

An Algorithm, Implementation and Execution Ontology Design Pattern

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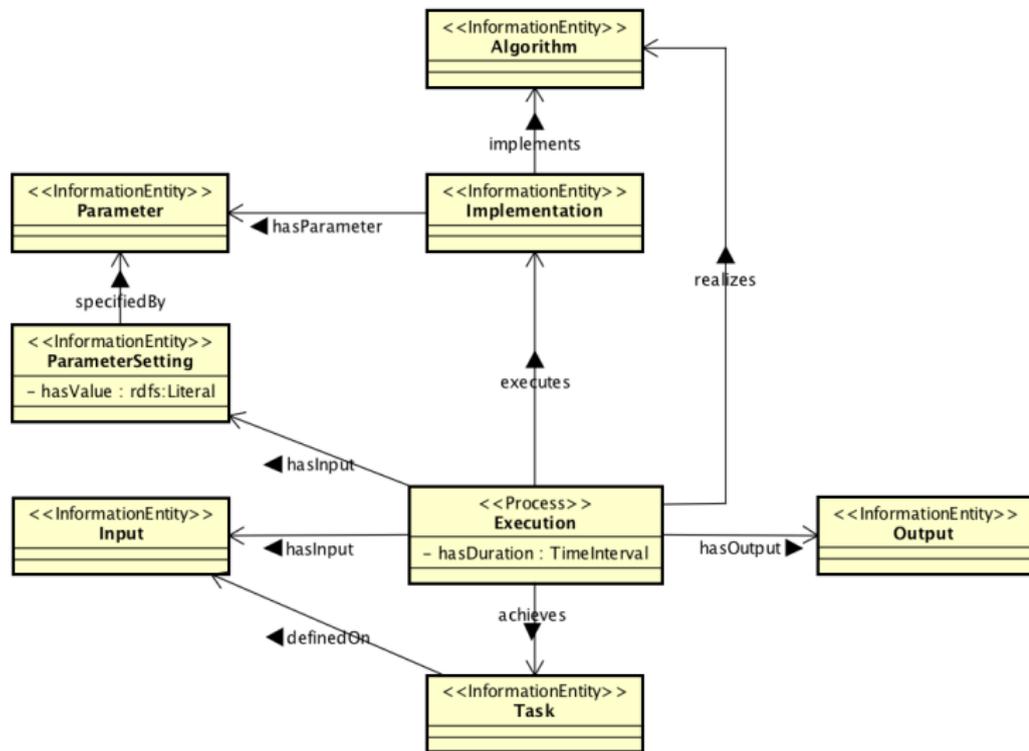
MLSchema

The intent of the design pattern is to model algorithm specifications, their implementations and executions. This includes also the parameters of implementations, settings of these parameters for a specific execution, as well as the inputs that the execution consumes (e.g., data) and the outputs it produces (e.g., models, reports).

Competency questions

- ▶ Which algorithm is implemented by this implementation?
- ▶ What are the implementations of this algorithm?
- ▶ Which implementation is executed?
- ▶ What are the parameters of this implementation?
- ▶ What are the parameter settings of particular parameters in this execution?
- ▶ What is the input to this implementation execution?
- ▶ What is the output produced by this implementation execution?
- ▶ What algorithm does this execution realize?
- ▶ What task does this execution achieves?
- ▶ What is the duration of this execution?
- ▶ What are the inputs this task is defined on?

An Algorithm, Implementation and Execution ODP

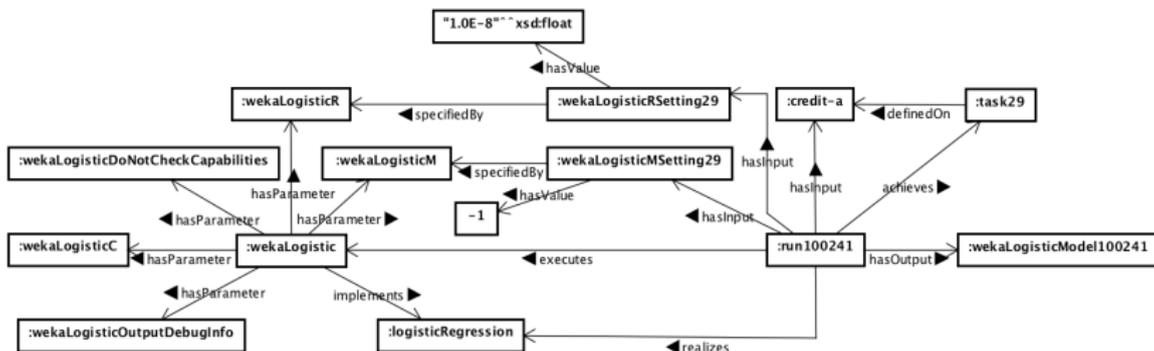


Pattern formalization

Algorithm \sqsubseteq InformationEntity
Implementation \sqsubseteq InformationEntity
Implementation \sqsubseteq \exists implements.Algorithm
Implementation \sqsubseteq \exists hasParameter.Parameter
Execution \sqsubseteq Process
Execution \sqsubseteq \exists hasInput.ParameterSetting
Execution \sqsubseteq \exists realizes.Algorithm
Execution \sqsubseteq \exists achieves.Task
Execution \sqsubseteq \exists hasDuration.TimeInterval
Parameter \sqsubseteq InformationEntity
ParameterSetting \sqsubseteq InformationEntity
ParameterSetting \sqsubseteq \exists specifiedBy.Parameter
ParameterSetting \sqsubseteq \exists hasValue.rdfs : Literal
Input \sqsubseteq InformationEntity
Output \sqsubseteq InformationEntity
Task \sqsubseteq InformationEntity
Task \sqsubseteq \exists definedOn.Input
 $\top \sqsubseteq \forall$ hasInput.Input
 $\top \sqsubseteq \forall$ hasOutput.Output

Example scenario: Machine Learning Domain

The scenario deals with an ML task realization based on an example derived from the OpenML portal.





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MACHINE LEARNING SCHEMA COMMUNITY GROUP

This group represents a collaborative, community effort with a mission to develop, maintain, and promote standard schemas for data mining and machine learning algorithms, datasets, and experiments. Our target is a community agreed schema as a basis for ontology development projects, markup languages and data exchange standards; and an extension model for the schema in the area of data mining and machine learning. The goals of this group are: To define a simple shared schema of data mining/ machine learning (DM/ML) algorithms, datasets, and experiments that may be used in many different formats: XML, RDF, OWL, spreadsheet tables. Collect use cases from the academic community and industry Use this schema as a basis to align existing DM/ML ontologies and develop more specific ontologies with specific purposes/applications Prevent a proliferation of incompatible DM/ML ontologies Turn machine learning algorithms and results into linked open data Promote the use of this schema, including involving stakeholders like ML tool developers Apply for funding (e.g. EU COST, UK Research Councils, Horizon2020 Coordination and Support Actions) to organize workshops, and for dissemination

Note: Community Groups are proposed and run by the community. Although W3C hosts these conversations, the groups do not necessarily represent the views of the W3C Membership or staff.

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name

ML Schema Core Specification

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