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Long journey of Ruby standard library.

Hiroshi SHIBATA @hsbt

2024/04/11 RubyConf AU 2024

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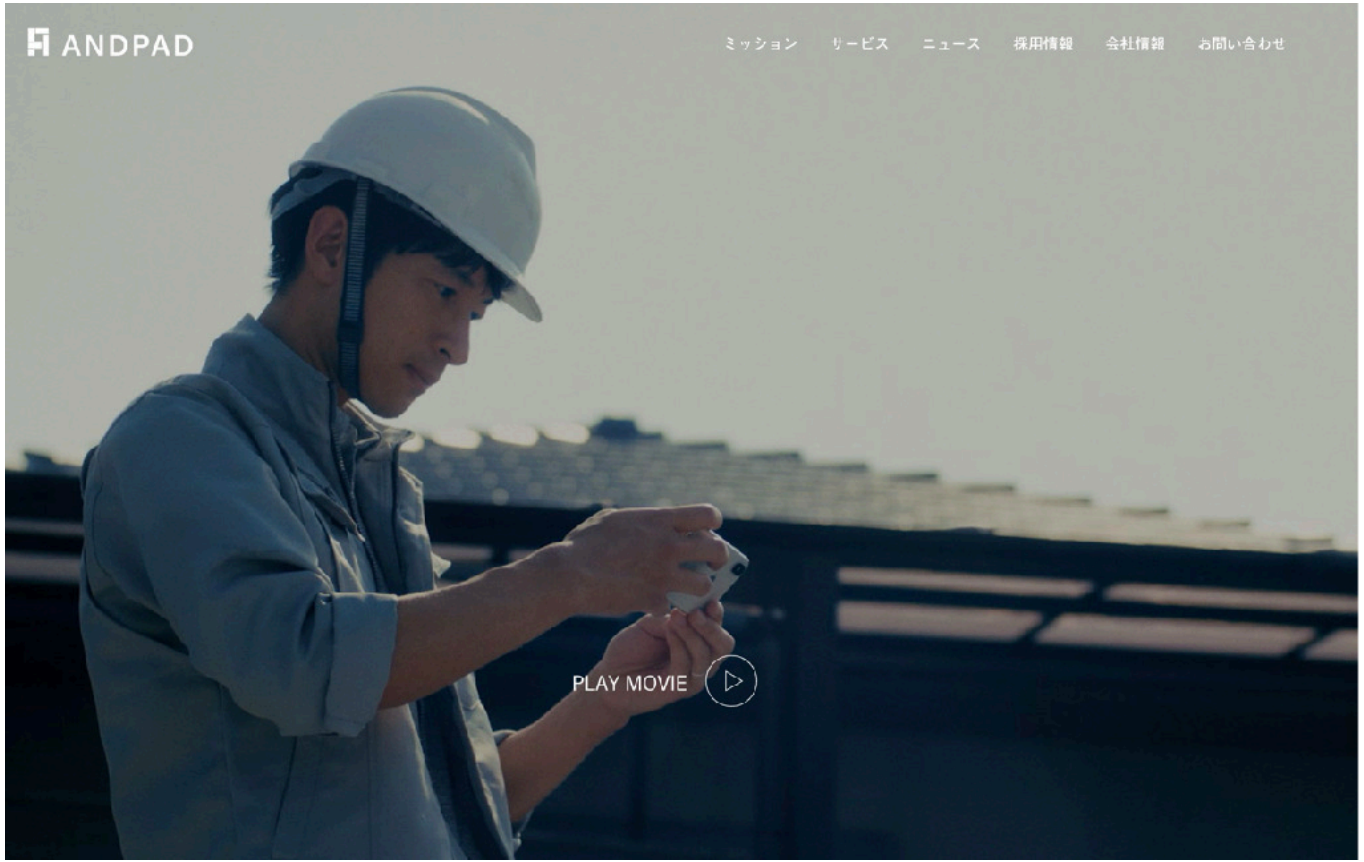
I'm from Japan where is Ruby birth place

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Introduction of ANDPAD

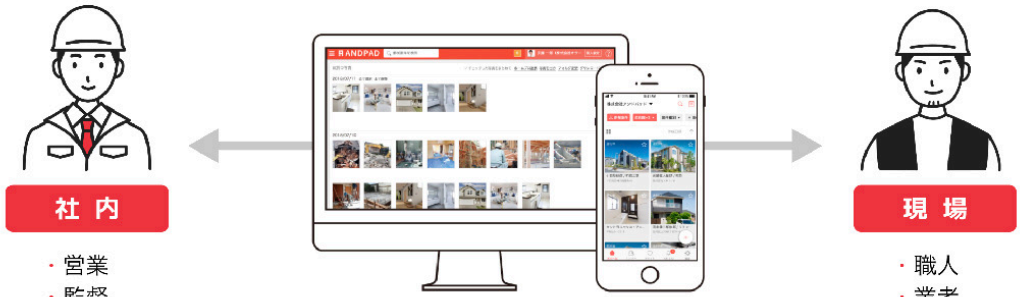


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History of standard libraries

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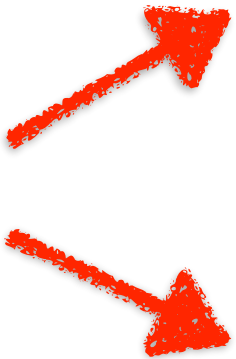
Learning Ruby's require

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Classification of Ruby core library

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Ruby

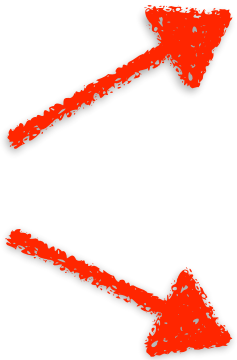


Embedded Class

- String
- Time
- ...

Standard Library

- URI
- JSON
- RSS
- ...



Pure Ruby Library

- URI
- FileUtils
- ...

C extension Library

- JSON
- OpenSSL
- ...

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Basic knowlege of require

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- `require` is major method in Ruby.
  - `require` can handle Ruby and C/Rust extension with your platform like linux or macOS.
- `require` find $LOAD_PATH by your installation path originally.
  - `require_relative` find only current path.

```
>> require 'rss'
=> true
>> require 'rss'
=> false
>> require "bigdecimal"
=> true
#
>> require "bigdecimal.bundle"
=> true
#
>> require "bigdecimal.so"
=> true

>> require_relative "rss"
...cannot load such file -- ...
```

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We bundled a lot of library at Ruby 1.8 because we don't have rubygems.org yet.

	Ruby 1.6	Ruby 1.8	Ruby 2.7	Ruby 3.3
Pure Ruby	63	104	65	56
C extensions	15	26	34	29

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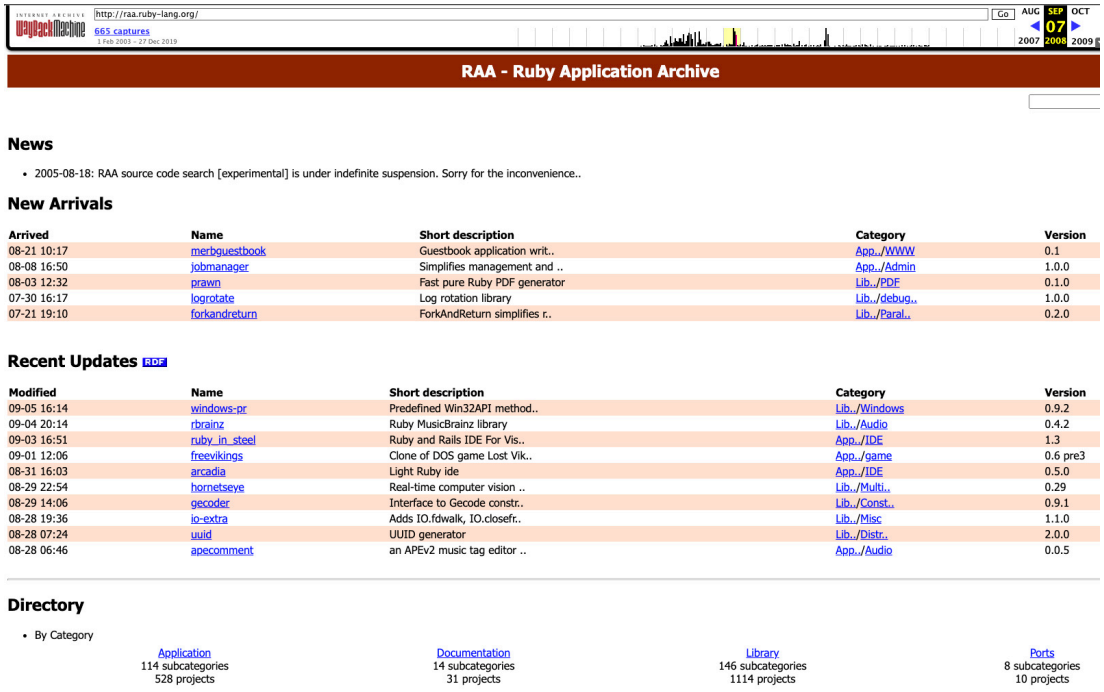
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How load Ruby code from outside of Ruby core?

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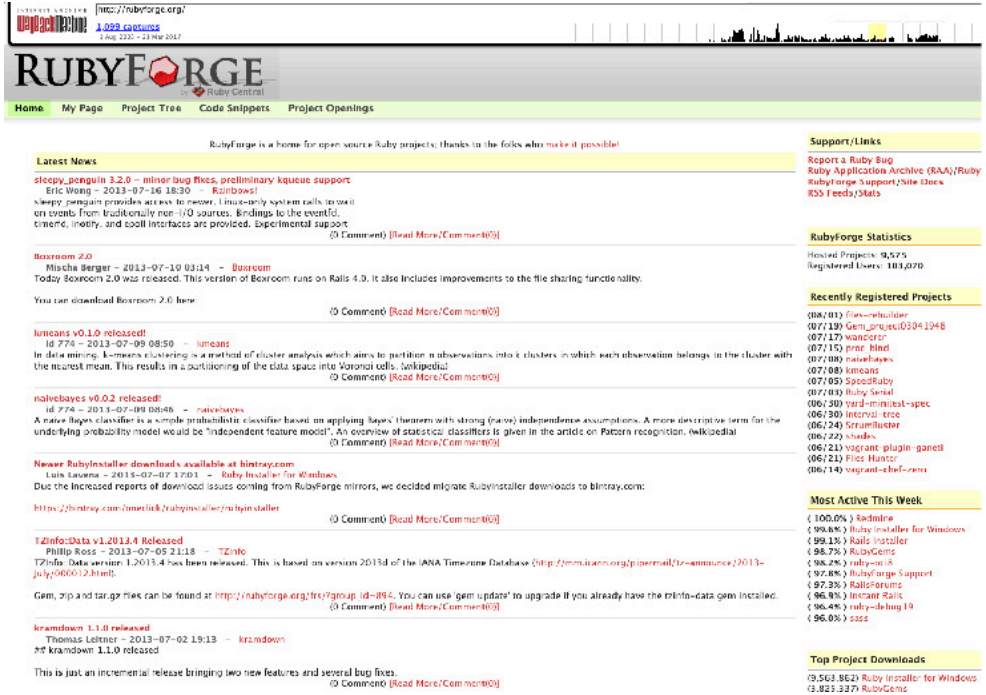
Q. How we get extra library outside of ruby installation in the past?

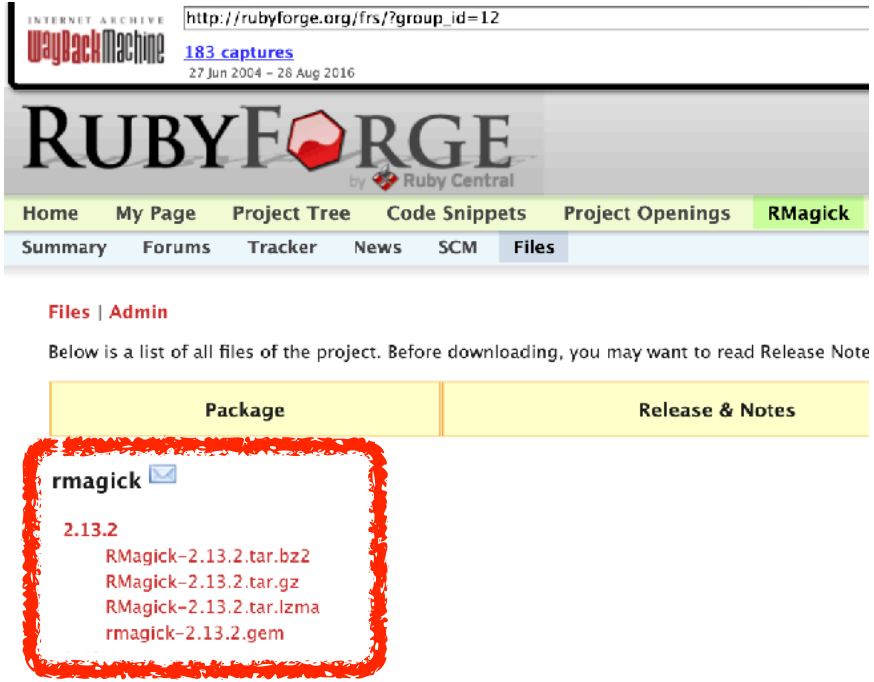
A. You can use Ruby Application Archive(RAA). That is the first sharing repository for ruby libraries.



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We can download gem from rubyforge in the past.





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History for rubygems and related services

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- 2003: Launch raa.ruby-lang.org and rubyforge.org
- 2004: RubyGems is released
- 2007: Ruby 1.9.0 is released with RubyGems 1.3
- 2009: Closed gems.github.com
- 2009: Transition gemcutter.org and gems.rubyforge.org to rubygems.org
- 2012-13: gemcutter utility has been merged into rubygems
- 2013: Closed raa.ruby-lang.org
- 2014: Closed rubyforge.org
- 2014-: rubygems.org is canonical library repository for the Ruby language

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We have RubyGems

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- RubyGems is a package/library for the Ruby programming language
  - We can install gems from rubygems.org today.
- gemspec is a file describing Gem::Specification
  - This class for defining metadata including name, version, platform, etc.

```
>> Gem.loaded_specs["rack"]
=>
Gem::Specification.new do |s|
  s.name = "rack"
  s.version = Gem::Version.new("2.2.8")
  s.installed_by_version = Gem::Version.new("3.4.10")
  s.authors = ["Leah Neukirchen"]
  s.date = Time.utc(2023, 7, 31)
  s.dependencies = [...(snip)...]
  s.description = "Rack provides a minimal, modular and adaptable interface for developing\nweb applications in Ruby. By wrapping HTTP requests and responses in\nthe simplest way possible, it unifies and distills the API for web\nservers, web frameworks, and software in between (the so-called\nmiddleware) into a single method call.\n"
(...snip...)
end
```

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How load libraries by rubygems? What's happend?

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- RubyGems extend `require` method for loading gem for us. This extension will find all of your gems at Gem::specification.find_by_path

```
def self.find_by_path(path)
  path = path.dup.freeze
  spec = @@spec_with_requirable_file[path] ||= stubs.find do |s|
    s.contains_requirable_file? path
  end || NOT_FOUND

  spec.to_spec
end
```

This returns all of your gemspec



- My environment have 2800+ gems. RubyGems search them.

```
$ ruby -e "t = Time.now; require 'bigdecimal'; p Time.now - t"
0.272687

$ ruby --disable-gems -e "t = Time.now; require 'bigdecimal'; p Time.now - t"
0.000786
```

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Where is bundler come here?

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- Bundler is also package manager of Ruby language
  - Bundler focused version locking and dependency resolution
  - Bundler keep original performance of original require of Ruby
- Bundler works with Gemfile like:

```
# frozen_string_literal: true

source "https://rubygems.org"

gem "rake", ">= 11.1”
```

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Introduction of Lockfile

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- Bundler generates lockfile named Gemfile.lock from Gemfile with dependency resolution.
- Bundler use this lockfile for version locking in your applicaiton

```
# Gemfile
# frozen_string_literal: true

source "https://rubygems.org"

gem "rss"
```



```
# Gemfile.lock
GEM
  remote: https://rubygems.org/
  specs:
    rexml (3.2.5)
    rss (0.2.9)
      rexml

PLATFORMS
  arm64-darwin-23

DEPENDENCIES
  rss

BUNDLED WITH
   2.5.6
```

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How Bundler detect the correct versions of gems?

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Bundler uses PubGrub for dependency resolver

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```ruby
source = PubGrub::StaticPackageSource.new do |s|
  s.add 'foo', '2.0.0', deps: { 'bar' => '1.0.0' }
  s.add 'foo', '1.0.0'

  s.add 'bar', '1.0.0', deps: { 'foo' => '1.0.0' }

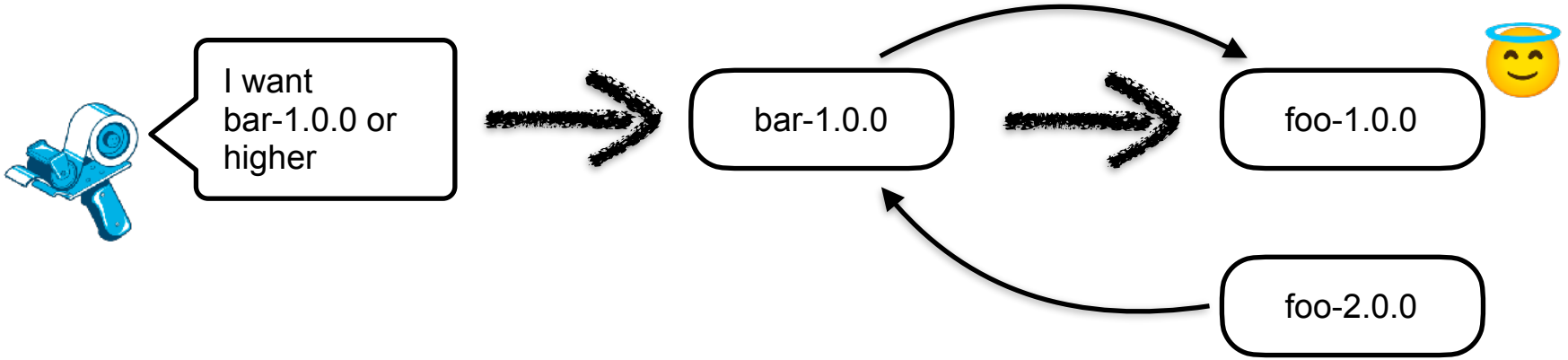
  s.root deps: { 'bar' => '>= 1.0.0' }
end

solver = PubGrub::VersionSolver.new(source: source)
result = solver.solve
p result
#=> {#<PubGrub::Package :root>=>0, "bar"=>#<Gem::Version "1.0.0">,
"foo"=>#<Gem::Version "1.0.0">}
```

- This is basic scenario of dependency resolution.
  - We can see Resolution with PubGrub::VersionSolver and package source definition provided by PubGrub.

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Easy scenario of PubGrub



- We want to use `bar >= 1.0.0`. bar-1.0.0 wants foo-1.0.0.
- We can get resolution result that is `bar-1.0.0` and `foo-1.0.0`.

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Conflict scenario of PubGrub

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```ruby
source = PubGrub::StaticPackageSource.new do |s|
  s.add 'foo', '2.0.0', deps: { 'bar' => '1.0.0' }
  s.add 'foo', '1.0.0'

  s.add 'bar', '1.0.0', deps: { 'foo' => '1.0.0' }

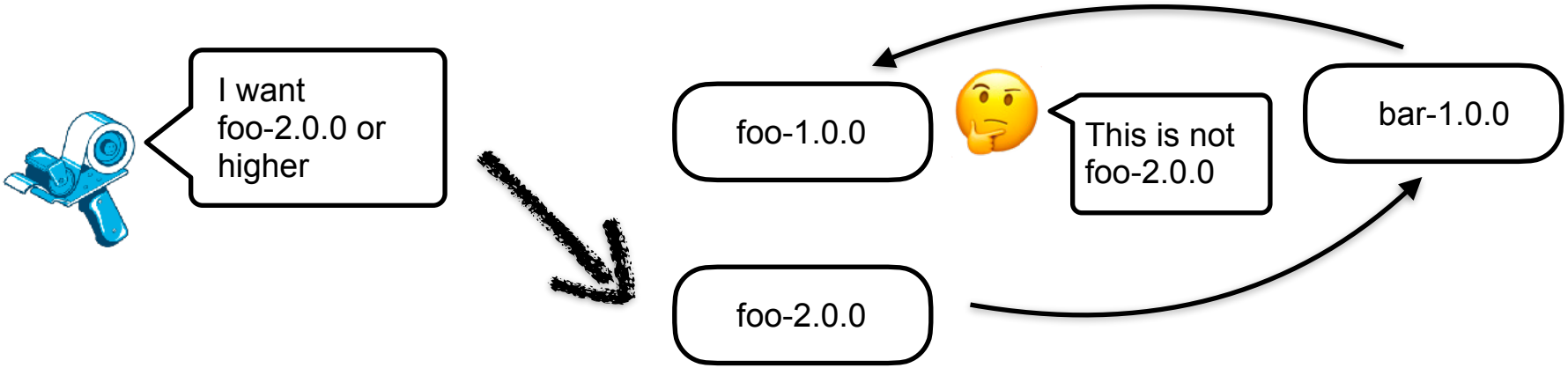
  s.root deps: { 'foo' => '>= 2.0.0' }
end

solver = PubGrub::VersionSolver.new(source: source)
result = solver.solve
p result
#=> pub_grub/version_solver.rb:233:in `resolve_conflict': Could not find compatible
versions (PubGrub::SolveFailure)
```

- This is conflict scenario of dependency resolution.
  - If PubGrub couldn't resolve their versions, it raises `SolveFailure`.

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Easy scenario of PubGrub



- We want to use `foo >= 2.0.0`.
  - But foo-2.0.0 wants bar-1.0.0, and bar-1.0.0 wants foo-1.0.0.

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A bit of complex scenario of PubGrub

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```
source = PubGrub::StaticPackageSource.new do |s|
  s.add 'foo', '3.0.0', deps: { 'bar' => '> 1.0.0' }
  s.add 'foo', '2.0.0', deps: { 'bar' => '1.0.0' }
  s.add 'foo', '1.0.0'

  s.add 'bar', '1.0.0', deps: { 'foo' => '1.0.0' }
  s.add 'bar', '2.0.0'

  s.add 'buzz', '1.0.0', deps: { 'foo' => '> 1.0.0' }

  s.root deps: { 'buzz' => '1.0.0' }
end

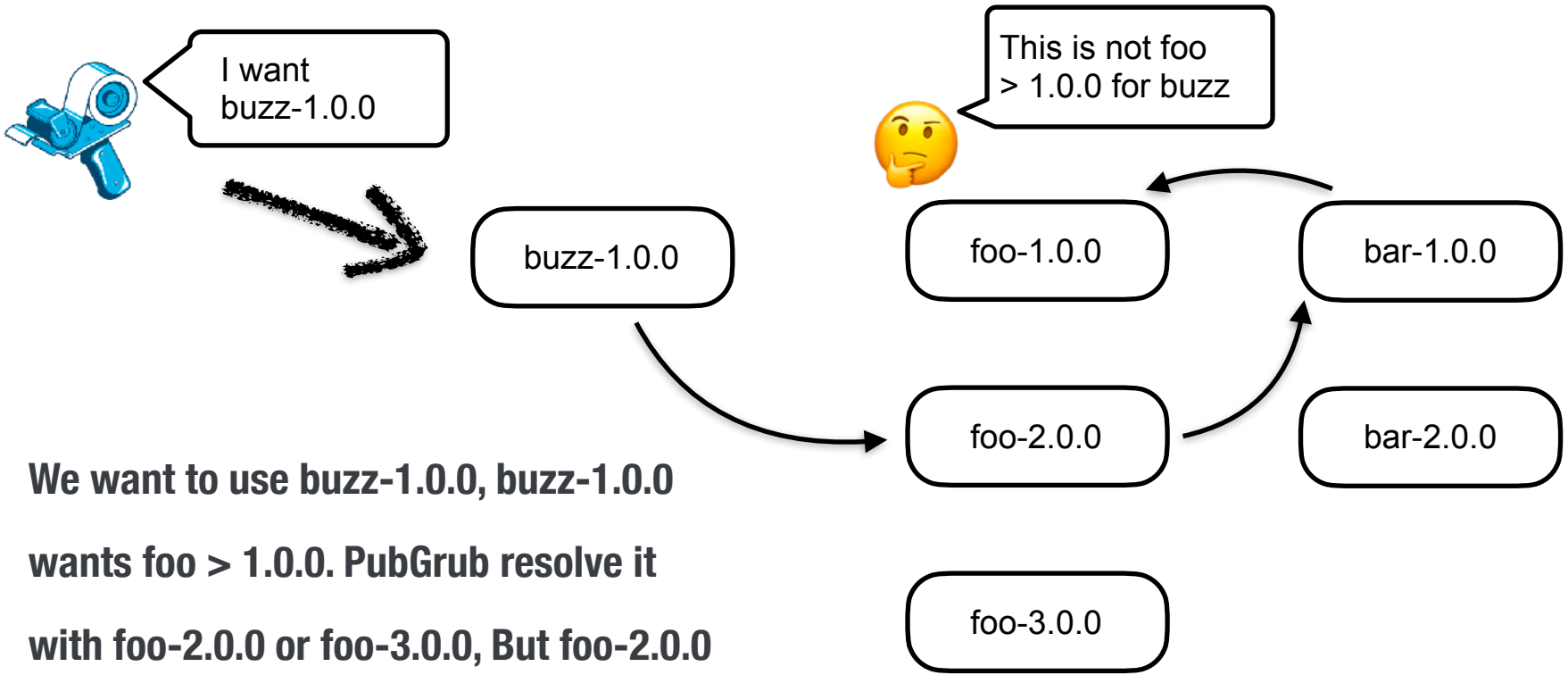
solver = PubGrub::VersionSolver.new(source: source)
result = solver.solve
p result
#=> {#<PubGrub::Package :root>=>0, "buzz"=>#<Gem::Version "1.0.0">, "foo"=>#<Gem::Version
"3.0.0">, "bar"=>#<Gem::Version "2.0.0">}
```

- This is additional scenario for PubGrub. We have three versions of foo, two versions of bar, and buzz.

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A bit of complex scenario of PubGrub

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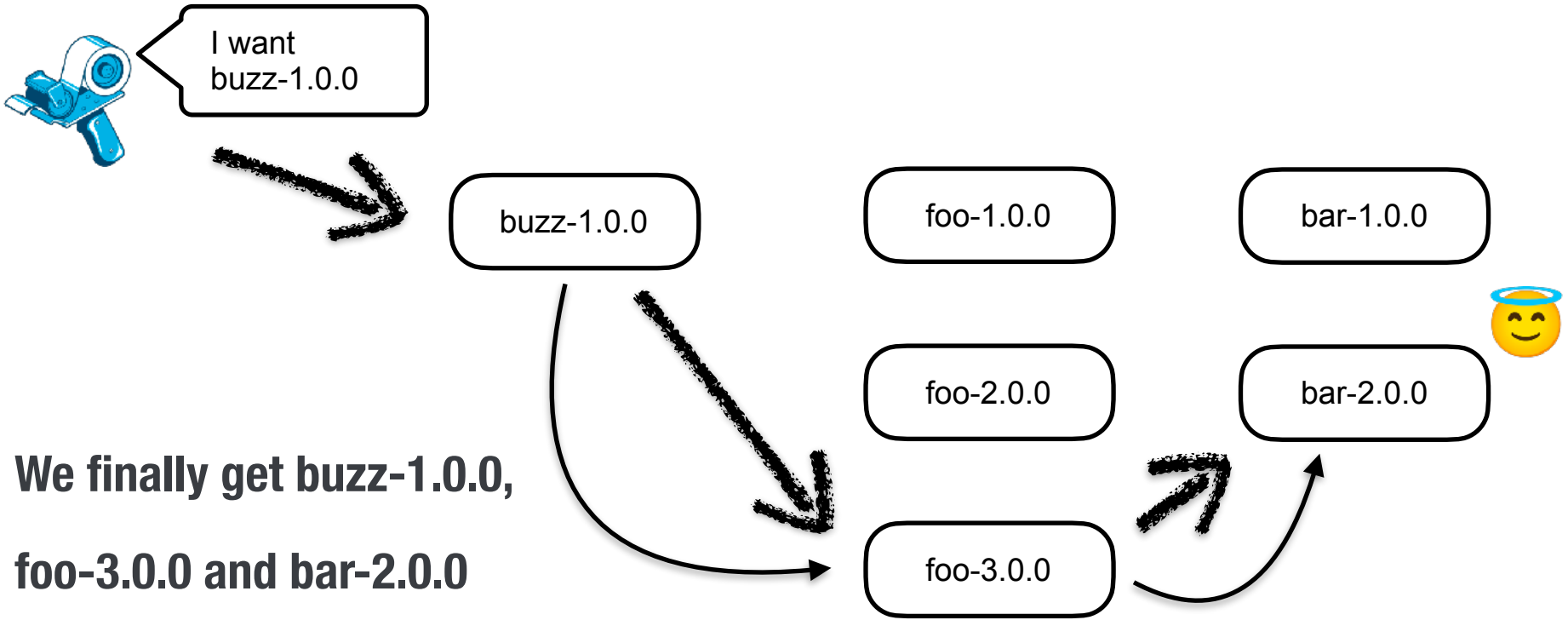


We want to use buzz-1.0.0, buzz-1.0.0 wants foo > 1.0.0. PubGrub resolve it with foo-2.0.0 or foo-3.0.0, But foo-2.0.0 conflicts with bar-1.0.0.

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A bit of complex scenario of PubGrub

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We finally get buzz-1.0.0, foo-3.0.0 and bar-2.0.0 as resolution result.

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Why Bundler is fast to load many of gems?

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- Bundler will clear your $LOAD_PATH
- Bundler create instance of PubGrub and call resolution methods inside `specs_for` and revert extended require by rubygems.

```
specs = @definition.specs_for(groups)
SharedHelpers.set_bundle_environment
Bundler.rubygems.replace_entrypoints(specs)
```

- Finally, Bundler inject only gem path into your $LOAD_PATH

```
~/.rbenv/versions/master/lib/ruby/gems/3.3.0+0/gems/rss-0.2.9/lib
~/.rbenv/versions/master/lib/ruby/gems/3.3.0+0/gems/rexml-3.2.5/lib
~/.rbenv/versions/master/lib/ruby/gems/3.3.0+0/gems/bundler-2.5.0.dev/lib
```

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Breaking time 

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Notable feature of RubyGems and Bundler, Default gems and Bundled gems

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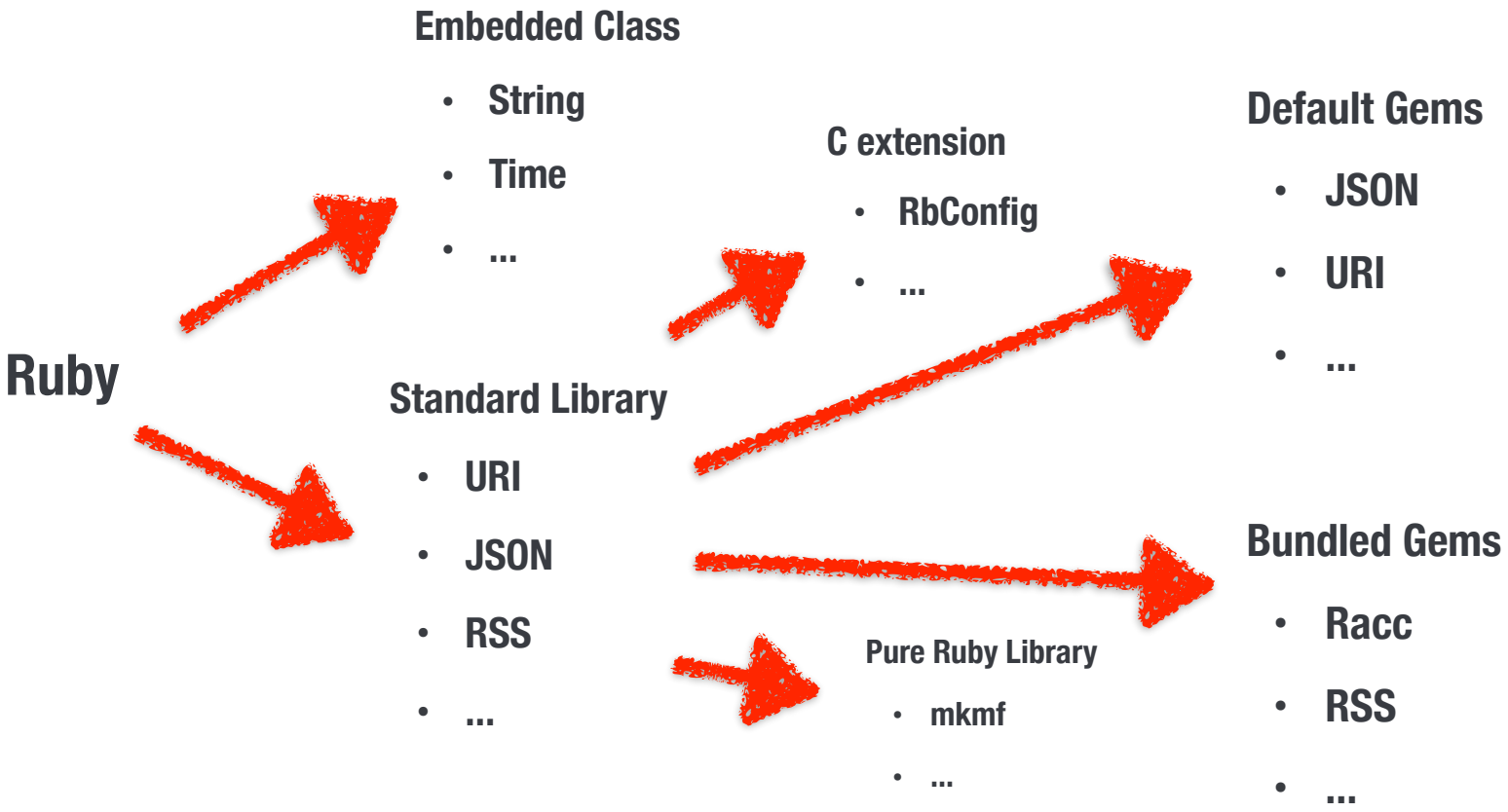
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What are default and bundled gems?

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Classification of Standard library in 2024

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- The Ruby core team released "Default gems" to the rubygems.org.
  - You can install standard libraries of Ruby via RubyGems.
  - Default gems are openssl, psych, json, etc… You can see all of default gems at https://stdgems.org/
- Rubygems have a detection method for default gems.

```
>> require 'rss'
=> true
>> Gem.loaded_specs["rss"].default_gem?
=> false
>> require 'openssl'
=> true
>> Gem.loaded_specs["openssl"].default_gem?
=> true
```

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Default gems repository is located under the https://github.com/ruby

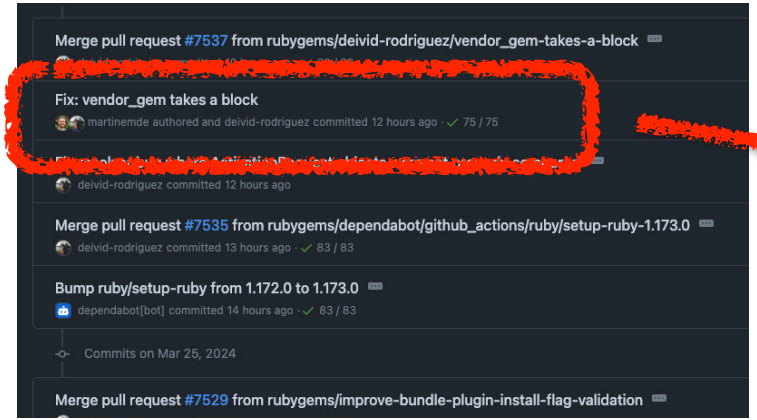
ruby/* repositories can develop bundler and rake same as your application.

```
$ bundle install
$ rake test
```

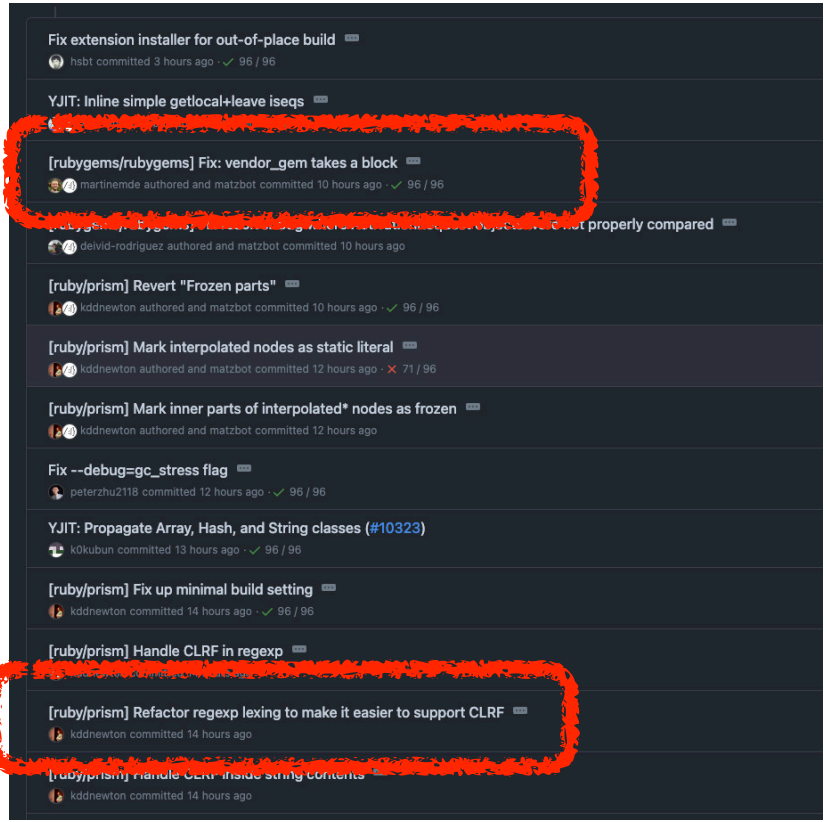


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rubygems/rubygems



ruby/ruby



ruby/prism

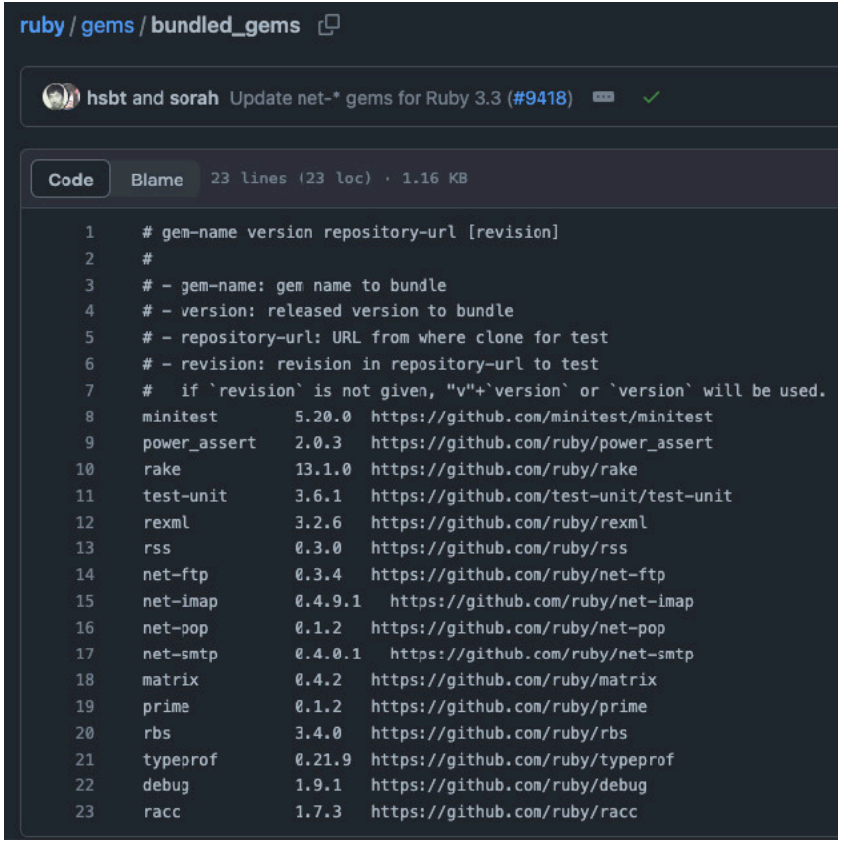


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What's Bundled gems

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- We bundled *.gem and unpacked files to tarball package for Bundled gems with `gems/bundled_gems` in ruby/ruby repository like this:
- `make install` installed Bundled gem your box.



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Why we need to default gems and bundled gems?

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Security

Ruby
A PROGRAMMER'S BEST FRIEND

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CVE-2024-27281: RCE vulnerability with .rdoc_options in RDoc

We have released the RDoc gem version 6.3.4.1, 6.4.1.1, 6.5.1.1 and 6.6.3.1 that have a security fix for a RCE vulnerability. This vulnerability has been assigned the CVE identifier CVE-2024-27281.

Details

An issue was discovered in RDoc 6.3.3 through 6.6.2, as distributed in Ruby 3.x through 3.3.0.

When parsing `.rdoc_options` (used for configuration in RDoc) as a YAML file, object injection and resultant remote code execution are possible because there are no restrictions on the classes that can be restored.

When loading the documentation cache, object injection and resultant remote code execution are also possible if there were a crafted cache.

Recommended action

We recommend to update the RDoc gem to version 6.6.3.1 or later. In order to ensure compatibility with bundled version in older Ruby series, you may update as follows instead:

- For Ruby 3.0 users: Update to `rdoc` 6.3.4.1
- For Ruby 3.1 users: Update to `rdoc` 6.4.1.1
- For Ruby 3.2 users: Update to `rdoc` 6.5.1.1

You can use `gem update rdoc` to update it. If you are using bundler, please add `gem "rdoc", ">= 6.6.3.1"` to your `Gemfile`.

Recent News

CVE-2024-27281: RCE vulnerability with .rdoc_options in RDoc
CVE-2024-27280: Buffer overread vulnerability in StringIO
Ruby 3.2.3 Released
Ruby 3.3.0 Released
Ruby 3.3.0-rc1 Released

Syndicate

Recent News (RSS)

Sustainability

ruby / irb

Code Issues 71 Pull requests 14 Actions Security Insights Settings

Releases / v1.12.0

st0012 released this last month · 10 com s to master since this release

Highlights

- The `help` command now displays a help message directly, instead of op
- You can now get detailed usage information for specific commands by u
  - `show_source`
  - `show_doc`
  - `edit`
  - `ls`
  - We welcome contributions to expand this list!
- The `show_source` command can now display methods defined during th
- In `irb:rdbg` sessions, simply hitting `<enter>` will now repeat the last c
- IRB now supports loading `.irbrc` from multiple locations. This means t

What's Changed

✨ Enhancements

- Introduce exit! command by @ignacio-chiazzo in #851
- Powerup show_source by enabling RubyVM.keep_script_lines by @tomp

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The major problem for the bundled gems

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If you use Bundler, you need to add the bundled gems into your Gemfile.

```
source "https://rubygems.org"

gem “rss”         # You need to this because rss is bundled gems
# gem "openssl"  # You can load openssl without this line

gem "bigdecimal" # You need to this always after Ruby 3.4
…
```

I need to consider to transition and migration plan for this.
But I have no idea yet. Maybe, I will add the some mechanism to Bundler internal to care about this.

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Warning feature of Bundled gems at Ruby 3.3

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Warning feature of bundled gems

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- I added warning feature about bundled gems.
- You can see how handle bundled gems like this.

```
$ cat -p Gemfile
source "https://rubygems.org"

gem "rss"

$ bundle exec irb
>> require "csv"
(irb):1: warning: csv which will no longer be part of
the default gems since Ruby 3.4.0. Add csv to your
Gemfile or gemspec.
=> true
```

```
module Gem::BUNDLED_GEMS
  SINCE = {
    "rexml" => "3.0.0",
    "rss" => "3.0.0",
    "webrick" => "3.0.0",
    "matrix" => "3.1.0",
    "net-ftp" => "3.1.0",
    "net-imap" => "3.1.0",
    "net-pop" => "3.1.0",
    "net-smtp" => "3.1.0",
    "prime" => "3.1.0",
    "abbrev" => "3.4.0",
    "base64" => "3.4.0",
    "bigdecimal" => "3.4.0",
    "csv" => "3.4.0",
    "drb" => "3.4.0",
    "getoptlong" => "3.4.0",
    "mutex_m" => "3.4.0",
    "nkf" => "3.4.0",
    "observer" => "3.4.0",
    "racc" => "3.4.0",
    "resolv-replace" => "3.4.0",
    "rinda" => "3.4.0",
    "syslog" => "3.4.0",
  }.freeze
```

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Example case

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```
require "bundler/inline"

gemfile do
  source "https://rubygems.org"
end

require "mutex_m"
require "rss"
```

You can see these warning with this example Gemfile.

```
test_warn_bundled_gems.rb:7: warning: mutex_m was loaded from the standard
library, but will no longer be part of the default gems since Ruby 3.4.0. Add
mutex_m to your Gemfile or gemspec.

test_warn_bundled_gems.rb:8: warning: rss was loaded from the standard
library, but is not part of the default gems since Ruby 3.0.0. Add rss to
your Gemfile or gemspec.
/Users/hsbt/.local/share/rbenv/versions/3.3.0-dev/lib/ruby/3.3.0/
bundled_gems.rb:74:in `require': cannot load such file -- rss (LoadError)
```

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Example case

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```ruby
require "bundler/inline"

gemfile do
  source "https://rubygems.org"
  gem "activesupport", "7.0.7.2"
end

require "active_support/all"
```

We also care dependencies from gems

like rails.

```
/Users/hsbt/.local/share/gem/gems/activesupport-7.0.7.2/lib/
active_support/core_ext/big_decimal/conversions.rb:3: warning:
bigdecimal was loaded from the standard library, but will no longer
be part of the default gems since Ruby 3.4.0. Add bigdecimal to
your Gemfile or gemspec. Also contact author of
activesupport-7.0.7.2 to add bigdecimal into its gemspec.
```

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Future of standard libraries at Ruby 3.4 and 3.5

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Migration of the bundled gems

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We will reduce Standard Library and extract them to default and bunlded gems

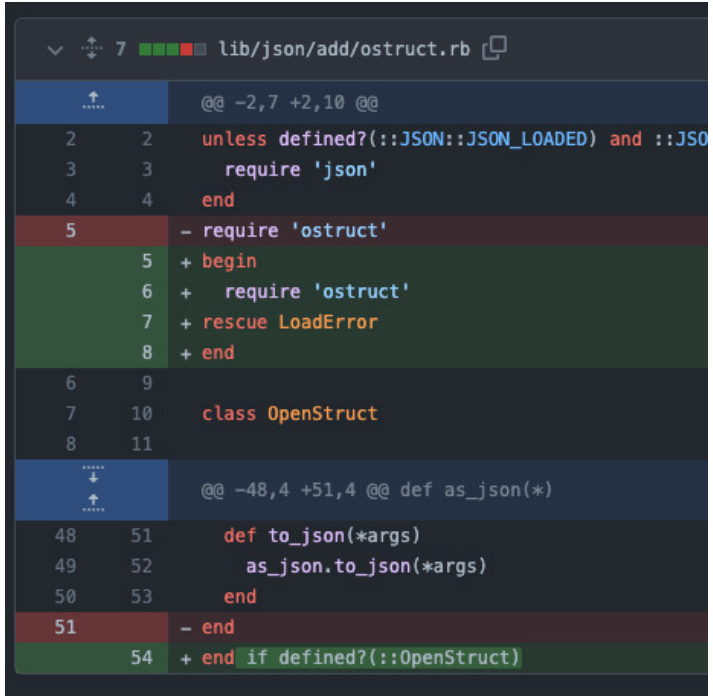
	Ruby 2.7	Ruby 3.3	Ruby 3.4	Ruby 3.5
Standard Library	51	18	18	18
Default gems	48	67	55	45(?)
Bundled gems	6	16	28	38(?)

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How extract default gems

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- Drop dependencies across default gems
- We need to consider C extension like bigdecimal.
  - After extracting bigdecimal as bundled gems, you need to compile that in any place.
  - Some of poeple don't have build toolchain in their prod environment...



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Cross-compilation Problem

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RubyGems will install C extension into the following directories.

```
RubyGems 3.4 and 3.5
* GEM_HOME/extensions/arm64-darwin-23/3.2.0-static/bigdecimal-3.1.6/bigdecimal.bundle
* GEM_HOME/gems/bigdecimal-3.1.6/lib/bigdecimal.bundle

< RubyGems 3.4
* GEM_HOME/gems/bigdecimal-3.1.6/ext/bigdecimal/bigdecimal.bundle
```

RubyGems added extension and lib directories to require_paths both. This means we can avoid to install C extension to under lib directory.

```
>> Gem.loaded_specs["bigdecimal"].require_paths
=> ["/Users/hsbt/.local/share/gem/extensions/arm64-darwin-23/3.3.0-static/bigdecimal-3.1.6", "lib"]
```

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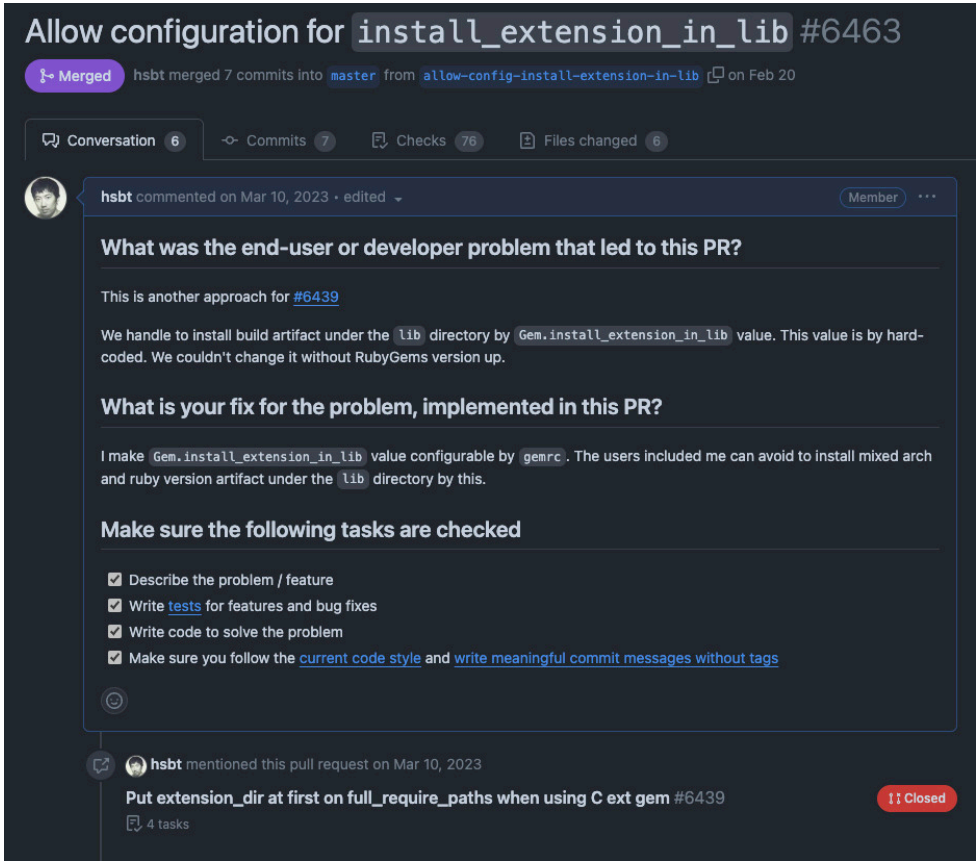
We considered namespace feature with RubyGems and Bundler

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I already make it with opt-in configuration for RubyGems 3.6.

You can skip to install C extension Under the `lib` directory like this.

```
gem: "--no-document"
:install_extension_in_lib: false
gemsrc_use_ghq: true
```



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Separate vendored libraries with namespace

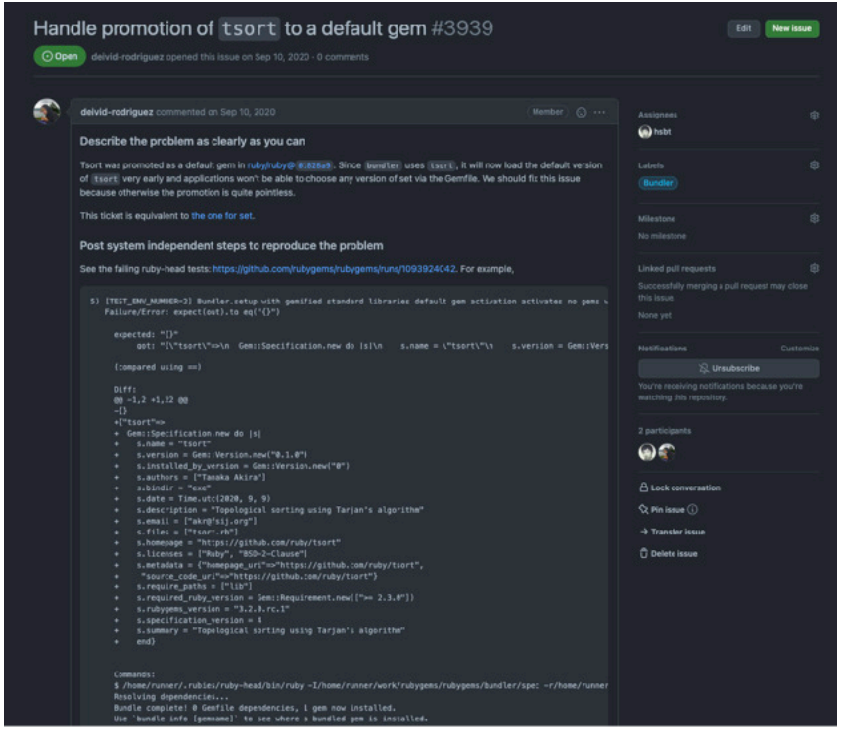
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Activation issue of default gems

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We still have a activation issue with RubyGems and the default gems like `json`.

```
You have already activated timeout 0.3.1, but
your Gemfile requires timeout 0.3.2. Since
timeout is a default gem, you can either remove
your dependency on it or try updating to a
newer version of bundler that supports timeout
as a default gem.
```



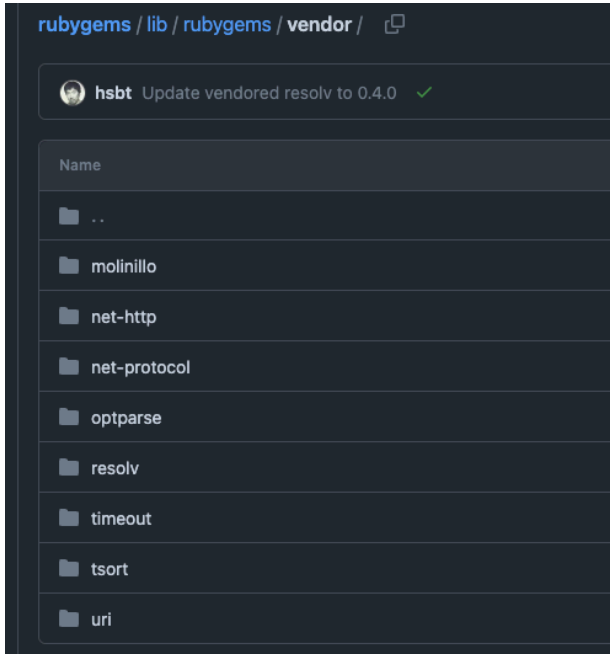
How handle this problem?

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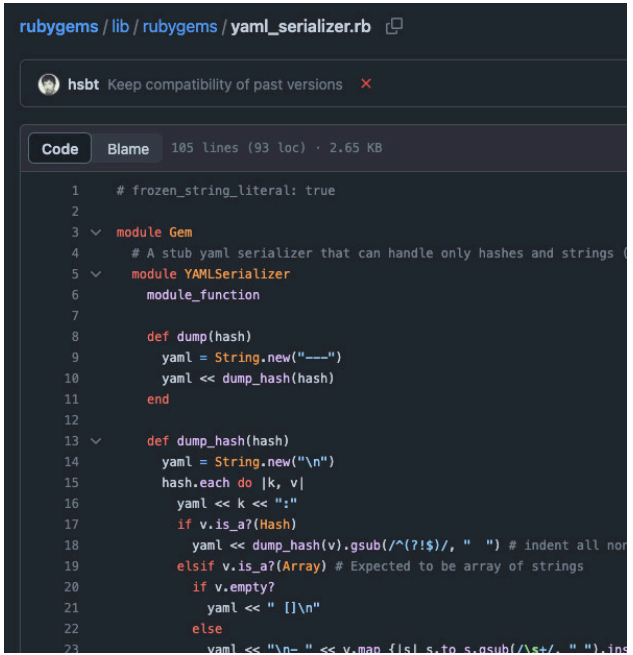
How handle activation problem?

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Vendoring approach when RubyGems uses only pure ruby libraries like URI.



Rewrite default gems written by C extension to pure ruby code.



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Type with RBS

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- `bundle gem` introduced `sig` directory for rbs
- RBS is a language to describe the structure of Ruby programs.

```
class Prime
  include Enumerable
  include Singleton

(snip)

  def each(ubound = nil, generator =
EratosthenesGenerator.new, &block)
    generator.upper_bound = ubound
    generator.each(&block)
  end
```

```
class Prime
  include Singleton

  include Enumerable[Integer]

  extend Enumerable[Integer]
(...)
  def each: (?Integer? ubound, ?
PseudoPrimeGenerator generator) { (Integer) ->
void } -> void
          | (?Integer? ubound, ?
PseudoPrimeGenerator generator) ->
PseudoPrimeGenerator
```

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Basic example of rbs_test

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```
module RBSTypeTest
  class PrimeSingletonTest < Test::Unit::TestCase
    include RBS::UnitTest::TypeAssertions

    library "singleton", "prime"
    testing "singleton(::Prime)"

    def test_each
      assert_send_type(
        "() { (::Integer) -> void } -> void",
        Prime, :each, &proc { break_from_block }
      )

    ...
```

We can test rbs signature with rbs_test framework provided by rbs gem.

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Wrap up

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Conclusion

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- I talked about...
  - History of Libraries, RubyGems, Bundler and their feature.
  - How handle default gems and bundled gems in Ruby 3.3.
  - What happens Ruby 3.4 and 3.5



< Ruby is a programmer's best friend

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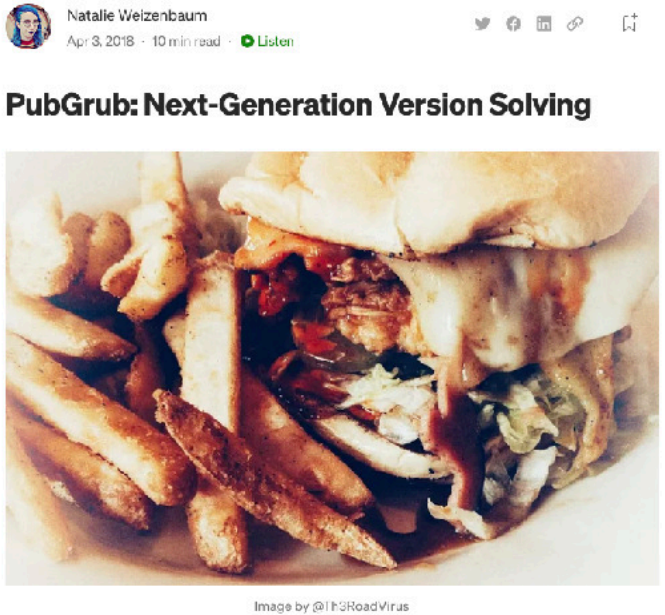
Appendix

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What's PubGrub?

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- PubGrub is next generation resolution engine developed by Natalie Weizenbaum a.k.a @nex3.
  - PubGrub is for Dart language. But we have Ruby implementation that is `pub_grub`.
- If resolution conflict occurs with PubGrub, PubGrub give up immediately to resolving loop. This makes faster resolution with complex Gemfile.



Natalie Weizenbaum
Apr 3, 2018 · 10 min read · Listen

PubGrub: Next-Generation Version Solving

Image by @TheRoadVirus

If you'd peeked in on me at work five months ago you'd find me with my nose in a textbook reading up on cutting-edge academic research on constraint-solving problems. Three months ago I was applying that knowledge to code, drafting and tweaking a new algorithm that united that research with a real-world tool. One month ago I was adding the last few features and polishing it up.

https://nex3.medium.com/pubgrub-2fb6470504f

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Introduce Kernel#gem method

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- RubyGems provide `gem` method to handle name and requirements.
  - It's different with gem method on Gemfile.
- This method inject gem path into your $LOAD_PATH with requirements

```
>> orig_paths = $LOAD_PATH.dup
>> gem "rake", "> 12", "< 13"
=> true
>> $LOAD_PATH - orig_paths
=> ["/Users/hsbt/.local/share/gem/gems/rake-12.3.3/lib"]
```

```
>> require "rake"
=> true
>> Rake::VERSION
=> "13.1.0"

#
>> gem "rake", "13.0.0"
=> true
>> require "rake"
=> true
>> Rake::VERSION
=> "13.0.0"

#
>> gem "rake", "> 12", "< 13"
=> true
>> require "rake"
=> true
>> Rake::VERSION
=> "12.3.3"
```

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RubyGems has some problems

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- RubyGems didn't have resolution mechanism with multiple libraries.
  - If you activated Rails 7, you should specify all of related libraries that support Rails 7.
  - It's difficult to resolve only `gem` method.
- Extended `require` is slow if you have a lot of gems like Rails application.

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How works `bundle install/ update rails`?

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What's happend called with setup_solver in Bundler?

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- `bundle update` will create instance of `Resolver` for resolution.
- Resolver invoke `setup_solver` and `solve_versions`. `setup_solver` prepared all versions of gemspec(called all_specs) and dependency tree and logger for `solve_versions`

```
source "https://rubygems.org"

gem "rails"
gem "importmap-rails"
```

```
>> @all_specs.keys
=> ["rails", "importmap-rails", "Ruby\u0000", "RubyGems\u0000"]
```

```
>> @all_specs["rails"].map{|s| [s.name, s.version.to_s]}
=>
[["rails", "0.8.0"],
 ["rails", "0.8.5"],
 ...
 ["rails", "7.0.7.2"],
 ["rails", "7.0.8"]]
```

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Real case of PubGrub resolution

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I want
rails-7.0.8
and
importmap-
rails-1.2.1

rails-0.8.0

rails-7.0.8

importmap-rails-0.1.0

importmap-rails-1.2.1

activerecord-...

activemailer-...

activesupport-...

actionview-...

railties-...

actionpack-...

mini_mime-...

mail-...

minitest-...

tzinfo-...

thor-...

rake-...

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Bundler will propagate conflict result into next resolution

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OK, I skip importmap-rails-1.2.1 and its dependencies.

rails-0.8.0

rails-7.0.8

importmap-rails-0.1.0

importmap-rails-1.2.1

activerecord-...

activemailer-...

activesupport-...

actionview-...

railties-...

actionpack-...

mini_mime-...

mail-...

minitest-...

tzinfo-...

thor-...

rake-...

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Result of resolution with rails and importmap-rails



yay, I got the full list of gems with rails-7.0.8 and importmap-rails-1.2.1

rails-7.0.8

importmap-rails-1.2.1

activerecord-...

activemailer-...

.
.
.

actionview-...

```
GEM
  remote: https://rubygems.org/
  specs:
    actioncable (7.0.8)
      actionpack (= 7.0.8)
      activesupport (= 7.0.8)
      nio4r (~> 2.0)
      websocket-driver (>= 0.6.1)
    actionmailbox (7.0.8)
      actionpack (= 7.0.8)
      activejob (= 7.0.8)
      activerecord (= 7.0.8)
      activestorage (= 7.0.8)
      activesupport (= 7.0.8)
      mail (>= 2.7.1)
      net-imap
      net-pop
      net-smtp
    actionmailer (7.0.8)
      actionpack (= 7.0.8)
      actionview (= 7.0.8)
      activejob (= 7.0.8)
      activesupport (= 7.0.8)
      mail (~> 2.5, >= 2.5.4)
```

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How extend require in your use case?

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```
def replace_require(specs)
  return if [::Kernel.singleton_class, ::Kernel].any? {|klass| klass.respond_to?(:no_warning_require) }

  [::Kernel.singleton_class, ::Kernel].each do |kernel_class|
    kernel_class.send(:alias_method, :no_warning_require, :require)
    kernel_class.send(:define_method, :require) do |name|
      if message = ::Gem::BUNDLED_GEMS.warning?(name, specs: specs)
        warn message, :uplevel => 1
      end
      kernel_class.send(:no_warning_require, name)
    end
    if kernel_class == ::Kernel
      kernel_class.send(:private, :require)
    else
      kernel_class.send(:public, :require)
    end
  end
end
```

We easily extend `require` like this. I only enabled this extension under the bundler. I added this to monkey patch collection of bundler.

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Sharing GEM_HOME each Ruby verions

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- I would like to unify GEM_HOME on your all of ruby versions. We can share pure ruby libraries each versions.

```
$ ls .local/share/gem/
bin/  build_info/  bundler/  cache/  credentials  doc/  extensions/  gem_exec/  gems/
last_update_check  plugins/  specifications/
~
$ ls .local/share/gem/extensions/
aarch64-darwin-23/  arm64-darwin-23/  universal-java-16/  universal-java-20/  universal-java-21/
~
$ ls .local/share/gem/extensions/arm64-darwin-23/
2.6.0-static/  2.7.0/  3.0.0-static/  3.1.0-static/  3.2.0-static/  3.3.0-static/  3.4.0+0-static/
~
$ ls .local/share/gem/gems | wc -l
6880
```

- The following message is displayed when RubyGems does not determine that the C extension is already installed

```
Ignoring erb-4.0.2 because its extensions are not built. Try: gem pristine erb --version 4.0.2
```

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What are notable features from 2023

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- Changes of Standard libraries
  - readline-ext is retired
  - racc is now bundled gems
- Changes of RubyGems and Bundler
  - Generate checksums
    - You can see them with `CHECKSUMS` section into your lockfile manually.
  - Bugfix! 🐛

Gemfile.lock

```
    rspec-mocks (~> 3.12)
    test-unit (~> 3.0)          You, 4 years ago via PR #3141
    turbo_tests (~> 2.1)
    uri (~> 0.13.0)
    webrick (~> 1.6)

CHECKSUMS
    diff-lcs (1.5.1) sha256=273223dfb40685548436d32b4733aa67
    kramdown (2.4.0) sha256=b62e5bcbd6ea20c7a6730ebbb2a10723
    kramdown-parser-gfm (1.1.0) sha256=fb39745516427d2988543
    mini_portile2 (2.8.5) sha256=7a37db8ae758086c3c3ac3a59c0
    mustache (1.1.1) sha256=90891fdd50b53919ca334c8c1031eada
    nokogiri (1.16.2) sha256=68922ee5cde27497d995c46f2821957
    nokogiri (1.16.2-arm64-darwin) sha256=c957226c8e36b31be6
    nokogiri (1.16.2-java) sha256=122652bfc338cd8a54a692ac03
    nokogiri (1.16.2-x64-mingw-ucrt) sha256=7344b5072ca69fc5
    nokogiri (1.16.2-x86_64-darwin) sha256=5def799e5f139f21a
    nokogiri (1.16.2-x86_64-linux) sha256=5b146240ac6ec6c40f
    nronn (0.11.1) sha256=60305c7a42dcaf6bdd33210993a7e38087
    parallel (1.24.0) sha256=5bf38efb9b37865f8e93d7a762727f8
    parallel_tests (3.8.1) sha256=c781c0910be3b489411f24e3a3
    power_assert (2.0.3) sha256=cd5e13c267370427c9804ce6a579
    racc (1.7.3) sha256=b785ab8a30ec43bce073c51dbbe791fd2700
```

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We considered namespace feature with RubyGems and Bundler

ANDPAD

tagomoris-san proposed namespace feature for package system of Ruby.

It may help our activation problem.

Ex. RubyGems and Bundler will use JSON under only their namespace. You can activate any version of JSON on your application.



Feature #19744 OPEN

Namespace on read

Added by tagomoris (Satoshi Tagomori) 5 months ago. Updated 1 day ago.

Status: Open
Priority: Normal
Assignee: -
Target version: -
[ruby-core: 114025]

Description

What is the "Namespace on read"

This proposes a new feature to define virtual top-level namespaces in Ruby. Those namespaces can require/load libraries (either .rb or native extension) separately from the gl
also required/loaded in the namespace.

Motivation

The "namespace on read" can solve the 3 problems below, and can make a path to solve another problems.
The details of those motivations are described in the below section ("Motivation details").

Avoiding name conflicts between libraries

Applications can require two different libraries safely which use the same module name.

Avoiding unexpected globally shared modules/objects

Applications can make an independent/unshared module instance.

(In the future) Multiple versions of gems can be required

Application developers will have fewer version conflicts between gem dependencies if rubygems/bundler will support the namespace on read.

Example code with this feature

```
# your_module.rb
module YourModule
end

# my_module.rb
require 'your_module'

module MyModule
end

# example.rb
namespace1 = NameSpace.new
namespace1.require('my_module') #=> true

namespace1::MyModule #=> #<Module:0x00000001027eabb8>::MyModule (or #<Namespace:0x00...>::MyModule ?)
namespace1::YourModule # similar to the above

MyModule # NameError
YourModule # NameError

namespace2 = NameSpace.new      # Any number of namespaces can be defined
namespace2.require('my_module') # Different library "instance" from namespace1

require 'my_module' # require in the global namespace

MyModule.object_id != namespace1::MyModule.object_id #=> true
namespace1::MyModule.object_id != namespace2::MyModule.object_id
```

The required/loaded libraries will define different "instances" of modules/classes in those namespaces (just like the "wrapper" 2nd argument of Kernel.load). This doesn't infl
resolution (without forced top-level reference like ::Name).

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