Chapter 16

Configuring CMIO Bus Devices

The CMIO bus devices — the DataVault, VMEIO host computer, CM-IOPG, and IOBA (the CMIO bus's interface to the CM-5)— are typically ready to use after Thinking Machines Customer Support installs and configures them. However, the system administrator at the site may later need to reconfigure some or all of the components of the system. For example, a device may be added or taken away from the system, or a device's arbiter status may need to be changed.

This chapter discusses CMIO bus device configuration at the system administrator level:

- Section 16.2 explains how to configure a DataVault.
- Section 16.3 explains how to configure a CMFS data storage device that contains a VMEIO interface module — that is, a CM-IOPG or a VMEIO host computer.

For information about configuring the CM-HIPPI, please consult the *CM-HIPPI User's Guide for the CM-2*.

16.1 Overview of CMIO Bus Device Configuration

The CM-5 CMIO bus configuration file, **`/etc/io.conf`**, must reflect the state of the CMIO bus device hardware. If you install, remove, or change the configuration of any CMIO bus device, edit **`io.conf`**, as described in Appendix C.

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16.1.1 Station ID, Bus ID, and Arbiter Status Conventions

The **`io.conf`** file contains entries for each CMIO bus device's bus ID, station ID, and arbiter status:

- A *bus ID* is a number between 0 and 255, exclusive (the numbers 0 and 255 are reserved), that uniquely identifies each CMIO bus in the CM-5 system. Every device connected to a CMIO bus must have that bus's bus ID.

- A *station ID* is a number between 1 and 15, inclusive, that identifies each device on a particular bus. Two devices can have the same station ID only if they are on different buses. It is usually convenient to designate station IDs as follows:

  - The ports of the (arbitrarily designated) first DataVault have station ID 15; since DataVault ports usually are on different CMIO buses, both ports can have the same station ID. The ports of additional DataVaults have progressively *lower* station IDs. Even if your site will use only one of the ports, both ports should have station IDs.

  - The (arbitrarily designated) first VMEIO host computer or CM-IOPG on the CMIO bus has station ID 9. Additional VMEIO host computers or CM-IOPGs have progressively *higher* station IDs. (If any front end is also a VMEIO host computer, it must have a station ID *and* a bus ID.)

- Each CMIO bus must have one and only one *bus arbiter*, which monitors the bus's state and arbitrates conflicting requests for I/O transactions. A bus arbiter can be almost any device residing on the bus, although in general:

  - It should be the device most likely to remain consistently operable.

  - It should not be an IOBA.

  - For optimal performance, it should be physically located in the middle of the bus.

For example, if a bus's devices comprise one IOBA, one VMEIO host computer, and a DataVault port, the DataVault port should be arbiter since it is most likely to remain operable over a long period of time. Note that each DataVault port can be arbiter of its respective bus.

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To verify a device's station ID, bus ID, and arbiter status:

- For a DataVault: Examine the output of **gc**, executed on the DataVault file server computer at a **<DV-DIAG>** prompt (see the **dvdiag** man page).
- For a VMEIO host computer or CM-IOPG: Examine the output of **vioconfig**, executed on each VMEIO host computer and CM-IOPG (see the **vioconfig** man page).

16.2 Configuring a DataVault

The following list summarizes DataVault configuration tasks. For details of these procedures, see Sections 16.2.1, 16.2.2, and 16.2.3.

- To logically configure a DataVault that has been newly installed, execute **dvcoldboot** and edit the CMIO bus configuration file, **/etc/io.conf**.
- To reconfigure a DataVault, execute **dvcoldboot** and edit the CMIO bus configuration file, **/etc/io.conf**.
- To remove a DataVault from the CM-5 system, edit **io.conf**.
- To reset the time of the DataVault's MicroVAX, use the **date** command. To change the date to reflect a time zone different from the default Eastern Daylight Savings Time, edit the DataVault's configuration file.

16.2.1 Executing dvcoldboot

To logically configure a DataVault, execute **dvcoldboot** on the DataVault file server computer with the appropriate configuration arguments:

dvcoldboot [... **-p***P, I* | **+a***P* | **-a***P* | **-b***P, N*...]

-p*P,I* Set port *P*'s station ID to *I*. *P* must be 0 or 1, and *I* must be less than 16.

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+a*P*	Set port *P* to be the arbiter on the bus. *P* must be 0 or 1.
–a*P*	Set port *P not* to be the arbiter on the bus. *P* must be 0 or 1.
–b*P, N*	Set port *P*'s bus ID to *N*. *P* must be 0 or 1, and *N* must be less than 255.

To (re)configure both ports of the DataVault, execute **dvcoldboot** with two sets of the configuration arguments. To set both ports to be arbiter of their respective buses, for example, execute something like this:

```
% dvcoldboot -p0,15 -p1,15 -b0,10 -b1,11 +a0 +a1
```

When you execute **dvcoldboot** with any of the configuration arguments, the utility establishes the DataVault's configuration by modifying the DataVault's own configuration file, **/usr/local/etc/diag/dv_coldboot.config** (see Figure 45). Once the DataVault's configuration is established, run **dvcoldboot** without arguments whenever you want to reinitialize the DataVault without changing its configuration.

```
spare drive 0: -1
spare drive 1: -1
spare drive 2: -1
station ID port (0): 1
station ID port (1): 2
bus ID on port (0): 1
bus ID on port (1): 2
arbiter on port (0): 1
arbiter on port (1): 1
```

Figure 45. dv_coldboot.config, located on the MicroVAX. The values shown are the default values, with which the file is initialized at the factory.

To change the configuration of a DataVault, either execute **dvcoldboot** with configuration arguments, which will modify **dv_coldboot.config** automatically, or edit **dv_coldboot.config** directly.

If **dvcoldboot** generates a message warning that **dv_coldboot.config** does not exist (it may have been accidently deleted, for example), execute

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dvcoldboot -i with appropriate configuration arguments. The **-i** argument recreates **dv_coldboot.config** with the default values; the default values are then modified by whatever configuration arguments you specify.

16.2.2 Editing io.conf

This section describes the edits to **/etc/io.conf** required when installing or deinstalling a DataVault. The edits to **io.conf** required when reconfiguring a DataVault should be self-evident after reading the instructions on how to install one; as such, separate instructions for reconfiguring a DataVault are not included.

To Install a DataVault Into the System

When you install a DataVault, edit **/etc/io.conf** as follows:

1. Determine the relevant configuration information:
    a. As discussed in Section 16.1.1, choose a station ID for either one or both of the DataVault's ports, depending on whether one or both will be configured into the system.
    b. Determine the bus ID of the CMIO bus(es) that the DataVault port(s) will be on.
2. Use the information obtained in the previous step to build one or two **IO_device_configuration** submodules, depending on whether one or both ports will be configured into the system. Each submodule must contain four lines, in the order listed:
    - The first line specifies the hostname of the DataVault.
    - The second line specifies a code, **DV,** indicating the device type.
    - The third line specifies the DataVault port's station ID.
    - The fourth line specifies the bus ID of the CMIO bus on which the DataVault port resides.

    Appendix C, Section C.1.2, discusses this task in more detail.

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3. Update the number of devices in the system: add either 1 or 2 (remember that each port of the DataVault counts as one device) to the entry on the second line of the **IO_device_configuration** module. For example, if the current entry is

```
3               ; Number of IO devices in system
```

and both ports of this DataVault are configured into the system, change the entry to

```
5               ; Number of IO devices in system
```

To Remove a DataVault from the System

When you remove a DataVault, edit **/etc/io.conf** as follows:

1. Find the DataVault's **IO_device_configuration** submodule(s) — there should be one submodule for each DataVault port configured into the system — and delete it/them.

2. Update the number of devices in the system: subtract either 1 or 2 (remember that each port of the DataVault counts as one device) from the entry on the second line of the **IO_device_configuration** module. For example, if the current entry is

```
5               ; Number of IO devices in system
```

and both ports of the DataVault had been configured into the system and are now removed from it, change the entry to

```
3               ; Number of IO devices in system
```


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16.2.3 Resetting the Time on the DataVault's MicroVAX

The time on the DataVault's MicroVAX is set by default to Eastern Daylight Savings time. If your site is outside of the Eastern Daylight Savings time region, reset the time to reflect the true time by editing the DataVault's configuration file, **`/usr/sys/config/VAX`**:

1. Find the line

   ```
   timezone        5 dst 1
   ```

   This is the parameter that defines the time zone information for your site.

2. Edit the *number* argument, which by default is set to `5`.

   The *number* argument identifies your time zone by measuring the number of hours west of Greenwich Mean Time (GMT). A negative number indicates hours east of GMT.

3. If necessary, edit the *daylight_savings* parameter, which by default is set to 1.

   The *daylight_savings* parameter indicates a particular daylight savings time correction algorithm. Valid values are 1–5, inclusive:

   1 United States (the default value)
   2 Australia
   3 Western Europe
   4 Central Europe
   5 Eastern Europe

   This parameter automatically handles the switch-over from standard time to daylight savings time and vice versa.

The kernel, with the new configuration file, must then be rebuilt by a Thinking Machines Corporation applications engineer.

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16.3 Configuring a CM-IOPG or a VMEIO Host Computer

The following list summarizes the tasks associated with configuring a CM-IOPG or a VMEIO host computer. For details of these procedures, see Sections 16.3.1 and 16.3.2.

- To logically configure a CMFS device that contains a VMEIO interface module, first execute **vioconfig** and edit the CMIO bus configuration file, **/etc/io.conf**.
- To reconfigure a CM-IOPG or a VMEIO host computer, execute **vioconfig** and edit the CMIO bus configuration file, **/etc/io.conf**.
- To remove a CM-IOPG or a VMEIO host computer from the CM-5 system, edit the CMIO bus configuration file, **/etc/io.conf**.

16.3.1 Executing vioconfig

To logically configure a CM-IOPG or a VMEIO host computer, execute **vioconfig** on the machine — on either the CM-IOPG or the VMEIO host computer — with any appropriate configuration arguments:

vioconfig -i *interface_number* **-t** *VMEIO−station−ID*
-b *VMEIO−bus−ID* **-x** *VMEIO−bus−speed* [**-A**|**-a**]

-i	Set the CM-IOPG's or VMEIO host computer's interface number; 0 and 1 are valid numbers. The default is 0.
-t	Set the machine's station ID.
-b	Set the machine's bus ID.
-x	Set bus speed. 2 <= *speed* <= 7; 7 is slowest.
-A	Set the machine to be the bus arbiter.
-a	Set the machine *not* to be the bus arbiter.

Executing **vioconfig** without any arguments reports the machine's current station ID, bus ID, arbiter status, and current bus speed.

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The **-x** option governs the speed at which the VMEIO host computer or CM-IOPG transmits across the CMIO bus when it is bus master. A value of **2** causes transmission of data at about 4 MHz, or 32 Mbytes/second and is appropriate for most CM-5 systems.

16.3.2 Editing io.conf

This section describes the edits to **/etc/io.conf** required when installing or deinstalling a CM-IOPG or VMEIO host computer. The edits to **io.conf** required when reconfiguring a CM-IOPG or VMEIO host computer should be self-evident after reading the instructions on how to install a CM-IOPG or VMEIO host computer; as such, separate instructions for reconfiguring a system are not included here.

To Install a CM-IOPG or VMEIO Host Computer Into the System

When you install a CM-IOPG or VMEIO host computer, edit **/etc/io.conf** as follows:

1. Determine the relevant configuration information:
    a. As discussed in Section 16.1.1, choose a station ID for the CM-IOPG/VMEIO host computer.
    b. Determine the bus ID of the CMIO bus(es) that the CM-IOPG/VMEIO host computer will be on.
2. Use the information obtained in the previous step to build one **IO_device_configuration** submodule. The submodule must contain four lines, in the order listed:
    - The first line specifies the hostname of the CM-IOPG/VMEIO host computer.
    - The second line specifies a code, **VME,** indicating the device type.
    - The third line specifies the station ID of the CM-IOPG/VMEIO host computer.
    - The fourth line specifies the bus ID of the CMIO bus on which the CM-IOPG/VMEIO host computer resides.

    Appendix C, Section C.1.2, discusses this task in more detail.

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3. Update the number of devices in the system: add 1 to the entry on the second line of the **IO_device_configuration** module. For example, if the current entry is

```
3               ; Number of IO devices in system
```

   change the entry to

```
4               ; Number of IO devices in system
```

To Remove a CM-IOPG/VMEIO Host Computer from the System

When you remove a CM-IOPG/VMEIO host computer from the CM-5 system, edit **/etc/io.conf** as follows:

1. Find the **IO_device_configuration** submodule of the CM-IOPG/VMEIO host computer and delete it.

2. Update the number of devices in the system: subtract 1 from the entry on the second line of the **IO_device_configuration** module. For example, if the current entry is

```
4               ; Number of IO devices in system
```

   and both ports of the DataVault had been configured into the system and are now removed from it, change the entry to

```
3               ; Number of IO devices in system
```

16.4 Configuring a CM-HIPPI

For information about configuring a CM-HIPPI, please refer to the *CM-HIPPI User's Guide for the CM-2*, Version 6.1.

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