DONote 1098A
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25-FEB-1991
Rev 25-NOV-1991

Hardware Database
Device Names, Subsystems and Hierarchical Path Designations

This note is meant to summarize the conventions agreed upon in naming and specifying the user parameters used to access a specific device, or group of devices on the hardware control CDAQ side of the DO detector.

Introduction

Most of the information (all that a user needs) to specify devices in the DO Control Data Acquistion system (CDAQ) is maintained in the DO Hardware Database (DOHDB). There are four main objects in DOHDB:

1. DEVICE: a logical device, such as a power supply with all of it's control registers, readbacks etc.
2. MODULE: a single physical piece of hardware, a VME card for example with it's serial number.
3. CELL: a physics readout cell; a Calorimeter readout cell, a CD wire etc.
4. CLASS: an arbitrary grouping of any of the other objects.

Each of these objects is specified by an identifier, a name. For simplicity, it has been decided that the names should be case insensitive. The primary way to specify a device is by it's name or name.attribute.

In addition to the CLASS there are two parameters associated with each DEVICE that can and will be used to specify GROUPS of devices. These are the SUBSYSTEM and HIERACHICAL PATH designations. These are numeric codes that specify GROUPS of devices. These two parameters are properties of a device, while a device is in a class.

The subsystem is just what it sounds like. It's a subsystem breakdown of the detector; High Voltage, Cryogenics etc. In the software system as it currently exists, there can be 32 subsystems and a device can be assigned to MANY subsystems. Thus a low voltage power supply might be in both the Low Voltage subsystem AND in the Trigger subsystem. This is implemented by having the subsystem specified as a bit encoded long word with each bit corresponding to a subsystem.

The Path descriptor encodes a hierarchical description of the detector. Each device in the system is assigned to one and only one "NODE" of the tree. It's position in the hierarchy describes its influence on other devices. Any device at a given node might influence the operation of any device at the same or lower node on the same branch. Its position does not imply that it influences all devices at the same or lower nodes. It does imply that it influences some device on the same node, or more than one of the lower nodes.

There are two main uses for the SUBSYSTEM and PATH descriptors. The first is to filter alarm or significant event messages pertaining to the devices. One may wish to see only messages pertaining to only the Cryogenics subsystem for example. Or one may wish to see only messages pertaining to devices that reside at, or below a particular node in the hierarchy. You can also filter on the AND or the OR of the subsystem/path, e.g. All Low Voltage supplies (subsystem) in the Calorimeter (Path).

The second use is in the DO protection scheme. In order to control (change setting of) a device, you will have to ask for and receive "ownership" of that device via the Subsystem/Path. Since both of these refer to groups of devices, you will also, gain "ownership" of all other devices that satisfy the same requested criteria, ie) all devices at or below the path node requested. If you have asked for exclusive ownership, then no one else will be able to change any of those devices until you relinquish ownership. This will guarantee that device setting that are critical for the run or the test that you are performing do not change until you are done. Because you will be granted "ownership" of groups of devices, it is important that devices be placed as low in the hierarchy as possible. This will allow as many users as possible to work simultaneously without interference. Ideally, an application (Pedestal calibration for example) would require ownership of only ONE node, and the hierarchy below that node.

DEVICE NAMES

A DEVICE is any monitoring and/or control logical element. Its name, up to 12 characters long, must be unique. A DEVICE has one or more ATTRIBUTES, named by up to 4 characters. It is the DEVICE.ATTRIBUTE that corresponds to a particular register, data value, memory address, memory array etc. The ATTRIBUTES relation in HDB contains all the necessary addressing information for CDAQ to be able to access the DEVICE.ATTRIBUTE, e.g. read and/or write the appropriate data.

To simplify communication, a few conventions as to the way DEVICEs are to be named have been agreed upon. The general form of a device name is:

DETM_DEVMOOO

where:

- DETM is a mneumonic for the detector a device is associated with; a string of up to 4 characters; some of the accepted mneumonics are: CAL, LVO, CDC, TRD, VTX, FDC, MUO, SAM
- DEVM is a mneumonic for a device type (ie ADC, PLS, LVB); a string of up to 4 characters
- OOO is a number which specifies a device further; a numeric string of up to a length making the full name not greater than 12 characters

There is a delimiting character (underscore) between DETM and DEVM; no such character is needed between DEVM and the numeric string, provided DEVM is non-numeric. leading or embedded blanks are not allowed.

For example, for the calorimeter, the first part of the name has been chosen to be:

DETM :=	CAL	calorimeter in general
	CALC	calorimeter central
	CALN	calorimeter end cap north
	CALS	calorimeter end cap south

Use of more than one mneumonic for the detector serves to indicate the physical location of a device/module, wherever it is appropriate.

The second part of the name, DEVM, describes what a device/module actually is, or/and what it does. So we have:

DEVM :=	ADC	Analog to Digital Converter
	PLS	PuLSer
	BLS	Base Line Subtractor
	BCC	BLS Crate Controller
	CAB	CABle driver (analogue)
	PA	PreAmplifier
	LVB	Low Voltage power supply for BLS cards

The last, numeric, part of the name is more hardware oriented than the 2 preceding ones and is composed of the crate ID, 3 numbers, and the card number in HEX where appropriate.

Example Attributes

VOLT	Voltage ADC read back
VSET	Voltage setting
VLIM	Voltage limit (+- about nominal setting)
CURR	Current read back
CLIM	Current limit (+- about nominal setting)
OVRV	Over voltage (Trip state)
OVRC	Over Current (Trip state)
RST	Reset - Clear Trip conditions
ON	Turn ON
OFF	Turn OFF
LOC	Go to Local mode, set to 0 first
REM	Go to Remote mode
RAMP	Start Ramp to set voltage/current
TEMP	Temperature read back
FLOW	Flow read back
STAT	Status readback

SUBSYSTEM

The Subsystem designation is a BIT encoded 32 bit integer. Thus a particular device.attribute can be in up to 32 different subsystems. The current DO subsystems and their bit assignments are:

Current DO Subsystem Assignments

	Bit	Subsystem description
Software	0	Host - Software (COOR/Data Logger/Alarms etc)
	1	Goodwin (M680xx) front end
	2	Briegel (IBM PC) front end (CD Gas Systems etc)
	3-7	Spare
Data	8	Clock/SFM
	9	Pulser
	10	Trigger
	11	Readout
	12	Detector Monitoring
	13	Control Tables (ie LVO lookup tables)
	14	Accelerator
Spare	15-22	Spare
	23	CD Gas Systems
Utilities	24	Cryogenics
	25	Magnet
	26	AC Power
	27	Low Voltage Power
	28	High Voltage Power
	29	Cooling Water - Temp, Flow, Pres etc
	30	Cooling Air - Temp, Flow, etc
	31	Smoke Alarms

15 CC Control nodes
16 CC filters
17 CC Cal Calib
18 CC μ Calib
19 CC CD calib

3 Primary
4 Secondary

HIERARCHICAL PATH

The DO Path descriptor is nibble encoded. Within the 32 bit long word this leaves the possibility for 8 levels with up to 15 nodes/level. In addition a zero (0) path descriptor implies that the device is unprotected since you can not request ownership of node 0. Any number of users may control/change that device at the same time.

The hierarchical path decomposition of the DO hardware, as it now exists is given below. It tries to maintain some location information as well as subdetector information. It was felt that most SETTING of devices would be done on the basis of subdetectors. So the second level is basically organized by detector. However, MONITORING of devices (read only operations like rack temperatures) would be more usefully organized by location. So there is a MONITOR node at the second level with location nodes depending from it. This node will (obviously) be used more for alarm filtering than for control protection.

Hierarchical Path Assignments for DO

HEX VALUE	NAME	Description
00000000	none	unprotected - default
2xxxxxxx	TB	Test Beam devices, breakdown of assignments is the same as for the main detector below.
10000000	DO	The DO Detector
1n000000	see below	(Detector Elements)
1n100000	Readout	Readout elements (ADCs, Preamps etc) see below for specific detector assingments
1n200000	Clock	Clock lines
1n300000	Control	Control Elements (HV etc) see below for specific detector assingments
1n400000	Calibration	Calibration Elements (Pulsers etc) see below for specific detector assingments
1A000000	TRIG	Trigger System
1A100000	LV1	Level 1 Trigger Framework
1A200000	LV1.5	Level 1.5 Trigger
1A300000	LV2	Level 2 Trigger
1B000000	ACCELERATOR	Accelerator devices
1C000000	CLOCK/SFM	Clock/Selector Fanout system
1Cn00000	Detector	Detector specific parts of the CLOCK/SFM
D-E		(Spare)
1F000000	MONITOR	Environmental Monitoring System - READ ONLY
1F100000	CNT_HSE	Fixed Counting House
1F110000	Cnt_Hse_1	Counting House - 1st Floor
1F11n000	see below	(Detector Elements)
1F120000	Cnt_Hse_2	Counting House - 2nd Floor
1F12n000	see below	(Detector Elements)
1F130000	Cnt_Hse_3	Counting House - 3rd Floor
1F13n000	see below	(Detector Elements)
1F140000	Cnt_Hse_4	Counting House - 4th Floor
1F14n000	see below	(Detector Elements)
1F200000	Mov_Cnt_Hse	Moving Counting House

1F210000	Mov_Cnt_Hse_1	Moving Counting House - 1st Floor
1F21n000	see below	(Detector Elements)
1F220000	Mov_Cnt_Hse_2	Moving Counting House - 2nd Floor
1F22n000	see below	(Detector Elements)
1F230000	Mov_Cnt_Hse_3	Moving Counting House - 3rd Floor
1F23n000	see below	(Detector Elements)
1F240000	Mov_Cnt_Hse_4	Moving Counting House - 4th Floor
1F24n000	see below	(Detector Elements)
1F300000	Platform	Detector Platform
1F310000	PLT_NE	Platform - North East Sector
1F31n000	see below	(Detector Elements)
1F320000	PLT_E	Platform - East Sector
1F32n000	see below	(Detector Elements)
1F330000	PLT_SE	Platform - South East Sector
1F33n000	see below	(Detector Elements)
1F340000	PLT_NC	Platform - North Central Sector
1F34n000	see below	(Detector Elements)
1F350000	PLT_C	Platform - Central Sector
1F35n000	see below	(Detector Elements)
1F360000	PLT_SC	Platform - South Central Sector
1F36n000	see below	(Detector Elements)
1F370000	PLT_NW	Platform - North West Sector
1F37n000	see below	(Detector Elements)
1F380000	PLT_W	Platform - West Sector
1F38n000	see below	(Detector Elements)
1F390000	PLT_SW	Platform - South West Sector
1F39n000	see below	(Detector Elements)
1F400000	DET	Top of Detector Platform
1F4n0000	see below	(Detector Elements)

The following are included below several of the nodes above. They are indicated by an "n" in one of the HEX fields.

"n"	Detector	description
1	LVO	LeVel 0 Detector
2	MUON	MUON detector
3	VTX	VerTeX detector
4	CDC	Central Drift Chamber
5	FDC	Forward Drift Chamber
6	TRD	Transition Radiation Detector
7	CAL	CALorimeter
8	SAMUS	Small Angle MUon Spectometer

Specific, detailed detector readout element assignments:

VTX readout elements	
13110000	VTX FADC Crates
13111000	VTX FADC Rack 202, Crate 0
13112000	VTX FADC Rack 202, Crate 1
13113000	VTX FADC Rack 203, Crate 0
13114000	VTX FADC Rack 203, Crate 1
13115000	VTX FADC Rack 204, Crate 0
13116000	VTX FADC Rack 204, Crate 1
13117000	VTX FADC Rack 205, Crate 0
13118000	VTX FADC Rack 205, Crate 1
13119000	VTX FADC Rack 223, Crate 0
1311A000	VTX FADC Rack 223, Crate 1
131(2-F)0000	VTX Readout Spare
CDC readout elements	
14110000	CDC FADC Crates
14111000	CDC FADC Rack 206, Crate 0
14112000	CDC FADC Rack 206, Crate 1
14113000	CDC FADC Rack 207, Crate 0
14114000	CDC FADC Rack 207, Crate 1
14115000	CDC FADC Rack 208, Crate 0
14116000	CDC FADC Rack 208, Crate 1
141(2-F)0000	CDC Readout Spare
FDC readout elements	
15110000	FDC FADC Crates
15111000	FDC FADC Rack 210, Crate 0
15112000	FDC FADC Rack 210, Crate 1
15113000	FDC FADC Rack 211, Crate 0
15114000	FDC FADC Rack 211, Crate 1
15115000	FDC FADC Rack 212, Crate 0
15116000	FDC FADC Rack 212, Crate 1
15117000	FDC FADC Rack 215, Crate 0
15111000	FDC FADC Rack 215, Crate 1
15112000	FDC FADC Rack 216, Crate 0
15113000	FDC FADC Rack 216, Crate 1
15114000	FDC FADC Rack 217, Crate 0
15118000	FDC FADC Rack 217, Crate 1
151(2-F)0000	FDC Readout Spare
TRD readout elements	
16110000	TRD FADC Crates
16111000	TRD FADC Rack 219, Crate 0
16112000	TRD FADC Rack 219, Crate 1
16113000	TRD FADC Rack 220, Crate 0
16114000	TRD FADC Rack 220, Crate 1
16115000	TRD FADC Rack 221, Crate 0
16116000	TRD FADC Rack 221, Crate 1
16117000	TRD FADC Rack 222, Crate 0
16118000	TRD FADC Rack 222, Crate 1
161(2-F)0000	TRD Readout Spare

CAL and MUON readout elements have not been further specified.

Specific, detailed detector control element assignments:

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VTX control elements
  13310000          VTX High Voltage
    13311000          VTX High Voltage (Movable Counting House)
  13320000          VTX Low Voltage
    13321000          VTX Shaper Power Supplies
      13321100          VTX Shaper Power Supply Rack PC 11, Crate 1
      13321200          VTX Shaper Power Supply Rack PC 11, Crate 2
      13321300          VTX Shaper Power Supply Rack PC 12, Crate 0
      13321400          VTX Shaper Power Supply Rack PC 12, Crate 1
      13321500          VTX Shaper Power Supply Rack PC 12, Crate 2
    13322000          VTX  FADC  Power Supplies
      13322100          VTX FADC Power Supply Rack 202
      13322200          VTX FADC Power Supply Rack 203
      13322300          VTX FADC Power Supply Rack 204
      13322400          VTX FADC Power Supply Rack 205
      13322500          VTX FADC Power Supply Rack 223
  133(3-F)0000      VTX Control Spare
CDC control elements
  14310000          CDC High Voltage
    14311000          CDC High Voltage (Movable Counting House)
    14312000          CDC High Voltage (East Platform)
  14320000          CDC Low Voltage
    14321000          CDC Shaper Power Supplies
      14321100          CDC Shaper Power Supply Rack PC 10, Crate 0
      14321200          CDC Shaper Power Supply Rack PC 11, Crate 0
      14321300          CDC Shaper Power Supply Rack PC 13, Crate 0
    14322000          CDC  FADC  Power Supplies
      14322100          CDC FADC Power Supply Rack 206
      14322200          CDC FADC Power Supply Rack 207
      14322300          CDC FADC Power Supply Rack 208
  143(3-F)0000      CDC Control Spare
FDC control elements
  15310000          FDC High Voltage
    15311000          FDC High Voltage (Movable Counting House)
  15320000          FDC Low Voltage
    15321000          FDC Shaper Power Supplies
      15321100          FDC Shaper Power Supply Rack PC 08, Crate 0
      15321200          FDC Shaper Power Supply Rack PC 08, Crate 1
      15321300          FDC Shaper Power Supply Rack PC 08, Crate 2
      15321400          FDC Shaper Power Supply Rack PC 08, Crate 0
      15321500          FDC Shaper Power Supply Rack PC 08, Crate 1
      15321600          FDC Shaper Power Supply Rack PC 08, Crate 2
    15322000          FDC  FADC  Power Supplies
      15322100          FDC FADC Power Supply Rack 210
      15322200          FDC FADC Power Supply Rack 211
      15322300          FDC FADC Power Supply Rack 212
      15322400          FDC FADC Power Supply Rack 215
      15322500          FDC FADC Power Supply Rack 216
      15322100          FDC FADC Power Supply Rack 217
  153(3-F)0000      FDC Control Spare
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TRD control elements

16310000	TRD High Voltage
16311000	TRD High Voltage (Movable Counting House)
16320000	TRD Low Voltage
16321000	TRD Shaper Power Supplies
16321100	TRD Shaper Power Supply Rack PC 10, Crate 1
16321200	TRD Shaper Power Supply Rack PC 10, Crate 2
16321300	TRD Shaper Power Supply Rack PC 10, Crate 1
16321400	TRD Shaper Power Supply Rack PC 10, Crate 2
16322000	TRD FADC Power Supplies
16322100	TRD FADC Power Supply Rack 219
16322200	TRD FADC Power Supply Rack 220
16322300	TRD FADC Power Supply Rack 221
16322400	TRD FADC Power Supply Rack 222
163(3-F)0000	TRD Control Spare

CAL and MUON control elements have not been further specified.

Specific, detailed detector calibration element assignments:

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VTX calibration elements
  13410000        VTX Pulsers
    13411000        VTX Pulser Control Rack PC 11, Crate 1
    13412000        VTX Pulser Control Rack PC 11, Crate 2
    13413000        VTX Pulser Control Rack PC 12, Crate 0
    13414000        VTX Pulser Control Rack PC 12, Crate 1
    13415000        VTX Pulser Control Rack PC 12, Crate 2
  134(2-F)0000    VTX Calibration Spare
CDC calibration elements
  14410000        CDC Pulsers
    14411000        CDC Pulser Control Rack PC 10, Crate 0
    14412000        CDC Pulser Control Rack PC 11, Crate 0
    14413000        CDC Pulser Control Rack PC 13, Crate 0
  144(2-F)0000    CDC Calibration Spare
FDC calibration elements
  15410000        FDC Pulsers
    15411000        FDC Pulser Control Rack PC 08, Crate 0
    15412000        FDC Pulser Control Rack PC 08, Crate 1
    15413000        FDC Pulser Control Rack PC 08, Crate 2
    15414000        FDC Pulser Control Rack PC 15, Crate 0
    15415000        FDC Pulser Control Rack PC 15, Crate 1
    15416000        FDC Pulser Control Rack PC 15, Crate 2
  154(2-F)0000    FDC Calibration Spare
TRD calibration elements
  16410000        TRD Pulsers
    15411000        TRD Pulser Control Rack PC 10, Crate 1
    15412000        TRD Pulser Control Rack PC 10, Crate 2
    15413000        TRD Pulser Control Rack PC 13, Crate 1
    15414000        TRD Pulser Control Rack PC 13, Crate 2
  164(2-F)0000    TRD Calibration Spare
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CAL and MUON calibration elements have not been further specified.