

Инфраструктура сборки JetBrains Rider

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Контекст

- Большая кодовая база ~25М строк кода
- Коробочные продукты
- Большая команда ~100 разработчиков
- Различные технологии и языки
- Поддержка многих ОС и архитектур



Цели

- Быстрый старт для новых членов команды
- Выпускать продукт в течение 2-3 дней
- Избавление от рутинных операций
- Ранее обнаружение проблем в проекте

Основные области

- Локальная конфигурация проекта
- Управление зависимостями
- Ускорение сборки проекта
- Непрерывная интеграция (CI)
- Непрерывная доставка (CD)

.NET в JetBrains 5 лет назад

- Много продуктов - 5
- Много репозиторий - 15
- Сложно шарить код между продуктами
- Все продукты только для Windows
- Все разработчики используют Windows



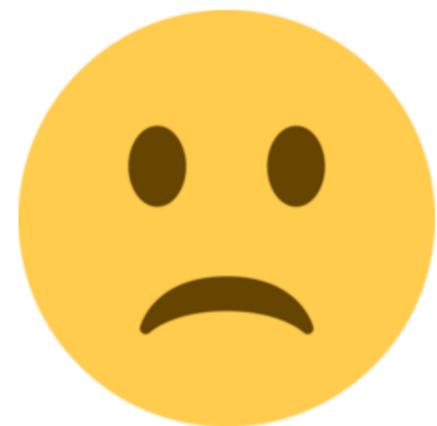
.NET в JetBrains сейчас

- Один репозиторий
- Добавился новый продукт Rider
- Простой шаринг кода между продуктами
- Кросс-платформенные продукты
- Много разработчиков на *nix



Локальная конфигурация проекта

Сложно обновлять общие части кода



Давайте переедем в моно репозиторий



Мержим все репозитории в один

```
commit c97b77e386bdb5e191e1a8f34749997ed0ee8fd4
Merge: fd4b9f03147d 67fdd692fd48 8680417b3426 2226ed8d06e3 9017c37528de 7cfe9d68355c cfe80b135d3
4 c4a41602c0dc b5faa9bc56e7 0fc533a02b39 5876be144536 52a29d960530 84e916076b45 df473ce7e4d3
Author: builduser <builduser@labs.intellij.net>
Date:   Fri Jan 1 21:42:54 2016 +0300

Merge branch 'wave04-ide' from multiple repositories

Repositories:
    root-repo
    ReSharperAutomationTools
    ReSharper
    Psi.Features
    Profiler
    Platform
    Timeline
    EtwService
    dotTrace
    dotPeek
    dotMemory
    dotCover
    dotCommon.Psi
    dotCommon

Repositories without this branch:
    dotInstant
```



Не можем открыть Solution в Visual Studio



Visual Studio падает с OOM

devenv.exe (11340) Properties

Environment Handles .NET assemblies .NET performance GPU Comment
General Statistics Performance Threads Token Modules Memory

CPU
12.41%

Private bytes
Private bytes: 2.9 GB

I/O
R+O: 0, W: 0
45 MB

TestSolution - Microsoft Visual Studio (Not Responding)

Extensions Window Help

Debug Any CPU ClassLibrary001 Live Share

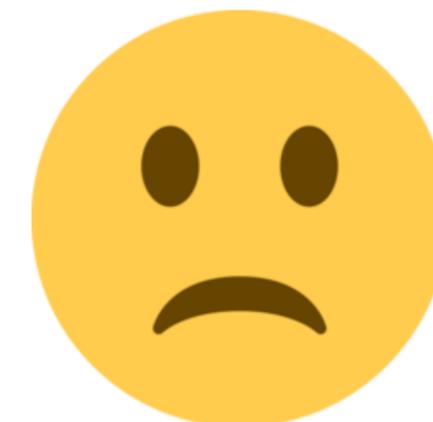
Output

Show output from: Build

```
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,61,15,63): warning CS0168: The variable 'o9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,65,15,67): warning CS0168: The variable 'p9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,69,15,71): warning CS0168: The variable 'q9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,73,15,75): warning CS0168: The variable 'r9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,77,15,79): warning CS0168: The variable 's9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,81,15,83): warning CS0168: The variable 't9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,85,15,87): warning CS0168: The variable 'u9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,89,15,91): warning CS0168: The variable 'v9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,93,15,95): warning CS0168: The variable 'w9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,97,15,99): warning CS0168: The variable 'x9' is declared b
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,101,15,103): warning CS0168: The variable 'y9' is declared
8>C:\Work\VsCrasher\TestSolution\ClassLibrary619\Class013.cs(15,105,15,107): warning CS0168: The variable 'z9' is declared
8>ClassLibrary619 -> C:\Work\VsCrasher\TestSolution\ClassLibrary619\bin\Debug\netstandard2.0\ClassLibrary619.dll
8>Done building project "ClassLibrary619.csproj".
```

Error List ... Output

Add to Source Control



Будем генерировать Solution



Наш инструмент для автоматизации

The screenshot displays the JetBrains ABuild interface. The top window, 'Build Dispatch - Build Dispatch', shows configuration for a build. The 'Home Dir' is 'C:\Work\alpha' and the 'Bin Dir' is '[Bin.\$(ProfileName)]'. The 'General' tab is active, showing options like 'Do not compile — ALL', 'Do not compile — native', 'Do not validate sources', 'Do not obfuscate', and 'Skip OS integration'. The 'PWC&GO' section is set to 'Low level'. The 'Build Log - Warm Up ...ootstrap (LIVE)' window shows a live log of the build process. The log includes messages such as 'This is a special warm-up build to refresh the cached Build Runner Core compilation.', 'Self-bootstrapping the Build Runner Core on the current Platform sources.', and 'Executing build for BuildRunnerCoreBootstrapCompiled with a plan of 22 items, got 32 build artifact types, 13 build steps and 9 build helpers.' The log is currently in a 'Running' state.

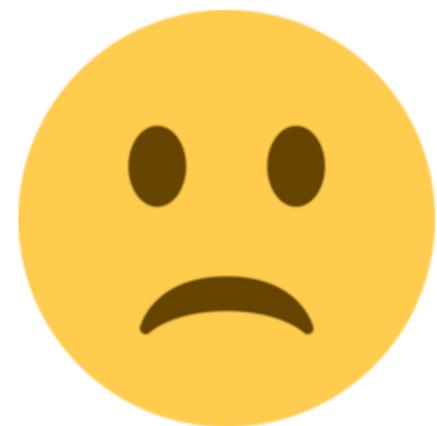
Kind	Message	Time
FATAL ⁰		
ERROR ⁰		
WARN ⁰		
INFO ¹⁹	INFO Self-bootstrapping the Build Runner Core on the current Platform sources.	00:00:00.102
VERBOSE ^{1,080}	INFO <EMPTY>	00:00:00.263
TRACE ³³	INFO Entering Windows NT Bootstrap	00:00:00.263
	INFO Logs for level INFO are written to C:\Users\mfilippov\AppData\Local\Temp\JetLogs\JetBrainsLog.Build.2020-11-28T16-22-03.INFO.log	00:00:05.803
	INFO Logs for level VERBOSE are written to C:\Users\mfilippov\AppData\Local\Temp\JetLogs\JetBrainsLog.Build.2020-11-28T16-22-03.VERBOSE.log	00:00:05.811
	INFO Started build stage: Bootstrap.	00:00:05.877
	INFO Running Build Script Sources compilation (00:00:05 elapsed).	00:00:11.116
	INFO Completed Build Script Sources compilation (00:00:05.8944270 total).	00:00:11.938
	INFO Executing build for BuildRunnerCoreBootstrapCompiled with a plan of 22 items, got 32 build artifact types, 13 build steps and 9 build helpers.	00:00:13.015
	INFO Bootstrapping project BuildEngine.	00:00:13.095
	INFO Loading source files.	00:00:13.095
	INFO Loading packages.	00:00:14.455
	INFO Compiling (8pcs)[BuildEngine, BuildInterfaces, ComponentModel, Core, Interop, Metadata, Util, Util.Text].	00:00:15.392
	INFO Running bootstrap projects compilation (00:00:05 elapsed).	00:00:19.461
	INFO Running bootstrap projects compilation (00:00:07 elapsed).	00:00:21.471
	Running • BuildRunnerCoreCompiler::CompileAsync	00:00:21.844



Собственная иерархия подсистем
построенная отдельно от проектов



Легко сломать сборку продукта



Добавим диагностику в наш инструмент



Ранняя диагностика

The screenshot displays the JetBrains ABuild interface. At the top, the title bar reads "C:\Work\alpha HomeDir - Alpha Profile - JetBrains ABuild". The main window is titled "Build Dispatch - Build Dispatch" and contains several tabs: "EntryPoints", "AutoFix", "Extract to BinDir", "Build Nupkgs", "Installer", "Validation", "Std Afx", "General", "Custom EntryPoint", "Run", "Binary Stage", "Source Stage", and "Tests". The "Run" tab is active, showing configuration options for the build process. A red arrow points to the "Build Log - Autofix Files" window, which displays a table of build messages.

Home Dir: "C:\Work\alpha" Bin Dir: Bin.\$(ProfileName) Set default Bin Dir & Root Suffix

VS year: 2019, ver: 16.0, Instance: 64874670

LOCAL INSTALL THE PRODUCT

Do not compile — ALL
 Do not compile — native
 Do not validate sources
 Do not obfuscate
 Skip OS integration

PWC&GO No IDE Selected

Low level

There is no build running. Choose an entry point artifact to run a build for.
[Save last build outputs](#) (0 files, 0 bytes total).

Build Log - Autofix Files

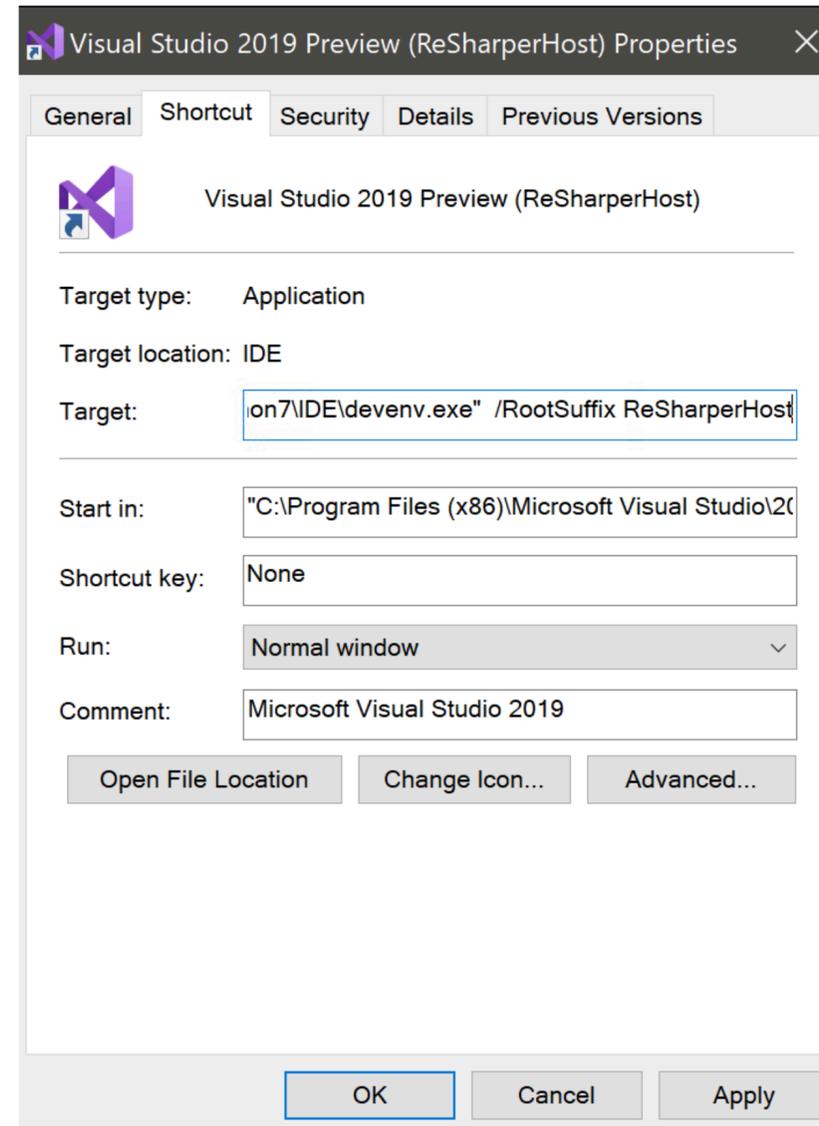
Kind	Message	Time
FATAL	0	
INFO	Verifying project file 627/653 ReSharperAutomationTools\src\ReSharperHost\Roslyn.Host\Roslyn.Host.csproj.	00:01:00.575
INFO	Verifying project file 628/653 ReSharperAutomationTools\src\ReSharperHost\Roslyn.Worker\Roslyn.Worker.csproj.	00:01:00.575
INFO	Verifying project file 629/653 ReSharperAutomationTools\src\ReSharperHost\WinForms.Designer.External\WinForms.Designer.External.csproj.	00:01:00.576
INFO	Verifying project file 630/653 ReSharperAutomationTools\src\ReSharperHost\WinForms.Designer.Host\WinForms.Designer.Host.csproj.	00:01:00.629
ERROR	Subplatform ReSharperAutomationTools\src\ReSharperHost illegally uses resources from a non-referenced subplatform DPA\Ide\VisualStudio. Linked with a ProjectReference in Subplatform ReSharperAutomationTools\src\ReSharperHost Project ReSharperHost\ReSharperHost.csproj to project DPA\Ide\VisualStudio\VS\DPA.Ide.VS.csproj.	00:01:00.677
WARN	Subplatform ReSharperAutomationTools\src\ReSharperHost Project ReSharperHost\ReSharperHost.csproj ProjectReference to project DPA\Ide\VisualStudio\VS\DPA.Ide.VS.csproj in subplatform DPA\Ide\VisualStudio is illegal because subplatform ReSharperAutomationTools\src\ReSharperHost does not reference subplatform DPA\Ide\VisualStudio.	00:01:00.705
INFO	Verifying project file 631/653 ReSharperAutomationTools\src\ReSharperHostProduct\ReSharperHostProduct.csproj.	00:01:00.706
INFO	Verifying project file 632/653 ReSharperAutomationTools\src\RiderSdk\Scripts\Scripts\RiderSdk.Scripts.csproj.	00:01:00.707
INFO	Verifying project file 633/653 ReSharperAutomationTools\src\RiderTutorials\Project\RiderTutorials.csproj.	00:01:00.720
INFO	Verifying project file 634/653 ReSharperAutomationTools\test\Cases\ConsoleToolsTests\ConsoleToolsTests.csproj.	00:01:00.729
INFO	Verifying project file 635/653 ReSharperAutomationTools\test\Cases\Debugger\JetBrains.Debugger.CorApi.Tests\Debugger.CorApi.Tests.csproj.	00:01:00.742
INFO	Verifying project file 636/653 ReSharperAutomationTools\test\Cases\Debugger\JetBrains.Debugger.MonoSession.Tests\Debugger.Mono.Tests.csproj.	00:01:00.742
INFO	Verifying project file 637/653 ReSharperAutomationTools\test\Cases\ReSharperHost\ReSharperHost.Tests\ReSharperHost.Tests.csproj.	00:01:00.753
INFO	Verifying project file 638/653 ReSharperAutomationTools\test\Cases\VisualFeatures\WinFormsDesigner\Test.WinFormsDesigner.csproj.	00:01:00.755
INFO	Verifying project file 639/653 ReSharperCpp\RiderPlugin\ReSharperCpp.RiderPlugin.csproj.	00:01:00.773
INFO	Verifying project file 640/653 ReSharperCpp\test\Src\RiderPlugin.Tests\RiderPlugin.Tests.csproj.	00:01:00.788
INFO	Verifying project file 641/653 Timeline\Src\Shared\ETW.Controller.Api\Timeline.EtwController.csproj.	00:01:00.795
INFO	Verifying project file 642/653 Timeline\Src\Shared\ViewModel\Timeline.ViewModel.csproj.	00:01:00.798



Некоторые операции требуют много шагов и часто повторяются



Как запустить отдельную Visual Studio



Добавим добавим автоматизацию таких операций



Наш центр управления полетами

The screenshot displays the JetBrains ABuild interface for a project named 'Alpha'. The main window is titled 'Build Dispatch - Build Dispatch' and shows various configuration options. The 'Home Dir' is set to 'C:\Work\alpha' and the 'Bin Dir' is 'Bin.\$(ProfileName)'. The 'VS year' is set to 2019, 'ver' to 16.0, and 'Instance' to 64874670. The 'Root Suffix' is checked and set to '\$(ProfileName)'. The 'LOCAL INSTALL THE PRODUCT' button is highlighted with a red arrow. The 'PWC&GO' button is also highlighted with a red arrow. The 'General' tab is selected, showing options like 'Do not compile — ALL', 'Do not compile — native', 'Do not validate sources', 'Do not obfuscate', and 'Skip OS integration'. The 'Binary Stage' and 'Source Stage' buttons are also visible. The 'Profile explorer' on the right shows the 'Product root'.



Выводы

- Моно репозиторий для большой команды
- Моно репозиторий требует инструментов
- Рутинные операции нужно автоматизировать

Управление зависимостями

Обновление версии NuGet пакета в IDE
происходит только в части подсистем



Научим наш инструмент понимать NuGet

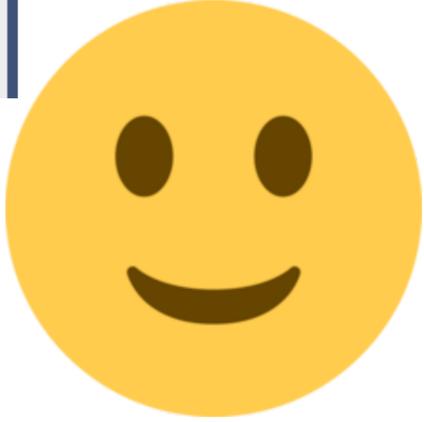


Автоматическое обновление версии NuGet

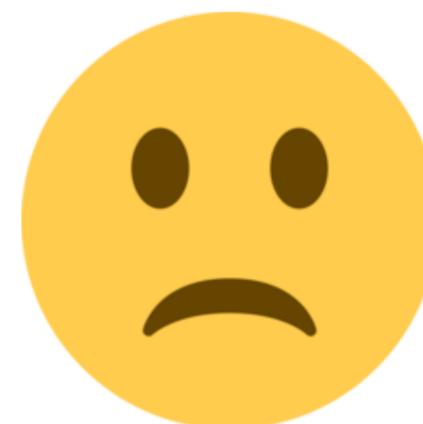
The screenshot shows a Visual Studio Build Log window titled "Build Log - Autofix Files (LIVE)". The log contains several entries with different severity levels: FATAL (0), ERROR (2), WARN (2), INFO (593), VERBOSE (15,001), and TRACE (455). A red arrow points to a specific error message:

ERROR The referenced NuGet package System.Buffers has conflicting reference specs (2pcs) ["System.Buffers 4.3.0", "System.Buffers 4.4.0 v4.6.1"]. Spec "System.Buffers 4.4.0 v4.6.1" referenced by (9pcs)[dotMemory\Core-Core\DotMemory.Core.csproj→packages.c...«583-MORE-CHARS»...t\Cases\Debugger→JetBrains.Debugger.CorApi.Tests\Debugger.CorApi.Tests.csproj→packages.config]. Spec "System.Buffers 4.3.0" referenced by (1pc) [ReSharperAutomationTools\External\DebuggerLibs→Debugger.Common\Debugger.Common.csproj→packages.config].

Below this error, a warning message states: "There're references to NuGet package System.Buffers version (2pcs)[4.3.0, 4.4.0]. Will be fixing all references to use the newest version, 4.4.0." This is followed by an info message: "Autofix found things to change in the XML file C:\Work\alpha\ReSharperAutomationTools\External\DebuggerLibs\Debugger.Common\packages.config, rewriting the file on disk." Another info message says: "Auto-fixed ReSharperAutomationTools\External\DebuggerLibs→Debugger.Common\Debugger.Common.csproj→packages.config." A final warning message says: "There were global changes, respawning context before running further stages."



Сборка падает если не доступен [nuget.org](https://www.nuget.org)



Сделаем свой собственный NuGet сервер



Готовые решения

- Artifactory
- NuGetGallery
- Nexus



Artifactory плохо поддерживает
NuGet v3 фиды в сложных сценариях



Сделаем свой репозиторий пакетов



Репозитории пакетов в Space

The screenshot displays the 'Package management' section of the Space application. The top navigation bar includes links for Teams, Chats, Work, Projects, Resources, Pricing, and Partners, along with a 'Try Space for free' button. The main heading is 'Package management', followed by a descriptive paragraph: 'Create and use package repositories in your CI/CD pipelines or from your local machine. Share packages between products using Container, Maven, NuGet, and npm repositories.'

The interface shows a sidebar with navigation options: Project, Project Tools (Code Reviews, Jobs, Checklists, Issues), Packages (selected), and Project Settings. Below this, there are sections for Repositories (ktor, ktor-samples) and a 'New repository' button.

The main content area is titled 'All repositories 3' and lists three repositories:

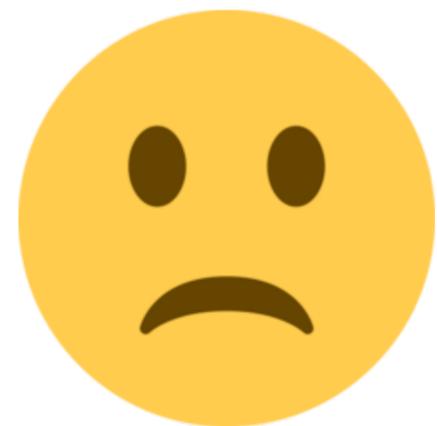
- internal-it** (Internal IT services)
- ktor-apps** (Repository for Galactica Ktor Apps)
- warp-drive** (Warp drive engine microservices)

The 'ktor-apps' repository is expanded to show a table of packages:

Package Name	Downloads	Version	Last Update
space.galacticatravels.apps.internal:chat	0 ↓	0.0.1-fa73e5b	27 Nov 17:17
space.galacticatravels.apps.internal:httplib	0 ↓	0.0.1-fa73e5b	27 Nov 17:17
space.galacticatravels.apps.internal:kweet	0 ↓	0.0.1-fa73e5b	27 Nov 17:17



При использовании NuGet проху нет
контроля над лицензиями пакетов



Запретим использовать любые источники
кроме своего



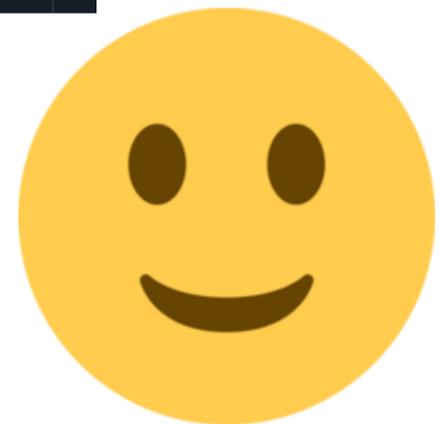
Сгенерированный NuGet.Config

```
NuGet.Config X
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <!-- This file is automatically replaced with \DevKit\BuildSystem\ProductRoot\NuGet.config -->
  <!-- Please make changes there. -->

  <packageSources>
    <!-- Remove all default Nuget feeds. Leave only what's explicitly added. -->
    <!-- Reason: the main Nuget Gallery goes down from time to time, we don't want our builds to fail by this reason, so all packages should be re-published -->
    <clear />

    <!-- Our internal MSDC server. Also should contain copies of Nuget packages used from the global server, to ensure successful builds in case the global server is down -->
    <add key="dotnet-build@LABS" value="https://packages.jetbrains.team/nuget/p/net/dotnet-build/v3/index.json" />
  </packageSources>
  <packageRestore>
    <!-- Allow NuGet to download missing packages -->
    <add key="enabled" value="False" />

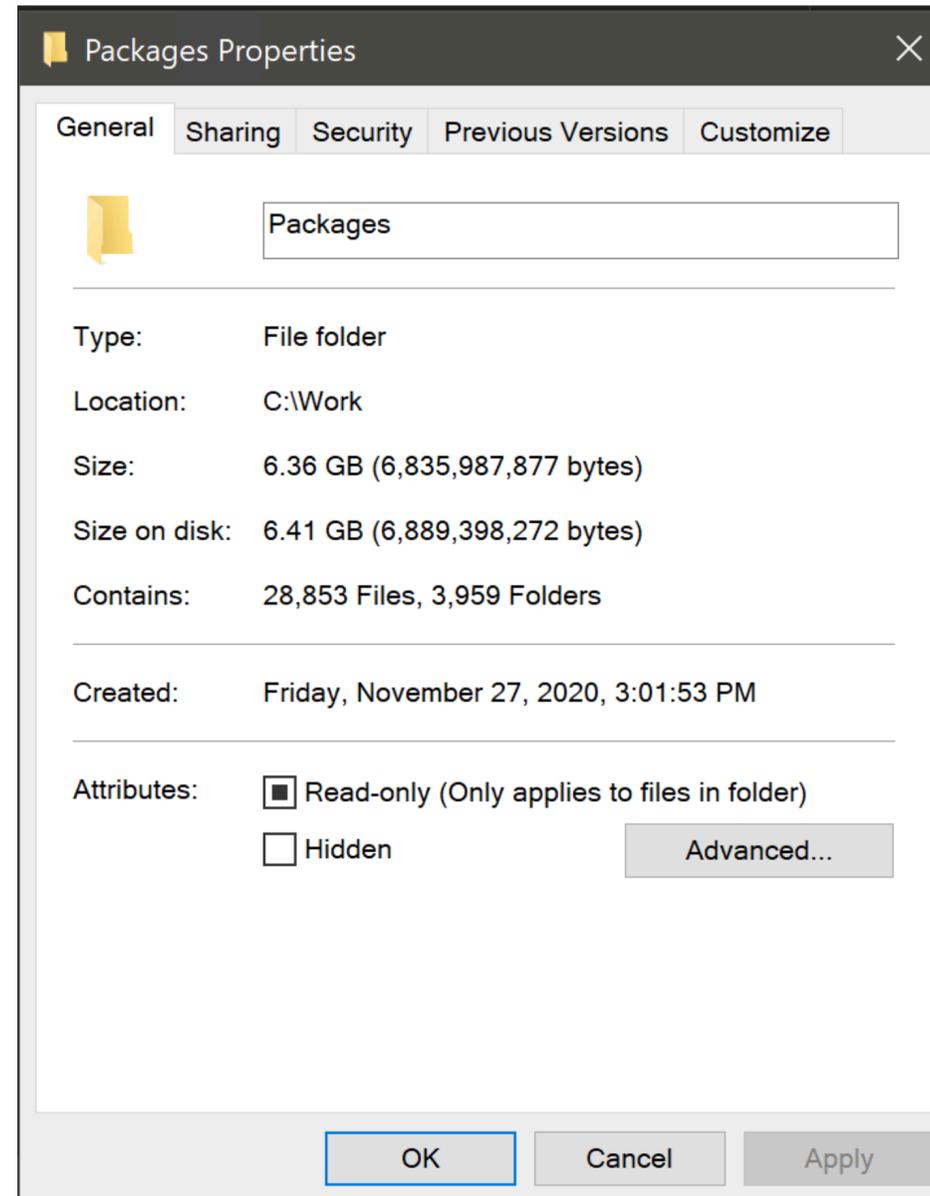
    <!-- Automatically check for missing packages during build in Visual Studio -->
    <add key="automatic" value="False" />
  </packageRestore>
</configuration>
```



У программистов кончается место на диске
из-за копий папки Packages



Наша папка Packages весит ~ 7Гб



Почему бы не использовать символические ссылки?

```
mfilippov — -zsh — 80x24
[5:12:47 PM]:~# ln -s /tmp/NuGetLocalCache /Work/alpha/Packages
```



Папка Packages после ОПТИМИЗАЦИИ

The image shows a Windows File Explorer window displaying a folder named 'Packages' located at 'C:\Work\alpha'. The folder contains a list of sub-folders, each with a folder icon and a name. The 'Packages Properties' dialog box is open, showing the 'General' tab. The dialog box displays the folder name 'Packages', its type as 'File folder', location as 'C:\Work\alpha', size as '0 bytes', size on disk as '0 bytes', and contains '0 Files, 0 Folders'. The creation date is 'Wednesday, November 18, 2020, 10:17:45 AM'. The 'Attributes' section shows 'Read-only (Only applies to files in folder)' checked and 'Hidden' unchecked. An 'Advanced...' button is visible next to the attributes. The dialog box has 'OK', 'Cancel', and 'Apply' buttons at the bottom.

al Disk (C:) > Work > alpha > Packages

Name

- Antlr2.Runtime.2.7.7.3
- Antlr2.Tools.2.7.6.4
- Appccelerate.StateMachine.3.3.0
- Armature.1.0.63
- Armature.Core.1.0.63
- Armature.Interface.1.0.63
- Autofac.4.8.1
- AWSSDK.CloudFront.3.3.101.11
- AWSSDK.Core.3.3.103.8
- AWSSDK.S3.3.3.103.1
- BLToolkit3.4.1.0
- BouncyCastle.1.8.3.1
- CaptureDump.1.0.9
- Castle.Core.4.0.0
- ClrStack.1.7.4
- DebuggerComInteropAnalyzer.1.0.
- DotNetZip.1.11.0
- FluentAssertions.5.10.3
- FluentFTP.25.0.5

Packages Properties

General | Sharing | Security | Previous Versions | Customize

Package name: Packages

Type: File folder

Location: C:\Work\alpha

Size: 0 bytes

Size on disk: 0 bytes

Contains: 0 Files, 0 Folders

Created: Wednesday, November 18, 2020, 10:17:45 AM

Attributes: Read-only (Only applies to files in folder)
 Hidden

Advanced...

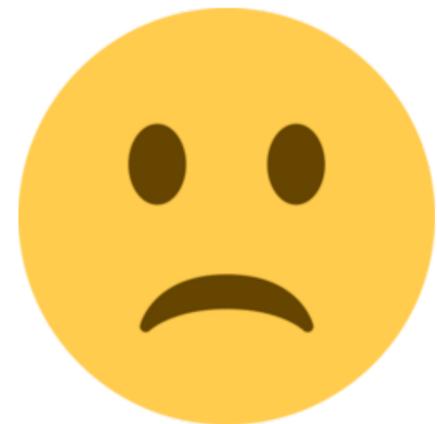
OK Cancel Apply



У Microsoft тоже есть решение этой проблемы для нового формата проектов



Загрузка пакетов обрывается при
плохом интернет канале



Реализуем собственный механизм загрузки
с поддержкой докачки и повторов



Теперь скачка работает даже на плохом WiFi



Наши OSS зависимости

- .NET Core Runtime
- MSBuild
- Roslyn



Мы не можем собрать проект из-за проблем с GitHub

GitHub Status

UPDATED 26 MINUTES AGO

What is this site?

We continuously monitor the status of github.com and all its related services. If there are any interruptions in service, a note will be posted here.

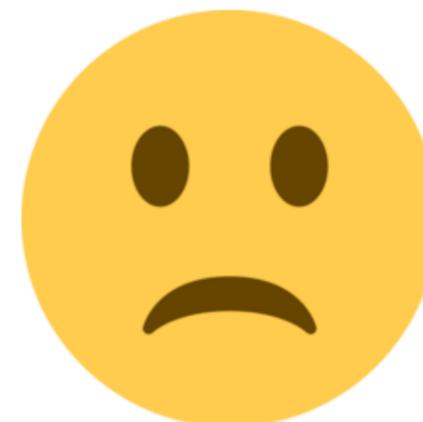
Status Messages

October 22, 2018

19:56 Malaysia **The majority of restore processes have completed. We anticipate all data stores
Time will be fully consistent within the next hour.**

17:47 Malaysia **We continue to monitor restores which are taking longer than anticipated. We
Time estimate they will be caught up in an hour and a half.**

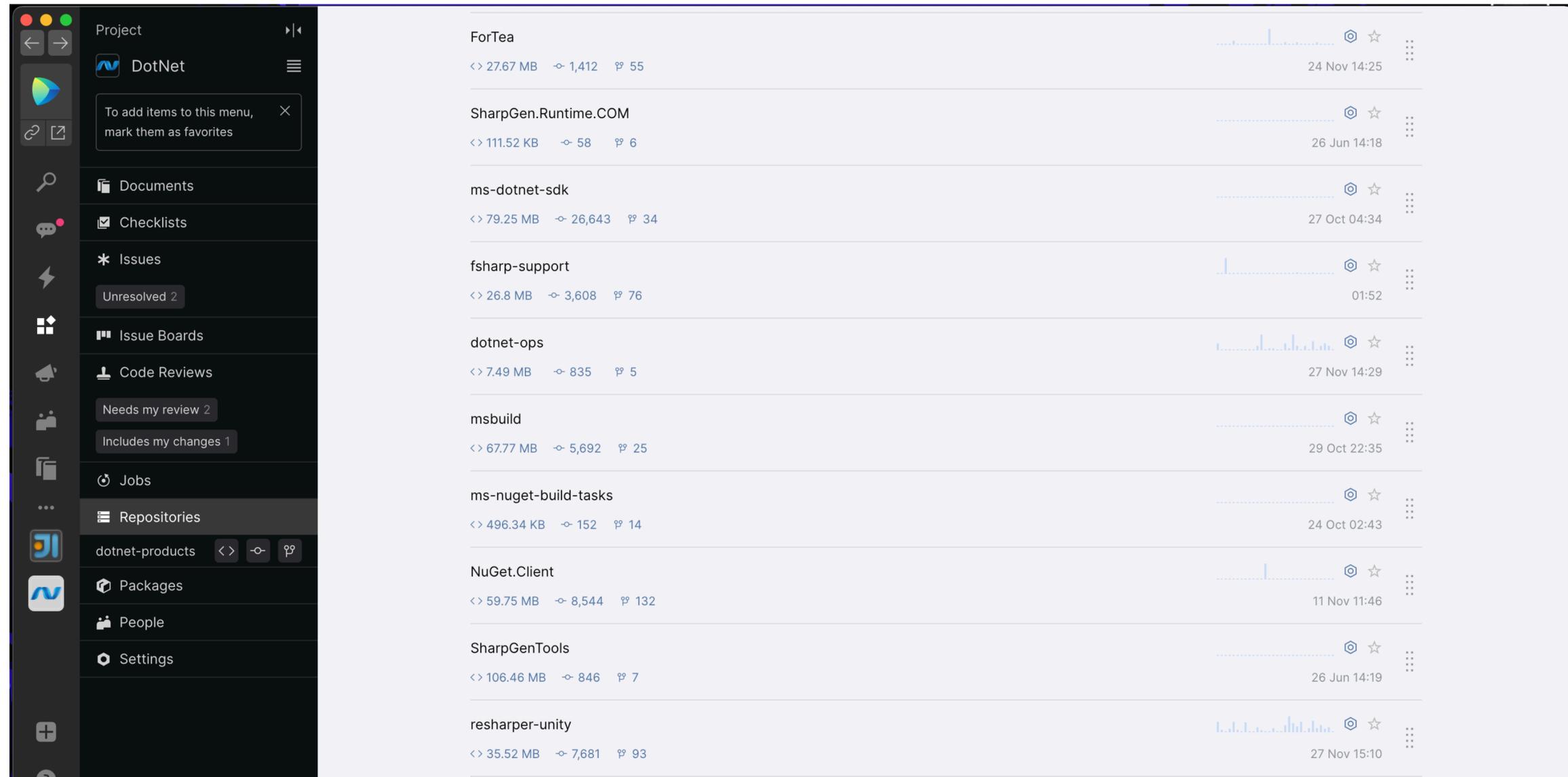
16:19 Malaysia **Our restore operations are still on track to serve consistent data within the hour.
Time We've posted an update at <https://blog.github.com/2018-10-21-october21->**



Реализуем собственный Git хостинг с
поддержкой зеркалирования



Наши зеркала в Space



The screenshot shows the Visual Studio Code interface with the Space view open. The left sidebar contains the Project Explorer, which is currently showing the 'dotnet-products' repository. The main area displays a list of mirrors, each with its name, size, number of files, and a last update timestamp. The mirrors listed are:

Repository Name	Size	Files	Last Update
ForTea	27.67 MB	1,412	24 Nov 14:25
SharpGen.Runtime.COM	111.52 KB	58	26 Jun 14:18
ms-dotnet-sdk	79.25 MB	26,643	27 Oct 04:34
fsharp-support	26.8 MB	3,608	01:52
dotnet-ops	7.49 MB	835	27 Nov 14:29
msbuild	67.77 MB	5,692	29 Oct 22:35
ms-nuget-build-tasks	496.34 KB	152	24 Oct 02:43
NuGet.Client	59.75 MB	8,544	11 Nov 11:46
SharpGenTools	106.46 MB	846	26 Jun 14:19
resharper-unity	35.52 MB	7,681	27 Nov 15:10

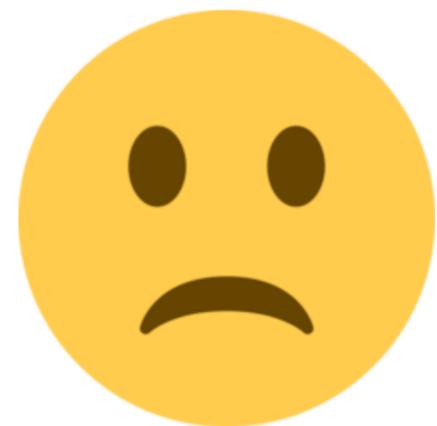


Выводы

- Воспроизводимые билды
- Фиксированные версии зависимостей
- Независимость от сторонних источников

Ускорение сборки проекта

Сборка проекта после мелкого
изменения занимает 10 минут



Реализуем умную перекомпиляцию



Работа R# build

Project: Daemon.Engine
Build state: Currently building one or more referenced projects
Changing state: Project state unknown

ReSharperHost.Generated									
CEAg	CLCo	SCRp	CICo	CIRi	CUNa	CUTC	CATr	CAMI	
CAPM	CCTS	CMM0	CSDe	CSM0	CSM1	CMM1	CUMe	CUSH	
CUVM	CoUt	CWCF	CRAg	CRem	CRCD	CRPr	CRUT	CTEI	
CTEW	CTEL	CTFI	CTFr	DCCC	DCDA	DCS0	DCWo	DCWH	
DCI0	DCI1	DCRP	DCUS	TCDI	DTCD	DTDI	DTDa	DTDS	
DTFe	DPAP	DASR	ESer	RFAc	RFSH	RMod	PCon	PCIU	
PrIn	PrSe	PrSn	PSIn	Deco	Reso	SBDu	Daem	DBSc	
DCS1	DaEn	DaPr	DaRe	DaSp	DaVB	DaXa	DaXm	FeAl	
FEnv	FESo	FIns	FNVB	FeNa	FIVB	FInt	FeIn	FREx	
	FSSe	FeXm	Int0	IBSc	ICSh	InRe	InVB	InXa	
	LTem	LTVB	Refa	RBSc	RCSh	ReIn	ReVB	ReXa	
SoAn	PFTB	CLex	EDGe	JSLG	LGUt	TGen	PsGe	TSLG	
UTes	XREX	XRHo	DeHo	DeWo	EFFe	EFRu	EnAn	IEWo	
JIDL	MBEL	CPEW	RSHo	RAIn	RTFr	RoHo	RoWo	WFDE	
WFDH	RTut	TICC	TICT	TIRA	DTIR	DAIC	AIRA	DAIR	
DADI	DPAR	Ide	MBHo	PDoc	PrHo	Proj	IEHo	IETa	
BADT	BELM	MBT0	MBT1	MBT2	BEng	BInt	CoMo	Core	
Int1	Meta	Sate	Shel	Symb	USta	UtTe	Util	Docu	
TCon	CLIn	Prof	PrUt	PWR0	Psi	PBSc	PCSh	PsIL	
ORCG	PPro	PREX	PsRe	PBCC	PsVB	PsXa	PsXm	Serv	
SBSc	SCSh	SePr	SeRe	SeVB	SeXa	SeXm	SeCp	PsCp	
UTCp	SeI1	SICS	SIVB	SIXa	UTAn	UTAV	UTMU	UTTP	
UTUP	UTU0	UTU1	UTU2	UTTR	UTXP	UTXR	DaWe	FeWe	
InWe	PsWe	ReWe	SeWe	FWLi	DCAp	DeCo	HRAG	MDS0	
MDS1	MDWi	MDeb	MDHe	MUIC	DMUI	PrWi	PWIm	PWR1	
PWST	SESo	SESS	SESV	SIAS	SIAV	SI1A	SIJS	UTSP	
UTSR									

```
20>UnitTesting.nUnit.Runner30 -> C:\Work\charlie\Bin.ReSharperHost\JetBrains.ReSharper.UnitTestRunner.nUnit30.dll
19>C:\Work\charlie\Obj\Obj.ReSharperHost\Toolset.Prj\MICRNECO.MPI1\tools\csc.exe /noconfig /lib:.\ /unsafe+ /checked- /nowarn:0162,0419,0612,0618,0645
17>MsBuildEventLogger -> C:\Work\charlie\Bin.ReSharperHost\JetBrains.ReSharper.MsBuildEventLogger.dll
20>----- Finished building project: UnitTesting.nUnit.Runner30. Succeeded: True. Errors: 0. Warnings: 0
17>----- Finished building project: MsBuildEventLogger. Succeeded: True. Errors: 0. Warnings: 0
19>UnitTesting.nUnit.Runner26 -> C:\Work\charlie\Bin.ReSharperHost\JetBrains.ReSharper.UnitTestRunner.nUnit26.dll
19>----- Finished building project: UnitTesting.nUnit.Runner26. Succeeded: True. Errors: 0. Warnings: 0
```



Плагин для Unity должен собираться на
всех платформах

Но ему нужен .NET Framework 3.5

даже на *nix



Решение от Microsoft



Microsoft.NETFramework.
ReferenceAssemblies 1.0.0

Microsoft .NET Framework Reference Assemblies

```
Package Manager .NET CLI PackageReference Paket CLI  
PM> Install-Package Microsoft.NETFramework.ReferenceAssemblies -Version 1.0.0
```

Dependencies

- [.NETFramework 2.0](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net20](#) (>= 1.0.0)
- [.NETFramework 4.0](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net40](#) (>= 1.0.0)
- [.NETFramework 4.5](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net45](#) (>= 1.0.0)
- [.NETFramework 4.5.1](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net451](#) (>= 1.0.0)
- [.NETFramework 4.5.2](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net452](#) (>= 1.0.0)
- [.NETFramework 4.6](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net46](#) (>= 1.0.0)
- [.NETFramework 4.6.1](#)
- [Microsoft.NETFramework.ReferenceAssemblies.net461](#) (>= 1.0.0)

Info

- last updated 12/2/2019
- [Project Site](#)
- [License Info](#)
- [Contact owners](#)
- [Report](#)
- [Download package](#) (20.46 KB)

Statistics

- 6,109,352 total downloads
- 2,244,591 downloads of current version
- 10,569 downloads per day (avg)

[View full stats](#)

Owners

- Microsoft
- dotnetframework

Authors

Microsoft



Нет пакета для .NET Framework 3.5



Реализуем свой генератор Reference
Assemblies



Так появился RefAsmer

JetBrains / Refasmer

Unwatch 25 Star 30 Fork 3

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

master 2 branches 9 tags

Go to file Add file Code

mfilippov Update NuGet title ✓ 83f6783 on Sep 24 101 commits

.github/workflows	Fix build script	2 months ago
src	Update NuGet title	2 months ago
.gitignore	Prepare Refasmer to release.	2 months ago
LICENSE	Initial commit	11 months ago
README.md	Update README	2 months ago

README.md

Refasmer

Simple tool to make reference assembly. Strips method bodies, private class fields etc. Also can generate xml files like FrameworkList.xml. Can be used as library (Refasmer.dll).

Installation

You could download refasmer from GitHub: <https://github.com/JetBrains/Refasmer/releases> or install as .NET Tool:

```
dotnet tool install -g JetBrains.Refasmer.CliTool
```

Usage:

About

The tool to create reference assembly from common assembly.

Readme

Apache-2.0 License

Releases 9

Release 1.0.12 **Latest** on Sep 24

+ 8 releases

Packages

No packages published

[Publish your first package](#)

Contributors 2

zabbius Sergey

mfilippov Mikhail Filippov

Languages

<https://github.com/JetBrains/Refasmer>



Наш пакет для .NET Framework 3.5



JetBrains.NETFramework.
ReferenceAssemblies.net35 1.0.1 ✓

JetBrains Reference Assemblies for .NET Framework 3.5

Package Manager .NET CLI PackageReference Paket CLI

```
PM> Install-Package JetBrains.NETFramework.ReferenceAssemblies.net35 -Version 1.0.1
```

Release Notes

Fix filename casing: System.XML.dll->System.Xml.dll, System.configuration.dll->System.Configuration.dll

> Dependencies

> Used By

✓ Version History

Version	Downloads	Last updated
1.0.1	4,592	6 months ago
1.0.0	239	6 months ago

Info

🕒 last updated 6 months ago

🌐 [Project Site](#)

📄 License: MIT

✉ [Contact owners](#)

📄 [Report](#)

📦 [Download package](#) (4.7 MB)

Statistics

↓ 4,831 total downloads

📦 4,592 downloads of current version

📈 27 downloads per day (avg)

[View full stats](#)

Owners

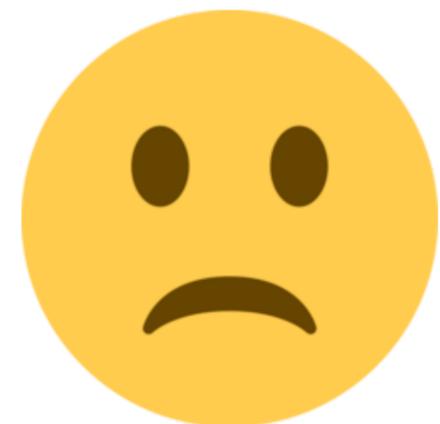
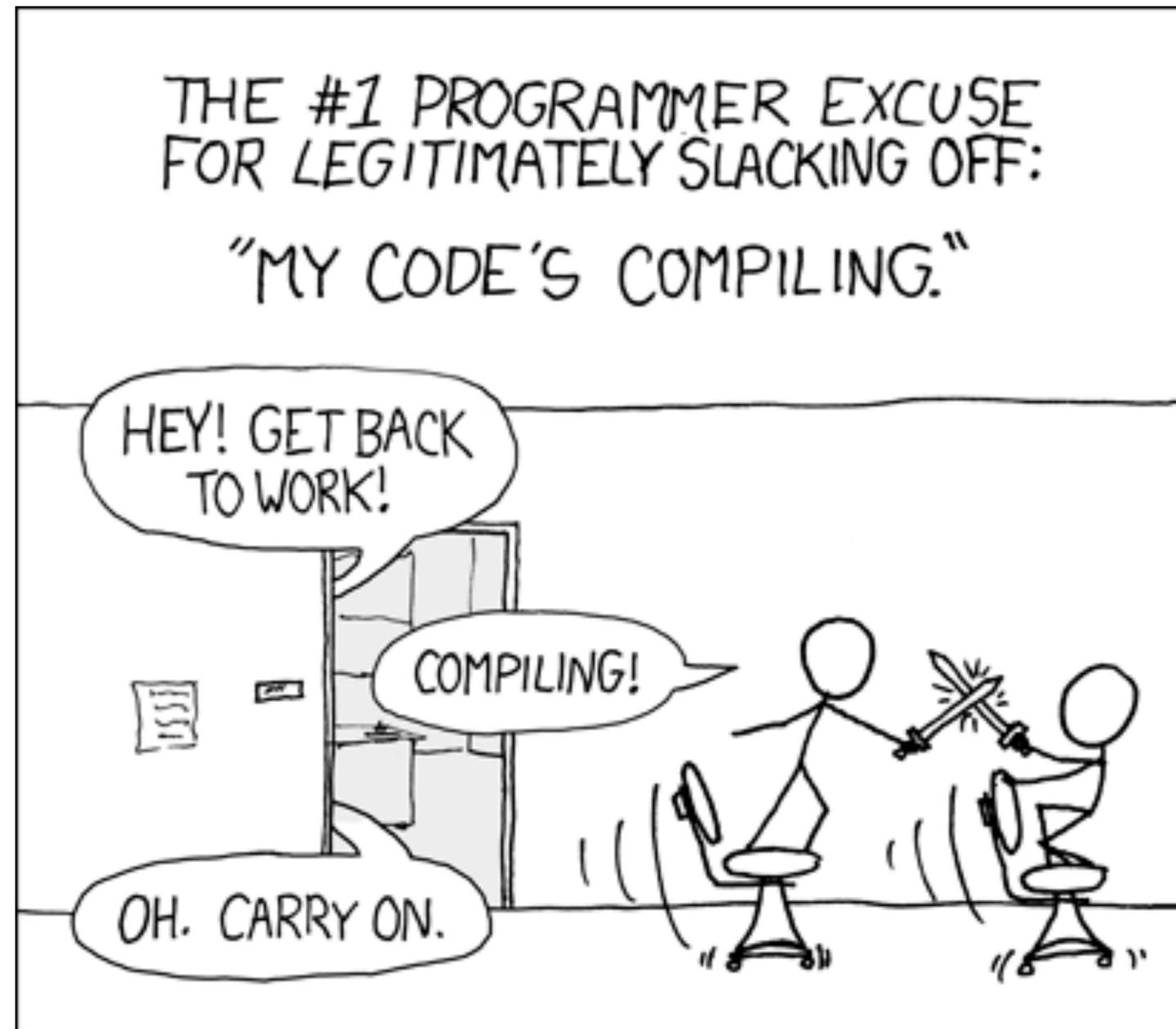
 [jetbrains](#)

Authors



<https://www.nuget.org/packages/JetBrains.NETFramework.ReferenceAssemblies.net35/>

Первая сборка всего проекта занимает около часа

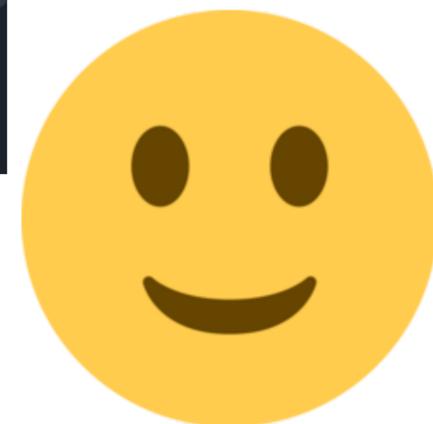


Реализуем Distributed Cache



Перекрываем Csc и Vbc задачи

```
C:\Work\charlie\Packages\JetBrains.Build.Platform.Tasks.CachedRoslynTask.1.0.20201028.208\build\CachedRoslynTask.Tasks - Sublime Text
File Edit Selection Find View Goto Tools Project Preferences Help
CachedRoslynTask.Tasks x
1 <?xml version="1.0" encoding="utf-8"?>
2 <Project xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
3   ..<UsingTask Condition="'$(DesignTimeBuild)' != 'true'" TaskName="Csc" AssemblyFile="CachedRoslynTask.dll"/>
4   ..<UsingTask Condition="'$(DesignTimeBuild)' != 'true'" TaskName="Vbc" AssemblyFile="CachedRoslynTask.dll"/>
5 </Project>
Line 1, Column 1 Spaces: 2 XML
```



Много промахов мимо кэша из-за
изменений приватных методов



Соединим Distributed Cache и RefAsmer



Статистика работы Distributed Cache

asgard.labs.jb.gg

Main Flaky tests Bonus fails Daily statistics Build durations Build statistics Build search Test statistics Test search Muted tests Benchmarks Other Build Id

Wave: 211 Start: 2020-11-21 End: 2020-11-28 Today Yesterday Week Month Year

Teamcity builds

BuildUnit	Tool	Profit	Ratio	Local hits	Remote hits	Download size	Download time	Compile	Compile time	Uploads	Upload size
Total	Total	22.08:06:25	93%	445618	91663	254.2 GB	09:32:19	33539	3.14:32:27	35821	96.7 GB
AnnotationsParser.exe	Csc	00:10:51	88%	61	27	679 kB	00:00:01	8	00:01:26	8	202.3 kB
AnnotationsParser.exe	Refasm	00:00:00	100%	512	63	45.2 MB	00:00:12	0	00:00:00	0	0 Bytes
cleanupcode.exe	Csc	00:00:02	0%	0	0	0 Bytes	00:00:00	69	00:04:59	69	3.4 MB
cleanupcode.exe	Refasm	00:06:53	98%	548	141	23.4 MB	00:00:05	6	00:00:04	6	262.2 kB
cleanupcode.x86.exe	Csc	-00:00:01	0%	0	0	0 Bytes	00:00:00	69	00:00:04	69	571 kB
cleanupcode.x86.exe	Refasm	00:00:02	9%	7	0	0 Bytes	00:00:00	64	00:00:37	64	872 kB
Configuration2Xml.dll	Csc	00:00:18	81%	128	82	14.9 MB	00:00:01	30	00:00:04	30	5.5 MB
Configuration2Xml.dll	Refasm	00:08:19	99%	1468	147	2.7 MB	00:00:01	10	00:00:03	10	56.7 kB
ConsoleProfiler.exe	Csc	00:03:23	81%	64	42	3.7 MB	00:00:01	15	00:00:48	15	1.3 MB
ConsoleProfiler.exe	Refasm	00:00:00	100%	6241	1261	29.5 MB	00:00:24	0	00:00:00	0	0 Bytes
ConsoleSnapshotPreviewer.exe	Csc	00:00:00	0%	0	0	0 Bytes	00:00:00	0	00:00:00	0	0 Bytes
ConsoleSnapshotPreviewer.exe	Refasm	00:00:00	0%	0	0	0 Bytes	00:00:00	0	00:00:00	0	0 Bytes
ConsoleSnapshotReader.exe	Csc	00:00:00	0%	0	0	0 Bytes	00:00:00	0	00:00:00	0	0 Bytes
ConsoleSnapshotReader.exe	Refasm	00:00:00	0%	0	0	0 Bytes	00:00:00	0	00:00:00	0	0 Bytes
CsLex.exe	Csc	00:09:59	96%	64	29	3 MB	00:00:02	2	00:00:18	2	214.4 kB
CsLex.exe	Refasm	00:00:00	100%	462	75	23.9 MB	00:00:09	0	00:00:00	0	0 Bytes
Debugger.Common.dll	Csc	00:06:03	83%	62	33	6.5 MB	00:00:03	12	00:01:11	12	2.4 MB
Debugger.Common.dll	Refasm	00:51:52	99%	5547	433	46.4 MB	00:00:23	3	00:00:01	3	10.4 kB
dmBench.exe	Csc	00:00:00	0%	0	0	0 Bytes	00:00:00	0	00:00:00	0	0 Bytes



Окружение влияет на результат компиляции



Соберем Toolset изолированный от окружения



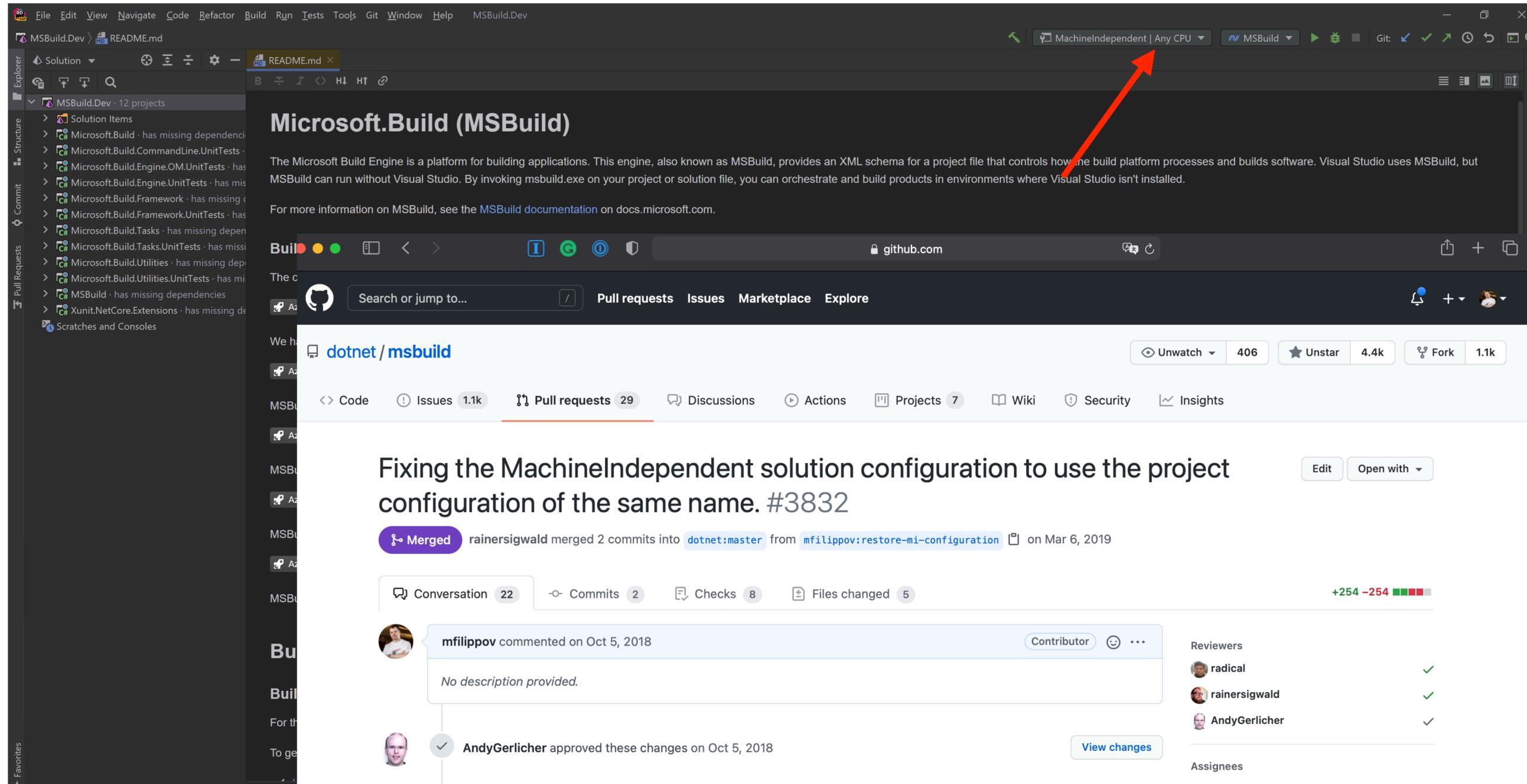
Toolset изолированный от машины

```
Users > mfilippov > AppData > Local > JetBrains > ~ > Toolset > 340D850D1B360A69 >
Name
JetBrains.Platform.MSBuild.Logger.Body.1.0.201... 11/25
JetBrains.Toolset.MSBuild.VC142_PSDK10_1904... 11/25
JetBrains.Toolset.MsCpp.20200825.0.1 11/25
JetBrains.Toolset.NETFXSDK_4_8.20190522.0.0 11/25
JetBrains.Toolset.PSDK_10_19041.20200827.0.0 11/25
JetBrains.Toolset.VC142.20200825.0.0 11/25

MSBuild.exe.config
<!-- Global Properties and Package Pre-Declarations -->
<!-- By convention, sibling paths to the MSBuild NuGet root dir are considered to be NuGet dirs as well, so packages for them -->
<property name="MsbuildExeDir" value="$([MSBuild]::GetCurrentToolsDirectory())\" />
<property name="JetToolsetNugetDir" value="$([System.IO.Path]::GetFullPath('$(MsbuildExeDir)..\..\..\'))\" />
<property name="NUGET_MsCppProps" value="$(JetToolsetNugetDir)JetBrains.Toolset.MsCpp.20200825.0.1\" />
<property name="NUGET_NetfxSdkCpp" value="$(JetToolsetNugetDir)JetBrains.Toolset.NETFXSDK_4_8.20190522.0.0\" />
<property name="NUGET_VC16" value="$(JetToolsetNugetDir)JetBrains.Toolset.VC142.20200825.0.0\" />
<property name="NUGET_PSDK_10" value="$(JetToolsetNugetDir)JetBrains.Toolset.PSDK_10_19041.20200827.0.0\" />
<property name="NUGET_LOGGER" value="$(JetToolsetNugetDir)JetBrains.Platform.MSBuild.Logger.Body.1.0.20170810\" />
<!-->
<!-- SDK paths -->
<property name="WindowsSdkDir" value="$(NUGET_PSDK_10)" />
<property name="WindowsSdkDir_71A" value="WindowsSdkDir_71A_is_not_defined" />
<property name="FrameworkSdkDir_71A" value="$(WindowsSdkDir_71A)" />
<property name="WindowsSdkDir_80" value="WindowsSdkDir_80_is_not_defined" />
<property name="WindowsSdkDir_80A" value="WindowsSdkDir_80A_is_not_defined" />
<property name="WindowsSdkDir_81A" value="WindowsSdkDir_81A_is_not_defined" />
<property name="WindowsSdkDir_81" value="WindowsSdkDir_81_is_not_defined" />
<property name="WindowsSdkDir_10" value="$(NUGET_PSDK_10)" />
<property name="UniversalCRTSdkDir_10" value="$(NUGET_PSDK_10)" />
<property name="UniversalCRTSdkDir" value="$(NUGET_PSDK_10)" />
<property name="UCRTContentRoot" value="$(NUGET_PSDK_10)" />
<property name="DotNetSdkRoot" value="$(NUGET_NetfxSdkCpp)" />
<!-->
<!-- VC-specific paths -->
<property name="NETFXKitsDir" value="$(NUGET_NetfxSdkCpp)" />
<!-- Finds compilers and some of the h/lib files under the VC folder from under the VS installation -->
<property name="VCInstallDir" value="VCInstallDir_is_not_defined" />
<property name="VCInstallDir_120" value="VCInstallDir_120_is_not_defined" />
<property name="VCInstallDir_140" value="VCInstallDir_140_is_not_defined" />
<property name="VCInstallDir_150" value="VCInstallDir_150_is_not_defined" />
<property name="VCInstallDir_160" value="$(NUGET_VC16)" />
<!-- VS-specific props files -->
<property name="VCTargetsPath10" value="$(NUGET_MsCppProps)MsBuild\v4.0\" />
<property name="VCTargetsPath11" value="$(NUGET_MsCppProps)MsBuild\v4.0\v110\" />
<property name="VCTargetsPath12" value="$(NUGET_MsCppProps)MsBuild\v4.0\v120\" />
<property name="VCTargetsPath14" value="$(NUGET_MsCppProps)MsBuild\v4.0\v140\" />
<property name="VCTargetsPath15" value="$(NUGET_MsCppProps)VisualStudio\2017\" />
<property name="VCTargetsPath16" value="$(NUGET_MsCppProps)VisualStudio\2019\" />
```



Можно собрать себе такой же MSBuild



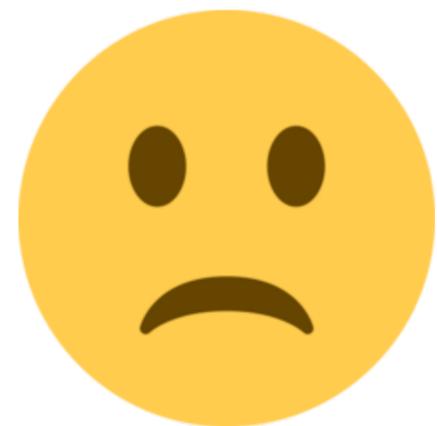
The image shows a composite screenshot. The top portion is a Visual Studio IDE window titled 'MSBuild.Dev' with a 'README.md' file open. The main content area displays the 'Microsoft.Build (MSBuild)' documentation. The bottom portion is a browser window showing the GitHub page for the 'dotnet/msbuild' repository. A red arrow points from the 'MachineIndependent | Any CPU' dropdown in the Visual Studio toolbar to the 'MachineIndependent' folder in the pull request diff view. The pull request, titled 'Fixing the MachineIndependent solution configuration to use the project configuration of the same name. #3832', is marked as merged and shows a list of reviewers: radical, rainersigwald, and AndyGerlicher, all with green checkmarks.



Разработчики переходят на *nix



Не хочется иметь две копии скриптов



Сделаем кросс-платформенные скрипты



Кросс-платформенный скрипт

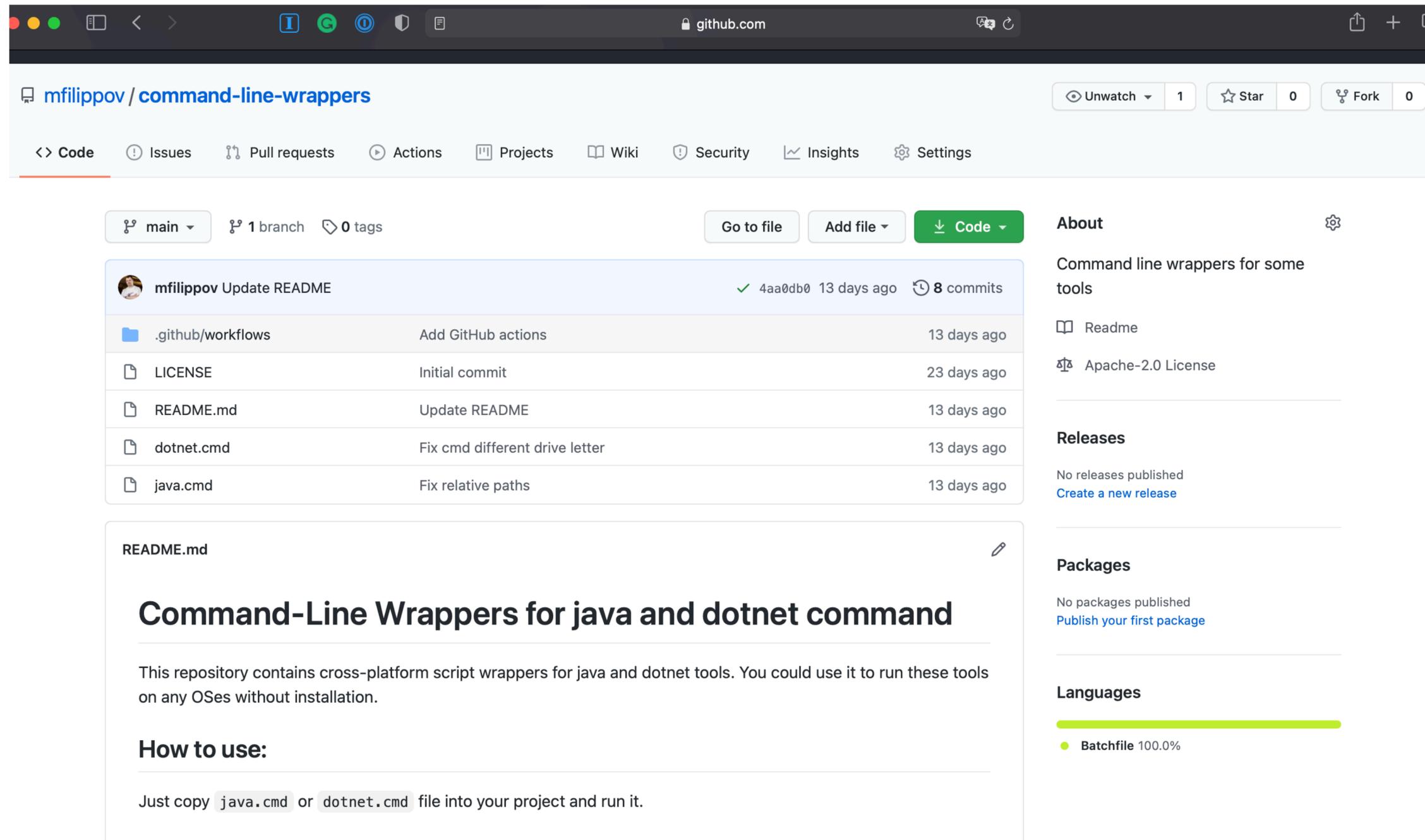
```
< > test.cmd ×  
1  :<<"::CMDLITERAL"  
2  @CALL echo Hello world!  
3  @GOTO :EOF  
4  ::CMDLITERAL  
5  exec echo Hello world!
```



Разные версии .NET Core ломают билды



Кросс-платформенные обертки



The screenshot shows a GitHub repository page for 'command-line-wrappers' by user 'mfilippov'. The repository has 1 branch (main) and 0 tags. The commit history shows 8 commits, with the most recent being 'Update README' by mfilippov 13 days ago. The repository contains files: .github/workflows, LICENSE, README.md, dotnet.cmd, and java.cmd. The README.md file is open, showing the title 'Command-Line Wrappers for java and dotnet command' and a description: 'This repository contains cross-platform script wrappers for java and dotnet tools. You could use it to run these tools on any OSes without installation.' The 'How to use:' section states: 'Just copy `java.cmd` or `dotnet.cmd` file into your project and run it.' The right sidebar shows 'About' (Command line wrappers for some tools), 'Releases' (No releases published), 'Packages' (No packages published), and 'Languages' (Batchfile 100.0%).

main 1 branch 0 tags

Go to file Add file Code

mfilippov Update README ✓ 4aa0db0 13 days ago 8 commits

.github/workflows	Add GitHub actions	13 days ago
LICENSE	Initial commit	23 days ago
README.md	Update README	13 days ago
dotnet.cmd	Fix cmd different drive letter	13 days ago
java.cmd	Fix relative paths	13 days ago

README.md

Command-Line Wrappers for java and dotnet command

This repository contains cross-platform script wrappers for java and dotnet tools. You could use it to run these tools on any OSes without installation.

How to use:

Just copy `java.cmd` or `dotnet.cmd` file into your project and run it.

About

Command line wrappers for some tools

Readme

Apache-2.0 License

Releases

No releases published
[Create a new release](#)

Packages

No packages published
[Publish your first package](#)

Languages

Batchfile 100.0%

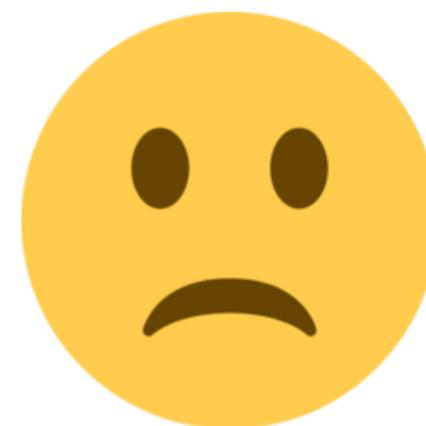


Выводы

- Время сборки влияет на продуктивность
- Если ваши билд долгий стоит этим заняться
- Велосипеды часто дополняют друг друга

Непрерывная интеграция (CI)

Линейная сборка с тестами идет 79 часов



Сделаем распараллеливание сборки



Настройка checkout rule

Administration / <Root project> / DotNetDiv / Wave 203 / Compile

Run ... Actions Build Configuration Home

ReSharper

Editing of the build configuration settings is disabled, reason: parameter teamcity.ui.settings.readOnly is set to true.

VCS Roots
In this section you can configure VCS roots for the build.

Name	Checkout Rules
(git) net203: dotnet-products Commit hook is active Latest check for changes: never Changes checking interval: never	View checkout rules (3)

Additional Options
Additional VCS checkout and update options.

Checkout Settings

VCS checkout mode: ?

Checkout directory: ? Auto (recommended)

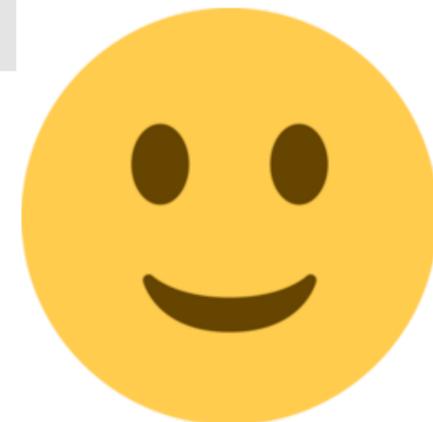
View Checkout Rules

net203: dotnet-products

```
+:ReSharper  
-:ReSharper/SDK  
+:DevKit
```

Newline-delimited set of rules in the form of +|-:VCSPath[=>AgentPath] ?
e.g. use -: to exclude all, or -:repository/path to exclude only the path from checkout
or +:repository/path => another/path to map to different path.
Note: checkout rules can only be set to directories, files are **not** supported.

⚠ Exclude checkout rules are specified while "checkout on agent" mode is used. Applying these checkout rules requires additional overhead and is inefficient.



Настройка snapshot dependencies

Administration / <Root project> / DotNetDiv / Wave 203 / Compile

Run ... Actions Build Configuration Home

ReSharper

- General Settings
- Version Control Settings 1
- Build Steps 3
- Triggers
- Failure Conditions 1
- Build Features 2
- Dependencies 3**
- Parameters 68
- Agent Requirements 2
- Suggestions
- < Hide unconfigured

Settings are stored in VCS (view history)

View DSL ?

Editing of the build configuration settings is disabled, reason: parameter teamcity.ui.settings.readOnly is set to true.

Snapshot Dependencies

Snapshot dependencies are used to create build chains. When being a part of build chain the build of this configuration will start only when all dependencies are built. If necessary, the dependencies will be triggered automatically. Build configurations linked by a snapshot dependency can optionally use revisions synchronization to ensure the same snapshot of the sources. ?

This build configuration is a part of a build chain

<input type="checkbox"/> Depends On	Dependency Options
<input type="checkbox"/> ... Platform Core	New build will use the same revisions as in the dependency Do not run new build if there is a suitable one Only use successful builds from suitable ones On failed dependency: mark build as failed to start On failed to start/canceled dependency: mark build as failed to start
<input type="checkbox"/> ... PsiFeatures	New build will use the same revisions as in the dependency Do not run new build if there is a suitable one Only use successful builds from suitable ones On failed dependency: mark build as failed to start On failed to start/canceled dependency: mark build as failed to start

Artifact Dependencies

Artifact dependency allows using artifacts produced by another build. ?

<input type="checkbox"/> Artifacts Source	Artifacts Paths
<input type="checkbox"/> ... Platform Core Build from the same chain	+:IsolatedBuildResult/**=>Artifacts.Inputs/PlatformCore -:**/*TeamCityCompileResult*



Билд проходите за час

DotNetDiv / Wave 203 / Trigger All Auto

✔ **#97418176 at 28 Nov 16:05** ☆

Tests passed: 496477, ignored: 14869, muted: 37; Build chain finished (success: 204)

refs/heads/net203

Actions ▾

Details ▾

Overview

Changes

Tests

Build Log

Dependencies

Artifacts

More ▾

Started 28 Nov 16:05 — 17:06 (1h:00m:53s)

Time in queue 4m:26s ▾ Triggered 28 Nov 16:00 by [Snapshot dependency](#); Schedule Trigger; DotNetDiv / Wave 203 / Trigger Main Branches with High Priority, build [#97418177](#)

Dependencies: 204 successful builds are finished

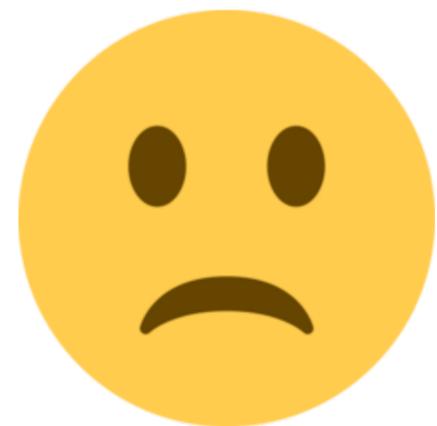
▾ **Tests**

✔ 496477 tests passed ⓧ 37 tests muted ⓧ 14869 tests ignored

○ Loading...



Долгие билды блокируют запуск зависимостей



Сделаем инструмент для оценки параллельности



Timeline билда в TeamCity

DotNetDiv / Wave 211 / Service / Merge Robot Chain

✓ #97806276 at 1 Dec 15:59 ☆

Tests failed: 67, passed: 491911, ignored: 14834, muted: 39; Build chain finished (success: 202)

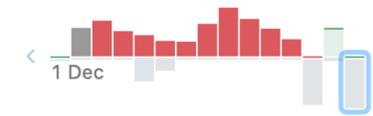
net211-mf-merge-net203-final

Actions

Details

Edit configuration...

Run



Overview Changes Tests Build Log **Dependencies** Artifacts More

Timeline

List

Chain

In queue 1h:52m Started at 1 Dec 15:59

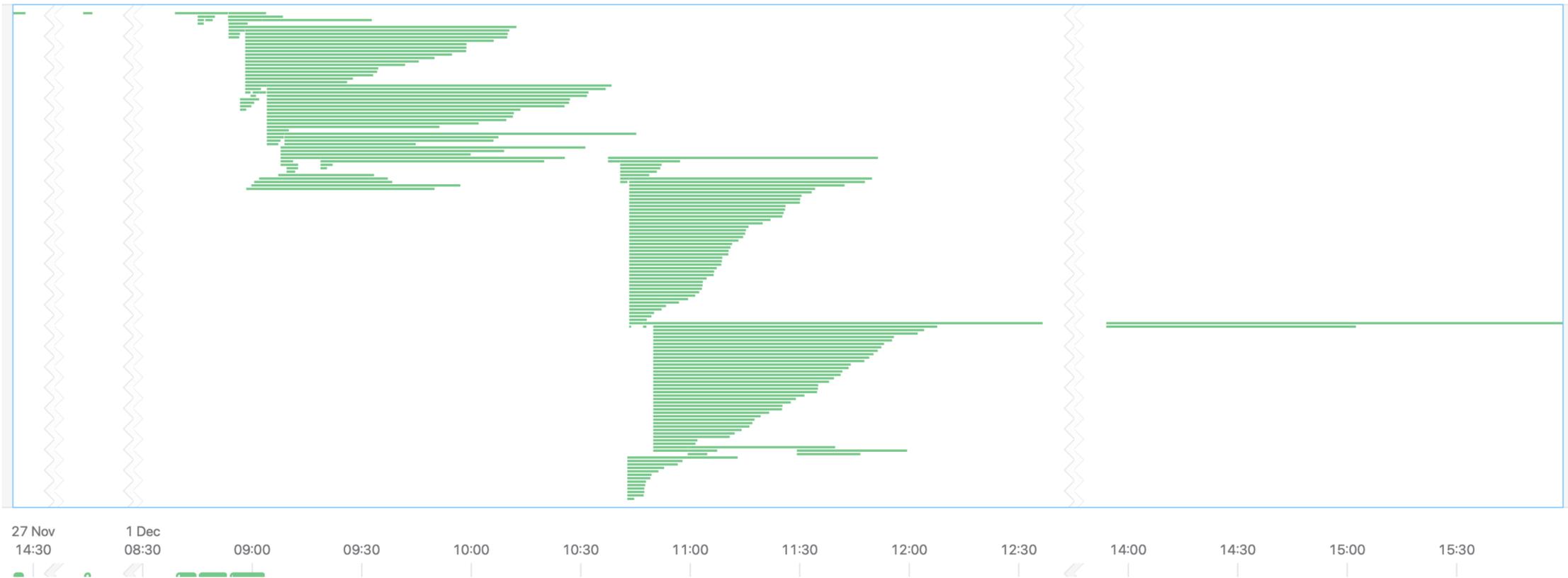
1h:33m: Build dependencies have not been built yet

1m:49s: Checking for changes is in progress

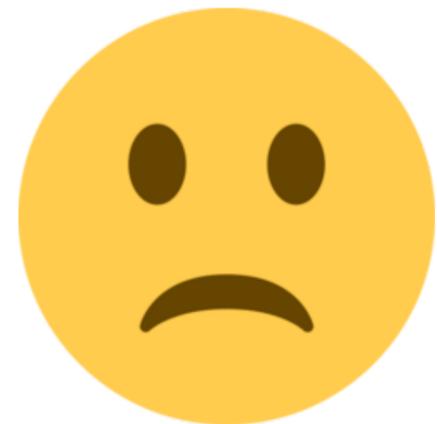
16m:34s: Waiting for the build settings finalization in other queued builds

34s: Other

○ In queue ● Successful ● Failed to start ● Canceled ● Running ● Queued Queue reasons: waiting for dependencies / other



Нет выигрыша в скорости пока мало агентов



Купим много железа



Теперь у нас 300+ агентов

 Projects Changes Agents **1298** Queue **533**

.NET agent pool

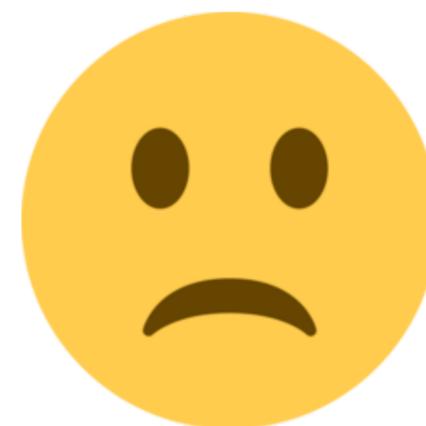
Agents 307 Assigned projects 2029

39 cloud images

- > dotnet-gitmerge-app19 1
- > dotnet-gitmerge-app23 2
- > dotnet-linux-app36 12
- > dotnet-linux-app45 6
- > dotnet-linux-app47 10
- > dotnet-linux-app55 10
- > dotnet-mac-unit-920 7
- > dotnet-mac-unit-1100 7
- > dotnet-mac-unit-1150 7
- > dotnet-mac-unit-1200 7
- > dotnet-mac-unit-1500 7
- > dotnet-mergerobot-app44 10
- > dotnet-mergerobot-app45 4
- > dotnet-vs2017 1
- > dotnet-windows-clean-app19 8
- > dotnet-windows-clean-app23 8
- > dotnet-windows-clean-app44 15
- > dotnet-windows-clean-app47 11
- > dotnet-windows-clean-app55 12
- > dotnet-windows-clean-app68 21



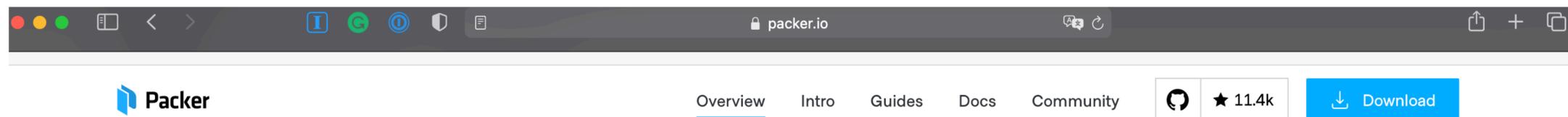
Нужен отдельный инженер для настройки агентов



Настроим автоматическую сборку образов агентов



Для сборки используем Packer



Build Automated Machine Images

Get Started

Download 1.6.5

```
...
$ packer build template.json
==> virtualbox: virtualbox output will be in this color.
==> vmware: vmware output will be in this color.
==> vmware: Copying or downloading ISO. Progress will be reported pe
==> vmware: Creating virtual machine disk
==> vmware: Building and writing VMX file
==> vmware: Starting HTTP server on port 8964
==> vmware: Starting virtual machine...
==> virtualbox: Downloading VirtualBox guest additions. Progress wi
==> virtualbox: Copying or downloading ISO. Progress will be reporte
```

INFRASTRUCTURE AS CODE

Modern, Automated

HashiCorp Packer automates the creation of any type of machine image. It embraces modern configuration management by encouraging you to use automated scripts to install and configure the software within your Packer-made images. Packer brings machine images into the modern age, unlocking untapped potential and opening new opportunities.



Неравномерная нагрузка на агенты



Объединим агенты в Cloud Profile



Количеством агентов легко управлять

Agent image	Snapshot	Behavior	Max # of instances		
T dotnet-gitmerge-app19 (dotnet-gitmerge-app19-image-107.39)	"Latest snapshot"	Clone; Delete	2	edit	delete
T dotnet-gitmerge-app23 (dotnet-gitmerge-app23-image-107.39)	"Latest snapshot"	Clone; Delete	2	edit	delete
T dotnet-linux-app36 (dotnet-linux-app36-image-107.39)	"Latest snapshot"	Clone; Delete	12	edit	delete
T dotnet-linux-app45 (dotnet-linux-app45-image-107.39)	"Latest snapshot"	Clone; Delete	6	edit	delete
T dotnet-linux-app47 (dotnet-linux-app47-image-107.39)	"Latest snapshot"	Clone; Delete	10	edit	delete
T dotnet-linux-app55 (dotnet-linux-app55-image-107.39)	"Latest snapshot"	Clone; Delete	10	edit	delete
T dotnet-mac-unit-1100 (dotnet-mac-unit-1100-image-103.51)	"Latest snapshot"	Clone; Delete	7	edit	delete
T dotnet-mac-unit-1150 (dotnet-mac-unit-1150-image-103.51)	"Latest snapshot"	Clone; Delete	7	edit	delete
T dotnet-mac-unit-1200 (dotnet-mac-unit-1200-image-103.51)	"Latest snapshot"	Clone; Delete	7	edit	delete
T dotnet-mac-unit-1500 (dotnet-mac-unit-1500-image-103.51)	"Latest snapshot"	Clone; Delete	7	edit	delete
T dotnet-mac-unit-920 (dotnet-mac-unit-920-image-103.51)	"Latest snapshot"	Clone; Delete	7	edit	delete
T dotnet-mergerobot-app44 (dotnet-mergerobot-app44-image-107.39)	"Latest snapshot"	Clone; Delete	10	edit	delete
T dotnet-mergerobot-app45 (dotnet-mergerobot-app45-image-107.39)	"Latest snapshot"	Clone; Delete	10	edit	delete
T dotnet-windows-clean-app19 (dotnet-windows-clean-app19-image-137.41)	"Latest snapshot"	Clone; Delete	8	edit	delete
T dotnet-windows-clean-app23 (dotnet-windows-clean-app23-image-137.41)	"Latest snapshot"	Clone; Delete	8	edit	delete
T dotnet-windows-clean-app44 (dotnet-windows-clean-app44-image-137.41)	"Latest snapshot"	Clone; Delete	15	edit	delete
T dotnet-windows-clean-app47 (dotnet-windows-clean-app47-image-137.41)	"Latest snapshot"	Clone; Delete	11	edit	delete
T dotnet-windows-clean-app55 (dotnet-windows-clean-app55-image-137.41)	"Latest snapshot"	Clone; Delete	12	edit	delete
T dotnet-windows-clean-app68 (dotnet-windows-clean-app68-image-137.41)	"Latest snapshot"	Clone; Delete	24	edit	delete
T dotnet-windows-full-app35 (dotnet-windows-full-app35-image-55.30)	"Latest snapshot"	Clone; Delete	4	edit	delete
T dotnet-windows-full-app36 (dotnet-windows-full-app36-image-55.30)	"Latest snapshot"	Clone; Delete	10	edit	delete
T dotnet-windows-full-app38 (dotnet-windows-full-app38-image-55.30)	"Latest snapshot"	Clone; Delete	10	edit	delete
T dotnet-windows-full-app45 (dotnet-windows-full-app45-image-55.30)	"Latest snapshot"	Clone; Delete	14	edit	delete
T dotnet-windows-full-app54 (dotnet-windows-full-app54-image-55.30)	"Latest snapshot"	Clone; Delete	22	edit	delete



Время билда зависит от нагрузки на VM



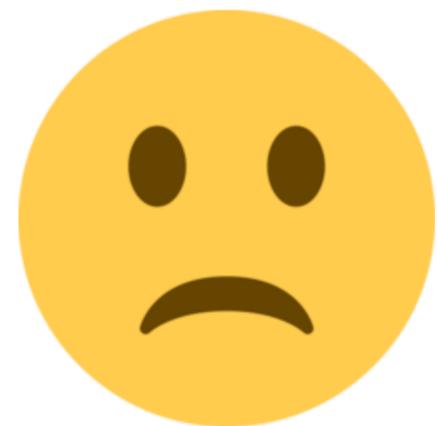
Попробуем блейд сервера вместо VM



Скорость компиляции выросла в 4 раза



Тесты не получили большого ускорения



Будем запускать часть билдов на VM



Гетерогенный пул максимально использует железо



Выводы

- Знание инструментов экономит время
- Автоматизируем все возможное
- Нужно иметь достаточно агентов
- Гибкая конфигурация агентов

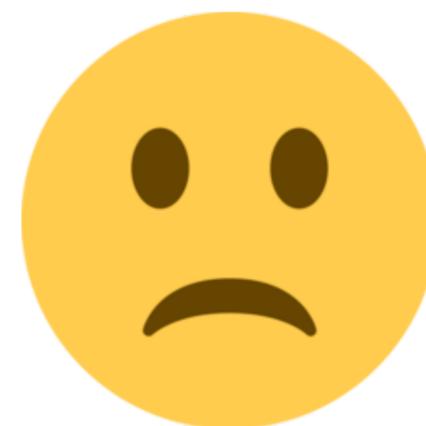
Непрерывная доставка (CD)

Как мы поставляем продукты

- Инсталлятор ~800Мб
- NuGet пакеты для SDK
- Три операционные системы



Инсталлятор слишком большой



Будем запускать на .NET Core сборки от 4.6.1



Запуск Rider на .NET Core

```
PID  TT  STAT  TIME COMMAND
8764  ??  S      0:09.96 /Users/mfilippov/Library/Application Support/JetBrains/Toolbox/apps/Rider/ch-0/203.5981.51/Rider.app/Contents/lib/ReSharperHost/macos-x64/dotnet/dotnet exec --runtimeconfig /Users/mfilippov/Library/Application Support/JetBrains/Toolbox/apps/Rider/ch-0/203.5981.51/Rider.app/Contents/lib/ReSharperHost/JetBrains.ReSharper.Host.netcore.runtimeconfig.json /Users/mfilippov/Library/Application Support/JetBrains/Toolbox/apps/Rider/ch-0/203.5981.51/Rider.app/Contents/lib/ReSharperHost/JetBrains.ReSharper.Host.exe --Port=62158 --Internal
```

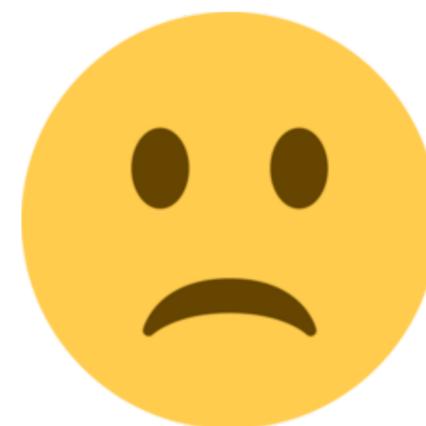
```
JetBrains.ReSharper.Host.netcore.runtimeconfig.json ×
1 {
2   "runtimeOptions": {
3     "tfm": "netcoreapp3.1",
4     "framework": {
5       "name": "Microsoft.NETCore.App",
6       "version": "3.1.0"
7     },
8     "configProperties": {
9       "Microsoft.NETCore.DotNetHostPolicy.SetAppPaths": true,
10      "DEFAULT_STACK_SIZE": "200000"
11    }
12  }
13 }
```

```
JetBrains.ReSharper.Host.deps.json ×
1 {
2   "runtimeTarget": {
3     "name": ".NETCoreApp,Version=v3.0",
4     "signature": ""
5   },
6   "compilationOptions": {},
7   "targets": {
8     ".NETCoreApp,Version=v3.0": {
9       "Autofac/1": {
10        "runtimeTargets": {
11          "NetCore/Autofac.dll": {
12            "rid": "any",
13            "assetType": "runtime",
14            "assemblyVersion": "4.8.1.0",
15            "fileVersion": "4.8.1.0"
16          }
17        }
18      },
19      "JetBrains.Annotations/1": {
20        "runtimeTargets": {
21          "NetCore/JetBrains.Annotations.dll": {
22            "rid": "any",
23            "assetType": "runtime",
24            "assemblyVersion": "2020.1.0.0",
25            "fileVersion": "2020.1.0.0"
26          }
27        }
28      },
29      "JetBrains.Lifetimes/1": {
30        "runtimeTargets": {
31          "NetCore/JetBrains.Lifetimes.dll": {
32            "rid": "any",
33            "assetType": "runtime",
34            "assemblyVersion": "777.0.0.0",
35            "fileVersion": "777.0.0"
36          }
37        }
38      },

```



В master ветке сломанные тесты



Пушить в мастер только, когда тесты зеленые



Merge robot

DotNetDiv / Wave 203

Edit configuration... Run ...

Trigger Pull Request Merge into net203 ★

Triggers a new pull request from the given branch to be tested and merged into the main branch.

<All branches> Actions Assign investigation...

Overview More

Branches Builds

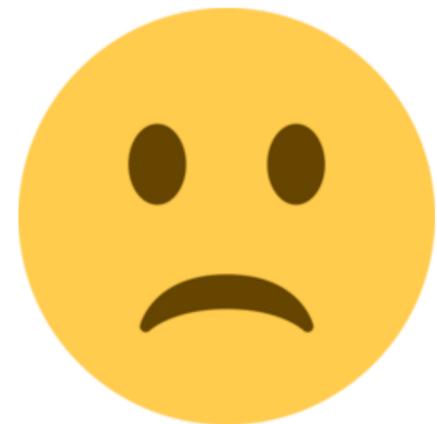
All Filter by agent na

100+ pending changes in Default branch

Build number	Branch	Status	Changes	Agent	Started	Duration	
#97897328	net203-dcvr-int... fixes	net203-dcvr-intest-fixes: merge successful	100+ changes	dotnet-merge...-2798	1 Dec 20 22:24	3h:24m:44s	
#97863581	net203-micha-fixes	net203-micha-fixes: merge successful	100+ changes	dotnet-merge...-2800	1 Dec 20 18:55	3h:59m:20s	
#97846489	net203-rtm-20... ority	net203-rtm-2020.3.0-cherry-net203.h.ne... triggered by https://buildserver.labs.intellij.net/viewLog.html?buildId=97780454 user Baltic purpose 'Merging net203-rtm-2020.3.0-cherry-net203.h.net211.h.anchor.vs.priority to net203-rtm-2020.3.0'	100+ changes	dotnet-merge...-2467	1 Dec 20 17:40	13m:00s	Build User 18 hours ago
#97845026	net203-dotPeek	net203-dotPeek: merge successful	12 changes	dotnet-merge...-2468	1 Dec 20 17:30	4h:58m:38s	
#97819657	net203-shvedov-bugs	net203-shvedov-bugs: merge failed: Build ...	13 changes	dotnet-merge...-2469	1 Dec 20 15:20	7h:11m:11s	
#97819301	net203-a.dyatlo... ugifx	net203-a.dyatlov-nullable.reference.types...	No changes	dotnet-merge...-2795	1 Dec 20 15:15	6h:24m:16s	
☆ #97817934	net203-pmFixes71	net203-pmFixes71: merge successful	100+ changes	dotnet-merge...-2798	1 Dec 20 15:09	5h:23m:08s	
#97799080	net203-to-211-usov	net203-to-211-usov: merge canceled: Buil...	100+ changes	dotnet-merge...-2466	1 Dec 20 13:34	1h:19m:26s	
#97797211	net203-qx-rele... -date	net203-qx-release-date: merge successful	100+ changes	dotnet-merge...-2796	1 Dec 20 13:23	8h:55m:33s	
#97785094	net203.h.net21... ority	net203.h.net211.h.anchor.vs.priority: merg...	No changes	dotnet-merge...-2801	1 Dec 20 12:23	5h:16m:20s	
#97782525	net203-dotPeek	net203-dotPeek: merge failed: Build is faili...	82 changes	dotnet-merge...-2797	1 Dec 20 12:13	5h:15m:41s	
#97780725	net203-usov	net203-usov: merge successful	4 changes	dotnet-merge...-2468	1 Dec 20 12:09	3h:27m:08s	
#97780454	net203.h.net21... ority	net203.h.net211.h.anchor.vs.priority: merg...	100+ changes	dotnet-merge...-2804	1 Dec 20 12:08	5h:30m:41s	
#97776571	net203.h.gutte... wn.15	net203.h.gutter.marks.slow.down.15: merg...	100+ changes	dotnet-merge...-2799	1 Dec 20 11:56	4h:24m:58s	



Мигающие тесты мешают вливаться



Будем повторять упавшие тесты

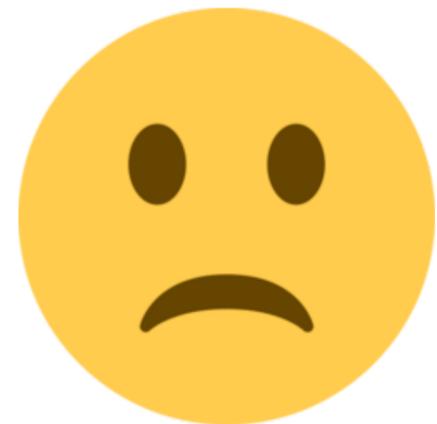


Повторяем упавшие тесты

```
Expand All Collapse All All Messages Search in log... Download log Enable soft-wrap lines Switch to light mode
Step 1/3: Robot command line target: robot (Ant) 3h:37m:33s
21:06:59 Checkout directory: /opt/buildAgent/work/cd8b42a0824c0993
21:06:59 Step 1/3: Robot command line target: robot (Ant) 3h:37m
21:06:59 Starting: /usr/lib/jvm/java-1.8.0-amazon-corretto/bin/java -DMono=/usr/bin/mono-sgen -DMono4.0_x64=/usr/lib/mono/4.0 -DMono4.5_x64=/usr/lib/mono/4.5 -DMonoVersion=6.12.0.90 -Dage
21:06:59 in directory: /opt/buildAgent/work/cd8b42a0824c0993
21:07:00 > get 2s
21:07:02 java 3h:37m
21:07:02 TeamCityHelper: running under TeamCity 2020.2 (build 85492)
21:07:03 2020-11-24 21:07:03 [main] INFO - Running merge robot in build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794400
21:07:04 > Merging net203 to net203-immediate-fixed-wording 3m:04s
21:10:08 ---> HTTP GET https://youtrack.jetbrains.com/api/admin/projects?fields=id,name&$top=10000
21:10:08 <--- HTTP 200 https://youtrack.jetbrains.com/api/admin/projects?fields=id,name&$top=10000 (389ms)
21:10:08 2020-11-24 21:10:08 [main] INFO teamcity-rest-client - Downloading artifact 'changedFiles.txt' from build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794596 t
21:10:09 > Publishing artifacts 4s
21:10:09 2020-11-24 21:10:09 [main] INFO teamcity-rest-client - Downloading artifact 'riderTestsMapping.xml' from build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794
21:10:10 2020-11-24 21:10:09 [main] INFO teamcity-rest-client - Downloading artifact 'riderTestsMapping.xml' from build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794
21:10:10 2020-11-24 21:10:10 [main] INFO teamcity-rest-client - Downloading artifact 'changedFiles.txt' from build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794596 t
21:10:10 > Changed files
21:10:10 2020-11-24 21:10:10 [main] INFO - Matched rules:
21:10:10
21:10:10 2020-11-24 21:10:10 [main] INFO - No rules matched
21:10:10 2020-11-24 21:10:10 [main] INFO - No Rider tests were selected to special run
21:10:10 2020-11-24 21:10:10 [main] INFO teamcity-rest-client - Downloading artifact '.vcs' from build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794596 to /opt/build
21:10:10 2020-11-24 21:10:10 [main] INFO teamcity-rest-client - Downloading artifact 'changedFiles.txt' from build https://buildserver.labs.intellij.net/viewLog.html?buildId=96794596 t
21:10:10 > Build chain
21:10:10 > Running tests, attempt 1 of 4 2h:19m
23:29:21 2020-11-24 23:29:21 [main] INFO - Failed dependencies:
23:29:21 https://buildserver.labs.intellij.net/viewLog.html?buildId=96795108
23:29:21 https://buildserver.labs.intellij.net/viewLog.html?buildId=96795087
23:29:21 2020-11-24 23:29:21 [main] INFO - Build https://buildserver.labs.intellij.net/viewLog.html?buildId=96795137 failed, retrying...
23:29:21 > Running tests, attempt 2 of 4 1h:12m
00:41:42 > Merging net203-immediate-fixed-wording to net203 2m:48s
00:44:30 ---> HTTP GET https://youtrack.jetbrains.com/api/admin/projects?fields=id,name&$top=10000
00:44:30 <--- HTTP 200 https://youtrack.jetbrains.com/api/admin/projects?fields=id,name&$top=10000 (384ms)
00:44:32 2020-11-25 00:44:31 [main] INFO - STATUS: net203-immediate-fixed-wording: merge successful
00:44:32 Process exited with code 0
```



Количество мигающих тестов растёт



Добавим бонусные прогоны



Люди вливают проблемы с производительностью



Тесты производительности

- Физические агенты
- Много прогонов
- Адаптивная логика
- Умные формулы

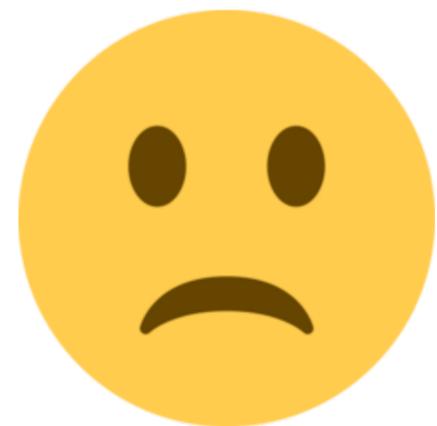


Тест на производительность блокирует мердж

```
Expand All Collapse All Important messages Search in log... Download log Enable soft-wrap lines Switch to light mode
Step 9/11: Gant [tests] (Ant) 15m:45s
08:03:35 *** Start testing tests with params: [outputdir: /opt/teamcity-agent/temp/buildTmp/test-output, packages: , methods: , workingDir: /opt/teamcity-agent/work/ac4a179caee90cf1/
08:03:35  v testng 14m:38s
08:03:35 OpenJDK 64-Bit Server VM warning: Option UseConcMarkSweepGC was deprecated in version 9.0 and will likely be removed in a future release.
08:03:36 JAXP: find factoryId =javax.xml.parsers.SAXParserFactory
08:03:36 JAXP: found system property, value=org.apache.xerces.jaxp.SAXParserFactoryImpl
08:03:36 JAXP: created new instance of class org.apache.xerces.jaxp.SAXParserFactoryImpl using ClassLoader: null
08:03:38 WARNING: An illegal reflective access operation has occurred
08:03:38 WARNING: Illegal reflective access by com.intellij.util.ReflectionUtil to field java.awt.event.InvocationEvent.runnable
08:03:38 WARNING: Please consider reporting this to the maintainers of com.intellij.util.ReflectionUtil
08:03:38 WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
08:03:38 WARNING: All illegal access operations will be denied in a future release
08:03:38 JAXP: find factoryId =javax.xml.parsers.DocumentBuilderFactory
08:08:21  v com.jetbrains.rider.test.cases.playback.startup.EarlyBackendStartTest.testEarlyBackendStart 58s
08:09:19 java.lang.Throwable: Performance degradation has been detected (check file:///opt/teamcity-agent/temp/buildTmp/system/testlog/playback-performance.log for details).
08:09:19 java.lang.Throwable: Performance degradation has been detected (check file:///opt/teamcity-agent/temp/buildTmp/system/testlog/playback-performance.log for details).
    at com.intellij.openapi.diagnostic.Logger.error(Logger.java:159)
    at com.jetbrains.rider.test.scriptingApi.ScriptingAPI_Playback_AnalysisKt.analyzeTestPerformance(ScriptingAPI.Playback.Analysis.kt:159)
    at com.jetbrains.rider.test.scriptingApi.ScriptingAPI_Playback_AnalysisKt.analyzeTestPerformance(ScriptingAPI.Playback.Analysis.kt:39)
    at com.jetbrains.rider.test.TestCaseRunner$run$$inlined$runInEdtAndWait$2.invoke(TestCaseRunner.kt:996)
    at com.jetbrains.rider.test.TestCaseRunner$run$$inlined$runInEdtAndWait$2.invoke(TestCaseRunner.kt:76)
    at com.jetbrains.rider.test.TestCaseRunner$run$$inlined$runInEdtAndWait$2.invoke(TestCaseRunner.kt:76)
    at com.jetbrains.rider.test.TestCaseRunner$run$$inlined$runInEdtAndWait$2.invoke(TestCaseRunner.kt:76)
    at com.jetbrains.rider.test.TestCaseRunner$run$$inlined$runInEdtAndWait$2.invoke(TestCaseRunner.kt:76)
    at com.jetbrains.rider.test.TestCaseRunner$run$$inlined$runInEdtAndWait$2.invoke(TestCaseRunner.kt:76)
    at java.desktop/java.awt.event.InvocationEvent.dispatch(InvocationEvent.java:313)
    at java.desktop/java.awt.EventQueue.dispatchEventImpl(EventQueue.java:770)
    at java.desktop/java.awt.EventQueue$4.run(EventQueue.java:721)
    at java.desktop/java.awt.EventQueue$4.run(EventQueue.java:715)
    at java.base/java.security.AccessController.doPrivileged(Native Method)
    at java.base/java.security.ProtectionDomain$JavaSecurityAccessImpl.doIntersectionPrivilege(ProtectionDomain.java:85)
    at java.desktop/java.awt.EventQueue.dispatchEvent(EventQueue.java:740)
    at com.intellij.ide.IdeEventQueue.dispatchEvent(IdeEventQueue.java:418)
    at java.desktop/java.awt.EventDispatchThread.pumpOneEventForFilters(EventDispatchThread.java:203)
    at java.desktop/java.awt.EventDispatchThread.pumpEventsForFilter(EventDispatchThread.java:124)
    at java.desktop/java.awt.EventDispatchThread.pumpEventsForHierarchy(EventDispatchThread.java:113)
    at java.desktop/java.awt.EventDispatchThread.pumpEvents(EventDispatchThread.java:109)
    at java.desktop/java.awt.EventDispatchThread.pumpEvents(EventDispatchThread.java:101)
    at java.desktop/java.awt.EventDispatchThread.run(EventDispatchThread.java:90)
08:09:23 Failed tests detected
```



Сложно покрыть тестами весь продукт



Будем анализировать аномалии в обычных тестах



Видна небольшая деградация



Main Flaky tests Bonus fails Daily statistics · Builds · Tests · Benchmarks · Other

Build Id



Test info for `com.jetbrains.rider.test.cases.debugger.AttachTest.enumerateMonoProcesses`

Ave: 203

Start: 2020-10-25

End: 2020-11-22



Today

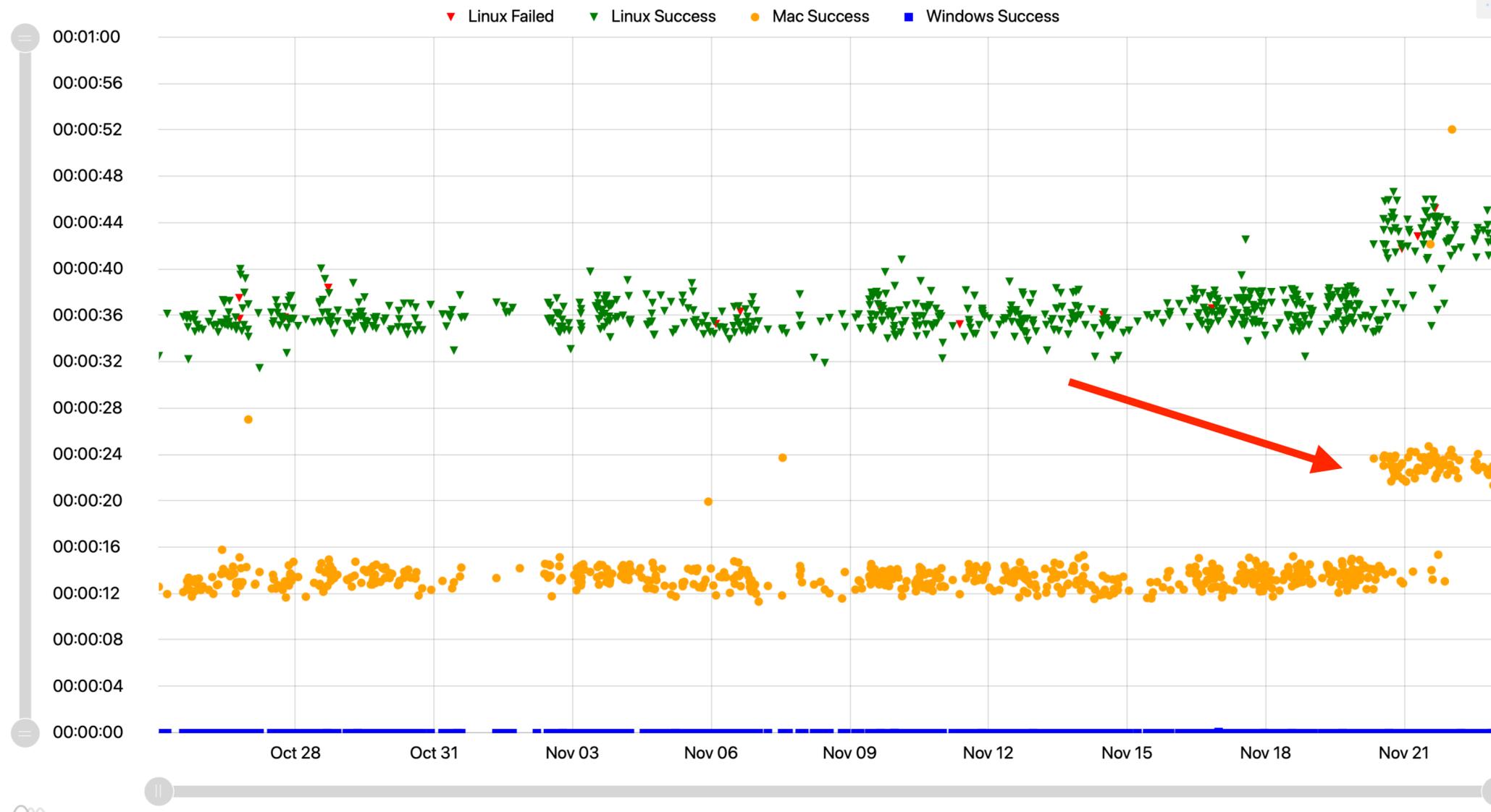
Yesterday

Week

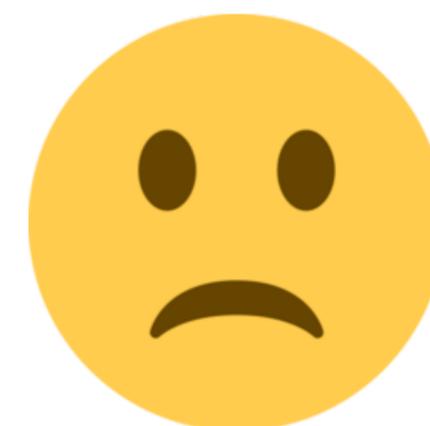
Month

Year

Trunk only



Постоянно что-то ломается



Сделаем свою систему мониторинга



Автоматическая классификация проблем

asgard.labs.jb.gg

Main
Flaky tests
Bonus fails
Daily statistics
Build durations
Build statistics
Build search
Test statistics
Test search
Muted tests
Benchmarks
Other

128 total robots = 85 success + 34 failed + 9 canceled + 0 running

1 unknown 3 flaky tests 11 bonus tests 1 chain canceled 3 tests 1 invalid branch 3 merge from trunk 11 compilation

Min success robot duration:	00:59:26	Min robot time in queue:	00:00:04	Min attempt time in queue:	00:00:04
Max success robot duration:	11:24:22	Max robot time in queue:	00:54:34	Max attempt time in queue:	00:54:34
Avg success robot duration:	05:34:10	Avg robot time in queue:	00:01:43	Avg attempt time in queue:	00:01:43

Wave:
 Start:
 End:
 User:
 Branch:

→
Today →
Yesterday →
Week →
Month →
Year →

Chains	Build	Status	Reason	Start	Duration	Queued time	Branch	User	Details
▶ 3	97368166 	Success		2020-11-27 20:25:25	04:29:44	00:00:14	net203-ak-complete-statement-new	andrew.karpov	
▶ 2	97367221 	Success		2020-11-27 20:21:40	03:21:59	00:00:36	net203-RIDER-53856-fix	upsorce	
▶ 2	97365960 	Success		2020-11-27 20:16:02	03:58:09	00:00:09	net203-shvedov-bugs	alexander.shvedov	
▶ 2	97351090 	Success		2020-11-27 17:35:12	03:07:53	00:00:08	net203-ak-nrt-generated	andrew.karpov	
▶ 1	97340487 	Failure	BonusTests	2020-11-27 16:28:10	02:23:29	00:00:22	net203-ak-complete-statement-new	andrew.karpov	• Build is failing with tests that should not fail at all: com.jetbrains.ride...
▶ 2	97340482 	Success		2020-11-27 16:26:17	03:54:40	00:00:23	net203-ln-rename-with-diff	nikita.lyubimov	
▶ 1	97339447 	Failure	BonusTests	2020-11-27 16:20:48	03:24:29	00:00:30	net203-RIDER-53856-fix	upsorce	• Build is failing with tests that should not fail at all: com.jetbrains.ride...



Выводы

- Нужно заботиться о размере продукта
- Важно следить за качеством продукта
- Можно извлекать пользу из готовых данных
- Быстрое реагирование на проблемы

Итоги

- Доставляем продукт за 2 дня
- Доверие к тестам
- Доверие к инфраструктуре

Мораль

- Любое решение можно сделать самому
- Любую рутину можно автоматизировать
- Любые операции можно ускорить

Всем спасибо!