AWS re:Invent

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IOT307

Race to generate IoT-connected wind energy

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Agenda

15 minutes – Workshop introduction and AWS IoT Things Graph primer

30 minutes - Engineering modules

15 minutes – AWS IoT Analytics and AWS IoT Events primers

30 minutes - Operations modules

20 minutes – Analyst modules

10 minutes – Race!

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Workshop goals

- See how common industrial outcomes can be achieved using AWS
- Learn several AWS IoT services that simplify the development
- Help power your team’s windfarm in a race

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Workshop personas and use cases

Engineering



Establish connectivity

Update device registry

Set up control systems

Operations



Monitor assets

Calculate KPI

Track device state

Establish historian

Analyst



Trend KPIs

Correlate KPI with changes

Detect anomalies

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Virtual wind turbine

Features:

Trend charts for key data

Safety assessment (beacon)

Brake controller via MQTT

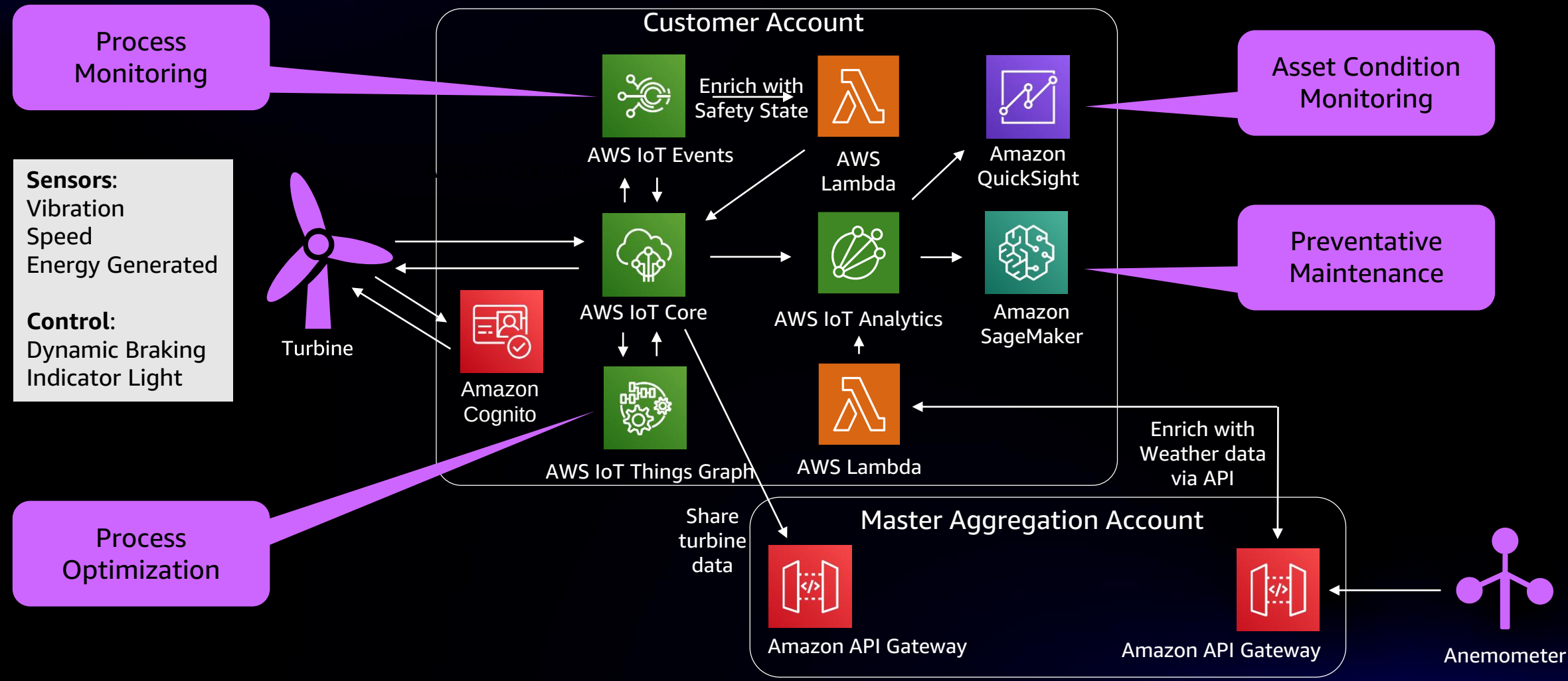
Wind generator

Race mode



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Architecture overview



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Windfarm teams

- Each of you contribute to a wind farm team
- Your table has a placard designating the team name
- You will tag your power generation measurements with your team name in the IoT device shadow
- Later, we will aggregate the power generated for your team in a race!

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AWS IoT Things Graph primer

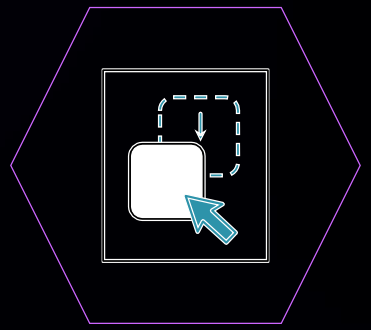
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AWS IoT Things Graph – Primer



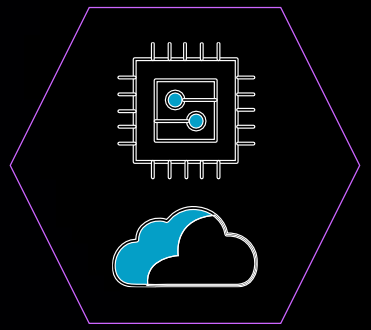
Model-driven approach

Uses models to represent devices or web services



Drag-and-drop visual UI

Visual user interface to connect up in the models in the desired workflow sequence



Run in the cloud or on the edge

Execute the workflow on AWS Cloud or on any AWS IoT Greengrass–enabled edge device

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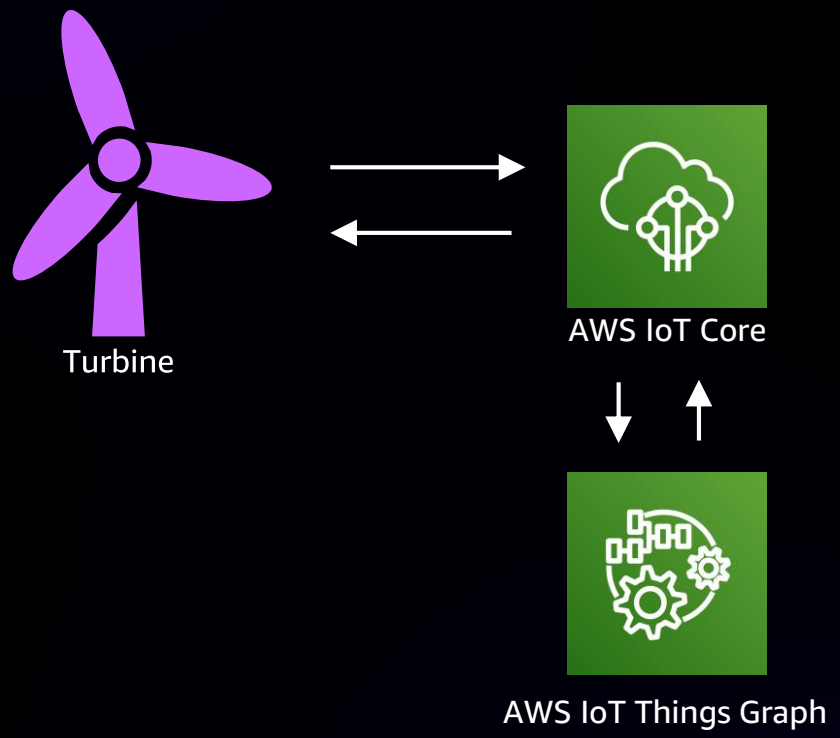
Models abstract low-level details

- **Build IoT application faster**: models are reusable across different devices, communication protocols, and proprietary interfaces
- **Create sophisticated workflows visually with virtually no coding**
- **Easy to manage**: with just a few clicks, deploy IoT applications on AWS cloud or on AWS IoT Greengrass-enabled devices.
- **Easy to monitor**: IoT Things Graph is fully integrated with Amazon Cloudwatch



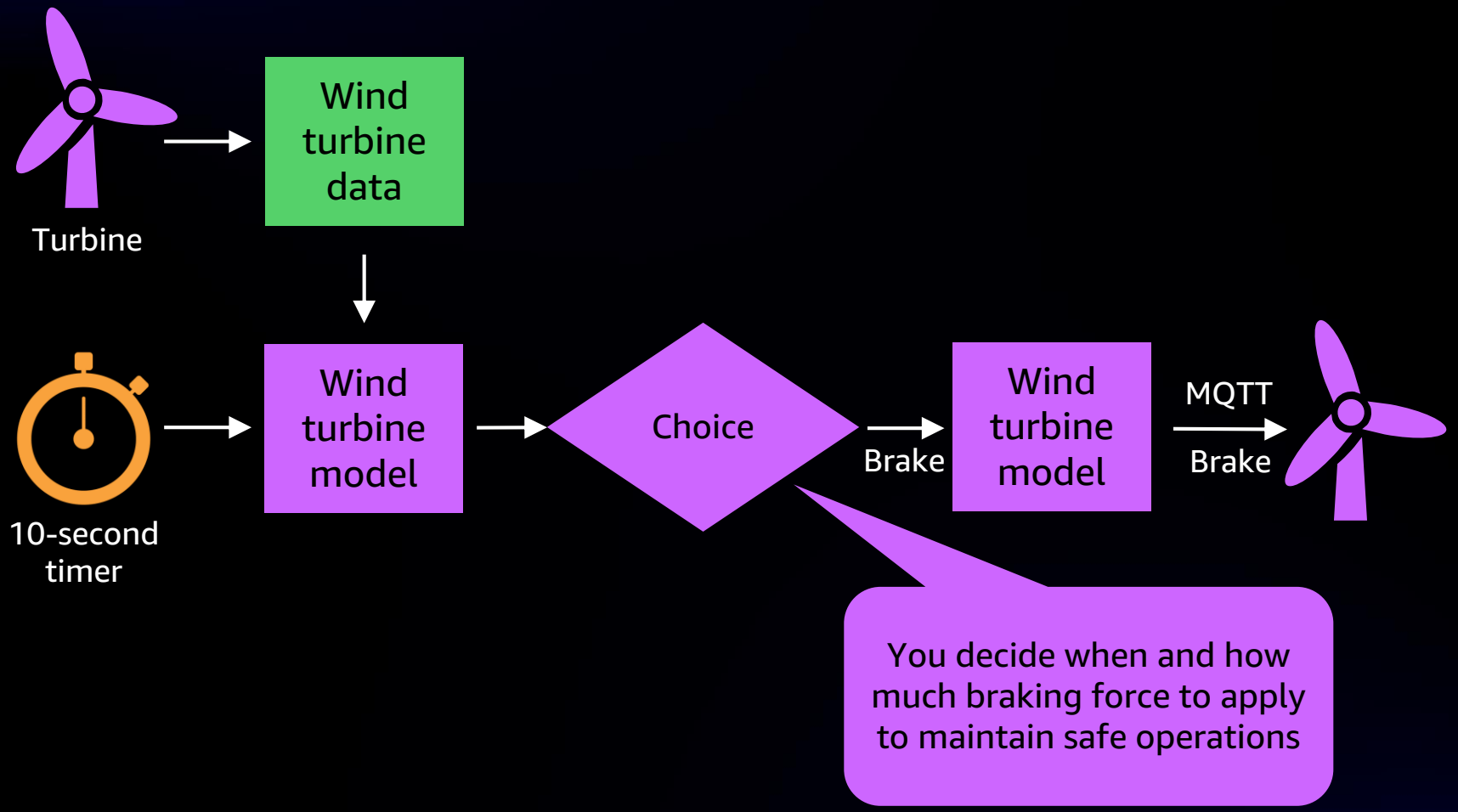
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Workshop architecture – AWS IoT Things Graph



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Workshop – AWS IoT Things Graph flow



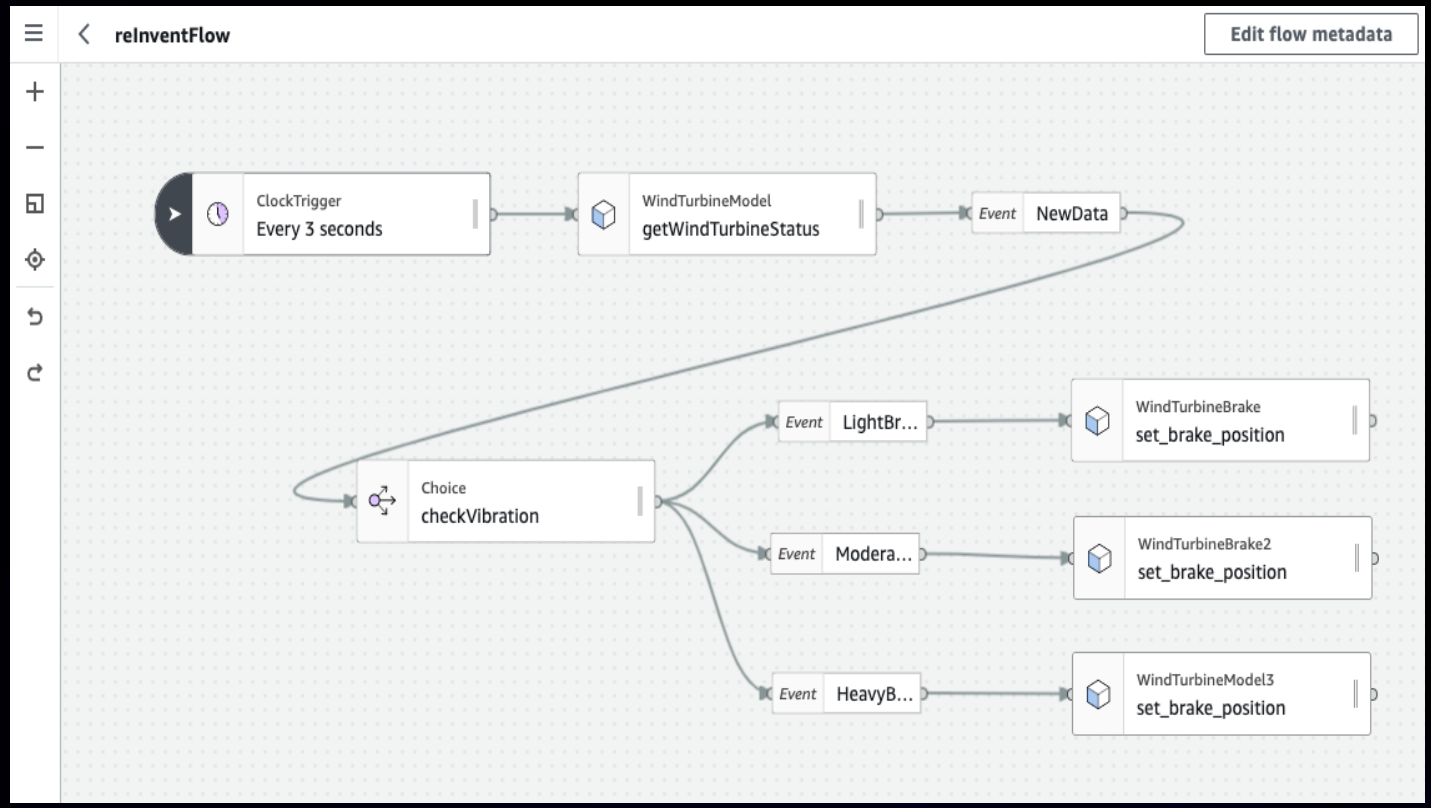
Steps

1. Workflow visual design
2. Workflow configuration
3. Workflow deployment

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Create multi-step workflows with minimal coding

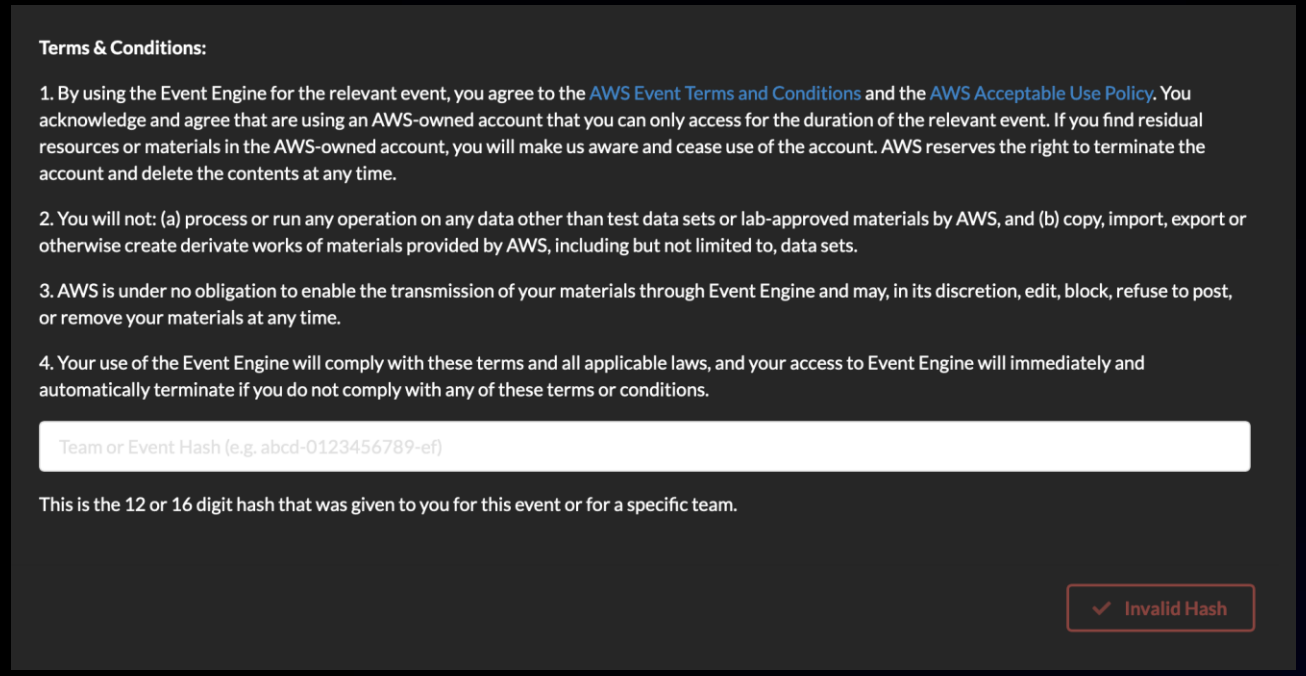
1. Drag and drop models into the canvas
2. Connect them with directed arrows
3. Specify events, actions, expressions for each model
4. Add a trigger node to start the workflow

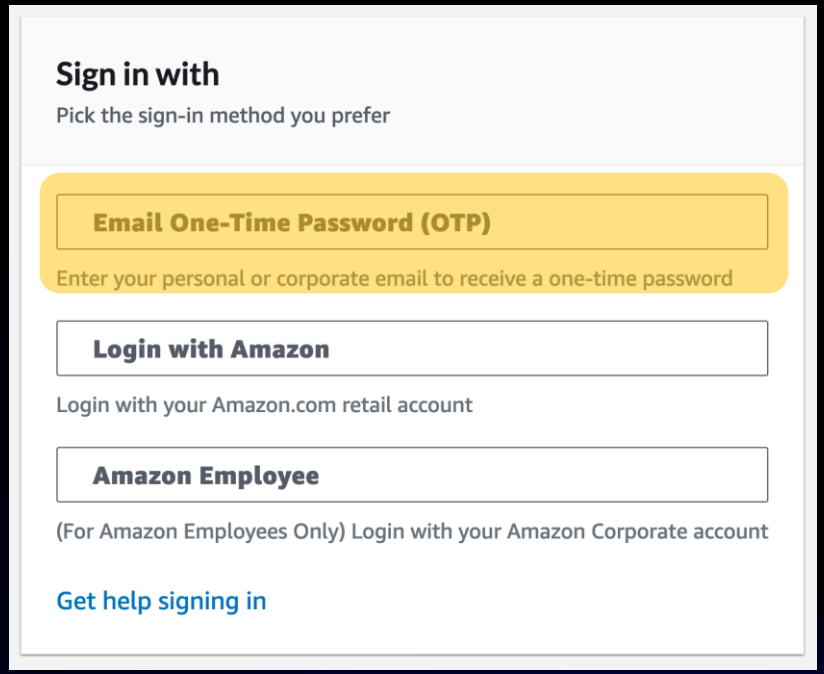


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Workshop access

- https://dashboard.eventengine.run
- Event Hash: 8120-105af34a74-6a





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Let’s get started!

Navigate to the link below for the workshop guide

https://bit.ly/3mzrDl4

Event Hash code

https://dashboard.eventengine.run

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AWS IoT Analytics primer

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AWS IoT Analytics – primer

AWS IoT Analytics is a service that processes, enriches, stores, analyzes, and visualizes IoT data for manufacturers and enterprises



Collect

Collect only the data you want to store and analyze

Process

Convert raw data to meaningful information

Store

Store device data in time-series data store for analysis

Analyze

Get deeper insight into the health and performance of assets

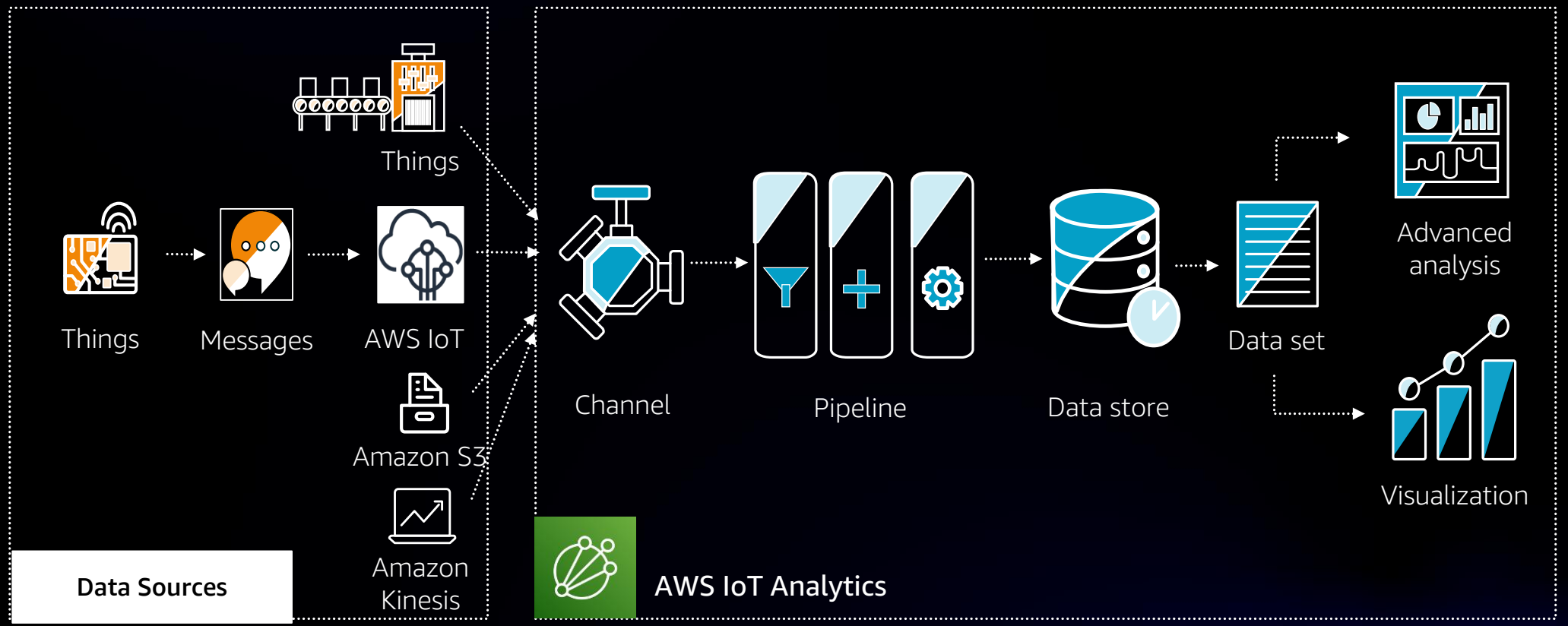
Visualize

Quickly visualize your IoT datasets

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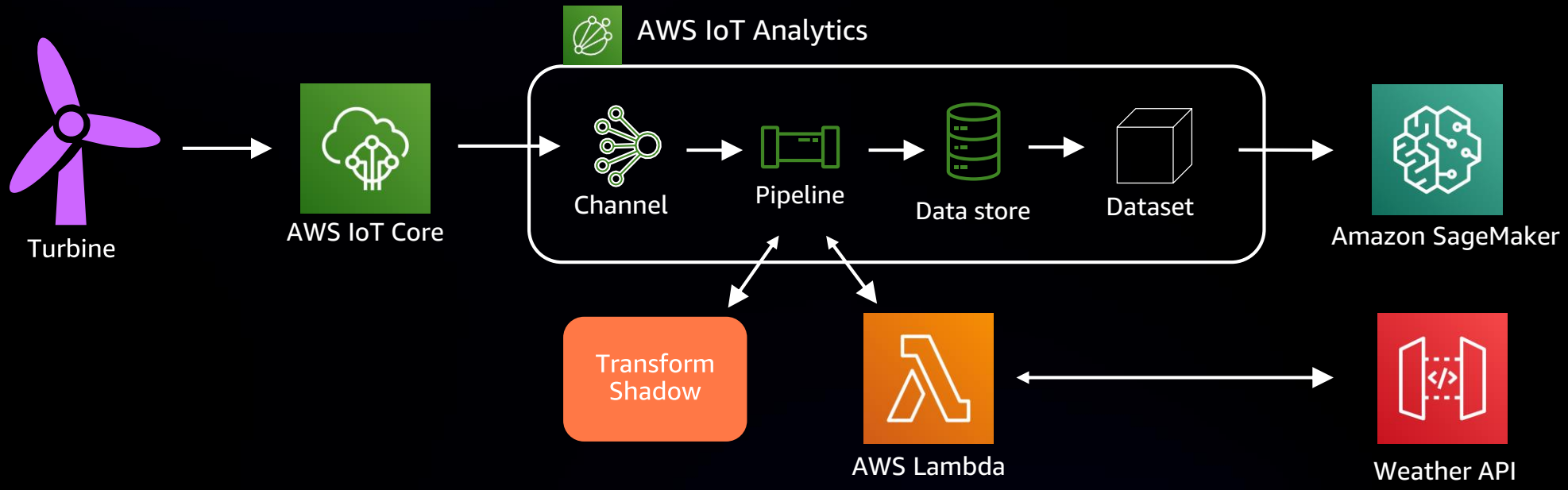
AWS IoT Analytics components

Fully managed service with pre-built ML model templates to process, enrich, store, and analyze IoT data



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Workshop architecture – AWS IoT Analytics



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AWS IoT Events primer

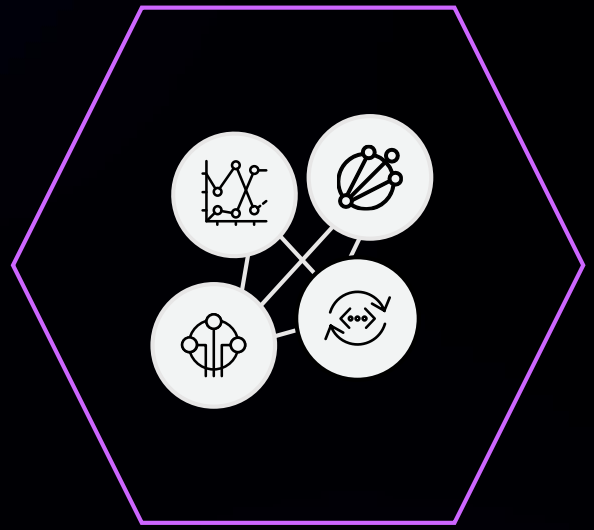
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AWS IoT Events – Primer



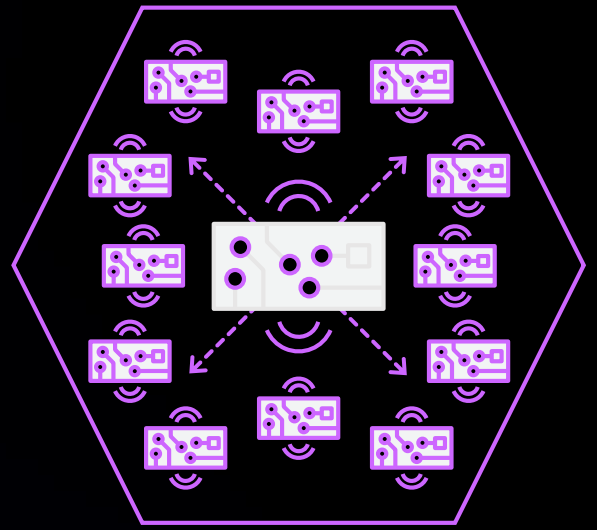
Event detector models

Reduce the cost of device maintenance



Integration with analytics tools and other AWS services

Uncover new insights



Scalability

Easily automate operations

aws

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Send data to AWS IoT Events inputs

- AWS IoT Events receives new data on a designated input
- The input defines all or a subset of the data from a JSON payload
- AWS IoT Core rules engine supports passing data to a AWS IoT Events input
- Inputs are later used when defining logic that transitions states in an AWS IoT Events detector model

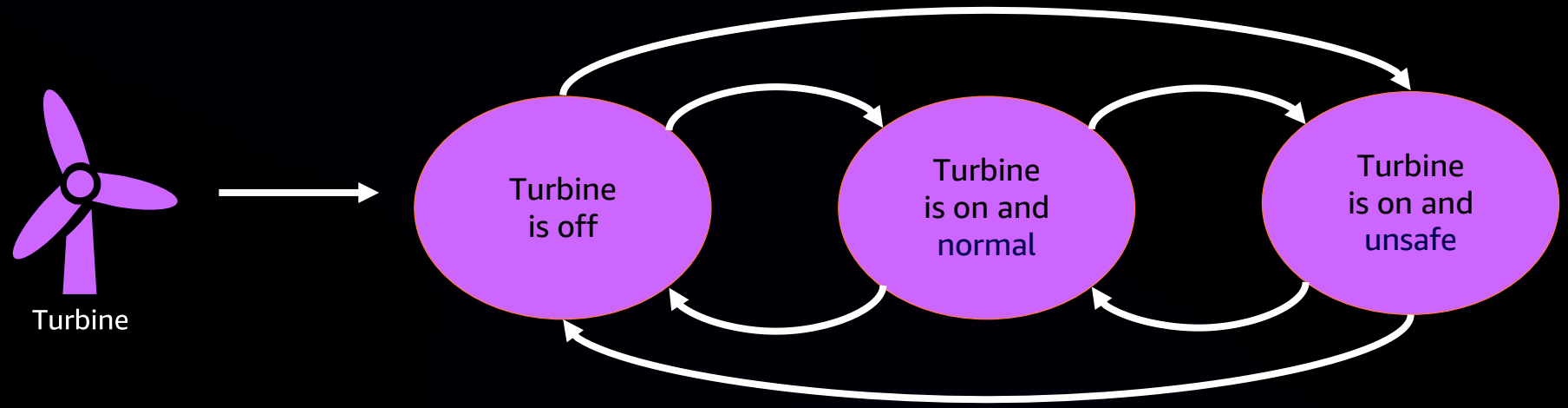
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Define detector models that manage state

- Detector models define various states that an IoT device can be in
- Every message received on an input can trigger an expression to be evaluated
- Trigger logic you define controls when a state change occurs
- State changes allow for actions to be taken like sending a message on a MQTT topic or Amazon SNS topic

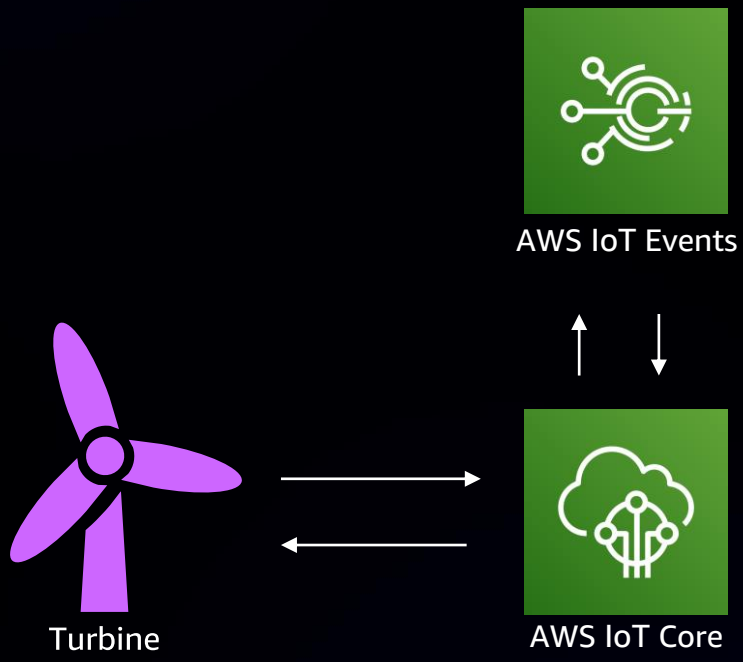
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Workshop – Detector model



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Workshop architecture – AWS IoT Events



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It’s time for the race!

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Race rules

- Toggle your virtual turbine to use the “Race”-generated wind. This is required for your data to be counted in the race
- Turbine power will not be counted if the vibration levels are unsafe for a message report
- The race will be 4 minutes long
- The winning team will have generated the most aggregate power over the 4-minute race

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Thank you!

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