



Equipment Management for Sensor Networks: Tracking Physical Infrastructure and Actions and Linking to Observational Data

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The Problem

Networks conducting long term monitoring using *in situ* sensors need the functionality to track physical equipment as well as deployments, calibrations, and other actions related to site and equipment maintenance. The observational data being generated by sensors are enhanced if direct linkages to equipment details and actions can be made. This type of information is typically recorded in field notebooks or in static files, which are rarely linked to observations in a way that could be used to interpret results. However, the record of field activities is often relevant to analysis or post processing of the observational data.



Web Interface

The web interface is deployed using Python Django and d3.js and uses the database as the underlying structure.

1. Site visits are created with calibrations, deployments, and other actions added as nested actions related to the site visit. The action type determines which attributes are necessary.

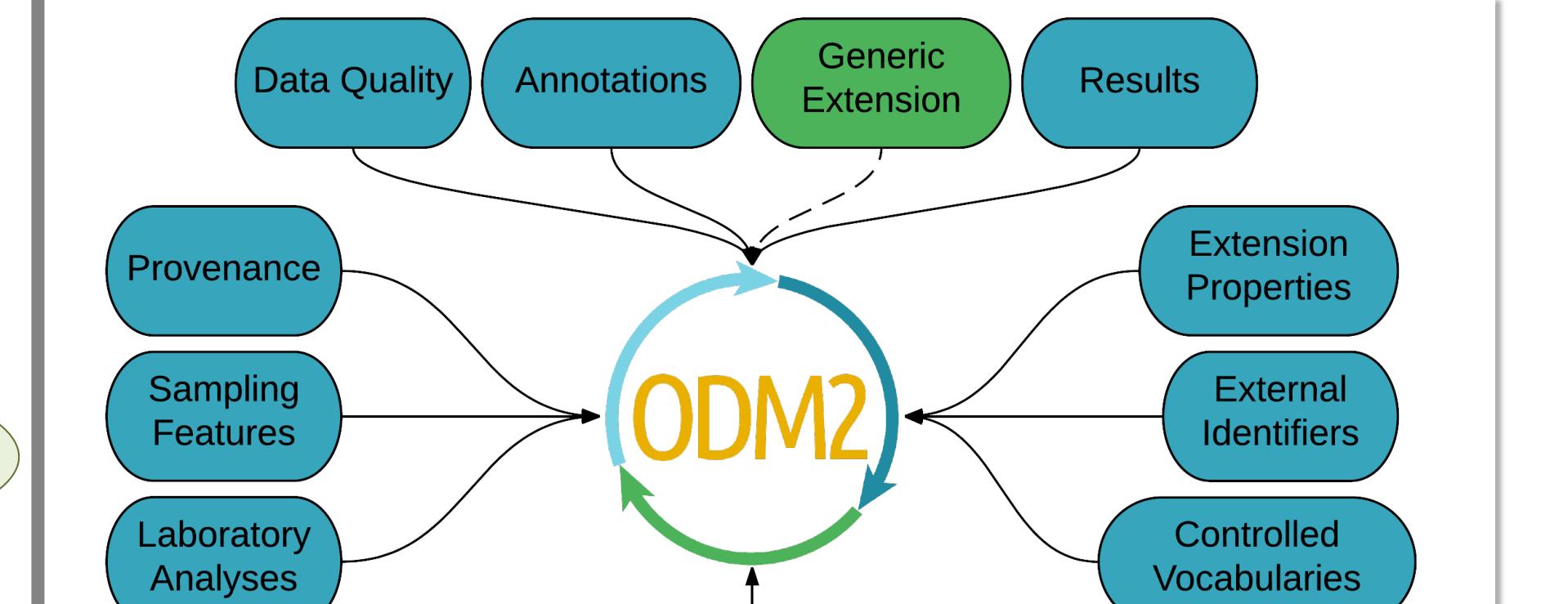
2. Site visit details and related actions can be queried and reviewed.

3. Deployment and calibration histories can be viewed by site.

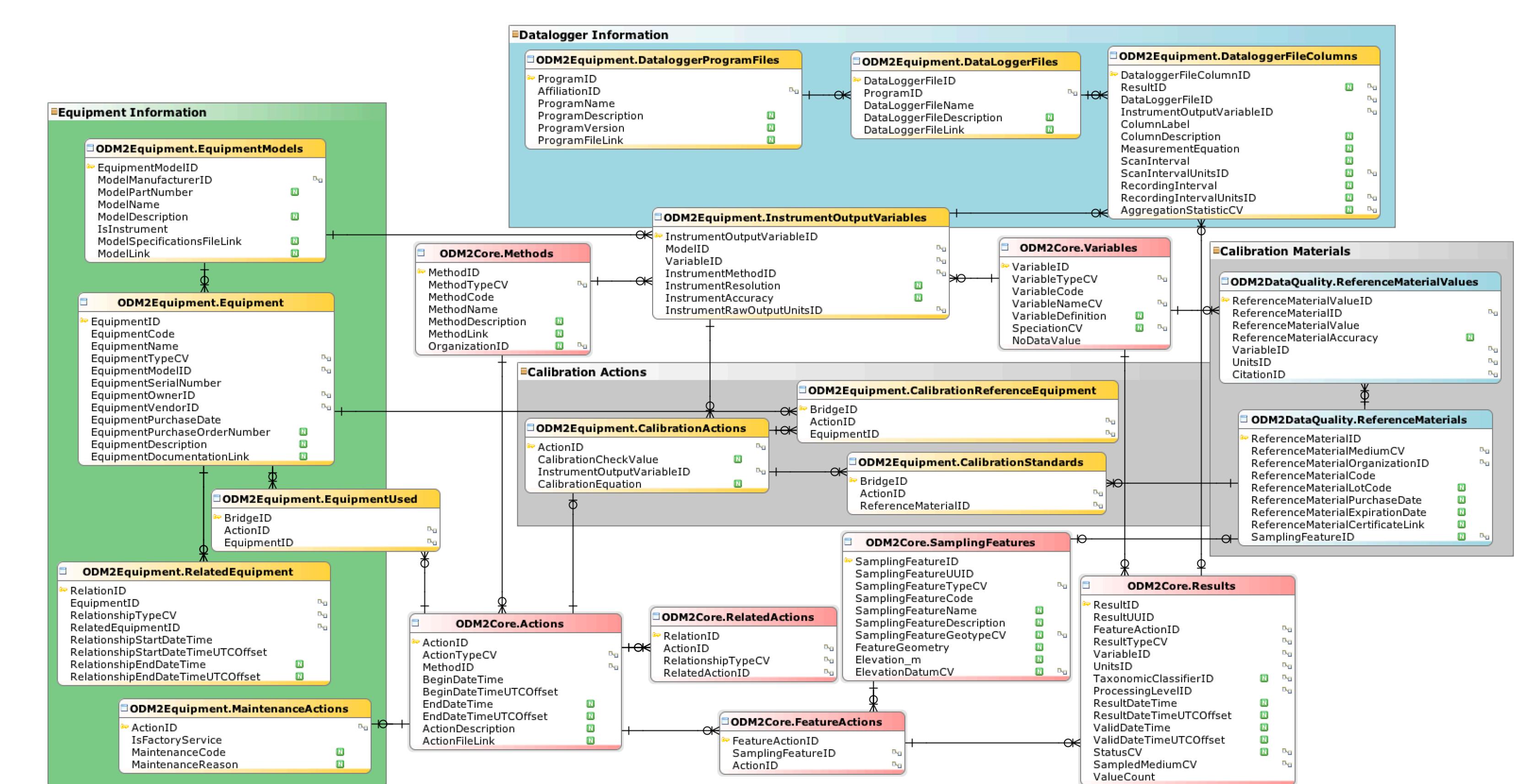
4. The full equipment inventory can be searched with detailed views for each piece of equipment.

5. Deployment and calibration histories can be viewed for each piece of equipment.

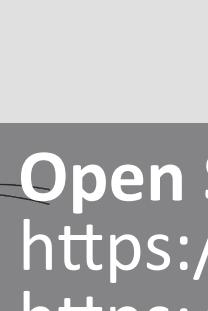
Schema Development



- The Equipment schema was designed as an extension to Version 2 of the Observations Model (ODM2).
- ODM2 is a community-developed information model for spatially discrete, feature-based earth observations.
- ODM2 consists of core entities to describe location, observed variable, and timing of observations including representation of Actions and Results.



6. For each instrument deployment, one or more result records are created, linking physical infrastructure to observations.



Open Source Code Repositories:
<https://github.com/ODM2/ODM2>
<https://github.com/UCHIC/ODM2Sensor>

Implementation

These tools have been deployed for the iUTAH (innovative Urban Transitions and Aridregion Hydro-sustainability) ecohydrologic observatory. Benefits include the ability to track a variety of environmental sensors across institutions, maintaining a consistent record despite personnel changes, and a reference for performing quality control on observational data. We anticipate linking observing infrastructure to observational data will be useful for similar large-scale and long-term networks. See <http://data.iutahepscor.org>.

