## Array#max and Array#min

**03/14/2016 01:30 PM - mame (Yusuke Endoh)**

<table>
<thead>
<tr>
<th>Status:</th>
<th>Closed</th>
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<tbody>
<tr>
<td>Priority:</td>
<td>Normal</td>
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<tr>
<td>Assignee:</td>
<td>mame (Yusuke Endoh)</td>
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### Description

I propose to define `Array#max`. It is 10+ times faster than `Enumerable#max` since it skips a call to `#each`.

```ruby
a = [*1..10000]; 100000.times { a.max }
```

- no patch: 22.424s
- `Array#max` defined: 1.740s

I don't think it is a good idea to copy all `Enumerable` methods to `Array`. But there are two reasons why `max` is special:

- It is one of the most basic operations for big data processing.
- We often use an idiom `[a, b].max` because of the lack of `Math.max(a, b)`.

I think the latter is particularly important. The idiom is concise but unsuitable in a hotspot since it creates a temporal array. If `Array#max` is defined, we can easily optimize the idiom by introducing a special instruction like `opt_newarray_max`.

```ruby
x, y = 1, 2; 10000000.times { [x, y].max }
```

- no patch: 2.799s
- `Array#max` defined: 1.224s
- `opt_newarray_max`: 0.555s

$ ./miniruby --dump=insns -e 'x, y = 1, 2; [x, y].max'

```
== disasm: #<ISeq:<main>@-e>============================================
local table (size: 3, argc: 0 [opts: 0, rest: -1, post: 0, block: -1, kw: -1@-1, kwrest: -1])
  [3] x
  [2] y
0000 trace             1
0002 putobject_OP_INT2FIX_O_1_C_   ( 1)
0003 putobject         2
0005 setlocal_OP__WC__0  2
0007 setlocal_OP__WC__0  3
0009 getlocal_OP__WC__0  3
0011 getlocal_OP__WC__0  2
0013 opt_newarray_max   2
0015 leave
```

The patches are attached. (0001 is a preparation. 0002 introduces `Array#max`. 0003 introduces a special instruction.)

Of course, we can say the same for `Array#min`. The patches include `Array#min` too.

What do you think?

### Associated revisions

**Revision 68a6f2e9 - 03/17/2016 12:14 PM - mame (Yusuke Endoh)**

- `array.c` (rb_ary_max, rb_ary_min): `Array#max` and `Array#min` added. [Feature #12172]
- `internal.h` (OPTIMIZED_CMP): moved from enum.c so that array.c can use it.
- `test/ruby/test_array.rb` (test_max, test_min): tests for `Array#max`
and Array#min.

- test/ruby/test_enum.rb (test_max, test_min): revised a bit to test Enumerable#max and #min explicitly.

git-svn-id: svn+ssh://ci.ruby-lang.org/ruby/trunk@54150 b2dd03c8-39d4-4d8f-98ff-823fe69b080e

Revision 54150 - 03/17/2016 12:14 PM - mame (Yusuke Endoh)

- array.c (rb_ary_max, rb_ary_min): Array#max and Array#min added. [Feature #12172]
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Revision f8e29640 - 03/17/2016 12:49 PM - mame (Yusuke Endoh)

- NEWS: add Array#max, #min, and the optimization. [Feature #12172]

Revision 54154 - 03/17/2016 12:49 PM - mame (Yusuke Endoh)

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History

#1 - 03/14/2016 02:44 PM - mame (Yusuke Endoh)
  - Description updated

#2 - 03/17/2016 11:58 AM - mame (Yusuke Endoh)
  - Status changed from Open to Assigned
  - Assignee set to mame (Yusuke Endoh)

  Matz and ko1 accepted this proposal. I'll commit.

#3 - 03/17/2016 12:14 PM - mame (Yusuke Endoh)
  - Status changed from Assigned to Closed

Applied in changeset r54150.

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Files

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<th>Patch Name</th>
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<th>Date</th>
<th>Author</th>
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<tr>
<td>0001-refactor-a-data-structure-for-CMP_OPTIMIZABLE.patch</td>
<td>5.3 KB</td>
<td>03/14/2016</td>
<td>mame (Yusuke Endoh)</td>
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<tr>
<td>0002-introduce-Array-max-and-Array-min.patch</td>
<td>5.11 KB</td>
<td>03/14/2016</td>
<td>mame (Yusuke Endoh)</td>
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