# Streaming PI System Data and Advanced Analytics in Google Cloud

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# Agenda:

- PI Integrator overview
- General Best Practices
- Scaling and Performance recommendations
- Data Modeling best practices
- Best Practices for streaming views
- PI Integrator for GCP Overview
- Google Pub/Sub Demo


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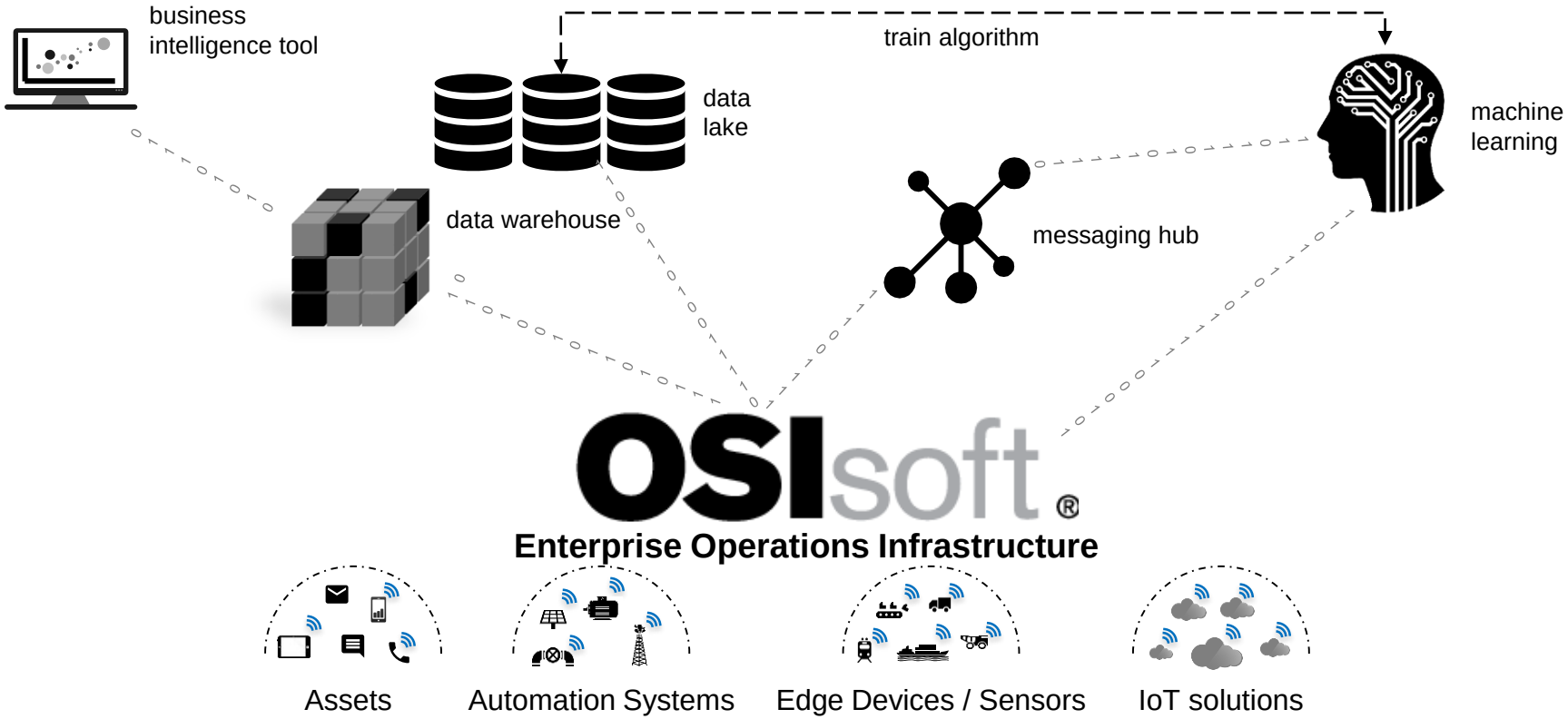
# Accelerate and operationalize advanced analytics





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# ***PI Integrators speed the process** that **brings trustworthy data** to many unique analytics tools*



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# General Best Practices

- Install the PI Integrator on its own dedicated server
- Install the latest versions of the PI Asset Framework and PI Data Archive
- Install the PI Integrator in close network proximity to the PI Data Archive
- Consider an aggregation server.
- Performance of the backend PI AF Server SQL database is a key performance factor for the PI Integrator because of the time spent with PI AF-related processing.


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# Scaling and Performance Recommendations

Overview | Log | Security | View Configuration | Statistics

## Run History

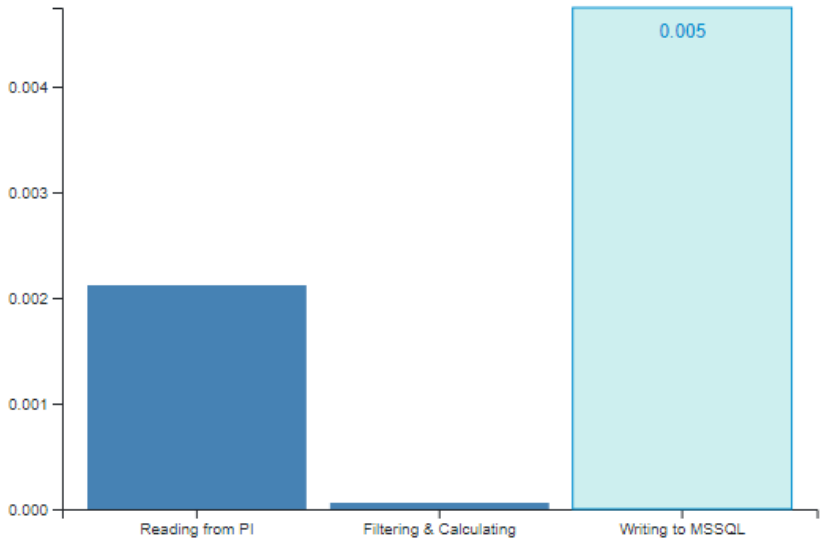
| Run Instances | Duration (seconds) | ... | ... | ... |
|---|---|---|---|---|
| 4/1/20 3:10 PM | 0.097 | 481 | 0 | 0 |
| 4/1/20 3:15 PM | 0.063 | 5 | 0 | 0 |
| 4/1/20 3:20 PM | 0.047 | 5 | 0 | 0 |
| 4/1/20 3:25 PM | 0.047 | 5 | 0 | 0 |
| 4/1/20 3:30 PM | 0.078 | 5 | 0 | 0 |
| 4/1/20 3:35 PM | 0.063 | 5 | 0 | 0 |
| 4/1/20 3:40 PM | 0.063 | 5 | 0 | 0 |
| **Total** 1197 | **75.17** | **6,461** | **0** | **0** |

View Logs for Run | Download Selected Report | Enable Full Reporting

## Duration (seconds)

Show All Runs

**4/1/20 3:20 PM**





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# Scaling and Performance Recommendations

- Minimize using the PI Integrator to generate and publish data on the fly
- Consider using filters for bad/null values.
- Separate views for static/contextual or slow-moving data and faster-updating or industrial instrumentation data (core PI System data).
- Strategize and prioritize your data requests to limit the size and scope of the data sets that are processed and generated.


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# Best Practices for Data Modeling within PI AF

- **Equipment-oriented**
  - Easier starting point for generating data sets used with a BI tool.
  - Contains unique attributes for the columns of that table.
  - Less favorable for systems where measurements and attributes are continuously changing.
- **Measurement-oriented**
  - Measurement-oriented model might be beneficial so that users do not have to republish data each time a measurement is added or removed.


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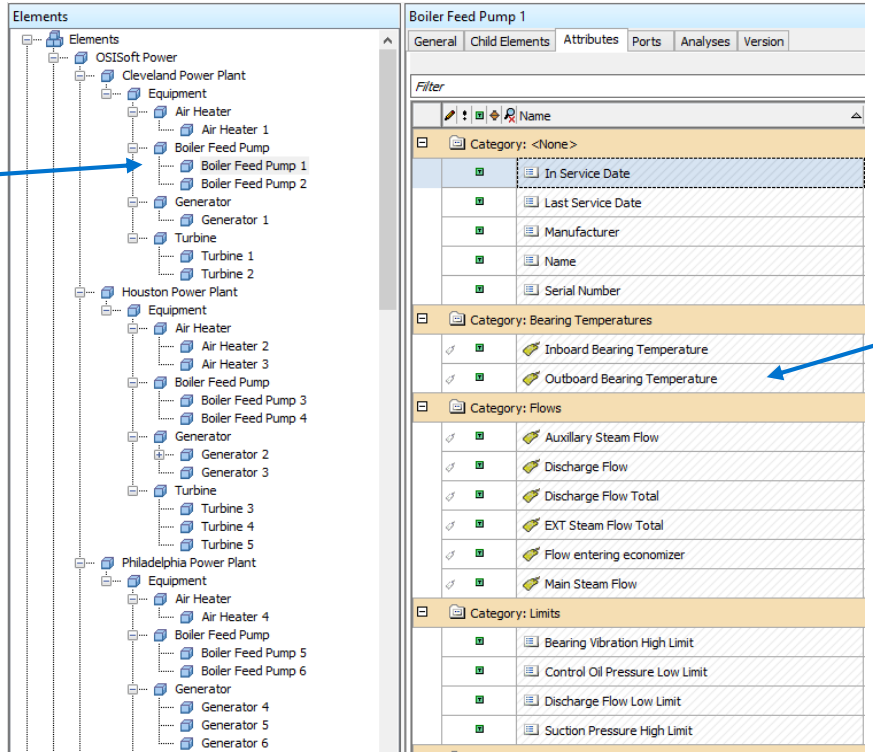
# Equipment-oriented model example

Leaf elements are equipment units




Attributes are measurements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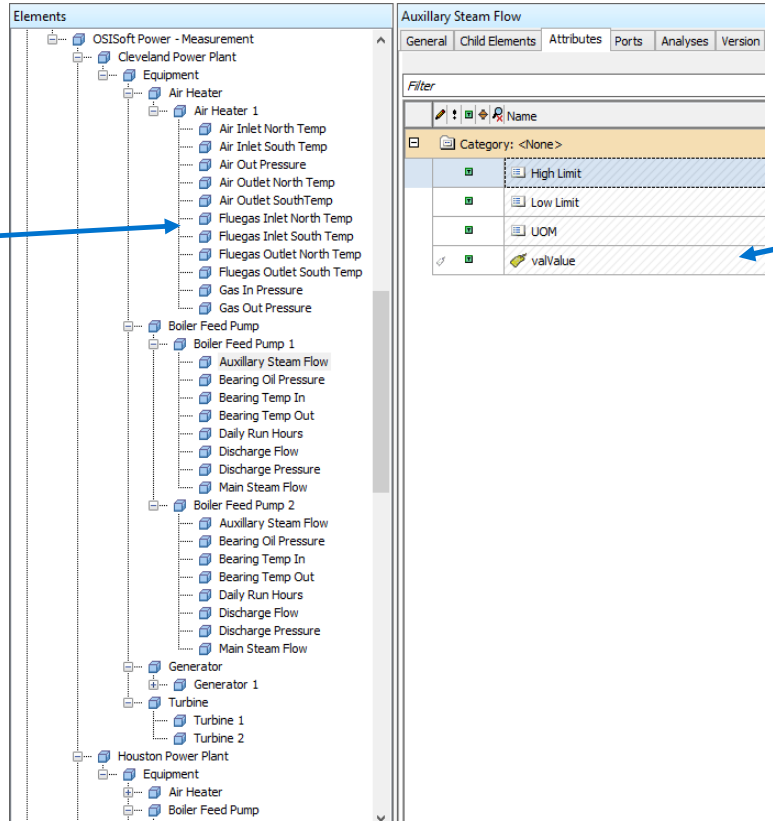
# Measurement oriented model example

Leaf elements are Measurements




Leaf elements are Measurement Value and properties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# Best Practices for streaming views

- Consider increasing the number of worker nodes on the machine.
- Use a smaller number of views with more attributes in the search shape
- Consider increasing the time interval between scans for large scheduled streaming view
- Azure Event Hubs and Azure IoT Hub writers support specifying the message size and message batch timeout.


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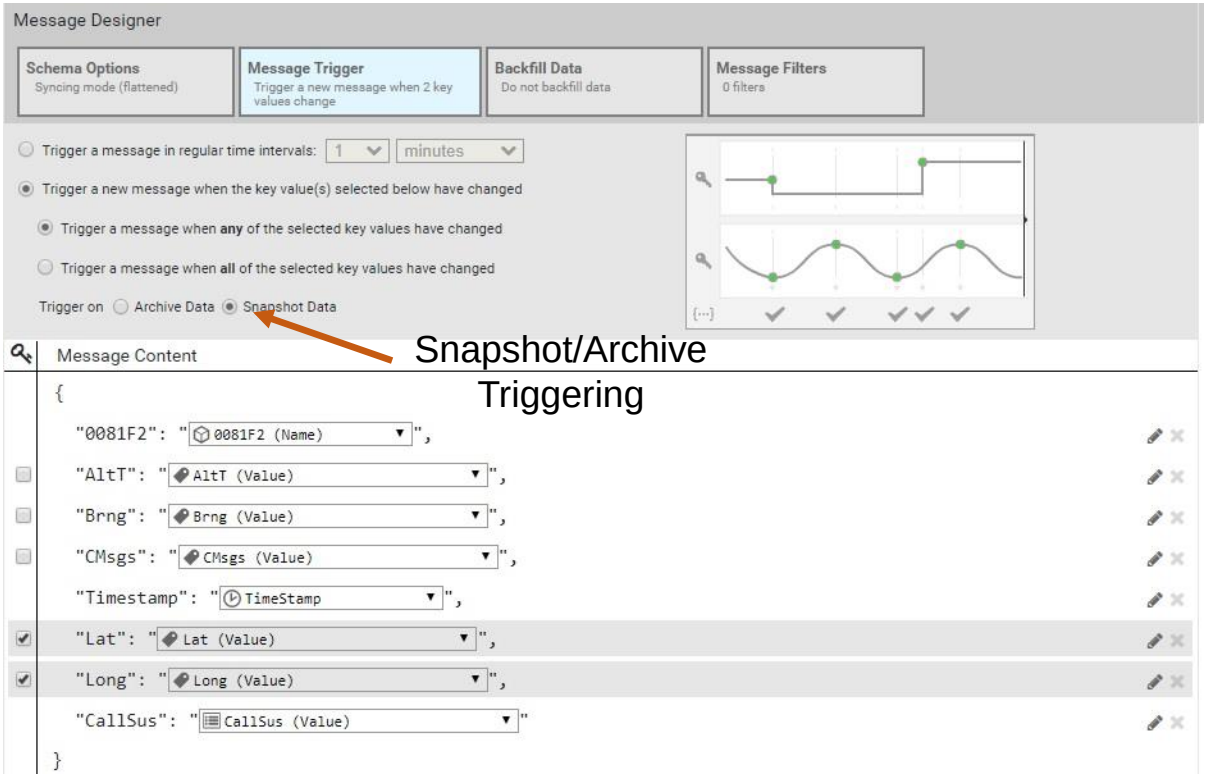
# Streaming Views: message triggering

Event-triggering mode

Key Attributes

Key Attributes




Snapshot/Archive Triggering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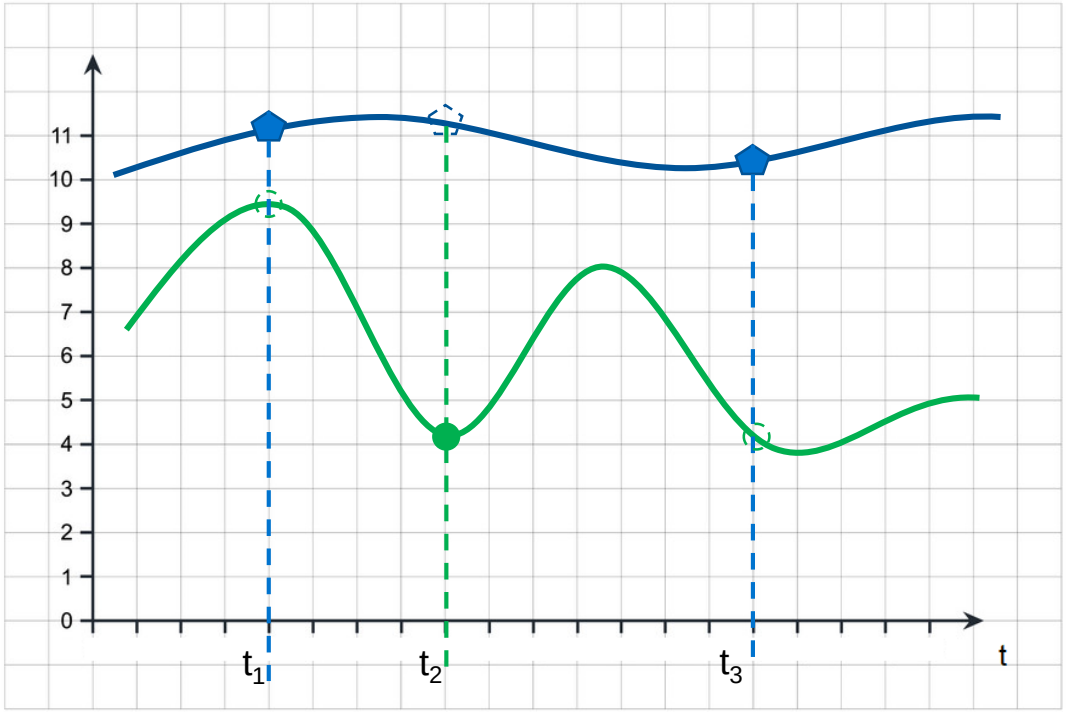
# Trigger “When any”





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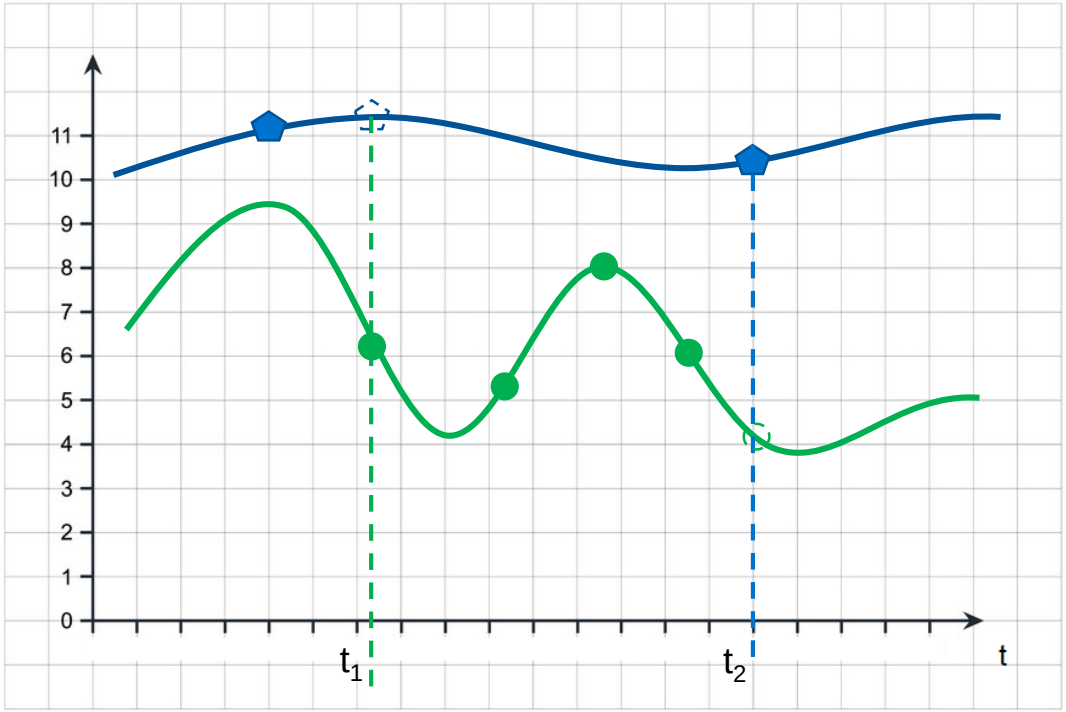
# Trigger “When any”





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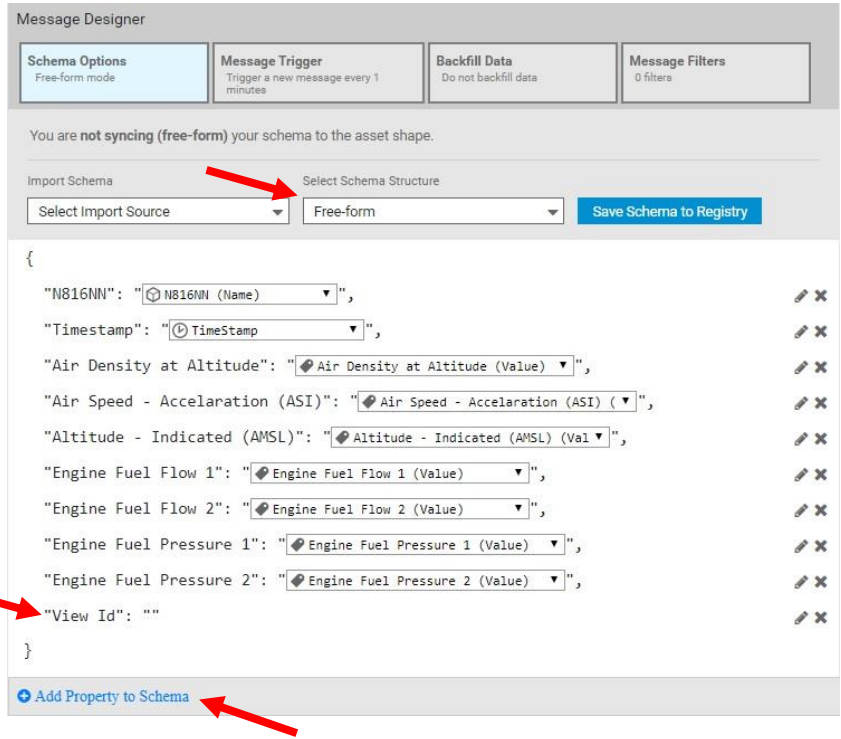
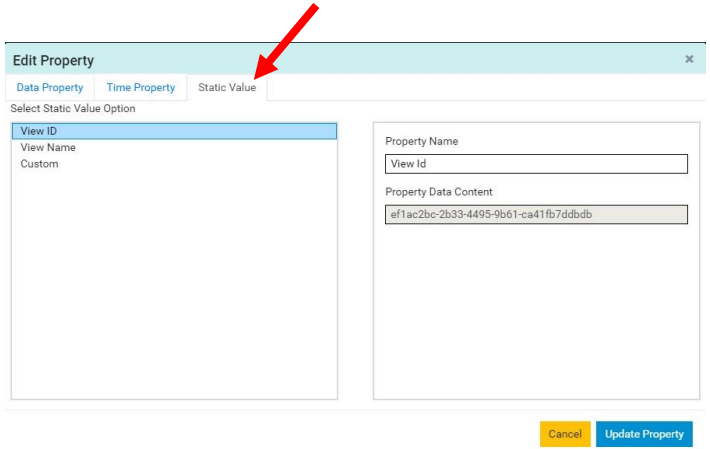
# Streaming views: routing





```
{
  "N816NN": "N816NN",
  "Timestamp": "2020-03-04T07:52:32.4696113-08:00",
  "Air Density at Altitude": 0.4493381083011627,
  "Air Speed - Accelaration (ASI)": 0.5210391879081726,
  "Altitude - Indicated (AMSL)": 25013.078125,
  "Engine Fuel Flow 1": 0.7463105916976929,
  "Engine Fuel Flow 2": 0.7463105916976929,
  "Engine Fuel Pressure 1": 29.944839477539062,
  "Engine Fuel Pressure 2": 29.944839477539062,
  "View Id": "ef1ac2bc-2b33-4495-9b61-ca41fb7ddbdb"
}
```

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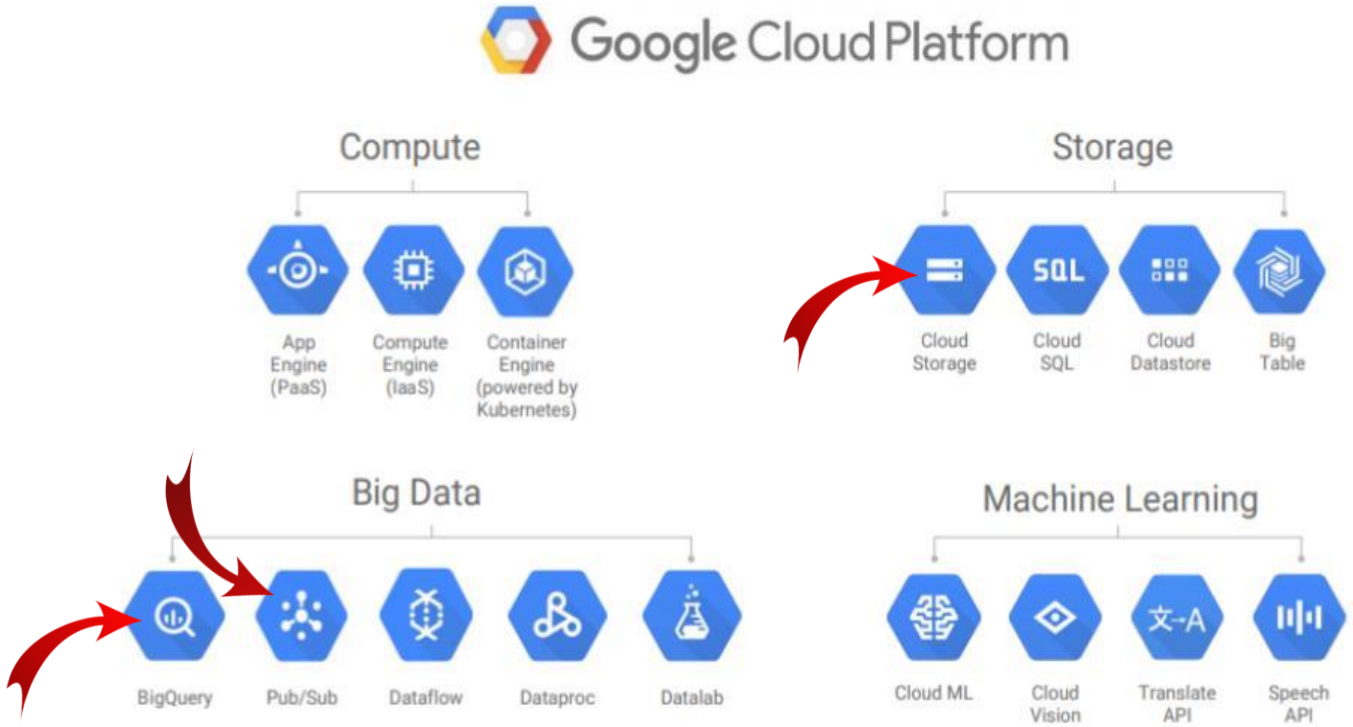
# Google Cloud Platform Overview





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# Google Pub Sub Core concepts:

- **Topic:** A named resource to which messages are sent by publishers.
- **Subscription:** A named resource representing the stream of messages from a single, specific topic, to be delivered to the subscribing application..
- **Message:** The combination of data and (optional) attributes that a publisher sends to a topic and is eventually delivered to subscribers.
- **Message attribute:** A key-value pair that a publisher can define for a message.


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# Google Pub Sub Key Use Cases:

- **Data streaming from various processes or devices.**
- Balancing workloads in network clusters.
- Implementing asynchronous workflows.
- Distributing event notifications.
- Refreshing distributed caches.
- Logging to multiple systems.
- ...


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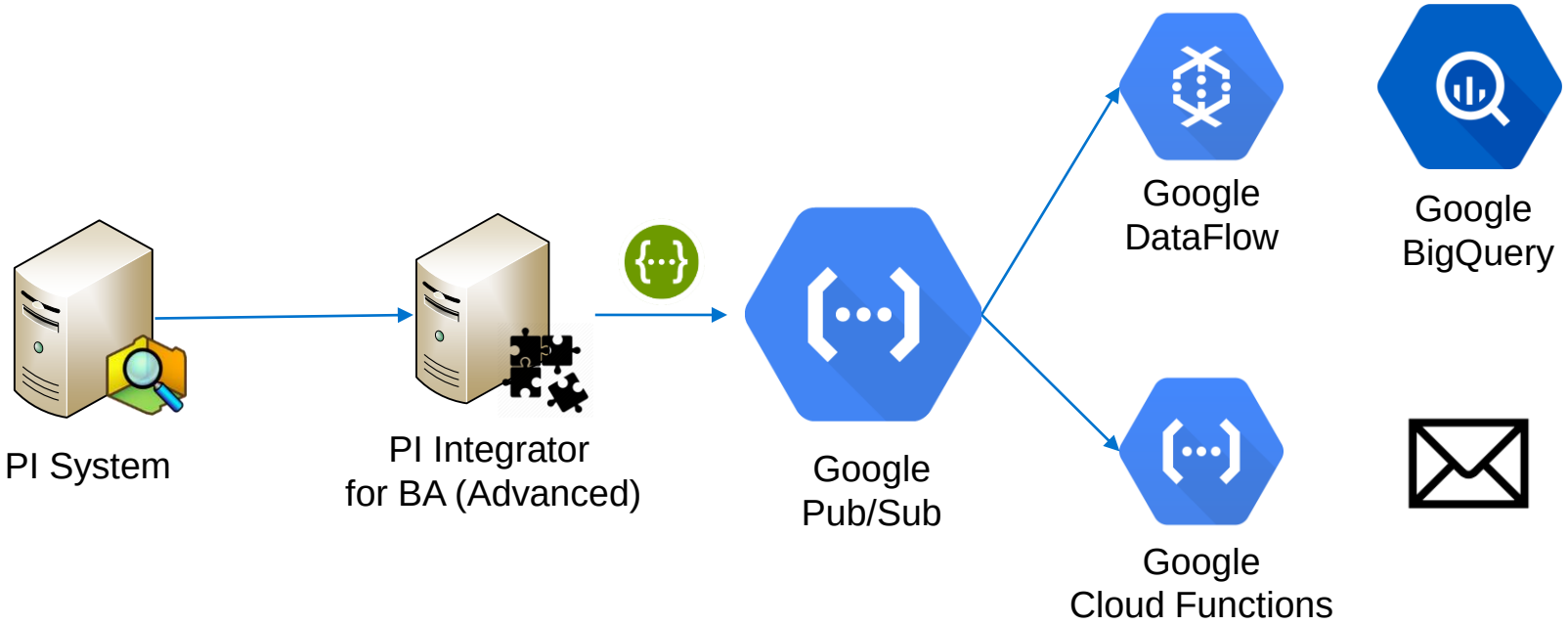
# Demo overview:





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# Speakers

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# Questions?

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State your
**name & company**

## Save the Date...


AMSTERDAM
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