

Simple Initial Experiment

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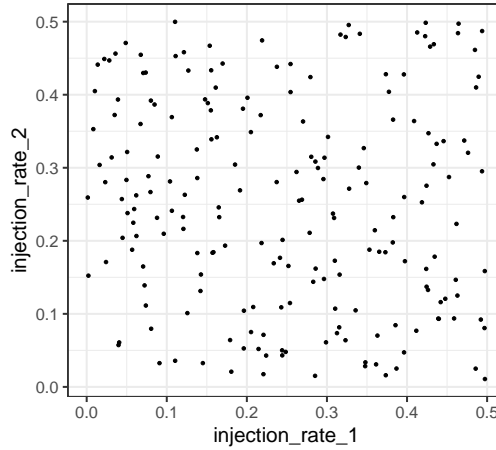
The experiment consists of changing injection rates inj_1 and inj_2 , for 2 applications in Supersim, and optimize the execution times $\mathcal{P}(inj_1)$ and $\mathcal{P}(inj_2)$. The experimental settings are:

Parameter	Value
Injection Rate 1 (inj_1)	$[0.1, 0.5]$
Injection Rate 2 (inj_2)	$[0.1, 0.5]$
Performance Metric	$\frac{\mathcal{P}_1(inj_1) + \mathcal{P}_2(inj_2)}{2}$

The interval for injection rates was limited because the simulator crashed for larger rates. The problem must be better understood to determine the proper injection rate ranges.

Low-discrepancy samples of size 20 were taken for both injection rates on the specified intervals, and 10 repetitions were performed. In total, 200 samples were measured, and the best value according to the performance metric was logged separately for each repetition.

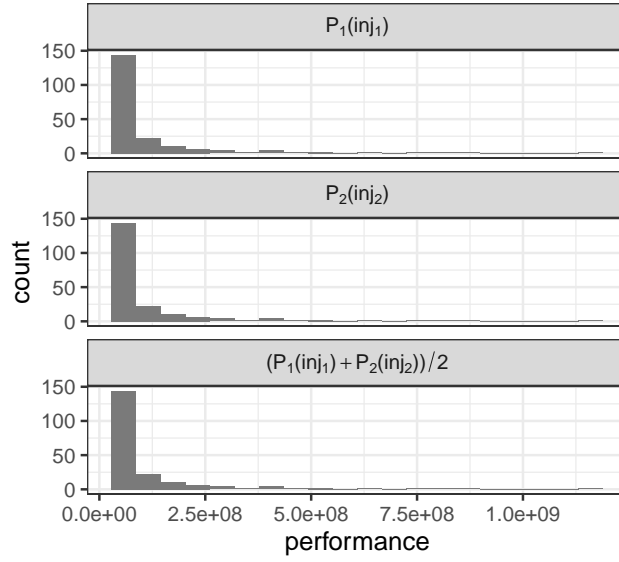
The figure below shows the injection rates, for both applications, in the 200 samples tested.



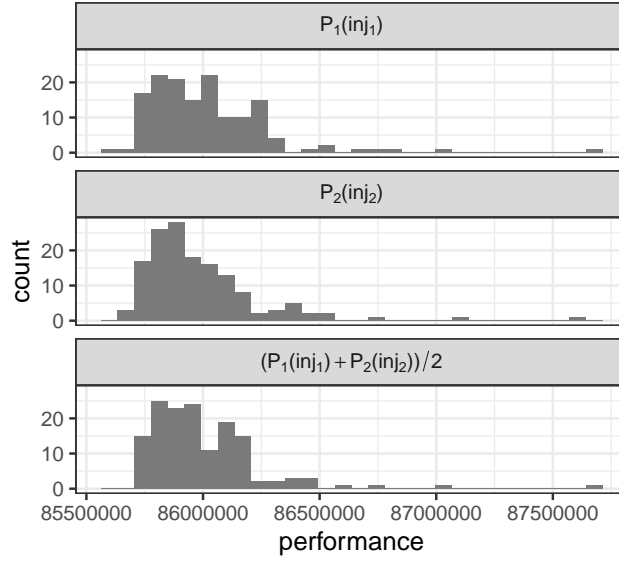
1 Initial Results

1.1 Histograms

Looking at the histograms of the performance metric and the execution times of both applications, in the figure below, we see that almost 150 of the configurations tested had performance below 10^9 .

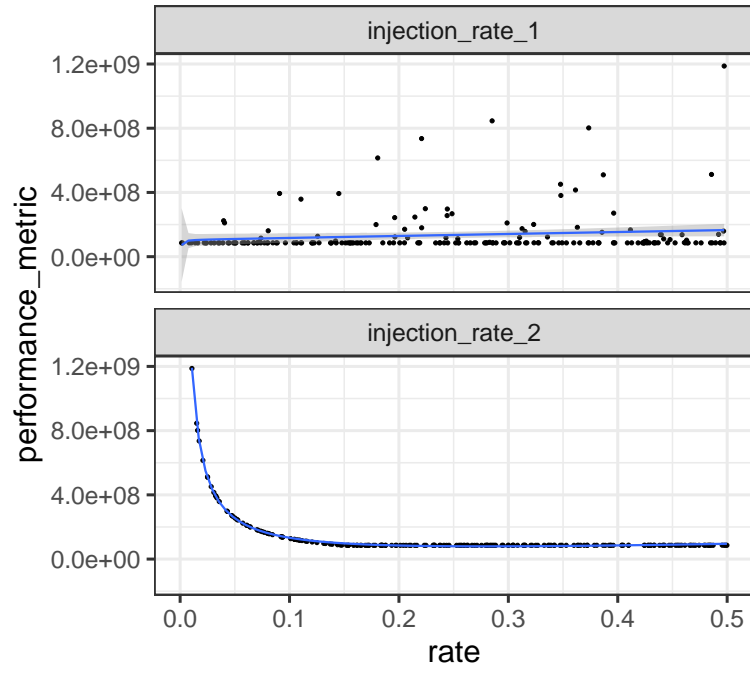


Below, we take a closer look at the lower end performance measurements.



1.2 Performance Metric and Injection Rate

We now look at the performance metric measured for each injection rate configuration. The figure below splits the values of injection rate for each application, and shows the performance metric computed using the execution times of both applications.



1.3 ANOVA and Goodness of Fit

Model Term	Significance p-value
(Intercept	2.3×10^{-6}
injection_rate_1	1.9×10^{-2}
injection_rate_2	3.8×10^{-63}
1/injection_rate_1	1.8×10^{-2}
1/injection_rate_2	8.4×10^{-261}
1/injection_rate_1×1/injection_rate_2	8.5×10^{-3}

Model Term	Significance p-value
injection_rate_1	4.3×10^{-115}
injection_rate_2	2.2×10^{-225}
1/injection_rate_1	7.2×10^{-19}
1/injection_rate_2	6.9×10^{-267}
1/injection_rate_1×1/injection_rate_2	8.5×10^{-3}