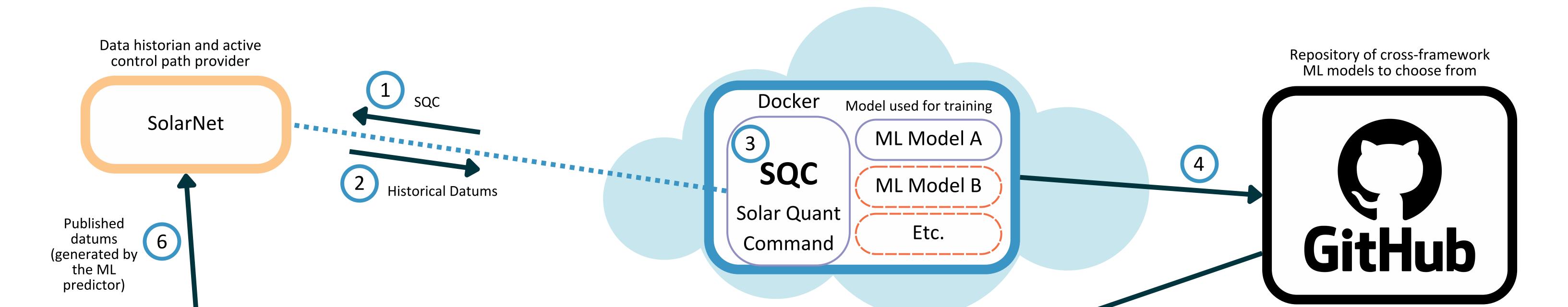
# Using Open-Source Software to Drive Down Soft Costs and Unlock **Innovation in Asset Management**

# **Open Source Machine Learning to DER Asset Management Application Framework**



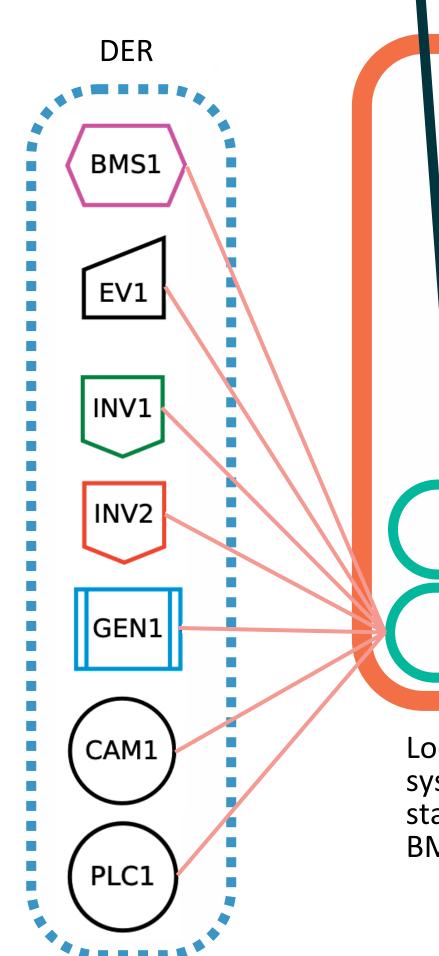
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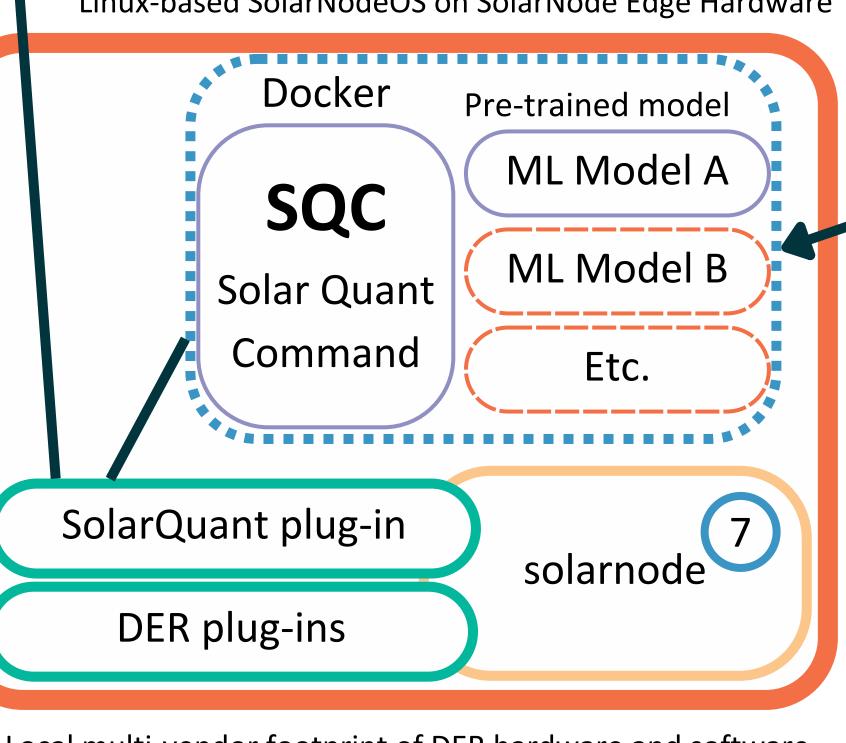
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Local multi-vendor footprint of DER hardware and software systems: inverters, kWh meters, pyranometers, weather stations, weather services, tariff services, charge controllers, BMS, BESS, EV charging stations, PLCs

#### Linux-based SolarNodeOS on SolarNode Edge Hardware

## PROCESS

Solar Quant Command (SQC) requests specified raw data from SolarNet

Historical datums and project specific metadata downloaded for training

Trained using user's preferred ML tools and techniques (e.g. TensorFlow or PyTorch)

4 Training ML model published

SolarQuant plug-in on grid edge device runs the trained model inside docker container

Published datums generated by the predictor

Predicted values produce actionable information via local logic, leading to multiple control actions on local DER hardware and local software systems

# **Benefits for Asset Management**

- Concurrent Heterogeneous DER Data Persistence Plugin Framework allows for expansion
- Plugin Framework supports generations of hardware Interoperability saves time and stress
- Allows for data synthesis new metrics
- Modular DERMS reduces required footprint and costs
- Grid Edge Intelligence means forwarned
- No License Fees when building new products
- Well tested libraries across industry implementations integrate with hardware and Software system concurrently

- Extremely Network Topology Flexible
- Super Durable Solutions packaged as Projects for sale Commercial-Off-The-Shelf (COTS) makes components fungible
- Decimates costs for Service-Oriented Business Models Support all major brands of DERs from one place
- "Swiss-Army-Knife" of DAS hardware, software configurable **Comprehensive Remote Access means fewer truck rolls DER configurations** remotely backed up and restored (S3)
- Investors love OSS : lower internal dev, maintenance costs

# SolarNode SolarQuant 😚 OSGi C spring n python`

# **Energy-Focused Open Source**

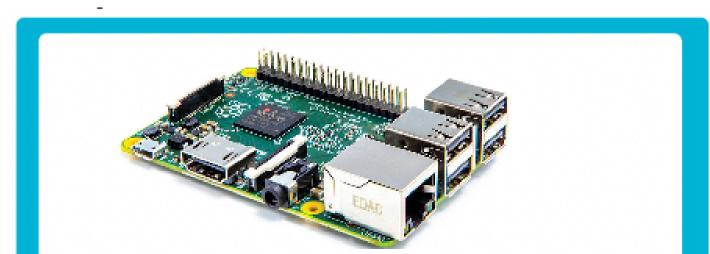
Frameworks & Libraries



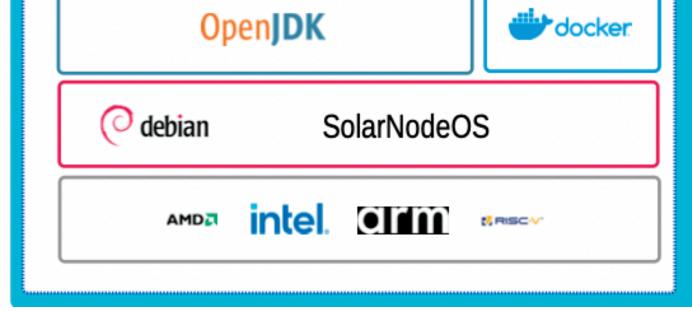
#### **Supported Protocols and Data Models**

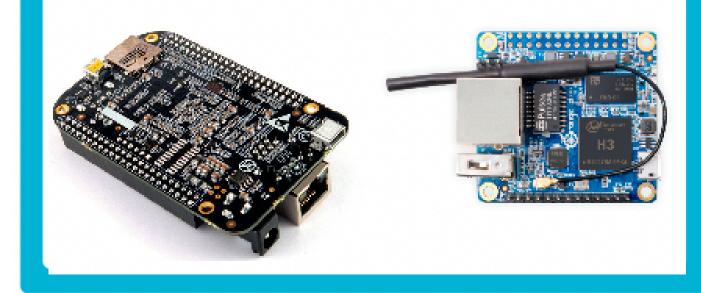


## **Common SBC Hardware**



## SolarNode Client Edge Gateway Stack





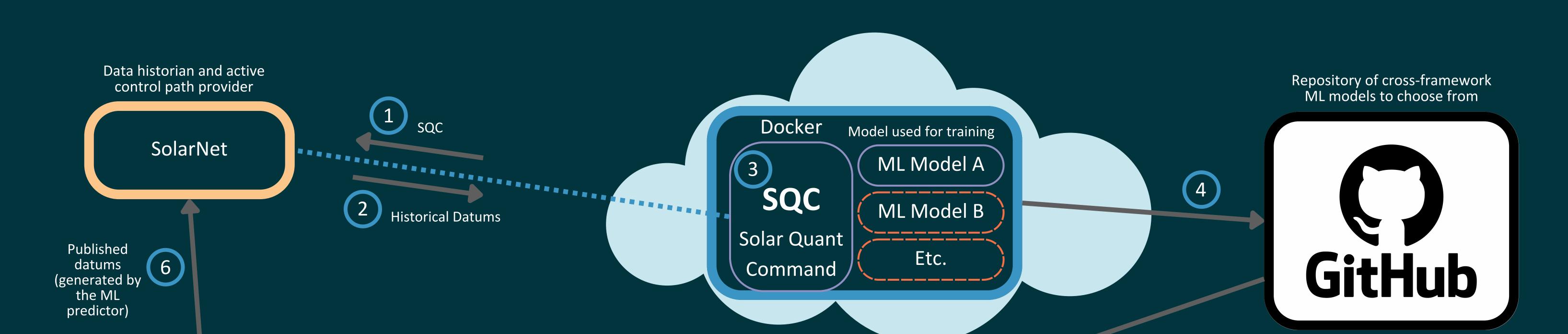
## **Ecogy Energy**

#### www.ecogyenergy.com

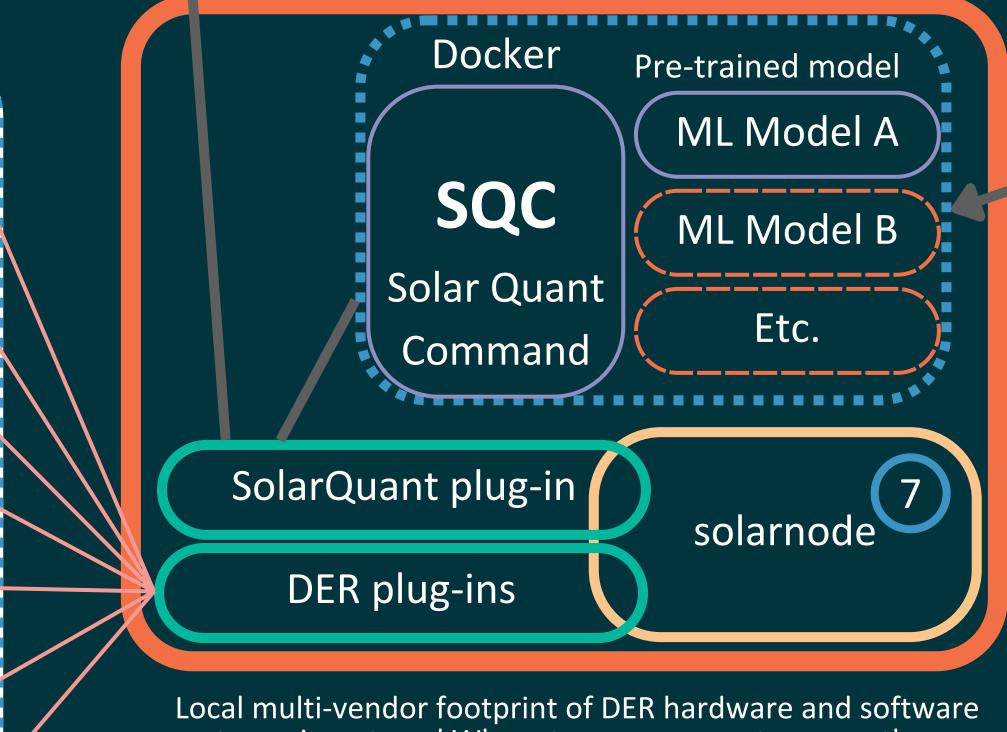
#### September, 2023

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DER

BMS1

EV1

INV1

INV2

GEN1

CAM1

PLC1

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# SolarNode Client Edge Gateway Stack

	SolarNode	SolarQuant
	🗞 OSGi 🛛 🥏 spring	Python <sup>*</sup>

# **Energy-Focused Open Source**

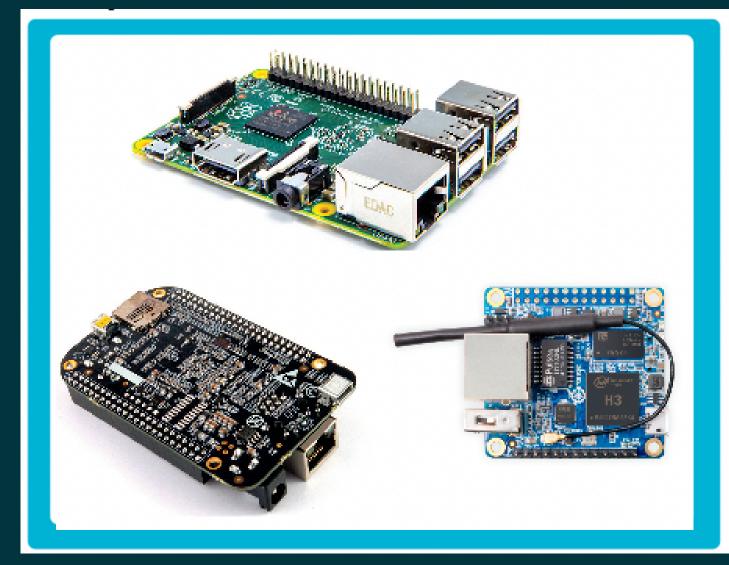
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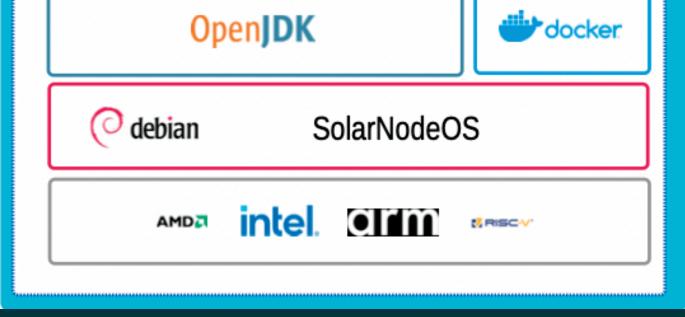


#### **Supported Protocols and Data Models**



### **Common SBC Hardware**







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