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DATA COMMUNICATIONS A modern firm may conduct its affairs from two or more locations. Forinstance, a typical manufacturing firm may have several plants, warehouses, and sales offices—all at locations removed from a home office. Communications between these remote locations have traditionally been conveyed by letters, telephone calls, and interoffice messenger services. Currently, however, an increasing number of firms are connect-ing their geographically dispersed locations by means of a data communications system. 'This means of communication provides the managers and employees of a firm who happen to reside in remote locations with the same access to data, com- puting power, and guidance that they would have if they were physically in the home office. The hardware components that make up data communications systems usu-ally include communications links, terminals and microcomputers, modems, and communications controls units. Data communications systems require the vadety of software needed by any hardware configuration, plus special software as communi-cations programs. In a technical sense, a data communications system links the data collection processing, storage, and dissemination facilities in a computer network. Networks have become increasingly important for three reasons: (1) many firms have becomegeographically dispersed and need to transmit large volumes of data quickly andreliably; (2) data communications technology has become more sophisticated, ver-satile, and affordable; and (3) many firms are using groupware tools to share dataand to facilitate collaboration among work groups, managers, and other employ-ees, Currently, it is estimated that more than 90 percent of all computers (exclud-ing microcomputers) in the United States are connected to data communications networks; for microcomputers, the estimate is about 75 percent and rapidly in-creasing. TYPES OF NETWORK ARCHITECTURES in the earliest days of computer technology, computer networks were scarcely feasi-ble. Geographically dispersed firms desiring to employ computers for data process-ing had three choices: (1) to subscribe to a computer service bureau; (2) to install a single large mainframe or minicomputer at a central site, usually at the home office;or (3) to install computers at various locations, usually not connected to a common network and functioning independently. Those firms electing the second option em-ployed centralized computer systems, whereas those choosing the third option created de-centralized computer systems. When data communications hardware and software were developed, computernetworks became feasible options. A computer network is a data communicationssystem that enables firms to share information and programs by linking computersand other devices such as printers. An early type of network was formed when firmsinstalled large computers at a central location and tied the centralized computer to terminals at various remote locations. For instance, Ramada Inns installed a large reservations computer at Omaha and tied each of their separate inns (motels) to the computer via terminals. This centralized computer network enabled Ramada Inns to ac-commodate reservations quickly; because the computer was placed at the approxi-mate center of the United States, it was able to minimize the communication line costs. Wide-Area Networks. Data communications networks differ in so many respects that each specific network may be unique. Nevertheless, they can be classified in terms of service areas and basic hardware/software architectures. With respect to service ar-eas, networks may be classified as wide-area and local-area. A wide-area network (WAN) is formed among computers and interconnected devices that are geographi-cally distant from one another. Two wide-area network architectures are centralized networks and distributed networks. PHASES IN DATA-BASE DEVELOPMENT Developing an integrated data base is a complex project. As with any complicated development project, it is best accomplished in phases. The six phases of systems development are planning, analysis, detailed design, implementation, testing, and maintenance. Although, at first glance, this process appears to be sequential, it is ac-tually iterative. For example, the implementation phase often leads not only to the testing phase, but it may also lead back into the design phase as discoveries are made during the process of implementing system components. Planning Planning, the first phase in data-base development, is intended to define the project scope and ascertain the feasibility of a data base. The project scope may include a firm's overall activities or some portion thereof. Assuming that a data base is technically viable, feasibility focuses on (1) whether the benefits of a proposed data base are greater than its costs

and (2) whether the data base will be effectively used. Planning can be best achieved if the top management of the firm first clarifies the firm's overall objectives and strategies. Analysis Using the organizational plan as a basis, analysts can prepare a broad, high-level diagram of the firm's entire array of operational activities as one of the first steps in the analysis phase. Called an enterprise diagram, this broad diagram shows many of the firm's entities, especially the key agents and processes (collected events), and their relationships. It provides a comprehensive slice of reality concern-ing the firm. Figure 6-3 depicts an enterprise diagram for lnfoage, focusing on the processes related to product sales (but omitting those involved in revenues from ser-vices). This enterprise diagram helps determine the importance and scope of the data base(s) to be developed and facilitates the assessment of data requirements.   Also during the analysis phase, user requirements as well as data requirements are specified. Data requirements include all data needed (1) to reflect the firm's op-erations and relationships and (2) to provide the myriad of users with the informa-tion they need to meet their responsibilities.   In addition to evaluating the firm's entities and documenting data requirements, the analysis phase includes the development of a logical systems design. The logi-cai design specifies expected output requirements, inputs, processes, and the ap-propriate conceptual data model.   For years you've been hearing about security as a critical issue, tf you believe the stories, hordes of wicked hackers are threatening to electronically topple or cripple firms' computer resources, in-cluding networks. The implementation of security measures to prevent or detect these alleged threats does not rank very high on the list of top in-formation technology (IT) concerns. Other pressing issues, such as desktop upgrades, data warehouses, !ntranets, and migration to client/server networks, are pushing security out of the limelight. Why have IT departments relegated security to the wings, and will it ever receive greater attention? One reason for inaction is that the severity of the security threat is subject to considerable debate. It is extremely difficult to track criminal activ-ity in the areas of computer security because the survival of many companies hinges on the percep-tion that their data is secure. The 1998 joint survey by the FBI and Computer Security Institute (CSI) found that only 17 percent of hacking victims con-tacted authorities. According to the FBI/CS! study, 72 percent of companies have suffered losses at some stage due to security breaches: of those companies, 46 percent reported total losses of $136,822,000.   A survey by InfWorld of 98 security administra-tors revealed that most felt confident that their computer resources, including networks, were se-cure from both internal and external risk expo-sures. Yet, almost 40 percent of the security administrators had never carried out an analysis of their computer security. The few who had suffered actual security breaches characterized them as mi-nor. The Infoworld survey also asked the security administrators about the security tools they use, such as network auditing tools, monitoring tools to detect intrusion, and firewalls; utilization of these tools was surprisingly low. Based on the sur-vey, lnfoworld concluded that many iT managers are operating under a false sense of security. Amidst all this confusion, security product vendors try to sell their wares using the scariest numbers they can possibly find. It probably suits many IT man-agers to assume these numbers are not applicable to their particular situation, as they continue to fo-cus on more "pressing issues." The managers who do look hard at the computer security problem are faced with an ugly reality. There are a lot more holes than can be realistically plugged, and, if your network has never been breached, it can be diffi-cult to justify the time and money spent on com-puter security-related work. In the end, it seems that the hardest thing to justify is the investment of precious IT dollars when your company may be gaining little more than peace of mind.   The recent flurry of acquisitions and mergers in this market sector may well provide tT managers with the key to justifying those computer security concerns. For example, Cisco Systems recently ac-quired the auditing and intrusion-detecting vendor WheelGroup, and Network Associates purchased the security vendor Trusted Information Systems. The fact that major vendors are jostling for posi-tion in the security market should guarantee greater mind share for security problems, it all adds up to one thing--security as an iT issue will only get bigger.   ……

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