Hall A High Voltage EPICS Screens
CS-Studio Phoebus

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Why Phoebus?

- No longer dependent on Eclipse
  - Standard Widget Toolkit (SWT) is one of the toolkits to create GUIs in Java
  - More than just SWT, Eclipse is an Integrated Development Environment (IDE)
    - Heavyweight (30+ min vs ~3 min compile time)
    - More code, e.g. 11.2 kloc vs 4.5 kloc for Channel Finder
- Since ~2016, various parts of CS-Studio have been migrating to using JavaFX as the GUI toolkit
  - Included with the Java Development Kit (JDK) since Java 11
    - also available separately for older JDKs
  - Phoebus has all components in JavaFX

Why not stay with CSS-BOY?

- Phoebus is more performant: less CPU % and less memory use
  - Varies based on screen, Heater Demo: ~ ¼ CPU (~40% vs ~10%) and ~ ½ memory usage (~9 MB vs ~4 MB)
- Phoebus can import and run BOY screens with no changes
  - Major exception are scripts
    - Generally, just need to change import path
    - Highly dependent on the script (one reason to avoid script use)
- Most BOY developers have moved to Phoebus
  - New widgets and features not in BOY

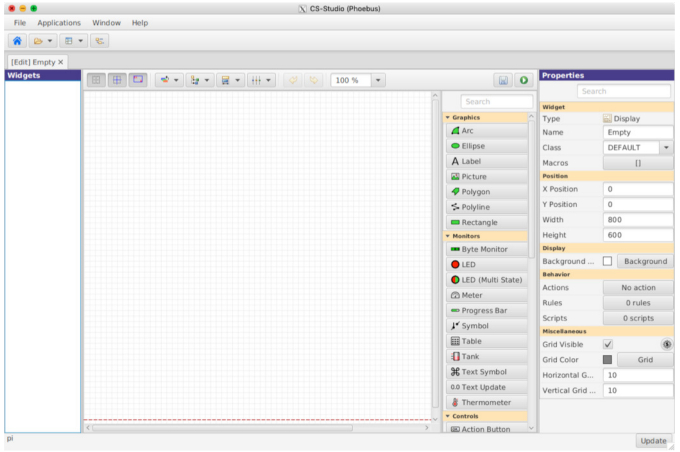
Hall A EPICS Screens

- Hall C recently upgraded from some Tcl/Tk screens to CSS-BOY
  - Scripts to generate CSS-BOY done by DSG (Lemon & Bonneau)
  - Upgrading screens and creating new scripts for Hall A

- Initial focus will be on detector high voltage

Creating Screens

- Phoebus screens are XML files with an extension of .bob (BOY is the same, but with .opi)
- One method of creating screens is with the built-in Display Builder editor
  - The default choice
  - Good when layout won't change



- Some Hall A screens need to be easily customizable (Example #1) or use external parameter files (Example #2)
  - Using Python to generate .bob files

Python Example #1

- Hall A will have experiments that use a suite of detectors in slightly different configurations
- For the main menu, easier to generate the screen dynamically from a dictionary

Desktop — aslow@adaqsc:~/EPICS/HV/CSS — ssh -Y hallgw.jlab.or...

```
#!/usr/bin/env python3

import sys
if len(sys.argv)>1:
    OUTFILE=sys.argv[1]
else:
    OUTFILE = "main-menu.bob"

ALL_PATHS=["../bb_all","../sbs_all"]

WIDTH = 300
# Width of the button groups
BWIDTH = 236
BGCOLOR = 'red="77" green="77" blue="77"'
FGCOLOR = 'red="255" green="255" blue="255"'

# Text Labels
TITLE = "Hall A High Voltage"
SUBTITLE = "Controls &amp;amp; Monitoring"

def makebuttonlist(spec,detlist):
    blist = []
    for det in detlist:
                                        1,1           Top
```

Each of these groups is a separate dictionary

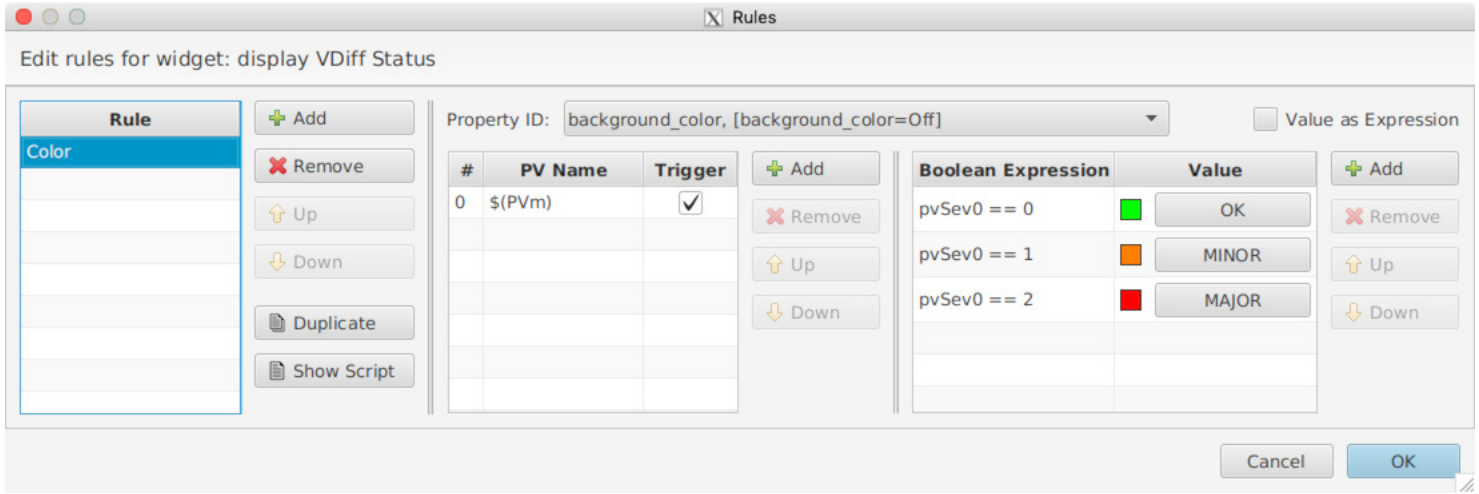
Python Example #2 (1/4)

- Some high voltage supplies have separate set and read process variable (PVs)

- Each high voltage channel has a calculated PV (Vdiff) that indicates difference between set and read
  - |Vset – Vread|
  - PV alarm limits
    - 25 V for LOW and HIGH
    - 50 V for LOLO and HIHI

Python Example #2 (2/4)

- When using the monitor widget and its alarm status, default changes only widget border, based on alarm; request was for entire widget to change color
- vdiff.bob uses a rule to change widget background color based on severity level of the PV passed via macro



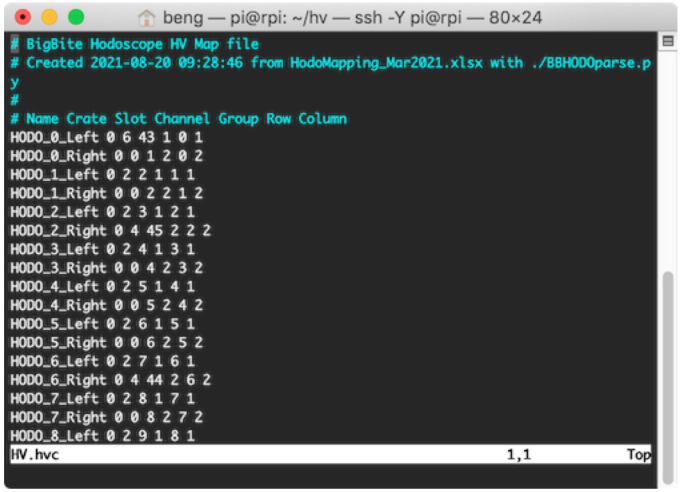
Python Example #2 (3/4)

- A mapping file (high voltage name, PV, row, column, etc.) can be used to generate a grid of indicators to show Vdiff status, using Python

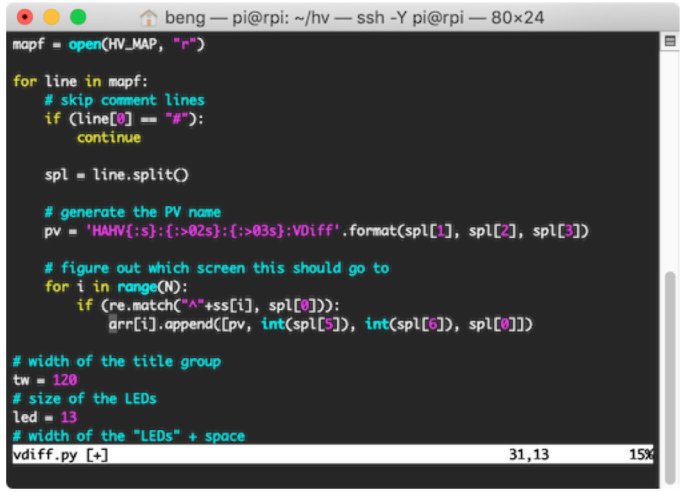
- To make the grid, multiple copies of vdiff.bob are embedded into the new detector screen and macros are used to define the individual PV for each monitor widget

Python Example #2 (4/4)

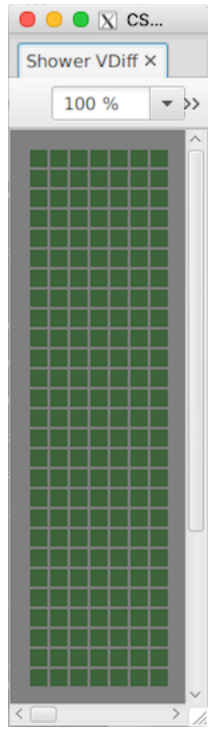
- Read the high voltage mapping file with Python to generate a grid of embedded displays to create the detector screen



High Voltage Map File



Python



Screen

Conclusion

- Phoebus will be used for generating local displays going forward

- Current scripts will be modified and new scripts and screens will be created
  - Next step will be embedding detector Vdiff screens into an overall screen