Le progrès réside dans les BC Breaks

Gina P. Banyard
The PHP Foundation
2026-10-09, Forum PHP AFUP 2026

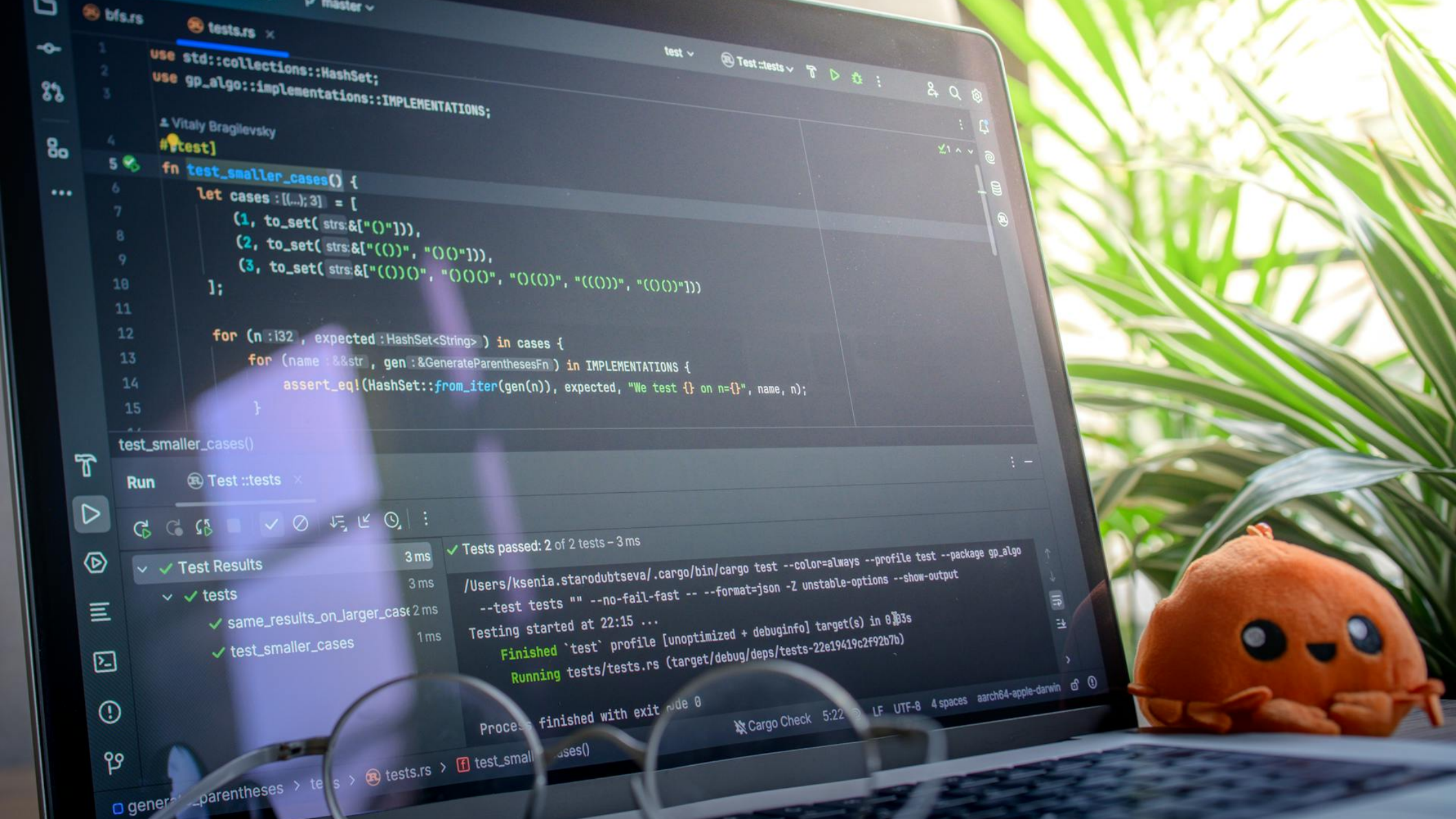
Backwards compatibility is great!



Susanne Nilsson *"Country Road"* (2016) / CC BY-SA 2.0



Richard Szwejkowski *"Birmingham 06-080821 3585"* (2021) / CC BY-SA 2.0


bfs.rs
tests.rs
use std::collections::HashSet;
use gp_algo::implementations::IMPLEMENTATIONS;
Vitaly Bragilevsky
#[test]
fn test_smaller_cases() {
let cases: [(...); 3] = [
(1, to_set(strs: &["()"])),
(2, to_set(strs: &["(())", "()()"])),
(3, to_set(strs: &["(())()", "()()()", "()(())", "((()))", "(()())"]))
];
for (n: i32, expected: HashSet<String>) in cases {
for (name: &&str, gen: &GenerateParenthesesFn) in IMPLEMENTATIONS {
assert_eq!(HashSet::from_iter(gen(n)), expected, "We test {} on n={}", name, n);
}
test_smaller_cases()
Run
Test ::tests
Test Results 3 ms
tests 3 ms
same_results_on_larger_case 2 ms
test_smaller_cases 1 ms
Tests passed: 2 of 2 tests – 3 ms
/Users/ksenia.starodubtseva/.cargo/bin/cargo test --color=always --profile test --package gp_algo
--test tests "" --no-fail-fast -- --format=json -Z unstable-options --show-output
Testing started at 22:15 ...
Finished `test` profile [unoptimized + debuginfo] target(s) in 0.03s
Running tests/tests.rs (target/debug/deps/tests-22e19419c2f92b7b)
Process finished with exit code 0
Cargo Check
5:22
LF
UTF-8
4 spaces
aarch64-apple-darwin
tests.rs

Breaking BC is necessary

Breaking BC is necessary

- Health & Safety issues
- Technological evolution
- Unforeseen externalities
- Unsafe usage
- Design mistakes
- Harmonisation
- Reduce future opportunity costs

Reluctance to BC breaks


12
TIMEX


200
200




DANGER
PLEASE
KEEP CLEAR

Outside of software



With Associates *"Fridge"* (2009) / CC BY-SA 2.0

Evolution of refrigerants

≤1920s Toxic gases e.g. ammonia, sulphur dioxide, chloromethane

1930s Use of chlorofluorocarbons (CFCs) [4] a non-toxic refrigerant

1970s Regulation of CFCs after discovery of ozone-depleting properties of CFCs

1980s Use of hydrochlorofluorocarbons (HCFCs) as a replacement for CFCs

1987 Adoption of **Montreal Protocol** [5]

- Phase-out ban for consumption & production of CFCs

1990s Use of hydrofluorocarbons (HFCs) non-ozone-depleting replacement for HCFCs

1997 Adoption of **Kyoto Protocol** [6]

- Reduction of consumption & production of HCFCs

2016 Adoption of **Kigali Amendment** to the Montreal Protocol [5]

- Reduction of consumption & production of HFCs of 80% over the next 30 years

2024 New EU Regulation on total phase out of HFCs by 2050 [7]

2025 UK Bans use of F-gasses with Global Warming Potential (GWP) $\geq$ 750 [8]

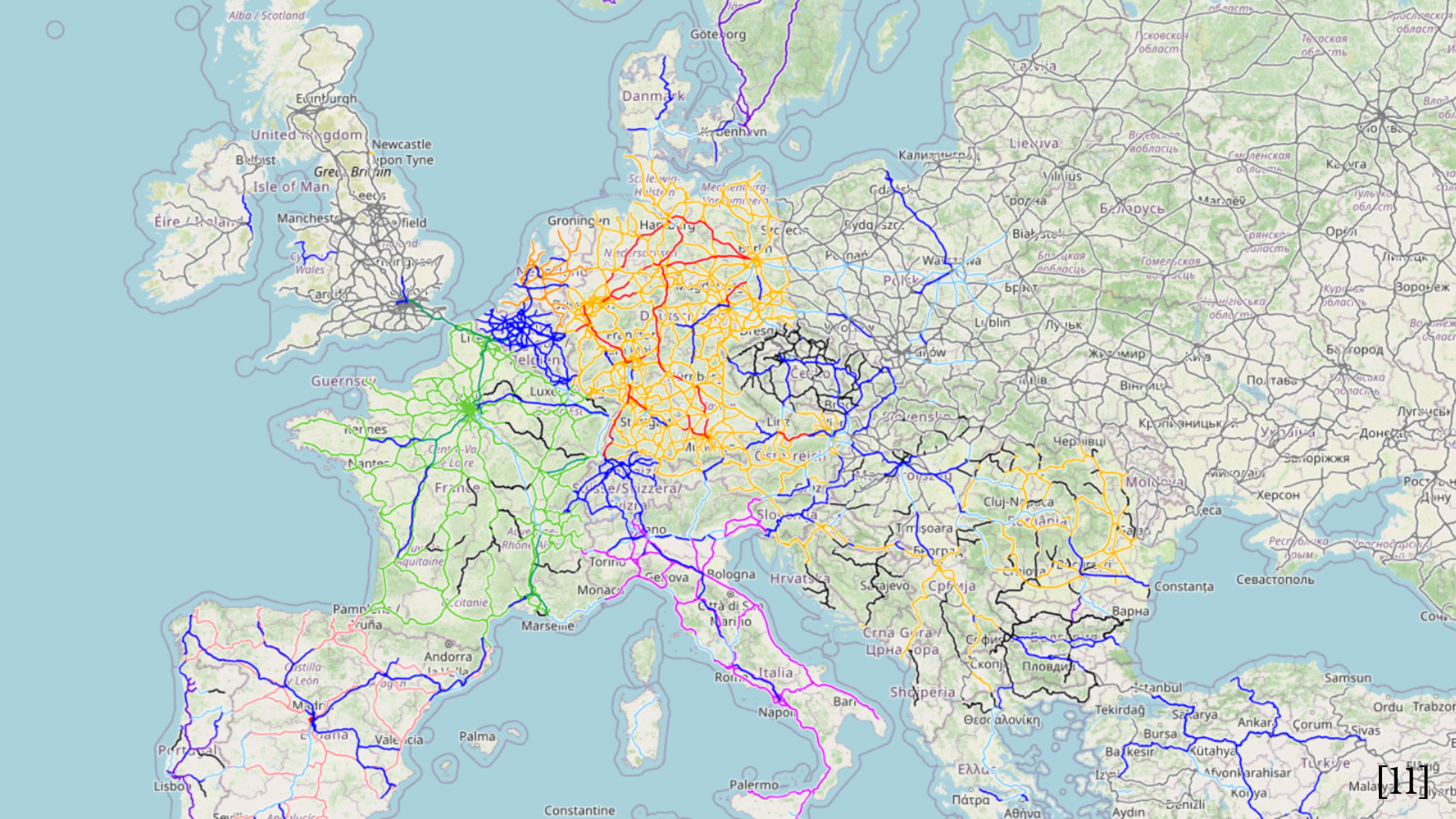
Natural deprecation


SKOR
TAXI

Coordinated System Wide Change

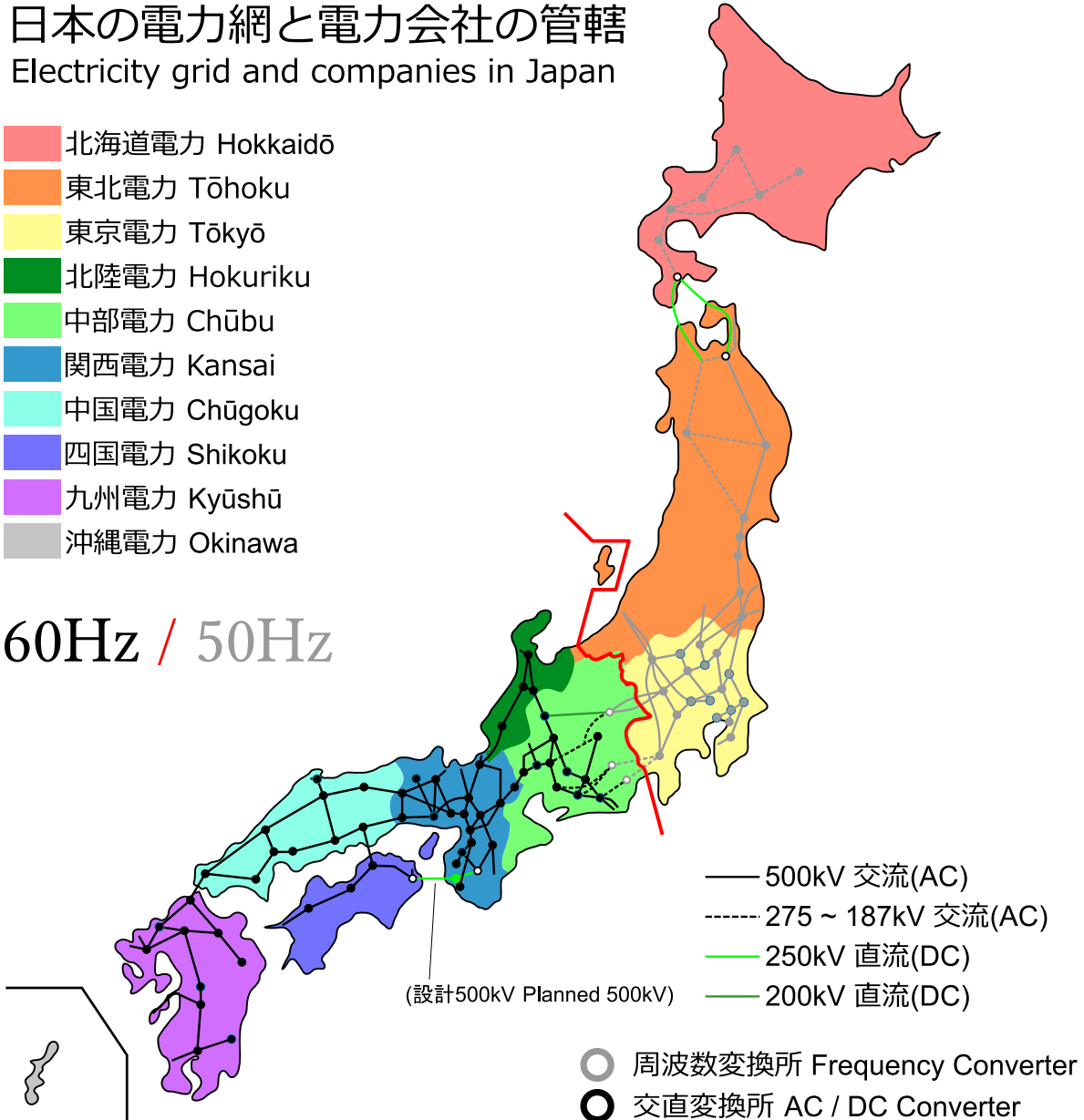
Okinawa did it twice! [10]


45
N4
45
N5
O2


Alba / Scotland
Edinburgh
United Kingdom
Newcastle upon Tyne
Belfast
Great Britain
Isle of Man
Manchester
Éire / Ireland
Wales
Cardiff
Göteborg
Danmark
København
Groningen
Hamburg
Berlin
Deutschland
Luxembourg
Guernsey
Nantes
France
Suisse/Svizzera/Schweiz
Torino
Genova
Monaco
Bologna
Hrvatska
Slovenija
Marseille
Andorra
Pamplona / Iruña
Castilla y León
Madrid
España
Valencia
Palma
Portugal
Lisboa
Roma
Italia
Napoli
Bari
Palermo
Constantine
Sevilla
Andalucía
Città di San Marino
Shqipëria
Crna Gora / Црна Гора
Sarajevo
Србија
Београд
Cluj-Napoca
Timișoara
Romania
Moldova
Chișinău
Одеса
Херсон
Севастополь
Constanța
Варна
Пловдив
Скопје
Θεσσαλονίκη
Ελλάς
Πάτρα
Αθήνα
Istanbul
Tekirdağ
Samsun
Ordu
Trabzon
Sakarya
Ankara
Çorum
Sivas
Bursa
Balıkesir
Kütahya
Türkiye
Afyonkarahisar
Konya
Aydın
Denizli
Malatya
Калининград
Lietuva
Vilnius
Беларусь
Гомельская область
Брест
Lublin
Луцьк
Warszawa
Białystok
Polska
Poznań
Gdańsk
Bydgoszcz
Житомир
Київ
Вінниця
Полтава
Черкаси
Кропивницький
Україна
Запоріжжя
Дніпро
Донецьк
Луганськ
Харків
Суми
Чернігів
Брянская область
Смоленская область
Калужская область
Орёл
Курская область
Белгород
Воронежская область
Липецкая область
Тульская область
Рязанская область
Московская область
Тверская область
Ярославская область
Республика Крым
Краснодарский край
Сочи



日本の電力網と電力会社の管轄
Electricity grid and companies in Japan

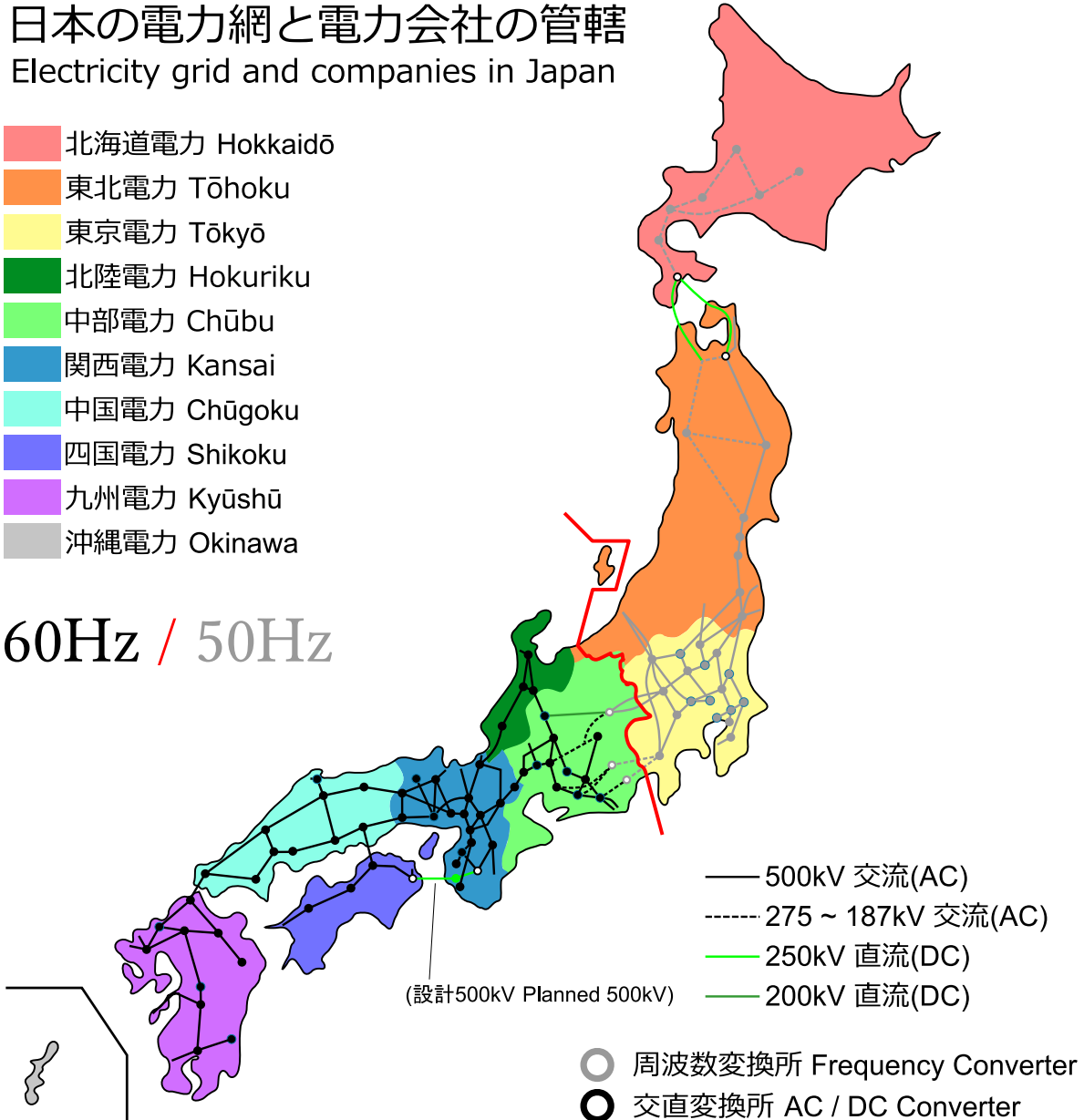




[13]



日本の電力網と電力会社の管轄
Electricity grid and companies in Japan



Just maintain BC and engineer a solution around it!



Glenn Beltz *"United 737 MAX 8 Departs Santa Barbara"* (2024) / CC BY 2.0

Lion Air crash: officials say 189 onboard lost flight JT610 – as it happened

Boeing passenger plane went down shortly after take-off from Jakarta


Lion Air
Lion Air: Why did a brand-new Boeing jet crash 13 minutes after takeoff?
By Bianca Britton, CNN
7 min read · Updated 5:24 AM EDT, Wed October 31, 2018

[17]


ing jet crash
Lio
13
By Bianca Britt
7 min read · Updated
Ethiopian Airlines plane crash kills all 157 people on board
The aircraft, carrying passengers from 35 countries, was only months old and of the same type involved in a previous disaster.
Sunday 10 March 2019 18:40, UK

[18]


Ethiopian A
people
The air
type
Sunday 10
By Bianca Britte
7 min read · Update
Lio
13
et crash
157
onths old and of the same
Analysis
Ethiopian flight 302: second new Boeing 737 to crash in four months
Gwyn Topham
Transport correspondent
Confidence that a newer plane inevitably means a safer plane in danger of being shaken

[19]


Ethiopian Airlines crash: anti-stall system 'engaged repeatedly'
Software may have redeployed without human input before plane went down, say sources
Confidence that a newer plane in danger of being shaken
Ethiopian Airlines crash: second new Boeing
et crash
157
and of the same
Sunday
7 min read

[20]

Maneuvering Characteristics Augmentation System



Dmitry Terekhov *"Boeing-737-200"* (2009) / CC BY-SA 2.0



Yamaguchi Yoshiaki *"737NG take off"* (2006) / CC BY-SA 2.0



Glenn Beltz *"United 737 MAX 8 Departs Santa Barbara"* (2024) / CC BY 2.0

So why?

2006 Appoints teams for a “clean sheet” design replacing the 737 [23]
2010 Postponed decision about 737 replacement [24]
2010 Airbus announces the A320neo family of planes
2011 Boeing decides to re-engine the 737 due to competitive pressure of the A320neo
2016 First test flight
2017 Airworthiness approval via Supplemental Type Certificate of 737 certificate

- 10-15% of the cost of a clean-sheet design
- Faster delivery than a clean-sheet design
- Airline pilots would not require a new type certification



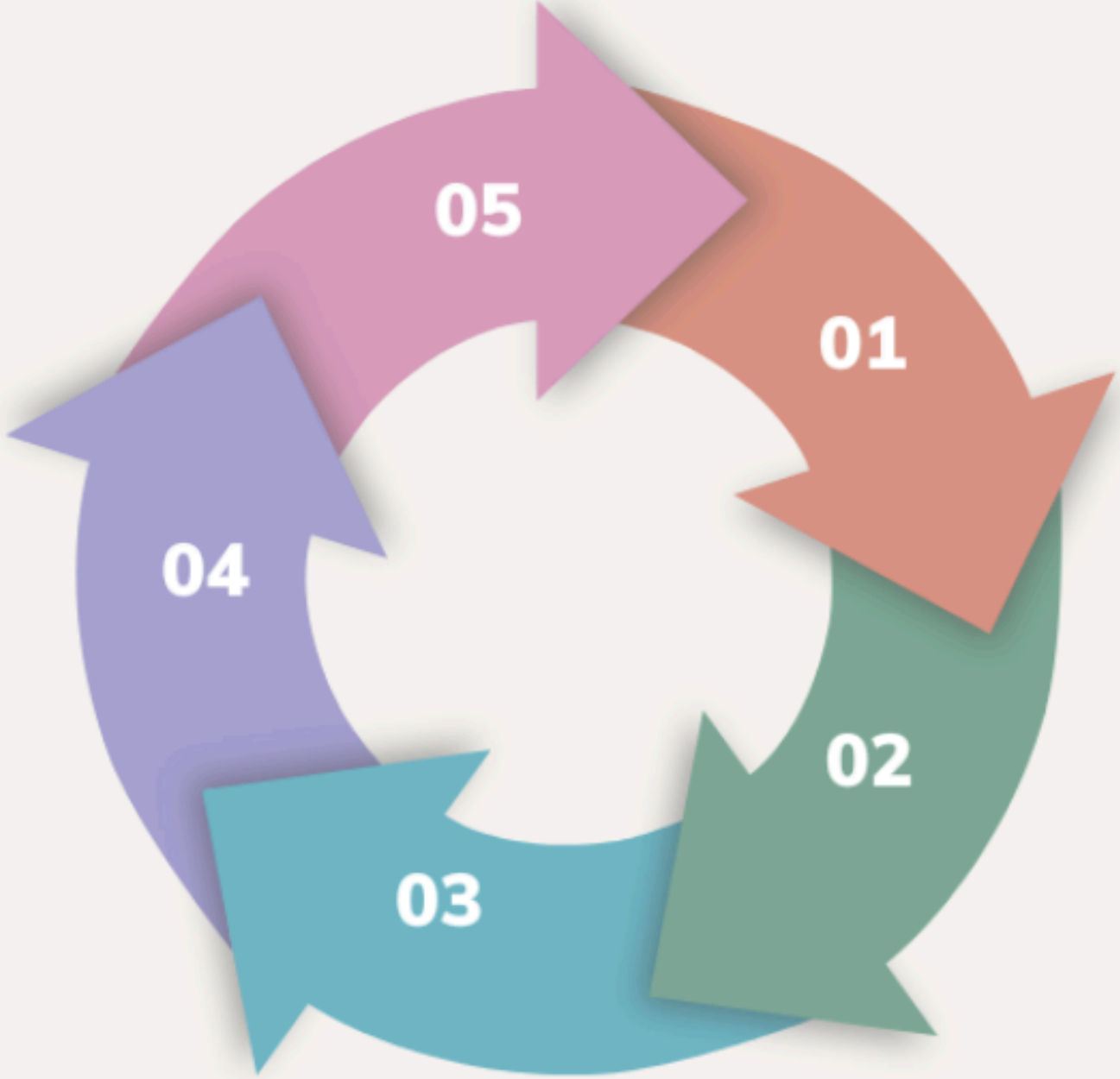
Boeing Is Reportedly In Beginning Stages Of Developing 737 MAX Replacement



By Aaron Bailey – Published Sep 30, 2025, 2:27 AM EDT

Journalist - Aaron joins the Simple Flying team with 14 years of experience in the travel & tourism industry. He has a background in airports and travel consulting for global companies in New Zealand, Europe, and North America. An Avid traveler, Aaron has visited 52+ countries across five…

Life Cycle Management



- PLANNING
- ACQUISITION
- OPERATION
- MAINTENANCE
- DISPOSAL

semver to the rescue!

Or not

Not all software uses semantic versioning

- Protocols (e.g. IETF RFCs)
- Most PLs
  - Including PHP
- End user software
- Linux kernel
- OS Versions

Did you know there is a version 2 of semver? [26]

Does semver *even solve the migration problem?*

I absolutely detest SemVer because it has no way of doing graceful deprecation, which arises because it conflates implementation and interface.

A library that wants to do graceful deprecation will have three releases, A, B, and C, where B introduces a new API and C removes the old one.

C is a breaking change for anything coming from A.

C is a breaking change for anything using B and not moving to the new interfaces.

You really want a set of SemVers, for each interface you support.
So you actually have something like:

- $A : \{1.0\}$
- $B : \{1.1, 2.0\}$
- $C : \{2.1\}$

I have never seen a system using SemVer that supports this. [...]

— D. Chisnall, 28 March 2026

The issue

```
// Version 1.0 (A)
function my_api() {}

// Version 1.1 (B)
#[\Deprecated(message: "use my_amazing_api instead", since: "1.1")]
function my_api() {}
function my_amazing_api() {}

// Version 2.0 (C)
function my_amazing_api() {}
```

What does "compatibility" even mean?

What does "compatibility" even mean?

Is something "incompatible" if:

- It removes a feature?
- It adds a feature?
- Changes the value of a constant?
- Changes an error message?
- Changes an error code?
- Changes an exception type?
- Changes the side effects?
- Changes internal implementation?

Is the "contract" about **observable** behaviour or **documented** behaviour?

BC breaks in software

Examples of BC breaks

- `goto` in PLs no longer allows jumping into functions
- HTTPS required by browsers, with certificate validity reduced to 47 days by 2029
- `SameSite` cookie default changed to `Lax` from `None`. [28]
- Emails requiring server authentication and proof of no spoofing
- More modern hardware requirements for the Linux kernel [29]
- Discontinued APIs offered by providers

In PHP:

- Object passing by val to passing by pointer
- `register_globals`
- Magic quotes
- Type and Value input validation

One of the responsibilities, I think, we have as designers is to protect the player from themselves.

— Sid Meier [30, 41:34 - 41:41]

One of the responsibilities, I think, we have as designers is to protect the *developers* from themselves.

— Me

Tools to protect us

- Types
  - Refined types to constrain value
- Visibility
- Read-only / mutable keywords
- Enumerations
- `final` / `open`
- `#[\Override]` attribute
- `#[\NoDiscard]` attribute
- Rust's borrow checker
- Literal types & values
  - E.g. preventing SQL injections at compile time in Scala [31]
- Choreographic programming for deadlock-free concurrent programs [32], [33]

We need to embrace making changes

— Björkus Dorkus, C23 editor [34]

```
$array < $integer
```

$$variable_variables

```
$string1 & $string2
```

```
new __PHP_Incomplete_Class()
```

uniqid()

Wisdom from Pr. R. L. Ackoff

1. Absolving

There are 4 ways of treating a problem

1. Absolving
2. Resolving

There are 4 ways of treating a problem

1. Absolving
2. Resolving
3. Solving

There are 4 ways of treating a problem

1. Absolving
2. Resolving
3. Solving
4. Dissolving

By redesigning the system that has it, so that the problem no longer exists.

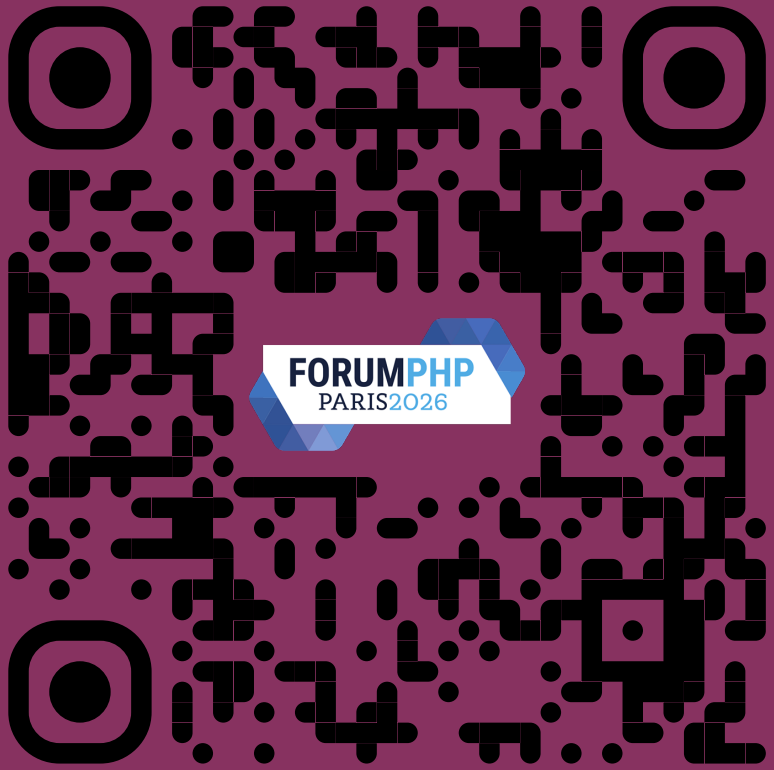
— R. L. Ackoff, [35, 1:00:20-1:00:27]

What does it mean for the future of PHP?

- Should we rename functions?
- Should we align parameter orders?
- Remove functions:
  - `md5()`
- Remove features:
  - Variable variables
  - Global scope fallback for functions
  - String comparisons
- Add controversial features:
  - Operator overloading
  - Eager class loading

Your voice *matters*!

Thank you!



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Mastodon: @Girgias@phpc.social
GitHub: Girgias

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