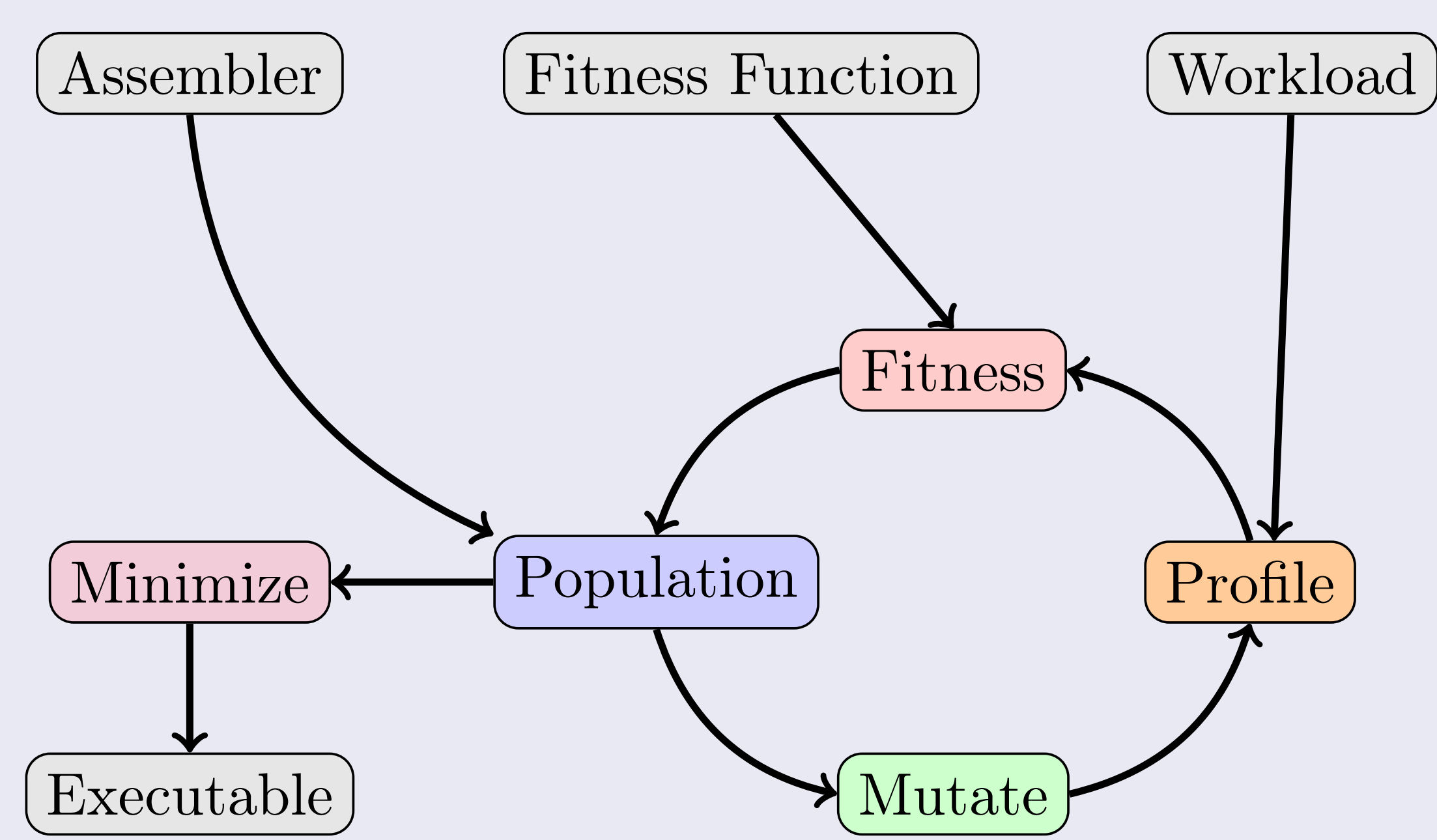
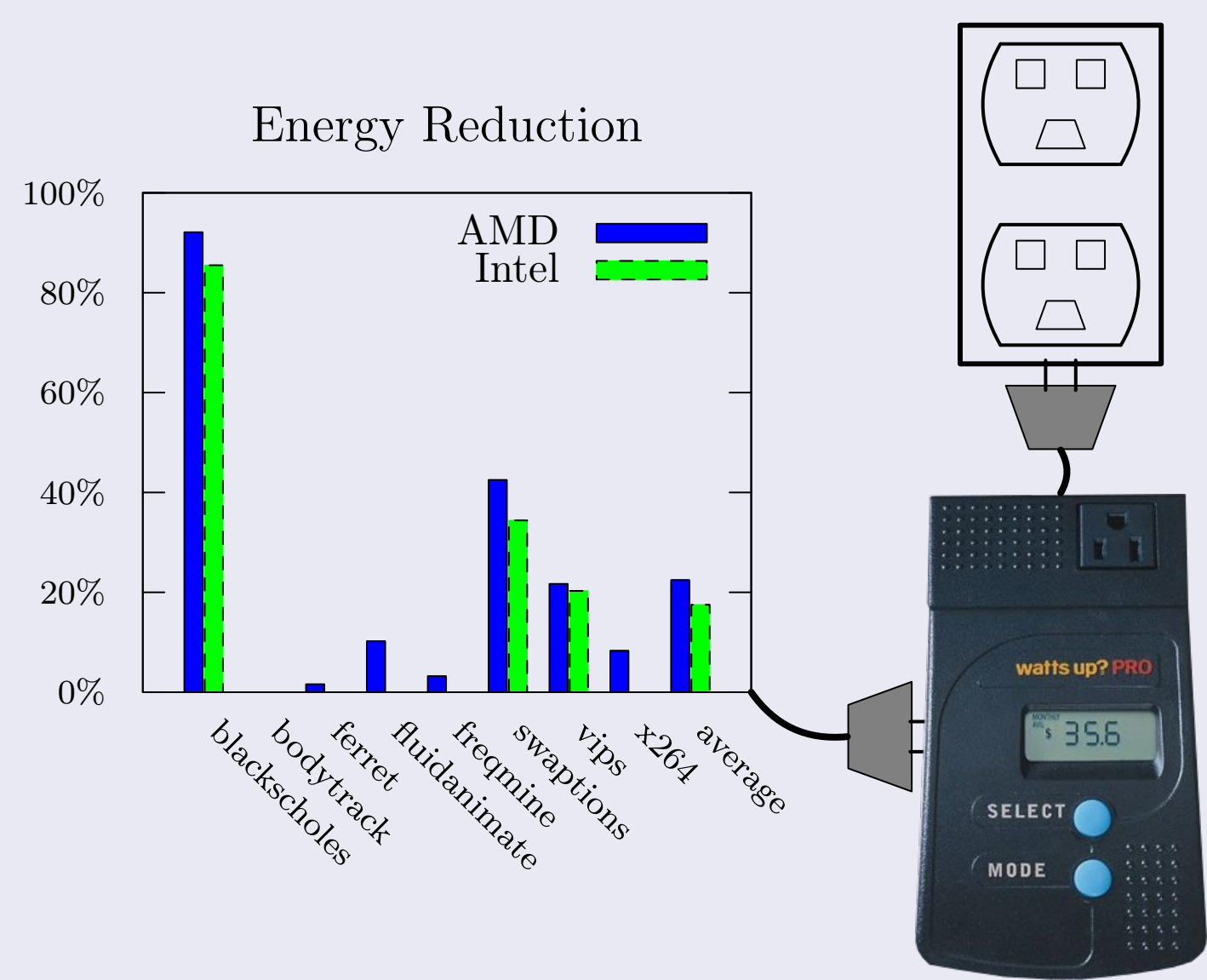


Post-compiler Software Optimization for Reducing Energy

GOA Genetic Optimization Algorithm



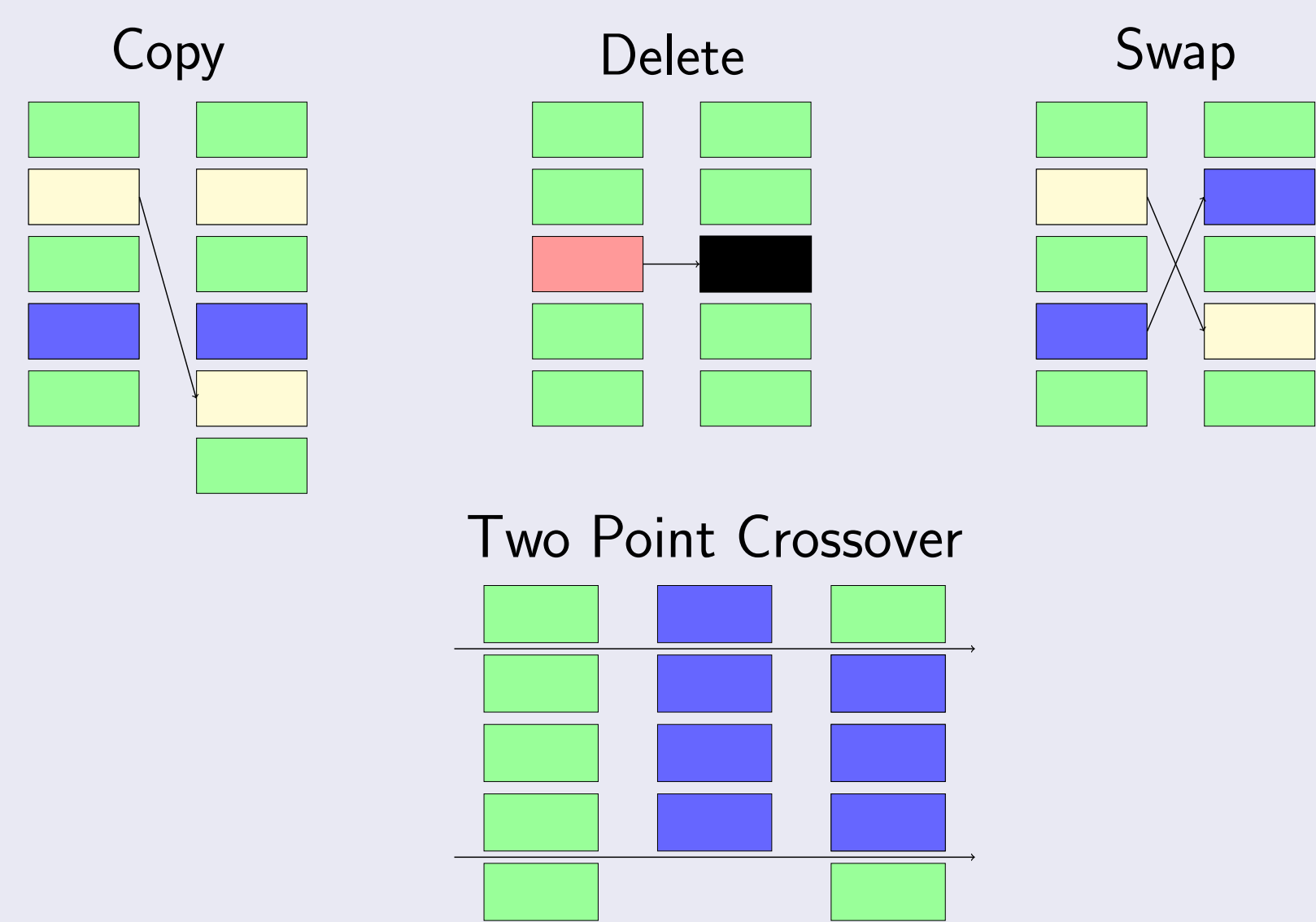
Results: Energy Reduction



Functionality on Withheld Tests

Program	AMD	Intel
blackscholes	100%	100%
bodytrack	92%	100%
ferret	100%	100%
fluidanimate	6%	31%
freqmine	100%	100%
swaptions	100%	100%
vips	100%	100%
x264	27%	100%

Mutation Operations



Energy Model

$$power = C_{const} + C_{ins} \frac{ins}{cycle} + C_{flops} \frac{flops}{cycle} + C_{tca} \frac{tca}{cycle} + C_{mem} \frac{mem}{cycle}$$

Coefficient	Description	Intel (4-core)	AMD (48-core)
C_{const}	constant power draw	31.530	394.74
C_{ins}	instructions	20.490	-83.68
C_{flops}	floating point ops.	9.838	60.23
C_{tca}	cache accesses	-4.102	-16.38
C_{mem}	cache misses	2962.678	-4209.09

Resources: Genetic Optimization Algorithm

GOA tooling

<https://github.com/eschulte/goa>

reproduce results

<https://github.com/eschulte/goa/tree/asplos2014>