Ruby master - Bug #12274

accessing to instance variable should be fast.

04/12/2016 03:50 PM - tarui (Masaya Tarui)

<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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<td>Assignee:</td>
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<td>Target version:</td>
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**Description**

Currently, accessing to instance variable is quite slower than accessing to local variable. I think accessing to instance variable is basic operation and it should be fast, so tried to improve.

patch: [https://github.com/tarui/ruby/commit/dd993da80c7ad84340689137bf8b308793595cae](https://github.com/tarui/ruby/commit/dd993da80c7ad84340689137bf8b308793595cae)


It increases in the maintenance cost a little, but can I commit it?

```bash
$ ./ruby -v --disable-gems ../../../optcarrot/bin/optcarrot --benchmark ../../../optcarrot/examples/Lan_Master.nes
ruby 2.4.0dev (2016-04-12 trunk 54553) [x86_64-linux]
fps: 13.664029283085743
checksum: 59662

$ ./ruby -v --disable-gems ../../../optcarrot/bin/optcarrot --benchmark ../../../optcarrot/examples/Lan_Master.nes
ruby 2.4.0dev (2016-04-12 fast-ivar-access 54553) [x86_64-linux]
fps: 15.120651593726231
checksum: 59662
```

**Associated revisions**

Revision 44916ec4 - 05/11/2016 12:50 PM - tarui (Masaya Tarui)

- compile.c (iseq_compile_each): share InlineCache during same instance variable accesses. Reducing memory consumption, raising cache hit rate and raising branch prediction hit rate are expected. A part of [Bug #12274].

  * iseq.h (struct iseq_compile_data): introduce instance variable IC table for sharing.

  * iseq.c (prepare_iseq_build, compile_data_free): construct/destruct above table.

Revision 54976 - 05/11/2016 12:50 PM - tarui (Masaya Tarui)

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07/29/2021
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iseq.c (prepare_iseq_build, compile_data_free): construct/destruct above table.

History

#1 - 04/12/2016 07:21 PM - ko1 (Koichi Sasada)
Tarui-san suggested another way to optimize and this is my version of that technique (with some refactoring).

evaluation result:
fps: 19.21335880758348
->
fps: 22.16285461090967
vm_getivar(VALUE obj, ID id, IC ic, struct rb_call_cache *cc, int is_attr)
{
    #if USE_IC_FOR_IVAR
    if (RB_TYPE_P(obj, T_OBJECT)) {
        VALUE val = Qundef;
        VALUE klass = RBASIC(obj)->klass;
        VALUE val;

        if (LIKELY(is_attr ? cc->aux.index > 0 : ic->ic_serial == RCLASS_SERIAL(klass))) {
            const long len = ROBJECT_NUMIV(obj);
            const VALUE *const ptr = ROBJECT_IVPTR(obj);

            long index = !is_attr ? (long)ic->ic_value.index : (long)(cc->aux.index - 1);

            if (LIKELY(is_attr ? cc->aux.index > 0 : ic->ic_serial == RCLASS_SERIAL(klass))) {
                long index = !is_attr ? (long)ic->ic_value.index : (long)(cc->aux.index - 1);

                if (index < len) {
                    val = ptr[index];
                    goto undefined;
                }
            } else if (RB_TYPE_P(obj, T_OBJECT)) {
                const long len = ROBJECT_NUMIV(obj);
                const VALUE *const ptr = ROBJECT_IVPTR(obj);

                st_data_t index;
                struct st_table *iv_index_tbl = ROBJECT_IV_INDEX_TBL(obj);

                val = Qundef;

                if (iv_index_tbl) {
                    if (st_lookup(iv_index_tbl, id, &index)) {
                        if ((long)index < len) {
                            val = ptr[index];
                        }
                    }
                } else if (RB_TYPE_P(obj, T_OBJECT)) {
                    const long len = ROBJECT_NUMIV(obj);
                    const VALUE *const ptr = ROBJECT_IVPTR(obj);

                    st_data_t index;
                    struct st_table *iv_index_tbl = ROBJECT_IV_INDEX_TBL(obj);

                    val = Qundef;

                    if (iv_index_tbl) {
                        if (st_lookup(iv_index_tbl, id, &index)) {
                            if (!is_attr) {
                                ic->ic_value.index = index;
                                ic->ic_serial = RCLASS_SERIAL(klass);
                            } else { /* call_info */
                                cc->aux.index = (int)index + 1;
                            }
                        }
                    }
                }
            }
        }
    }

    if (UNLIKELY(val == Qundef)) {
        if (!is_attr && RTEST(ruby_verbose))
            rb_warning("instance variable %"PRIsVALUE" not initialized", QUOTE_ID(id));
        val = Qnil;
        undefined:
    }
}
if (!is_attr && RTEST(ruby_verbose)) {
    rb_warning("instance variable %"PRIaVALUE" not initialized", QUOTE_ID(id));
}

- return val;
+ return Qnil;
}
#endif /* USE_IC_FOR_IVAR */

if (is_attr)

Koichi Sasada wrote:

Tarui-san suggested another way to optimize and this is my version of that technique (with some refactoring).

The diff is hard to read, would you have a commit on GitHub or a patch file?

Tarui-san, could you explain a bit the technique?
I am not sure to understand, it seems vm_getinstancevariable already has some inline cache.
Is it some manual inlining in the instruction code + avoiding some ID2SYM/INT2FIX (but these two seem performed at compile time, so mostly irrelevant for the benchmark)?

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#2 - 04/12/2016 08:41 PM - Eregon (Benoit Daloze)

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#3 - 04/13/2016 01:13 AM - tarui (Masaya Tarui)

there are 2 parts of optimization.

- share inline cache between same symbol(at compile.c)
- inline fast pass only and cut useless check(RB_TYPE_P).(at insns.def)

We can skip st_lookup from the 2nd insns by sharing cache.

Inlining register pass may have a bit penalty.
Cutting check was a accidental :-(, but it is not necessary if cached serial equals class one.

#4 - 04/13/2016 01:32 AM - tarui (Masaya Tarui)

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We can skip st_lookup from the 2nd insns by sharing cache.

Inlining register pass may have a bit penalty.

Cutting check was a accidental :-), but it is not necessary if cached serial equals class one.

I see, thanks for explaining :)

About the object check, is it not problematic to do ((struct RBasic*) obj)->klass if obj is a tagged integer (since klass is the second member, after flags)?
Or is there a hidden check before doing that?

#7 - 04/13/2016 12:55 PM - tarui (Masaya Tarui)

About the object check, is it not problematic to do ((struct RBasic*) obj)->klass if obj is a tagged integer (since klass is the second member, after flags)?

Thank you for pointing out.
I'll revive check.

#8 - 05/11/2016 12:50 PM - tarui (Masaya Tarui)
- Status changed from Open to Closed

Applied in changeset r54976.

- compile.c (iseq_compile_each): share InlineCache during same instance variable accesses. Reducing memory consumption, raising cache hit rate and raising branch prediction hit rate are expected. A part of [Bug #12274].
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