Как мы начали использовать vcpkg

и переехали на git

Денис Панин

Мастер на все руки @ NVIDIA

В чем проблема переехать на git?

```
#include "../../../../самодельные_куски_буста.h"
```

В чем проблема переехать на git?

```
#include "../../../../самодельные_куски_буста.h"

#pragma comment(lib, "../../cool_lib/vc12_only.lib")
```

В чем проблема переехать на git?

```
#include "../../../../самодельные_куски_буста.h"

#pragma comment(lib, "../../cool_lib/vc12_only.lib")
```

Общий код между компонентами

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The leader in visual computing explains why they've standardized on Helix Core.

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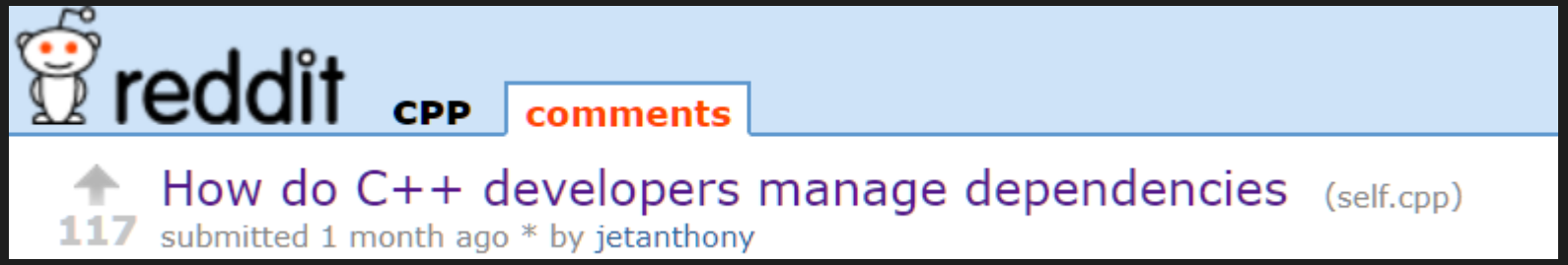
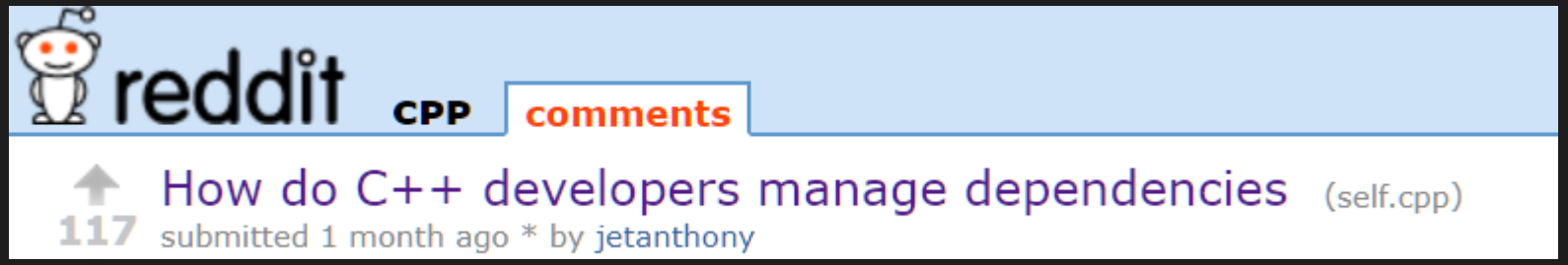
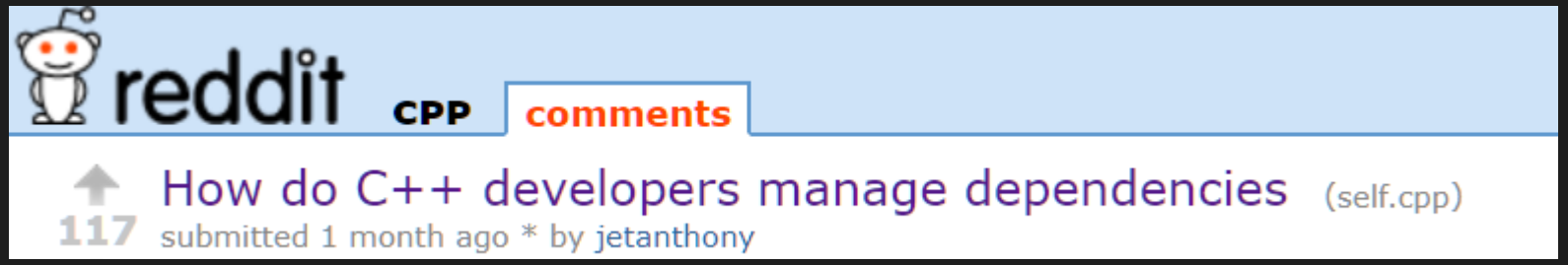

reddit
CPP
comments
How do C++ developers manage dependencies
(self.cpp)
117
submitted 1 month ago * by jetanthony



[–] **ooglesworth** 151 points 1 month ago

Through much pain and anguish.



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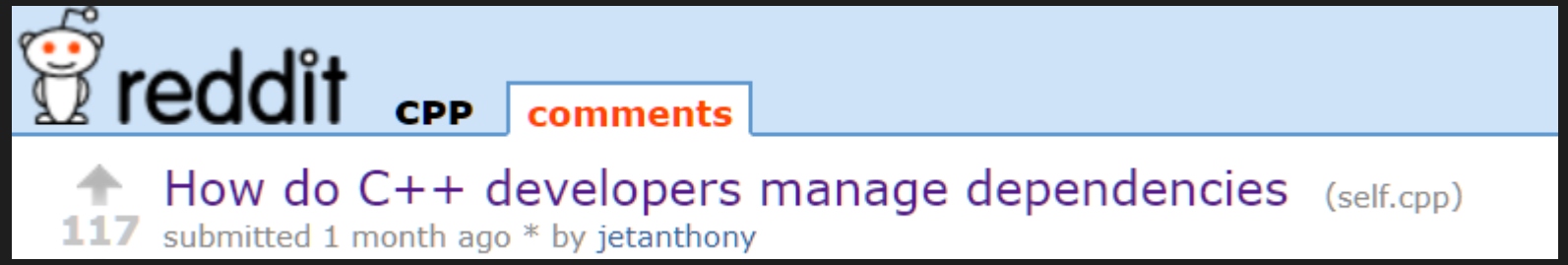
[–] **quzox_** 46 points 1 month ago

Step 1: Buy a lot of vodka

Step 2: Drink it

Step 3: Hope that the build is OK



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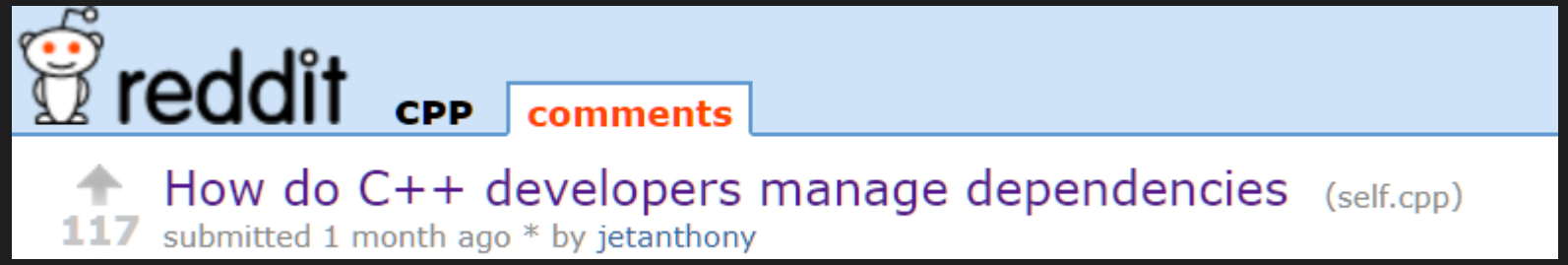

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From years of experience in several large companies: they don't, mostly.

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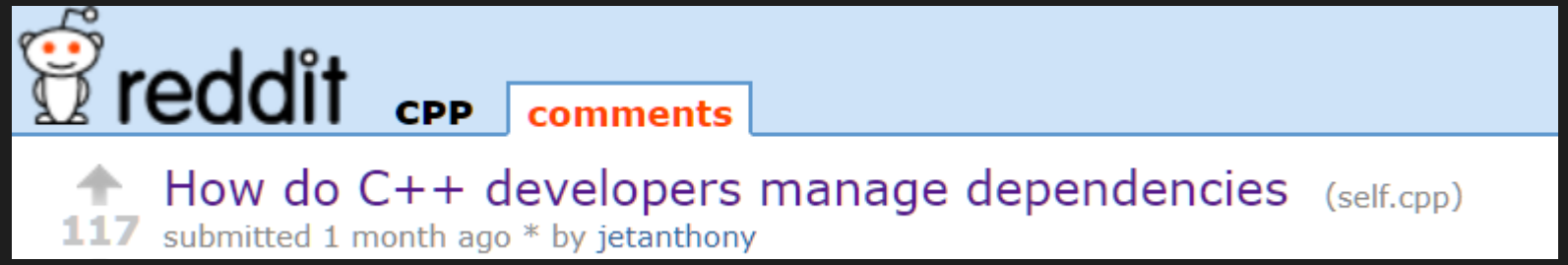

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[–] **Gustav__Mahler** 4 points 1 month ago

Multiple responses recommending hard liquor. My people.

[–] **quzox_** 46 points 1 month ago

Step 1: Buy a lot of vodka

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What dependency managers do you use in your projects?

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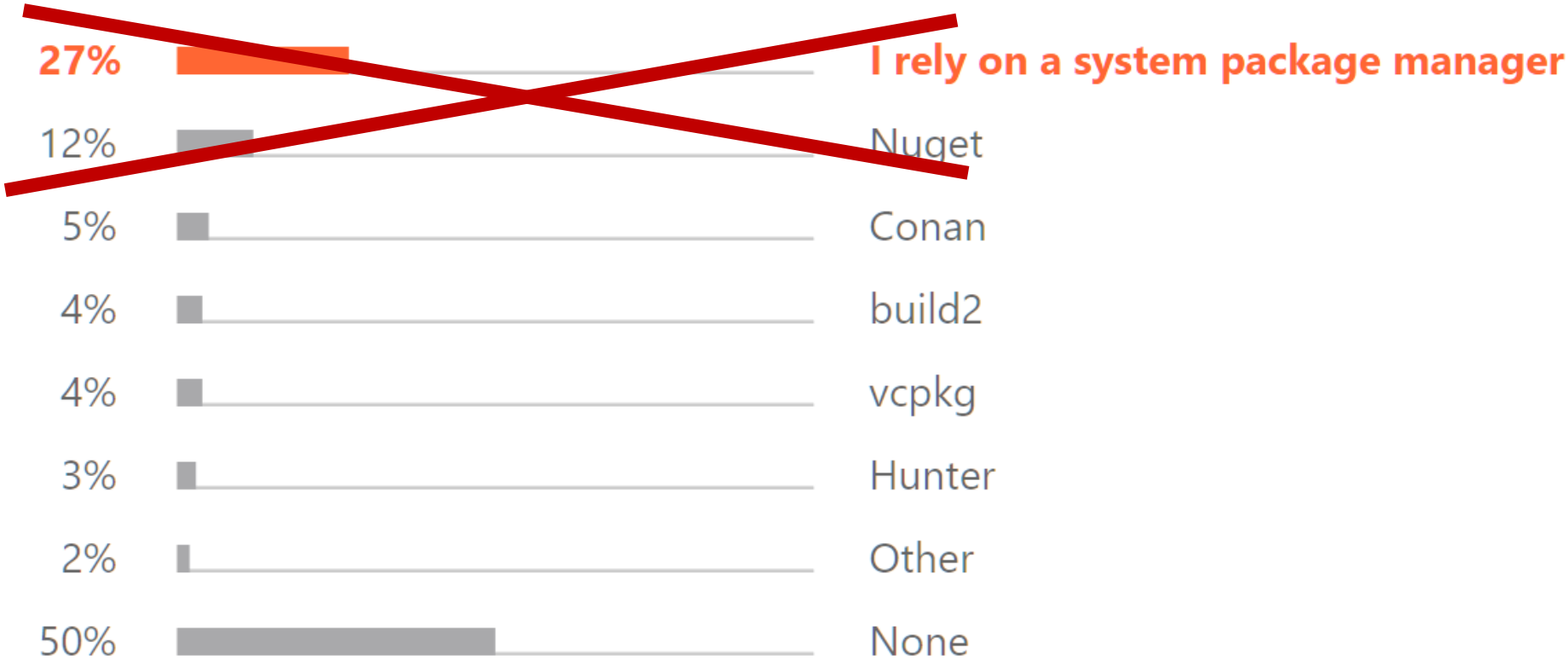


Часть 1.

Что может быть проще vcpkg?

```
git clone https://github.com/Microsoft/vcpkg.git
cd vcpkg
bootstrap-vcpkg.bat
```

```
git clone https://github.com/Microsoft/vcpkg.git
cd vcpkg
bootstrap-vcpkg.bat

vcpkg.exe integrate install
```

```
git clone https://github.com/Microsoft/vcpkg.git
cd vcpkg
bootstrap-vcpkg.bat

vcpkg.exe integrate install
```

All MSBuild C++ projects can now #include any installed libraries.

Linking will be handled automatically.

Installing new libraries will make them instantly available.

```cpp
#include <fmt/format.h>

int main() {
    fmt::format("Hello {}", "vcpkg");
}
```

```cpp
#include <fmt/format.h>

int main() {
    fmt::format("Hello {}", "vcpkg");
}
```

```
vcpkg install fmt:x64-windows
```

\packages\fmt_x64-windows\

```
\packages\fmt_x64-windows\

include -> fmt\*.h
```

```
\packages\fmt_x64-windows\

include -> fmt\*.h
bin     -> fmt.dll, fmt.pdb
```

```
\packages\fmt_x64-windows\

include -> fmt\*.h
bin     -> fmt.dll, fmt.pdb
lib     -> fmt.lib
```

```
\packages\fmt_x64-windows\

include -> fmt\*.h
bin     -> fmt.dll, fmt.pdb
lib     -> fmt.lib
debug   -> lib, bin (fmtd.*)
```

```
\packages\fmt_x64-windows\

include -> fmt\*.h
bin     -> fmt.dll, fmt.pdb
lib     -> fmt.lib
debug   -> lib, bin (fmtd.*)
share   -> *.cmake, copyright\license
```

```
\packages\fmt_x64-windows\
    --Копирование-->
\installed\x64-windows\
```

```
\installed\x64-windows\

include -> fmt\*.h, boost\*.h
bin     -> fmt.dll, boost-*.dll
lib     -> fmt.lib, boost-*.lib
debug   -> lib, bin (fmtd.*, boost-*d.*)
share   -> *.cmake, copyrights\licenses
```

Часть 2.

Интеграция.

MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.Cpp.Common.props

```
<VCLibPackagePath Condition="'$(VCLibPackagePath)' == ''">
  $(LOCALAPPDATA)\vcpkg\vcpkg.user
</VCLibPackagePath>
```

MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.Cpp.Common.props

```
<VCLibPackagePath Condition="'$(VCLibPackagePath)' == ''">
  $(LOCALAPPDATA)\vcpkg\vcpkg.user
</VCLibPackagePath>
```

MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.CppCommon.targets

```
<Import
  Condition="'$(VCLibPackagePath)' != '' and Exists('$(VCLibPackagePath).targets')"
    Project="$(VCLibPackagePath).targets"
/>
```

```
MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.Cpp.Common.props

<VCLibPackagePath Condition="'$(VCLibPackagePath)' == ''">
  $(LOCALAPPDATA)\vcpkg\vcpkg.user
</VCLibPackagePath>

MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.CppCommon.targets

<Import
  Condition="'$(VCLibPackagePath)' != '' and Exists('$(VCLibPackagePath).targets')"
    Project="$(VCLibPackagePath).targets"
/>

%LOCALAPPDATA%\vcpkg\vcpkg.user.targets (C:\Users\%USERNAME%\Appdata\Local\...)

<Project>
  <Import Condition="Exists('D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets')"
     Project="D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets"
  />
</Project>
```

```
MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.Cpp.Common.props

<VCLibPackagePath Condition="'$(VCLibPackagePath)' == ''">
  $(LOCALAPPDATA)\vcpkg\vcpkg.user
</VCLibPackagePath>

MSVS_FOLDER/MSBuild/Microsoft/VC/v160/Microsoft.CppCommon.targets

<Import
  Condition="'$(VCLibPackagePath)' != '' and Exists('$(VCLibPackagePath).targets')"
    Project="$(VCLibPackagePath).targets"
/>

%LOCALAPPDATA%\vcpkg\vcpkg.user.targets (C:\Users\%USERNAME%\Appdata\Local\...)

<Project>
  <Import Condition="Exists('D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets')"
     Project="D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets"
  />
</Project>
```

D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets

```
<PropertyGroup Condition="'$(Platform)|$(ApplicationType)' == 'x64||'">
  <VcpkgEnabled Condition="'$(VcpkgEnabled)' == ''">true</VcpkgEnabled>
  <VcpkgTriplet Condition="'$(VcpkgTriplet)' == ''">x64-windows</VcpkgTriplet>
</PropertyGroup>
```

D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets

```
<PropertyGroup Condition="'$(Platform)|$(ApplicationType)' == 'x64||'">
  <VcpkgEnabled Condition="'$(VcpkgEnabled)' == ''">true</VcpkgEnabled>
  <VcpkgTriplet Condition="'$(VcpkgTriplet)' == ''">x64-windows</VcpkgTriplet>
</PropertyGroup>
```

test_project.vcxproj

```
<VcpkgEnabled>true</VcpkgEnabled>
<VcpkgTriplet>x64-windows-static</VcpkgTriplet>
<Import Project="D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets" />
```

D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets

```
<VcpkgConfiguration
  Condition="'$(VcpkgConfiguration)' == ''">
    $(Configuration)
</VcpkgConfiguration>

<VcpkgNormalizedConfiguration
   Condition="$(VcpkgConfiguration.StartsWith('Debug'))">
     Debug
</VcpkgNormalizedConfiguration>
```

D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets

```
<VcpkgConfiguration
  Condition="'$(VcpkgConfiguration)' == ''">
    $(Configuration)
</VcpkgConfiguration>

<VcpkgNormalizedConfiguration
   Condition="$(VcpkgConfiguration.StartsWith('Release'))">
     Release
</VcpkgNormalizedConfiguration>
```

D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets

```
<VcpkgConfiguration
  Condition="'$(VcpkgConfiguration)' == ''">
    $(Configuration)
</VcpkgConfiguration>
```

test_project.vcxproj

```
<VcpkgConfiguration>Release</VcpkgConfiguration>
<Import Project="D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets" />
```

D:\vcpkg\scripts\buildsystems\msbuild\vcpkg.targets

```
<VcpkgRoot Condition="'$(VcpkgRoot)' == ''">
    $([MSBuild]::GetDirectoryNameOfFileAbove(
        $(MSBuildThisFileDirectory), .vcpkg-root)
    )\installed\$(VcpkgTriplet)\
</VcpkgRoot>
```

D:\vcpkg + \installed\$(VcpkgTriplet)\

D:\vcpkg\installed\x64-windows\

```
\installed\x64-windows\

include -> fmt\*.h, boost\*.h
bin     -> fmt.dll, boost-*.dll
lib     -> fmt\fmt.lib, boost-*.lib
debug   -> lib, bin (fmtd.*, boost-*d.*)
share   -> *.cmake, copyrights\licenses
```

```
<ClCompile>
  <AdditionalIncludeDirectories>
    %(AdditionalIncludeDirectories);$(VcpkgRoot)include
  </AdditionalIncludeDirectories>
</ClCompile>
```

```
<Link>
  <AdditionalDependencies>
    %(AdditionalDependencies);$(VcpkgRoot)lib\*.lib
  </AdditionalDependencies>
</Link>
```

```
VcpkgRoot: D:\vcpkg\installed\x64-windows\
Link: D:\vcpkg\installed\x64-windows\lib\*.lib
```

Автолинковка!

```
<Link>
  <AdditionalDependencies>
    %(AdditionalDependencies);$(VcpkgRoot)lib\*.lib
  </AdditionalDependencies>
</Link>
```

Страшный скрипт:

1. dumpbin $(TargetFile).$(TargetExt)
2. Ищем каждую библиотеку в $(VcpkgRoot)bin\
3. Копируем, при нахождении

Часть 3.

Версионирование библиотек?

%VCPKG_DIR%/ports/%PACKAGE%/CONTROL:

```
Source: imgui-sfml
Version: 2.1
Homepage: https://github.com/eliasdaler/imgui-sfml
Description: ImGui binding for use with SFML
Build-Depends: sfml, imgui
```

%VCPKG_DIR%/ports/%PACKAGE%/portfile.cmake:

```
include(vcpkg_common_functions)
vcpkg_from_git(
  OUT_SOURCE_PATH SOURCE_PATH
  URL https://gitlab-master.nvidia.com/dpanin/prebuilt_lib
  REF 383b691d47c921270c0a87887e2865fc2c571042)
```

%VCPKG_DIR%/ports/%PACKAGE%/portfile.cmake:

```
include(vcpkg_common_functions)
vcpkg_from_git(
  OUT_SOURCE_PATH SOURCE_PATH
  URL https://gitlab-master.nvidia.com/dpanin/prebuilt_lib
  REF 383b691d47c921270c0a87887e2865fc2c571042)

file(MAKE_DIRECTORY
  ${CURRENT_PACKAGES_DIR}/include
  ...)

file(COPY "${SOURCE_PATH}/include/prebuilt_lib.h"
  DESTINATION ${CURRENT_PACKAGES_DIR}/include/
) # Не забываем бинари
```

%VCPKG_DIR%/ports/%PACKAGE%/portfile.cmake:

```
include(vcpkg_common_functions)
vcpkg_from_git(
  OUT_SOURCE_PATH SOURCE_PATH
  URL https://gitlab-master.nvidia.com/dpanin/prebuilt_lib
  REF 383b691d47c921270c0a87887e2865fc2c571042)

file(MAKE_DIRECTORY
  ${CURRENT_PACKAGES_DIR}/include
  ...)

file(COPY "${SOURCE_PATH}/include/prebuilt_lib.h"
  DESTINATION ${CURRENT_PACKAGES_DIR}/include/
) # Не забываем бинари

file(WRITE ${CURRENT_PACKAGES_DIR}/share/prebuilt_lib/copyright
 "Copyright rofl")
```

```
somewhere_else/boost-1.34/{CONTROL, portfile.cmake}
somewhere_else/boost-1.35/{CONTROL, portfile.cmake}
```

```
somewhere_else/boost-1.34/{CONTROL, portfile.cmake}
somewhere_else/boost-1.35/{CONTROL, portfile.cmake}


vcpkg install boost-1.34 --overlay-ports=somewhere_else
```

```
somewhere_else/boost-1.34/{CONTROL, portfile.cmake}
somewhere_else/boost-1.35/{CONTROL, portfile.cmake}


vcpkg install boost-1.34 --overlay-ports=somewhere_else

vcpkg install boost-1.35 --overlay-ports=somewhere_else
```

```
somewhere_else/boost-1.34/{CONTROL, portfile.cmake}
somewhere_else/boost-1.35/{CONTROL, portfile.cmake}


vcpkg install boost-1.34 --overlay-ports=somewhere_else

vcpkg remove boost-1.34
vcpkg install boost-1.35 --overlay-ports=somewhere_else
```

```
somewhere_else/boost-1.34/{CONTROL, portfile.cmake}
somewhere_else/boost-1.35/{CONTROL, portfile.cmake}
```

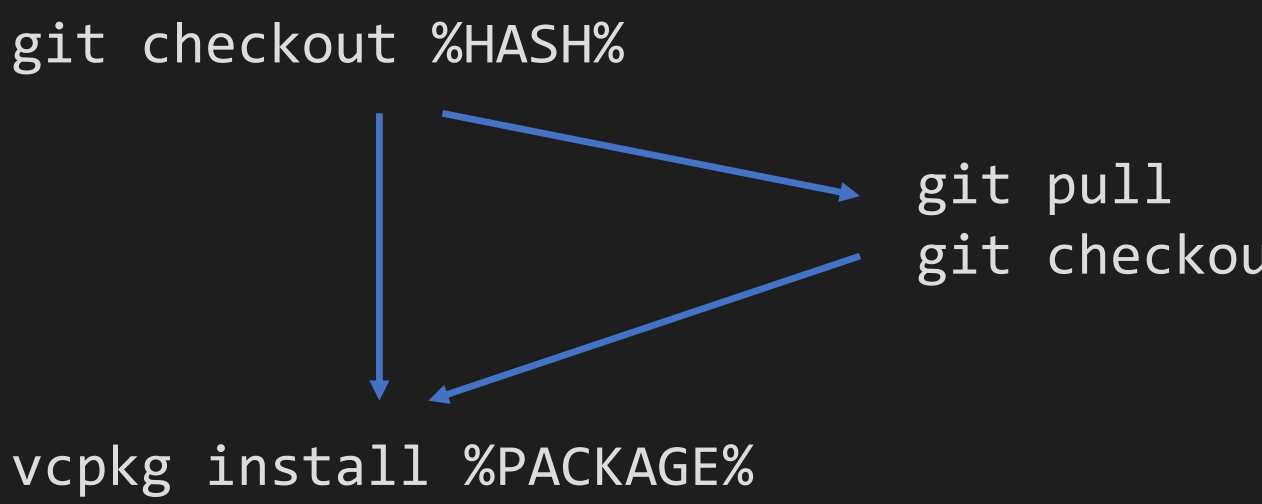
```
vcpkg install boost-1.34 --overlay-ports=somewhere_else
```

```
vcpkg remove boost-1.34
vcpkg install boost-1.35 --overlay-ports=somewhere_else
```

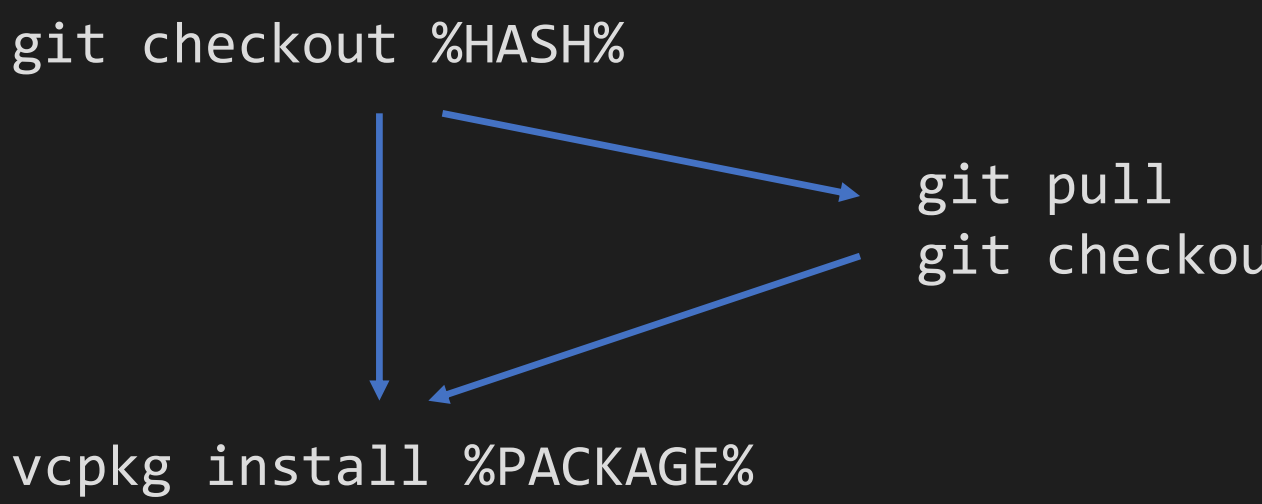
:(

```
somewhere_else/our-boost/{CONTROL, portfile.cmake}
```

somewhere_else/our-boost/{CONTROL, portfile.cmake}



somewhere_else/our-boost/{CONTROL, portfile.cmake}



somewhere_else/boost@HASH

```
vcpkg export packages... --raw --output=somewhere
```

```
vcpkg export packages... --raw --output=somewhere

somewhere\installed\%TRIPLET%\
    bin\
    include\
    lib\
    share\
```

```
vcpkg export packages... --raw --output=somewhere

somewhere\installed\%TRIPLET%\
    bin\
    include\
    lib\
    share\

somewhere\scripts\...
    vcpkg.targets
    vcpkg.cmake
```

```
vcpkg export packages... --raw --output=somewhere

<Project>
  <Import Project=
    "somewhere\...\vcpkg.targets"
</Project>
```

```
vcpkg export packages... --raw --output=somewhere
```

```
<Project>
  <Import Project=
    "somewhere\...\vcpkg.targets"
</Project>
```

```
Include    -> somewhere\...\include\
Link all   -> somewhere\...\lib\*.lib
Copy dll   -> somewhere\...\bin\*.dll
```

```
vcpkg_root = $(SolutionDir)\.nvpkg

vcpkg export packages... --raw --output=$(vcpkg_root)


Include   -> $(vcpkg_root)\...\include\
Link all  -> $(vcpkg_root)\...\lib\*.lib
Copy dll  -> $(vcpkg_root)\...\bin\*.dll
```

```
vcpkg_root = $(SolutionDir)\.nvpkg

vcpkg export packages... --raw --output=$(vcpkg_root)


Include   -> $(vcpkg_root)\...\include\
Link all  -> $(vcpkg_root)\...\lib\*.lib
Copy dll  -> $(vcpkg_root)\...\bin\*.dll
```

Не забываем почистить все за собой!
И как-то все заблокировать...

Каждому проекту свой vcpkg!

0. В .gitignore -> .vcpkg

Каждому проекту свой vcpkg!

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1. Prebuild - клон и сборка в $(SolutionDir)\.vcpkg

Каждому проекту свой vcpkg!

0. В .gitignore -> .vcpkg
1. Prebuild - клон и сборка в $(SolutionDir)\.vcpkg
2. Prebuild - чтение файла зависимостей?..

Часть 4.

Чтение файла зависимостей?

```
$(SolutionDir)\...\vcpkg.cpp

static const char* nvidia_vcpkg_packages = {
  /* REPO / Package @ hash */
  "fmt@..."
  "rapidjson@..."
  "nvpkg/internal@..."
};
```

```
$(SolutionDir)\...\vcpkg.cpp

static const char* nvidia_vcpkg_packages = {
  /* REPO / Package @ hash */
  "fmt@..."
  "rapidjson@..."
  "nvpkg/internal@..."
};
```

Изменение .cpp файла:

1. Вызов prebuild скрипта с подтягиванием зависимостей
2. перекомпиляция всех зависимых проектов

Pre-build скрипт

1. Проверка $(SolutionDir)\.vcpkg\vcpkg.exe
   Скачивание и сборка, если нету.

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1. Проверка $(SolutionDir)\.vcpkg\vcpkg.exe
   Скачивание и сборка, если нету.

2. Проверка vcpkg.cpp внутри .vcpkg\installed
   Если идентичны - то уже все скачано

Pre-build скрипт

1. Проверка $(SolutionDir)\.vcpkg\vcpkg.exe
   Скачивание и сборка, если нету.

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3. Удаляем installed, downloaded, packages

Pre-build скрипт

1. Проверка $(SolutionDir)\.vcpkg\vcpkg.exe
   Скачивание и сборка, если нету.

2. Проверка vcpkg.cpp внутри .vcpkg\installed
   Если идентичны - то уже все скачано

3. Удаляем installed, downloaded, packages

4. Комбо из git checkout %HASH% && vcpkg install %PACKAGE%

Что у нас в итоге получилось?

0. Не нужно ничего устанавливать

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0. Не нужно ничего устанавливать

1. Скачивание & сборка vcpkg, установка пакетов в 1 клик RUN

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0. Не нужно ничего устанавливать

1. Скачивание & сборка vcpkg, установка пакетов в 1 клик RUN

2. Перекачивание и пересборка автоматическая

Что у нас в итоге получилось?

0. Не нужно ничего устанавливать

1. Скачивание & сборка vcpkg, установка пакетов в 1 клик RUN

2. Перекачивание и пересборка автоматическая

3. Все детские болезни vcpkg успешно вылечены:
   - Версионирование работает
   - Одновременное наличие разных версий не нужно

Часть 5.

Бонус-контент.

```
project (hello)
include (~/vcpkg/scripts/buildsystems/vcpkg.cmake)

add_executable (hello hello.cpp)
find_package (fmt CONFIG REQUIRED)
target_link_libraries (hello PRIVATE fmt::fmt)
```

```
cmake . && cmake --build .
```

%VCPKG_ROOT%\triplets\nvidia-x64.cmake

```
set(VCPKG_TARGET_ARCHITECTURE x64)
set(VCPKG_CRT_LINKAGE dynamic)
set(VCPKG_LIBRARY_LINKAGE static)
```

%VCPKG_ROOT%\triplets\nvidia-x64.cmake

```
set(VCPKG_TARGET_ARCHITECTURE x64)
set(VCPKG_CRT_LINKAGE dynamic)
set(VCPKG_LIBRARY_LINKAGE static)

set(VCPKG_CMAKE_SYSTEM_NAME Linux)
set(VCPKG_CXX_FLAGS /Qspectre)
```

https://github.com/microsoft/vcpkg/blob/master/docs/users/triplets.md

Не хочу пересобирать каждый раз!

```
$(SolutionDir)\vcpkg.cpp
$(SolutionDir)\.vcpkg\installed\*
```

Не хочу пересобирать каждый раз!

```
$(SolutionDir)\vcpkg.cpp
$(SolutionDir)\.vcpkg\installed\*

$(SolutionName)-$(Arch)-$(Toolchain)-$(vcpkg_cpp_hash).zip -> Artifactory
```

Не хочу пересобирать каждый раз!

```
$(SolutionDir)\vcpkg.cpp
$(SolutionDir)\.vcpkg\installed\*

$(SolutionName)-$(Arch)-$(Toolchain)-$(vcpkg_cpp_hash).zip -> Artifactory


vcpkg install boost:boost-$(Arch)-$(Toolchain)-$(Hash)
.vcpkg\packages\boost_boost-$(Arch)-$(Toolchain)-$(Hash) \*

$(Package)-$(Arch)-$(Toolchain)-$(Hash).zip -> Artifactory
```

Не хочу пересобирать каждый раз!

```
$(SolutionDir)\vcpkg.cpp
$(SolutionDir)\.vcpkg\installed\*

$(SolutionName)-$(Arch)-$(Toolchain)-$(vcpkg_cpp_hash).zip -> Artifactory


vcpkg install boost:boost-$(Arch)-$(Toolchain)-$(Hash)
.vcpkg\packages\boost_boost-$(Arch)-$(Toolchain)-$(Hash) \*

$(Package)-$(Arch)-$(Toolchain)-$(Hash).zip -> Artifactory


boost-x64-v142-HASH.zip     ->
fmt-x64-v142-HASH2.zip      ->    .vcpkg\installed\nvidia-x64\
sfml-x64-v142-HASH3.zip     ->
```

Часть 6.

Которую все ждали.

Часть 6, которую вы все ждали.

1. Количество пакетов (1225+ vs 300+)

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2. Простая автоматизация внутренних релизов

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5. Интеграция Conan'а меняет .vcxproj файлы
6. Я еще не доучил C++, чтобы учить Python

vcpkg install the_end:2019-piter

github.com/starl1ght/piter2019

t.me/starl1ght