

Large-scale Use and Exchange of Classification Rules in the Maritime Industry

Position paper for the W3C Workshop on Rule Languages for Interoperability

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1 Introduction

In this paper, we choose to focus our attention on a few issues that we mean deserve particular attention, but there is no intention from our side of making this list exhaustive.

2 Interest

The international maritime industry is governed by strict international regulations managed by the International Maritime Organization (IMO). Maritime operations are inherently dangerous, with potentially very damaging consequences in terms of loss of lives, environmental consequences and economic loss. Operating at the highest levels of safety in a very competitive industry requires that ships are built, operated and managed in accordance with best practices systematically accumulated in a wide range of fields over many years. At the same time, the maritime business is inherently international, so the industry has always recognized that the best way of improving safety at sea is through international regulations. International regulations state that in order for a vessel to be operated commercially, it must have certain certificates. Such certificates are issued by the ship classification societies in order to ensure that vessels, throughout their entire lifecycle, are built, maintained and operated in strict adherence with the safety regulations and best industry practices. Thus, within the maritime industry, the ship classification societies have a special responsibility for managing risk in implementing the safety regulations through systematic application of ship classification rules. Furthermore, they do continuous improvement of these rules through in-depth engineering analysis and systematic gathering and analysis of operational experience. The tools used for this purpose are computer-based.

Up until now, ship classification rules have, apart from including mandatory IMO rules, to a large extent been managed by each individual ship classification society. Recently, three international ship classification societies, ABS, Lloyds's Register and DNV, have joined forces to develop a common, unified set of ship classification rules (<http://www.jtprules.com/>) that will ensure that new ships are built in accordance with common standards.

DNV Software (<http://www.dnv.com/software/>), an independent business unit in DNV (<http://www.dnv.com>, <http://www.dnv.com/maritime>), delivers software to the maritime industry that supports ship building and operation based on best engineering practices and ship classification rules. Our next generation software aims at, as far as possible, externalizing the ship classification rules from the applications using them. It is in DNV Software's interest to support mix-and-match of our applications with non-DNV rules. Similarly, it is in DNV's interest to be able to supply DNV rules to other software vendors in a standard, vendor-neutral format.

Our motivation for participating in a rule language standardization process lies in that we need rule format based on industry standards that supports exchange of rules and applicability of rules across different applications. Furthermore, we would like to participate in the process in order to ensure that the rule format either supports our representation needs directly or is sufficiently extensible for us to be able to make domain-specific extensions.

3 Position

In this section, we identify a number of issues that we mean deserve close consideration.

3.1 Use cases

Although we recognize the limitations of scope inherent in the Call for Participation, we advocate that a set of use cases that spans the entire life cycle of a set of rules should be identified early in the process and carried through in order to ensure that the resulting standard supports the appropriate representation needs, either directly or through extensibility hooks. We would like to propose use cases as well as participate in the sessions exploring them.

3.2 Manageability of large sets of rules

The ability to properly manage large sets of rules (of the order of tens of thousands) is of key importance. Flexible means of physical organization of rule sets as well as constructs for logical organization, categorization and indexing of rules are needed.

3.3 References, scoping

Means of logical organization, e.g. through a hierarchical namespace mechanism, are needed in order to provide logical structure as well as avoiding naming conflicts.
References between a

3.4 Rule versioning/Life cycle issues

Rules and sets of rules must have version information that allows authoring tools as well as execution environments to select appropriate rules. As an example from the ship classification domain, different vessels may be classed according to different versions of the same rule sets, depending on the time they were first classed. Status/maturity level of individual rules or rule sets is needed.

3.5 Authoring/documentation issues

It should be possible to provide documentation in the form of inline text for individual predicates, rules and rule sets. Additionally, it should be possible to add any number of external references. Inline documentation or external references should be stored in a recognizable form that allows external tools to easily extract it. This would be useful for documentation purposes as well as for providing online help to users.

3.6 Typed variables and type mapping

References to external data through named variables should be supported. Typing of these variables should be possible, but not mandatory. If typed variables are used that bind directly to external data (see next paragraph), it should be possible to map the references to the external type system to the local type reference. Type maps should be reusable in order to avoid specifying the same type mapping in different rule sets.

3.7 External data binding

In order to give the rule format maximum versatility, we need high flexibility wrt. what data can be bound and the means of data binding. The standard should specify generic adapters for binding to common data formats, such as XML, but the standard should support custom adapters that bind directly to custom data formats without the need for marshalling the data through a standard format. When

3.8 Atomic predicates

In line with the preceding paragraph; since binding to arbitrary external data should be supported, the format should allow custom atomic predicates that evaluate these data. The same way it is undesirable to marshal all application data through a common data format during rule evaluation, it is undesirable to restrict the semantics of atomic predicates to a common syntax. Although, a common expression syntax should be defined as part of the standard, the standard should allow other expression syntaxes to be used. In the case of ship classification rules, atomic predicates expressing complicated mathematical expressions are needed.

4 Background

4.1 About the author

I have worked in a number of technical roles, lead system architect, software engineer and technical specialist, in several industries and with a wide range of problem areas. I have experience from product development as well as design of custom solutions. Over the years, I have developed a number of model execution environments, including two rule execution engines. In DNV Software, I am currently responsible for rule system technologies.

4.2 DNV Software

DNV Software is an independent software vendor and reseller specialised in developing innovative software solutions for design, construction, strength assessment, risk and information management. DNV Software is serving more than 3000 clients in 55 countries.

Our goal is to support our customers working efficiently in accordance with established safety standards and best engineering practice. Supporting this goal, DNV Software has developed a specialized rule development and rule execution environment for its products and solutions.

4.3 DNV

DNV is one of the world's leading ship classification societies, and helps the maritime industry manage risk in all phases of the ship's life, through ship classification, statutory certification, fuel testing and a range of technical, business risk, financial and competency related services.