OAK RIDGE National Laboratory

User Interfaces

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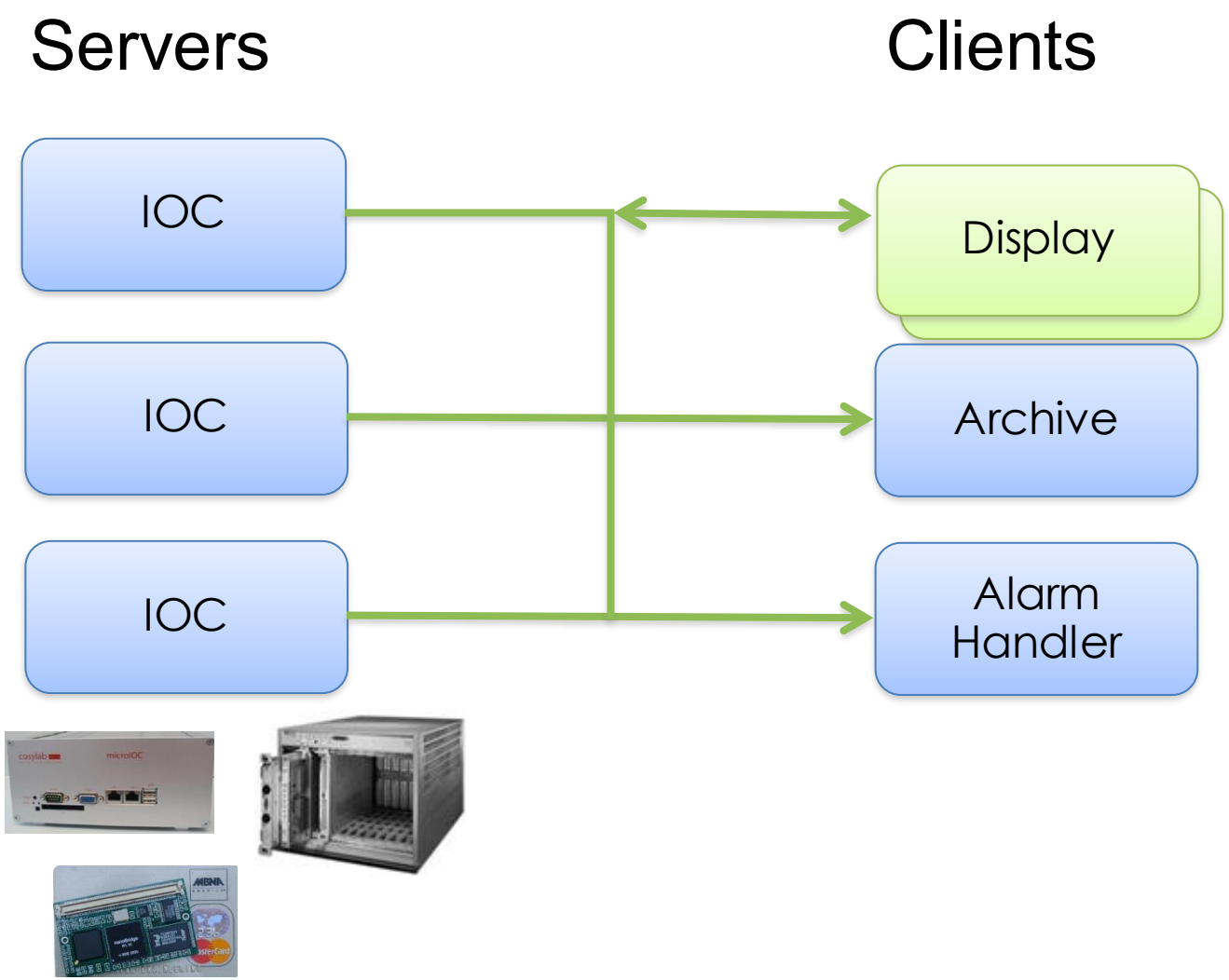
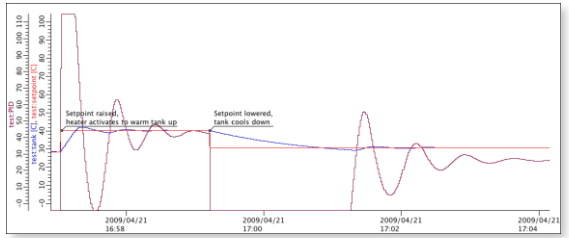
ORNL is managed by UT-Battelle, LLC for the US Department of Energy

U.S. DEPARTMENT OF ENERGY

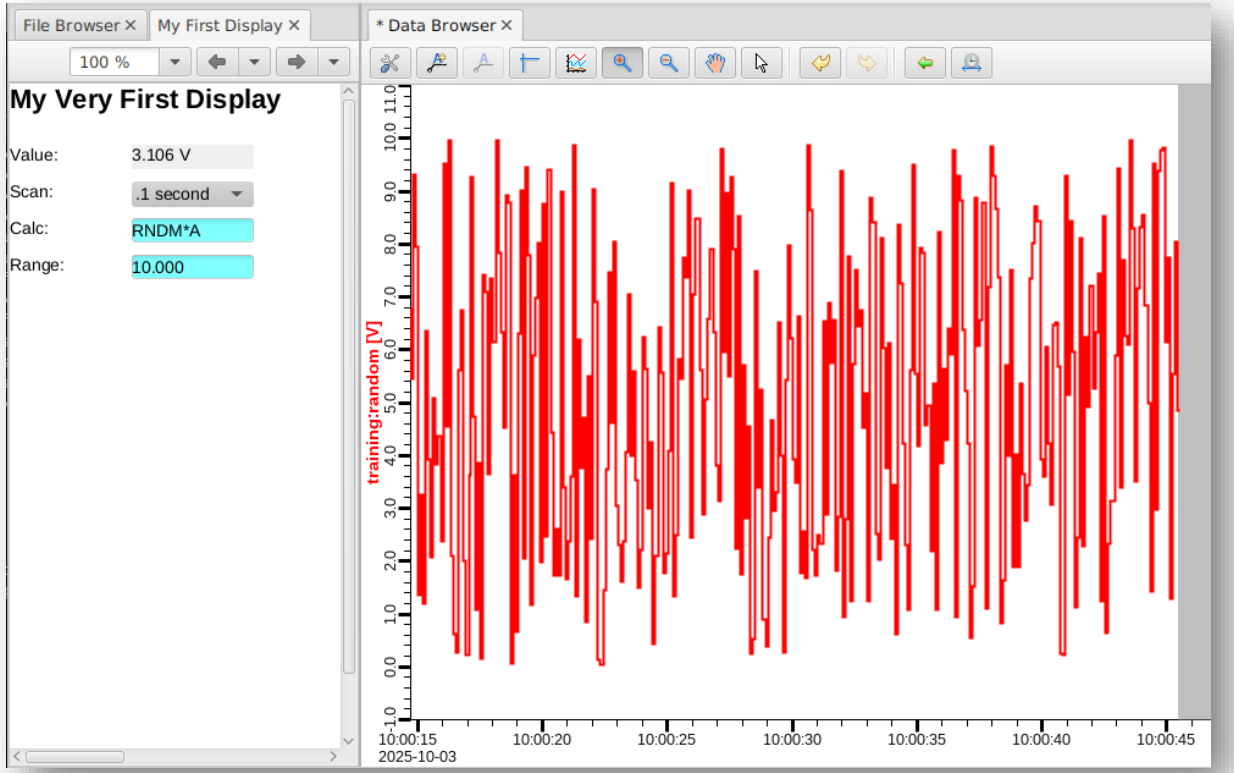
EPICS: Distributed System





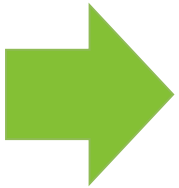
First Steps into the Deep End

1. Run 01_first_steps/very_first.db to get 'training:random'
2. Start css
3. Open Applications, Utilities, File Browser
4. Right-click on 01_first_steps, New Display, "my_first"
5. Double-click "My Display", type "My Very First Display", enter
6. Change Label "Some Value:" into "Value:"
7. Change "<sim://sine>" PV into "training:random"
8. Push Run button 
9. Change PREC and EGU fields of the PV
   a) Via 'caput' in terminal
   b) Via 'dbpf' in IOC shell
   c) Via 'Probe' in CSS
   d) Via text editor in very_first.db
10. Add Label "Scan:"
11. Add Combo Box for PV "training:random.SCAN"
12. Add Label and Text Entry for PV "training:random.CALC"
13. .. for "training:random.A"
14. Right-click on value in runtime and open Data Browser
15. Zoom/pan to show data
16. Right-click on section tab to "Split Left/Right", arrange like this:



Over the years

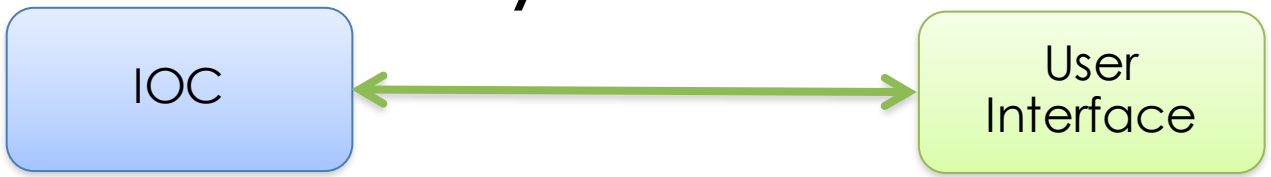
What changes, what doesn't?



- ✓ Basic dial-by-number
- ✓ Import "Contacts", Name & Number

- Custom dial tone, icons, .. in "Contacts"
- Speed dial
- Apps

Over the years



Since ~1990:

```
record(ai, "my_record")
{
  field(DTYP, "MyDevice")
  field(INP , "@channel2")
  field(SCAN, "1 second")
  ...
```

More supported platforms:
vxWorks, RTEMS, Linux, OS X, Windows, ..
68000, Intel, PPC, Arm, ..

1. edd/dm 198x
2. medm 199x
3. edm 200x
4. CS-Studio 201x
   2009: BOY
   2017: Display Builder
   2019: Web Runtime

Also:
tcl/tk/ca,
python/qt/ca, ..

Limited compatibility.

“Program" vs. ”Display Manager”

Tcl/tk, Matlab, Delphy, Visual Basic, Python/Qt, … and CA/PVA client library

- You can program sophisticated displays
- Nobody else will understand and maintain your code
- In 5..10 years, need to re-implement it all

Edd/dm, medm, dm2k, edm, CS-Studio *.opi, CS-Studio *.bob

- Use provided Widgets
  - ‘Label’, ’Text Update’, …
- Operators can easily tweak your displays or create new ones
- In 5..10 years, there is hope for translating displays to a new tool

Limited Compatibility

MEDM

```
Text
{
  object
  {
    x= 265
    y= 440
    width=155
    height=20
  }
  "basic attribute”
  {
    clr=54
  }
  textix=”Hello"
}
```

EDM

```
object activeXTextClass
beginObjectProperties
x 265
y 440
w 155
h 20
font "arial-bold-r-10.0"
fgColor index 5
value {
  ”Hello"
}
endObjectProperties
```

Dump of tool’s in-memory “model”.

Qt Designer

```
<widget class="caLabel" name="caLabel_0">
  <property name="foreground">
    <color alpha="255">
      <red>10</red>
      <green>0</green>
      <blue>184</blue>
    </color>
  </property>
  <property name="text">
    <string>Hello</string>
  </property>
  <property name="geometry">
    <rect>
      <x>265</x>
      <y>440</y>
      <width>155</width>
      <height>20</height>
    </rect>
  </property>
</widget>
```

Why not just <text>Hello?

General Format

Display Builder

```
<widget type="label">
  <x>268</x>
  <y>440</y>
  <width>155</width>
  <height>20</height>
  <text>Hello<text>
  <foreground_color>
    <color red="0" green="0" blue="0”/>
  </foreground_color>
</widget>
```

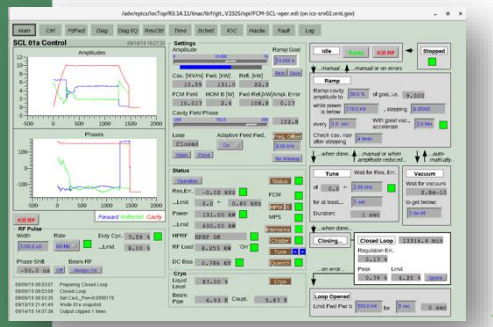
- XML
  - Somewhat human-readable
  - Parsers for every programming language
- “label”, “text_update”
  - Not hinting at specific implementation

Example: ORNL/SNS

- Accelerator
  - EDM displays*
  - CS-Studio Display Builder*
  - CS-Studio Data Browser
  - CS-Studio Alarms
  - CS-Studio MPS Bypass Table
- Beam Lines
  - CS-Studio Display Builder*
  - CS-Studio Data Browser
  - CS-Studio Alarms
  - CS-Studio Scan UI

* Web-EDM and Display Builder Web Runtime for read-only web access

Conversions



Web Runtime

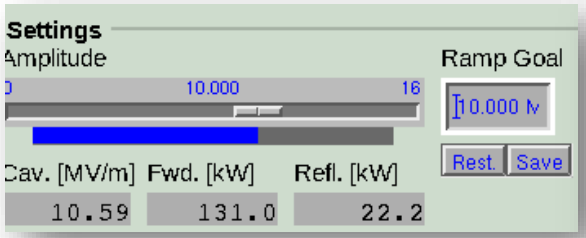
EDM

Older CS-Studio '*.opi'

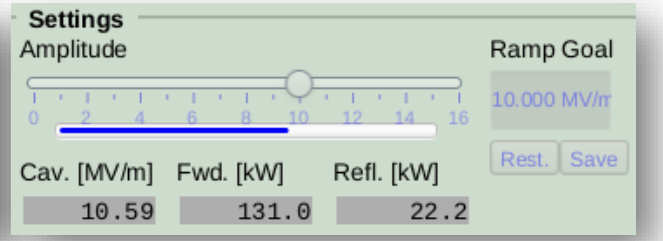
MEDM

CS-Studio Display Builder

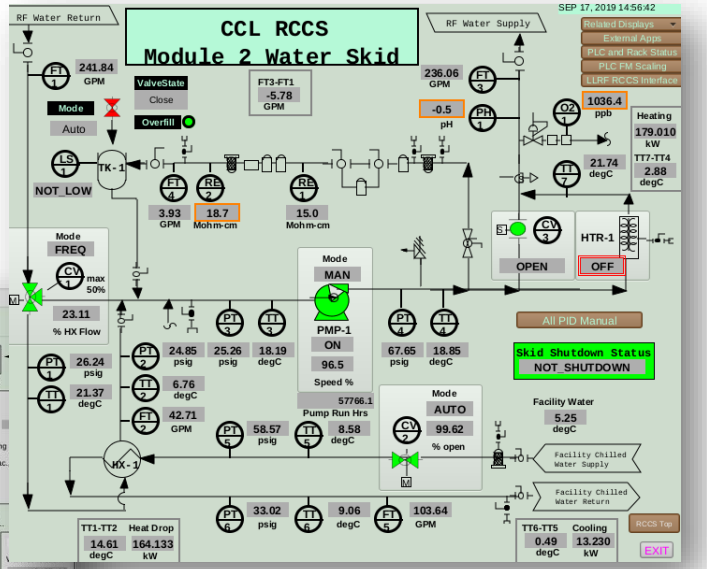
Web Runtime



EDM



Display Builder



manual or automatic

manual

Largely automatic conversion of essential display content for files going back to 199x

Possible Approaches

Pick one tool and keep it

- ✓ Stability
- - Eventually no more updates
- - Freeze OS?

Use today's tool to the fullest, then update to next tool

- ✓ All the new features
- - Need to re-implement displays

Use today's tool carefully, then upgrade to compatible tool

- ✓ Can use most displays for a long time
- - Need to re-implement some
- - Miss out on some features