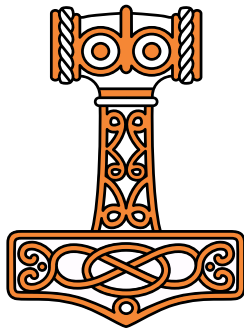DYALOG

Olhão 2022

Performance Improvements in Set Operations
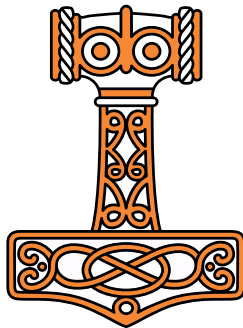
Karta S. Kooner

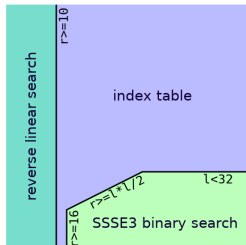October 10, 2022

DYALOG

Olhão 2022

Performance is an important aspect of the interpreter

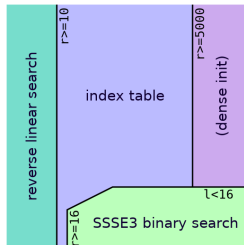Many performance enhancements introduced over many years

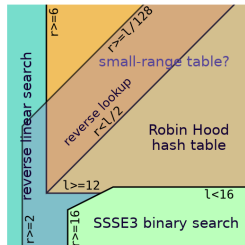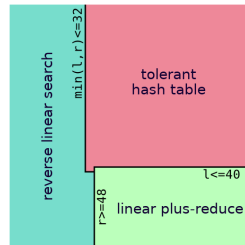Dyalog 18.0 introduced significant changes to the performance profile of the interpreter
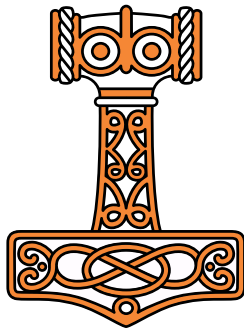
3

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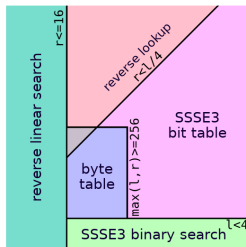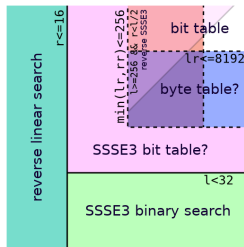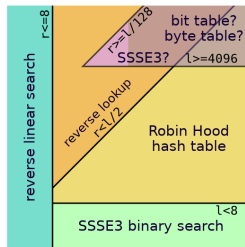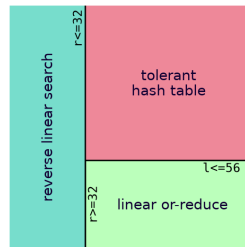
Olhão 2022

Key questions to ask:

- what does the performance profile look like?

- are the assumptions of the past still valid?

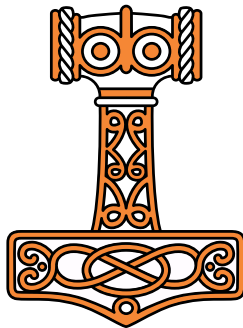- has the input space been sufficiently well tested?

DYALOG

Olhão 2022

Dyalog 18.2 reverted some performance enhancements
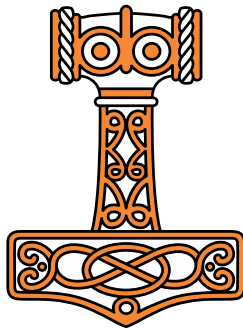introduced in Dyalog 18.0 for safety reasons

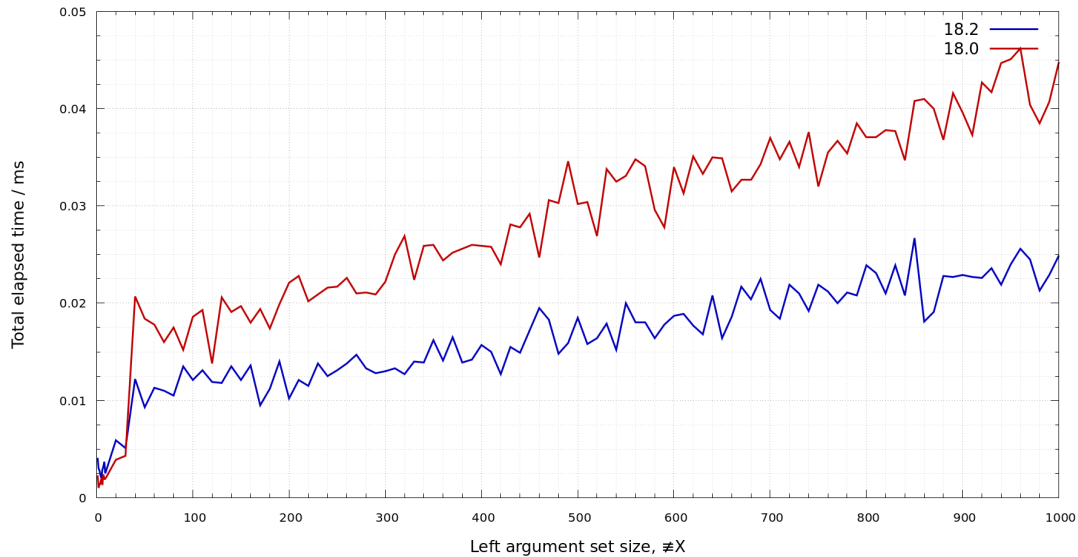How should these be reinstated?
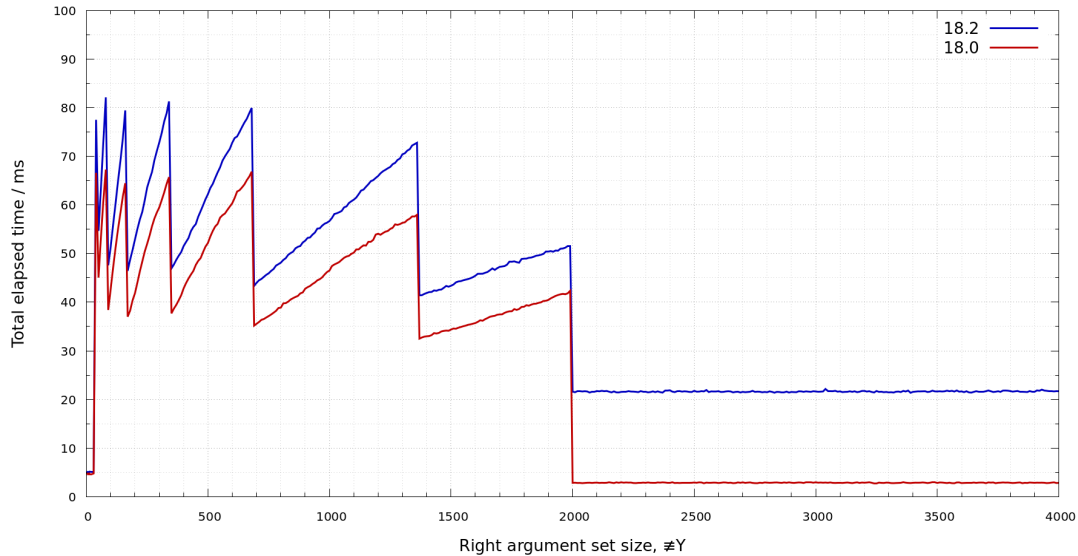
Should they be reinstated?

DYALOG

Olhão 2022

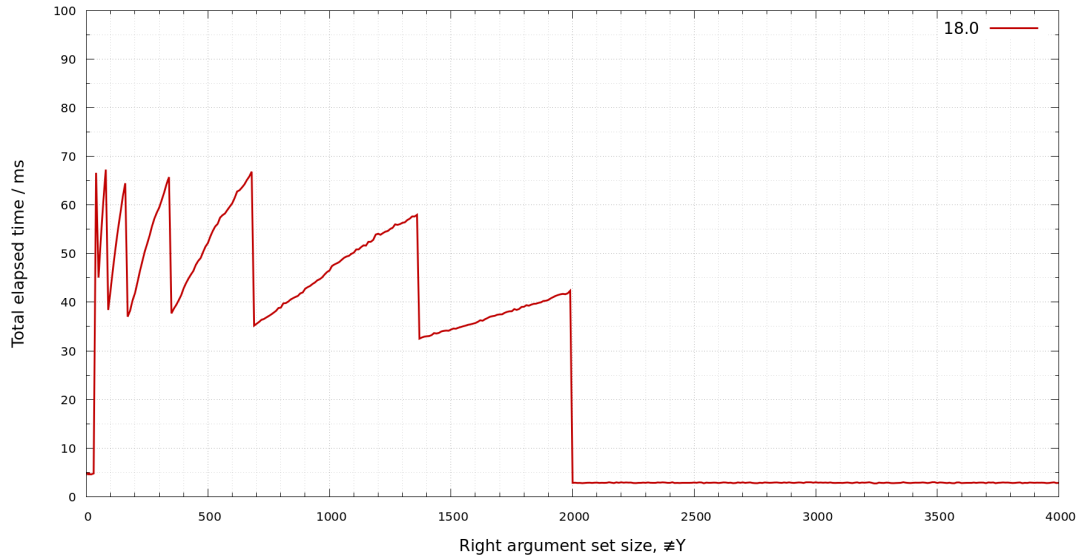Good opportunity to step back and evaluate

X←?1000ρ10*6 ◇ Y←?1000ρ10*6 ◇ X∈Y

X←?(2×10*6)ρ3442210 ◇ Y←?5000ρ4000 ◇ X∈Y

X←?(2×10*6)ρ3442210 ◇ Y←?5000ρ4000 ◇ X∈Y

X←?(2×10*6)ρ3442210 ⋄ Y←?5000ρ4000 ⋄ X∈Y

Total elapsed time / ms vs Right argument set size, ≢Y

- 18.0
- 18.0 larger hash tables
- 18.0 adjusted

Membership Performance (Total elapsed time / ms)

Index-Of (Total elapsed time / ms)

Membership Performance (Total elapsed time / ms)

x-axis: Left argument set size, random values in [0,2*32)

y-axis: Right argument set size, random values in [0,2*32)

X∈Y — Total elapsed time / ms

X∈Y — Total elapsed time / ms

X∈Y — Total elapsed time / ms

X∈Y — Total elapsed time / ms

18.0

18.2

Size of set Y, random values in [0,2*16)

Size of set X, random values in [0,2*16)

Size of set X, random values in [0,2*16)

17
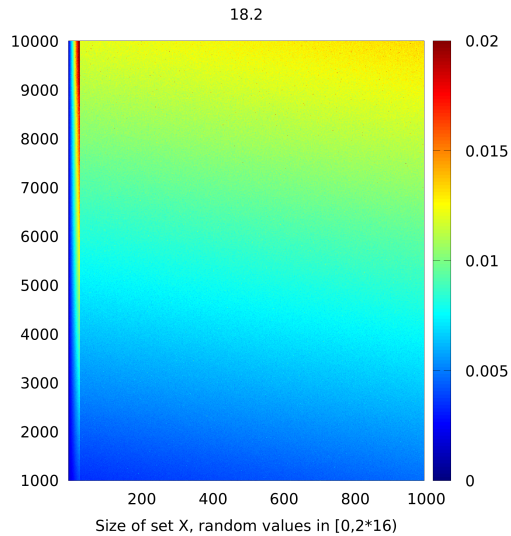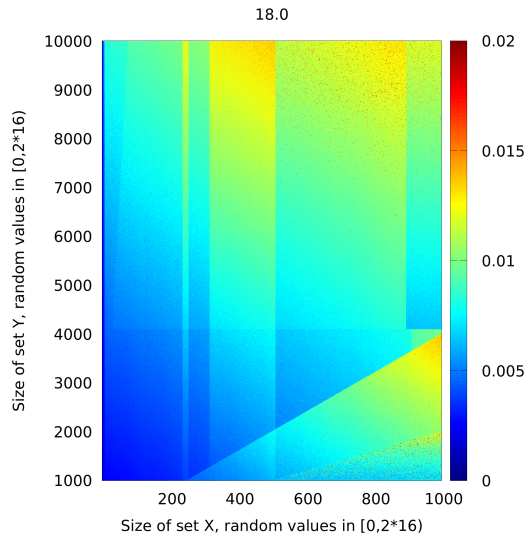
X∈Y — Total elapsed time / ms

18.0

18.2

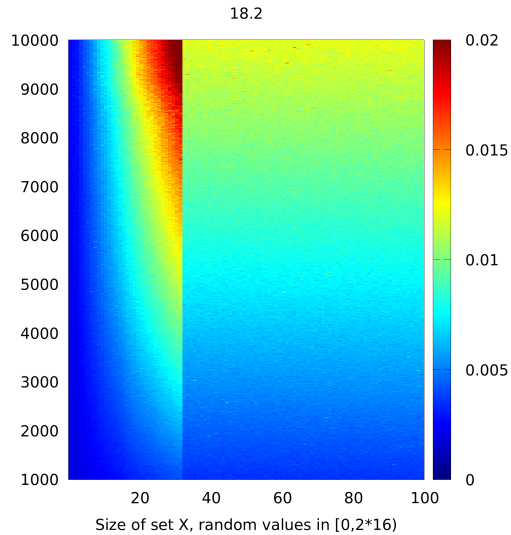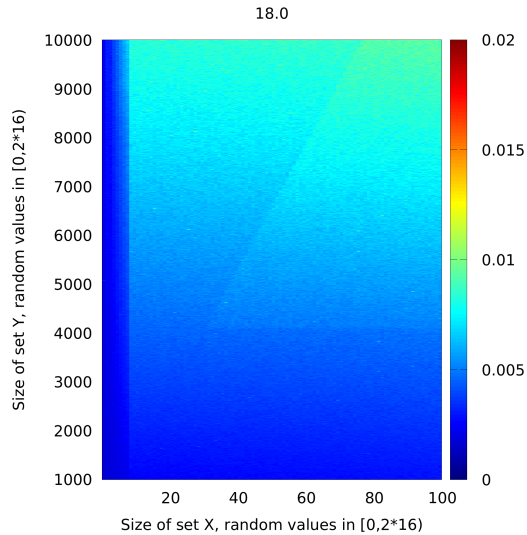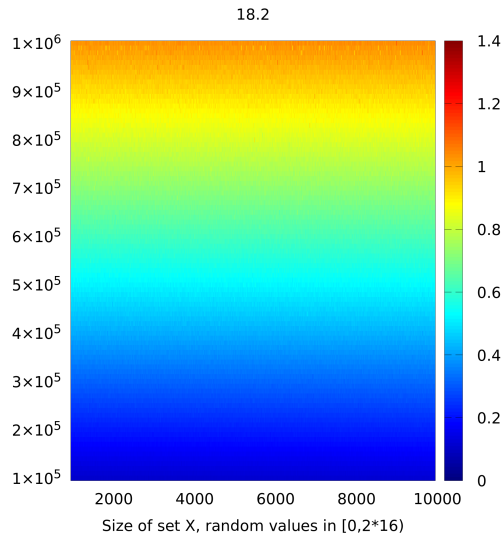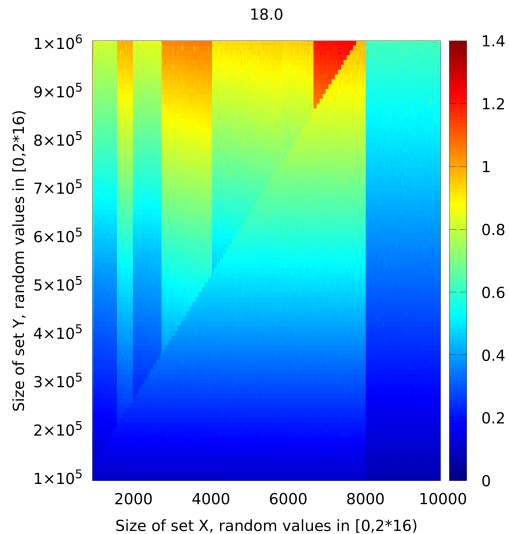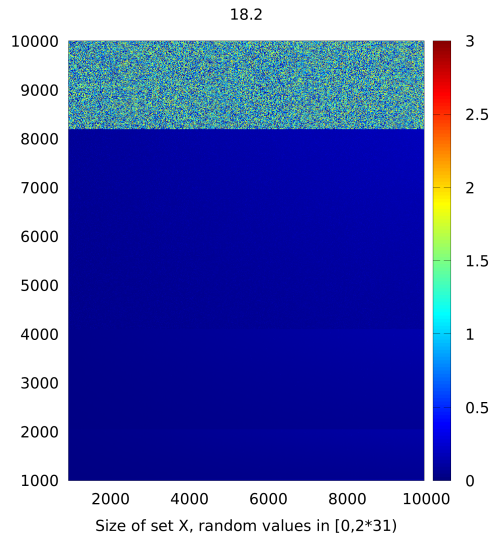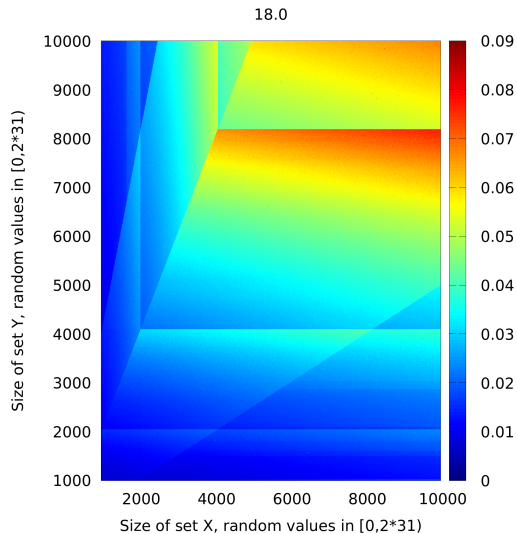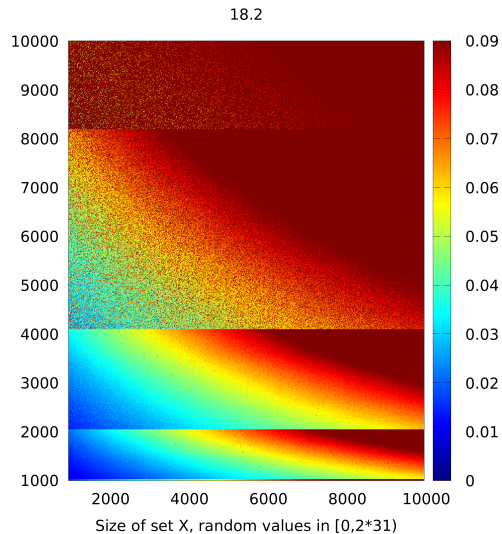Size of set Y, random values in [0,2*31)

Size of set X, random values in [0,2*31)
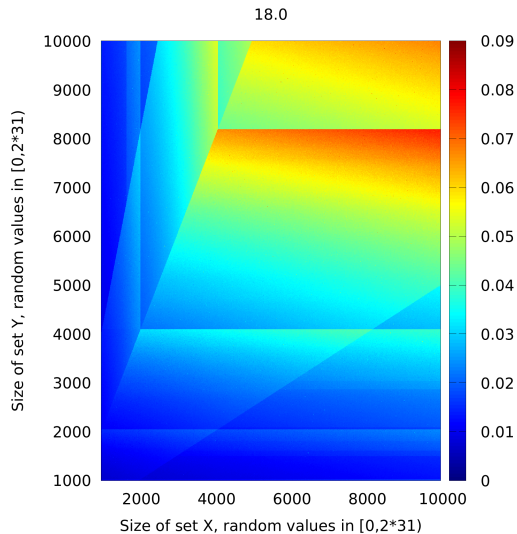
X∈Y — Total elapsed time / ms

X∈Y — Total elapsed time / ms

18.0

18.2

Size of set Y, random values in [0,2*31)

Size of set X, random values in [0,2*31)

X∈Y — Total elapsed time / ms

18.0

18.2

Size of set Y, random values in [0,2*31]

Size of set X, random values in [0,2*31]

Size of set X, random values in [0,2*31]

X∈Y — Total elapsed time / ms

18.0

18.2

Size of set Y, random values in [0,2*8)

Size of set X, random values in [0,2*8)
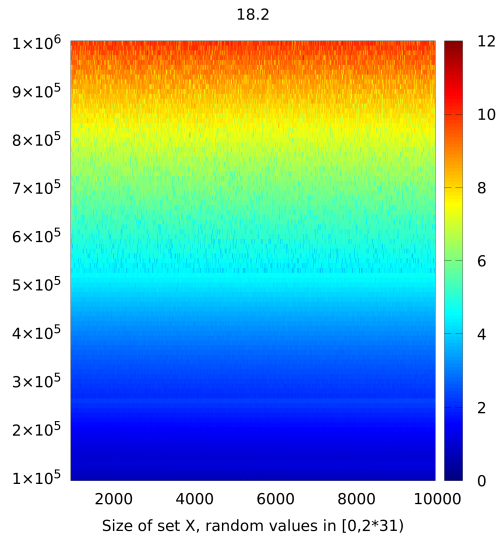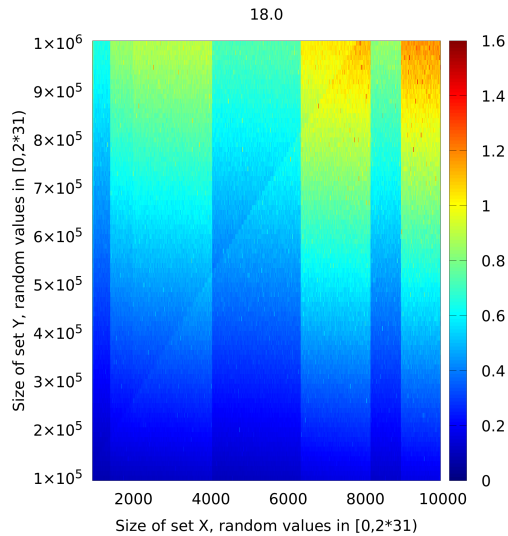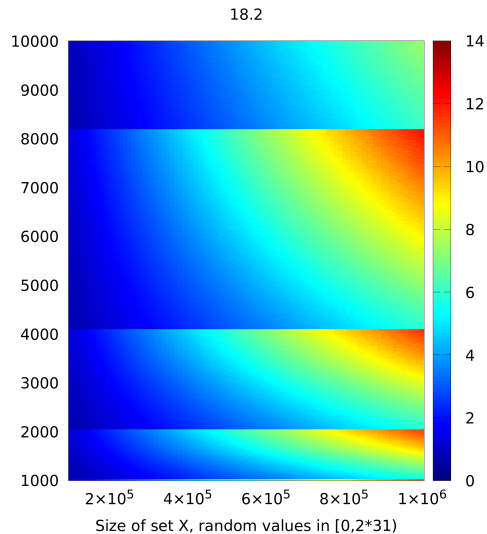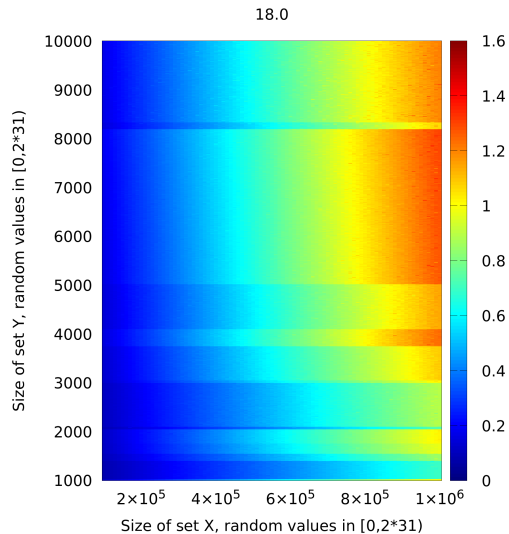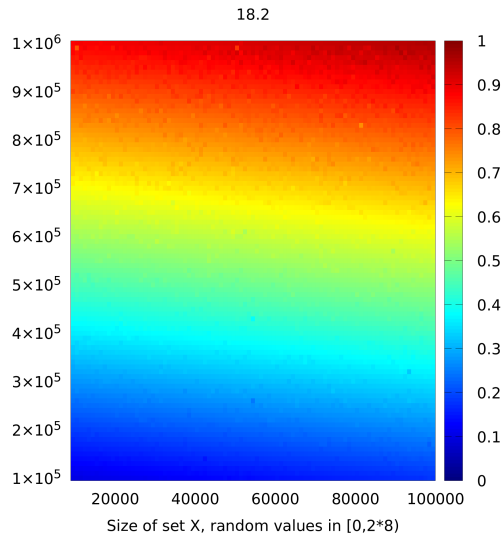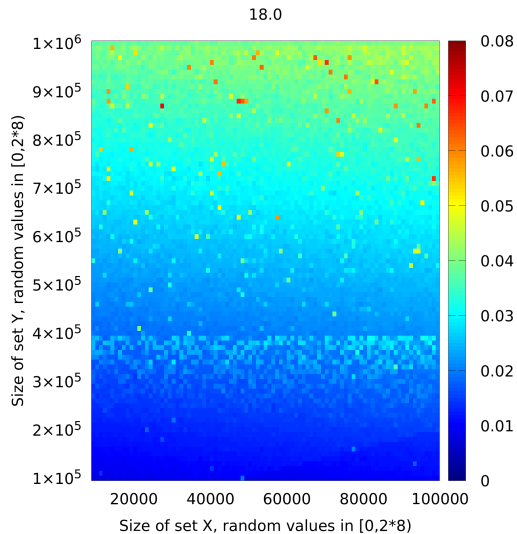
X∈Y — Total elapsed time / ms

X∈Y — Total elapsed time / ms

DYALOG
Olhão 2022
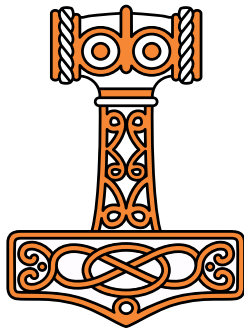
Determining the true performance profile of a primitive
is a difficult task
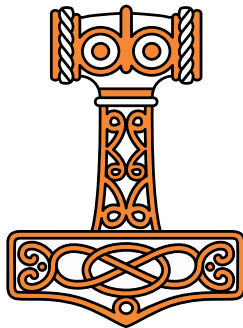
Sampling the input space can still be insightful

DYALOG

Olhão 2022

Reintroduce 18.0 performance improvements provided they are:

- significant (ideally, an order of magnitude$_2$)

- likely to be useful to the user

- adequately tested

ƆVΛLOG

Olhão 2022

Provide a mechanism to gather usage statistics

Possible target data includes:

- which algorithms are being hit, or would have been hit

- argument properties: set sizes, set range...

- timing statistics