



## EICON AI

*Edge Computing. Bring your AI algorithms to the data, not vice versa.*

*Manage your AI algorithms in the Cloud, execute them 'at the Edge'.*

Built on an instance of **EICON REACH** (for more detail, please see below), **EICON AI** enables AI algorithm owners to manage their algorithms in the Cloud while managing their execution 'at the edge', i.e., in the Healthcare setting.

A multitude of issues and complexities are resolved by using this architecture. Algorithm management – versioning, updates, etc. – is simplified; data pre-processing and data workflows can be easily configured and adapted; and, most importantly, data never need to leave home since the algorithm is executed adjacent to the data source, thus avoiding all issues/concerns associated with sending PHI into the Cloud.

### **Key Features:**

- The AI algorithm is fully managed in the EICON REACH HUB (in the Cloud)
- All data preprocessing and algorithm-related workflows are fully configured on the EICON REACH HUB
- The EICON REACH CAN, i.e., the remote module on which the algorithm will be executed, is configured on the HUB
- The CAN is deployed adjacent to the data source
- Once the CAN has been deployed, it operates independently of the HUB. (Nonetheless, it is worth noting, the HUB retains the ability to alter the CAN configuration at any time).
- Data flow from the data source to the CAN, to the AI algorithm, and results are returned to the data source (or, as appropriate, to a connected PACS endpoint)
- Notes on Technology:
  - All components of this solution are containerized (Docker)
  - Comprehensive Security
  - Regulatory Compliance
  - All user actions and data transformations are captured in an audit trail, stored and available for review on the EICON AI HUB
  - Full control over communication model – configurable to allow workflow and process requests to originate from HUB or from CAN. (This is an important security consideration).
  - Version control and updates seamlessly managed

### **Key Benefits:**

- Computing at the Edge – a model for the future. The separation of algorithm management from algorithm execution and the high level of configurability in EICON AI makes this an extremely scalable solution that can easily be adapted for enterprise-level adoption of AI-based capabilities to match evolving developments in medical imaging AI.

- Performance. While providing full control over AI algorithm workflows, the EICON AI architecture optimizes algorithm execution – shortens the data round-trip from source to algorithm and of results back to source.
- Data security and privacy. Source data never leave the hospital network. Consequently, data de-identification is not required and any concerns relating to inadvertent release of PHI beyond the secure hospital network are obviated.

**Flowchart – EICON AI Overview**

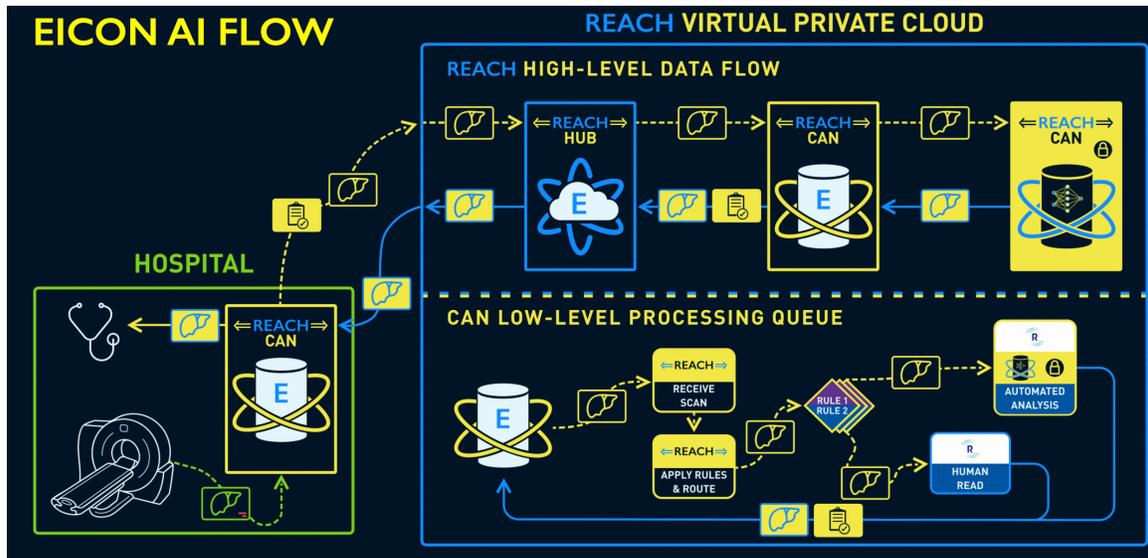


Figure 1 EICON AI Flowchart

**Processing Steps Overview per Flowchart:**

1. SET UP: REACH HUB sits in the EICON Cloud or Client Virtual Private Cloud (VPC)
2. SET UP: REACH Clinical Access Node (CAN) is deployed from HUB to the Hospital, provisioned with algorithm and workflow rules. [CAN checks regularly with HUB for workflow updates]
3. Workflow:
  - a. Scan originates on the machine and is automatically routed to the CAN
  - b. CAN executes workflow steps that may include preprocessing data, then executes algorithm, receives results, processes results.
  - c. CAN sends status and audit trail to HUB

**UNDERLYING TECHNOLOGY**

**EICON REACH** provides Cloud-based control over remote environments with minimal intrusion and maximum flexibility. All workflows, configurations, rules, business and technical processes are maintained in the Cloud in a single, consistent, extensible

library. Control and execution of these processes on remote client environments is managed from a Cloud-based Control Module.

**Design Goals:** Maximize versatility, configurability and extensibility; minimize complexity for the user; simplify deployment; strong security; scalability.

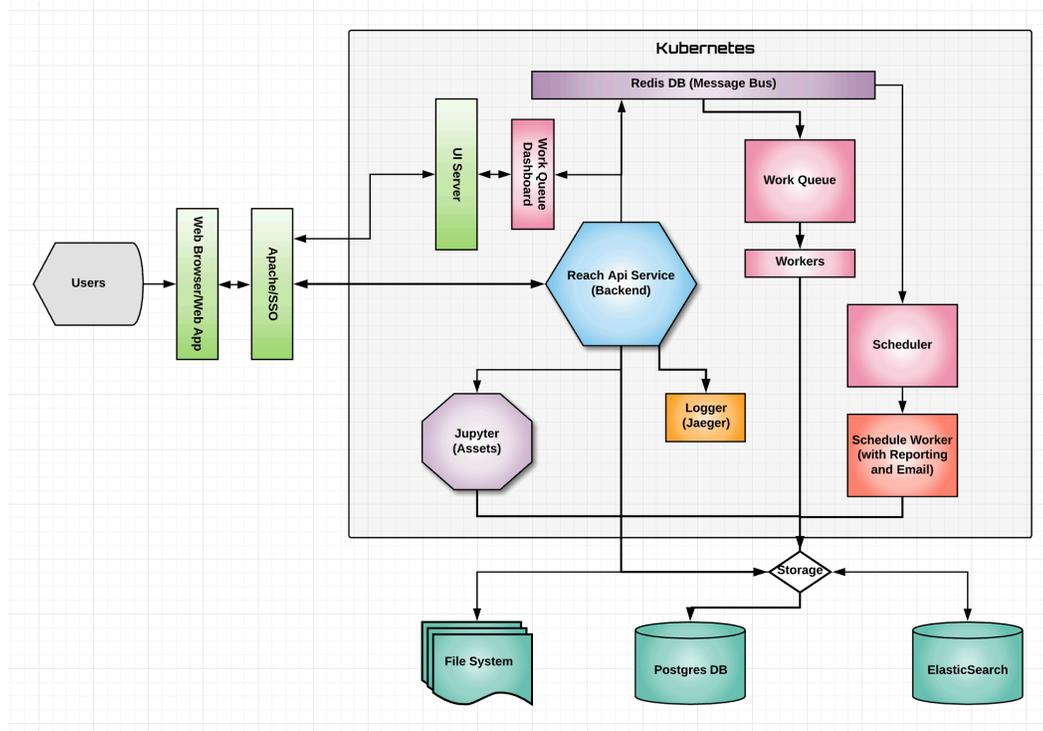
**Overview / Key Components:** EICON REACH consists of three major components:

1. A library of assets (Jupyter Notebooks) for configurations, workflows, rules, dataflows, business/technical processes, etc., which are created, stored and managed in the Cloud
2. A containerized Cloud-based Control Module (HUB) for each customer, and
3. Any number of Communications/Access Node (CAN) containers, i.e., remote clients.

A secure API is used for all communication between HUB and CAN.

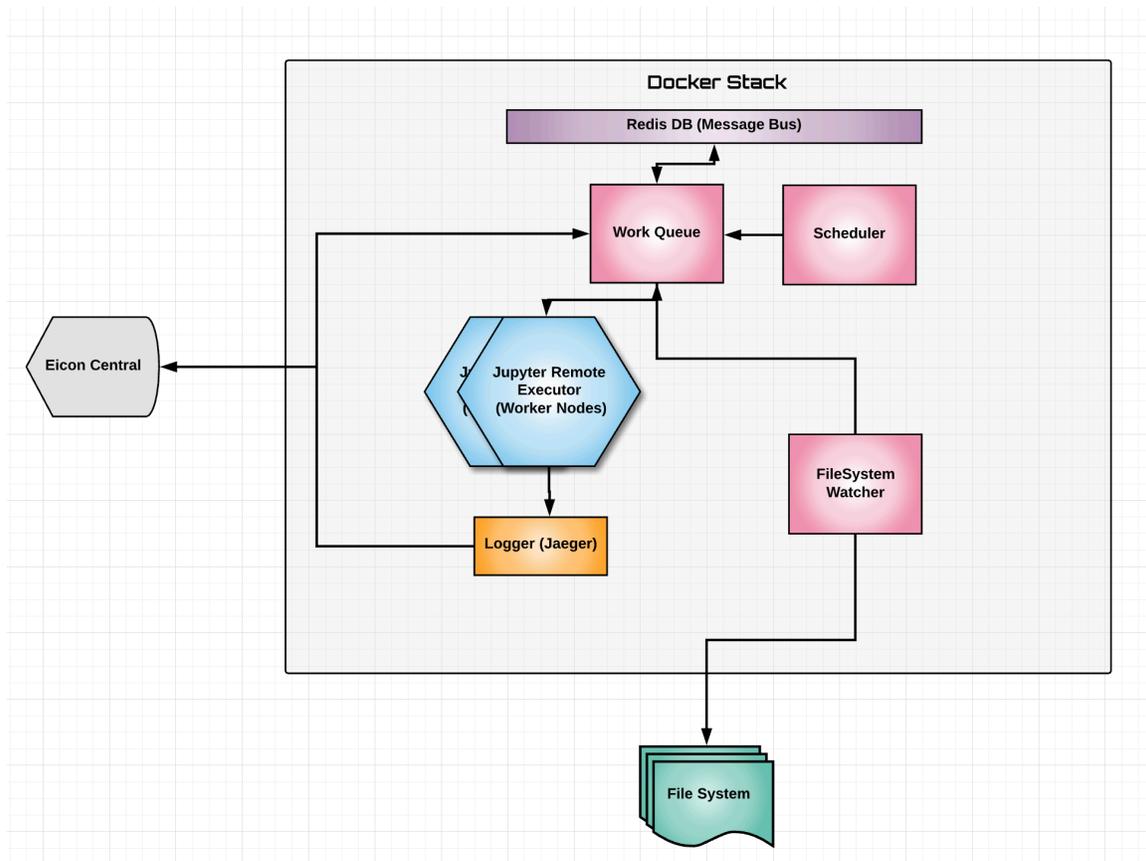
The HUB has access to all assets in the central store and is used to configure CANs, download CANs to target environments, associate assets with CANs, and manage the execution of assets on CANs.

**EICON REACH Control Module (HUB)**



**EICON REACH Communications/Access Node (CAN)**

Here is the architecture for a single CAN. There will typically be more than one, possibly many, CANs associated with each Control Module/HUB.



### **Additional Notes**

- The Remote Communications/Access Node (CAN) is designed to be minimally “smart”. Its purpose is to receive and execute instructions from the HUB. This enables us to model and manage the remote CAN’s behavior without changing anything on the CAN itself.
- At present, configurations, workflows, transformations, rules, etc. are set up in Jupyter Notebooks. In the future, there may be some exceptional situations that require a particular capability on the CAN that is not configurable on the Cloud environment. This will need to be included as part of the CAN Docker image.
- CAN-based activity, logs and audit trail are communicated back to the HUB from the CAN and stored in an ElasticSearch repository.
- A CAN’s access to the local file system is controlled in the docker-compose configuration.