



C-Motion Engine (CME) Architecture

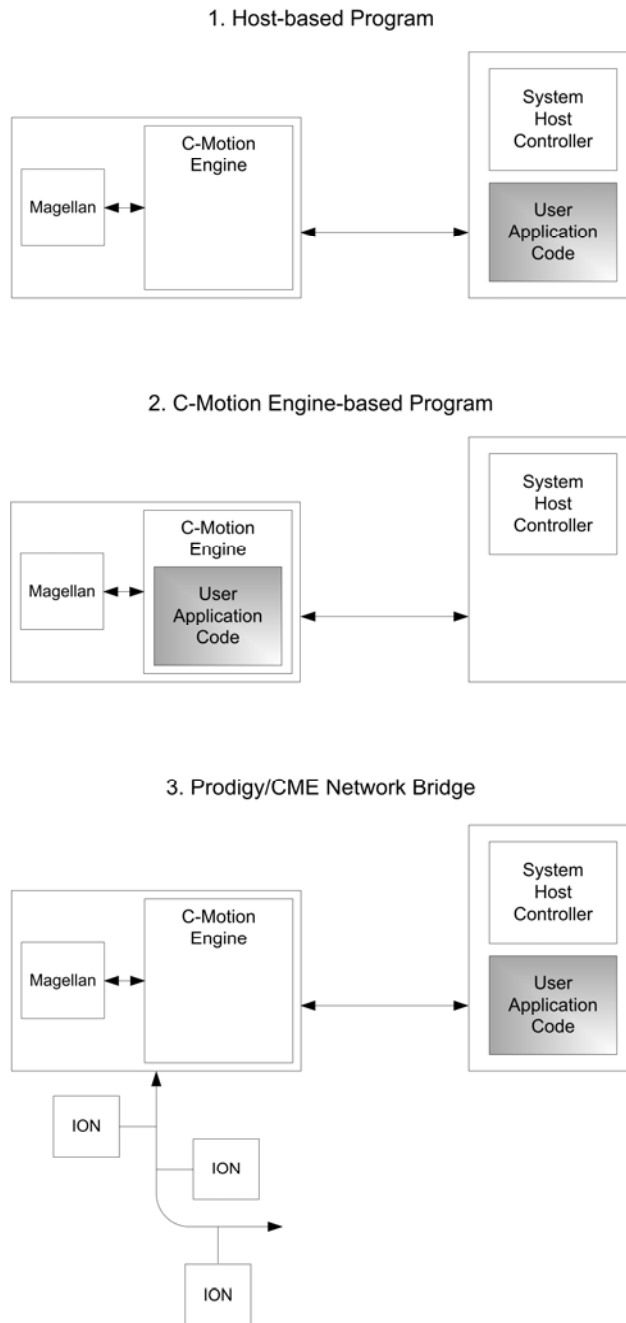
PMD's C-Motion Engine enables application programs written in 'C' to run directly on the Prodigy /CME motion control card. The board-level programming of the /CME line of Prodigy cards is made possible by the addition of PMD's C-Motion Engine (CME). The C-Motion Engine allows a user's C-Motion® code to run directly on the card, off-loading the system host and enabling independent stand-alone operation.

Using a Prodigy/CME card, there are three overall ways that the user's code can control the motion system:

- 1. *Host-based user program communicating to on-card resources.*** In this configuration the user's application code resides in the host controller and uses the Ethernet, serial, CANbus, PC/104 or PCI interface to communicate to on-card resources such as the Magellan Motion Processor. The on-card motion processor is controlled using C-Motion or VB Motion procedures, and other Prodigy/CME resources such as the dual ported RAM are controlled using PMD C or Visual Basic library calls.
- 2. *C-Motion Engine-based user program.*** In this configuration the user's application code resides on the Prodigy/CME's C-Motion Engine module. The same C-Motion and other library procedures that are used with a host-based user program are used with code downloaded onto the C-Motion Engine, although some changes may be required. The user program may communicate with a host using the "user packet" feature of the PRP protocol, or may use any of the communication peripherals on the card to communicate directly with a host or other devices.
- 3. *Host-based user program communicating to remote resources.*** In this configuration the user's application code resides in the host controller and utilizes the Ethernet, serial, CANbus, PC/104 or PCI interface to communicate to the Prodigy/CME card, which in turn is connected to a Magellan-based device. Using this approach, host control may be extended to IONs and other Magellan-based devices using the Prodigy/CME card as a network "bridge."

The figure below illustrates these three options.

Figure: Three Ways to Locate the Code on the Prodigy/CME Card



These three options provide great flexibility in designing your control architecture. Deciding which approach to use for a given application is an important consideration in optimizing system performance. Some system control tasks may best be handled by user code located entirely in the host. Locating code on the host allows a broad choice of software tools and libraries for code development, gives the system access to the PC's peripherals such as the keyboard, mouse or touch screen user interfaces, and runs on the PC's high speed processor which typically has access to a large amount of memory. On the other hand, high speed execution of the application code typically inter-operates with other operating system resources, and this can reduce execution speed, and increase response latency.

User code running on the Prodigy/CME card must be developed with PMD-provided tools and libraries, and the Prodigy/CME card does not have standard user interface devices such as a mouse or screen. In addition, compared to typical PC processors, the C-Motion Engine execution unit executes at a lower speed, and has more limited memory resources. On the other hand, code running on the Prodigy/CME card can be much more predictable in its response time, and can provide safe operation even if the host or network malfunctions, or is not available.

Another approach is to implement lower level, timing-critical tasks on the Prodigy/CME card, and perform higher level tasks requiring a user interface, on the host controller. The C-Motion Engine can be programmed to respond to commands from a high level controller via the Prodigy/CME's serial, CANbus, or Ethernet links. In this way the user's application code, downloaded onto the card, forms a local machine controller while still communicating to the high level controller to synchronize overall system behavior.

Finally, locating the code in the card allows use of the Prodigy/CME card as a stand-alone controller. In this mode a host controller network communication link is not used, and one or more of the card's network or digital I/O ports are typically used to interface to buttons or other devices. This is also a common configuration for machines that will interface to a central PLC (Programmable Logic Controller).

By supporting application code on the host controller as well as downloaded directly on the card, the user is provided with multiple options for optimizing the control architecture of his machine, and locating his software on the hardware platform that will best match his machine's operational and performance requirements.



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