

## FHIR Packages

Marten Smits - Firely

# HL7 FHIR DevDays

The largest FHIR-only  
event in the world

Minneapolis, MN



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**firely**

**HL7<sup>®</sup>**  
International

## Who am I?

- Marten Smits
- Developer and Product Owner at Firely
  - Firely .NET SDK
  - Firely Validator API
  - **FHIR Packages Library**
- 10 years at Firely



# Learning Objectives

- **Why do we need packages?**
- What are FHIR packages?
- How do I use packages?
- How do I publish a package?



# Identifying resource version

## FHIR instances

Unique within a server:

**Server** + **Resource Type** + **Id** + **Version**

`https://server.com/fhir/Patient/10232/_history/2`

## FHIR conformance resources

Unique across servers:

**Canonical**

```
<meta>
  <profile
value="http://my.org/StructureDefinition/Patient" />
</meta>
```

```
<url value="http://my.org/StructureDefinition/Patient" />
```

# Identifying resource versions

## FHIR conformance resources

Unique across servers:

**Canonical**

```
<meta>
  <profile
    value="http://my.org/StructureDefinition/Patient" />
</meta>
```

```
<url value="http://my.org/StructureDefinition/Patient" />
```

Patient Profile

```
<url value="http://my.org/StructureDefinition/Patient" />
```

Observation Profile

```
<url value="http://my.org/StructureDefinition/Observation" />
<targetProfile
  value="http://my.org/StructureDefinition/Patient" />
```

Patient Instance

```
<meta>
  <profile
    value="http://my.org/StructureDefinition/Patient" />
</meta>
```

# Identifying resource versions

But **Canonicals** turned out not to be unique:

DSTU1: <http://hl7.org/fhir/StructureDefinition/Patient>  
 DSTU2: <http://hl7.org/fhir/StructureDefinition/Patient>  
 STU3: <http://hl7.org/fhir/StructureDefinition/Patient>  
 R4: <http://hl7.org/fhir/StructureDefinition/Patient>

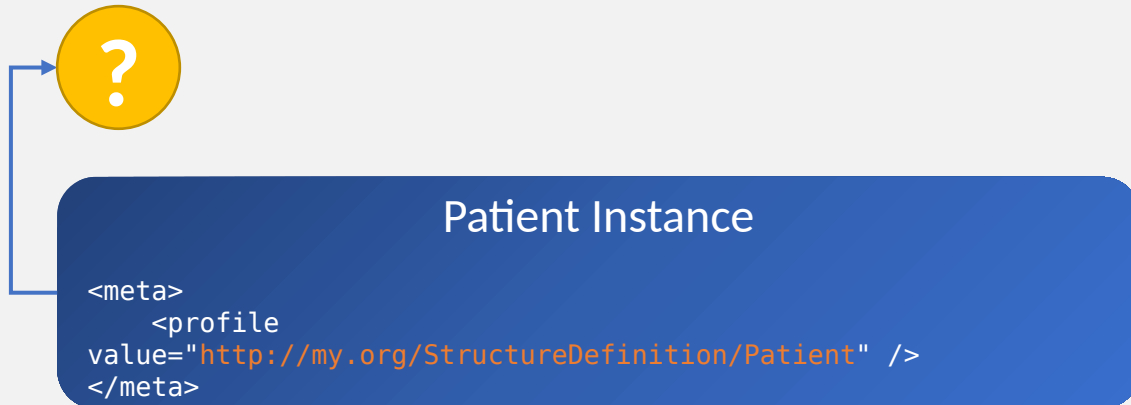
## FHIR conformance resources

Unique across servers:

**Canonical** + **Version**

```
<meta>
  <profile value="http://my.org/StructureDefinition/Patient|
  value#"http://my.org/StructureDefinition/Patient" />
</meta>

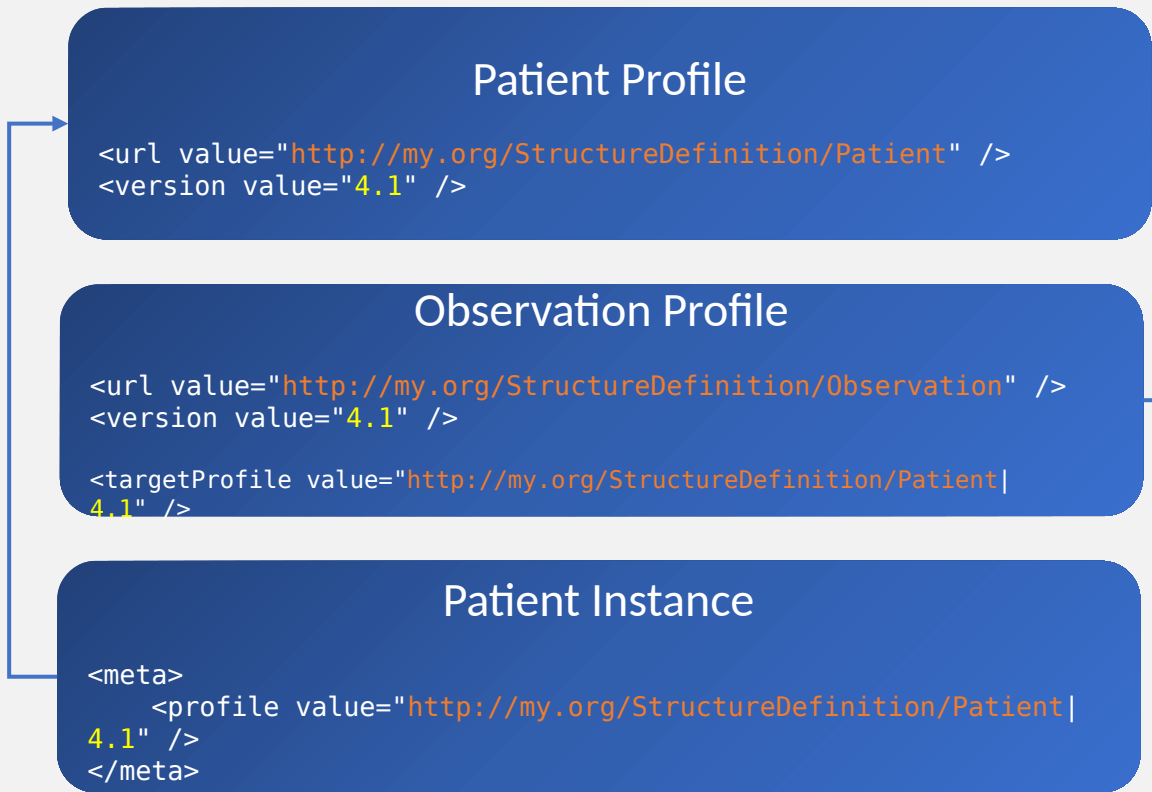
<url value="http://my.org/StructureDefinition/Patient" />
<version value="4.1" />
```



# Identifying resource versions

## FHIR conformance resources

Unique across servers:  
**Canonical** + **Version**



```

    <meta>
      <profile value="http://my.org/StructureDefinition/Patient|4.1" />
    </meta>

    <url value="http://my.org/StructureDefinition/Patient" />
    <version value="4.1" />
  
```

# Identifying resource versions

## Patient Profile

```
<url value="http://my.org/StructureDefinition/Patient" />
<version value="4.2" />
```

## Observation Profile

```
<url value="http://my.org/StructureDefinition/Observation" />
<version value="4.2" />
<targetProfile value="http://my.org/StructureDefinition/Patient|
4.2" />
```

## Patient Instance

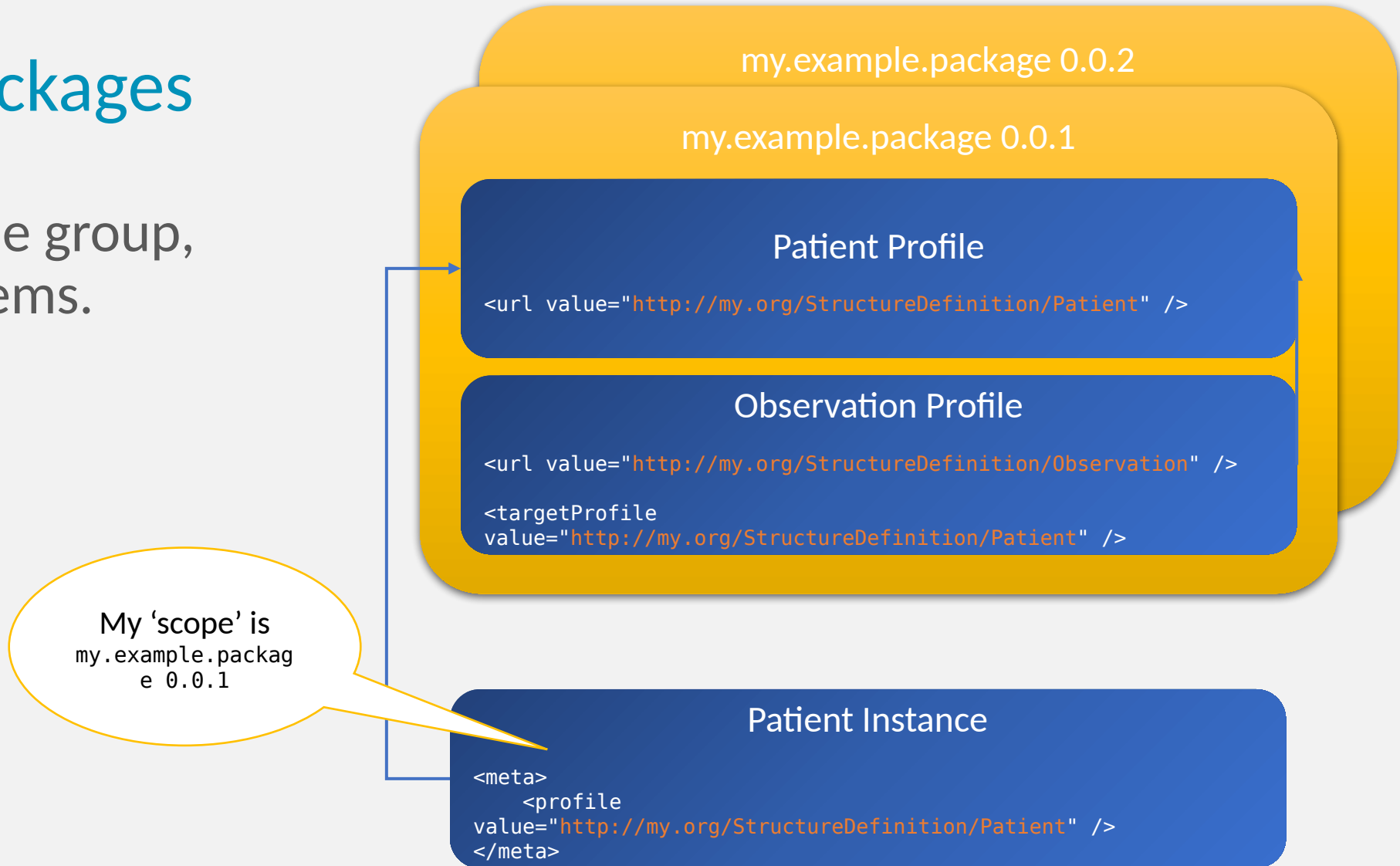
```
<meta>
  <profile value="http://my.org/StructureDefinition/Patient|
4.2" />
</meta>
```

However:

- Putting the **right set of profiles** (and their dependencies) together is messy
- If you change the version of one profile, you must **update all resources** pointing to it

## FHIR Packages

Version the group,  
not the items.



# Learning Objectives

- Why do we need packages?
- **What are FHIR packages?**
- How do I use packages?
- How do I publish a package?



# What are packages?

hl7.fhir.us.core#6.1.0.tgz

Package.json


StructureDefinitions

ValueSets

Examples

# Package specification

## Specification on HL7 Spec

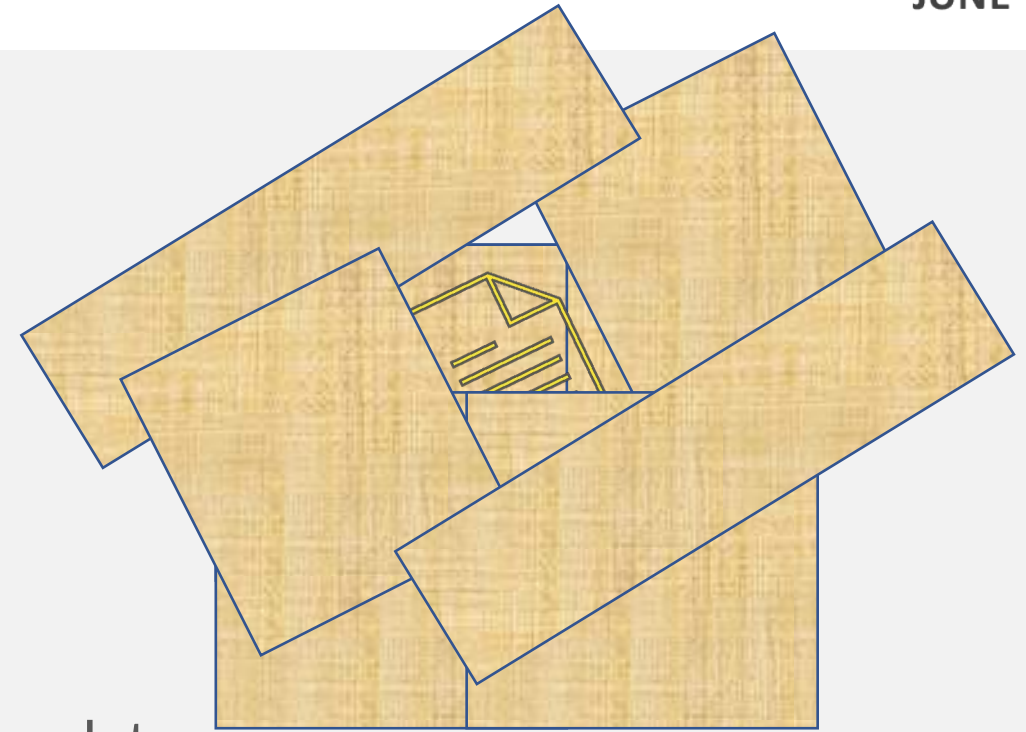
- Based on  packages
- Permanent, but they can be unlisted
- Also used to distribute Implementation Guides

# Package manifest

```

{
  "name": "hl7.fhir.us.core",
  "version": "5.0.1",
  "type": "IG",
  "date": "20220622194452",
  "license": "CC0-1.0",
  "canonical": "http://hl7.org/fhir/us/core",
  "url": "http://hl7.org/fhir/us/core/STU5.0.1",
  "title": "US Core Implementation Guide",
  "description": "The US Core Implementation
Guide...",
  "dependencies": {
    "hl7.fhir.r4.core": "4.0.1",
    "hl7.terminology.r4": "3.1.0",
    "hl7.fhir.uv.bulkdata": "2.0.0",
    "hl7.fhir.uv.smart-app-launch": "2.0.0",
    "us.nlm.vvac": "0.7.0",
    "hl7.fhir.uv.sdc": "3.0.0"
  },
  "author": "HL7 International - Cross-Group
Projects",
  "jurisdiction": "urn:iso:std:iso:3166#US"
}

```



## Mandatory:

name, version, description,  
author, dependencies

## For Implementation Guide Packages

- More mandatory parameters
- Keep in sync with values in the IG resource

# Learning Objectives

- Why do we need packages?
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- **How do I use packages?**
- How do I publish a package?



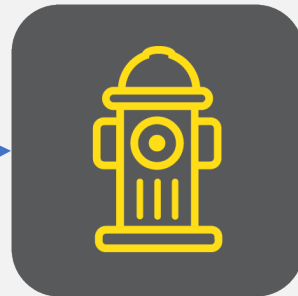
# Finding packages

## Package feeds

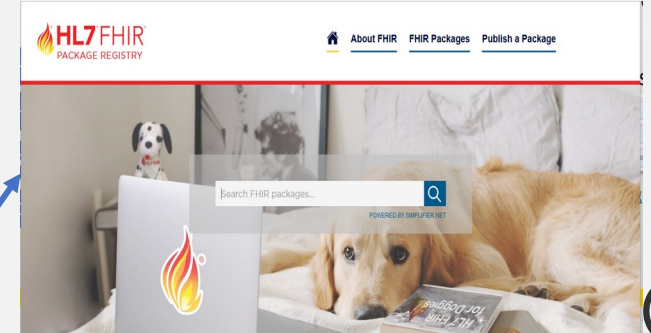


- HL7.org publications
- HL7 terminologies
- Simplifier.net
- Others

Simplifier.net  
Package server

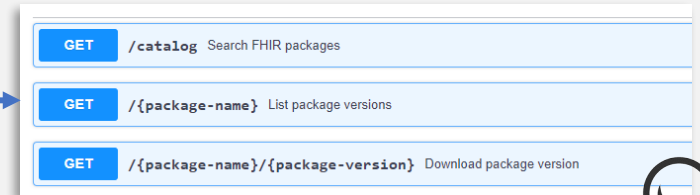


## Package Registry UI



[registry.fhir.org \(docs\)](https://registry.fhir.org/docs)

## Package Registry API



[packages.fhir.org \(docs\)](https://packages.fhir.org/docs)

# Installing packages

## Server

- See your manual

```
PS C:\Users\Marten> fhir install hl7.fhir.us.core 6.1.0
Package installed: hl7.fhir.us.core@6.1.0
Package installed: hl7.fhir.r4.expansions@4.0.1
Package installed: hl7.terminology.r4@5.5.0
Package installed: hl7.fhir.r4.core@4.0.1
```

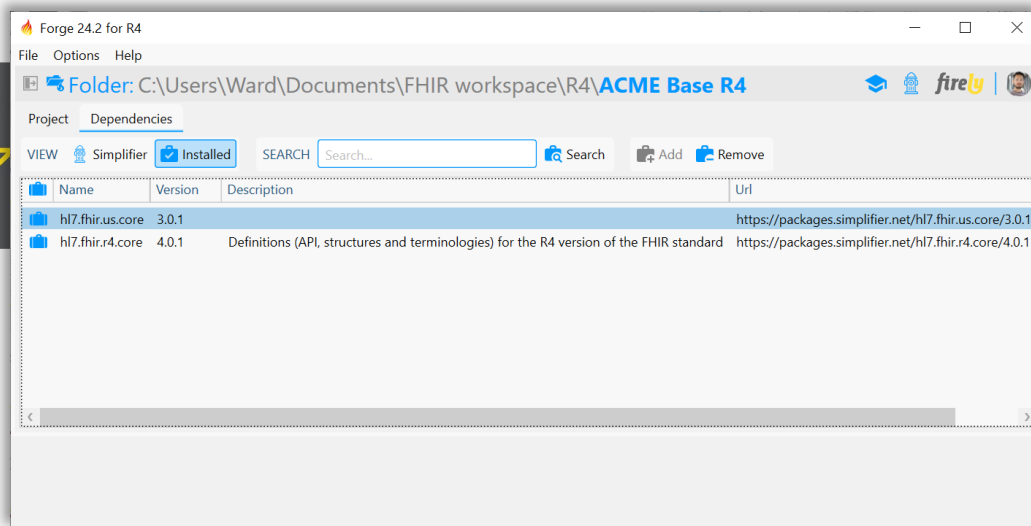
## Locally

- NPM, [Firely Terminal](#)
- Will be installed in your user profile.



# Building on packages

**User interface:** Search in the package registry and install in the *Forge* profile editor.



```

config.yaml
template: fhir.base.template#current

id: nl.wardweistra.acme
version: 0.0.1
canonical: https://fake-acme.org/fhir/IG
fhirVersion: 4.0.1
name: "The ACME Implementation Guide"
status: active
copyrightYear: 2020+
releaseLabel: STU1
dependencies:
  - hl7.fhir.us.core: 3.1.0

menu:
  IG Home: index.html
    
```



**Code:** Specify dependencies in *FHIR Shorthand* or the IG resource.

```

ImplementationGuide-nl.wardweistra.acme.json
{
  "resourceType": "ImplementationGuide",
  "id": "nl.wardweistra.acme",
  "url": "https://fake-acme.org/fhir/IG/ImplementationGuide/nl.wardweistra.acme",
  "version": "0.0.1",
  "name": "TheACMEImplementationGuide",
  "status": "active",
  "packageId": "nl.wardweistra.acme",
  "fhirVersion": [
    "4.0.1"
  ],
  "dependsOn": [
    {
      "uri": "http://hl7.org/fhir/us/core/ImplementationGuide/hl7.fhir.us.core",
      "packageId": "hl7.fhir.us.core",
      "version": "3.1.0"
    }
  ],
  "definition": {
    
```

**IG Publisher**

# Creating packages

User interface: Package your *Simplifier* project.

PROJECT R4 test

[Create a new package](#) Publish

Release
Package Description
Content

**Package name:**

Devdays.package.tutorial ✔

A package is identified by package entry name + version

**Version:** [SemVer docs](#)

1.0.0-alpha ✔

pre-release Version should be in the Semantic Version (Semver) format: 0.8.1, 1.0.1-beta

**Author:**

Marten ✔

**Status:**

Please choose carefully! Once a package is public it cannot be made private anymore!  
Private packages can only be seen by you and other package members.

Public  Private

**Release notes:**

1 This just for the DevDays folks! ✔

**Publish**

- ✔ Publish your project as a package
- ✔ Packages are permanent and cannot be deleted

**Unlisting**

- ✔ Packages can be deprecated at any time
- ✔ Deprecated packages are invisible but can still be used

**Versioning**

- ✔ Packages are always versioned
- ✔ Versioning must follow [SemVer](#) standard
- ✔ Use a preview version to indicate non-finished work
- ✔ A preview version looks like this 1.2.0-preview, 1.3.0-beta-1



**Command line:** The *IG Publisher* generates (and installs) a package with every IG.

```
PS C:\Users\Ward\Documents\FHIR workspace\R4\SushiProjectUS\build> . .\_genonce.bat
Checking internet connection...
Reply from 104.196.166.17: bytes=32 time=102ms TTL=118
We're onLine

** some magic **

Package Cache: C:\Users\Ward\.fhir\packages (00:00.0062)
Load Template from fhir.base.template#current (00:01.0561)

** lots of magic **

Installing nl.wardweistra.acme#dev to the package cache

** just a little more magic **

Finished. 00:45.0323. Validation output in C:\Users\Ward\Documents\FHIR workspace\R4\SushiProjectUS\build\out
put\qa.html
Errors: 0, Warnings: 2, Info: 0, Broken Links = 13 (01:22.0343)
Done (01:22.0346)
Press any key to continue . . .
```

Or use *Firely Terminal* to package a project folder.



```
PS C:\Git\test\testPackage> fhir pack
Package file created: testPackage.tgz
Package build sucesfully and saved as: testPackage.tgz
```

# Creating packages – naming and version

Names should contain

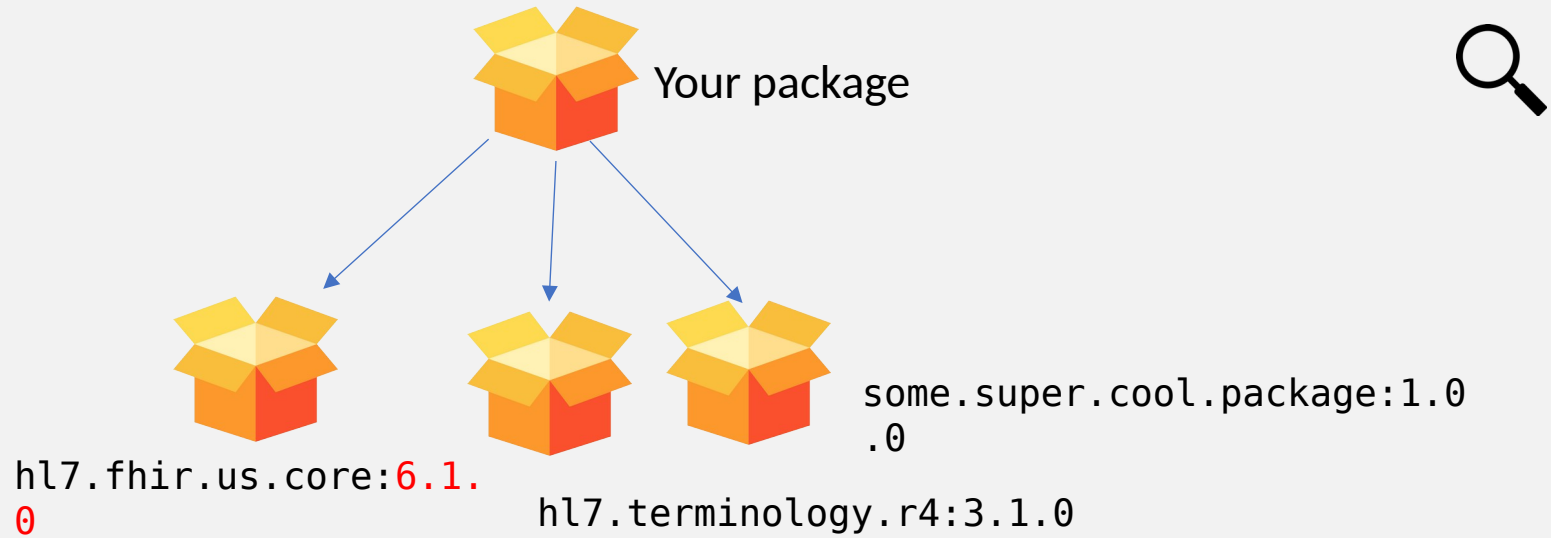
- |                         |                   |
|-------------------------|-------------------|
| 1. Region               | hl7.fhir.core.r4  |
| 2. Author, organization | hl7.fhir.uv.sdc   |
| 3. Subject              | hl7.fhir.us.core  |
| 4. A dot                | uk.core.r4        |
|                         | de.basisprofil.r4 |

Versions should be done using Semantic Versioning

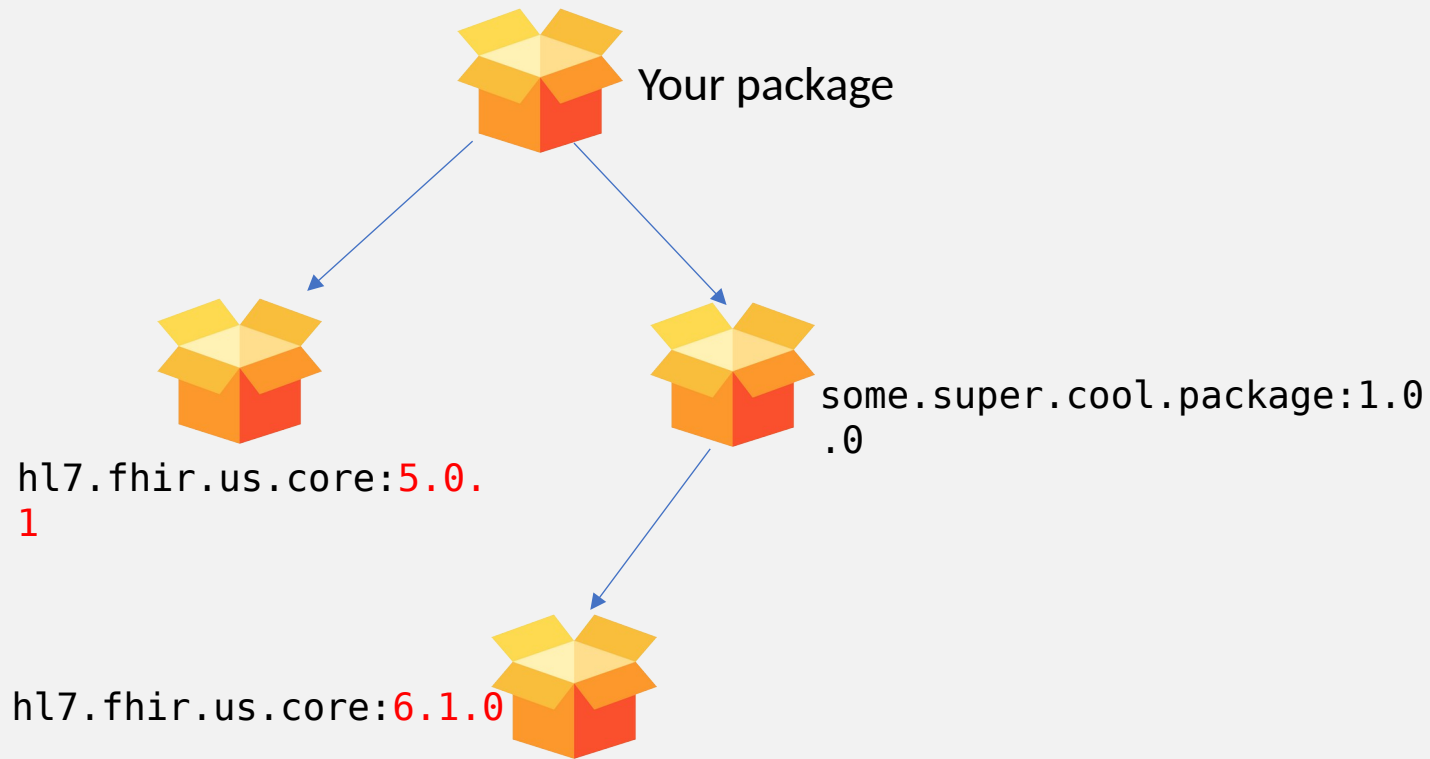
**1.3.2**-preview1

- MAJOR** incompatible changes
- MINOR** backward compatible additions
- PATCH** backward compatible fixes
- LABEL** annotations

# Creating packages – dependencies



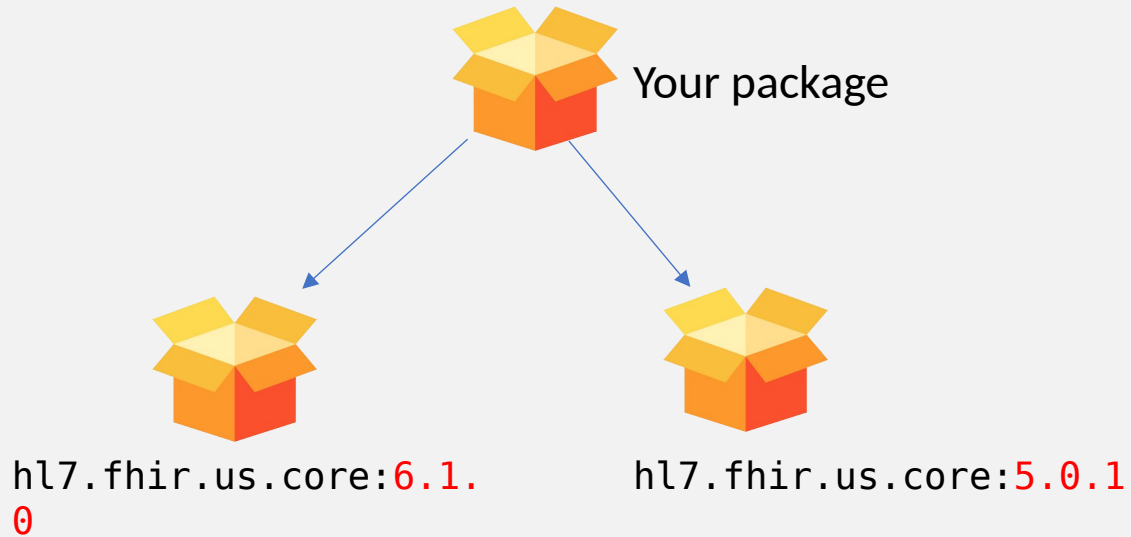
# Creating packages – dependencies



<http://hl7.org/fhir/StructureDefinition/us-core-patient>

- highest version?
- “nearest” version?

# Creating packages – dependencies



- Currently not possible without a hack
- Tooling needs to implement aliasing
- Reference without version - > Highest version
- Want a lower version -> use version pipe

# Learning Objectives

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# Publishing packages

## To the FHIR Registry

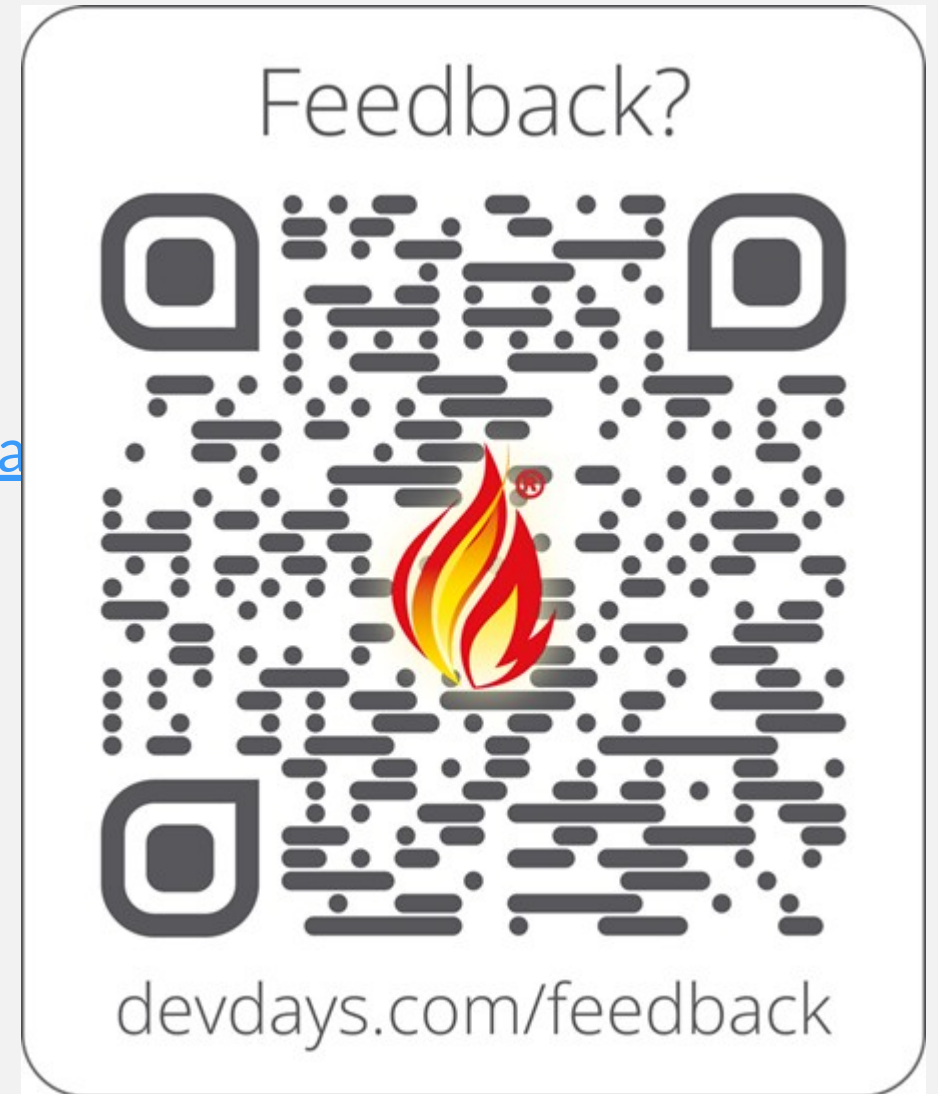
- Via Simplifier.net
  - *Let's Build 'Publishing with Simplifier.net' after this*
- Via HL7 balloted IG
- DIY: Via your own package feed

## Internally

- Setup (or reuse) your own Fhir package server
- For .NET users:  
<https://github.com/FirelyTeam/Firely.Fhir.Packages>

## Q&A

- You can find / reach me here:
  - [marten@fire.ly](mailto:marten@fire.ly)
  - <https://github.com/FirelyTeam/Firely.Fhir.Pa>
  - <https://chat.fhir.org>
  - Tap me on the shoulder during the event



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