

Figure 1: timing-pattern

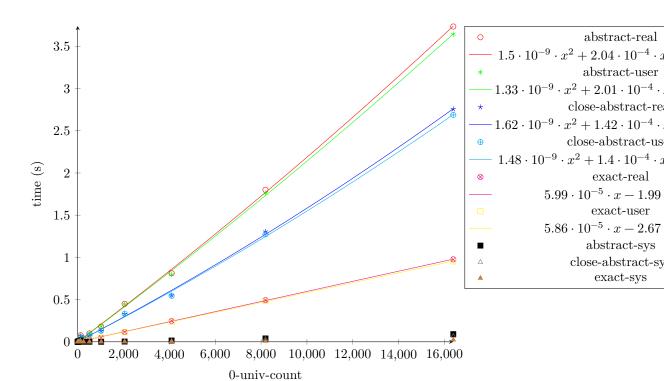


Figure 2: timing-n-polymorphic-universes param-1-n 0

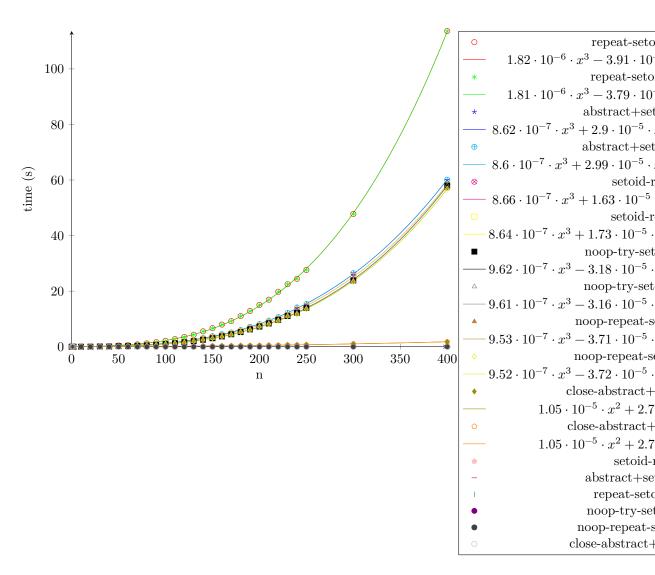


Figure 3: timing-repeat-setoid-rewrite-under-binders

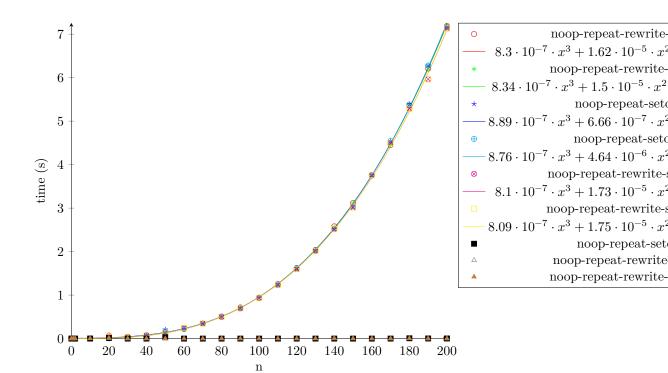


Figure 4: timing-repeat-setoid-rewrite-under-binders-noop

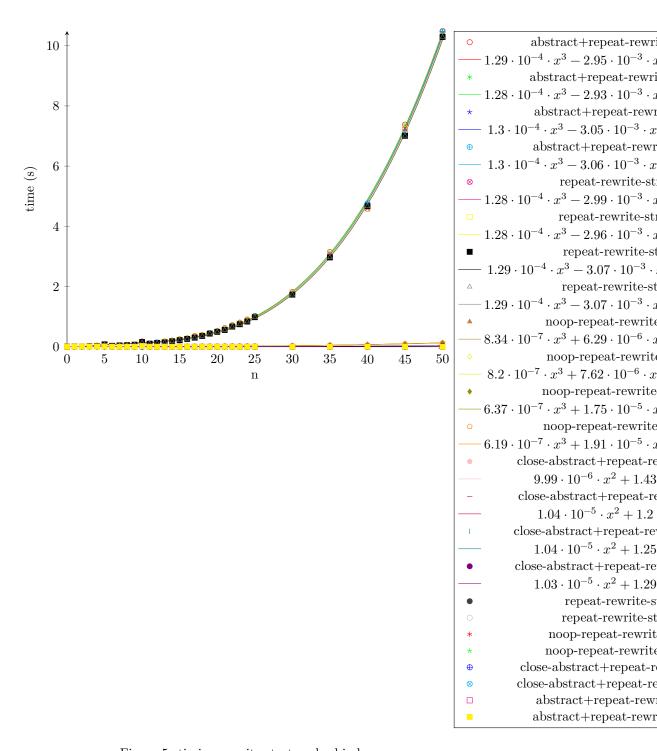
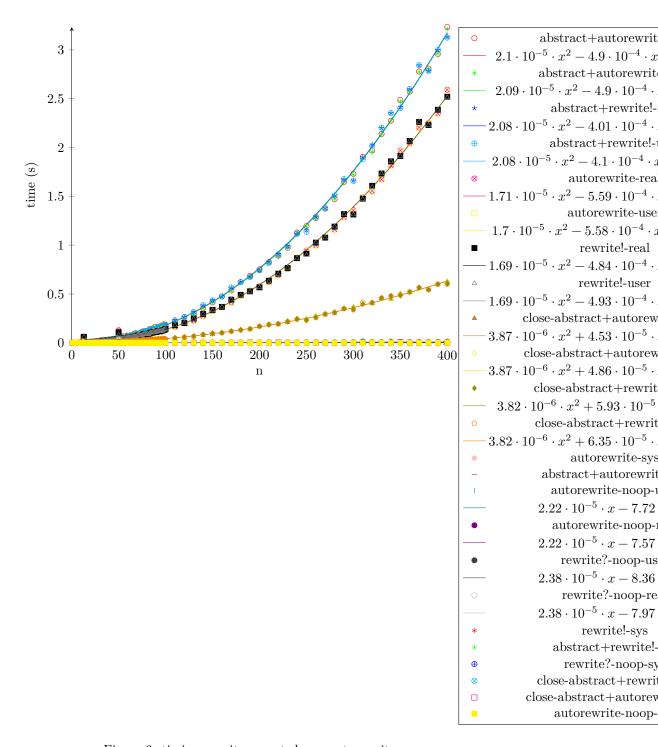


Figure 5: timing-rewrite-strat-under-binders



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

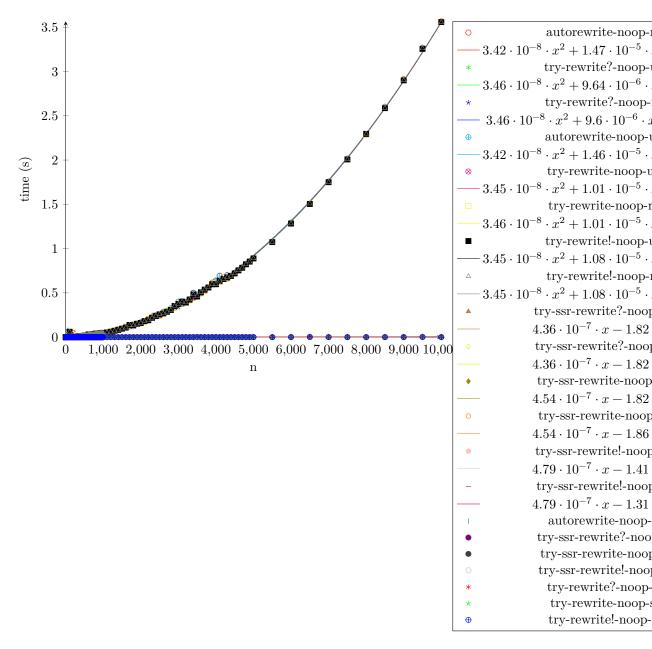
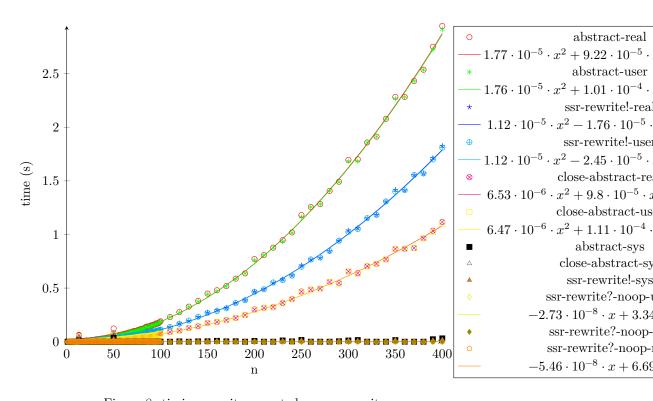


Figure 7: timing-rewrite-repeated-app-autorewrite-noop



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

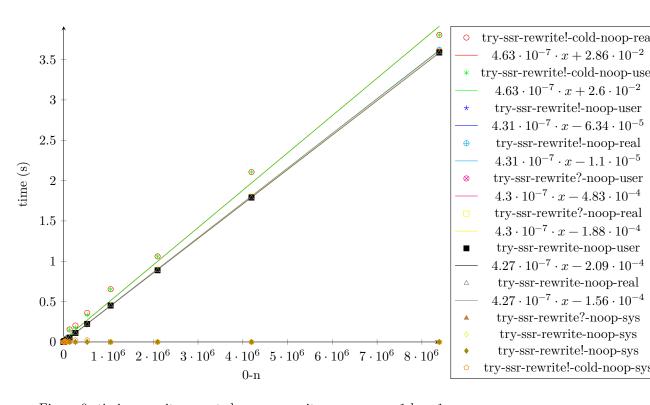


Figure 9: timing-rewrite-repeated-app-ssrrewrite-noop param-1-lgn $\ 1$

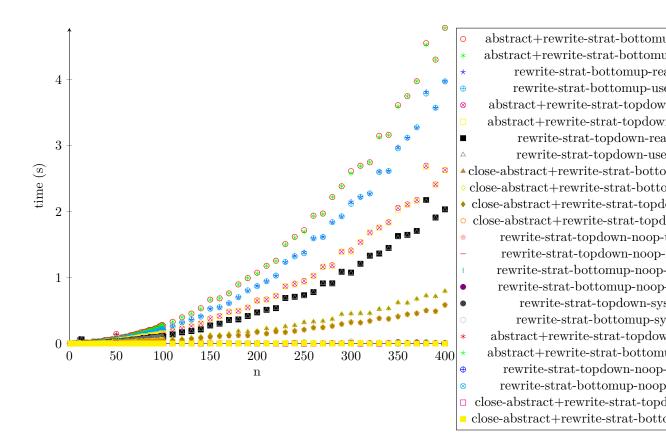


Figure 10: timing-rewrite-repeated-app-rewrite-strat

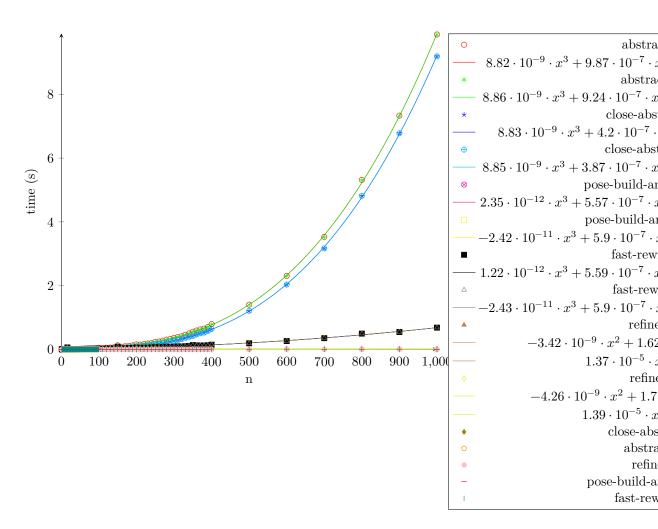
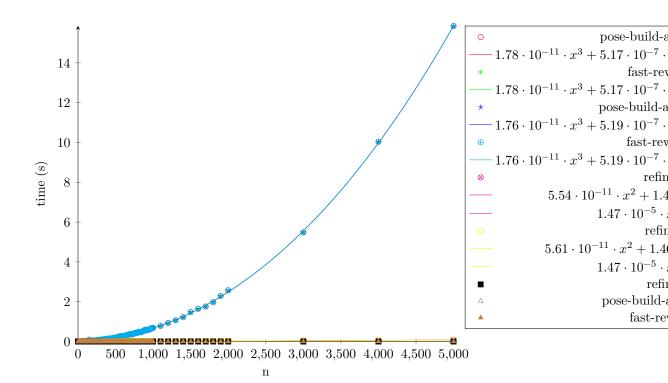
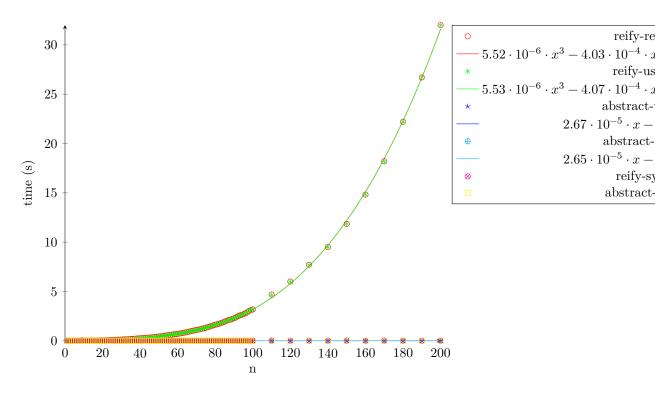


Figure 11: timing-rewrite-repeated-app-fast-rewrite



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



 ${\bf Figure~13:~timing-type class-reification-let-in-HOAS}$

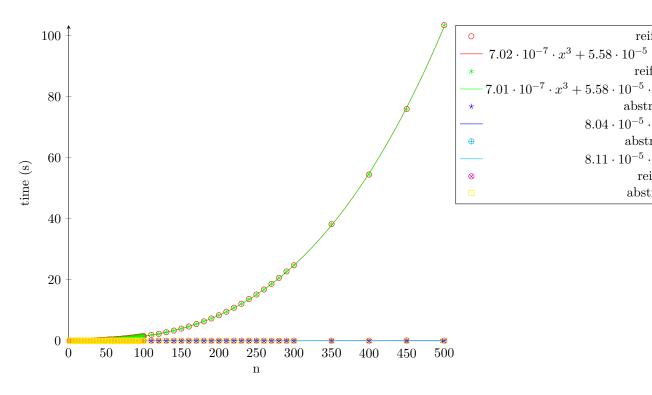
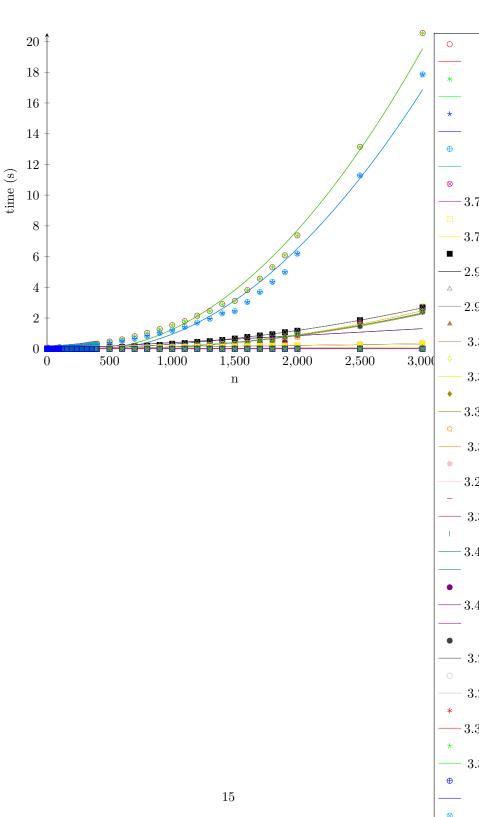


Figure 14: timing-typeclass-reification-let-in-PHOAS



 $2.68 \cdot 10^{-6} \cdot x^2 - 1.58 \cdot 10^{-6}$ $2.68 \cdot 10^{-6} \cdot x^2 - 1.58 \cdot 10^{-6}$ $2.39 \cdot 10^{-6} \cdot x^2 - 1.59 \cdot 10^{-6}$ $2.39 \cdot 10^{-6} \cdot x^2 - 1.59 \cdot 10^{-6}$ $3.76 \cdot 10^{-7} \cdot x^2 - 3.08 \cdot 10^{-4} \cdot x^2$ $3.75 \cdot 10^{-7} \cdot x^2 - 3.07 \cdot 10^{-4} \cdot x^2$ $2.94 \cdot 10^{-7} \cdot x^2 + 8.89 \cdot 10^{-6} \cdot x^2$ $2.93 \cdot 10^{-7} \cdot x^2 + 1.04 \cdot 10^{-5} \cdot x^2 + 1.04 \cdot 10^{-5}$ $3.38 \cdot 10^{-7} \cdot x^2 - 2.5 \cdot 10^{-4} \cdot x$ $3.38 \cdot 10^{-7} \cdot x^2 - 2.5 \cdot 10^{-4} \cdot x$ $3.31 \cdot 10^{-7} \cdot x^2 - 2.44 \cdot 10^{-4} \cdot x^2$ $3.3 \cdot 10^{-7} \cdot x^2 - 2.42 \cdot 10^{-4} \cdot x$ $3.29 \cdot 10^{-7} \cdot x^2 - 2.36 \cdot 10^{-4} \cdot x^2$ $3.3 \cdot 10^{-7} \cdot x^2 - 2.36 \cdot 10^{-4} \cdot x$ $3.42 \cdot 10^{-7} \cdot x^2 - 2.56 \cdot 10^{-4} \cdot x^2$ $3.42 \cdot 10^{-7} \cdot x^2 - 2.55 \cdot 10^{-4} \cdot x^2$ $3.25 \cdot 10^{-7} \cdot x^2 - 2.22 \cdot 10^{-4}$ $3.25 \cdot 10^{-7} \cdot x^2 - 2.22 \cdot 10^{-4}$ $3.38 \cdot 10^{-7} \cdot x^2 - 2.39 \cdot 10^{-4} \cdot x^2$ $3.37 \cdot 10^{-7} \cdot x^2 - 2.4 \cdot 10^{-4} \cdot x$

abstract-real

abstract-user

fast-rewrite-real

fast-rewrite-user

check-admit-real

check-admit-user

close-abstract-use

close-abstract-rea

type-pf-cast-real

type-pf-cast-user

type-admit-user

type-admit-real

check-admit-cast-u

check-admit-cast-r

 $4.55 \cdot 10^{-4} \cdot x - 5.48 \cdot$ refine-real

 $4.55 \cdot 10^{-4} \cdot x - 5.48 \cdot$ type-admit-cast-us

type-admit-cast-re

check-pf-cast-rea

check-pf-cast-use

build-eval-thunk-ua

 $1.09 \cdot 10^{-4} \cdot x - 1.18 \cdot$ build-eval-thunk-re $1.09 \cdot 10^{-4} \cdot x - 1.15 \cdot$ build-thunk-user $1.08 \cdot 10^{-4} \cdot x - 1.25$ build-thunk-real $1.08 \cdot 10^{-4} \cdot x - 1.18 \cdot$ obools I secon

refine-user