CS-Studio Alarm System Using **kafka**

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### Alarm System Helps Operators

- Monitors PVs
- Displays those in alarm
  - Unit “acknowledged” and recovered
- ... with
  - Guidance
  - Related displays
  - Support for email, logbook
- Allow online changes
  - Add/remove PVs
  - Change Guidance etc.

### Architecture since ~2009

- **RDB:** Configuration
  - Configuration
  - Persists last state
  - Cannot get updates

- **Message Service:** Updates
  - Get State updates
  - Get configuration updates
  - Cannot persist configuration

### Initial Tests

**2010 Test (PostgreSQL JMS)**

- Create hierarchy with 50,000 PVs
  - 5 minutes
- Show config in new Alarm Tree
  - Nothing shown until all loaded after 30 seconds
- Handle Alarm Updates
  - 10 per second
- Handle State Updates
  - 100 per second

**2018 Test (Kafka)**

- 10,000 PVs
  - 10 seconds
- Shows growing tree for 10 seconds
- 500 per second

### Clients only need the most recent message

- Send message and forget
- Persist messages until disk is full
- ‘Compact’ messages

### Message stream options

**a)** Send message and forget
**b)** Persist messages until disk is full
**c)** ‘Compact’ messages

### Compacted Kafka Message Store

Old segment keeps single message with last value for each item

### Alarm Ecosystem

- **ES/Kibana:**
  - Report on # alarms/hour
  - Top 10 trigger PVs
- **Config Logger:**
  - Configuration snapshots

### CS-Studio Alarm System Update

RDB & JMS → **kafka**

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