

## Ruby - Bug #3609

### Float Infinity comparisons in 1.9

07/24/2010 01:14 PM - taw (Tomasz Wegrzanowski)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                           |                  |
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| <b>Status:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Closed                                                    | <b>Backport:</b> |
| <b>Priority:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Normal                                                    |                  |
| <b>Assignee:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                           |                  |
| <b>Target version:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.0.0                                                     |                  |
| <b>ruby -v:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ruby 1.9.1p429 (2010-07-02 revision 28523) [i386-darwin9] |                  |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                           |                  |
| <pre>=begin The way &lt;=&gt; works on pretty much everything in Ruby is that if a &lt;=&gt; b return 0, 1, or -1, it completely determines the entire set of comparisons a==b, a&gt;=b, a&gt;b, a&lt;=b, a&lt;b, b&lt;=&gt;a, b==a, b&gt;=a, b&gt;a, b&lt;=a, b&lt;a. (and if it doesn't, a==b/b==a will be both true or both false, everything else will raise exception or return false/nil)  Float Infinity in 1.9 but not 1.8 seems to violate that. Comparing it with strange things returns 1 if it's on the left, but raises exception in every other way.  inf = 1.0/0.0 inf &lt;=&gt; "foo" # =&gt; 1 "foo" &lt;=&gt; inf # ArgumentError: comparison of String with Float failed  This interacts even more strangely with very large bignums and the "if bignum converts to float, it equals that float" thing Ruby currently does [ruby-core:31376].  inf=1.0/0.0 huge=10**500  Consistent either way: inf &gt;= huge # =&gt; true huge &lt;= inf # =&gt; true inf &lt; huge # =&gt; false huge &gt; inf # =&gt; false  Consistent only with mathematical interpretation (or with "equal if converts, except for special cases for infinities"): inf &lt;=&gt; huge # =&gt; 1 huge&lt;=&gt; inf # =&gt; -1 huge &lt; inf # =&gt; true huge &gt;= inf # =&gt; false  Consistent only with "equal if converts": inf == huge # =&gt; true huge == inf # =&gt; true inf &gt; huge # =&gt; false inf &lt;= huge # =&gt; true  Now I'd definitely prefer mathematical interpretation of floats, to "equal if converts", but this just doesn't make any sense no matter which way I look at it.  =end</pre> |                                                           |                  |

### History

**#1 - 07/25/2010 03:11 AM - marcandre (Marc-Andre Lafortune)**

- Category set to core

=begin

I completely agree that `Math::Float <=> "foo"` should return nil.

The current behavior is due to r23742 which wanted to address the fact that `Float::Infinity <=> BigDecimal("1.0E500")` was returning 0 (I think, see rubydev:38681)

To fix `Float::Infinity <=> "foo"`, the minimum that must be done is:

```
diff --git a/numeric.c b/numeric.c
index eb3d4be..daa5d6d 100644
```

```
--- a/numeric.c
```

```
+++ b/numeric.c
```

```
@@ -1038,7 +1038,7 @@ flo_cmp(VALUE x, VALUE y)
```

```
break;
```

```
default:
```

- [REDACTED]
- [REDACTED]
- [REDACTED] !RTEST(rb\_funcall(y, rb\_intern("infinite?"), 0, 0))) {  
if (a > 0.0) return INT2FIX(1);  
return INT2FIX(-1);

The fact that `<=>` is not consistent with `<`, etc, is also a problem that need to be fixed. Either the special treatment should be extended to the other comparison operators, or the special treatment for infinity should be removed from `<=>`

I believe the special treatment should be removed altogether:

```
diff --git a/numeric.c b/numeric.c
```

```
index eb3d4be..a6c5360 100644
```

```
--- a/numeric.c
```

```
+++ b/numeric.c
```

```
@@ -1038,11 +1038,6 @@ flo_cmp(VALUE x, VALUE y)
```

```
break;
```

```
default:
```

- [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED] return rb\_num\_coerce\_cmp(x, y, rb\_intern("<="));
- ```
}  
return rb_dbl_cmp(a, b);
```

I understand the intent, but the fact is that `Float::INFINITY` is a very big value, but since it is the float representation of a lot of big real numbers, like 10400, 1040000 or even Infinity itself, I feel that r23742 introduces many inconsistencies. For example, currently:

```
1.0e200 ** 2 <=> BigDecimal("1.0e999999") # => 1
```

=end

**#2 - 07/25/2010 05:47 AM - nobu (Nobuyoshi Nakada)**

- Status changed from Open to Closed

- % Done changed from 0 to 100

=begin

This issue was solved with changeset r28751.

Tomasz, thank you for reporting this issue.

Your contribution to Ruby is greatly appreciated.

May Ruby be with you.

=end

**#3 - 07/25/2010 06:01 AM - nobu (Nobuyoshi Nakada)**

- Status changed from Closed to Assigned
- Assignee set to yugui (Yuki Sonoda)

=begin

=end

**#4 - 07/30/2010 01:50 AM - mame (Yusuke Endoh)**

- Status changed from Assigned to Closed

=begin

Backported at r28788.

=end

**#5 - 07/30/2010 06:54 AM - marcandre (Marc-Andre Lafortune)**

- Status changed from Closed to Open
- Assignee deleted (yugui (Yuki Sonoda))

=begin

The patch fixes comparison with non numerics, but doesn't address the rest of the issues:

- inconsistency with mathematics
- inconsistency with other operators like <, <=, ..

Is there objection to removing the special test for infinity?

```
diff --git a/numeric.c b/numeric.c
index 740ef54..ed159ce 100644
--- a/numeric.c
+++ b/numeric.c
@@ -1039,15 +1039,6 @@ flo_cmp(VALUE x, VALUE y)
break;
```

default:

- [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
  - [REDACTED]
- ```
return rb_num_coerce_cmp(x, y, rb_intern("<="));
}
```
- ```
return rb_dbl_cmp(a, b);
```

=end

**#6 - 07/30/2010 12:47 PM - mame (Yusuke Endoh)**

- Target version set to 2.0.0

=begin

Hi,

The patch fixes comparison with non numerics, but doesn't address the rest of the issues:

Indeed. I thought nobu aimed to fix only the obvious wrong condition.

Is there objection to removing the special test for infinity?

It looks like a design issue rather than code bug. So I change this to 1.9.x.

I have no objection against removal of the code in trunk. Though, I like rather extend the special test to other operators than remove.

--

Yusuke Endoh [mame@tsg.ne.jp](mailto:mame@tsg.ne.jp)  
=end

**#7 - 08/27/2010 01:59 PM - shyouhei (Shyouhei Urabe)**

*- Status changed from Open to Closed*

=begin

=end