ALARM HANDLER SYSTEM STATUS SUMMARY IMPLEMENTATION PLAN

John K. Munro, Jr.
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INTRODUCTION

Initial efforts to implement of the EPICS Alarm Handler tool for the SNS control system met with mixed success. Neither the operators nor the subsystem controls engineers found it easy or convenient to use without investing a lot of time to understand how to make effective use of it. The plan presented here describes a fresh approach that shows a summary status of the accelerator based on a logic hierarchy that starts at the subsystem level, combining the status information using Boolean logic and works its way to the highest overview, i.e., the status of the accelerator as a unit, showing the operational status at each level. Four states (with corresponding colors) are used to provide status information for each summary status process variable (PV): normal (green), warning about possible problems (yellow), abnormal (red, e.g., out of range of the normal operating values), and fault condition (white, for invalid PV or loss of communication).

PLAN SUMMARY

EPICS CALC records will be used to define the "summary PVs" since they support the alarm types and severities required and can combine many inputs using Boolean logic operations to produce a summary PV giving status information at the next higher level of subsystem readiness, passing along the alarm type and severity information. (NOTE: all CALC record inputs will pass along the alarm severity if the input PV is followed by MS, even if that input is not used in the calculation.) New PVs will have to be created and added to existing EPICS databases to implement this summary PV status indication.

Summary PVs will be used to display alarm status colors in two ways: by use of a colored outline around a graphical widget (e.g., a related display button) and by a status indicator "LED" in the lower right corner of the screen.

PROPOSED PV NAMING SCHEME

A search of the Oracle RDB to see what signal names are currently in use was conducted to find out what names would be good candidates. The name "Alarm" was chosen to emphasize the primary use of the summary PVs by the EPICS Alarm Handler and to

provide operational summary status indication by means of red-yellow-green-white alarm status colors. Since the "Alarm" PVs will have this special role, they must be used with care. To support the use of these summary PVs, a logical device "Summary" will be added to the list of devices. The syntax for the summary PV names will be

System_Subsystem:Summaryx_Screen:Alarm

where the Subsystem name is optional and x in "Summaryx" is a sequence number to accommodate multiple instances. "Screen" is the screen name, e.g.,

Overview screens	Ovr
Drain subsystem	Drain
Pump heat exchanger	PmpHx
P&ID diagrams	PID

Examples of PVs to show how a hierarchical naming scheme would look is given below, using the ring injection dump to illustrate.

Level of hierarchy	**Summary PV name**
Subsystem overview screen	Idmp:Summary_Ovr:Alarm
Drain tank screen	Idmp:Summary_Drain:Alarm
Separator	Idmp:Summary_Sep:Alarm
Guard ring	Idmp:Summary_Guard:Alarm
Pump heat exchanger	Idmp:Summary_PmpHx:Alarm

An example using the DTL vacuum system:

Level of hierarchy	**Summary PV name**
DTL tank subsystem	DTL_Vac:Summary_Ovr:Alarm
DTL1 interlock PLC	DTL_Vac:Summary1_PID:Alarm

An example using the DTL RCCS, magnets, etc.

Level of hierarchy	**Summary PV name**
DTL tank subsystem for RCCS	DTL_RCCS:Summary_Ovr:Alarm
DTL1 interlock PLC	DTL_RCCS:Summary1_PID:Alarm
DTL tank subsystem for magnets	DTL_Mag:Summary_Ovr:Alarm
DTL1 magnet power supplies	DTL_Mag:Summary1_PS:Alarm

The highest level summary PVs will not be provided by an IOC used to control a specific subsystem since the status of multiple subsystems will be combined. A "soft IOC" will be used to display these PVs on high-level screens. For these PVs a subsystem name is not always needed. According to the PV naming convention the subsystem name is optional, so this should not be a problem. Some example names for these PVs are

Level of hierarchy	**Summary PV name**
Accelerator overview screen	Sns:Summary_Ovr:Alarm
Linac overview screen	Lin:Summary_Ovr:Alarm

STATUS SUMMARY IMPLEMENTATION COMMENTS

Alarm handler configuration files will be created to implement a hierarchical display of the summary PV status information.

System configurations or operating conditions for the normal, abnormal, and warning status indications/alarms must be determined and documented by the engineers who are familiar with operation of the hardware and controls for each of the subsystems. Many times what is "normal" or "abnormal" is intuitively obvious, but this should not always be assumed to be the case. In order to get internal consistency for the SNS accelerator, some common conventions (e.g., use of red/green to indicate that a valve or switch is open or closed) used in some technical areas may be opposite to conventions used in other disciplines, so that a choice must be made. Care in documenting what is done in such cases where inconsistencies arise is particularly important.