Ruby 2.1 のすべて

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About this presentation

- In this presentation, I will show you about Ruby 2.1 which I know.

Ruby 2.1 release plan announcement

"I, Naruse, take over the release manager of Ruby 2.1.0 from mame. Ruby 2.1.0 is planed to release in 2013-12-25. ***<u>I'm planning to call for feature proposals soon like 2.0.0 [ruby-core:45474], so if you have a suggestion you should begin preparing the proposal.</u>****"*

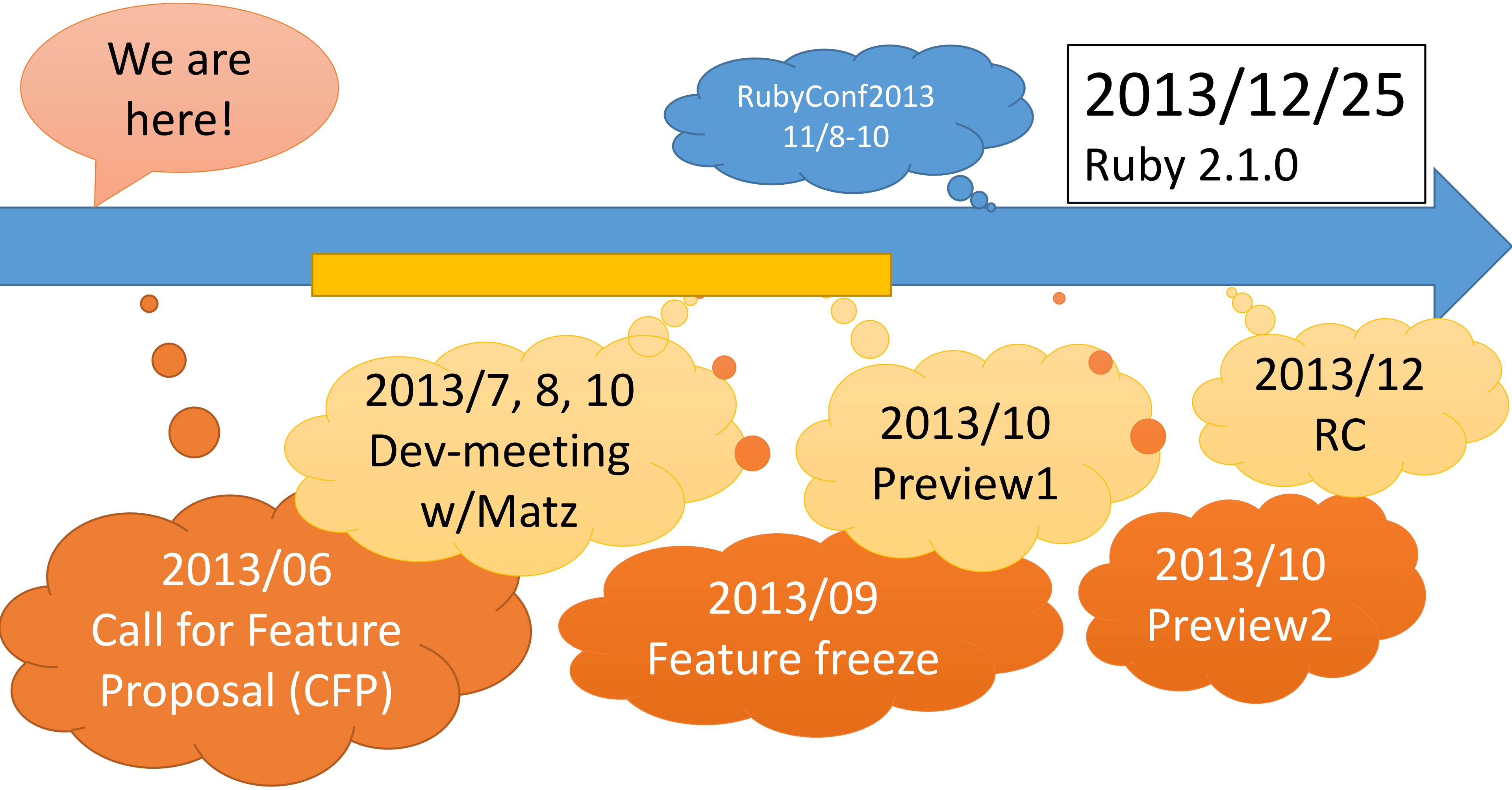
- *[ruby-core:54726] Announce take over the release manager of Ruby 2.1.0*

by NARUSE, Yui

2013/12/25!

http://www.flickr.com/photos/htakashi/5285103341/ by Takashi Hososhima

Ruby 2.1 schedule (more)



https://bugs.ruby-lang.org/projects/ruby-trunk/wiki/ReleaseEngineering210

Ruby 2.1 Changes

- Syntax changes
  - Required keyword argument
  - “r”, “i”, “f” suffix
  - “def” sentence returns a symbol of method name
- Runtime changes
  - String#scrub
  - Object tracing
  - Refinement is no longer experimental features
- Performance improvements
  - RGenGC: Generational GC
  - klasscache - the class hierarchy invalidation patch
- Other changes

Syntax
Required keyword argument

- “Keyword argument” from Ruby 2.0 is a alternative of optional argument
  - def foo(foo=1, bar: 2); end
  - foo(); foo(100); foo(100, bar: 200) # OK
- “Required keyword argument” is a not optional keyword argument
  - def foo(foo=1, bar:); end
  - foo(); foo(100); # NG: missing keyword: bar
  - foo(100, bar: 200) # OK

Syntax
“r” suffix for Rational numbers

- To represent ½, in Ruby “Rational(1, 2)”

  → Too long!!
- Introduce “r” suffix

  ½ → 1/2r
- “[digits]r” represents “Rational([digits], 1)”
- 1/2r #=> 1/Rational(2, 1)
- 1/Rational(2, 1) #=> Rational(1/2)

Syntax
“i” suffix for Complex numbers

- We already have “Integer#i” method to make imaginary number like “1+2.i”
- We already introduced “r” suffix for Rational

  → No reason to prohibit “i” suffix!!
- [digits]i represents “Complex(0, [digits])”
- 1+2i #=> 1+Complex(0, 2)
- 1+Complex(0, 2) #=> Complex(1, 2)

- You can mix “r” and “i” suffix

Syntax “f” suffix for String

- String literal “foo” creates new objects each time
  - 10.times{p “foo”.object_id} #=> show different objects
  - To support mutable strings
- “foo”f (‘f’ suffix) creates same/frozen string
  - 10.times{p “foo”f.object_id} #=> show only one object id
- Aggregate same frozen strings
  - p(“foo”f.object_id, “foo”f.object_id) #=> same object id
- Mainly for performance
  - Target is framework such as ERb, etc

Syntax
“def” returns a name symbol

- p(def foo; end) #=> nil @Ruby 2.0 and before
- p(def foo; end) #=> :foo @Ruby 2.1

- Usecase
  - private static void def main(args) …; end

Runtime changes String#scrub

- Problem: How to verify/fix invalid byte sequence?
- From Ruby 2.1, we introduce two methods “String#scrub” and “String#scrub!” to verify and fix invalid byte sequence.

Runtime changes
Object tracing

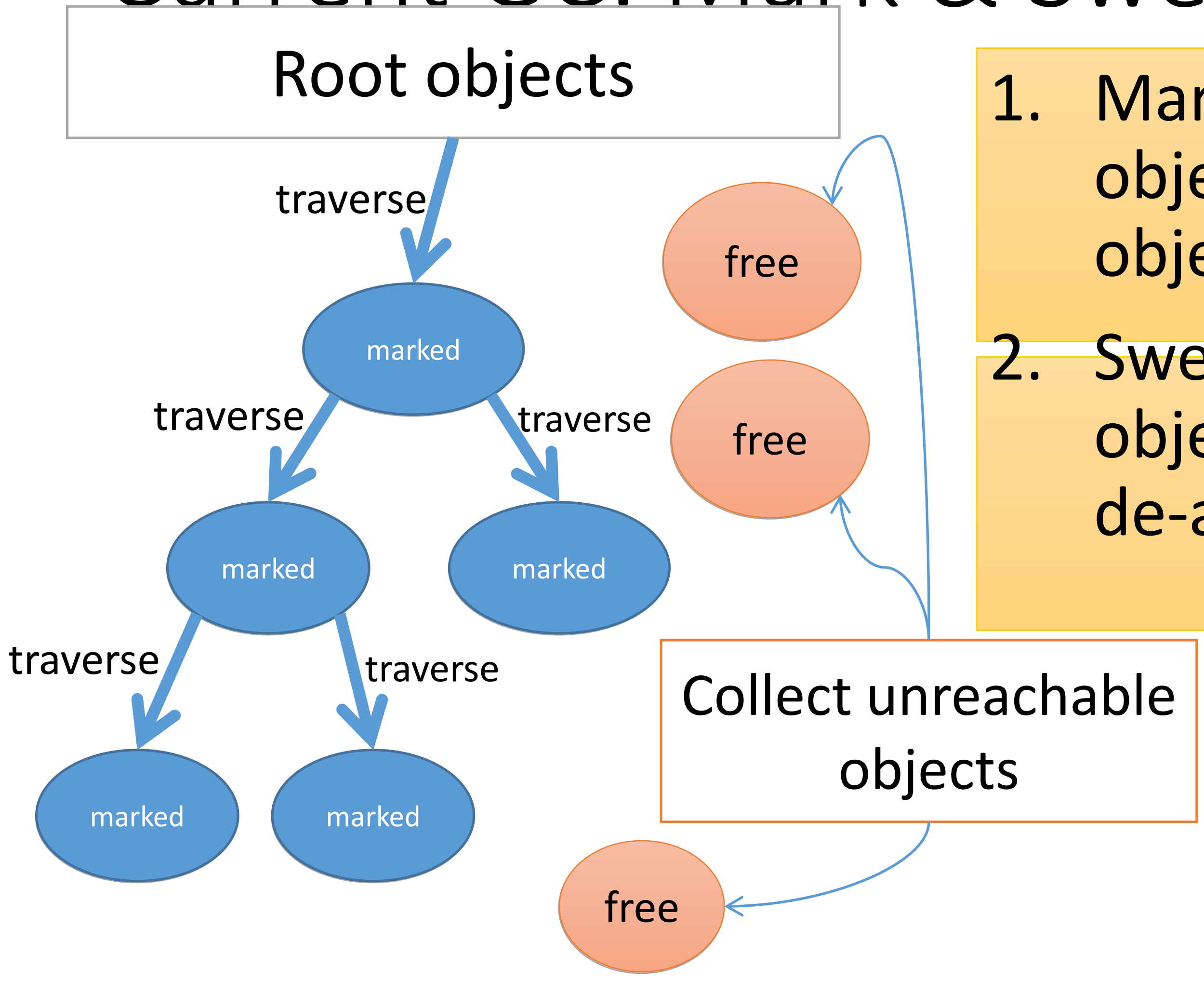
- ObjectSpace. trace_object_allocations
  - Trace object allocation and record allocation-site
    - Record filename, line number, creator method’s id and class
  - Usage:

```
ObjectSpace.trace_object_allocations{ # record only in the block
   o = Object.new
   file = ObjectSpace.allocation_sourcefile(o)   #=> __FILE__
   line = ObjectSpace.allocation_sourceline(o) #=> __LINE__ -2
}
```

Performance improvement RGenGC: Generational GC

- Issue: M&S is slow
- Issue: Introducing generational GC causes serious compatibility problem
- Proposal: Introduce new GC algorithm RGenGC (Restricted Generational GC) without compatibility problem

Performance improvement Current GC: Mark & Sweep



1. Mark reachable objects from root objects
2. Sweep ***unmarked*** objects (collection and de-allocation)

RGenGC: Background Generational GC (GenGC)

- Weak generational hypothesis: Most objects die young → Concentrating reclamation effort on the youngest objects
- Separate young generation and old generation
  - Create objects as young generation
  - Promote to old generation after surviving *n-th* GC
  - In CRuby, *n == 1* (after 1 GC, objects become old)
- Usually, GC on young space (minor GC)
- GC on both spaces if no memory (major/full GC)

RGenGC: Background Difficulty of inserting write barriers

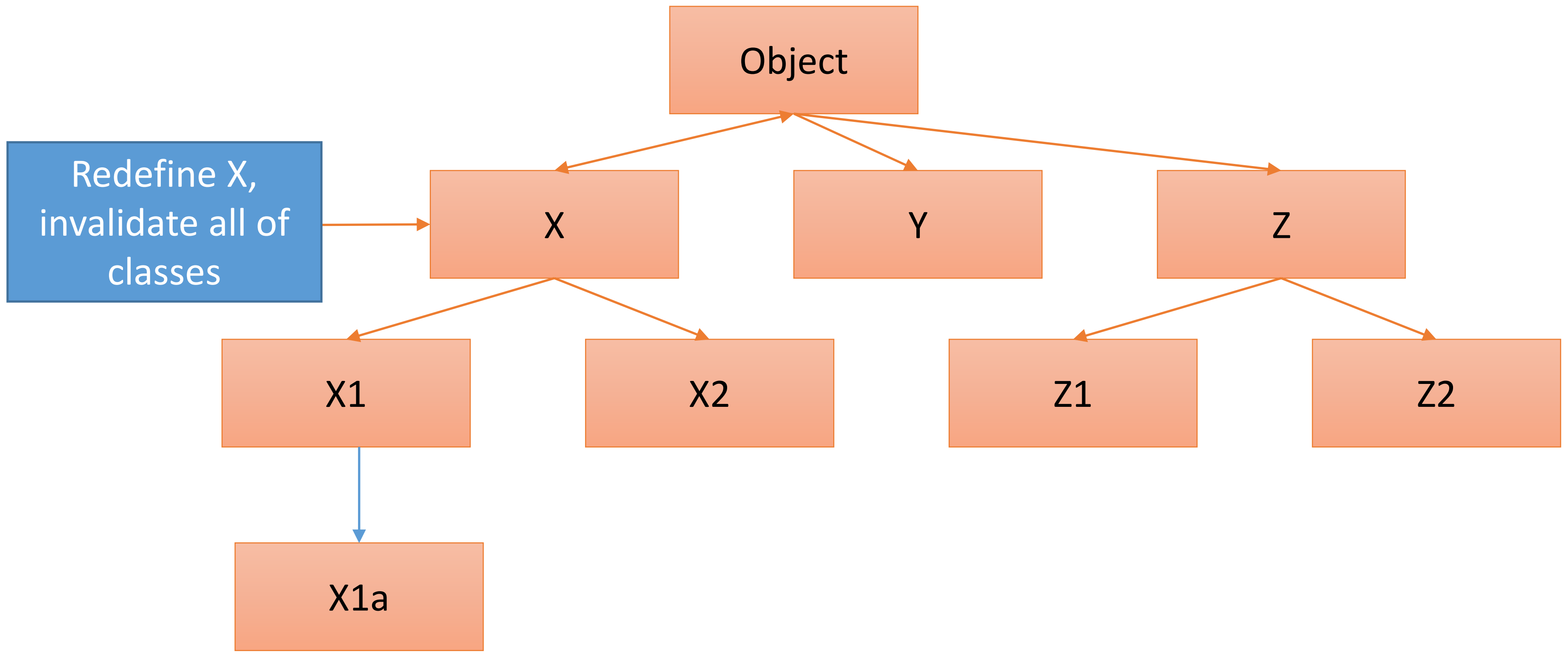
- To introduce generational garbage collector, WBs are necessary to detect [old→new] type reference
- “Write-barrier miss” causes terrible failure
  1. WB miss
  2. Remember-set registration miss
  3. (minor GC) marking-miss
  4. **Collect live object → Terrible GC BUG!!**

Performance improvement RGenGC: Generational GC

- RGenGC: Restricted Generational GC
  - New GC algorithm allows mixing “Write-barrier protected objects” and “WB unprotected objects”
  - **No** (mostly) **compatibility issue** with C-exts
- Inserting WBs gradually
  - We can concentrate WB insertion efforts for major objects and major methods
  - Now, **Array, String, Hash, Object, Numeric** objects are WB protected
    - Array, Hash, Object, String objects are very popular in Ruby
    - Array objects using **RARRAY_PTR() change to WB unprotected** objects (called as Shady objects), so existing codes still works.

Performance improvement
klasscache: the class hierarchy invalidation

- Invalidate all classes' method cache



Performance improvement
klasscache: the class hierarchy invalidation

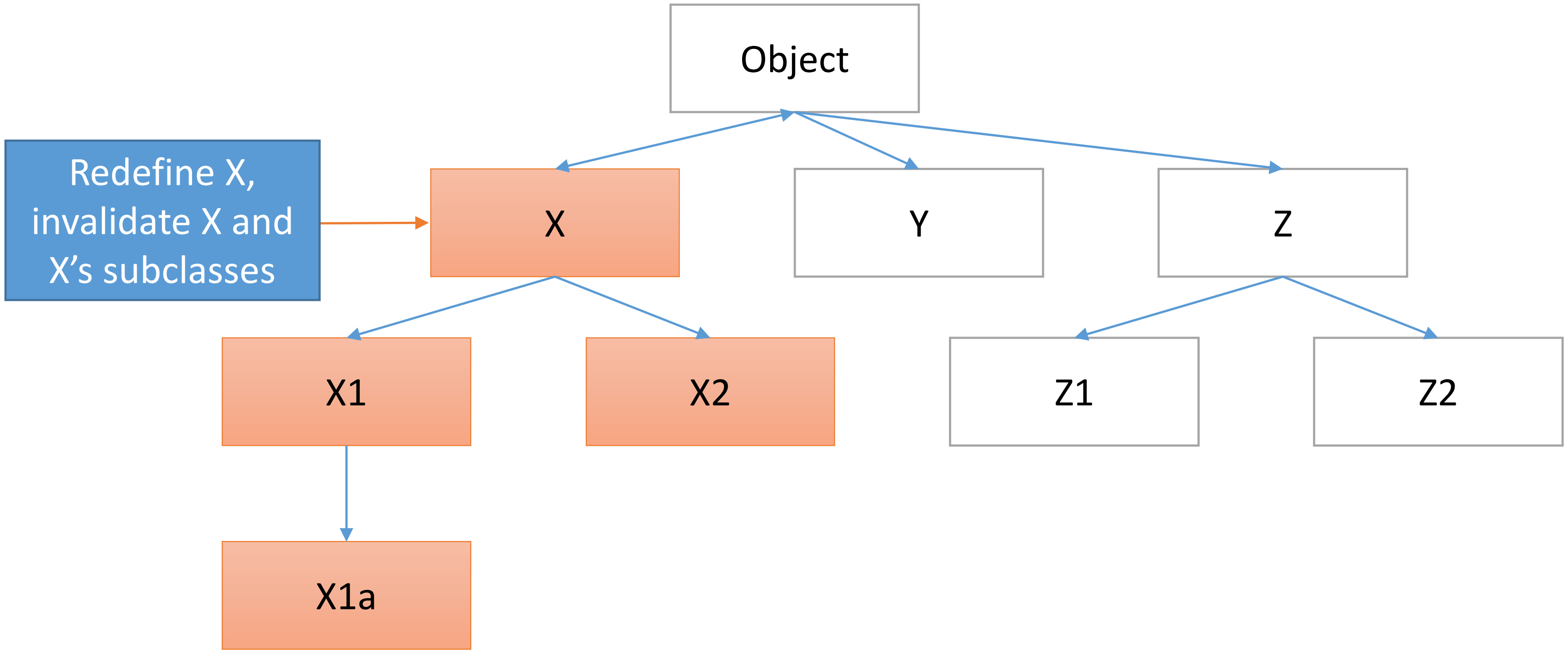
“This patch adds class hierarchy method caching to CRuby. This is the algorithm used by JRuby and Rubinius.”

[ruby-core:55053] [ruby-trunk - Feature #8426][Open]
Implement class hierarchy method caching

by Charlie Somerville

Performance improvement
klasscache: the class hierarchy invalidation

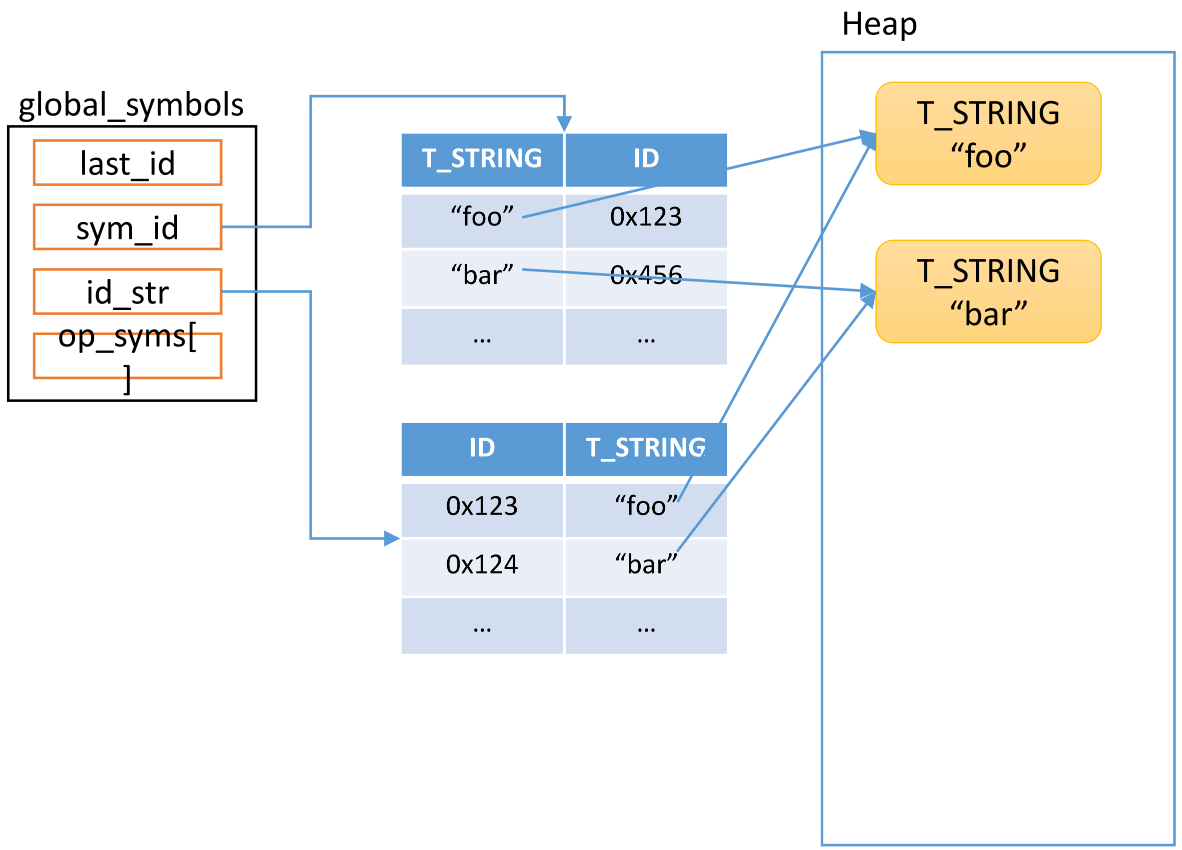
- Invalid only sub-classes under effective class



Planned changes

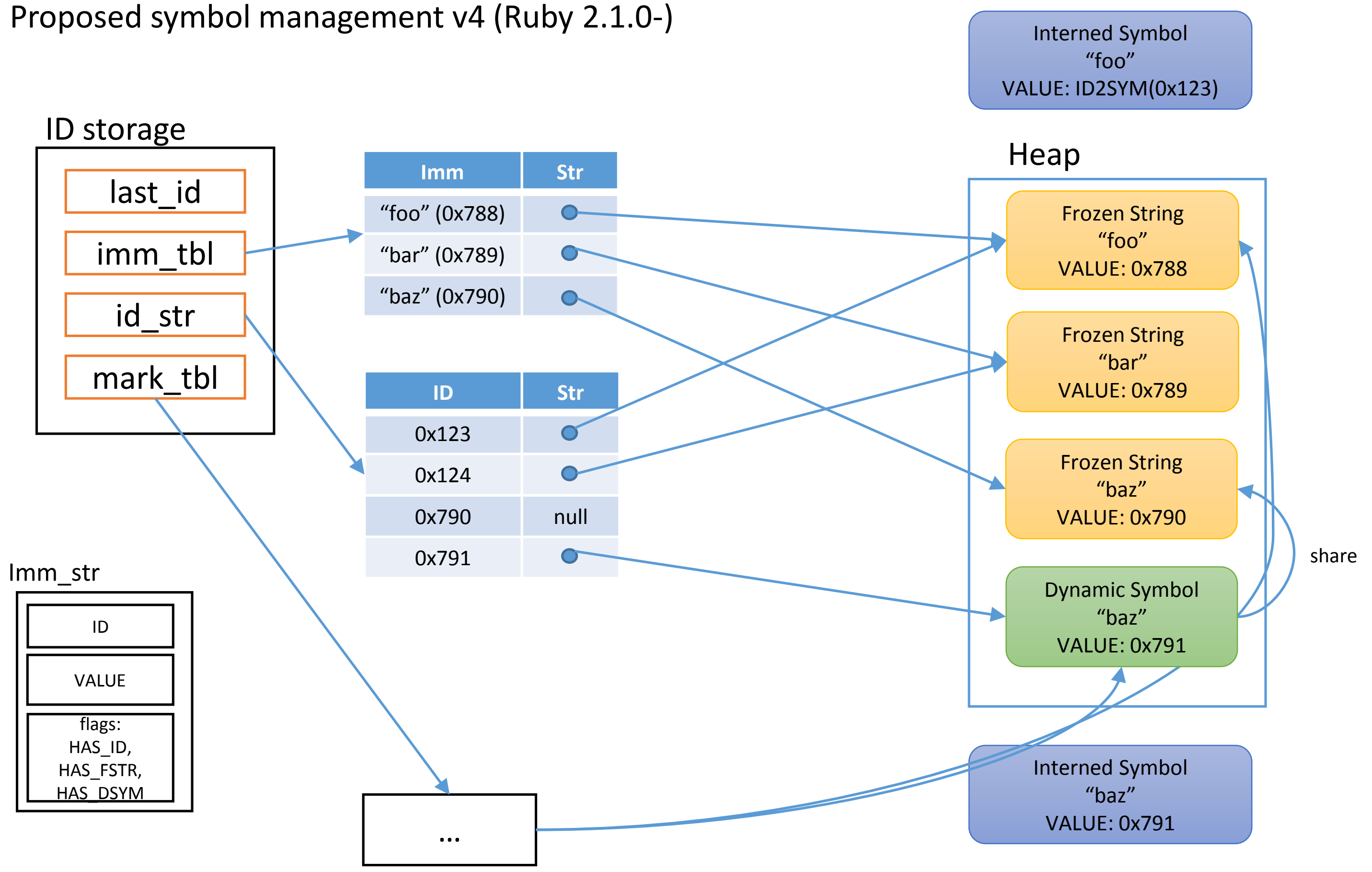
- Sophisticated Symbol management
  - Collectable symbols

Current symbol management (-Ruby 2.0.0)



```
rb_intern(char *cstr, enc) {/* pseudo code */
  str = make_fake_str(cstr, enc)
  if (st_lookup(sym_id, str, &id)) { return id }
  else {
    str = make_true_str(cstr, enc);
    ID id = last_id++;
    st_insert(sym_id, cstr, id)
    st_insert(id_str, id, cstr)
}
```

Proposed symbol management v4 (Ruby 2.1.0-)



Summary

- Schedule: <u>Release at 2013/12/25</u>
    - Preview1 2013/10
    - Preview2 2013/10 with feature freeze
    - Preview3 ?
    - Release candidate 2013/12/11
    - Release 2013/12/25
- New features
- Performance improvement

- https://bugs.ruby-lang.org/projects/ruby-trunk/wiki/ReleaseEngineering210

Thank you

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