OAK RIDGE National Laboratory

Phoebus Alarm System: Alarm Server

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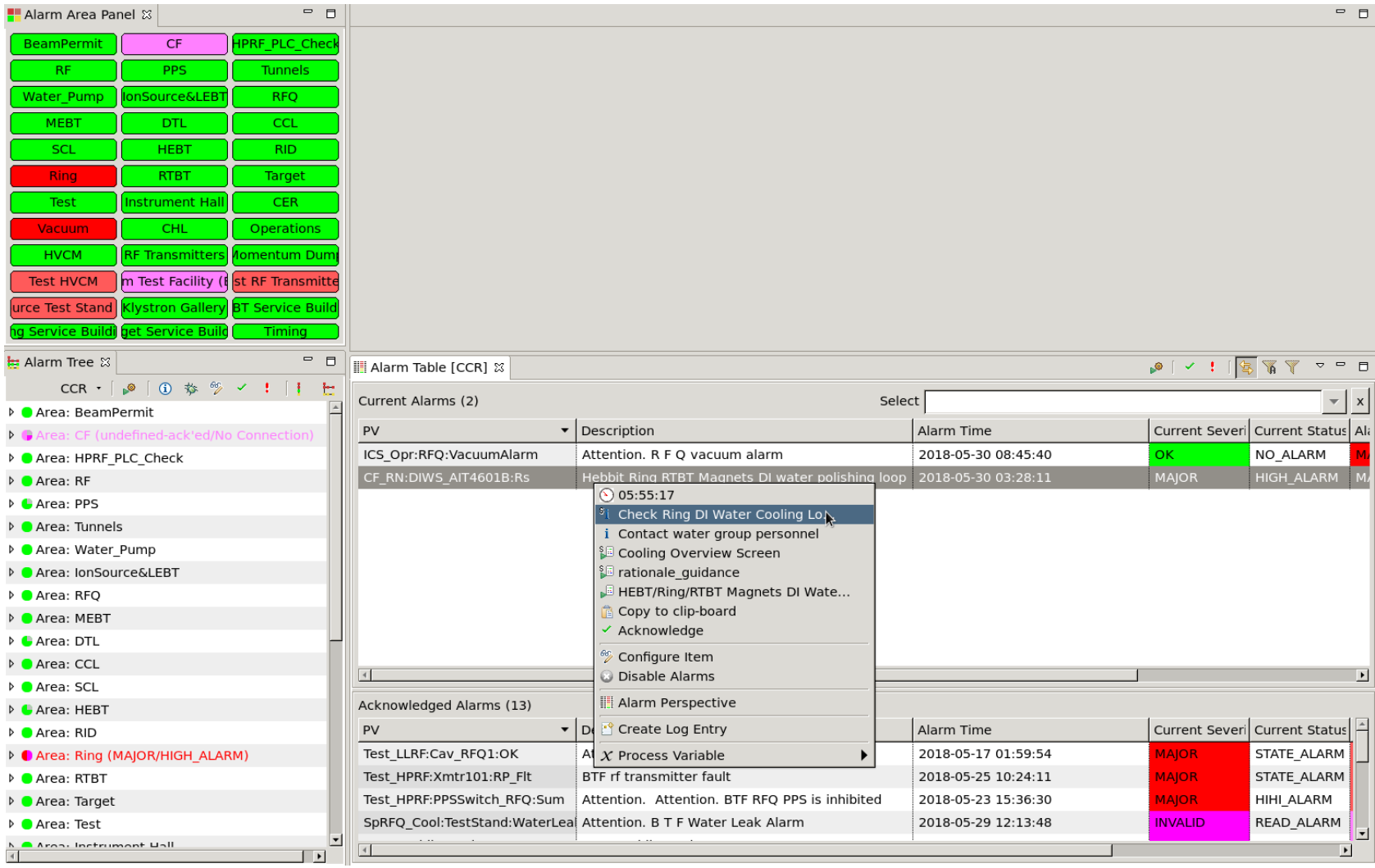
Alarm System

Alarm Server

- Monitor PVs
- Track alarms, acknowledgement

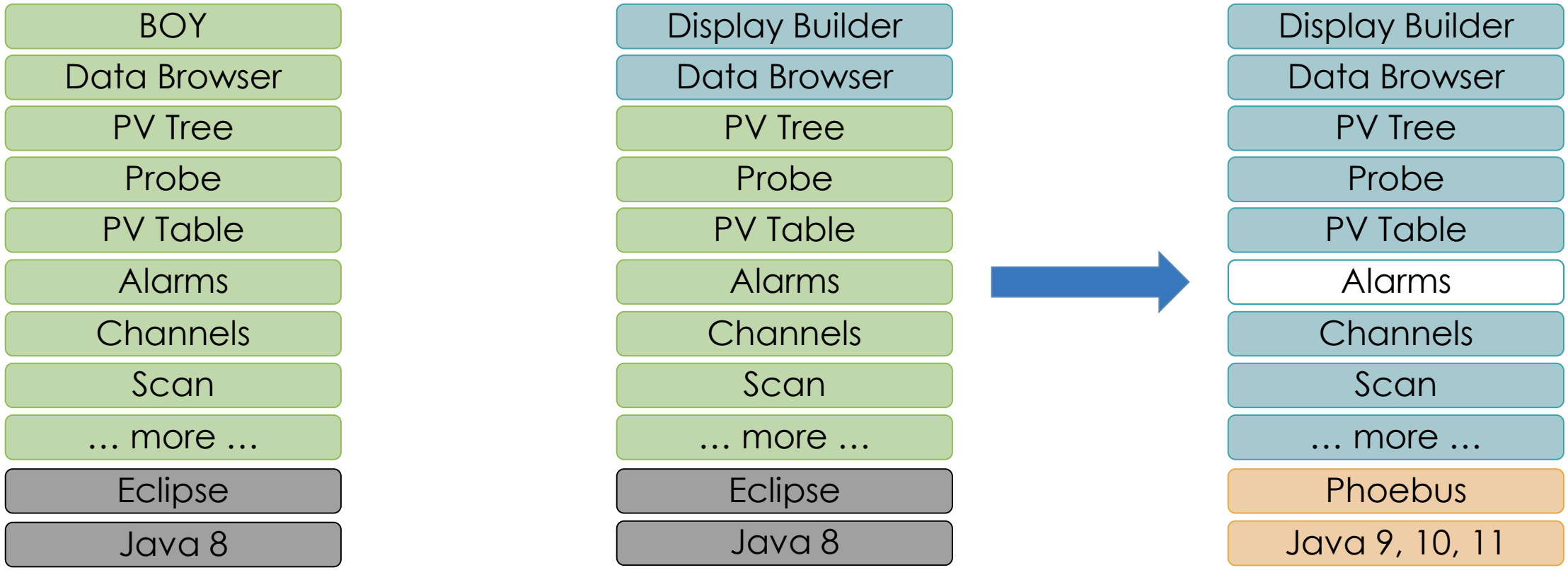
Alarm UI

- Configure (add PVs, guidance, links to displays)
- Show current state
- Acknowledge alarms
- Open guidance, related displays, email, log, ..



June 2018: Port to Phoebus

JavaFX SWT



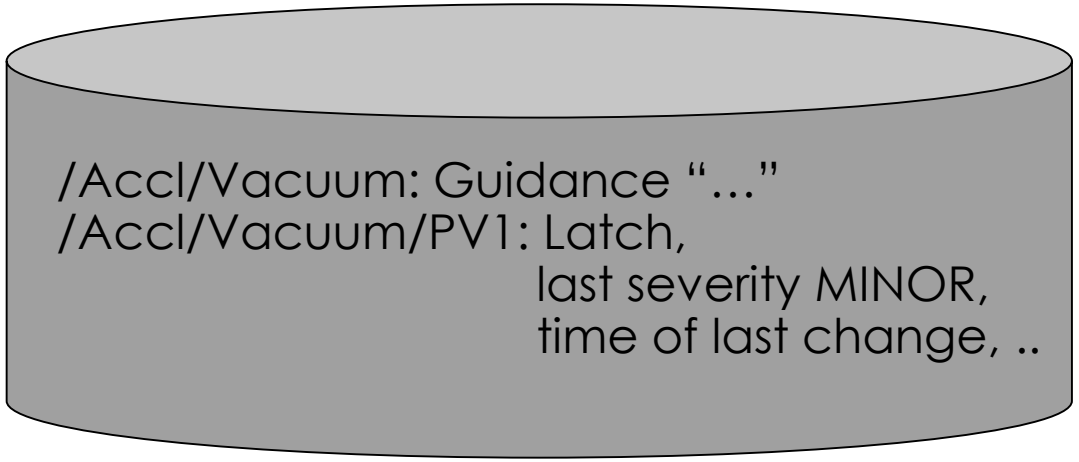
CS-Studio, 2010

Since ~2016

2018

Reconsidered Original Architecture

- ‘Static’ Relational Database
  - ☑ Configuration
  - ☑ Persists last state
  - - Cannot get updates



- ‘Dynamic’ Message Service
  - ☑ Send acknowledgements
  - ☑ Get State updates
  - - Cannot get configuration

/Accl/Vacuum/PV1: Acknowledged

/Accl/Vacuum/PV1: Severity now MINOR_ACK

/Accl/Vacuum: Guidance was changed

All tools need to interface both APIs and ‘merge’ information

Message Streaming Platform

a) Send message and forget

b) Persist messages until disk is full

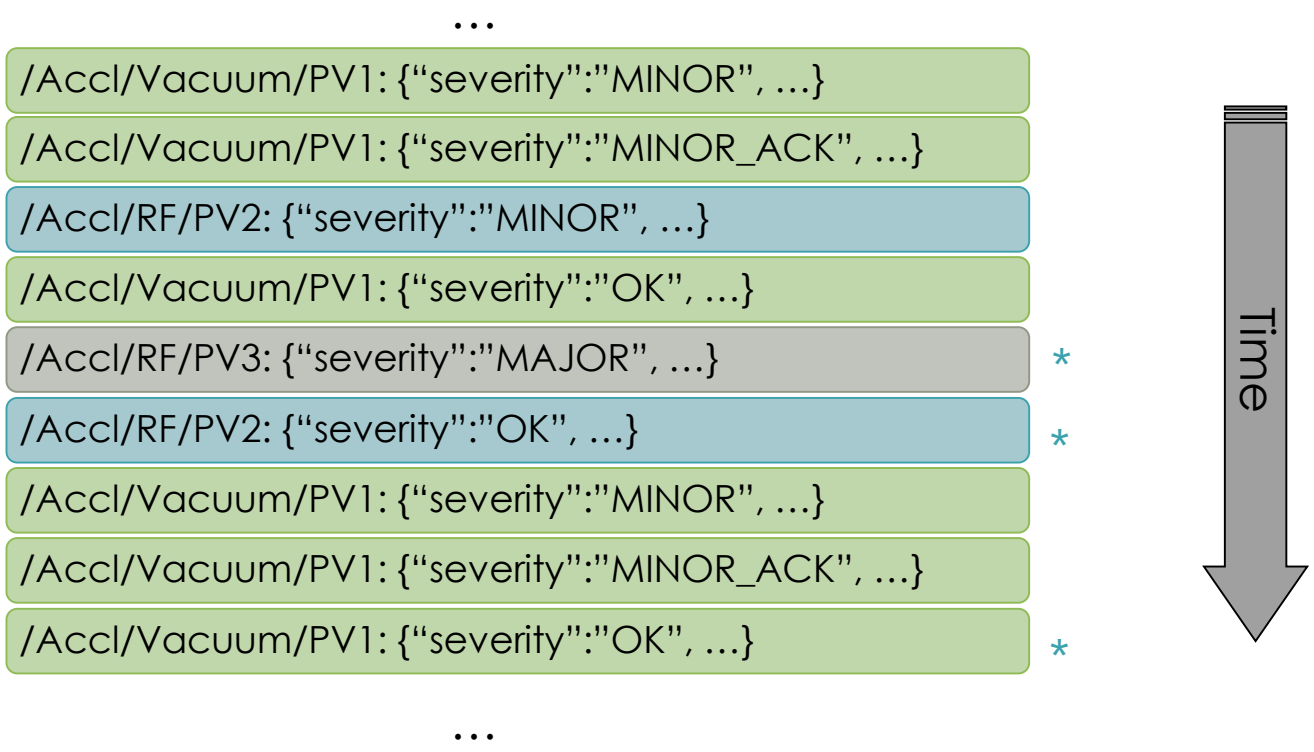
c) ‘Compact’ messages to only keep most recent update

Combines ‘static’ RDB and ‘dynamic’ message service.

One API for all tools.

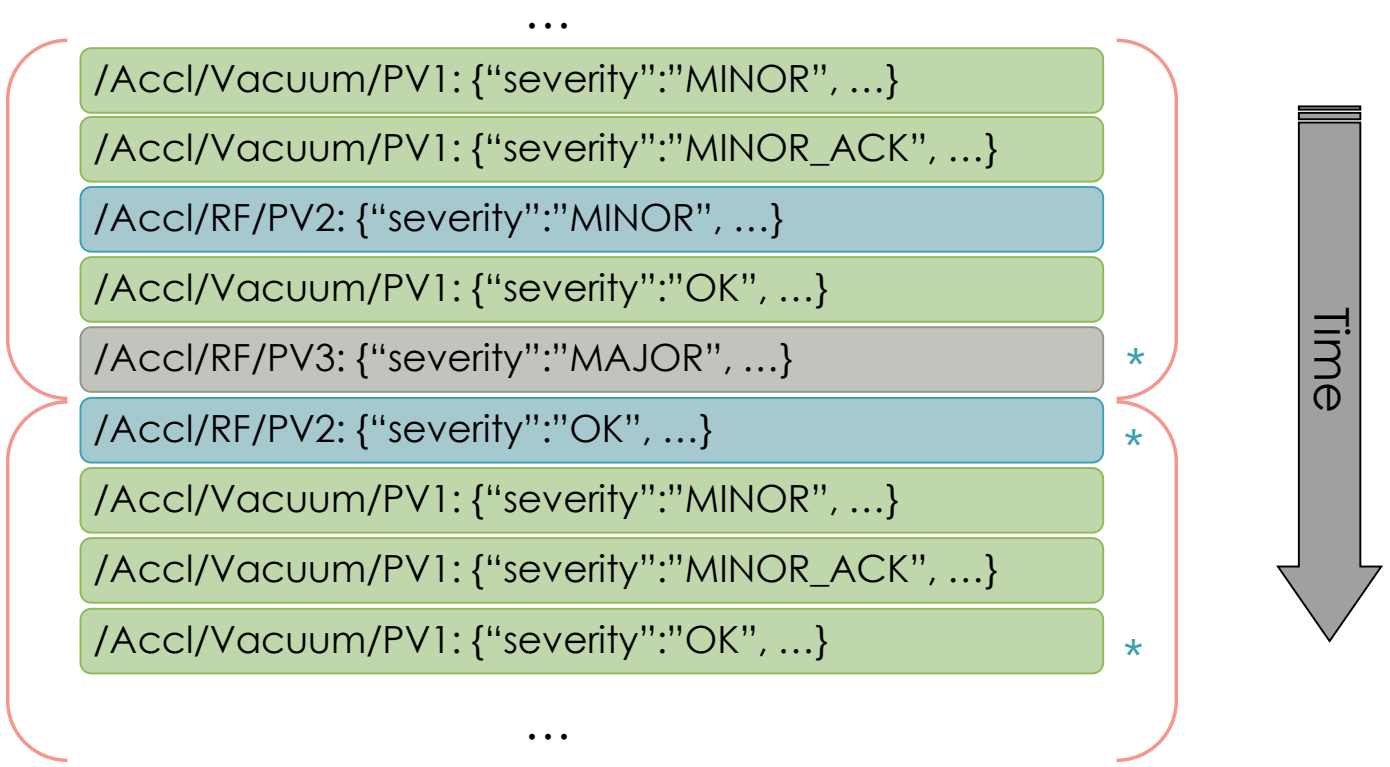
Clients tend to only need the most recent item state

- Assume state updates from beginning of time



Kafka Message Store

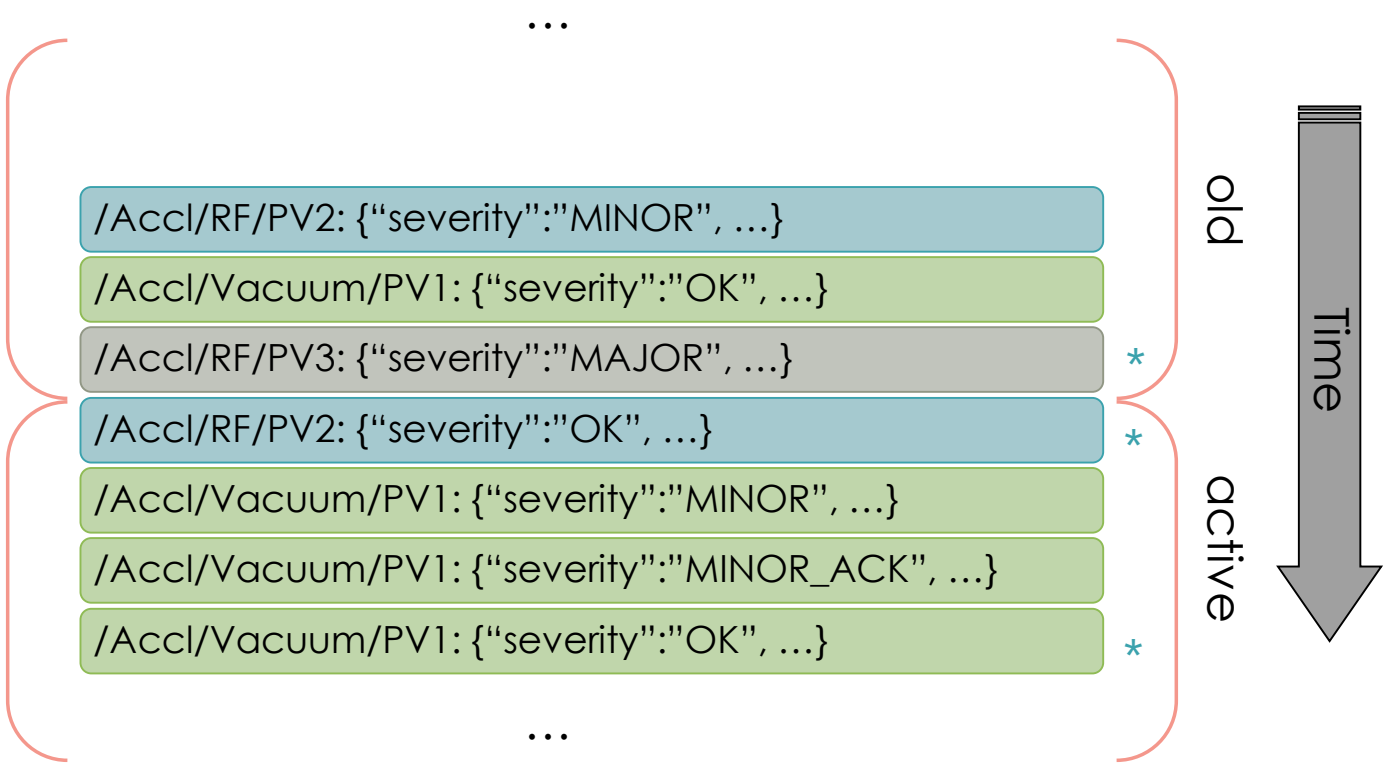
- New ‘segment’ for example every 10 seconds



‘Compact’:
Keep most recent message for each item.

Compacted Kafka Message Store

- Keeps *single* older segment with *last* value for each item]
- Active segment for new messages



New clients get at least one message with most recent state for each item.

Maybe a few more recent updates from 'active' segment.

From then on, updates as state changes.

Kafka w/ compacted topics

May add a few extra messages on startup, but

- One API replaces RDB and message service
- Faster than reading initial state from RDB

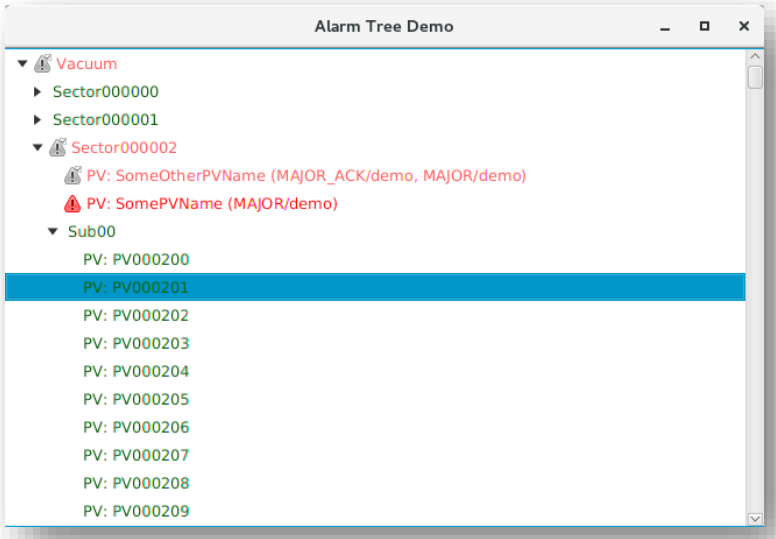
Initial Tests

2010 Test (PosgreSQL, JMS)

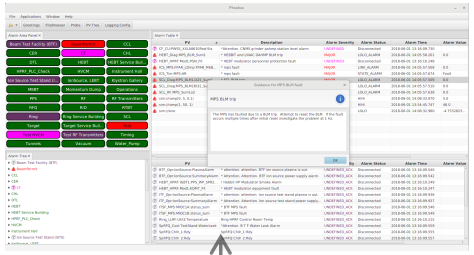
- Load hierarchy with 50000 PVs into RDB
  - 5 minutes
- Show config in new Alarm Tree
  - Nothing shown until all loaded after 30 seconds
- Handle Alarm Updates
  - 10 per second

2018 Test (Kafka)

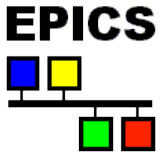
- 100000 PVs into Kafka
  - 3 seconds
  - Shows growing tree for 10 seconds
  - 500 per second



Alarm Ecosystem



Alarm Server



Channel Access IOC

PVA IOC

- Alarm configuration
- Alarm State updates
- Acknowledgement

- Live control system data

Alarm System Update for Phoebus

RDB & JMS → APACHE kafka®

- Same XML import/export
- Similar UI
- Operational @ SNS beam lines since Jan. 2019
- Performance headroom