

Inferring Types by Mining Class Usage Frequency from Inline Caches

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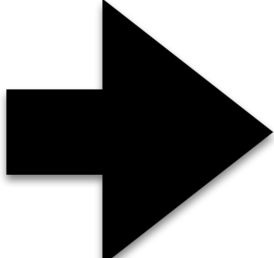
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Example

```
GLMPane>>resetAnnouncer  
super resetAnnouncer.  
self presentations do:  
  [ :each | each resetAnnouncer ]
```

```
GLMPane>>update  
...  
self presentations do: [ :each | each update ]
```

resetAnnouncer
update  ~~75~~ 63 classes

Possible types for each

GTGenericStackDebugger

GLMRoassal2Presentation

...

MooseFinder

PPBrowser

...

GTPPDebugger

PPVerticalParserInspector

GLMPane

...

GTSimpleMethodsBrowser

GLMRubricTextPresentation

63

classes

DYNAMIC TYPE

Possible hierarchies for **each**

GLMPane

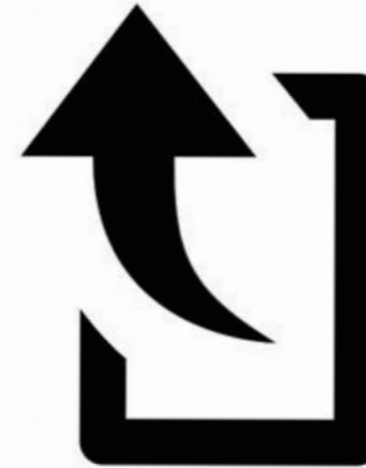
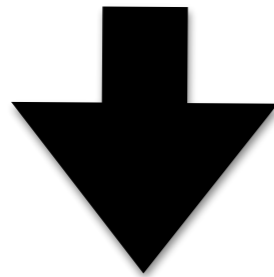
GLMPresentation

Two
hierarchies

Inline Caches

RECEIVER TYPE

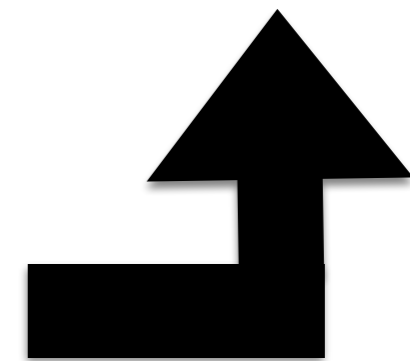
```
GLMPane>>resetAnnouncer  
super resetAnnouncer.  
self presentations do:  
  [ :each | each resetAnnouncer]
```



```
1400  
objhdr: 8000000A000035  
nArgs: 0 type: 2  
blksiz: 148  
method: 100038  
mthdr: 9  
selctr: 100040=#resetAnnouncer  
blkentry: 12E => 152E  
stackCheckOffset: 5D/145D  
cmRefersToYoung: no cmlsFullBlock: no  
0000141c: xorl %edx, %edx : 31 D2  
0000141e: call .+0xffff205 (0x00000628=ceMethodAbort0Args) : E8 05 F2 FF FF  
00001423: nop : 90  
00001424: andl $0x00000001, %eax : 83 E0 01  
00001427: jmp .+0x00000011 (0x0000143a=#resetAnnouncer@3A) : EB 11  
00001429: nop : 90  
0000142a: nop : 90  
0000142b: nop : 90  
entry:  
0000142c: movl %edx, %eax : 89 D0  
0000142e: andl $0x00000003, %eax : 83 E0 03  
00001431: jnz .+0xffff11 (0x00001424=#resetAnnouncer@24) : 75 F1  
00001433: movl %ds:(%edx), %eax : 8B 02  
00001435: andl $0x003ffff, %eax : 25 FF FF 3F 00  
0000143a: cmpl %ecx, %eax : 39 C8  
0000143c: jnz .+0xffffe0 (0x0000141e=#resetAnnouncer@1E) : 75 E0  
noCheckEntry:  
0000143e: movl %ss:(%esp), %ebx : 8B 1C 24  
00001441: movl %edx, %ss:(%esp) : 89 14 24  
00001444: pushl %ebx : 53  
00001445: pushl %ebp : 55  
00001446: movl %esp, %ebp : 89 E5  
00001448: pushl $0x00001400=#resetAnnouncer@0 : 68 00 14 00 00  
isAbsPCReference:  
0000144d: movl $0x00100000=nil, %ebx : BB 00 00 10 00  
00001452: pushl %ebx : 53  
00001453: pushl %edx : 52  
00001454: movl %ds:0x80000='stackLimit', %eax : A1 00 00 08 00  
00001459: cmpl %eax, %esp : 39 C4  
0000145b: jb .+0xffffbf (0x0000141c=#resetAnnouncer@1C) : 72 BF  
HasBytecodePC bc 20/21:  
0000145d: movl -12(%ebp), %edx : 8B 55 F4  
00001460: testb $0x03, %dl : F6 C2 03  
00001463: jnz .+0x0000000e (0x00001473=#resetAnnouncer@73) : 75 0E  
00001465: movl %ds:(%edx), %eax : 8B 02  
00001467: andl $0x003ffff7, %eax : 25 F7 FF 3F 00  
0000146c: jnz .+0x00000005 (0x00001473=#resetAnnouncer@73) : 75 05  
0000146e: movl %ds:0x8(%edx), %edx : 8B 52 08  
00001471: jmp .+0xfffffd (0x00001460=#resetAnnouncer@60) : EB ED
```

```
21 <70> self  
22 <85 00> superSend: resetAnnouncer  
24 <87> pop  
25 <70> self  
26 <D1> send: presentations  
27 <8F 01 00 03> closureNumCopied: 0 numArgs: 1 bytes 31 to 33  
31 <10> pushTemp: 0  
32 <D0> send: resetAnnouncer  
33 <7D> blockReturn  
34 <CB> send: do:  
35 <87> pop  
36 <78> returnSelf
```

BYTECODE



Inline Caches

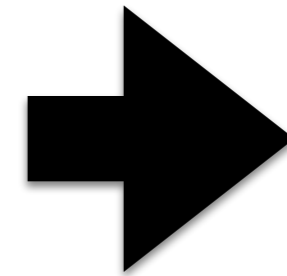
GTGenericStackDebugger	➔	22
GLMRoassal2Presentation	➔	2
...		
MooseFinder	➔	0
PPBrowser	➔	6
...		
GTPPDebugger	➔	0
PPVerticalParserInspector	➔	0
GLMPane	➔	112
...		
GTSimpleMethodsBrowser	➔	3
GLMRubricTextPresentation	➔	13

Inline Caches - Ordered Classes

GLMPane	➔	112
GTGenericStackDebugger	➔	22
...		
GLMRubricTextPresentation	➔	13
PPBrowser	➔	6
...		
GTSimpleMethodsBrowser	➔	3
GLMRoassal2Presentation	➔	2
MooseFinder	➔	0
...		
GTPPDebugger	➔	0
PPVerticalParserInspector	➔	0

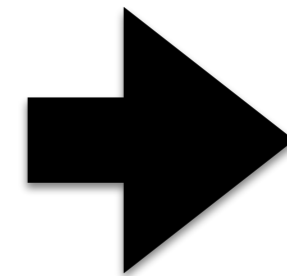
Inline Caches - Ordered Hierarchies

GLMPlane



112

GLMPresentation



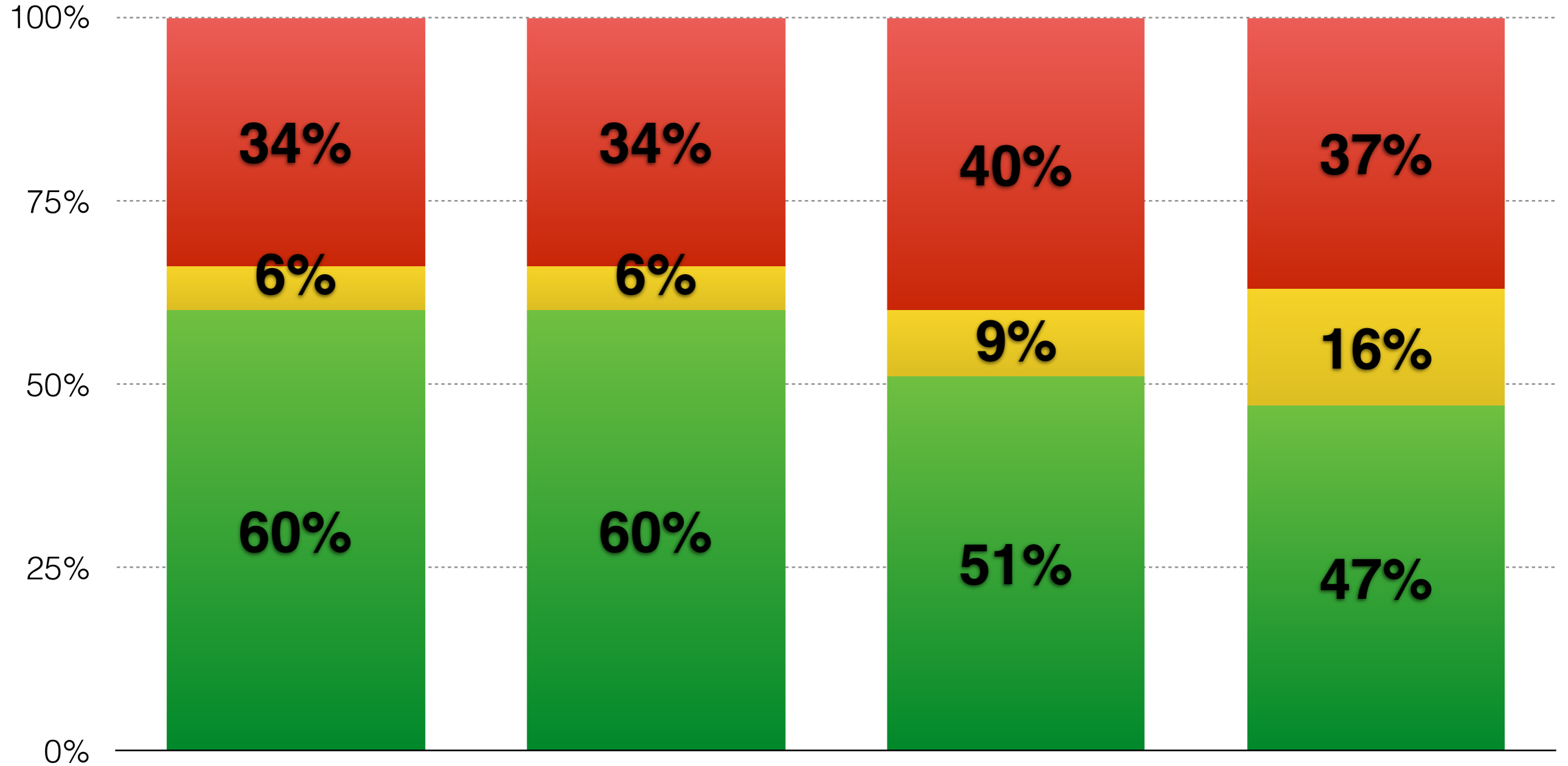
564

Inline Caches - Ordered Hierarchies

GLMPPresentation ➔ 564

GLMPane ➔ **112**

RESULTS - classes



Roassal2

Glamour

Morphic

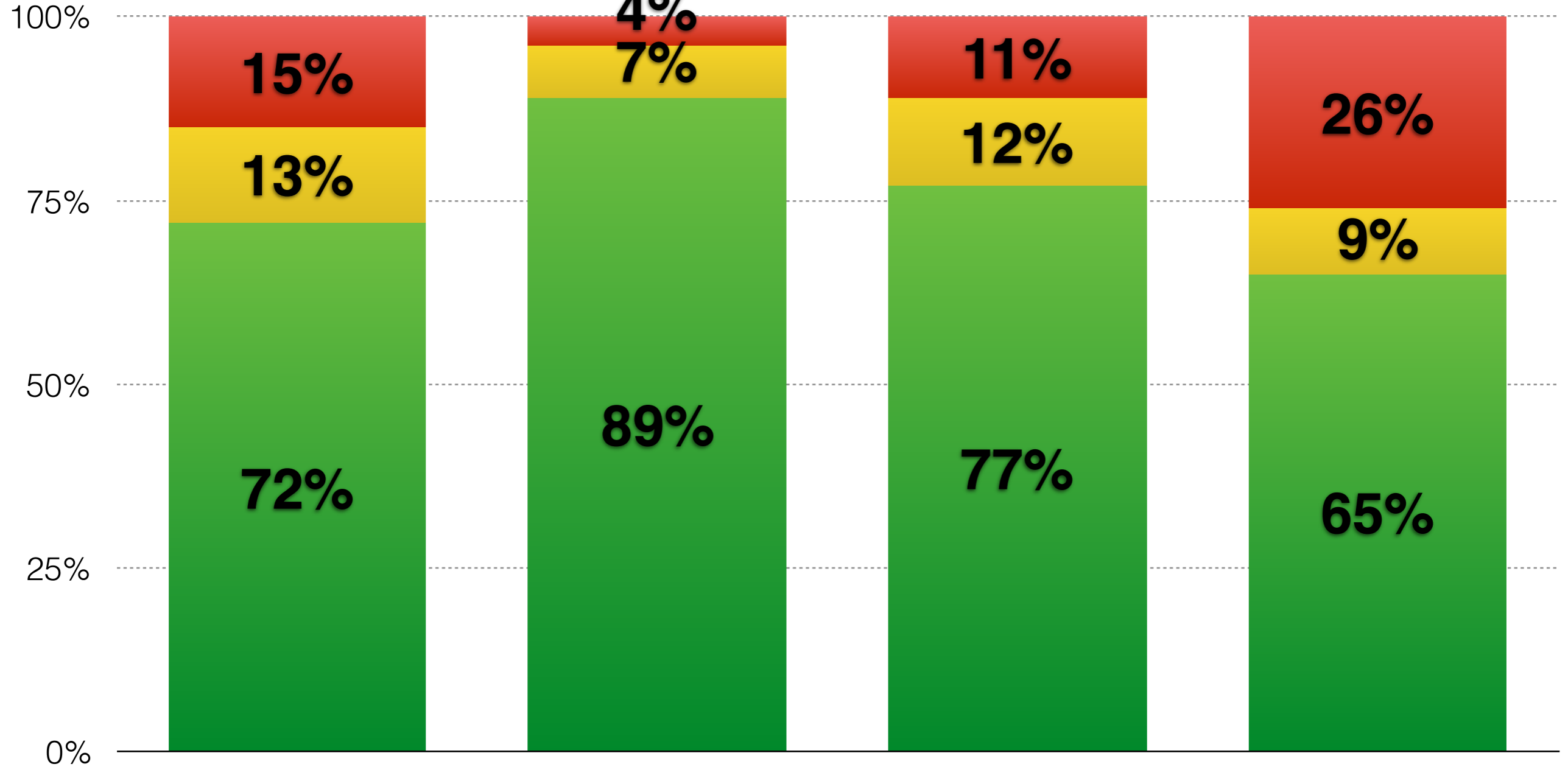
Moose

■ incorrectly guessed variables - average 34%

■ near-guessed variables - average 7%

■ guessed variables - average 59%

RESULTS - hierarchies



Roassal2

Glamour

Morphic

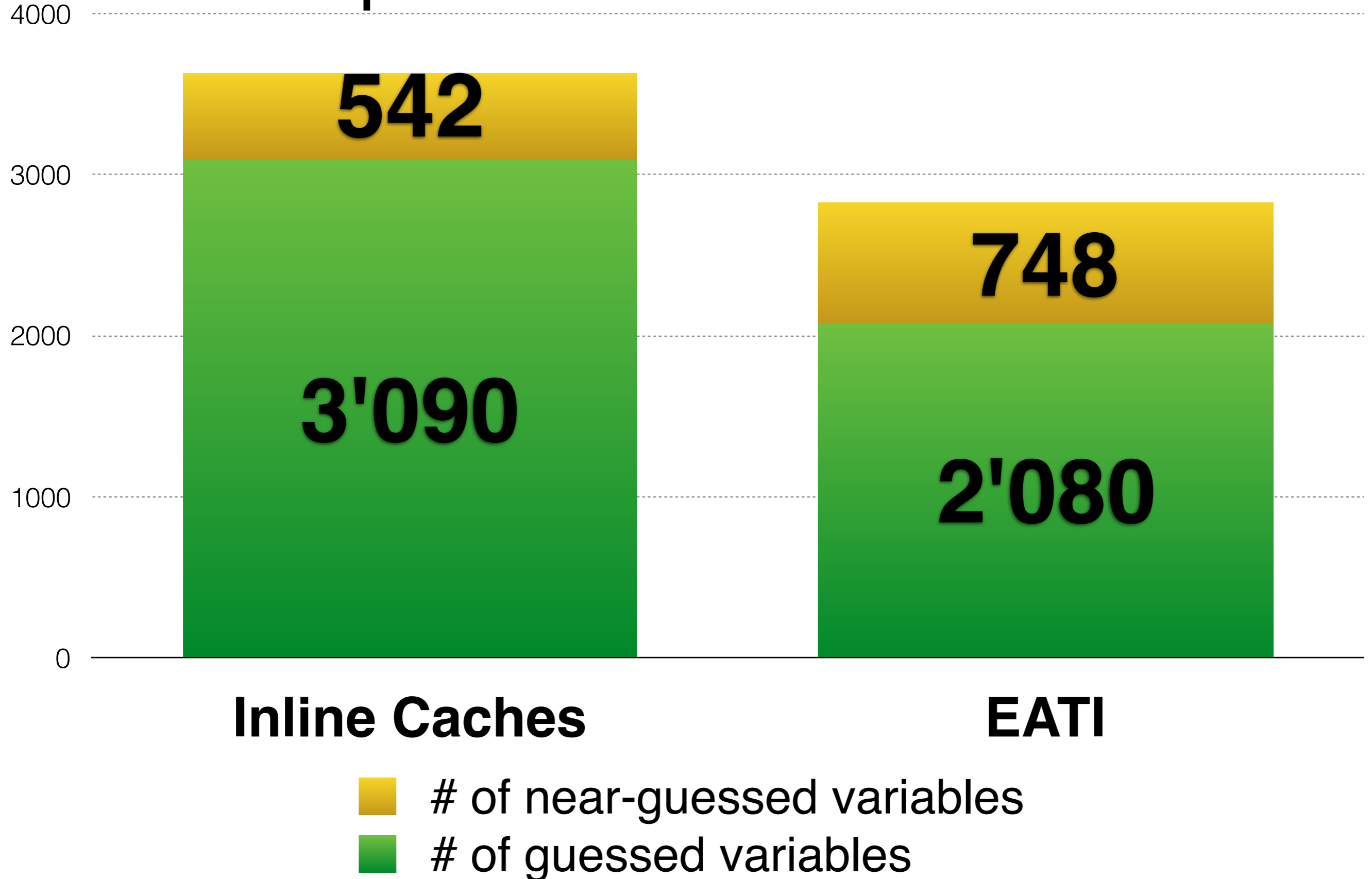
Moose

■ incorrectly guessed variables - average 15%

■ near-guessed variables - average 13%

■ guessed variables - average 72%

Comparison with EATI



Summary

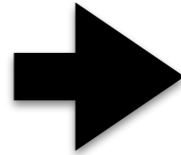
```
GLMPane>>resetAnnouncer
```

```
super resetAnnouncer.
```

```
GLMPane>>update
```

```
...
```

```
self presentations do: [ :each | each update ]
```



GTGenericStackDebugger

...

MooseFinder

PPBrowser

...

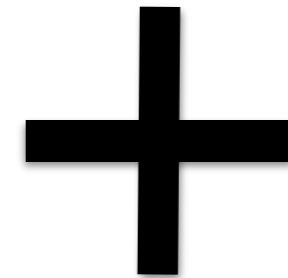
GTPPDebugger

GLMPane

...

GTSimpleMethodsBrowser

GLMRubricTextPresentation

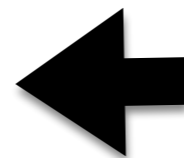


INLINE

CACHING

FREQUENCY

DATA



GLMPane

GLMTabulator

GLMCompositePresentation

GLMListPresentation

...

GLMImplicitBrowser

OnMooseMetaPropertiesWithoutComments

PPPParserBrowser

GLMSpecPresentation