From Factory to Cloud: The path to Beam

Dan Honey - Oden Technologies
Dan Honey
Principal Engineer
Oden’s Customers

Medium to large manufacturers in plastics extrusion, injection molding, and metal stamping.

Process and Quality Engineers looking to centralize, analyze, and act on their data.

Plant managers who are looking to optimize logistics, output, and cost.
In the beginning...

- There was Hardware
- We were scrappy
- It worked...
  - 12-18 hour days
  - “OSHA” compliance
  - Lots of devices
  - Lots of machine manuals
  - Lots of Redbull
It worked until it didn’t

How bad could it be?

I’m glad you asked...

- WiFi connectivity
- Time keeping (RTCs)
- Power surges
- People unplugging your stuff
- Security concerns
- Maintenance
- Expensive converters
- Embedded fleet != Server rack
There has to be a better way!
Learn from the industry

- Aggregate data
- Use off the shelf solutions
- Reduce hardware footprint
- Reduce cost of deployment
- Once device per factory
Realize your true value

- Pivoted away from hardware
- Focus on value: ML & Analytics
- Still a lingering device presence
- Trade 1000 devices for a 100
The path to Beam...
How we ingest raw data with devices

Sensor Readings → OPCUA → Cloud IoT Core → Streaming Calculations

```
{
  "ServerTimestamp": 1598457417,
  "ServerDate": "Wed Aug 26 15:56:57 2020 UTC",
  "Values": {
    "TagName": "melt-temp1",
    "TagValue": 356.81,
    "TagQuality": "good",
    "TagTimestamp": 1598423417
  }
}
```

```
{
  "value": 356.81,
  "timestamp": 1598423417,
  "metric": "57ae4a63-d36a-5d22-8ad9-ec69dad50337",
  "uuid": "b5d9ba17-9d09-49d5-b2f0-0f921f4feeeea",
  "route": "/metric"
}
```
How we ingest raw data with beam

Sensor Readings

Machine comms

{  "ServerTimestamp": 1598457417,
  "ServerDate": "Wed Aug 26 15:56:57 2020 UTC",
  "Values": {
    "TagName": "melt-temp1",
    "TagValue": 356.81,
    "TagQuality": "good",
    "TagTimestamp": 1598423417
  }
}

Cloud IoT Core

Streaming Calculations

Pub Sub

Dataflow

{  "value": 356.81,
  "timestamp": 1598423417,
  "metric": "57ae4a63-d36a-5d22-8ad9-ec69dad50337",
  "uuid": "b5d9ba17-9d09-49d5-b2f0-0f921f4feee5",
  "route": "/metric"  
}
How it works

1. The Cloud IoT Core connects to the kepware platform.
2. Data flows to the pub/sub topic `devices/<UUID>/events/kepware`.
3. Pub/Sub topics include `projects/oden-production/topics/events-mqtt`.
4. Data flows to the data flow `Kepware Beam Job`.
5. Data flows to the acquisition beam job.

Kepware Beam Job:
1. Subscribe to events
2. Pull and store config
3. Map data
4. Publish to events topic

Acquisition Beam Job:
End