Critical manufacturing
an ASM PT company

Connect IoT - Learning Path

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Connect IoT - Learning Path

Overview

An equipment integration combines MES configuration, a driver for each piece of equipment, and workflows that decide what happens with each value. Each of these parts is easy to build and easy to get subtly wrong, and most mistakes only show at run time.

This learning path orders the Connect IoT tutorials for an integrator: an automation engineer who builds and maintains integrations and knows the equipment and its protocols, but is new to Connect IoT. Each step names the tutorial to complete, what you can do afterwards, and a few questions to check yourself before you move on. At the end, you can design, build, test, and troubleshoot an integration that connects equipment to MES.

Info

For the entities and tasks used throughout the path, see Automation and Tasks.

Learning Path

Step 1: Basic Configuration

Complete Connect IoT - Basic Configuration Tutorial. Read Create the Setup Workflow for the setup chain each driver needs, and How to: Configure Each Machine from MES when one controller serves several machines. Afterwards, you can create the protocol, driver definition, and controller of an integration, connect an instance to an entity, and see its driver reach `Communicating`.

- Which process runs the workflows, and how does a task reach the equipment?
- In which order do you create the objects of an integration?
- Which tasks does the Setup workflow chain for each driver, and what answers the setup phase?
- How does a changed connection parameter reach a driver that is already `Communicating`?

Answers

Step 2: How Values Travel

Complete Connect IoT - How Values Travel Tutorial. Afterwards, you can predict when a Data Flow task runs, which values it reads, and what it keeps between runs.

- What makes a Data Flow task run?
- What does a Data Flow task keep from one run to the next?
- Why does a handler for overlapping occurrences belong in Control Flow?
- What is the difference between an output that emits `null` and one that emits `undefined`?

Answers

Step 3: Control Flow in Depth

Complete Connect IoT - Control Flow in Depth Tutorial. Afterwards, you can build handlers that branch, loop, and recover from failures, and reuse logic in functions and subworkflows.

- How does a task read the output of another task?
- Where do you write an expression?
- Which operators combine two conditions?
- What surrounds work that may fail, and what does the catch-all receive in Control Flow?
- When does a Data Flow subworkflow run?

Answers

Step 4: One Protocol Tutorial

Complete the tutorial of the protocol your equipment uses: SECS/GEM Integration Tutorial, Connect IoT - Raw File and CSV Tutorial, Connect IoT - OPC UA Tutorial, Connect IoT - MQTT Tutorial, Connect IoT - REST Client and Server Tutorial, or Connect IoT - TCP/IP Tutorial. Afterwards, you can configure a driver for real equipment, declare its properties, events, and commands, and read, react, and write from a workflow.

- How do you choose the driver for a piece of equipment?
- How does a workflow reach the equipment?
- Whose role does `connectionMode` or `mode` describe?
- Which outputs do you link on equipment tasks?
- Where does equipment work start in the connection lifecycle?

Answers

Step 5: Talking to MES

Complete Connect IoT - Talking to MES Tutorial. Afterwards, you can call MES services and actions, answer requests from MES, and read configuration from MES.

- When do you use a system action, and when a message bus subject?
- How do you name the inputs of Execute Service Call?
- What does a reply task send when the answer is `0` or `false`?
- How many tasks answer one request?

Answers

Step 6: Timing and State

Complete Connect IoT - Timing and State Tutorial. Afterwards, you can schedule work, wait, set deadlines, and keep values and per-item state between occurrences.

- Which task fits a period, a moment, a pause, and a deadline?
- What type must an interval have when it arrives on a Data Flow link?
- What activates a Synchronize?
- What happens when you retrieve a value whose expiration passed?
- Which stored values survive a restart?

Answers

Step 7: Writing a Code Task

Complete Connect IoT - Writing a Code Task Tutorial. Afterwards, you can decide when a Code task is the right tool, write and test it, and handle its failures.

- What do you check before you write code?
- What belongs in a Code task, and what does not?
- Where does the code keep a value between runs?
- How does the code report a failure?

Answers

Step 8: Troubleshooting and Anti-Patterns

Read Troubleshooting by Symptom, Workflow Anti-Patterns, and Connect IoT Runbook. Afterwards, you can diagnose a failing integration from its symptoms, avoid the designs that cause failures, and operate running instances.

- Where do you look first when an integration misbehaves?
- How do you tell that a task never ran?
- How do you confirm that a change reached a running instance?
- What does a restart start again, and what does it lose?

Answers

Next Steps

Start with Connect IoT - Basic Configuration Tutorial. To extend the same integration step by step, continue with Connect IoT - Intermediate Configuration Tutorial, Connect IoT - Advanced Configuration Tutorial, and Connect IoT - Control Flow Configuration Tutorial, and enable the scenarios of MES with Connect IoT - MES Interoperability Scenarios Tutorial.

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