Abstract

Command and Control (C2) systems manage the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of a mission. To support automation in a C2 system, decision trees can be established to create a model where disparate data relationships can be associated to drive rule executions, which in turn drive resultant actions.

Our research resulted in the creation of an expert system decision framework to accept C2 data and to recommend the appropriate response that was flexible enough to apply to theoretically limitless situations. Our system accepts real-time data streams in JSON format which is parsed into dynamically-created classes in Java. Thus we extended a language typically known for libraries of static classes into a more flexible programming language model where classes can be created with any number and type of fields to add to the Entity object.

We introduced the Drools rule engine and its salience prioritization values to simulate a human expert by representing the importance of a rule and determining the firing order of the rules; the higher the salience of the rule, the higher its priority. Chained rules check for the existence of objects that could have been created as the result of another rule. Rules could create new Entities. The chained rule depends on this new Entity’s creation. If the Entity was created, the chained rule fired. If not, the condition did not pass, and the chained rule did not fire.

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A flexible application for any decision making scenario from nuclear submarines to restaurant emergencies, from search and rescue missions to patient diagnoses.