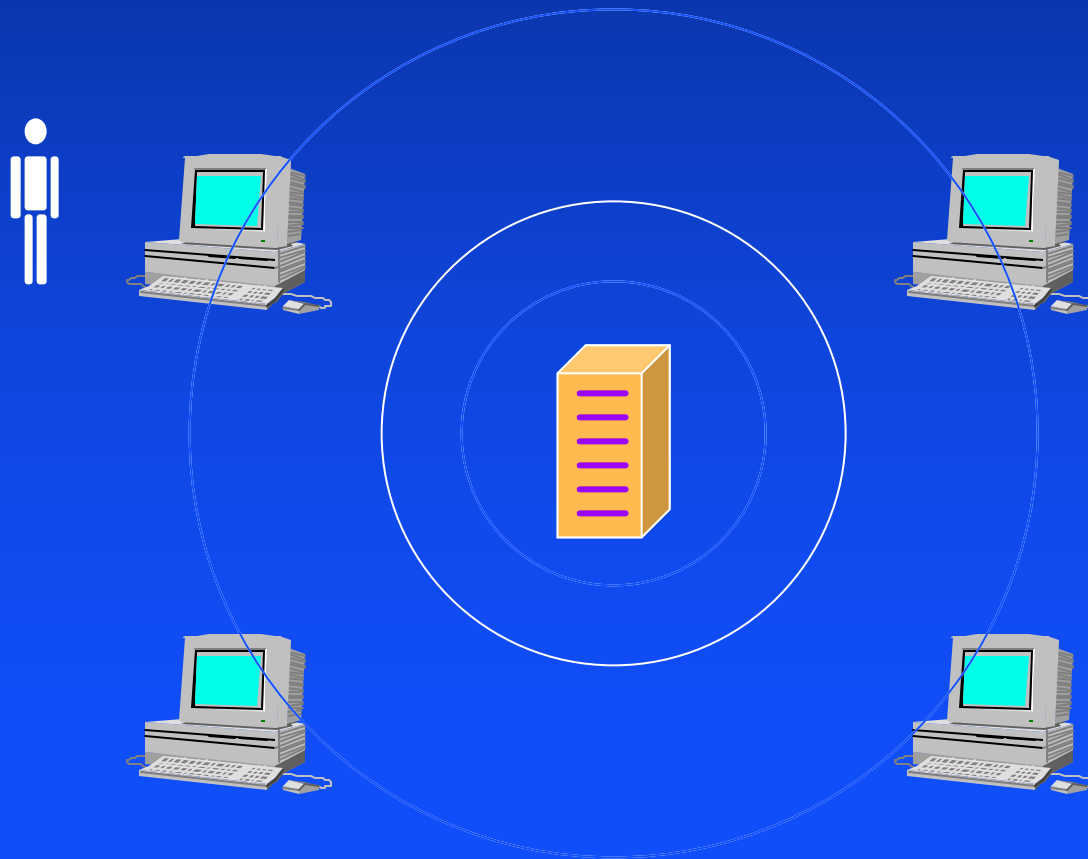
■ Brokerage of resources

- Bandwidth (e.g. Bandwidth Broker in Diffserv)
- CPU (e.g. in Gnutela),
- File (e.g. Gnutela File locators)
- Music (e.g. Napster)

The breezing principle (FF)

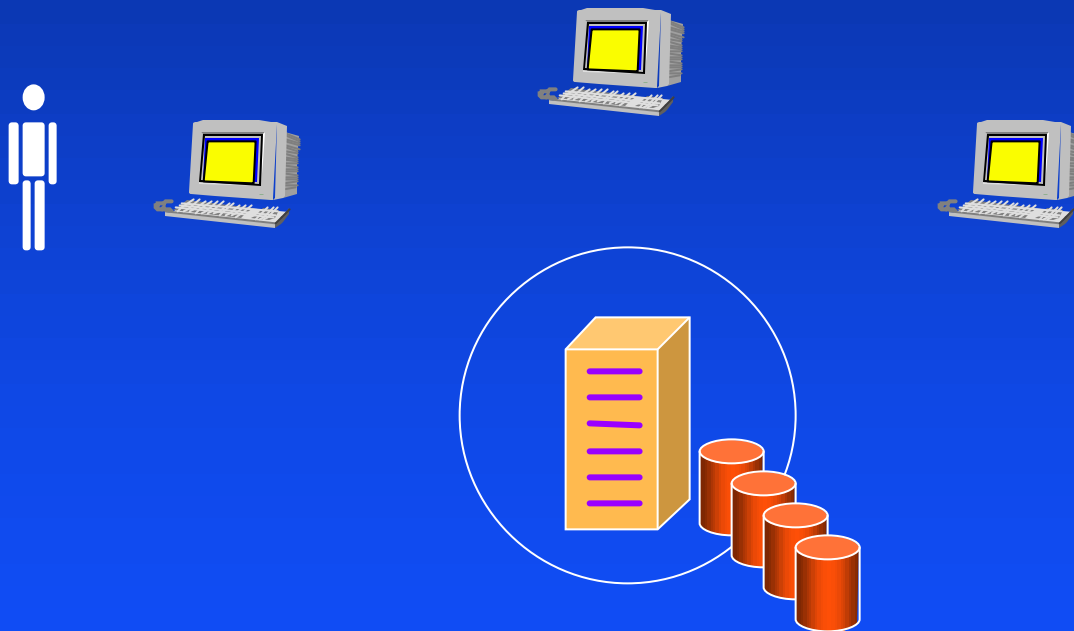
■ Observation:

- over past 30 years
- cycles of centralization - decentralization phases



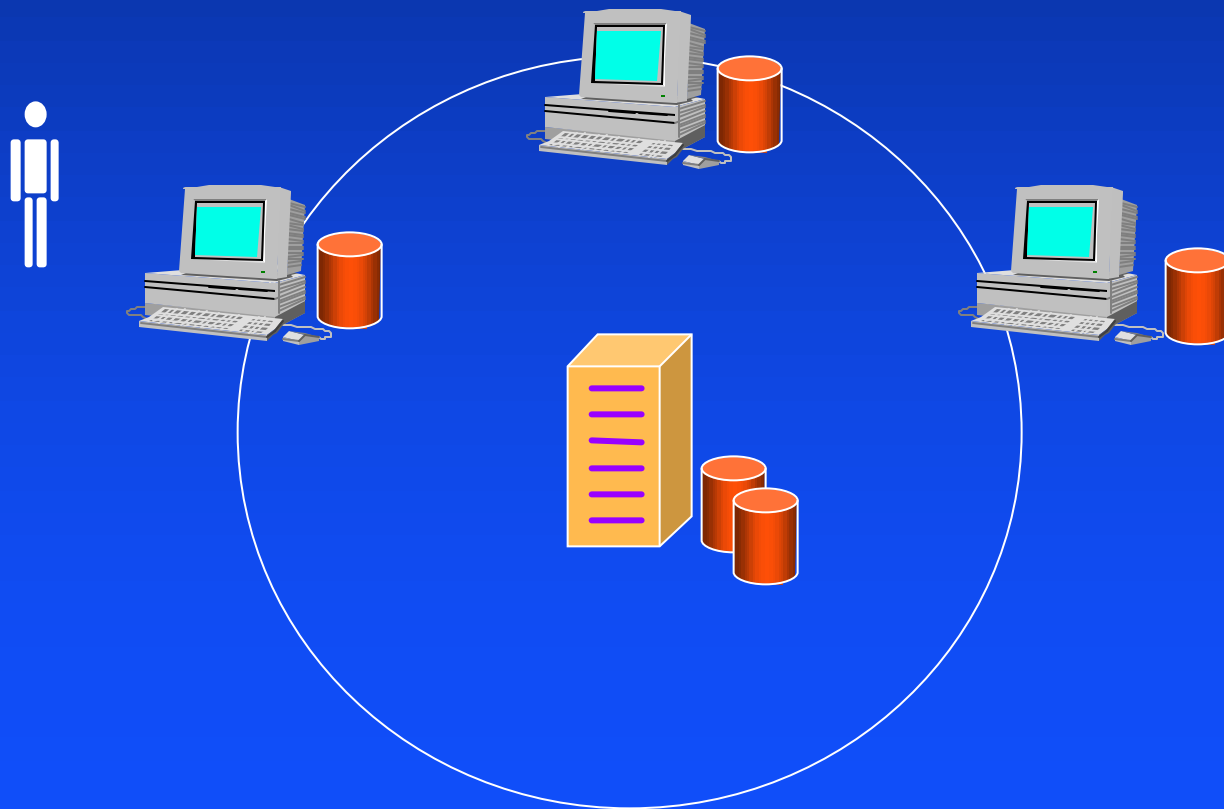
Ex: central servers / desktops

Character terminals



Ex: central servers / desktops

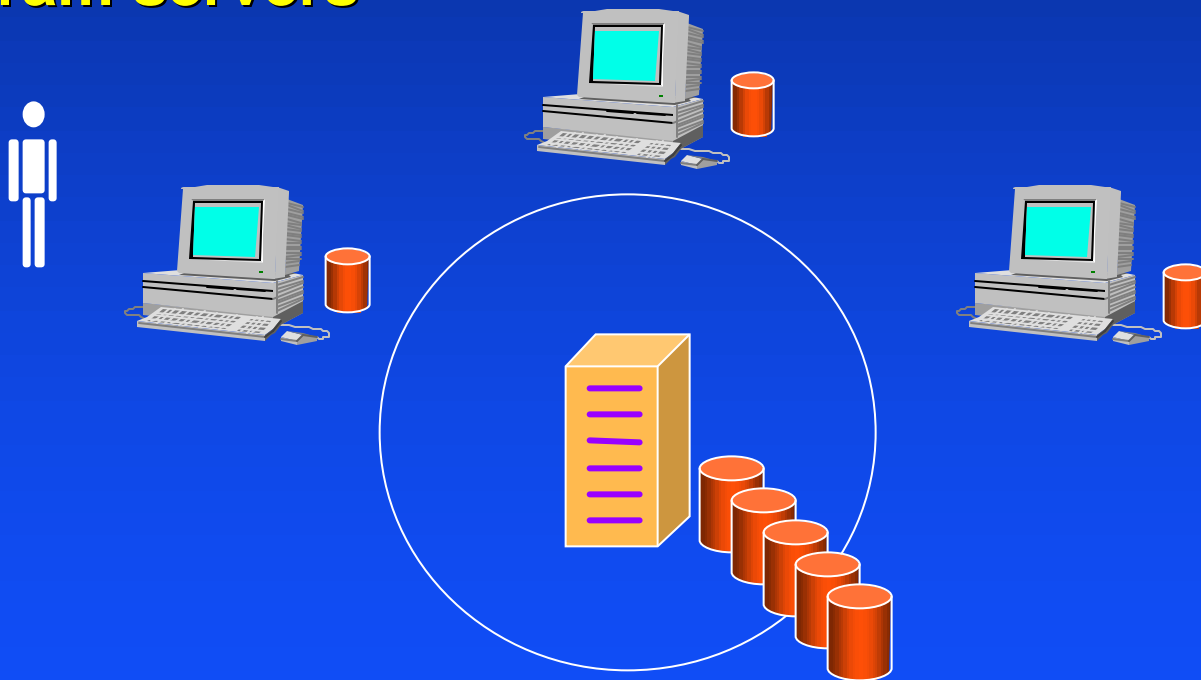
Workstations, PCs



Ex: central servers / desktops

PCs with

- home directory servers,
- program servers



End of

Part 1

Introduction