Multics Cray Station Software

Cray Research, Incorporated, of Minneapolis, Minnesota, is renowned for the design, development, and manufacture of powerful computers. The CRAY-1 and CRAY X-MP systems offer both scalar and vector processing, with speeds ranging up to 400 million floating-point operations per second.

Alone, a CRAY system is a brain without a body or sensory organs. It requires another computer system, called a *front-end* to provide its contacts with the outside world, to organize and administrate the work submitted to it, and to format the results it delivers. Multics is one of a small number of systems that provide these front-end services to Cray machines. The software that performs this interface is called the Multics Cray Station.

Users can develop programs interactively on the Multics system and submit them to the CRAY for compilation and execution. The CRAY output can then be massaged in the rich Multics environment via report generators, editors, graphics packages, the database manager, and user-written applications.

Multics also provides a secure video interface to the CRAY that permits users to monitor and control their work on the CRAY. Specific treatment of requests for processing on the CRAY aids administrative control, an important feature on a system with such vast (and potentially expensive) resources. Moreover, the Multics system can be used as a file server for jobs submitted from other front-ends, extending the Multics security benefits to these other jobs.

Hardware. There are two ways to connect a Multics system to a CRAY. For connecting machines in the same location, CRAY's Front End Interface (FEI) provides a link into the Multics system's IOM in the same way as a tape or disk controller. For connections at greater distances, a HYPERchannel™ can be used. The graphic below shows the possibilities.

For greater flexibility and resilience to hardware problems, multiple connections can be established between the two systems. It is also possible to front-end a CRAY with more than one Multics system and also possible to front-end several CRAYs with one Multics system.

Software Features. The CRAY has its own operating system, COS, which supports program compilation and job management in addition to data exchange with the front-end systems. The transfers can be initiated by either the CRAY or the front-end systems.

The exchanges use the CRAY front-end protocol, which combines high transfer speed with a simple approach (half-duplex). The Multics front-end supports the full capability of this protocol, without restriction.

Up to eight concurrent files can be transferring in each direction. ASCII, binary, or transparent (Cray format) data files are handled, and can originate in, or be directed to, the Multics storage system, tape, or output devices such as line printers and high-speed plotters.

Using Multics as a CRAY front-end simplifies the task of interfacing with the CRAY. Users can create libraries of CRAY JCL macros which contain parameters, not unlike exec_coms. The JCL macros can be referenced like include files with argument values supplied as needed.

Status. There are currently six sites utilizing connections between Multics and CRAY systems. Both Ford Motor Company, Dearborn, and the Royal Aircraft Establishment, England, connect to their CRAY systems via the CRAY Front-End Interface (FEI). The sites in France use various types of HYPERchannel connections to CRAY machines.

The Multics-CRAY connection was developed over a period of years by Bull and Honeywell (UK). It has since been enhanced to operate under MR11.0 and the most-recent CRAY software release, COS 1.14.

For more information on the Multics Cray Station Software, contact Multics Marketing.