DPS 8

DPS 8/47 central system

Among today's large system users, the tendency is to combine horizontal with vertical growth. This is possible because the Distributed Systems Architecture (DSA) gives full freedom to implement a distributed system combining multiple host and satellite systems in whatever structure suits the requirements. The benefits are many: cost-effective communications by optimizing access paths, easier and more precise resource management when functions are clearly separated between systems, greater resilience to failures, better control, and better performance. As a result, many large system users prefer to build a system including multiple hosts than to concentrate all the processing power in a single mainframe.

Nevertheless, for the large organization, a second (or nth) system is likely to need considerable power in its own right. Moreover, the additional systems must provide full scope for independent evolution, and should ideally be interchangeable with the other mainframes from the software point of view.

One common approach is to retain the existing large system (or systems) for production work and install a second system to support "solution center" functions: decision support, information retrieval... in short, the emerging breed of applications that address the personal productivity of tactical and strategic management. Some sites also find it advantageous to separate the development functions. This can eliminate resource conflicts and boost the productivity of both development and production work.

In either case, but particularly so for the solution center, it would be counter-productive to separate the second system entirely from the primary production system. Both systems need access to common data. And the ability of GCOS 8 solution center products to access production data bases in full security is too great an asset to be disregarded, even when implementing the solution center on a second system for resource optimization reasons.

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For the established DPS 8 user, the DPS 8/47 and DPS 8/49 offer an economical, versatile, and supremely cost-effective route to horizontal growth. They are entirely software-compatible with the larger DPS 8/52, DPS 8/62, and DPS 8/70 models of the range, as with the DPS 88 range of very large systems. What is more, they can use the same peripheral subsystems, network processors, and terminals. They offer tremendous potential for evolution: the DPS 8/47 can be upgraded on site to a DPS 8/49, offering 50% more power in its single-processor version and accepting up to four processors. And, finally, they can share common data bases with any of the larger systems mentioned above via the Extended Shared Mass Store facility.

ARCHITECTURE

Figure 1 shows the logical organization of the major components of a DPS 8/47 system:

- The SCU (System Control Unit) coordinates the other components, managing memory accesses and interrupts
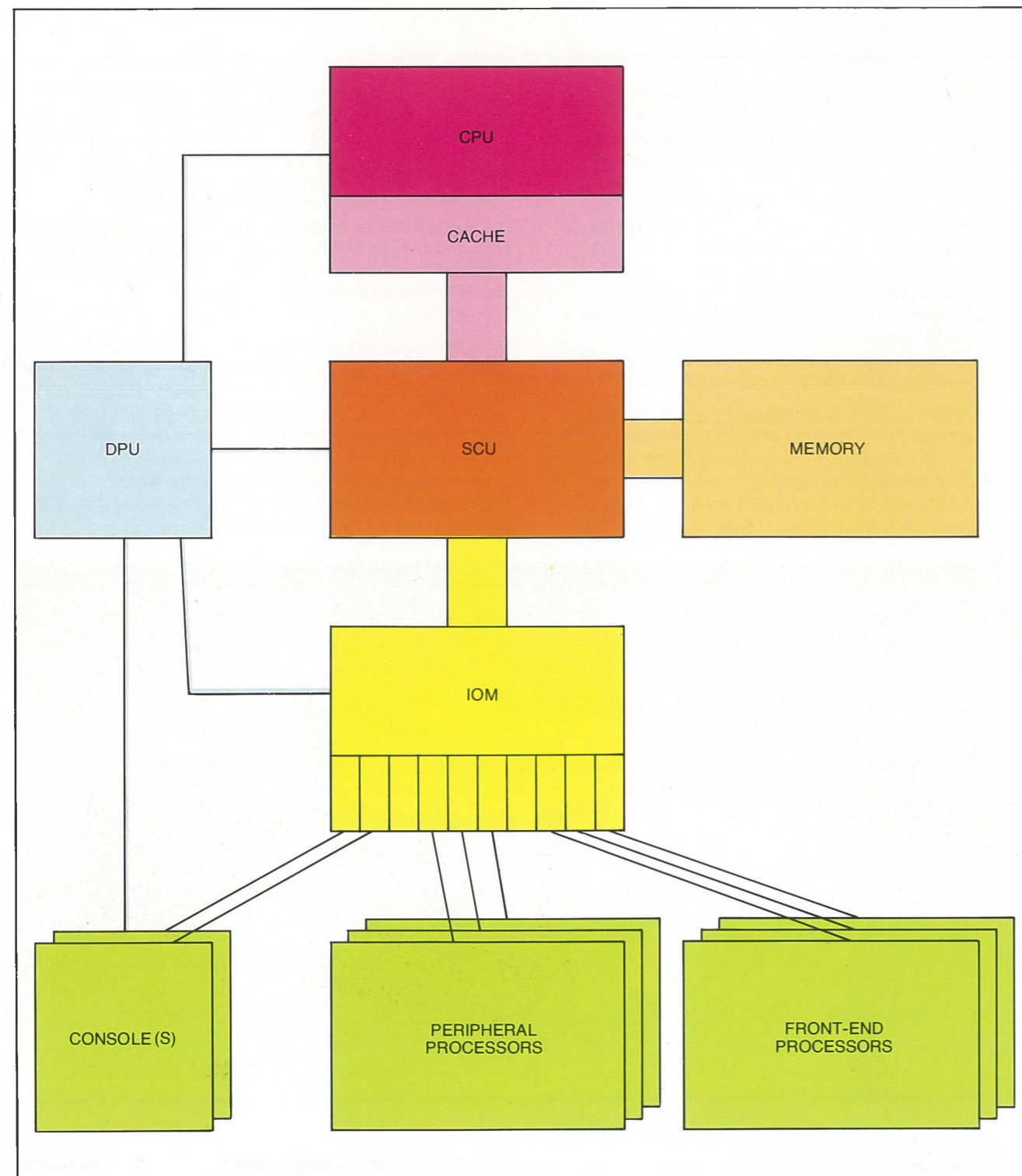- The CPU (Central Processor Unit) performs data processing in the strict sense of the term, operating on data in its 32K-byte cache memory and requesting data from main memory, peripheral subsystems, and the network as required
- The IOM (Input/Output Multiplexer) manages data transfers between main memory and the peripheral and network subsystems
- The peripheral processors manage disk drives, magnetic tape units, and unit record devices
- The front-end processors take full charge of input and output operations for the communications network
- The Diagnostic Processor Unit monitors all the system components for correct functioning and intervenes to perform test and diagnostics when necessary

The advantages of this architecture derive from the ability of all the units to work independently in parallel. Multiple data transfers take place in full simultaneity, without direct central processor involvement, boosting overall throughput to the maximum.

The System Control Unit coordinates memory accesses for CPU and IOM and manages interrupts. The memory itself is implemented in LSI technology with 64K bits per chip, and includes Error Detection and Automatic Correction logic.

The Central Processor Unit uses microprogrammed logic, unlike the hardwired DPS 8/52, DPS 8/62, and DPS 8/70 models. It also uses pipelining techniques reminiscent of those implemented in the DPS 88 range. The result is a rare combination of power and economy.

The four stages of the pipeline perform instruction decoding, address formation, operand fetch, and execution on four consecutive instructions at the same time, giving high efficiency in program execution. A large cache memory (32K bytes) maximizes processing speed, with an effective cache management algorithm minimizing the need for main memory accesses.

The Input/Output Multiplexer handles multiple data transfers at the same time, multiplexing the attached peripheral and front-end processors. The ability to configure multiple channels between IOM and these processors makes a major contribution to both performance and availability.

Peripheral processors are microprogrammed units that control disk drives, tape units, and printers and card readers. They further offload responsibility for ancillary operations from the central system components. In this way, for example, a mass storage processor can manage multiple data accesses on multiple devices, once it has received the appropriate instructions via the IOM.

Front-end processors are drawn from the Datanet 7100 range. Common to all of the Bull medium and large system product lines, they provide flexible, efficient network control under their DNS (Distributed Network Supervisor) operating system. Salient features include the ability to support multiple host-to-host and host-to-satellite links, support for a full complement of terminal types, and the ability to use all X.21 and X.25 public data networks.

The Diagnostic Processor Unit ensures maximum availability. If an error is detected in a system component, the DPU analyses the problem, tests the component in question, and informs the operator. By identifying most causes of failure while they are still potential, in time to take corrective action, it ensures minimal down-time.

CONFIGURATIONS

The basic DPS 8/47 system includes:
- One Central Processor Unit
- One System Control Unit with 4 Megabytes of main memory
- One Input/Output Multiplexer
- One Diagnostic Processor Unit

The user can expand the configuration by adding:
- Additional memory, up to a total of 16 Megabytes
- Up to four consoles
- Mass storage processors
- Magnetic tape processors
- Unit record processors
- Front-end processors

Moreover, the DPS 8/47 can be upgraded on site to a DPS 8/49, with 50 % greater power and allowing the configuration of up to four CPUs, two IOMs, two SCUs, and 32 Megabytes of main memory.

It is worth noting the configuration flexibility for the peripheral and networking subsystems. The IOM provides 20 slots for channel functions. Disk, tape, unit record, and network processors require three, three one or two, and one slot, respectively. Within the limits of slot availability, users can configure whatever equipment they require. It is also possible to configure multiple channels to tape, disk, and front-end processors.

A list of the available peripheral and networking hardware follows. For fuller details, see "DPS 8 in figures", reference 65.A8-29GH.

Mass storage

- MSP8000 integrated processor (one channel, expandable to two, support for up to 16 spindles)
- MSP0611 freestanding processor (one channel, support for up to 16 spindles)
- MSP0612 freestanding processor (dual simultaneous channels, support for up to 32 spindles)
- MSU0451 disk drive (removable disk pack, 157 million bytes)
- MSU0500 disk drive (twin fixed disk packs, 626 million bytes)
- MSU0501 disk drive (twin fixed disk packs, 1101 million bytes)

Magnetic tape

- MTP8001 integrated processor (one channel, support for up to 8 drives)
- MTP0611 freestanding processor (one channel, expandable to two, support for up to 8 tape drives with one channel, 16 with dual simultaneous channels)
- MTU0438 tape drive (6250/1600 bpi, 75 ips)
- MTU0538 tape drive (6250/1600 bpi, 125 ips)

Unit record

- URP8001 integrated processor (for two printers and two card readers)

Figure 1. DPS 8/47 architecture

CPU

CACHE

DPU

SCU

MEMORY

IOM

CONSOLE(S)

PERIPHERAL PROCESSORS

FRONT-END PROCESSORS

- URP8002 integrated processor (for two card readers)
- URP8004 integrated processor (for two printers)
- PRU1101 line printer (1180 lines per minute, 136 print positions)
- PRU1501 line printer (1540 lines per minute, 136 print positions)
- PRU1601 line printer (1600 lines per minute, 160 print positions)
- CRU0501 tabletop card reader (500 cards per minute)

Consoles

- CSU6601 console (display, keyboard, and printer)
- CSU6602 (printer console)
- CSU6603 (display console)
- CSF6604 (23-in repeater monitor)

Front-end processors

- Datanet 7101 (one or two channels, up to 24 lines)
- Datanet 7102 (one or two channels, up to 64 lines)
- Datanet 7103 (one to four channels, up to 128 lines)

PACKAGING

One of the incidental advantages of the new technology used in the DPS 8/47 and DPS 8/49 is compactness. All the basic central system components are housed in a single cabinet occupying less than t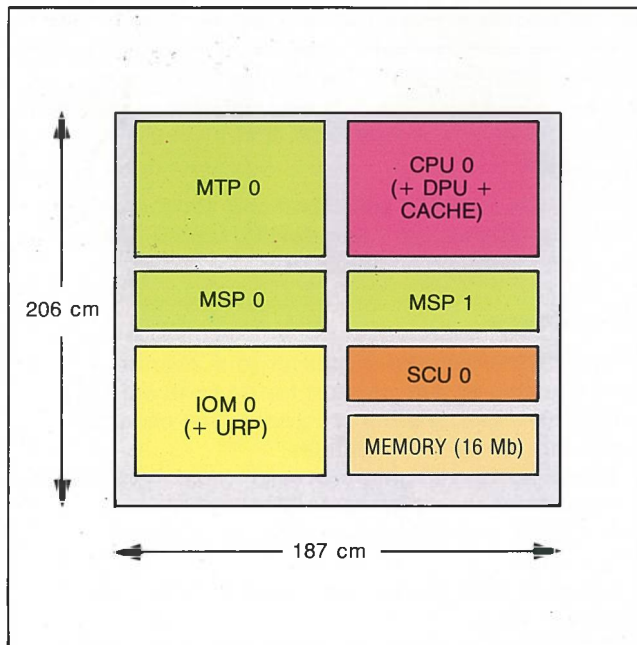wo square metres of floor space. Figure 2 shows the arrangement of the components within this cabinet. Note that there is also space for two mass storage processors, a magnetic tape processor, and 16 Megabytes of main memory.

SOFTWARE

The DPS 8/47 runs under the GCOS 8 operating system, which provides:

- Multiprogramming and multiprocessing
- Efficient resource control for simultaneous transaction processing, time sharing, and local and remote batch work
- Total security, taking advantage of the segmentation and descriptor-controlled access of the DPS 8 hardware
- Support for up to 477 simultaneous user programs
- Software Disk Cache Buffer
- Data Management IV: a CODASYL-compatible data base management system
- Relational Access Manager, providing relationally complete ability to superimpose relational views on the contents of existing data bases and files
- Data Management IV Transaction Processor, for efficient transaction processing, with support for cooperative transaction processing involving multiple hosts and/or satellite systems
- A variety of decision support tools: Personal Data Query (Example Query, Interactive Query, Comprehensive Report Examination and Display Option), Personal Computing Facility,...
- Full range of programming languages: Cobol 74, Fortran 77, PL/1, Pascal, LISP, RPG II, APL, C language,...
- Extended Shared Mass Store, which allows user to build a configuration of two or more loosely-coupled systems, sharing a common data base (thus, it can be used to support implementation of solution center functions on a DPS 8/47, with access to the production data base of a separate system).

Figure 2. DPS 8/47 packaging

SPECIFICATIONS

Height: 187 cm
Width: 206 cm
Depth: 83 cm
Weight: 1020 cm

Power: 200/220 V ac, 3-phase, 50/60 Hz
Power consumption: 5.6 kW
Heat generation: 4.8 kCal/hr

Environment: 20 to 26 °C, 40 % to 60 % relative humidity