Multi Tier Computing (Unit 1)

OPEN SYSTEM STANDARDS FOR CLIENT/SERVER COMPUTING

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Client/Server Computing

Client/server computing has many facets. It is comprised of three distinct and very different components. However, client/server computing is so loosely defined that it can easily take on the characteristics of the component most familiar to the definer, often a vendor of hardware or software for that component.

4.1 Dispelling the Myths

Many myths surround client/server computing. Some are promoted by marketing literature. Others are promoted by the press, more by omission than inclusion.

4.1.1 Client/Server Computing Is Easily Implemented

Implementing any technology that requires integration of hardware and software from multiple vendors is not easy. Implementing client/server computing is no different.

To many mainframe-oriented IS professionals, client/server computing is part of the micro world. Without understanding the capabilities of the micro and its related software and how the mainframe capabilities can complement them, applications cannot be designed to take advantage of both.

Client/Server computing is a **distributed computing model** in which:

- A **client** requests services
- A **server** provides services

Communication occurs over a network using **open system standards**

Key Characteristics:

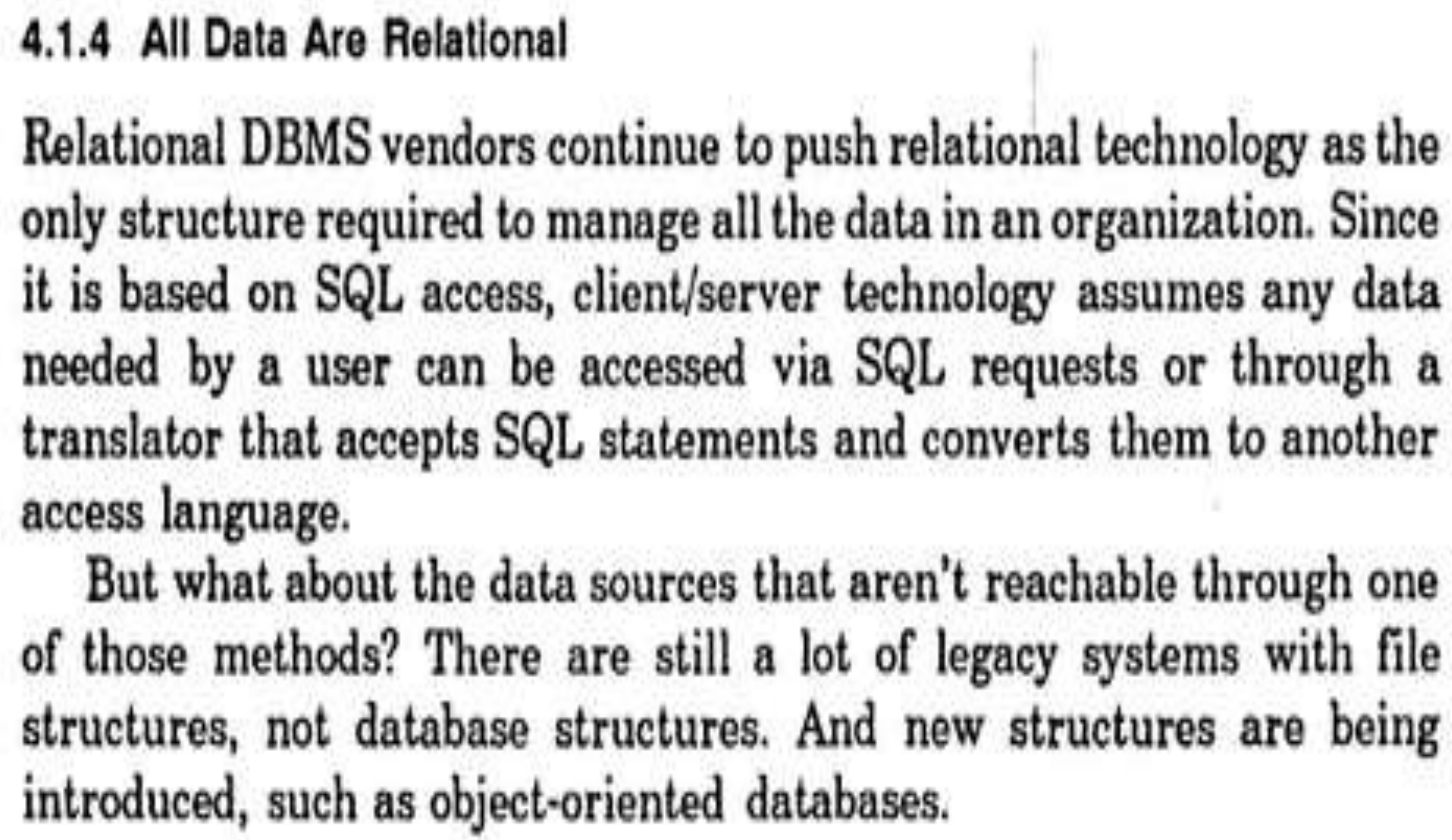
- Distributed processing
- Interoperability
- Scalability
- Resource sharing
- Platform independence

Role of Open Standards :

Open system standards allow **heterogeneous clients and servers** (different vendors, OS, hardware) to communicate seamlessly.

4.1.2 Current Desktop Machines Are Sufficient

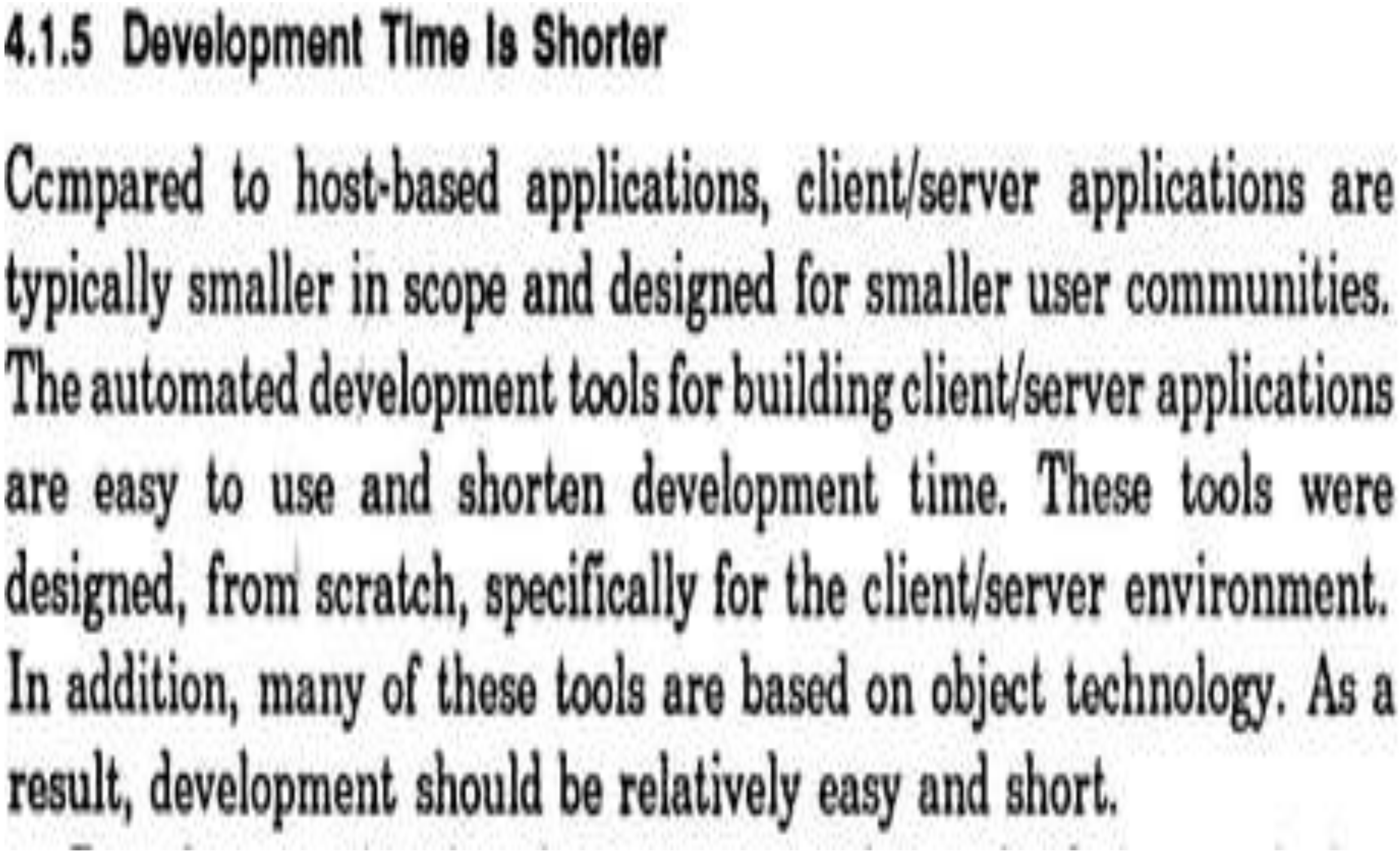
Organizations cannot always use their existing desktop hardware to support a client/server environment. The AT and 286 class machines do not have the power required for this environment and will have to be upgraded or replaced. Most client software requires at least a 386 machine (ideally 33 MHz) with a minimum of 2-Mbytes memory and 40 Mbytes of hard disk capacity.



4.1.4 All Data Are Relational

Relational DBMS vendors continue to push relational technology as the only structure required to manage all the data in an organization. Since it is based on SQL access, client/server technology assumes any data needed by a user can be accessed via SQL requests or through a translator that accepts SQL statements and converts them to another access language.

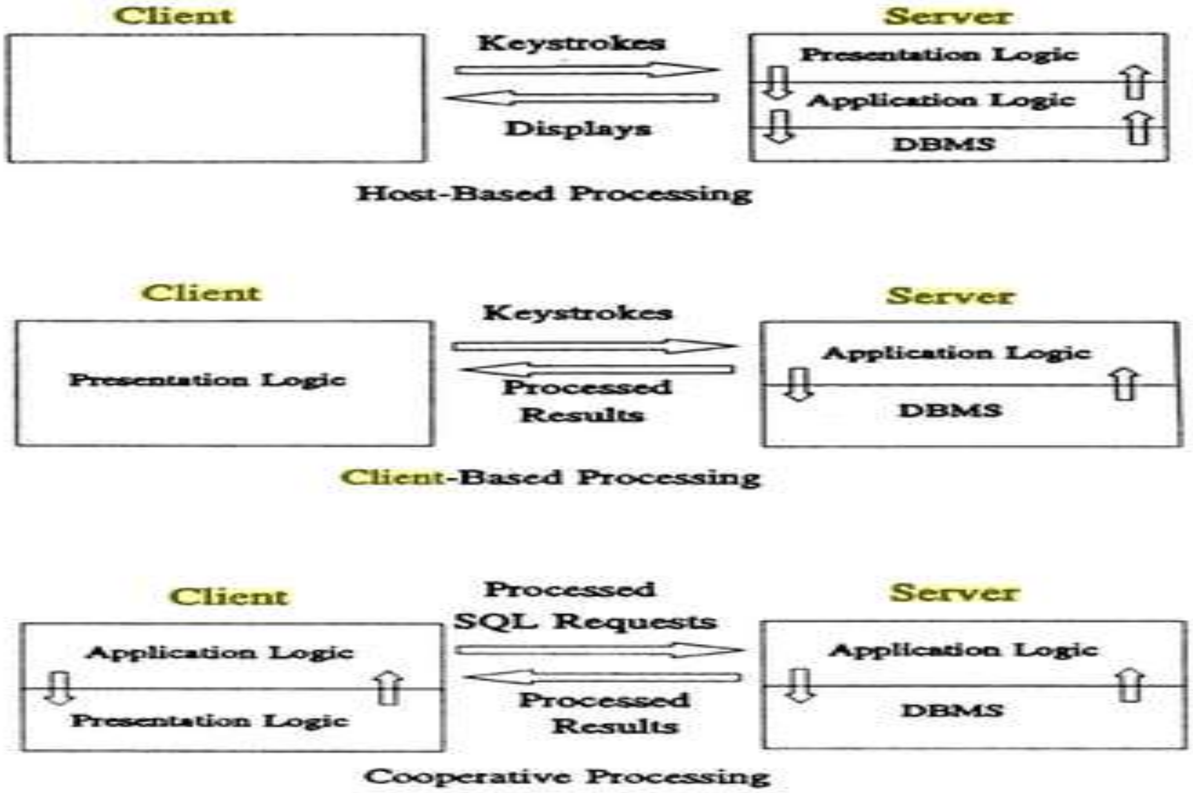
But what about the data sources that aren't reachable through one of those methods? There are still a lot of legacy systems with file structures, not database structures. And new structures are being introduced, such as object-oriented databases.



4.1.5 Development Time Is Shorter

Ccmpared to host-based applications, client/server applications are typically smaller in scope and designed for smaller user communities. The automated development tools for building client/server applications are easy to use and shorten development time. These tools were designed, from scratch, specifically for the client/server environment. In addition, many of these tools are based on object technology. As a result, development should be relatively easy and short.

- **Architecture is always the same – No**



Host-Based Processing

Client-Based Processing

Cooperative Processing

4.2 Obstacles—Upfront and Hidden

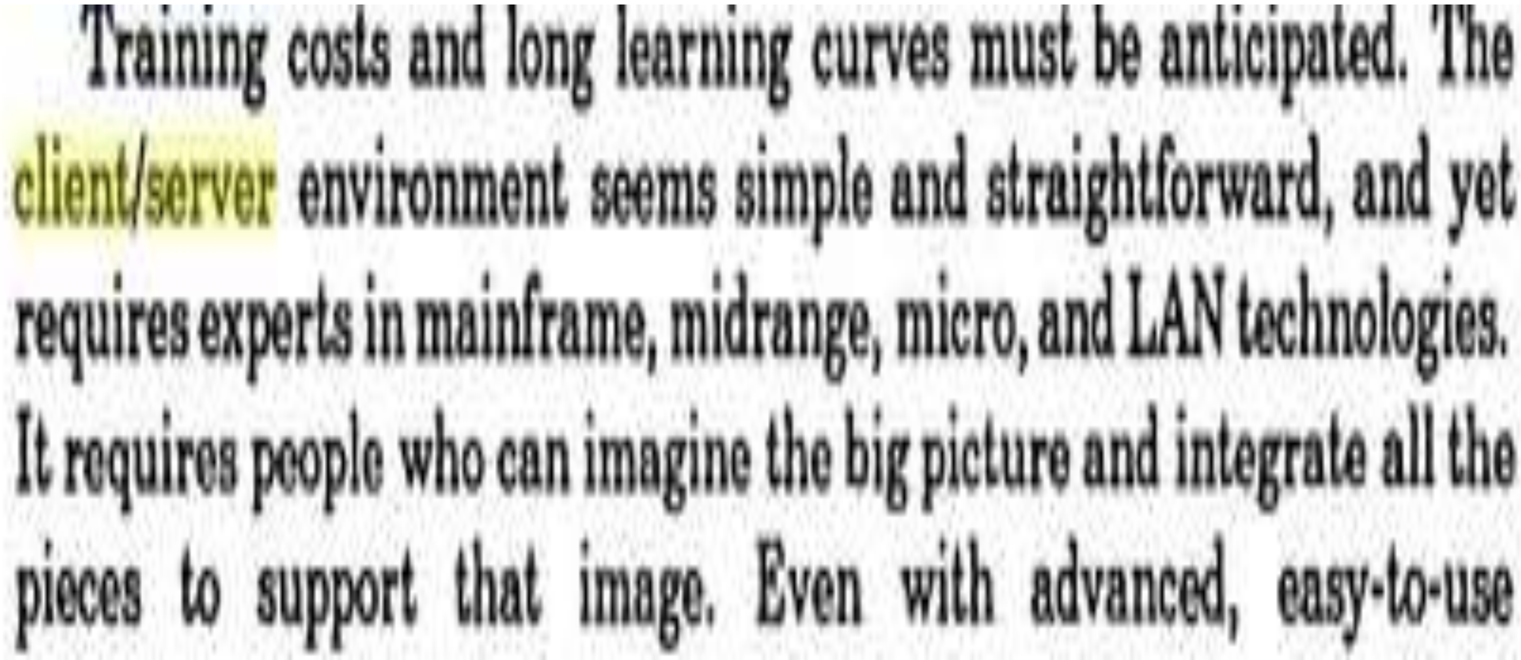
Client/server computing is not the easy task that marketing literature would have us believe. There are some very real, and painful, hurdles on the road to success.

4.2.1 Costs

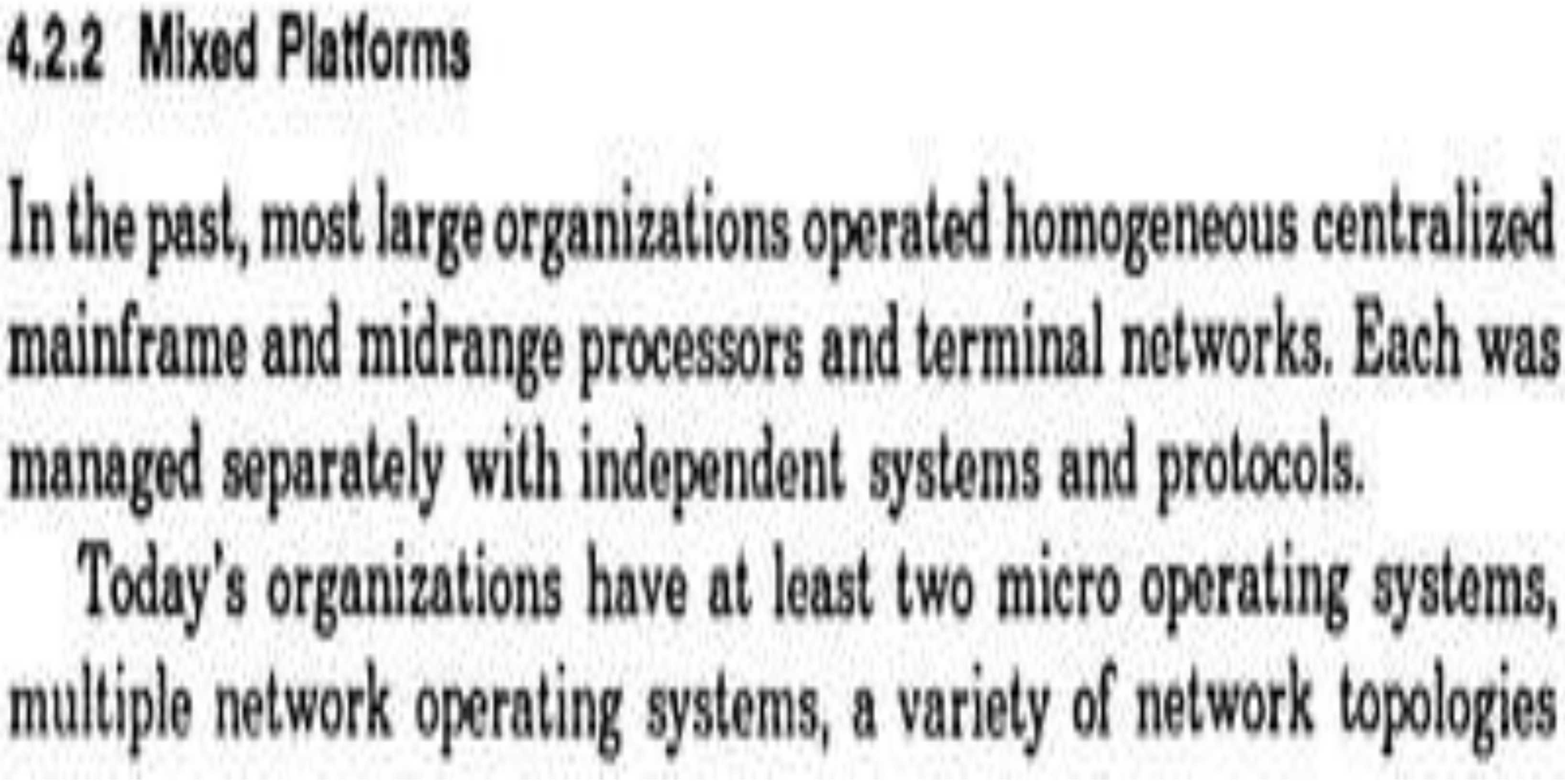
Potential cost savings prompt organizations to consider client/server computing. The combined base price of hardware (machines and network) and software for client/server systems is often a tenth of the cost of host machines and software.

Conservative figures for the cost per MIPS (millions of instructions per second) are:

- IBM mainframes—about $100,000
- Midrange—about $50,000 (includes some bandwidth processors)
- Desktop—about $300



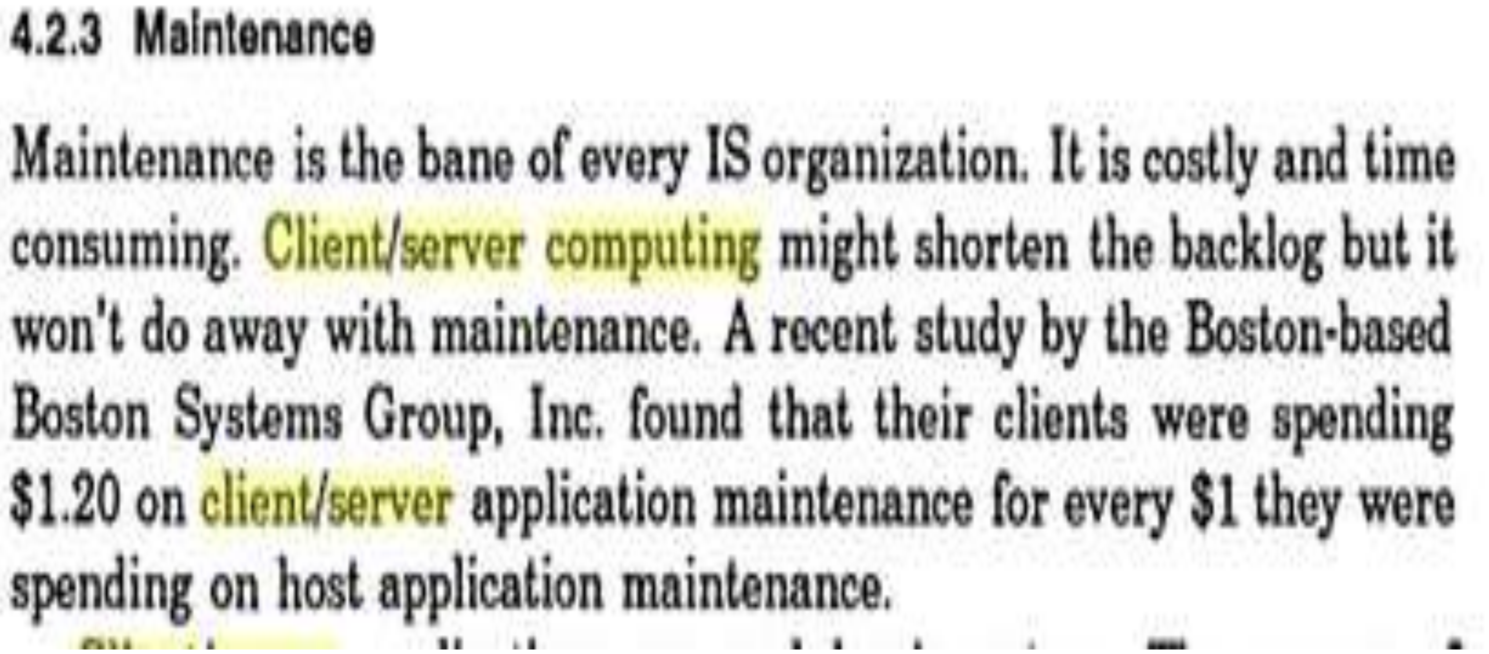
Training costs and long learning curves must be anticipated. The client/server environment seems simple and straightforward, and yet requires experts in mainframe, midrange, micro, and LAN technologies. It requires people who can imagine the big picture and integrate all the pieces to support that image. Even with advanced, easy-to-use



4.2.2 Mixed Platforms

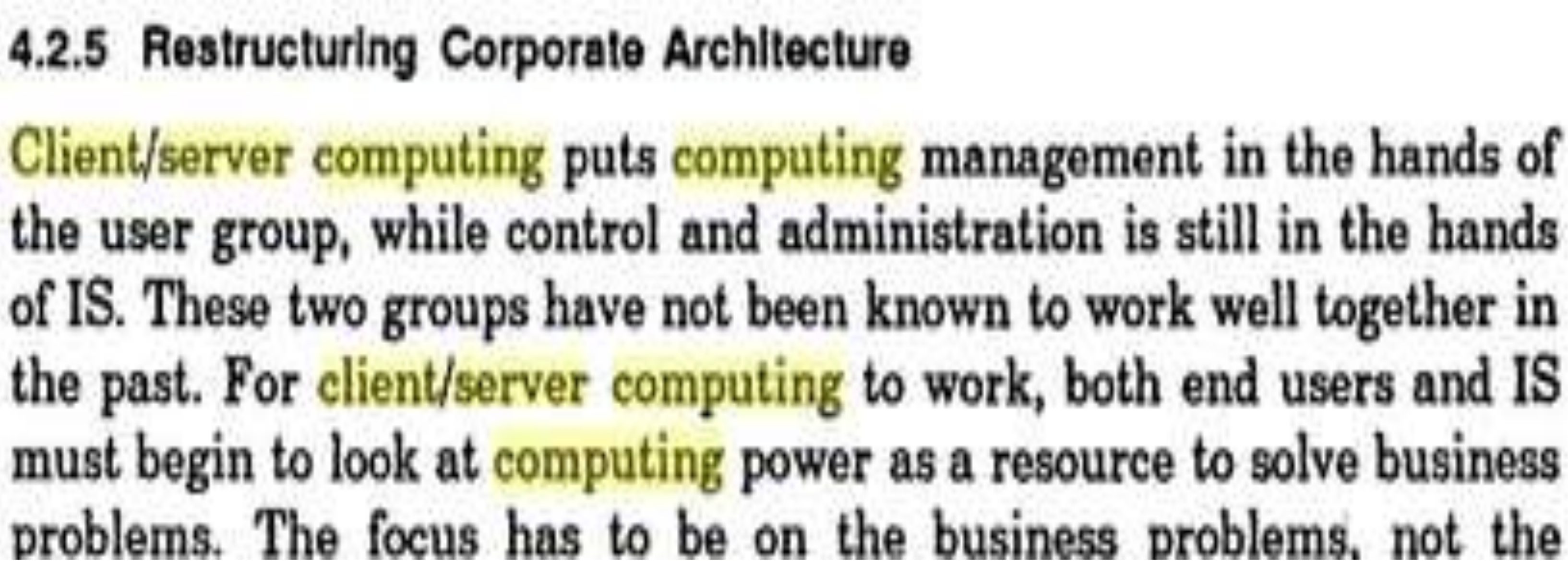
In the past, most large organizations operated homogeneous centralized mainframe and midrange processors and terminal networks. Each was managed separately with independent systems and protocols.

Today's organizations have at least two micro operating systems, multiple network operating systems, a variety of network topologies



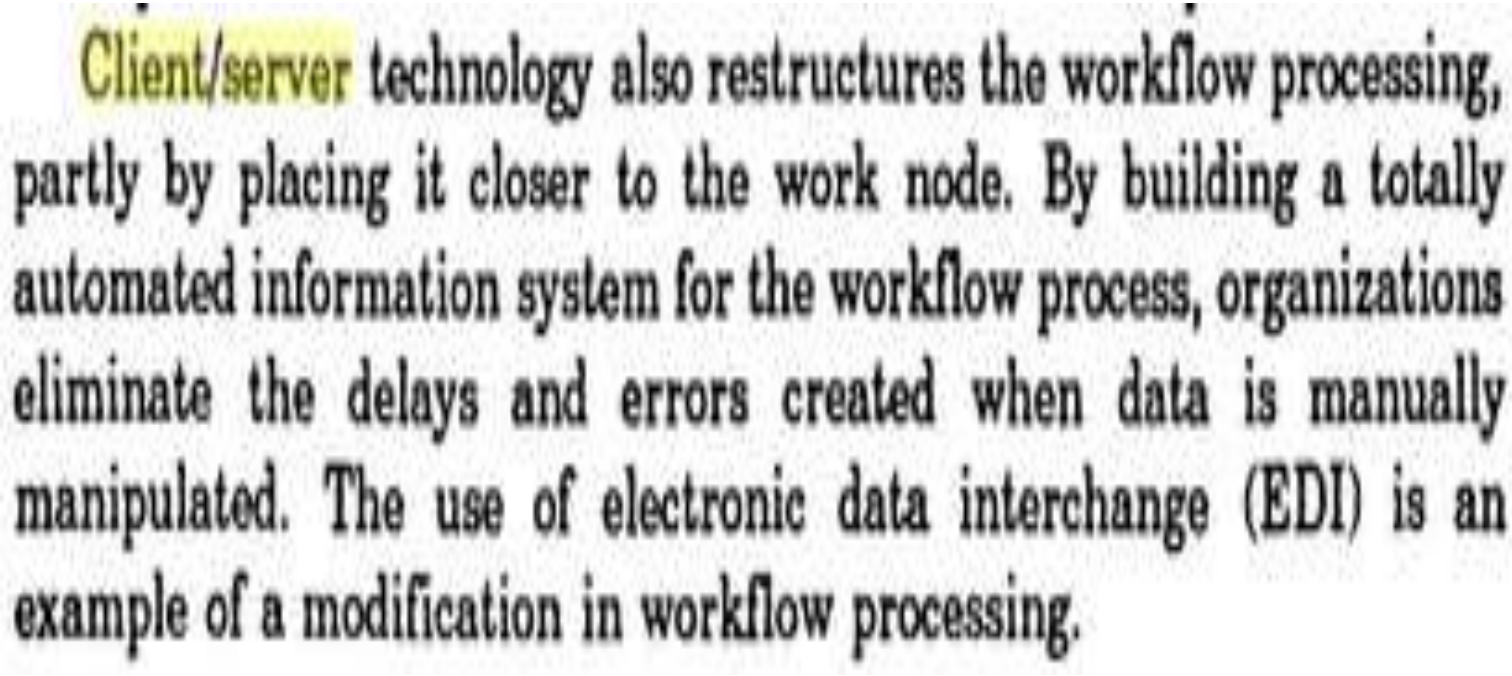
4.2.3 Maintenance

Maintenance is the bane of every IS organization. It is costly and time consuming. Client/server computing might shorten the backlog but it won't do away with maintenance. A recent study by the Boston-based Boston Systems Group, Inc. found that their clients were spending $1.20 on client/server application maintenance for every $1 they were spending on host application maintenance.

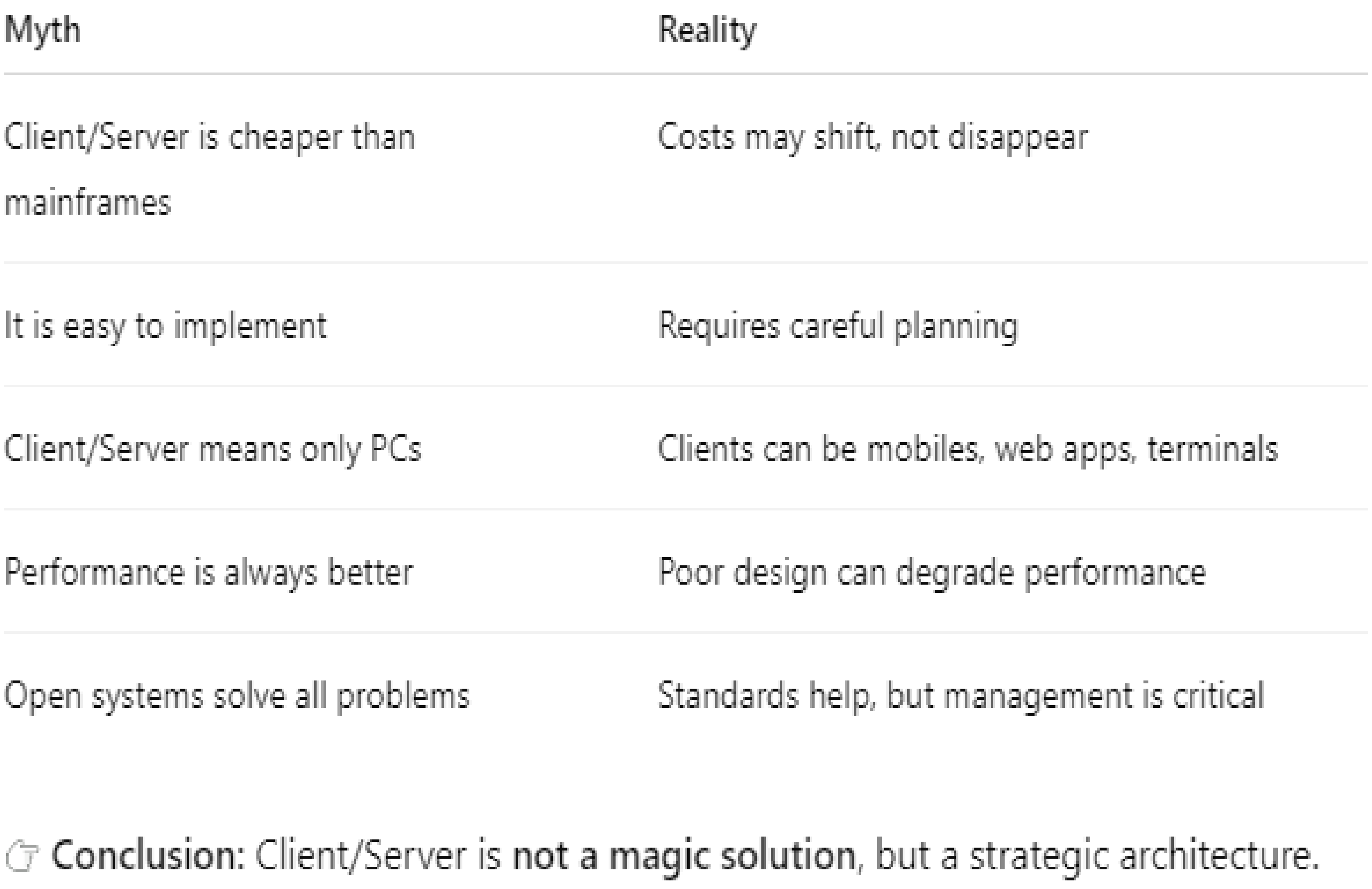


4.2.5 Restructuring Corporate Architecture

Client/server computing puts computing management in the hands of the user group, while control and administration is still in the hands of IS. These two groups have not been known to work well together in the past. For client/server computing to work, both end users and IS must begin to look at computing power as a resource to solve business problems. The focus has to be on the business problems, not the



Client/server technology also restructures the workflow processing, partly by placing it closer to the work node. By building a totally automated information system for the workflow process, organizations eliminate the delays and errors created when data is manually manipulated. The use of electronic data interchange (EDI) is an example of a modification in workflow processing.



Myth	Reality
Client/Server is cheaper than mainframes	Costs may shift, not disappear
It is easy to implement	Requires careful planning
Client/Server means only PCs	Clients can be mobiles, web apps, terminals
Performance is always better	Poor design can degrade performance
Open systems solve all problems	Standards help, but management is critical

👉 **Conclusion:** Client/Server is **not a magic solution**, but a strategic architecture.

The Institute of Electrical and Electronic Engineers (IEEE) Technical Committee on Open Systems offers the following definition of open systems:

> A comprehensive and consistent set of international information technology standards and functional standards profiles that specify interfaces, services, and supporting formats to accomplish interoperability and portability of applications, data and people.

4.3.1 Standards Areas

Standards address four areas of client/server computing:

- **Platforms.** These standards are developed by hardware and software vendors, usually in response to *de facto* standards, such as Intel chips, UNIX, and DOS with Windows.
- **Networks.** Industry-standard networking protocols such as OSI and TCP/IP are being used instead of vendor-specific networking protocols.
- **Middleware.** This new term, used to classify the software that sits between the application and the operating system, includes GUIs, databases, E-mail systems, software development tools (such as CASE), and IS management tools (such as encryption and recovery routines).
- **Applications.** Organizations decide on standard applications to facilitate work group interaction and work-product compatibility.

Standards specifications should be developed by consensus and be publicly available. For a standard to be effective, its specification must be widely accepted (used). It is difficult to predict which specification

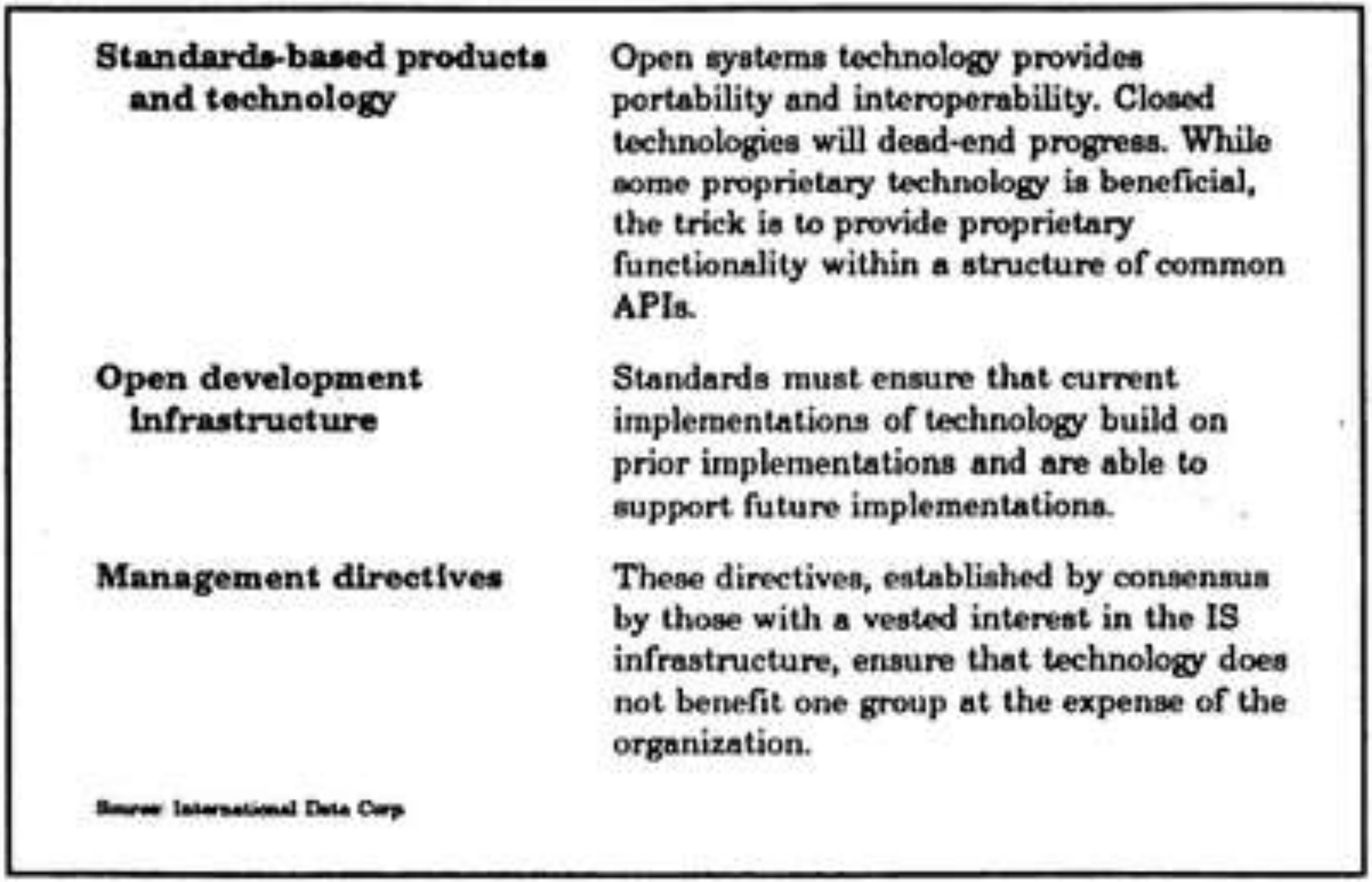
Existing Standards (OS and Networks)

1. Unix
2. POSIX (IEEE unix based)
3. TCP/IP
4. OSI (Open Systems Interconnection) – Layered n/w structure
5. Remote Data Access (RDA), Distributed Rational Database Architecture (DRDA)

Why open systems:

1. Conform to a broad set of formal and defacto standards
2. Support for verity of vendors
3. Demands strategic adoption of standards by users and developers
4. Plug and play, easier development

Standards Setting Organizations



Standards-based products and technology	Open systems technology provides portability and interoperability. Closed technologies will dead-end progress. While some proprietary technology is beneficial, the trick is to provide proprietary functionality within a structure of common APIs.
Open development infrastructure	Standards must ensure that current implementations of technology build on prior implementations and are able to support future implementations.
Management directives	These directives, established by consensus by those with a vested interest in the IS infrastructure, ensure that technology does not benefit one group at the expense of the organization.

Source: International Data Corp

Factors for Success:

- Business Motivation
- Internetworking
- Interoperability
- Compatible environments
- Perceived benefits