A SURVEY OF MICRO-MAINFRAME LINKS

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The PC, now a necessary business tool, can be even more powerful if connected to a mainframe computer. This paper surveys the current literature on micro-mainframe links, noting the benefits (access to corporate data, mainframe applications, and remote printing) and the pitfalls (problems involving security and data integrity). The article compares three approaches to micro-mainframe links: terminal emulation, file transfer and cooperative processing. Cooperative processing is the approach to be used in the future. How IBM’s System Application Architecture (SAA) and its new LU6.2 peer-to-peer cooperative processing protocol will affect micro-mainframe links is described, as are other vendors’ approaches. The article concludes with a description and analysis of micro-mainframe link software packages reviewed in the literature.

The Personal Computer is no longer a personal tool for only the home. The hardware and software have fully matured so that the PC now fits in a larger corporate computing scheme (Ondegaal, 1990). The graphical interface, ease of use, responsiveness, and prototyping ability of the PC are too important to neglect in the business environment (Buerger, 1990; Gupthill, 1989; Ondegaal, 1990). However, to fully solve business problems, the PC must be linked to other corporate computing resources, including host mainframe computers. This micro-mainframe link creates a network that is extremely valuable, cost effective, and essential to survive in business today (Bookholdt, 1989; LaPlante, 1991; Johnson, 1990). Various approaches, communication media and protocols, and software packages are used for this link. This link creates increased integration which affects not only a business’s effectiveness, but also its politics, security, and culture. This paper reviews the literature on these micro-mainframe link issues, discusses specific hardware and software products, and refers the reader to sources that analyze and compare these products.

The information for this survey originated in English language journals. Since currency is critical, only articles written after January 1989 were selected. From the Nexis and Dialogue online bibliographic services, using the keyword “micro-mainframe link,” approximately 70 articles were found for this survey. A subset of these articles was chosen based on relevance, currency, and availability.
The Power and Possible Pitfalls of Micro-Mainframe Links

Why are micro-mainframe links so important? If the specifics of the link are chosen properly, a system can utilize the best of both the PC and the mainframe in a synergistic manner. The responsiveness of the PC can be combined with the number-crunching, security, and storage capabilities of the mainframe to create a powerful information platform (Johnson, 1990). Many systems reviewed use PCs for data entry and interfacing to application programs, while the mainframe acts as a repository, and performs batch and security functions (Gupthill, 1989; Korzeniowski, 1990; Odengaal, 1990; Hunn, 1989). When designed properly, a micro-mainframe link can allow (Johnson, 1990):

1) Remote printing capability
2) Additional storage
3) Access to corporate E-mail
4) Access to up-to-date data quickly and easily
5) Fast, easy, and timely data entry
6) Access to mainframe program applications

With this new computing power, a business can be more competitive, effective, and efficient.

However, before implementing a micro-mainframe link, a serious analysis of the organizational system requirements of users is of utmost importance. First, a culture clash may occur between control-minded mainframe personnel and independent-minded PC users (Johnson, 1990). If this conflict does occur, it must be quickly resolved. Synchronizing the purchase and installation of equipment at both ends of the micro-mainframe link can help to minimize such problems. More importantly, a manager must define the needs of the users by considering the number of users and the allocation of resources in terms of the type of communication media, protocol, hardware, and software. If the users’ needs are understood beforehand, these critical decisions can be made wisely (Johnson, 1990).

The literature discusses potential security and integrity problems that must be anticipated when implementing micro-mainframe links. Security breakdowns could occur when using a PC and mainframe password and auditing routines may be circumvented (Odengaal, 1990; Bookholdt, 1989). Sensitive data, such as personnel salaries, could erroneously be displayed. These security issues can be avoided by assigning a security manager, classifying sensitive data files, and restricting access to areas where PCs capable of accessing this type of data are located (Bookholdt, 1989). Integrity problems could occur when critical corporate mainframe data, such as financial figures, are corrupted by unverified PC file modification routines (Bigley, 1990; Mohen, 1989). Alice LaPlante (1991) states that, since the PC desktop is so powerful, this potential data integrity problem may be worth the risk. However, Bookholdt (1989) presents a survey on micro-mainframe links in which he discusses how to avoid problems with security and integrity and where to find various security and integrity methods and products. He states that files can be made more secure through time and date stamps when updates occur. Additionally, rules can be enforced that do not allow PC-altered files to be used in important batch reports. Finally, he claims that all files should be validated in a common mainframe routine, no matter where the files originated. Bookholdt also discusses potential integrity problems arising from concurrent updates. He advises that updates should be monitored with locks and/or “checkout-checkin” procedures. These utilities automatically disable access to a record or file so that the same data cannot be updated simultaneously by different users.

Another potential problem with micro-mainframe links occurs when attempting to import too much data from large mainframe files and exceeding a PC’s disk capacity. To resolve this, database extracts, or smaller views of the corporate database, should be used when downloading mainframe files. Extracts could contain only current information or only summaries of older data.
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