Fujitsu's evolutionary mid-range application platform

XSP is a versatile operating system available across the range of Fujitsu 's M Series computers. A product of Fujitsu's ongoing investment in research and development, XSP is the successor to the well established ESP III and FSP operating systems, which are installed on the majority of Fujitsu systems worldwide. XSP combines the significant processing power of ISP with the menu-driven user friendliness of ESP III. By providing a consistent environment across Fujitsu 's M Series systems, XSP streamlines support activities - providing an even higher quality of service to Fujitsu customers.

With full support of cooperative processing, XSP combines the centralized processing power of the mainframe with the flexibility of workstations and PCs. XSP offers excellent upgradability, connectivity, and support for international standards, as well as access to a wide range . XSPprovides organizations with a state- of-theilrt operating system that of applicationsenables them to stay at the forefront of new developments in technology.

XSP - leading the way for information systems in the 1990s
As an integral part of Fujitsu's cooperative processing solutions, XSP represents the next generation of Fujitsu's information systems. By recognizing and supporting cooperative processing as an important aspect of today's business environment, XSP provides a solution that focuses on the needs of end users. XSP combines the centralized processing capabilities of mainframes with the flexibility of workstations and PCs - providing the best features of both worlds. With XSP, Fujitsu continues to provide organizations with the optimum operating system that features high performance, high productivity, standardization, and ease of use.

Fujitsu is committed to being dynamically responsive to customer needs. Through ongoing development, the base of applications available is constantly expanding to provide XSP users with a comprehensive range of solutions from Fujitsu and third-party developers. As well as supporting the development of new applications, XSP maintains compatibility with existing Fujitsu systems. Current users of FSP and ESP III systems can migrate to the versatile XSP environment with minimum disruption to operations. XSP streamlines Fujitsu's mid-range offerings, and offers a smooth upgrade path throughout the range of M Series processors. With XSP, Fujitsu preserves existing investments while keeping the door open to the latest advancements.

Fujitsu has developed XSP with the aim of integrating mainframe technology with the technologies of workstations and PCs. By integrating these important technologies with international standards, XSP allows organizations to build global information systems for communication with computers all over the world. XSP allows organizations to respond quickly to changing needs at the front line of information processing. Users at PCs and workstations are able to process vital information through their own, familiar user interfaces - calling on high-volume database and communications processing from the mainframe when required.

The success of an information system depends on proven functionality in several important areas. For this reason, XSP is developed around the concept of four servers that represent a combination of information system requirements.

The database server - An integrated, high-speed database processing and distributed computing environment for development, maintenance, and execution of in-house and third-party applications.

The communications server - A highly reliable communications environment that promotes the creation of local and global, multi-vendor communications networks based on international standards.

The applications server - A high-speed, highly reliable processing environment that enables fast access, high throughput, and handling of large volumes of data.

The management server - A highly secure, user- friendly environment that provides ease of operation, system maintenance, and control.

The database server

With more people relying on PCs and workstations in business activities, the role of the mainframe in an information system is changing. Where a mainframe was once used for all types of processing, its main function has evolved into that of a centralized server that integrates the front-end components. XSP's database server supports a fully integrated, database processing and distributed computing environment. With a high- speed relational database, application development tools, conformance to international standards, and end-user productivity tools, XSP provides organizations with the facilities they need to develop, maintain, and execute in-house and third-party applications.

Fujitsu's high-performance relational database system - SymfoWARE

SymfoWARE, the heart of XSP's database server, represents a major breakthrough in relational database performance. SymfoWARE utilizes the unique features of Fujitsu's M Series processors to provide all the advantages of relational databases, with performance levels comparable to non-relational database systems. With SymfoWARE, the versatility of relational databases is now available for online transaction processing as well as decision support and end-user computing applications. Being a true relational database, SymfoWARE eliminates data redundancy - improving the organization's productivity through the efficient use of data.

SymfoWARE uses a unique dedicated access method to facilitate high-speed data retrieval with low overheads. The combination of SymfoWARE's special enhancements and processing capability allows organizations to maximize productivity with large- scale distributed databases. As well as improving productivity through superior performance, SymfoWARE fully conforms to major international and industry standards for remote database access (OSI/RDA), Structured Query Language (ISO/SQL), and standard programming languages. By conforming to established standards, SymfoWARE ensures the easy portability of applications software, control of distributed data, and the protection of system development investments.

Fujitsu's information management solution - AIM

The Advanced Information Manager (AIM) is the core of XSP's database server. AIM integrates on-line transaction processing, database systems, and software development with a host of applications. Developers, managers, and end users benefit from the variety of productivity tools available for the AIM environment. AIM/DB, Fujitsu's CODASYL-like network database management system, provides organizations with the capability to create and maintain largescale database applications in which responsiveness and reliability are critical. AIM provides a comprehensive control environment that allows developers to concentrate on application development rather than on specific details of hardware and system software. AIM facilitates control over distributed databases and applications, and provides an interface between application programs. Additionally, AIM fosters communication between multiple host systems - improving the reliability and availability of information. With a range of utilities, debugging tools, and functions that optimize memory and CPU resources during runtime, AIM provides XSP users with the ideal environment for development of efficient, user-friendly systems.

Application development environment

XSP's database server provides developers with access to a complete application development environment. XSP's development tools are complemented by a range of versatile program editors, which suit various development requirements.

Integrated data dictionary -

Application developers take advantage of the productivity benefits of ADAM/IRD, a fully integrated data dictionary that enhances the functionality of XSP's application development environment. ADAM/IRD effectively links all the resources needed for efficient development and maintenance of application programs.

Conventional programming languages -

In addition to the wide range of features that simplify application development, XSP also provides full language support for COBOL 85, FORTRAN, PL/I, and C.

Versatile program editors -

To suit varying development requirements, developers have access to a choice of program editors, which run under the Advanced Interactive Facility (AIF). For development and maintenance of large applications, the Generalized Program Editing and Management Facility (GEM) allows efficient use of DASD storage. GEM offers a variety of functions that allow development personnel to operate productively. These functions include reporting, program library control, module sharing, automatic data compression, multiple backup control, and exclusive control. As well as GEM, XSP offers a choice of editors such as Fujitsu's AP/DF and PFD, which provide developers with the facilities required to make the most of specific programming situations. Developers can provide user-friendly menu screens for applications with PSAM, XSP's screen development facility.

End-user productivity tools

The XSP database server makes a wide selection of productivity tools available to end users. XSP's productivity tools simplify end-user activities with a number of office automation, information retrieval, decision support, resource management, and reporting facilities.

Information retrieval - XSP's database server provides various products that simplify information retrieval. Users will be able to extract information from databases without the assistance of programmers - freeing programmers to concentrate on more complex tasks. STRACT provides SymfoWARE and VSAM databases with a single user interface to a variety of end-user and decision-support functions. STRACT combines end-user facilities such as interactive SQL, report generation, and graph creation, with more complex decision support functions such as statistical analysis, time-series forecasting, and management modeling. For users who do not need the complete functionality of STRACT, STRACT-S provides a subset of STRACT, which includes data definition, report generation, and graph creation features. STRACT Partner allows users to access and manipulate SymfoWARE relational database files through a PC. With an MS-Windows™ like interface, STRACT Partner provides a user- friendly environment in which to access the query and reporting functions of STRACT-S and STRACT.

The communications server

Being competitive in today's business environment depends on the ability to deliver the right information to the right place at the right time. The large number of computing platforms and architectures used by different organizations around the world make the task of providing a truly global information system even more challenging. With extensive support of international standards, XSP's communications server satisfies the needs for openness and interconnectivity between multi-vendor systems. XSP's communications server provides a highly reliable communications environment that implements international standards to create global, multi-vendor communications networks. Based on Fujitsu 's FNA5 Architecture, the communications server offers a complete networking solution that incorporates multivendor interoperability, high-speed/high reliability networking, intelligent networking, and network management.

Fujitsu's networking strategy for the 1990s and beyond - FNA5

XSP's communications server is based on FNA5, the philosophy that guides the design of Fujitsu's data communication systems. FNA5 introduces XSP users to true multi-vendor connectivity through interfaces to the most widely used communications standards, which include OSI, TCP/IP, and SNA.

By supporting the international OSI standard, FNA5 complies with the International Standards Organization's definition of an open system, and allows applications using the OSI protocol stack to communicate with OSI applications on other systems. FNA5 overcomes the complexities of communication between different systems from various vendors to enable organizations to configure large-scale distributed networks.

With FNA5 standard interfaces, XSP systems can connect with OSI systems throughout the world to encompass a global information system.

The OSI VTAM-VTAM-G V30

The Virtual Telecommunications Access Method- General (VTAM-G V30) is the core component of FNA5. VTAM-G V30 implements the OSI component of FNA5, which allows XSP systems to communicate with other systems around the world. VTAM-G V30 also supports the FNA architecture of existing Fujitsu systems to streamline migration to XSP from another system.

With VTAM-G V30, an XSP system enables transfer of information between products from different vendors as part of a multi-vendor global network. Unlike OSI connectivity products that depend on gateways, VTAM-G V30 inherently supports OSI. This approach significantly reduces the number of instruction steps required for OSI transactions, and presents a significant performance improvement over systems that depend on gateways. VTAM-G V30 conforms to Government OSI Profiles (GOSIP)- ensuring XSP systems will integrate well with government strategies for implementing OSI standards for networks.

Through VTAM-G V30's Extended and Open Networking Facility (EONF), Fujitsu extends OSI support to local and wide area networks. EONF allows the creation of an open backbone network that enables an OSI application on a third-party system to communicate with an OSI application on an XSP system. EONF also provides XSP systems with expanded addressing, line sharing, priority allocation, and multiple communication paths to improve the efficiency of the entire network.

TCP/IP connectivity - VTAM-G TISP

Fujitsu's TCP/IP Support Program (TISP) provides a versatile TCP/IP interface for FNA5. VTAM-G TISP enhances the operation of XSP's communications server by providing connectivity with UNIX networks and workstations through TCP/IP protocols. As well as connecting XSP to UNIX systems, VTAM-G TISP further expands XSP's distributed computing capability through connectivity with Ethernet™ IEEE 802.3 LANs and FDDI networks. VTAM-G TISP improves interoperability between systems with two-way file transfer of ASCII, EBCDIC, and binary files. With VTAM-G TISP, XSP users benefit from the best of both worlds - the advanced features of XSP with the open systems benefits of UNIX.

Host-to-host communications

XSP's communications server allows organizations to share information between host computers and applications. The FNA Loose Coupling Facility (FLCF) extends XSP's host-to-host connectivity to IBM SNA hosts. This facility allows XSP networks to be connected with SNA networks without changes to addressing or naming conventions.

The Integrated Data Communications Manager (IDCM), which integrates the communications functions of online systems such as AIM, AIF, and DSM, further enhances the connectivity features of FLCF. IDCM provides XSP with the communications basis for implementation of distributed processing, and reduces the complexity of a distributed processing environment.

PC connectivity

Through VTAM-G and IDCM, XSP's communications server promotes extensive PC connectivity via local area networks. For greater functionality in this vital area of communications, XSP supports a variety of industry-standard LAN systems.

Network management for increased control

The Corporate Network Management System for Information (COMS-I) provides XSP systems with an advanced network management facility. COMS-I collects information about network performance, configuration, security, and fault detection, and presents it in easy-to-understand reports. With full support of NET/MASTER'STM NCL language, COMS-I acts as the network management center for multivendor networks, which include components based on standards such as SNA, FNA, OSI, and SNMP.

The right information at the right time

With Fujitsu's commitment to standards, multivendor connectivity, and network management capability, XSP will allow organizations to maintain a competitive edge through a flexible and reliable base for corporate communications.

Major communications server components
Network architecture - FNA5
OSI integration -VTAM-G V~30
TCP/IP connectivity - TISP
Host-to-host communications - FLCF; VTAM-G MSNF
Network management- COMS-I
System reliability - FUJITSU SURE SYSTEM 2000
File transfer- FTU
FDDI networking- FSLINK
Distributed resource management- DRMS

The applications server

The need for processing exceptionally large amounts of data efficiently is becoming more important in todays competitive commercial world. Large-scale distributed databases, decision support systems, modeling and simulation tools, and online transaction processing systems require enormous processing capability that can only be provided by a sophisticated combination of hardware and software. XSP's applications server features a range of products that take advantage of Fujitsu 's sophisticated M Series systems to provide maximum system performance, reliability, and flexibility with all applications. A combination of sophisticated hardware and software tools, the applications server offers high-speed, high-volume processing, and legendary Fujitsu reliability.

Virtual machines for more flexibility

For maximum flexibility, XSP's applications server supports the creation of several virtual machines on a single M Series system. Each virtual machine can operate under a different operating system. The use of virtual machines improves system reliability in the installation of

upgrades and in the development of new applications. During an upgrade, applications will continue to run under the existing system until the new system is fully operational. New applications can be separated from existing applications during development to enable testing and evaluation without disruption to normal operations.

Organizations migrating to XSP from ESP III and FSP can undertake the changeover between operating systems smoothly and efficiently with Fujitsu's Execution Facility for Multi Operating Systems (EMOS). EMOS is a virtual machine program product designed to simplify migration to XSP by allowing an ESP III, FSP, or XSP system to operate alongside an XSP system on a single CPU. This facility simplifies migration by allowing the new operating system to be efficiently integrated with existing resources.

Virtual machines running under XSP can take advantage of the Extended Virtual Machine (EVM) hardware of Fujitsu's high-end M Series processors. EVM enhances performance by reducing CPU overheads during virtual machine operation. Where the control instructions essential to efficient virtual computing were previously simulated by software, EVM incorporates these features in firmware to provide more reliable control of system resources in virtual mode.

The Advanced Virtual Machine/Extended (AVM/ EX) facility, which operates on M Series processors that feature the EVM hardware, allows various virtual machines to operate on a single CPU. As well as supporting virtual machine operation on EVM- equipped M Series processors, XSP also provides virtual machines via the Advanced Virtual Machine/ Extended Facility (AVM/EF), which supports virtual machines on all M Series processors.

With the range of virtual machine facilities available to XSP, users benefit from a wide choice of applications. Organizations can take advantage of applications developed for operating systems such as MSP-EX, FSP, ESP III, UTS/M, UXP/M, and IBM systems - by running them side-by-side with XSP applications on the same machine.

High throughput via more efficient processing

XSP supports the high-speed System Storage Unit (SSU)* of Fujitsu's high-end M Series computers. The SSU provides a new level of storage - with performance between main memory and Solid State Disk (SSD)- that improves the throughput of I/O- intensive applications. The SSU can be used to store frequently used files and databases - significantly improving access time and reducing channel load. With a transfer rate of 300 megabytes per second and up to two gigabytes of storage capacity, the SSU reduces I/O time by up to 90 percent compared with conventional DASD. Extremely efficient online transaction processing systems can be configured by storing frequently accessed files in the SSU for rapid processing.

To complement the performance benefits of the SSU, XSP also supports the database assist feature* (DBA), which is used exclusively to improve the performance of Fujitsu's SymfoWARE.

DBA provides a high-performance retrieval function, which utilizes the DASD management capability of Fujitsu's F1700 file control units. By allowing the disk controller to perform part of the database retrieval function, DBA significantly reduces CPU load for selecting records and items, and reduces channel load for transferring records.

With a reduction in CPU usage and improvement in response time, the combination of the DBA and F1700 file control units will provide a powerful, yet cost-effective performance improvement for XSP systems.

XSP uses the advanced features of Fujitsu's high- capacity disk subsystems to further improve the retrieval times for large databases. The Disk Cache Support Program (DCSP) controls the high-speed disk cache of F6425, and F6427 disk subsystems. DCSP monitors the number of accesses for each file and applies the Least Recently Used (LRU) algorithm to ensure that the most frequently used files remain in cache memory. As cache memory allows much faster access to data than DASD, these files are accessed much more rapidly, with a significant reduction in accesses to DASD.

Fail-safe systems

Because reliability and data integrity are important to successful operation of an organization, Fujitsu provides additional reliability features to ensure completely reliable operation.

The SSU can be configured to provide a high- speed hot standby system for SymfoWARE databases. A hot standby system will ensure that a complete database can be restored to normal operation within seconds in the event of system failure.

The reliability benefits of hot standby are also available for multiple XSP systems via the Automatic Duplex Control Facility (ADCF). ADCF provides an additional factor of safety where XSP is configured on more than one machine in an interconnected system. With ADCF, control can be transferred from one XSP system to another in the event of problems in the original system. ADCF is also available for multiple XSP systems operating under EMOS on one real machine.

Another feature that promotes a more reliable system is the Dual Volume Control Facility (DVCF), which improves the reliability of disk subsystems and ensures data integrity. A combination of hardware and software, DVCF manages two copies of a file on separate disk spindles. If the path to the primary volume fails, all further accesses are directed to the second volume. This feature dramatically reduces the adverse effects of a failure in a DASD device, control unit, or channel.

Better performance for business in the 1990s

With the flexibility of virtual machines, the high throughput of Fujitsu's special hardware enhancements, and a range of reliability features, XSP will provide organizations with the performance they need for the most demanding applications.

Major applications server components
Virtual machine environment- AVM/EX, AVM/EF, EMOS
Virtual machine hardware -EVM, RVM
High-throughput storage - SSLI
Database performance enhancer - DB Assist
Disk cache support -DCSP
Reliability features - ADCF DVCF

(support not yet available)

The management server

The efficient management of a sophisticated computer system is of vital importance to an organization. Operations such as monitoring, control, and maintenance of systems can be extremely time consuming, and costly in terms of manpower Through easy-to use system interfaces and expanded automatic operations, XSP's management server products will provide simplified system generation and customization, enhanced security, increased system control, and increased flexibility The management server will reduce the need for human intervention in the control of system resources, and allow organizations to assign MIS staff to more productive tasks.

Ease of system maintenance and control

The management server encompasses a range of tools that simplify the important task of system maintenance and control. Facilities such as performance monitoring, capacity management, online analysis, and reporting contribute to the reliable operation of XSP systems. Graphical displays of results allow operations personnel to monitor the system without having to interpret complex statistics. To further simplify operations, system menus can be customized to ensure ease of use and increased productivity.

Performance monitoring -

With XMON, Fujitsu's powerful system monitoring tool, XSP combines the functionality of a range of utilities into one easy-to- use product. FCMSYS/EM monitors system activities and reports information in real time - providing an immediate view of system activities and rapid identification of system problems. Through a user- friendly interface, FCMSYS/EM monitors channels, peripherals, real memory, CPU cycles, page datasets, and I/O operations to provide the complete picture of system performance.

Integrated capacity management -

FCMSYS, Fujitsu's integrated capacity management system, provides data collection, data storage, data analysis, and data presentation facilities that simplify the task of capacity management, and improve the productivity of information systems staff. System management information from various sources is collected and stored in a central database that can be accessed easily. FCMSYS provides a comprehensive chargeback facility that allows organizations to distribute costs for system usage among different departments for accounting and audit purposes. Up to 80 different types of reports can be generated to meet individual reporting needs - providing organizations with the information required to allocate system resources efficiently.

Optimized system performance -

Operations personnel can optimize the throughput of the system with the information collected by XSP's Performance Data Logger/Performance Data Analyzer (PDL/PDA). PDL/PDA monitors the performance of system hardware and software, and helps to identify modifications that would

result in improved system performance. Utilization statistics are gathered for the CPU, real storage, channels, and DASD devices. PDL/PDA can be configured to sample the performance status of resources at periodic intervals, or to log specified events as they occur.

Easy customization of system environment -

An XSP system can be customized to suit an organization's requirements with the Integrated Definition Aid (IDA). IDA provides easy installation and customization of the system environment through a set of user-defined menus. To facilitate ease of maintenance, IDA offers simple control of all system customization parameters. As all parameters are registered in the IDA dictionary, control and maintenance of the system becomes even easier.

Improved security

As security is an important aspect of today's computer systems, Fujitsu safeguards an organization's data with the Resource Access Control Facility (RACF). RACF protects data from unauthorized, deliberate, or accidental access that could be detrimental to an organization's operations. RACF implements a password system that can be tailored to suit any desired level of security.

A fully functional environment with low overheads

With simplified system operation and control, comprehensive system management facilities, and a high level of security, XSP's management server provides organizations with a fully functional system with low operation overheads.

Major management server components
Security -RACF
Remote and local printer support - APS, APS/DSP
System customization - IDA
Cartridge tape support - ADI; LIBSP, CLM
Optical disk support- OSM
Tape management- TRM
Performance management -XMON, FCMSYS, EXPECT, PDL/PDA
Online messages and codes - ISER
High-speed backup and restore - ARCS
Graphics support- ADJLIST, COMPACT, IMPRESS
Hardware monitoring tools - NMTAS OLTES, TOLTE-C

Compatibility with existing FSP and ESP III systems

In implementing the four server concept under XSP, Fujitsu combines the power and flexibility of FSP with the ease of use of ESPIII, while increasing conformance to international standards. With XSP, Fujitsu maintains a high degree of compatibility with both of these systems - ensuring that migration from ESP III or FSP to XSP can be achieved quickly and efficiently.

To facilitate easy migration to XSP, the Execution facility for Multi Operating System (EMOS) allows the existing and new systems to coexist while the new installation is being fine tuned. EMOS, which is designed specifically for migration to XSP, supports an ESP III or FSP system alongside an XSP system on the same CPU. Additionally, more than one installation of XSP can

also be supported on the same real machine. EMOS allows multiple systems to share system resources such as peripherals, CCPs, and communication lines. Links between multiple operating systems and direct file transfers are also made easy under EMOS.

Migration tools

XSP features a range of tools that streamline the migration process. Facilities are available to convert source code to SymfoWARE format, generate SymfoWARE definition data, and facilitate file transfer between new and existing systems. XSP's migration tools are supported by comprehensive, easy-to-use documentation, which simplifies the migration process.

Compatibility

With XSP, Fujitsu builds on its wealth of experience to provide a fully functional operating system that protects an organization's new and existing investments. Migration to XSP requires only minimal conversion for databases, JCL, and CL on existing FSP and ESP III systems. No conversion is required for COBOL 85 source and load modules, PSAM screen formats, AIM/DB network databases, or SymfoWARE relational databases.

Hardware supported

In order to provide a comprehensive upgrade path for organizations, XSP operates on a wide range of Fujitsu M Series processors. XSP is supported on the smallest single-CPU M-730 machine to the extremely powerful quadratic processor M-1800/45. The wide range of models supported offers XSP users the flexibility of upgrading their hardware as the organization grows, whilst retaining the same operating system. XSP supports up to two gigabytes of real memory, and up to two gigabytes of virtual storage via 31-bit virtual addressing.

XSP - the evolutionary application platform

With XSP, Fujitsu provides a versatile operating system that will grow with the needs of organizations. Excellent upgradability, connectivity, support for international standards, increased productivity, and access to a wide range of applications and application development tools makes XSP the ideal applications platform. XSP successfully combines the central processing capability of the mainframe, with the flexibility of workstations and PCs to provide the best of both centralized and distributed systems. XSP opens the door to a wider choice of processing options, and allows organizations to meet expanding corporate demands while maintaining their investments in existing systems and staff.