CATEGORIZING COMPUTER SYSTEMS

Section 5

CATEGORIES OF COMPUTER SYSTEMS
Contemporary computers can be categorized as mainframes, midrange computers, PCs, workstations, and supercomputers. Managers need to understand the capabilities of each of these types of computers, and why some types are more appropriate for certain processing work than others.

Classifying Computers
A personal computer (PC), which is sometimes referred to as a microcomputer, is a computer that can be placed on a desktop or carried from room to room. Smaller laptop PCs are often used as portable desktops on the road. PCs are used as personal machines as well as in business. Handheld computers as well as newer pen-based PCs fall into this category. PCs are constantly evolving. For example, the latest generation of tablet PCs recognizes handwriting and handles multimedia much better than previous generations. A workstation also fits on a desktop but has more powerful mathematical and graphics-processing capabilities than a PC and can perform more complicated tasks than a PC in the same amount of time. Workstations are used for scientific, engineering, and design work that requires powerful graphics or computational capabilities.

A midrange computer is more powerful, more expensive, and larger than a PC but is capable of supporting the computing needs of smaller organizations or of managing networks of other computers. Midrange computers can be minicomputers, which are used in systems for universities, factories, or research laboratories, or they can be servers, which are used for managing internal company networks or websites. Server computers are specifically optimized to support a computer network, enabling users to share files, software, peripheral devices (such as printers), or other network resources. Servers have large memory and disk-storage capacity, high-speed communications capabilities, and powerful CPUs.
Servers have become important components of firms’ IT infrastructures, because they provide the hardware platform for electronic commerce. By adding special software, they can be customized to deliver web pages, process purchase and sale transactions, or exchange data with systems inside the company. Organizations with heavy electronic commerce requirements and massive websites are running their web and electronic commerce applications on multiple servers in server farms in computing centres run by commercial vendors such as IBM.

A mainframe is the largest computer, a powerhouse with massive memory and extremely rapid processing power. It is used for very large business, scientific, or military applications where a computer must handle massive amounts of data or many complicated processes.

A supercomputer is a highly sophisticated and powerful computer that is used for tasks requiring extremely rapid and complex calculations with hundreds of thousands of variable factors. Supercomputers use parallel processors and traditionally have been used in scientific and military work, such as classified weapons research and weather forecasting, which use complex mathematical models. They are now starting to be used in business for the manipulation of vast quantities of data.

Computer Networks and Client/Server Computing

Today, stand-alone computers have been replaced by computers in networks for most processing tasks. The use of multiple computers linked by a communications network for processing is called distributed processing. In contrast, with centralized processing, in which all processing is accomplished by one large central computer, distributed processing distributes the processing work among PCs, midrange computers, and mainframes linked together.

One widely used form of distributed processing is client/server computing. Client/server computing splits processing between “clients” and “servers.” Both are on the network, but each machine is assigned functions it is best suited to perform. The client is the user point-of-entry for the required function and is normally a desktop computer, workstation, or laptop computer. The user generally interacts directly only with the client portion of the application, often to input data or retrieve data for further analysis. The server
provides the client with services. The server could be anything from a mainframe to a
desktop computer, but specialized server computers are often used in this role. Servers
store and process shared data and also perform back-end functions not visible to users,
such as managing network activities. Figure 5W-6 illustrates the client/server computing
concept. Computing on the internet uses the client/server model (see Chapter 9).

Figure 5W-6

The exact division of tasks between the client and the server depends on the requirements
of each application, including its processing needs, the number of users, and the available
resources. For example, client tasks for a large corporate payroll might include inputting
data (such as enrolling new employees and recording hours worked), submitting data
queries to the server, analyzing the retrieved data, and displaying results on the screen or
on a printer. The server portion fetches the entered data and processes the payroll. It
controls access so that only authorized users can view or update the data.

In some firms client/server networks with PCs have actually replaced mainframes and
minicomputers. The process of transferring applications from large computers to smaller
ones is called **downsizing**. Downsizing can potentially reduce computing costs because
memory and processing power on a PC cost a fraction of their equivalent on a mainframe.
The decision to downsize involves many factors in addition to the cost of computer
hardware, including the need for new software, training, and perhaps new organizational
procedures.

**Network Computers and Peer-to-Peer Computing**

In one form of client/server computing, client processing and storage capabilities are so
minimal that the bulk of computer processing occurs on the server. The term *thin client* is sometimes used to refer to the client in this arrangement. Thin clients called **network computers** (NCs) have minimal memory, storage, and processing power and are designed to work on networks. NC users download whatever software or data they need from a central computer over the internet or their organization’s internal network. The central computer also saves information for the user and makes it available for later retrieval, effectively eliminating the need for secondary storage devices such as hard disks, floppy disks, CD-ROMs, and their drives.

NCs are less expensive to purchase than PCs with local processing and storage and can be administered and updated from a central network server. Software does not have to be purchased, installed, and upgraded for each user because software is delivered and maintained from one central point. Network computers and centralized software distribution thus increase management control over the organization’s computing function.

However, PC prices have fallen so that units can be purchased for almost the same cost as NCs. If a network failure occurs, hundreds or thousands of employees would not be able to use their computers whereas people could keep working if they had full-function PCs. Companies should closely examine how network computers could fit into their information technology infrastructure.