

Benchmark	Pycket	Racket	Larceny	8/	Spidermonkey	Python	Pypy
	mean	mean	mean	mean	mean	mean	mean
Bubblechaperone	776 ±7 ms	6667 ±5 ms	sm ∓	sm =	sm ∓	sm ±	± ms
$\mathrm{Bubble}_{\mathrm{direct}}$	$653 \pm 3 \mathrm{ms}$	$1382 \pm 2 \mathrm{ms}$	$1595 \pm 1  ms$	$336 \pm 0 \mathrm{ms}$	$221 \pm 0  ms$	$20626 \pm 36 \mathrm{ms}$	$597 \pm 2 \mathrm{ms}$
$Bubble_{proxy}$	$\pm$ ms	± ms	$\pm$ ms	$111379 \pm 4449  ms$	$113832 \pm 2284  ms$	$100209 \pm 816  ms$	$1248 \pm 11  ms$
Bubbleunsafe	$547 \pm 2  ms$	$955 \pm 2  \text{ms}$	$\pm$ ms	$\pm$ ms	∓ ms	$\pm$ ms	$\pm$ ms
Bubble <sub>unsafe</sub> *	$540 \pm 2  ms$	$726 \pm 1 \mathrm{ms}$	± ms	∓ ms	∓ ms	± ms	$\pm$ ms
Churchchaperone	$6960\pm49\mathrm{ms}$	$38042 \pm 1200  ms$	$\pm$ ms	∓ ms	∓ ms	± ms	$\pm$ ms
Church <sub>chaperone-a</sub>	$1239 \pm 6 \mathrm{ms}$	$4542\ \pm 213ms$	$\pm$ ms	∓ ms	∓ ms	± ms	$\pm$ ms
Church <sub>contract</sub>	$1448{\pm}12ms$	$10330\ \pm 284ms$	$\pm$ ms	$291928 \pm 1548  ms$	$403966 \pm 5428  ms$	$\pm$ ms	$\pm$ ms
Church <sub>direct</sub>	$752 \pm 3  \text{ms}$	$1241 \pm 7 \text{ ms}$	$796\pm12\mathrm{ms}$	$2067 \pm 7 \mathrm{ms}$	$3470 \pm 10  ms$	$\pm$ ms	$\pm$ ms
$Church_{proxy}$	$\pm$ ms	$\pm$ ms	$\pmms$	$54073 \pm 118  ms$	$153989 \pm 680  \mathrm{ms}$	$\pm$ ms	$\pm$ ms
Church <sub>proxy-a</sub>	$\pm$ ms	$\pm$ ms	$\pm$ ms	$51991 \pm 125  ms$	$150996 \pm 950  ms$	$\pm$ ms	$\pm$ ms
Churchwrap	$2392 \pm 8  ms$	$4184 \pm 8  ms$	$4129\pm19ms$	$8588 \pm 39 \mathrm{ms}$	$17171 \pm 203  ms$	$298532 \pm 6236  ms$	$68958\pm172\mathrm{ms}$
Procchaperone	$88 \ \pm 1  ms$	$1051 \pm 10  ms$	$\pmms$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
Procchaperone+return	$90 \pm 1  ms$	$1576 \pm 8  \text{ms}$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
Procdirect	$21 \pm 1  ms$	$34 \pm 0 \mathrm{ms}$	$\pm$ ms	$39 \pm 0 \mathrm{ms}$	$27 \pm 0  ms$	$1464 \pm 25 \mathrm{ms}$	$67 \pm 1  ms$
Proc <sub>impersonate</sub>	$88 \pm 1  ms$	$1020 \pm 7 \mathrm{ms}$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
Procimpersonate+return	$90 \pm 1  ms$	$1532 \pm 10  ms$	$\pmms$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
Procindirect	$20 \pm 1  ms$	$124 \pm 2  \text{ms}$	$\pmms$	$38 \pm 0 \mathrm{ms}$	$28 \pm 1  ms$	$1453 \pm 25 \mathrm{ms}$	$80 \pm 1  ms$
Procproxy	$\pm$ ms	$\pm$ ms	$\pm$ ms	$1555 \pm 9 \mathrm{ms}$	$2604 \pm 8  ms$	$\pm$ ms	$\pm$ ms
Procwrapped	$22 \pm 1  ms$	$180 \pm 1  ms$	$\pmms$	$38 \pm 0 \mathrm{ms}$	$27 \pm 0  ms$	$2682 \pm 15  ms$	$72 \pm 2 \mathrm{ms}$
Procwrapped+check	$23 \pm 1  ms$	$366 \pm 3 \mathrm{ms}$	$\pm$ ms	$118 \pm 1  \text{ms}$	$140 \pm 0  ms$	$4319 \pm 92 \mathrm{ms}$	83 ±2 ms
Procwrapped+return	$23 \pm 1  ms$	$405 \pm 7  ms$	$\pm$ ms	368 ±1 ms	899 ∓5 ms	$5457 \pm 57 \mathrm{ms}$	$276 \pm 1  ms$
Structchaperone	$135 \pm 1  ms$	$5546 \pm 60 \mathrm{ms}$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
Structdirect	$134 \pm 1  ms$	$527 \pm 0  ms$	$1069 \pm 1  ms$	$377 \pm 0 \mathrm{ms}$	$271 \pm 18  ms$	$4650 \pm 34  ms$	$126 \pm 1  ms$
Structimpersonate	$136 \pm 1  ms$	$5530 \pm 103  ms$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
$Struct_{proxy}$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$26531\ \pm 618ms$	$26760\ \pm 103ms$	$103454 \pm 860  ms$	$2077 \pm 28  ms$
Struct <sub>unsafe</sub>	$133 \pm 1  ms$	$337 \pm 0 \mathrm{ms}$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms
$Struct_{unsafe}*$	$133 \pm 1  \text{ms}$	$337 \pm 0 \mathrm{ms}$	$\pm$ ms	$\pm$ ms	$\pm$ ms	$\pm$ ms	∓ ms