

Figure 1: timing-pattern

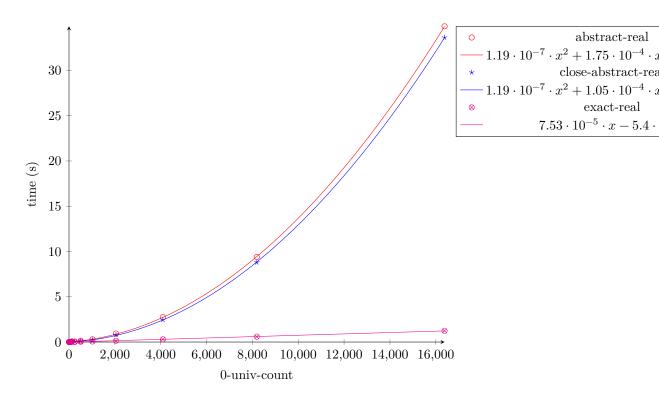


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$

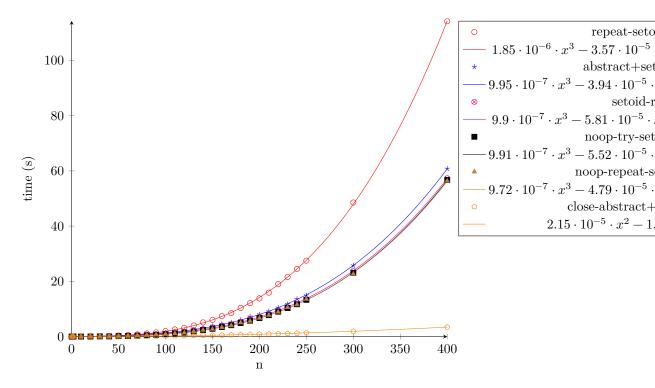


Figure 3: timing-repeat-setoid-rewrite-under-binders

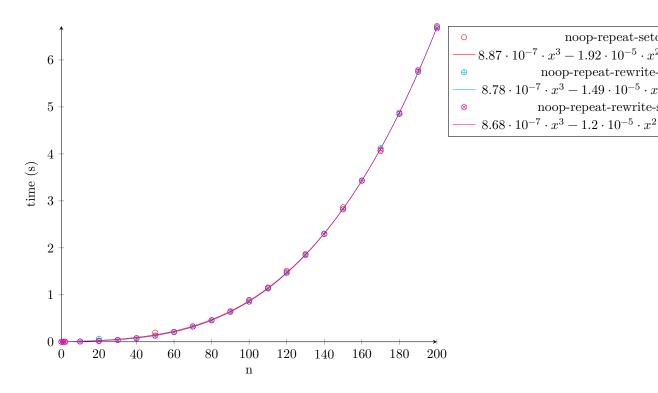
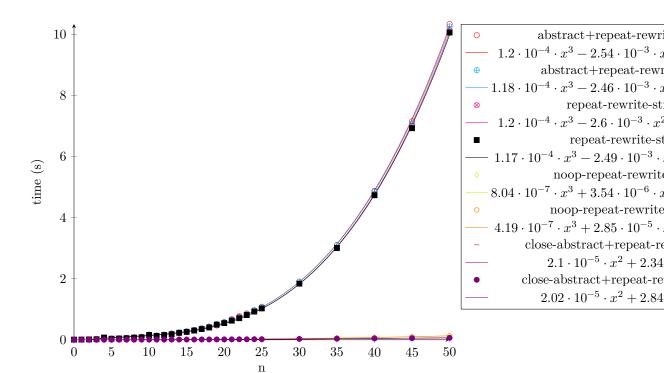
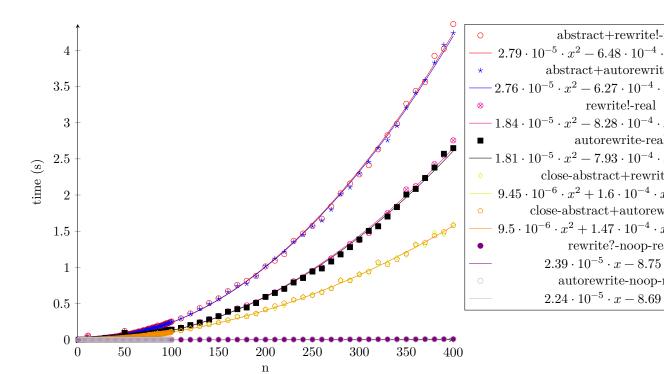


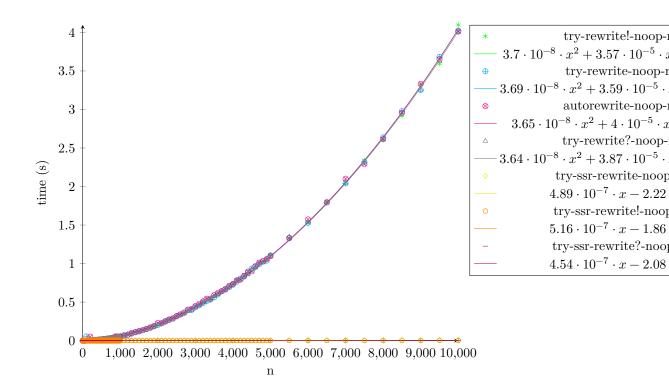
Figure 4: timing-repeat-setoid-rewrite-under-binders-noop



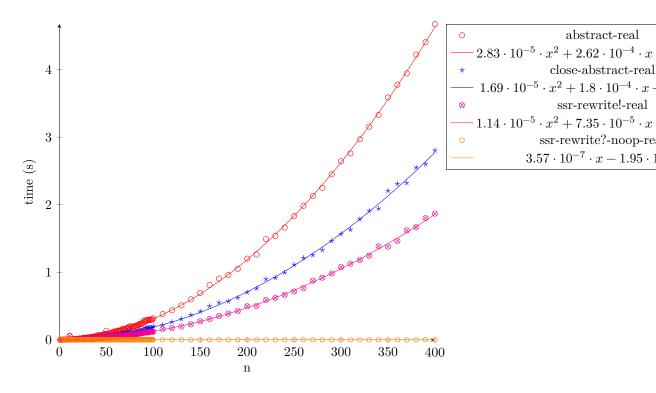
 $Figure\ 5:\ timing-rewrite-strat-under-binders$



 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$



 $Figure~7:~timing\mbox{-rewrite-repeated-app-autorewrite-noop}$



 ${\bf Figure~8:~timing\text{-}rewrite\text{-}repeated\text{-}app\text{-}ssrrewrite}$

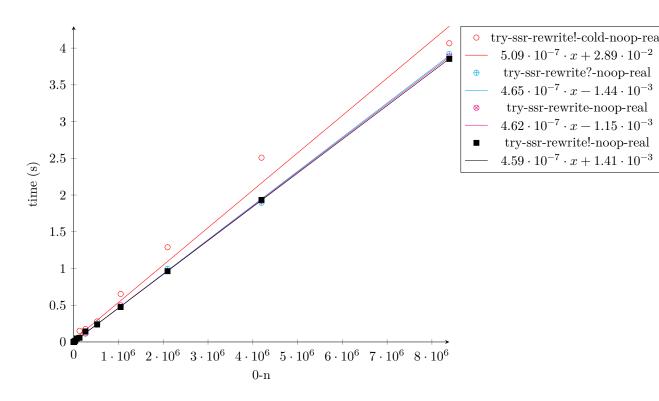
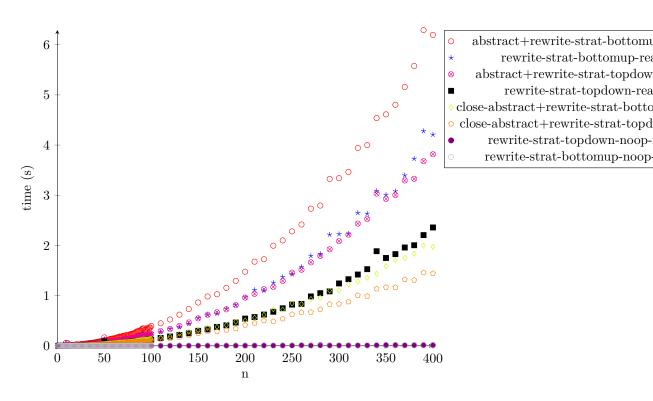


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

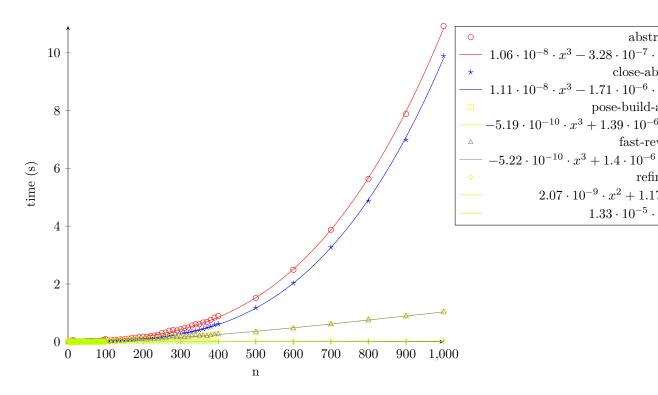


 $abstract + rewrite - strat - bottom \\ \\$ rewrite-strat-bottomup-rea abstract + rewrite - strat - topdowrewrite-strat-topdown-rea

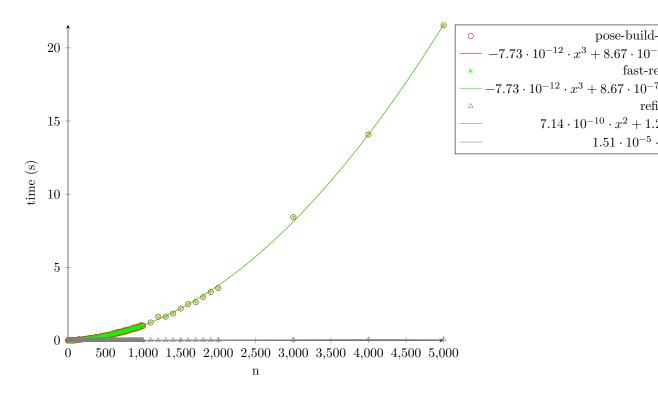
rewrite-strat-topdown-noop-

rewrite-strat-bottomup-noop-

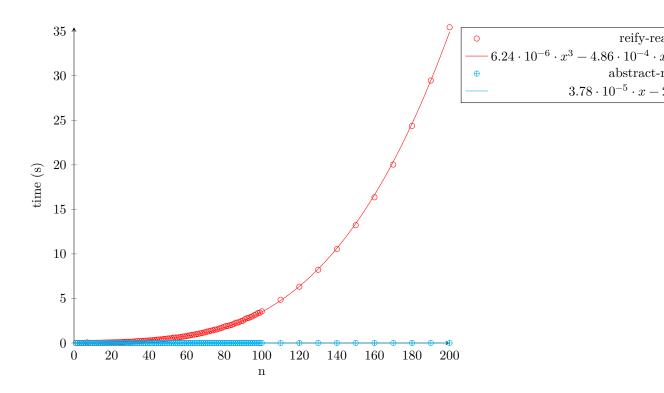
 $Figure~10:~timing\mbox{-rewrite-repeated-app-rewrite-strat}$



 $Figure~11:~timing\mbox{-rewrite-repeated-app-fast-rewrite}$



Figure~12:~timing-rewrite-repeated-app-fast-rewrite-no-abstract



 $Figure \ 13: \ timing-type class-reification-let-in-HOAS$

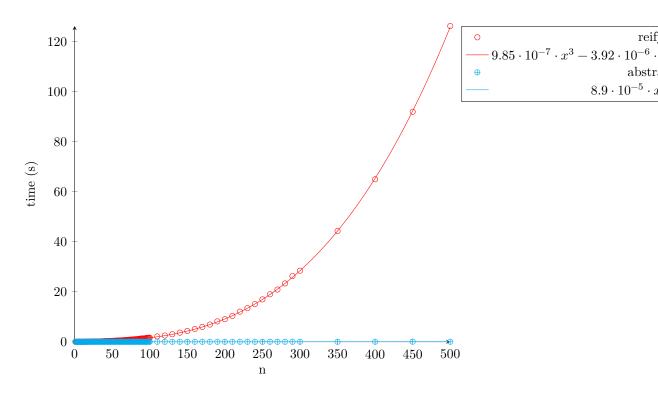
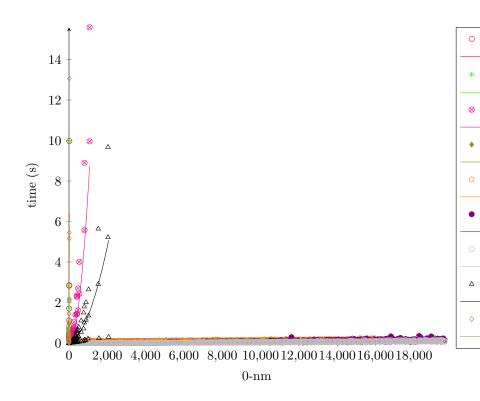


Figure 14: timing-typeclass-reification-let-in-PHOAS



rewrite-strat(topdown-bot) $6.5 \cdot 10^{-3} exp(0.46 \cdot (0.46 \cdot$

rewrite-strat (bottomup-bot 6.26 \cdot 10⁻³ exp (0.46 \cdot (

 $7.67 \cdot 10^{-6} \cdot x^2 - 1.63 \cdot 10^{-4} \cdot .$

 $2.17 \cdot 10^{-10} \cdot x^2 + 5.58 \cdot 10^{-6} \cdot$

 $1.07 \cdot 10^{-10} \cdot x^2 + 5.17 \cdot 10^{-6} \cdot$

 $2.31 \cdot 10^{-10} \cdot x^2 + 4.15 \cdot 10^{-6} \cdot$

 $1.02\cdot 10^{-10}\cdot x^2 + 3.53\cdot 10^{-6}\cdot \\$

 $1.01 \cdot 10^{-6} \cdot x^2 + 3.67 \cdot 10^{-4}$

 $-7.57 \cdot 10^{-3} \cdot x^3 + 0.24 \cdot x^2 -$

cps+cbn-real

cps+lazy-real

cps+cbv-real

cps+simpl-real

setoid-rewrite-re

cps+vm-compute-

cps+native-compute

Figure 15: timing-rewrite-lift-lets-map param-1-n 1, param-2-m 1

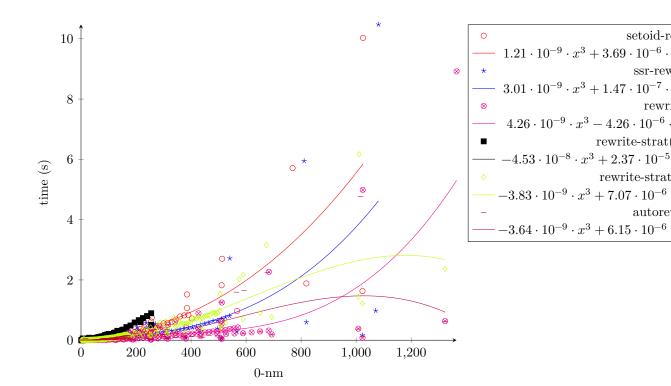
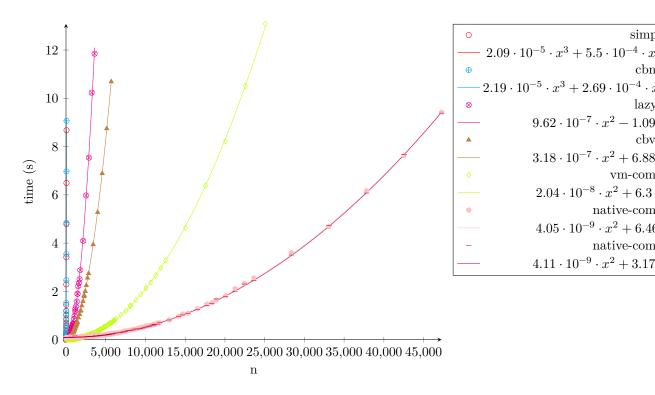


Figure 16: timing-rewrite-plus-0-tree param-1-n 0, param-2-m 1, param-3-input-size 5, param-4-output-size 3, param-5-num-rewrites 1



simp

vm-com

native-com

native-com

 $9.62 \cdot 10^{-7} \cdot x^2 - 1.09$

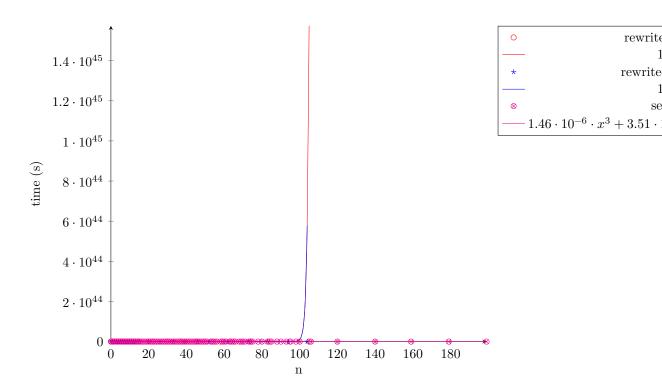
 $3.18 \cdot 10^{-7} \cdot x^2 + 6.88$

 $2.04 \cdot 10^{-8} \cdot x^2 + 6.3$

 $4.05 \cdot 10^{-9} \cdot x^2 + 6.46$

 $4.11 \cdot 10^{-9} \cdot x^2 + 3.17$

Figure 17: timing-sieve-of-eratosthenes



rewrite

Figure 18: timing-rewrite-under-lets-plus-0 $\,$

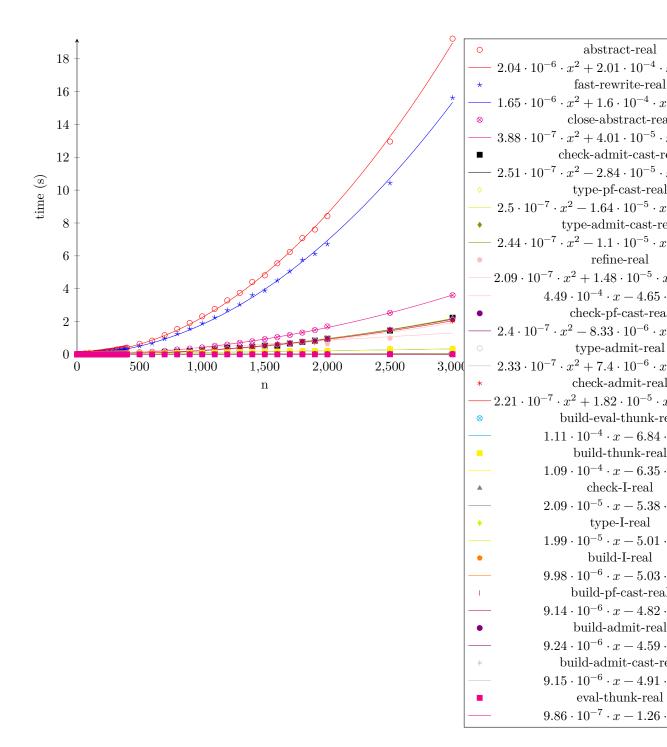


Figure 19: timing-rewrite-repeated-app-fast-rewrite-ltac2