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Performance Analysis

Using the test cases provided, a second, more thorough analysis comparing the old Reactivity Engine (Old RE) to our new, optimized version (Opt) has been performed, with an emphasis on memory usage. Statistics for 5 to 25 rules, in increments of 5, evaluated over a period of 2 minutes, are recorded and discussed.

The 2 minute period was implemented by spawning a Timer thread which ran the STOP directive after 120,000ms. This enabled accurate timing, even when the GUI failed to respond. In Opt, a new directive was added to the grammar: “RUN n”, where n is the number of seconds to run before running the STOP directive.

Old RE was unable to function well even with only 10 rules. Though accurate data was obtained for t, Knoplerfish became unresponsive after the RUN command was given, so no further tests were performed beyond 10 rules on Old RE.

As can be seen, the number of messages per second actually decreases for Old RE after adding more rules. This is because Old RE stopped reporting data from half of the registered sensors.

Opt’s memory usage is significantly better than Old RE, consuming almost 1/3 as much memory for a comparable set of rules.

By subtracting the memory used before the RUN directive from the memory used after, the amount of memory consumed by rule evaluation process can be approximated. As can be seen, Opt consumes almost no memory for 5 rules, and increases moderately afterward, whereas Old RE uses almost all of the memory allocated to it to evaluate rules.

Opt also appears to scale well, as the amount of memory needed to evaluate rules as compared to the total memory allocated to it hovers around 30% for 15, 20, and 25 rules.