



# Chocolatey

The package manager for Windows

## Chocolatey + DSC = Software Automation Sweeter



Rob Reynolds

Founder

Chocolatey Software

@ferventcoder







# Rob Reynolds

- Creator and Founder of Chocolatey 
- Enjoys long walks on the beach and designing solutions that make hard things easy
- Co-wrote infrastructure framework known as the Chuck Norris Framework
- Over 10 years experience in infrastructure automation
- Obsesses over user experience
- Microsoft MVP for whatever they are calling .NET area now





# Agenda

- The Story of Windows Automation
- Windows Software Ecosystem
- Chocolatey
- Chocolatey + DSC





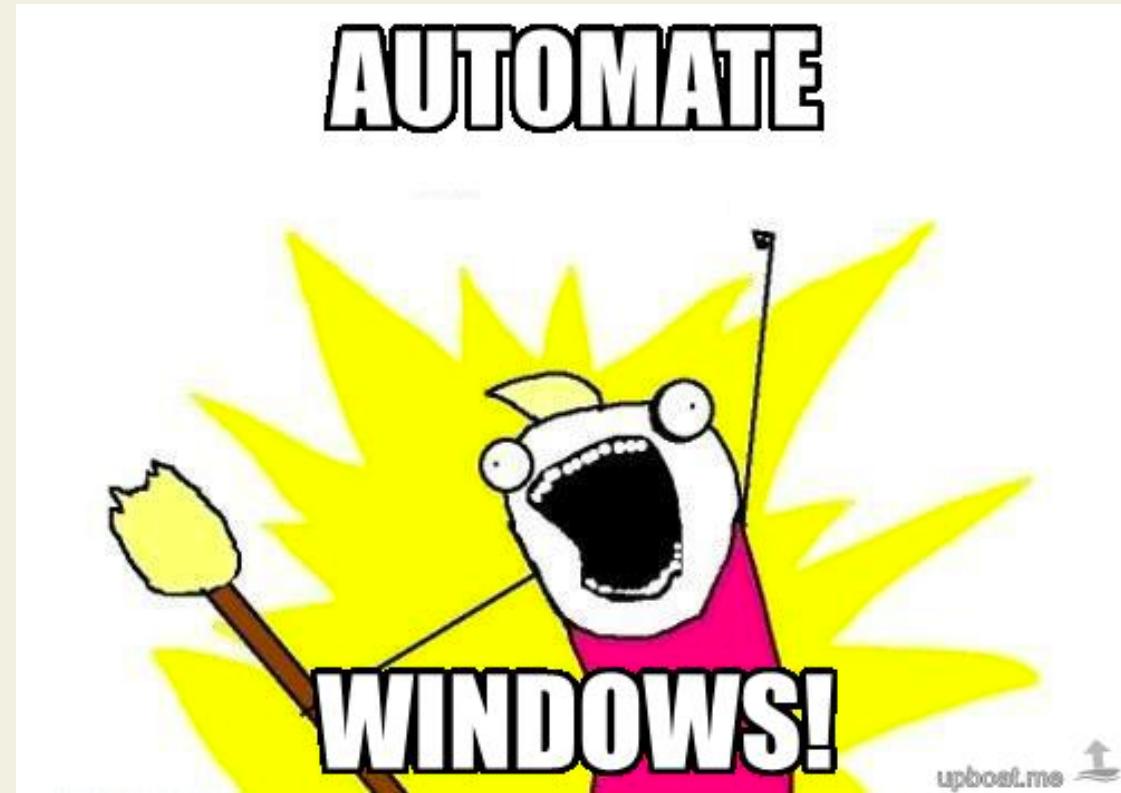
**Let's talk about a story...  
possibly your story**





# The Story of Modern Automation for Windows







You probably use or have  
used traditional tools





# Traditional Tools

- Manual Configuration
- Golden Images
- Endpoint management tools
- Not necessarily bad, just are harder to fit into modern automation approaches





# Modern Automation

- Feature-Rich
- Infrastructure as Code (IaC)
- Source Control
- Testable Infrastructure
- Reporting
- Centralized Management





# PowerShell DSC

- Microsoft
- Building on PowerShell
- Desired State
- Modern Approaches
- Framework - couple it with full Configuration Management Platforms like Puppet / Chef when appropriate





# So you modernized your Windows automation





# DevOps == Rainbows and Unicorns

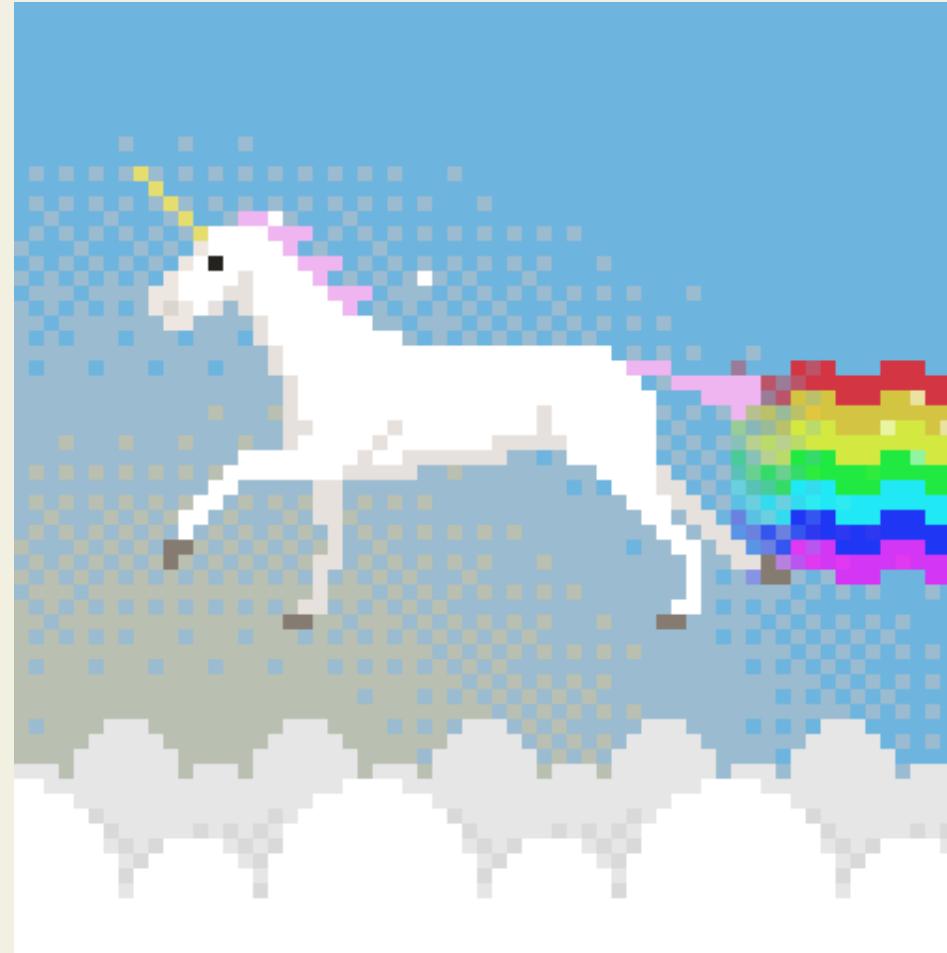
“Umm...”



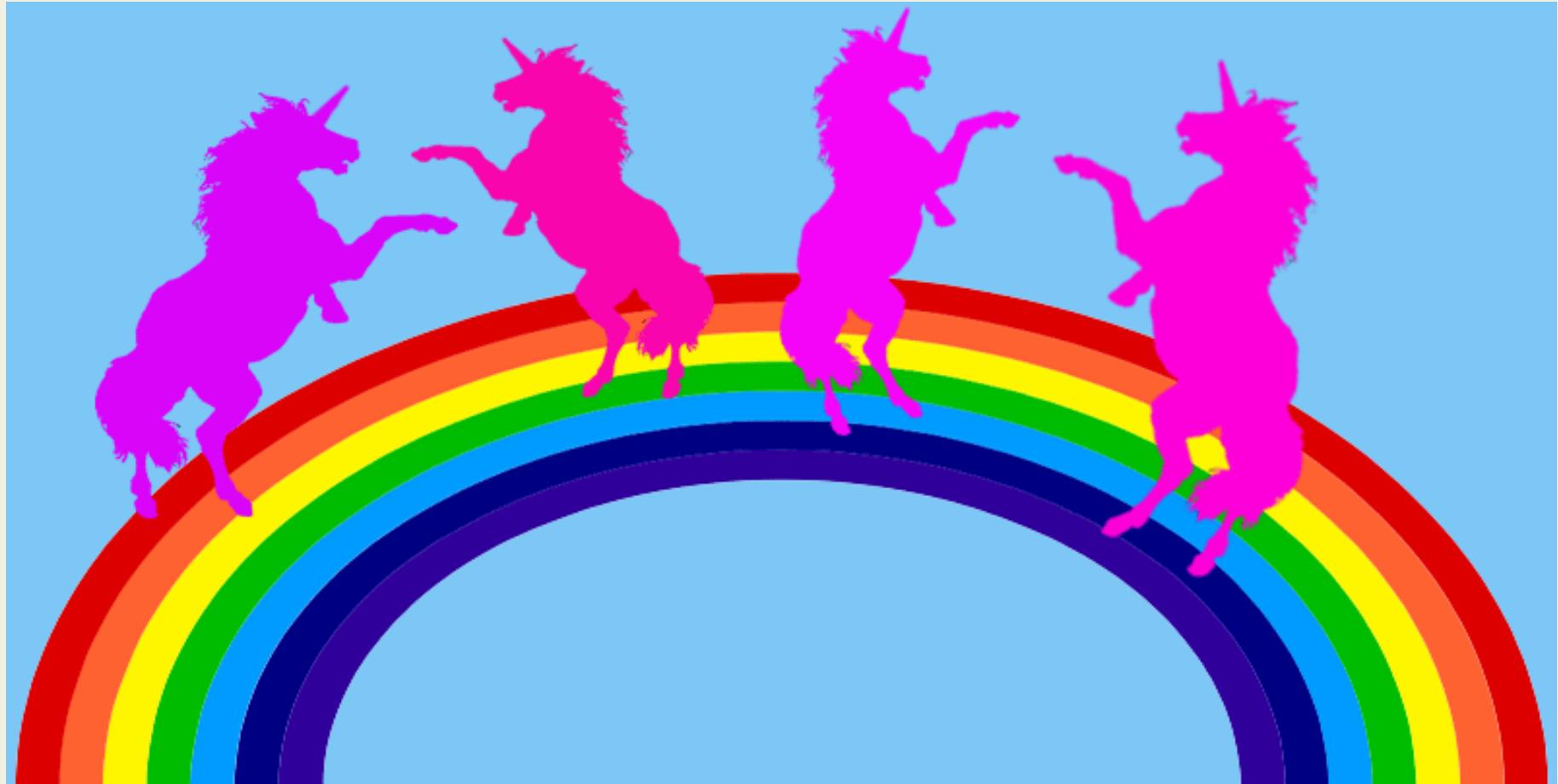
# Rainbows and Unicorns

“Just go with it...”









# Something was not quite right...





# Configuration Management alone is missing something





**Software Management / Package  
Management is necessary for  
great Configuration Management**





**Software management may  
account for 50-90% of your  
automation**



# Windows Software Ecosystem

- Over 20 installer formats and thousands of installers in the wild
- Zips and other archive formats
- Internal software
- Software installers are messy
- It's like the Wild West





# PowerShell DSC - Package Resource

- You may have used Package Resource
- Finding the PackageID (MSI Product Code GUID)
- Non-MSI?
- Upgrades?



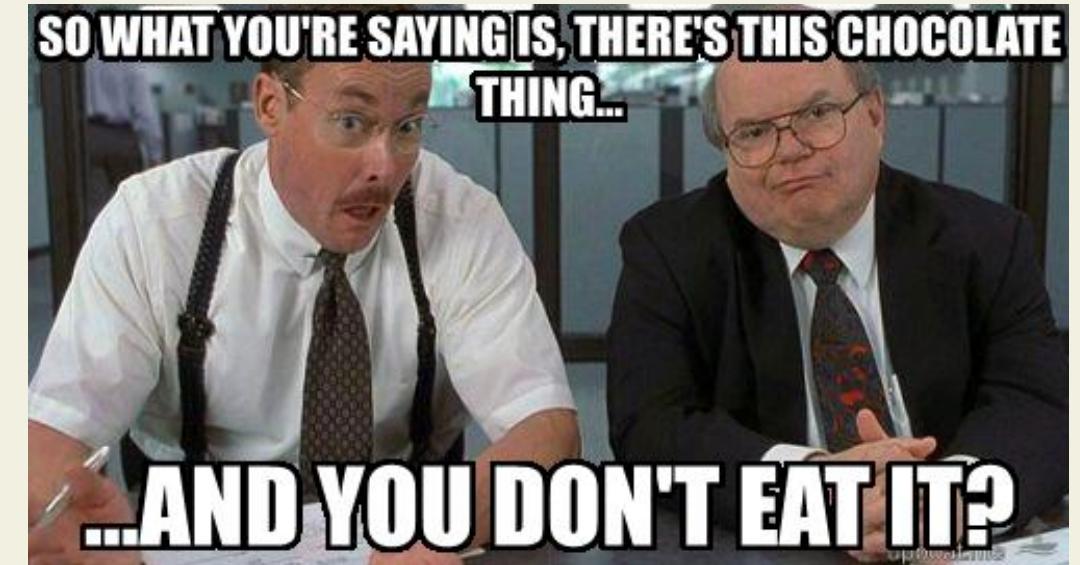


**“Fortunately there is a  
better way”**



# What is Chocolatey?

- Software Management
- PowerShell
- Fancy zip files = “packages”
- Packages are independent software deployment artifacts
- Takes your deployment scripts to the next level





# So you knew about Chocolatey





But does it work well in  
organizational sense?



Recognize this?





# That's an iceberg





Well, obviously - what does it represent though?





# Here's a hint

The screenshot shows the Chocolatey.org website at https://chocolatey.org/packages. The page displays a list of community-maintained packages. Two packages are shown in detail:

- Chocolatey 0.10.5** by ferventcoder (gep13)  
Chocolatey is a package manager for Windows (like apt-get but for Windows). It was designed to be a decentralized framework for quickly installing applications and tools that you need. It is built on the NuGet Infrastructure currently using PowerShell as its focus for delivering packages from the distros to your door, err computer. Chocolatey is... [More Information](#)  
54,330,514 downloads | Tags: nuget, apt-get, machine, repository, chocolatey
- Flash Player Plugin 25.0.0.127** by William chocolatey purity  
The Adobe Flash Player is freeware software for viewing multimedia, executing Rich Internet Applications, and streaming video and audio, content created on the Adobe Flash platform. #!# Notes - This vendor versions software only by the latest major version so '-version' parameter which targets specific minor version will always install latest minor... [More Information](#)  
5,053,547 downloads | Tags: adobe, flash player, plugin, freeware, cross-platform, browser, admin



## Understanding Chocolatey and Packaging

### Community Package Repository

- Public domain
- Distribution rights
- Has Internet dependencies - failure point
- Possible trust issues for organizations

### Organizational Use

- Internal / Offline
- Many thousands of packages larger
- Reliability

Do not cross this line to external / internet

WARNING: Objects in mirror may be larger than they appear





**Let's take a step back and  
evaluate what's possible**





# Chocolatey - Sane Software Management

- Easily manage the software lifecycle
- Native installers, zips, binaries
- PowerShell module simplifies work
- Packages are independent building blocks
- Integrates with configuration management
- Business friendly features





# Chocolatey - The Approach

6+ years - proven technology

- Single, unifying interface - control the chaos
- Decentralized - multiple places to get packages, including internal
- PowerShell
- Flexible
- Secure
- Reliable





# FOSS vs Chocolatey for Business (C4B)



- **Chocolatey open source (FOSS) == package management**
  - Works well in organizational use
- **C4B == complete software management**
  - Smoother experience
  - Builds on top of FOSS
  - Better system integration, endpoint management, etc
  - Better visual interfaces (GUIs)
  - Features geared specifically towards organizational use

# Smart Installs / Smarter Upgrades

```
Administrator: Windows PowerShell
PS C:\packages> choco install git.install --source . -y
Chocolatey v0.9.10-beta1-426-g3c8b16e Business
Installing the following packages:
git.install
By installing you accept licenses for the packages.

git.install v2.8.4
Loading 'chocolatey.licensed' extension.
Copying git.install
  from 'C:\ProgramData\chocolatey\lib\git.install\tools\files\Git-2.8.4-64-bit.exe'
Virus checking skipped/turned off. Not verifying 'Git-2.8.4-64-bit.exe'
Installing Git-2.8.4-64-bit.exe...

Git-2.8.4-64-bit.exe has been installed.
WARNING: Git installed - You may need to close and reopen your shell for PATH changes to take effect.
Environment Vars (like PATH) have changed. Close/reopen your shell to see the changes (or in powershell/cmd.exe just type `refreshenv`).
The install of git.install was successful.
Software installed to 'C:\Program Files\Git\' ←

Chocolatey installed 1/1 package(s). 0 package(s) failed.
See the log for details (C:\ProgramData\chocolatey\logs\chocolatey.log).
PS C:\packages> git
git : The term 'git' is not recognized as the name of a cmdlet, function, script file, or operable program. Check the spelling of the name, or if a path was included, verify that the path is correct and try again.
At line:1 char:1
+ git
+ ~~~
    + CategoryInfo          : ObjectNotFound: (git:String) [], CommandNotFoundException
    + FullyQualifiedErrorId : CommandNotFoundException

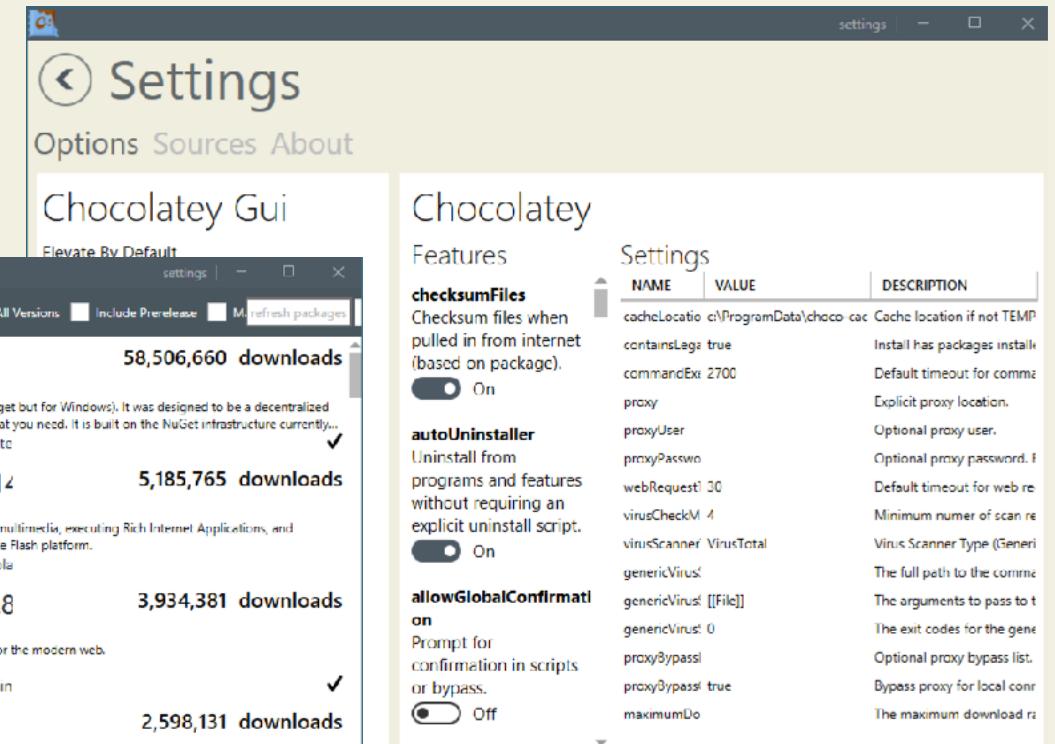
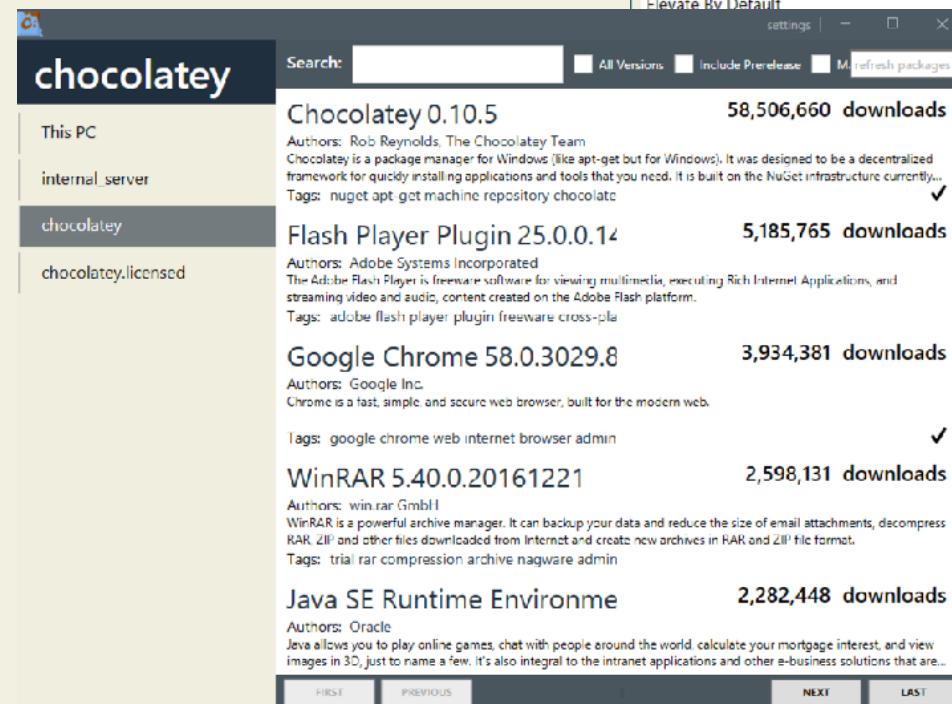
PS C:\packages> refreshenv ←
Refreshing environment variables from the registry...
Finished
PS C:\packages> git
usage: git [--version] [--help] [-c <path>] [-c name=value]
           [--exec-path=<path>] [--html-path] [--man-path] [--info-path]
```

- Track software installation in Programs & Features to map packages to system installs
- Track environment variable changes
- Leave out guesswork by reporting on software installation location
- Upgrades - Use XML Document Transform (XDT) for .NET configuration file changes
- Exclusive to Chocolatey - Use new tools / commands without closing / re-opening your shell for environment changes to take effect



# Graphical Interface - Chocolatey GUI

- Configure Chocolatey
- Manage software installations





# Automatic Uninstallation

```
PS C:\packages> choco uninstall 1password -y
Chocolatey v0.9.10-beta-422-g335bc01 Business
Uninstalling the following packages:
1password

1password v4.6.0.598
Running auto uninstaller...
Auto uninstaller has successfully uninstalled 1password.
1password has been successfully uninstalled.

Chocolatey uninstalled 1/1 packages. 0 packages failed.
See the log for details (C:\ProgramData\chocolatey\logs\choco.log)
```

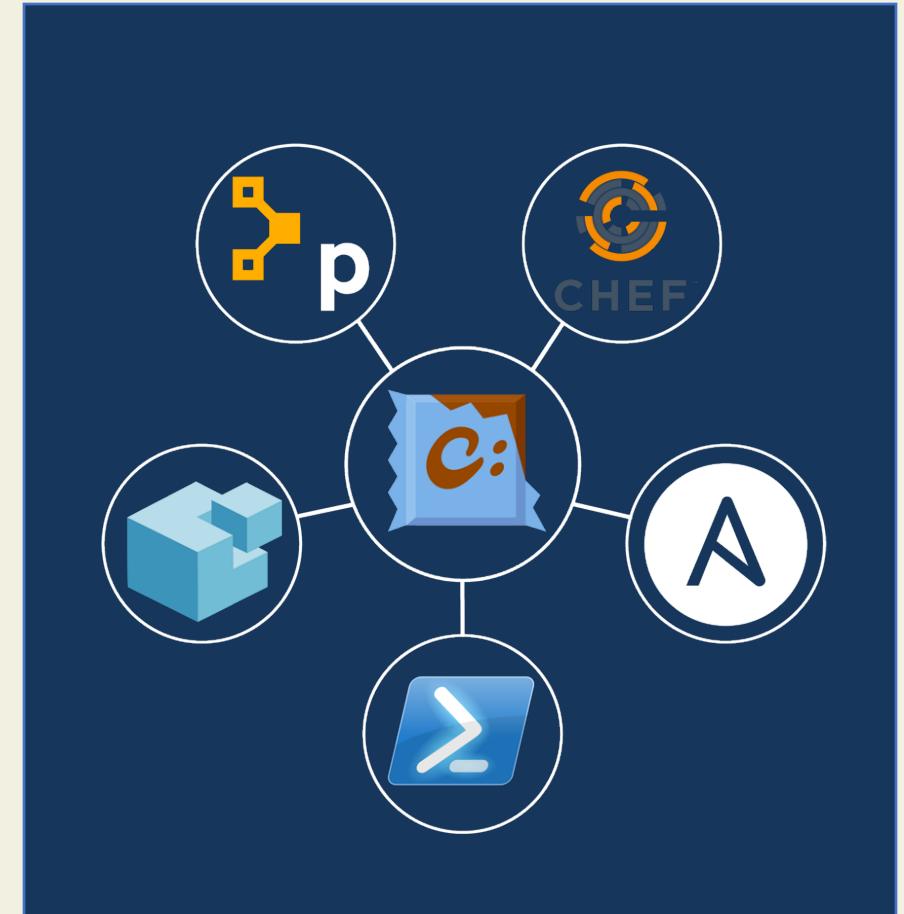
- Exclusive to Chocolatey - Automatically uninstall over 90% of installations without uninstall script
- AutoUninstaller reduces time by not developing and managing uninstall scripts





# Integrates with Everything

- <https://chocolatey.org/docs/features-infrastructure-automation>
- Puppet
- Chef (built-in), cookbook
- PowerShell DSC
- Ansible
- Saltstack
- Octopus Deploy
- Boxstarter
- SCCM
- RMM, or really anything that can run scripts





# Reporting / Auditing





# Inventory - Comprehensive Software Audit

```
PS C:\> choco list -lo --include-programs
1password 4.6.0.603
chocolatey 0.9.10.3
chocolatey.extension 1.4.0
chocolatey.server 0.1.1
DotNet4.0 4.0.30319.20141222
git 2.7.0.0
Googlechrome 51.0.2704.106
roundhouse 0.8.5.0
8 packages installed.

7-zip 9.22 (x64 edition)|9.22.00.0
Bitvise SSH Server 5.60 (remove only)|
ChocolateyGUI 0.13.2.0|0.13.2.0
Launchy 2.5|
Notepad++|6.4.2
Oracle VM VirtualBox Guest Additions 4.3.12|4.3.12.0
Puppet (64-bit)|3.8.3
7 applications not managed with chocolatey.
```

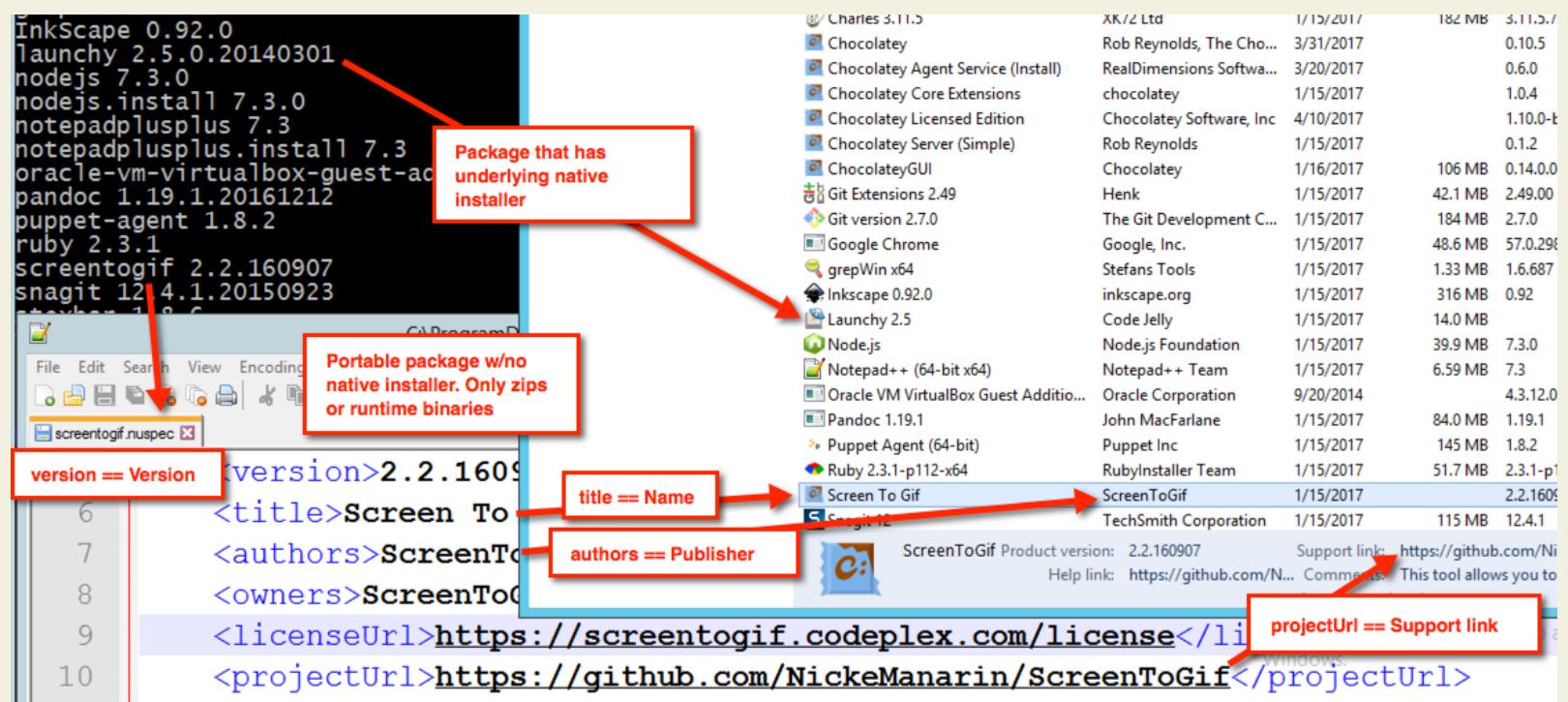
- Exclusive to Chocolatey - Visibility beyond just the software 'installed' in Programs & Features
- Track versions of zip archives & own internal software that is not visible in system installation.
- Get a complete view of your systems. Chocolatey reports applications in systems not directly under its management.
- Package Audit (C4B) adds who and when

```
PS C:\packages\createpackages> choco list -lo --audit -r
1password|4.6.0.598|User:vagrant|Domain:WIN2012R2X64|Original User:vagrant|Install Date:Utc:2017-07-09 16:53:17Z
7zip|16.02.0.20160811
baretail|3.50.0.20120226
```



# Package Synchronizer (C4B) - All Packages in Programs and Features

- Programs and Features represents only 50-80% of the software on a machine
- Chocolatey brings managed entries for non-installer packages
- Supporting legacy inventory reporting systems is now a snap
- Do not need to build MSIs / Installers for internal use just to support legacy reporting





# Logging - Detailed Reporting

```
Open Highlighting Follow Tail ANSI C:\ProgramData\chocolatey\logs\chocolatey.log (5.9 MB)
0 2017-06-09 21:55:52,794 2236 [DEBUG] - Configured chocolatey.infrastructure.logging.log4net.config.xml from assembly choco, Version 0.10.7.0, Cultureneutral, PublicKeyToken=8d467a1460811042
0 2017-06-09 21:55:52,849 2236 [DEBUG] - XmlConfiguration is now operational
0 2017-06-09 21:55:52,857 2236 [DEBUG] - Evaluating license file found at 'C:\ProgramData\chocolatey\license\chocolatey.license'.
0 2017-06-09 21:55:53,044 2236 [DEBUG] - Loading Licensed Extensions and Commands
0 2017-06-09 21:55:53,083 2236 [INFO ] - =====
0 2017-06-09 21:55:53,411 2236 [INFO ] - Chocolatey v0.10.7 Business
0 2017-06-09 21:55:53,427 2236 [DEBUG] - Chocolatey is running on Windows v 6.3.9600.0
0 2017-06-09 21:55:53,427 2236 [DEBUG] - Attempting to delete file "C:\ProgramData\chocolatey\choco.exe.old".
0 2017-06-09 21:55:53,435 2236 [DEBUG] - Attempting to delete file "C:\ProgramData\chocolatey\choco.exe.old".
0 2017-06-09 21:55:53,443 2236 [DEBUG] - Command line: "C:\ProgramData\chocolatey\choco.exe" upgrade chocolatey.extension -s C:\vagrant\resources\packages -y -f
0 2017-06-09 21:55:53,443 2236 [DEBUG] - Received arguments: upgrade chocolatey.extension -s C:\vagrant\resources\packages -y -f
0 2017-06-09 21:55:53,536 2236 [DEBUG] - RemovePendingPackagesTask is now ready and waiting for PreRunMessage.
0 2017-06-09 21:55:53,544 2236 [DEBUG] - CountdownTask is now ready and waiting for PostRunMessage.
0 2017-06-09 21:55:53,544 2236 [DEBUG] - Terminal services setup not necessary for this session.
0 2017-06-09 21:55:53,552 2236 [DEBUG] - SynchronizeTask is now ready and waiting for PreRunMessage.
0 2017-06-09 21:55:53,552 2236 [DEBUG] - PackagesInProgramsAndFeaturesTask is now ready and waiting for PostRunMessage.
0 2017-06-09 21:55:53,560 2236 [DEBUG] - Sending message 'PreRunMessage' out if there are subscribers...
0 2017-06-09 21:55:53,575 2236 [DEBUG] - [Pending] Removing all pending packages that should not be considered installed...
0 2017-06-09 21:55:53,599 2236 [DEBUG] - [Synchronize] Updating packages with Programs and Features
0 2017-06-09 21:55:53,599 2236 [DEBUG] - [Synchronize] Currently only supports removals. Soon will handle updates.
0 2017-06-09 21:55:53,872 2236 [DEBUG] - 7zip 16.02.0.20160811
0 2017-06-09 21:55:53,880 2236 [DEBUG] - baretail 3.50.0.20120226
0 2017-06-09 21:55:53,950 2236 [DEBUG] - Charles 3.11.5
0 2017-06-09 21:55:53,950 2236 [DEBUG] - chocolatey 0.10.7
0 2017-06-09 21:55:53,950 2236 [DEBUG] - chocolatey-agent 0.6.0
0 2017-06-09 21:55:53,950 2236 [DEBUG] - chocolatey-core.extension 1.0.4
0 2017-06-09 21:55:53,950 2236 [DEBUG] - chocolatey.extension 1.10.0
0 2017-06-09 21:55:53,958 2236 [DEBUG] - chocolatey.server 0.1.2
0 2017-06-09 21:55:53,958 2236 [DEBUG] - ChocolateyGUI 0.14.0-unstable0165
0 2017-06-09 21:55:53,958 2236 [DEBUG] - DotNet4.0 4.0.30319.20141222
0 2017-06-09 21:55:53,958 2236 [DEBUG] - DotNet4.5.2 4.5.2.20140902
0 2017-06-09 21:55:53,958 2236 [DEBUG] - git 2.7.0.0
0 2017-06-09 21:55:53,958 2236 [DEBUG] - gitextensions 2.49
0 2017-06-09 21:55:53,958 2236 [DEBUG] - GoogleChrome 55.0.2883.87
0 2017-06-09 21:55:53,966 2236 [DEBUG] - grepwin 1.6.16
0 2017-06-09 21:55:53,966 2236 [DEBUG] - InkScape 0.92.0
0 2017-06-09 21:55:53,966 2236 [DEBUG] - l10n-en-US 0.5.0.20140901
```

- Log file captures very detailed information - environment and state
- Reduces rollback / recreation necessity





# Compliance – Audit Out of Date Software

- choco outdated
- Comprehensive reporting on available upgrades
- See what will upgrade on next maintenance window

```
PS C:\packages> choco outdated
Chocolatey v0.9.10-beta1-426-g3c8b16e Business
Outdated Packages
  Output is package name | current version | available version | status

nodejs|4.4.5|6.2.1|false
nodejs.install|4.4.5|6.2.1|false
notepadplusplus|6.8.1|6.9.2|false
notepadplusplus.install|6.8.1|6.9.2|false
roundhouse|0.8.5.0|0.8.6|false

Chocolatey has determined 5 package(s) are outdated.
PS C:\packages>
```





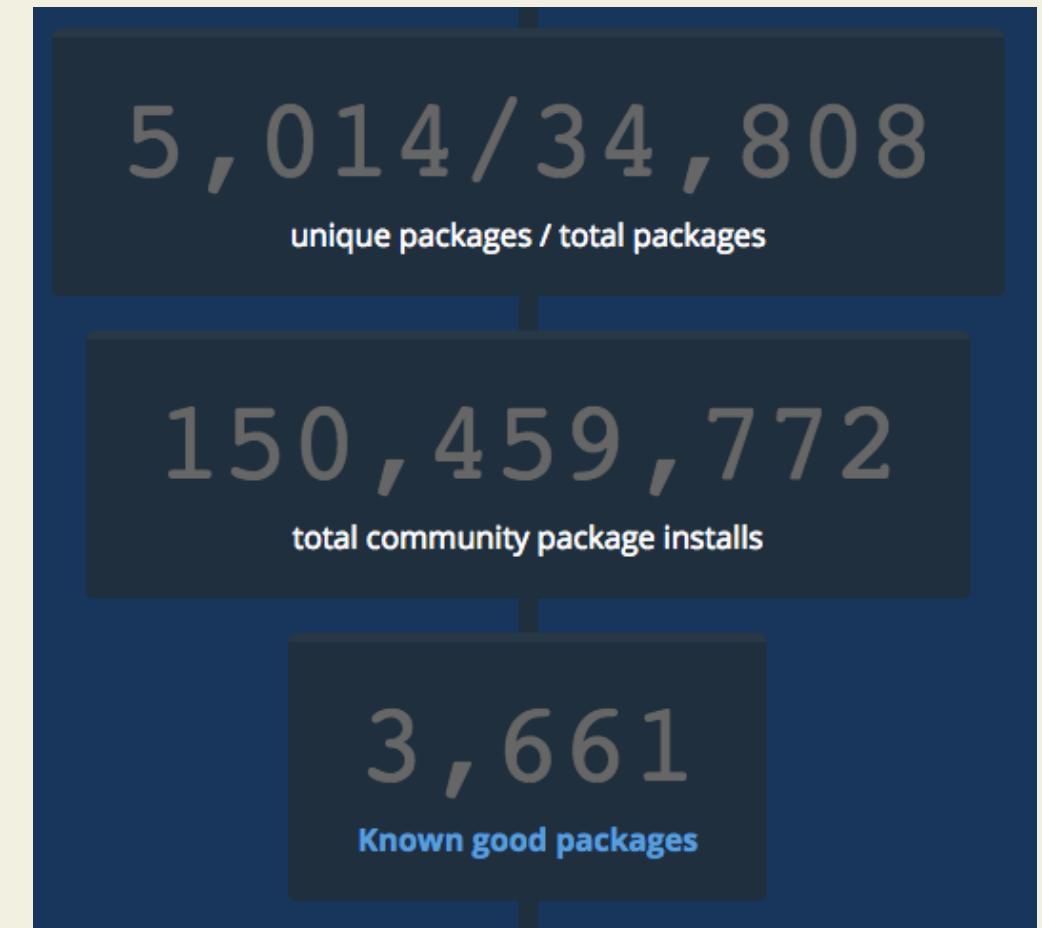
# Package Repository





# Community Package Repository

- <https://chocolatey.org/packages>
- Community Feed / Community Maintained
- Moderated as of October 2014
- Everything goes through VirusTotal
- **Organizations Should Avoid**
  - **Not Fully Reliable - public repo means subject to distribution rights (download CDN cache feature helps)**
  - **Trust and Control**





# Hosting Your Own Package Server

- <https://chocolatey.org/docs/how-to-host-feed>
- Non-Windows Hosting
  - Artifactory 
  - Sonatype Nexus 
- NuGet Gallery proper 
- ProGet / MyGet 
- NuGet.Server / Chocolatey.Server
- Puppet - chocolatey/chocolatey\_server module
- Visual Studio Team Services





# Creating Software Deployment “Packages”





# Chocolatey Packages

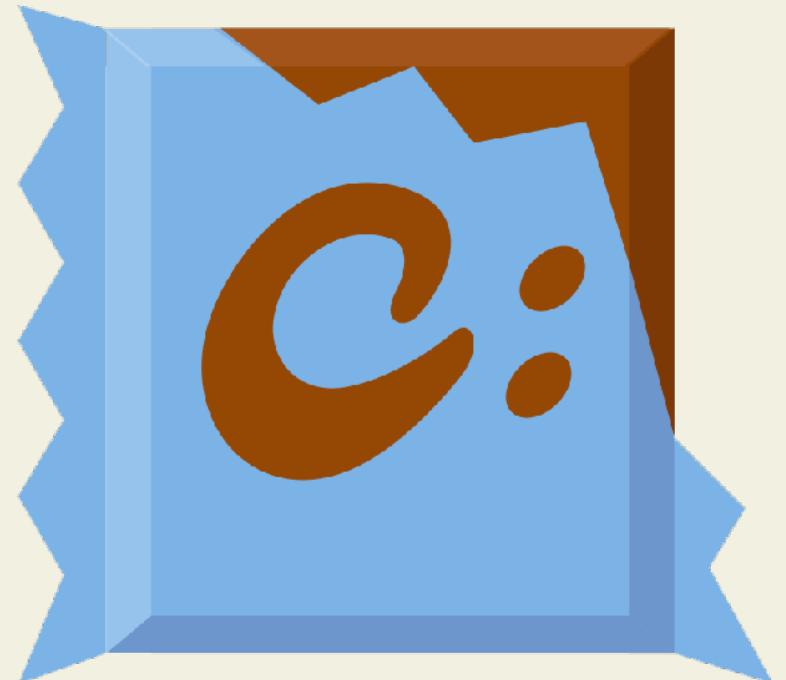
- Terminology: "Package" is nupkg file, "Software" is binaries or installers
- Zip files + Versioning, Dependencies & PowerShell
- Metadata - Software Information / Package Information
- PowerShell - <https://chocolatey.org/docs/helpers-reference>
  - 30+ Built-in functions - complex tasks become 1 liners
  - Handle additional missing installer logic (like add to PATH)
  - Add options missing from installer arguments
- Files - drop in binaries, native installers





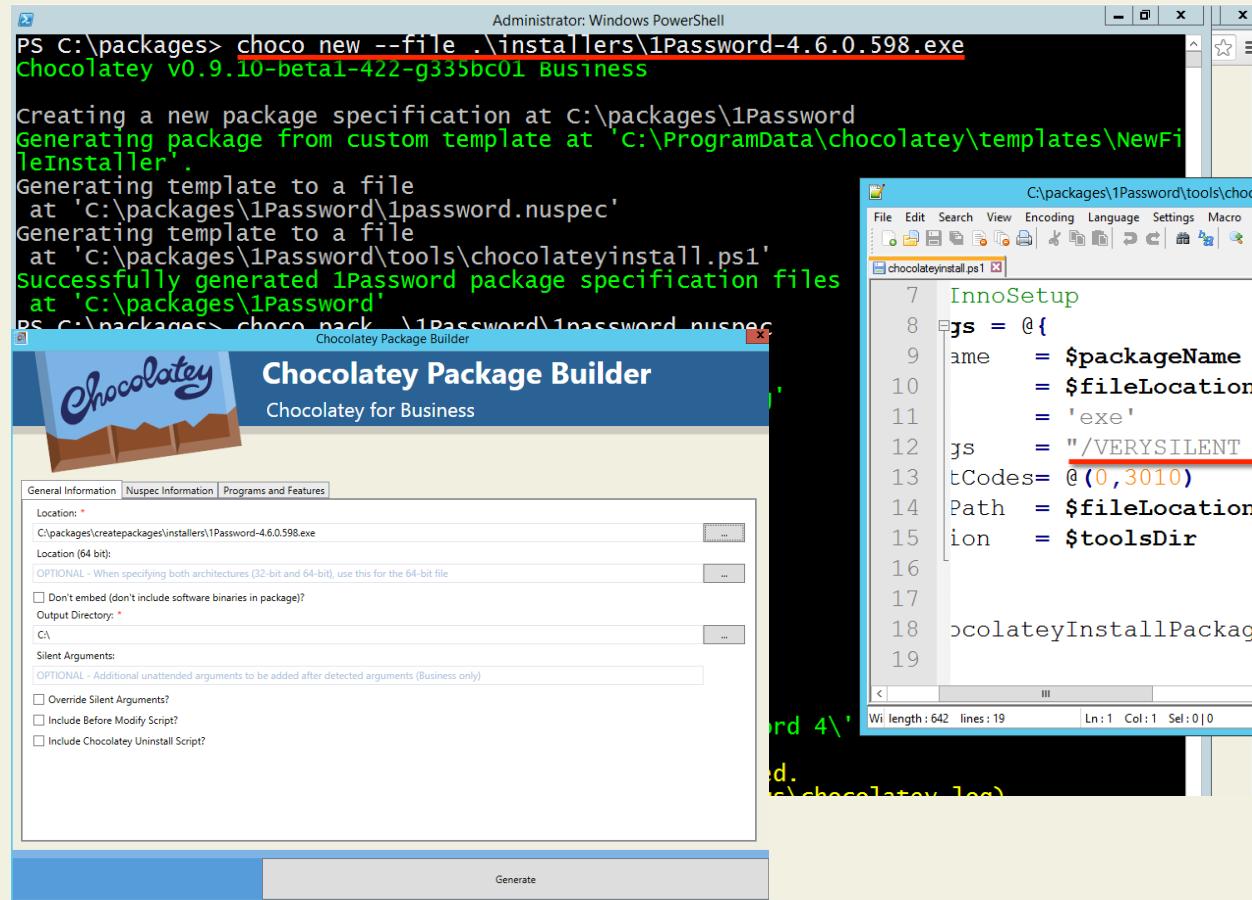
# Creating Packages

- <https://chocolatey.org/docs/create-packages>
- choco new
  - Generates package files with most of the work done
  - Create your own packaging templates!





# Package Builder (C4B) - “Generate software deployment packages in seconds”



- Package Builder automatically creates high quality packaging from an installer/zip in 5-10 seconds
- Determines everything necessary for silently installing software
- Supports passing urls (and checksums) - downloads files first
- Allows customization
- Supports exe, msi, 7z, zip, msu, and msp files

# Package Internalizer (C4B) - “Convert existing packages to 100% offline and reliable”

- Take advantage of existing packages without dependency on the internet
- Downloads existing package and all remote resources
- Recompiles package to use those internal resources
- Option to download and point to other locations
- Ability to host packages on private internal repositories
- Visual Interface coming

```
Ps c:\packages> choco download --recompile git.install
Chocolatey v0.9.10-beta1-426-g3c8b16e Business
Downloading an existing package to C:\packages\download

git.install v2.8.4 [Approved]
Found Install-ChocolateyPackage. Inspecting values for remote resources.
Found 'https://github.com/git-for-windows/git/releases/download/v2.8.4.windows-2.8.4-32-bit.exe' for replacement.
Found 'https://github.com/git-for-windows/git/releases/download/v2.8.4.windows-2.8.4-64-bit.exe' for replacement.

Download of 'Git-2.8.4-32-bit.exe' completed.
Replacing 'https://github.com/git-for-windows/git/releases/download/v2.8.4.windows-2.8.4-32-bit.exe' with '$(Split-Path -parent $MyInvocation.MyCommand.Definition.Path)\Git-2.8.4-32-bit.exe'

Download of 'Git-2.8.4-64-bit.exe' completed.
Replacing 'https://github.com/git-for-windows/git/releases/download/v2.8.4.windows-2.8.4-64-bit.exe' with '$(Split-Path -parent $MyInvocation.MyCommand.Definition.Path)\Git-2.8.4-64-bit.exe'
Updating chocolateyInstall.ps1 with local resources.
Recompiling package.

Recompiled package files available at 'C:\packages\download\git.install'
Recompiled nupkg available in 'C:\packages'
```



# How does it work?





ReactionGIFS.me





# Package Synchronizer (C4B)





# Package Synchronizer - Auto Sync

```
PS C:\> choco list -lo
Chocolatey v0.9.10-beta1-422-g335bc01 Bu
[Synchronize] Removing 1password package
tey.
chocolatey 0.9.10-beta-20160609
chocolatey.extension 1.4.0
chocolatey.server 0.1.1
DotNet4.0 4.0.30319.20141222
git 2.7.0.0
git.install 2.8.4
GoogleChrome 51.0.2704.84
Launchy 2.5.0.20140301
roundhouse 0.8.5.0
9 packages installed.
PS C:\>
```

- Chocolatey maintains state based on packages. System state can be manipulated outside of Chocolatey
- Any Chocolatey command will trigger synchronization in licensed editions of Chocolatey
- Package Synchronizer syncs with manual software removal
- Syncs w/software that automatically upgrades, such as Chrome





# Package Synchronizer - Choco Sync Command

```
PS C:\> choco sync -r
Package Id|Display Name|Version|New Package
7zip|7-Zip 16.02 (x64)|16.2|False
oracle-vm-virtualbox-guest-additions|Oracle V
12.0|True
bitvise-ssh-server|Bitvise SSH Server 5.60 (r
PS C:\>
```

- Brings all software in Programs and Features under Chocolatey management
- Generates packaging and baselines to Chocolatey install
- Provides packaging code to take back to source control





# Other Features

- <https://chocolatey.org/docs/release-notes>
- Internal sources (like ProGet)
- *choco upgrade all* - Windows update for your 3rd party and internal software
- Shimming - like symlinks but better
- Pass install arguments directly through to installer (append or override package args)
- Package Parameters to adjust logic in packages
- Handles locking on upgrades in package folders
- Great reference docs - <https://chocolatey.org/docs/commands-reference> & <https://chocolatey.org/docs/helpers-reference>
- Excellent open source support community
- 30+ built-in PowerShell Functions
- Extend functionality with your own PowerShell Modules
- Custom Package Templates
- Can manage anything on Windows





# Other Features (C4B)

- <https://chocolatey.org/docs/release-notes-licensed>
- Auto-uninstaller more effective - uninstaller detection / Package Synchronizer
- Install/upgrade keeping secrets out of logs
- Ubiquitous Install Directory Option
- More built-in PowerShell functions
- Uninstall non-Chocolatey managed software
- Direct Installer - install directly from exe/msi
- Package Throttle / Package Reducer / Package Audit
- Runtime malware protection
- CDN Cache
- Professional Packaging Services
- Amazing expert support team - <https://chocolatey.org/support>





# Chocolatey Roadmap

- <https://chocolatey.org/docs/roadmap>
- Central Management UI (C4B)
- Choco Deploy CLI (C4B)
- WSA / Windows Nano Support
- PowerShell  
PackageManagement Official Provider
- Package Enhancements
- Pack Validation
- Virtual packages
- GPG Signing
- Package Grid (C4B)
- Deferred Installer (C4B)
- Possible support on other platforms



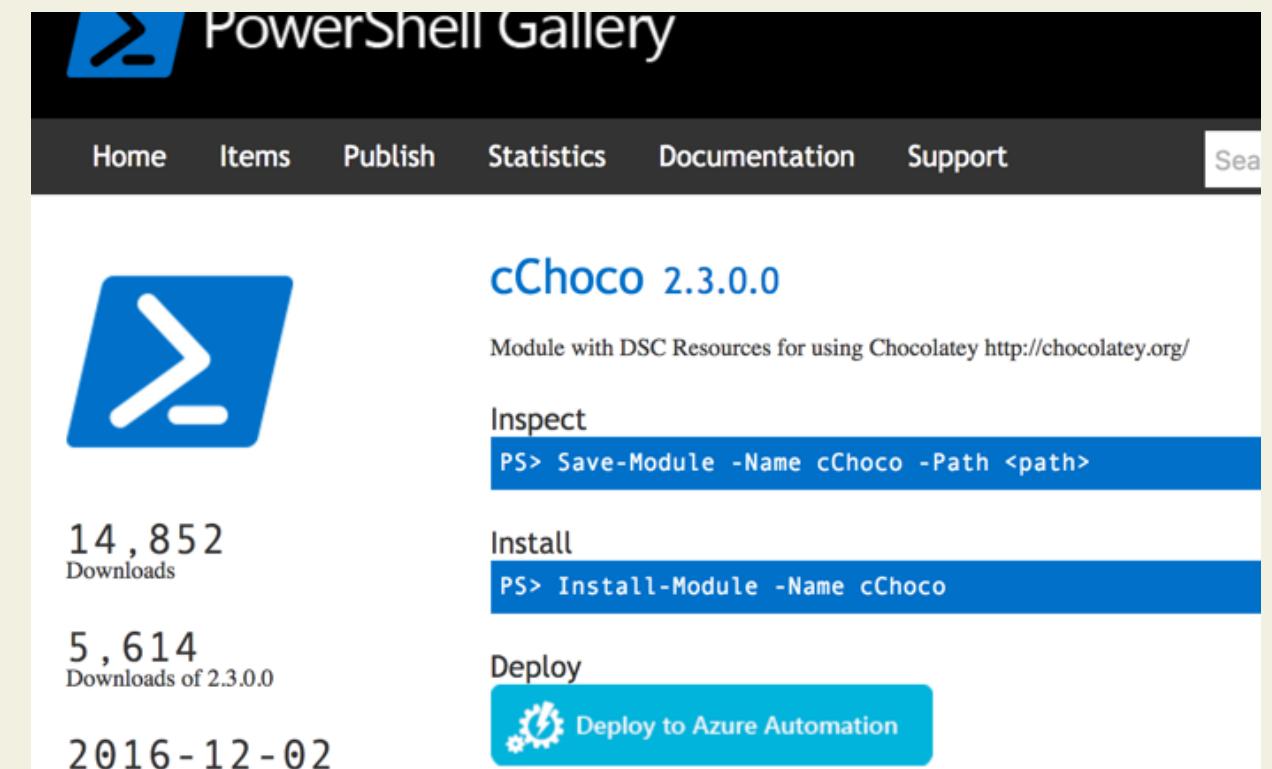


# Where does DSC come in?



# cChoco DSC Resource

- Manages Chocolatey installation
- Manages Choco sources and configuration
- Manages packages
- <https://github.com/PowerShellOrg/cChoco>
- <https://www.powershellgallery.com/packages/cChoco/2.3.0.0>





# cChocoInstaller

- Manages Chocolatey installation
- Manage install location
- Can work offline, however currently requires specifying a script to run locally

```
..cChocoInstaller.ChocoInstall
...
# default installation location ... allows
# Chocolatey to apply default security
# settings
InstallDir = "$env:ProgramData\chocolatey"
ChocoInstallScriptUrl = 'file:///C:/InstallChoco.ps1'
...
```





# cChocoSource

- Manage available package sources
- Add or remove, does not disable
- Add credentials
- Add priorities for sources
- Will need new source items - 0.10.4+

```
..cChocoSource·DefaultChocoSource·{  
...··Ensure···=·'Absent'  
...··Name···=·'chocolatey'  
...··Source···=·'https://chocolatey.org/api/v2/'  
...}  
  
..cChocoSource·InternalChocoSource·{  
...··Ensure···=·'Present'  
...··Name···=·'internal_server'  
...··Source···=·'http://localhost/chocolatey'  
...·#Credentials··=·add·credentials  
...·Priority··=·1  
...}
```



# cChocoFeature

- Manage available Chocolatey features
- cChoco vNext

```
-cChocoFeature·FipsComplianceChocoFeature·{  
    Ensure.....=·'Present'  
    FeatureName··=·'useFipsCompliantChecksums'  
}  
  
-cChocoFeature·ElevatedWarningsChocoFeature·{  
    Ensure.....=·'Absent'  
    FeatureName··=·'showNonElevatedWarnings'  
}  
  
-cChocoFeature·RememberedArgsChocoFeature·{  
    Ensure.....=·'Present'  
    FeatureName··=·'useRememberedArgumentsForUpgrades'  
}
```

T



# cChocoPackageInstall

- Ensure software package installation
- Optional params, chocoParams, Version, Source, and AutoUpgrade
- Allows customizing complete choco call

```
-cChocoPackageInstaller._Name_Package -{  
    .Ensure ..... = 'Present|Absent'  
    .Name ..... = 'packageId'  
    .Params ..... = 'package-parameters'  
    .chocoParams ..= 'Params-for-choco.exe'  
    .Version ..... = 'package-version'  
    .Source ..... = 'location'  
    .AutoUpgrade ..= $False  
}
```



# cChoco - Get Involved

- If you are looking for a place to contribute, this is a good place
- <https://github.com/chocolatey/cchoco>

Branch	Status
master	master - OK
development	development - OK

## Community Chocolatey DSC Resource

[chat on gitter](#)

This resource is aimed at getting and installing packages from the choco gallery.

The resource takes the name of the package and will then install that package.

See [ExampleConfig.ps1](#) for example usage.

See list of packages here: <https://chocolatey.org/packages>





# Demo





# Once you go Chocolatey...





# Would you go back to other methods?





# Automate Software Management Without Chocolatey?





# Automate Software Management Without Chocolatey?





# Automate Software Management Without Chocolatey?





# Questions





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