

Figure 1: timing-pattern

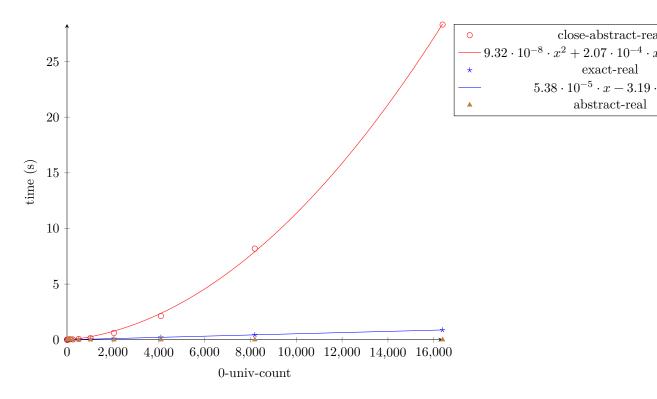


Figure 2: timing-n-polymorphic-universes param-1-n $\,0\,$

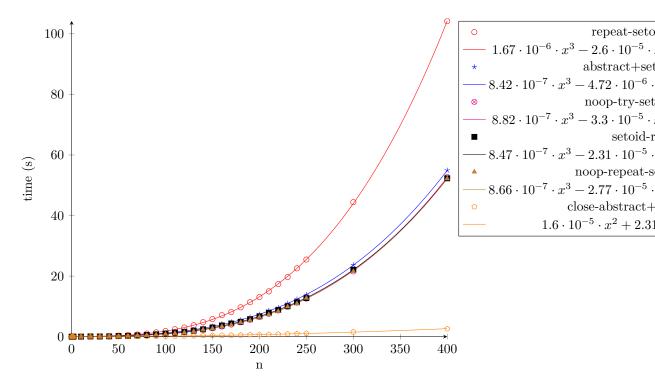


Figure 3: timing-repeat-setoid-rewrite-under-binders

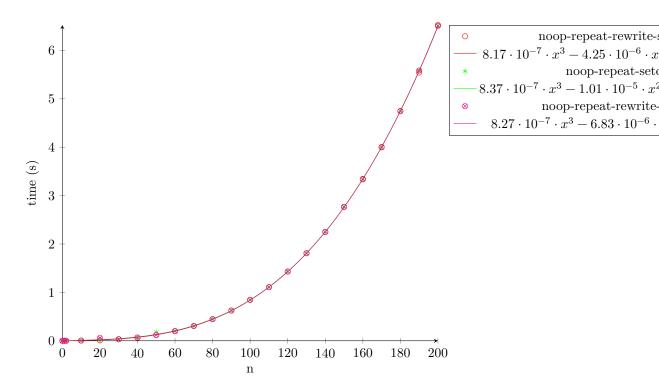


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

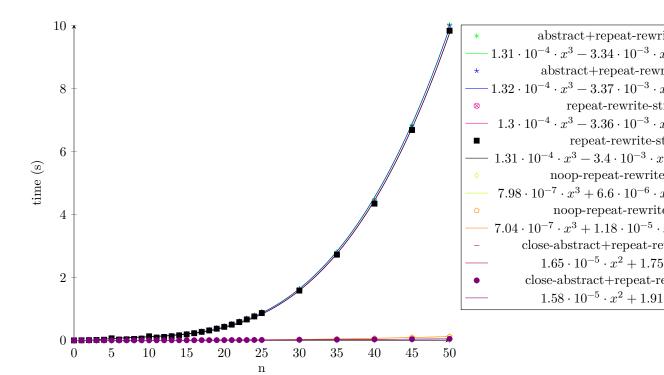
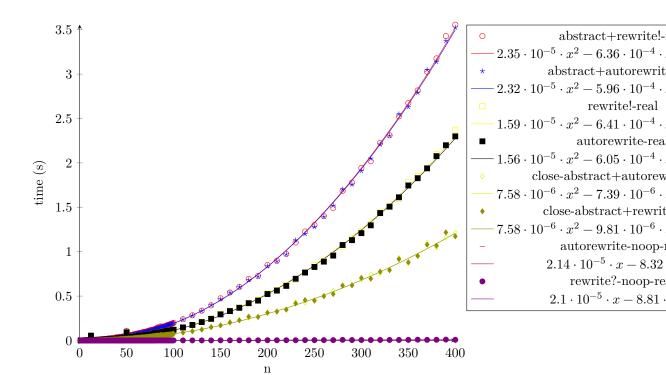
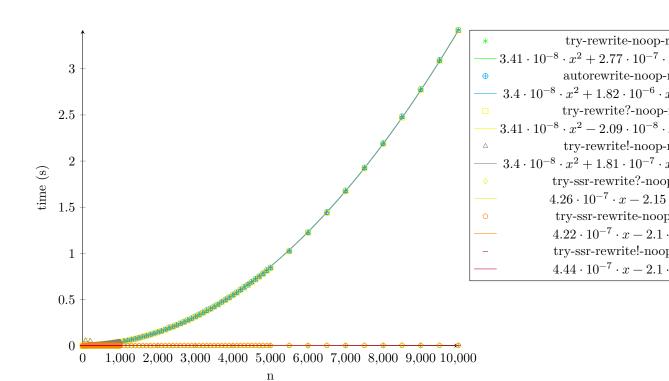


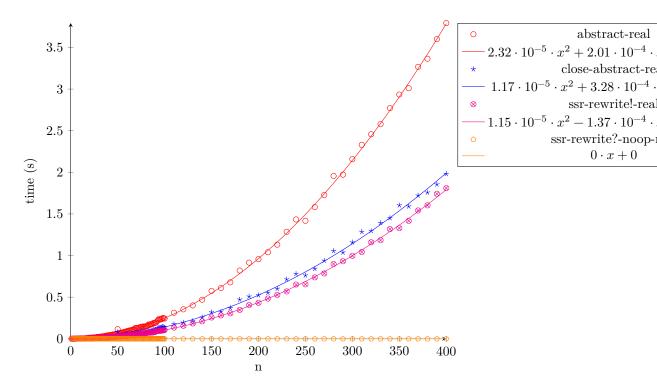
Figure 5: timing-rewrite-strat-under-binders



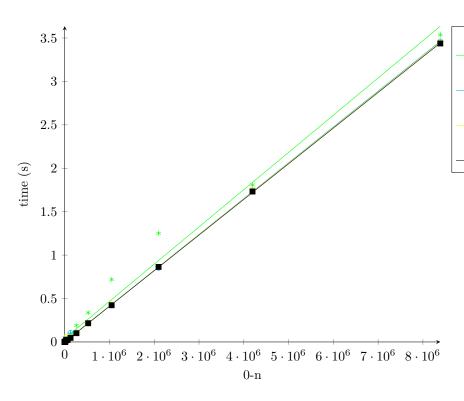
 $Figure \ 6: \ timing-rewrite-repeated-app-autorewrite \\$



Figure~7:~timing-rewrite-repeated-app-autorewrite-noop



 $Figure \ 8: \ timing-rewrite-repeated-app-ssrrewrite \\$

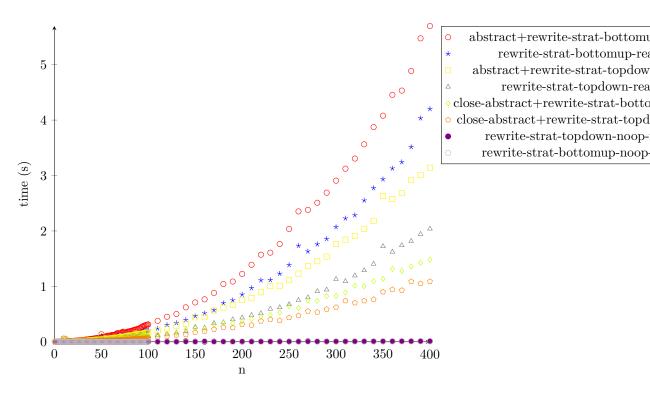


try-ssr-rewrite!-cold-noop-rea $4.29\cdot 10^{-7}\cdot x + 3.9\cdot 10^{-2}$ try-ssr-rewrite!-noop-real

 $\begin{aligned} &4.13 \cdot 10^{-7} \cdot x + 1.2 \cdot 10^{-3} \\ &\text{try-ssr-rewrite-noop-real} \\ &4.11 \cdot 10^{-7} \cdot x + 1.05 \cdot 10^{-3} \end{aligned}$

try-ssr-rewrite?-noop-real $4.1\cdot 10^{-7}\cdot x - 3.33\cdot 10^{-4}$

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



 $abstract + rewrite - strat - bottom \\ \\$

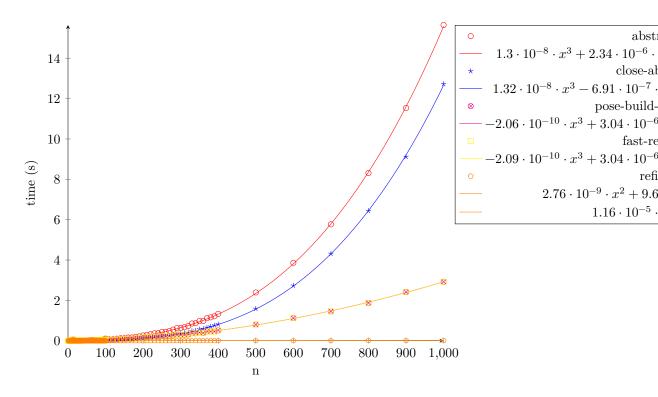
abstract + rewrite - strat - topdow

rewrite-strat-bottomup-rea

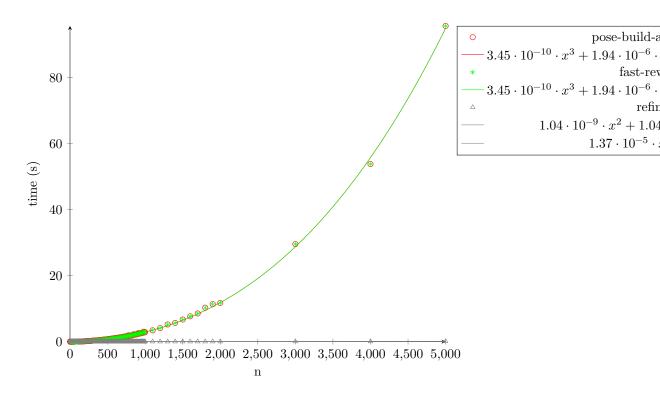
rewrite-strat-topdown-rea

rewrite-strat-topdown-nooprewrite-strat-bottomup-noop-

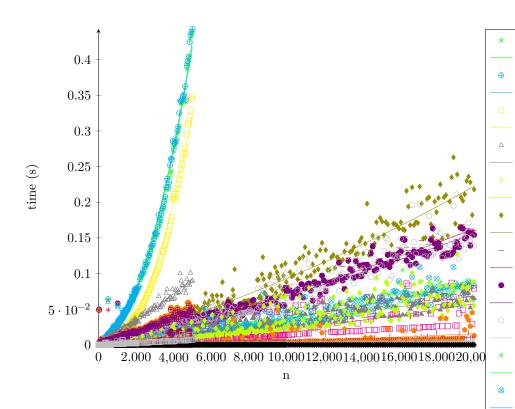
 $Figure~10:~timing\mbox{-rewrite-repeated-app-rewrite-strat}$



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



 $Figure~12:~timing\mbox{-rewrite-repeated-app-fast-rewrite-no-abstract}$



norm-reif-for-be $1.56 \cdot 10^{-8} \cdot x^2$ reif-for-beta- $1.56 \cdot 10^{-8} \cdot x^2$ eval-lazy-for-be $1.49 \cdot 10^{-8} \cdot x$ actual-reif-for-b $7.24 \cdot 10^{-10} \cdot x$ lazy-beta-iota-for-be $1.56\cdot 10^{-10}\cdot x^{2}$ reif-for-Para $1.87 \cdot 10^{-10} \cdot x^{2}$ reif-for-Parame $9.48 \cdot 10^{-11} \cdot x^{2}$ norm-reif-for-Para $9.44 \cdot 10^{-11} \cdot x^{2}$ norm-reif-for-Pa $1.18 \cdot 10^{-10} \cdot x^{2}$ actual-reif-for-Par $7.53 \cdot 10^{-11} \cdot x^{2}$ actual-reif-for-P $6.3\cdot 10^{-11}\cdot x^2$ lazy-beta-iota-for- $6.85 \cdot 10^{-11} \cdot x^{2}$ eval-lazy-for-Para $1.98 \cdot 10^{-11} \cdot x^{2}$

eval-lazy-for-Pa $5.89 \cdot 10^{-11} \cdot x^{2}$ cbv-for-Para $2.44\cdot 10^{-11}\cdot x^{2}$

cbv-for-Parame $7.21 \cdot 10^{-12} \cdot x^{2}$ lazy-beta-iota-for-

 $1.29 \cdot 10^{-10} \cdot x^{2}$ lazy-beta-iota-for-P $1.9 \cdot 10^{-12} \cdot x^{2}$ eval-lazy-for-beta

 $8.91 \cdot 10^{-11} \cdot x^{2}$

▲ transitivity-(Denote-rv)- $8.91 \cdot 10^{-11} \cdot x^{2}$

transitivity-(Denote-rv 0

 $8.91 \cdot 10^{-11} \cdot x^{2}$

transitivity-(Denote-rv)- \Diamond

 $8.91 \cdot 10^{-11} \cdot x^{2}$ transitivity-(Denote-rv

 $8.91 \cdot 10^{-11} \cdot x^{2}$ pre-for-beta-P

 $8.91\cdot 10^{-11}\cdot x^{2}$ pre-for-beta-

 $8.91 \cdot 10^{-11} \cdot x^{2}$

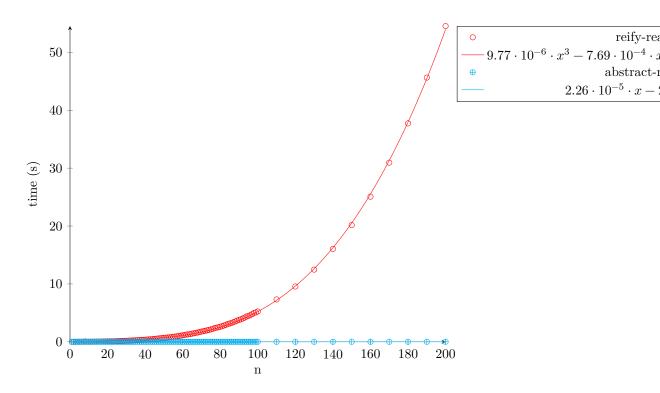
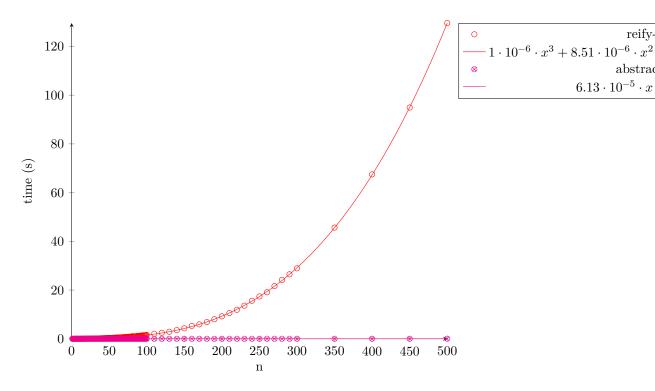


Figure 14: timing-typeclass-reification-let-in-HOAS



 ${\bf Figure~15:~timing-type class-reification-let-in-PHOAS}$