Немного о Boost

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+ Boost.CircularBuffer, Boost.Variant

Содержание

* Вести с полей разработки
* Из Boost в C++ Standard
* Проблемы
* Полезности
* Boost онлайн

Новости

* AFIO — на доработке
* Fiber — на доработке
* Compute — в ближайшем релизе
* DLL — в ближайшем релизе
* Hana — в ближайшем релизе

Compute

```
// create a vector on the device
compute::vector<float> device_vector(host_vector.size(), context);

// transfer data from the host to the device
compute::copy(
    host_vector.begin(), host_vector.end(), device_vector.begin(),
queue
);

// calculate the square-root of each element in-place
compute::transform(
    device_vector.begin(),
    device_vector.end(),
    device_vector.begin(),
    compute::sqrt<float>(),
    queue
);
```

DLL

```
#include <boost/dll.hpp>

auto cpp11_func = boost::dll::import<int(std::string&&)>(
        path_to_shared_library, "i_am_a_cpp11_function"
    );

cpp11_func("Hello");
```

DLL

```
#include <boost/dll/smart_library.hpp>

dll::smart_library sm("libcpp.so");
auto ovl1 = sm.get_function<void(int)>   ("overloaded");
auto ovl2 = sm.get_function<void(double)>("overloaded");
```

Hana

```
auto animals = hana::make_tuple(
    Fish{"Nemo"}, Cat{"Garfield"}, Dog{"Snoopy"}
);

// Access tuple elements with operator[] instead of std::get.
Cat garfield = animals[1_c];

// Perform high level algorithms on tuples (this is like std::transform)
auto names = hana::transform(animals, [](auto a) {
  return a.name;
});
```

В стандарт C++!

* Filesystem
* Thread
* Variant
* ASIO
* optional
* any
* string_ref→string_view
* and_/or_→ conjunction/disjunction

Проблемы в Boost

* Долго компилируется
* Большой объём бинарных файлов

~~Долго~~ компилируется

Мы исправляемся:

* Уменьшение зависимостей
* Variadic templates
* Убрали поддержку старых компиляторов

Советы:

* Современный компилятор
* Spirit, GIL, Fusion в cpp файлах

Большой объём бинарных файлов

С каждым годом лучше:

* noexcept
* variadic templates
* SCARY iterators
* -fvisibility=hidden

Советы:

RTTI on *

-fvisibility=hidden *

современный компилятор *

Полезности

Полезности

```
class task_type;

class work_queue {
    std::deque<task_type>       tasks_;
    boost::mutex                tasks_mutex_;
    boost::condition_variable   condition_variable_;

public:
    void push_task(const task_type& task) {
        boost::unique_lock<boost::mutex> lock(tasks_mutex_);
        tasks_.push_back(task);
        condition_variable_.notify_one();
    }

    // ...
    task_type pop_task();
};
```

Полезности

```
class task_type;

class work_queue {
    std::deque<task_type>       tasks_;
    boost::mutex                tasks_mutex_;
    boost::condition_variable   condition_variable_;

public:
    void push_task(const task_type& task) {
        boost::unique_lock<boost::mutex> lock(tasks_mutex_);
        tasks_.push_back(task);
        lock.unlock(); // up to 2 times faster
        condition_variable_.notify_one();
    }

    // ...
    task_type pop_task();
};
```

Полезности

```
task_type pop_task() {
    boost::unique_lock<boost::mutex> lock(tasks_mutex_);
    while (tasks_.empty()) {
        condition_variable_.wait(lock);
    }

    task_type ret = tasks_.front();
    tasks_.pop_front();
    return ret;
}

void push_task(const task_type& task) {
    boost::unique_lock<boost::mutex> lock(tasks_mutex_);
    tasks_.push_back(task);
    lock.unlock();
    condition_variable_.notify_one();
}
```

Полезности

```
#include <vector>
#include <boost/shared_ptr.hpp>

auto foo() {
    std::vector< boost::shared_ptr<int> > res;


    for (unsigned i = 0; i < 1000; ++i)
        res.push_back(
            boost::shared_ptr<int>(new int)
        );

    return res;
}
```

Полезности

```
#include <vector>
#include <boost/shared_ptr.hpp>

auto foo() {
    std::vector< boost::shared_ptr<int> > res;

    res.reserve(1000);
    for (unsigned i = 0; i < 1000; ++i)
        res.push_back(
            boost::shared_ptr<int>(new int)
        );

    return res;
}
```

Полезности

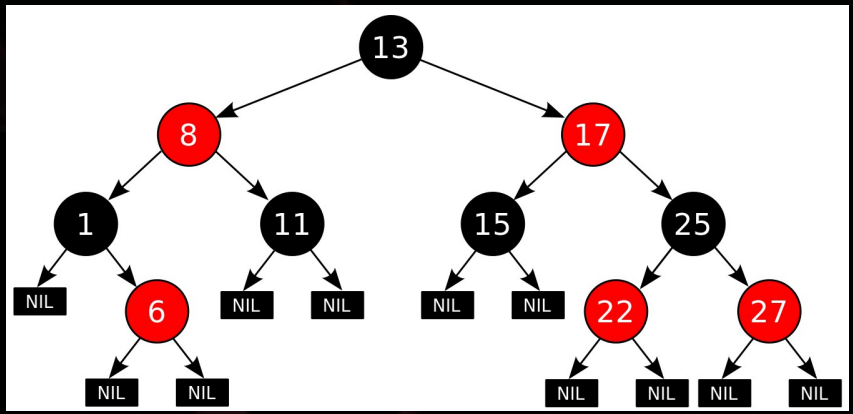
```
#include <vector>
#include <boost/shared_ptr.hpp>

auto foo() {
    std::vector< boost::shared_ptr<int> > res;

    res.reserve(1000);
    for (unsigned i = 0; i < 1000; ++i)
        res.push_back(
            boost::make_shared<int>()
        );

    return res;
}
```

Полезности: set<int>



Выделенная под 1 нод память 64 Byte:

|||||||| |||||||| |||||||| |||||||| ||||||||| ||||||||| ||||||||| ||||||||

| - вспомогательные данные аллокатора

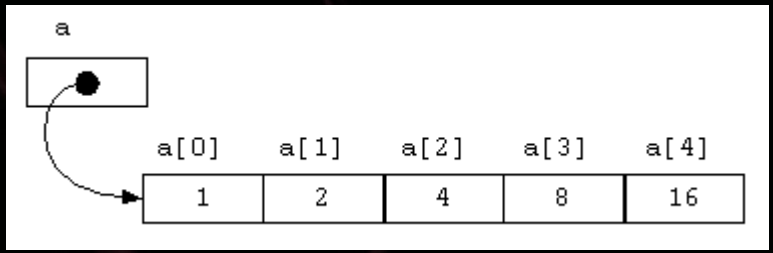
| - node's parent

| - node's left / right

| - data

| - неиспользованные байты кеша

container::flat_set<int>



В одной кеш линии x86 64 Byte:

||||||| ||||||| ||||||| ||||||| ||||||| ||||||| ||||||| |||||||

| - вспомогательные данные аллокатора

| - data

14 int в одной кеш линии

container::small_vector

```
#include <vector>

std::vector<int> data;

// Usually we get less than 16 ints
data.reserve(16);
get_some_data(data);
```

container::small_vector

```
#include <boost/container/small_vector.hpp>

// Usually we get less than 16 ints
boost::small_vector<int, 16> data;
get_some_data(data);
```

Полезности: Predef

```
#if !defined(__clang__) \
    && !defined(__ICC) \
    && !defined(__INTEL_COMPILER) \
    && (defined(__GNUC__) \
        || defined(__GNUG__))

// GCC specific

#endif
```

Полезности: Predef

```
#include <boost/predef/compiler.h>

#if BOOST_COMP_GNUC

// GCC specific

#endif
```

Boost онлайн

Boost Application | std::shared_ptr::g | boost thread vers | Using and buildin

en.cppreference.com/w/cpp/memory/shared_ptr/get

pointer, not the managed pointer.

Example

Run | Share | Exit | GCC 5.2 (C++14)

Powered by Coliru online compiler

```
1  #include <deque>
2  #include <boost/function.hpp>
3  #include <boost/thread/mutex.hpp>
4  #include <boost/thread/locks.hpp>
5  #include <boost/thread/condition_variable.hpp>
6
7  class work_queue {
8  public:
9      typedef boost::function<void()> task_type;
10
11 private:
12     std::deque<task_type>   tasks_;
13     boost::mutex            tasks_mutex_;
14     boost::condition_variable cond_;
15
16 public:
17     void push_task(const task_type& task) {
18         boost::unique_lock<boost::mutex> lock(tasks_mutex_);
19         tasks_.push_back(task);
20         lock.unlock();
21         cond_.notify_one();
22     }
23
24     task_type try_pop_task() {
```

Compiler messages:

```
/tmp/ccRIXpzT.o: In function `popper_sync()':
main.cpp:(.text+0x2c5): undefined reference to `boost::detail::get_current_thread_data()'
main.cpp:(.text+0x45b): undefined reference to `boost::this_thread::interruption_point()'
main.cpp:(.text+0x468): undefined reference to `boost::system::system_category()'
/tmp/ccRIXpzT.o: In function `boost::detail::thread_data<void (*)()>::~thread_data()':
main.cpp:(.text._ZN5boost6detail11thread_dataIPFvvEED2Ev[_ZN5boost6detail11thread_dataIPFvv
/tmp/ccRIXpzT.o: In function `boost::detail::thread_data<void (*)()>::~thread_data()':
```

Boost онлайн

Boost Application × | std::shared_ptr::g × | boost thread vers × | Using and buildin ×

apolukhin.github.io/Boost-Cookbook-4880OS/#Chapter05-recipe3-part1

an empty task if no tasks remain), and a method to post tasks.

Online Examples

Boost Application Development Cookbook

Heading

Chapters

Recipe's Intro

Compile & Run

About

Compile & Run

Run | Compile

Program arguments:

Compilation command:

```
g++ -Wall -DBOOST_THREAD_VERSION=4 main.cpp -lboost_thread -lboost_syst
```

Output:

```
Compilation: SUCCESS. Program output:

Exit code: 0
```

Code (editable):

```
1  #include <deque>
2  #include <boost/function.hpp>
3  #include <boost/thread/mutex.hpp>
4  #include <boost/thread/locks.hpp>
5  #include <boost/thread/condition_variable.hpp>
6
7  class work_queue {
8  public:
9      typedef boost::function<void()> task_type;
10
11 private:
12     std::deque<task_type>   tasks_;
13     boost::mutex            tasks_mutex_;
14     boost::condition_variable cond_;
15
16 public:
17     void push_task(const task_type& task) {
18         boost::unique_lock<boost::mutex> lock(tasks_mutex_);
19         tasks_.push_back(task);
20         lock.unlock();
21         cond_.notify_one();
```

Boost онлайн

http://apolukhin.github.io/Boost-Cookbook-4880OS/