



RED BADGER

Mapping the Future of Sustainable Digital Products

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Red Badger



1 Rust

2 WebAssembly

3 Next-gen platforms

Stu

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- Founder of Red Badger

@stuartharris



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6 principles of sustainable software engineering

1. **Carbon efficiency** — minimize the amount of carbon emitted per unit of work
2. **Energy efficiency** — the more you utilize a computer, the more efficient it becomes at converting electricity to useful computing operations
3. **Carbon awareness** — Shifting demand to times when carbon intensity is low
4. **Hardware efficiency** — reduce embodied carbon by extending the life of hardware
5. **Measurement** — measure the carbon footprint of your software
6. **Climate commitments** — net zero (abate/eliminate) vs. carbon neutral (offset)

25 minute overview

$$\text{SCI} = ((\text{E} * \text{I}) + \text{M}) \text{ per R}$$

Energy consumed by software in kWh

Carbon emitted per kWh of energy, gCO₂/kWh

Carbon emitted through the hardware that the software is running on

Functional Unit; this is how software scales, for example per user or per device



Sustainable Software Engineering

Find as many "Carbon Proxies" as you can

- Time-to-interactive and Page weight
- Average server response time
- Cost of your services
- The utilisation of your servers

[Sustainable Software Engineering overview, How to measure and reduce the carbon footprint of your application](#)

Three revolutions

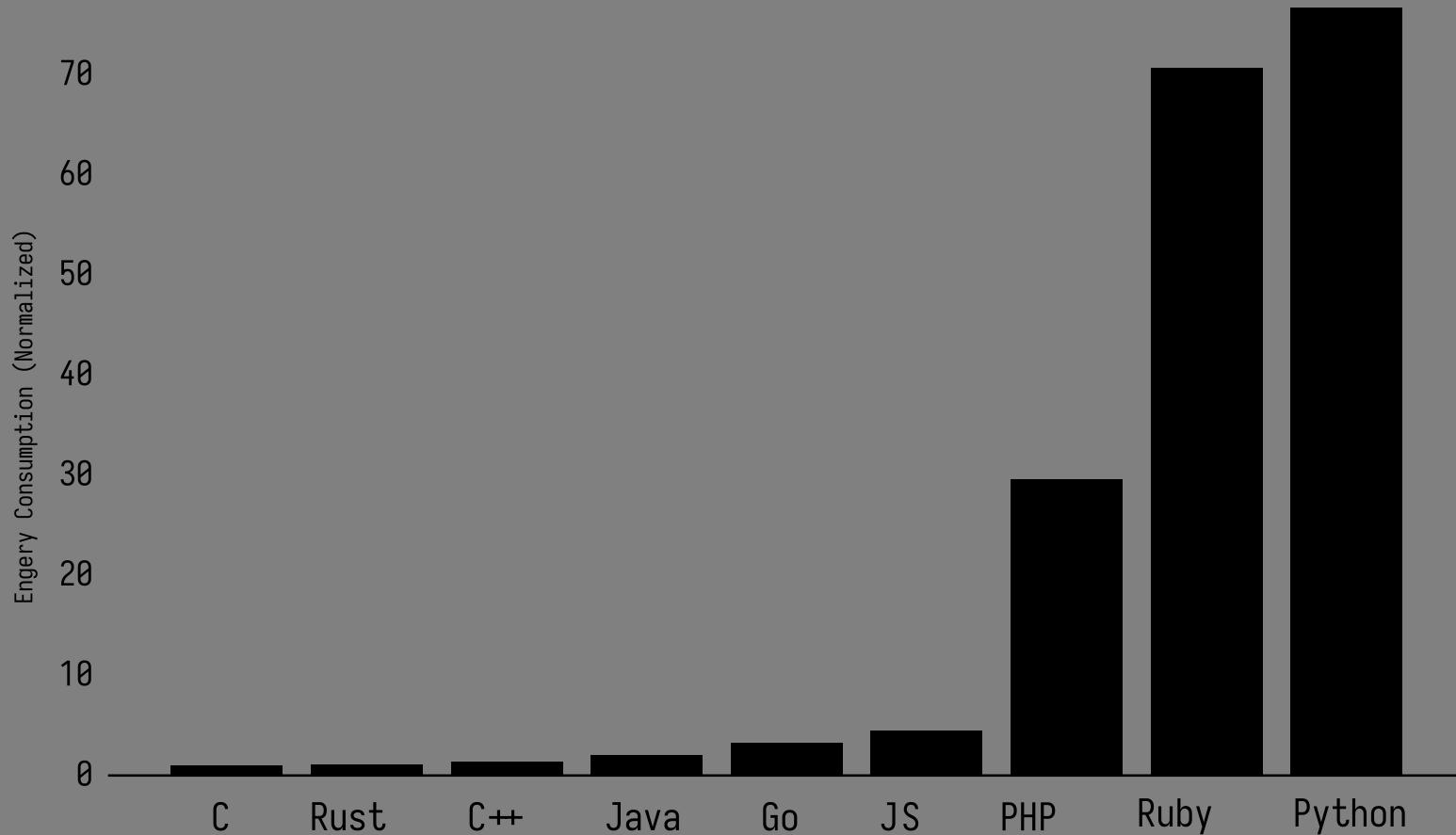
- 1 Rust is a **revolution** in sustainable software engineering
- 2 WebAssembly
- 3 Next-gen platforms

1

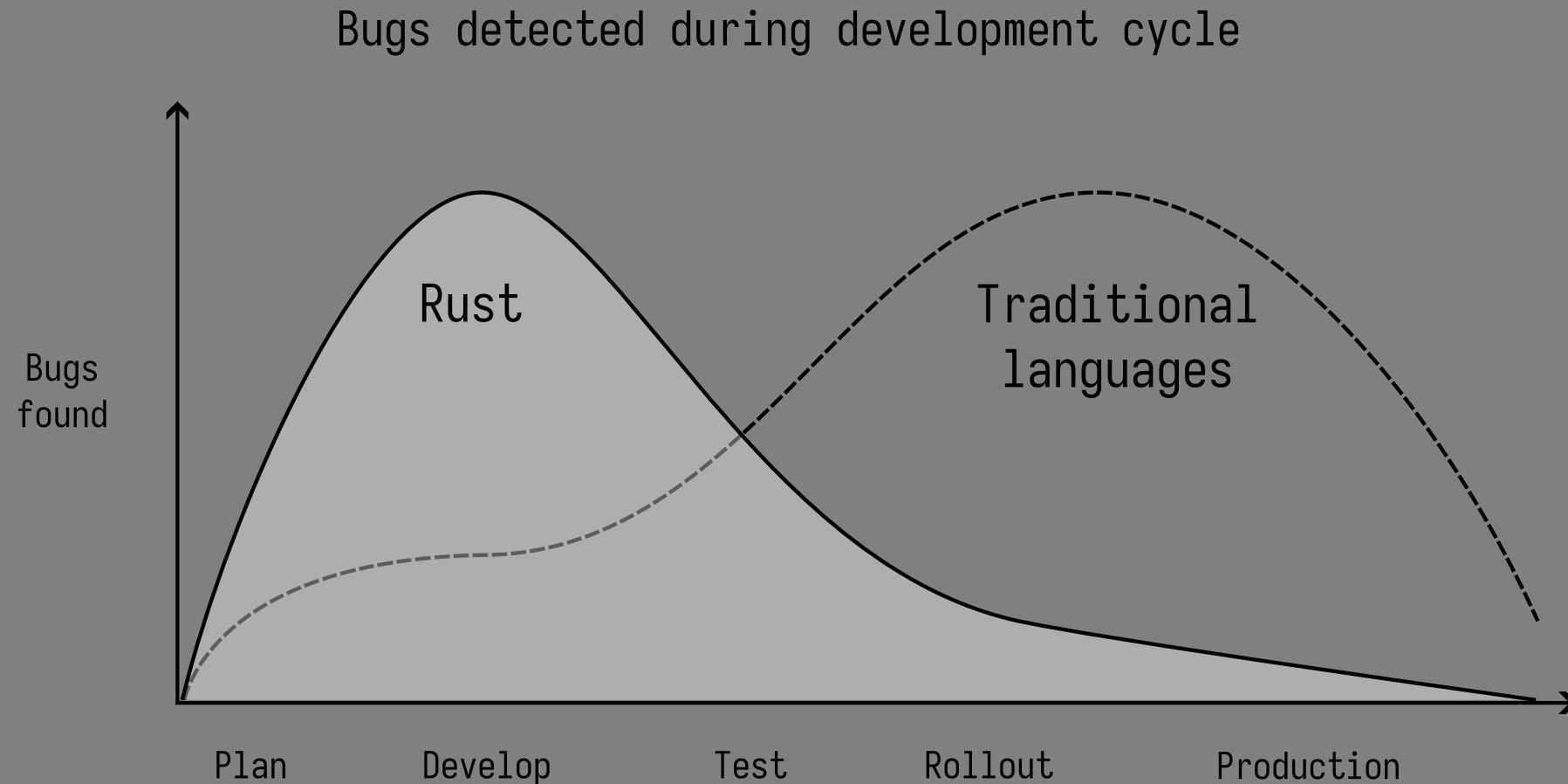
Rust is a **revolution** in
sustainable software
engineering



Energy Consumption by Programming Language (Normalized)

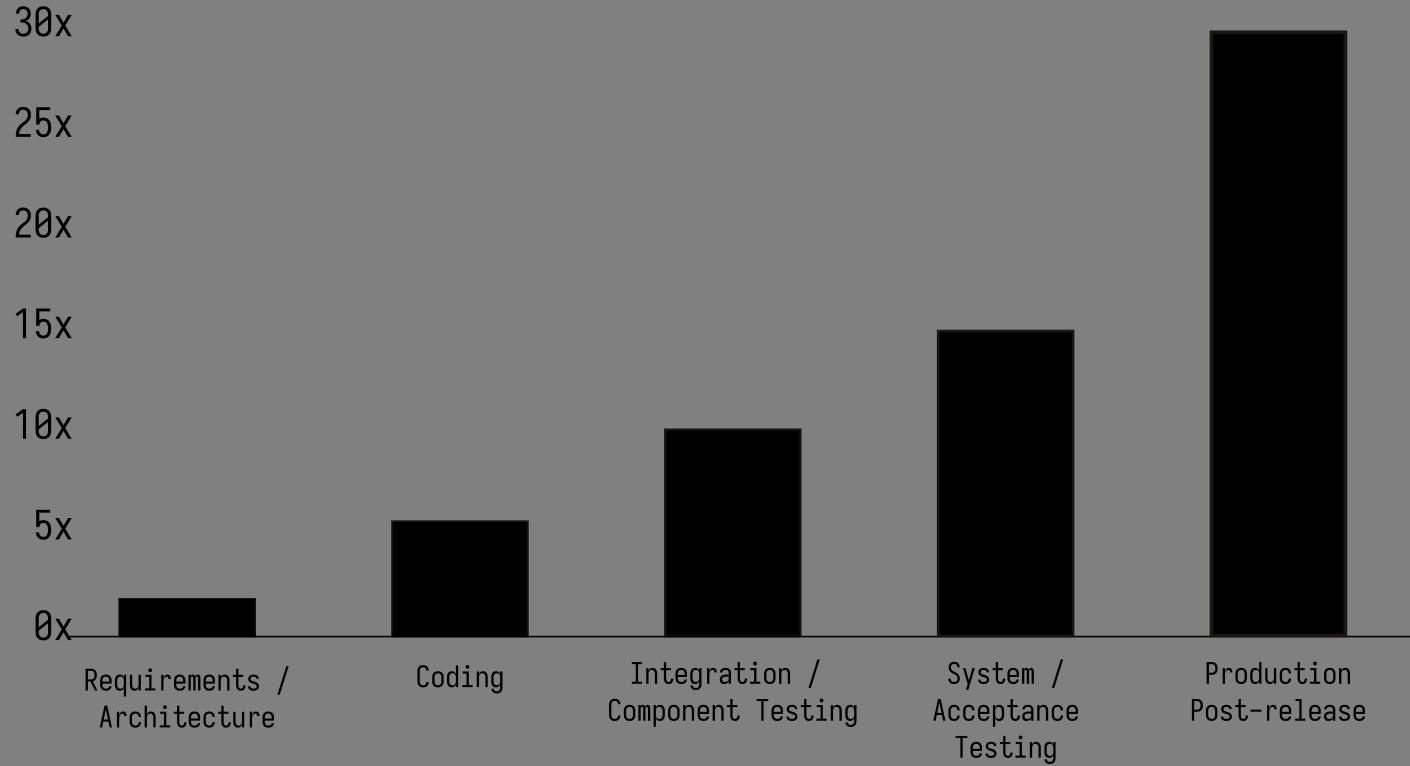


Why Rust in production?, Sustainability with Rust



Why Rust in production?

Relative cost to fix bugs, based on time of detection



Why Rust in production?

Three revolutions

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2 WebAssembly

3 Next-gen platforms

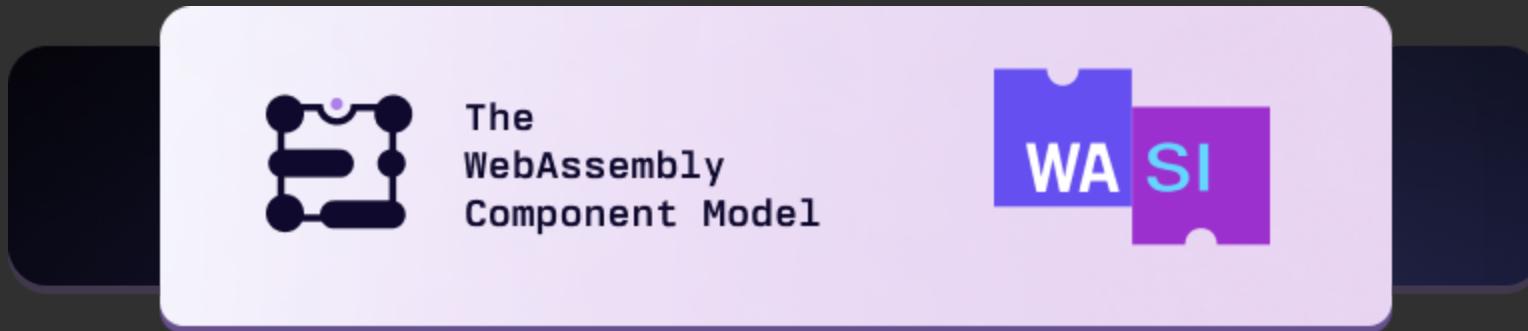
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**WebAssembly is a
revolution**





The WebAssembly Component Model





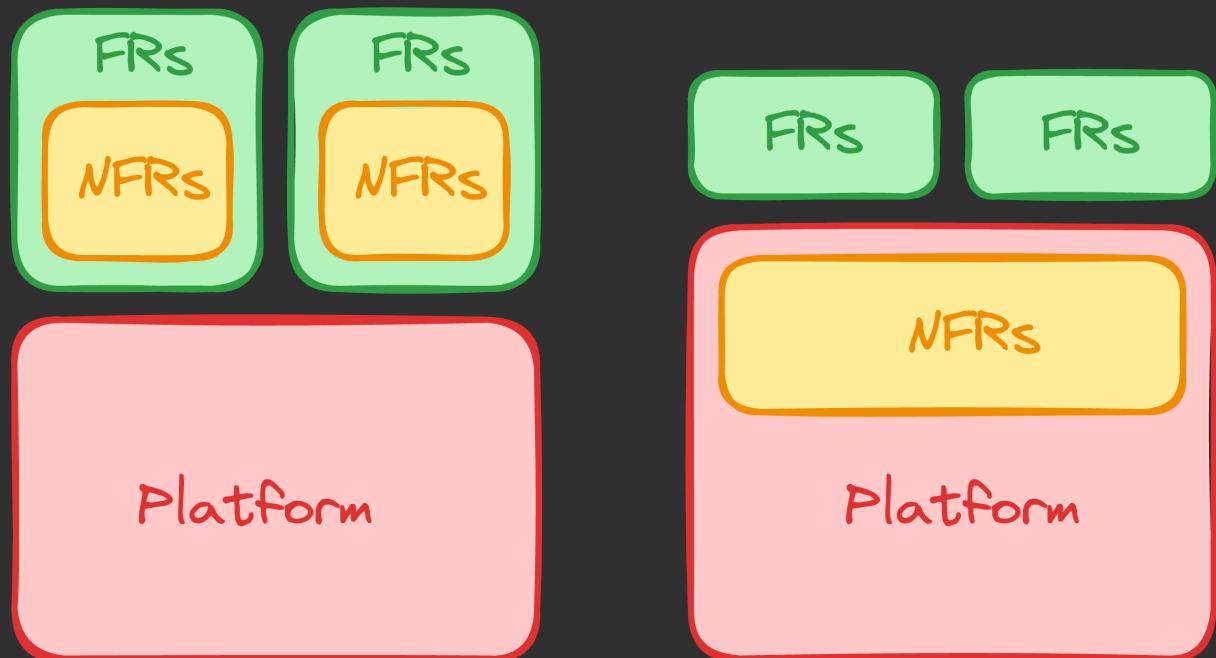
Three revolutions

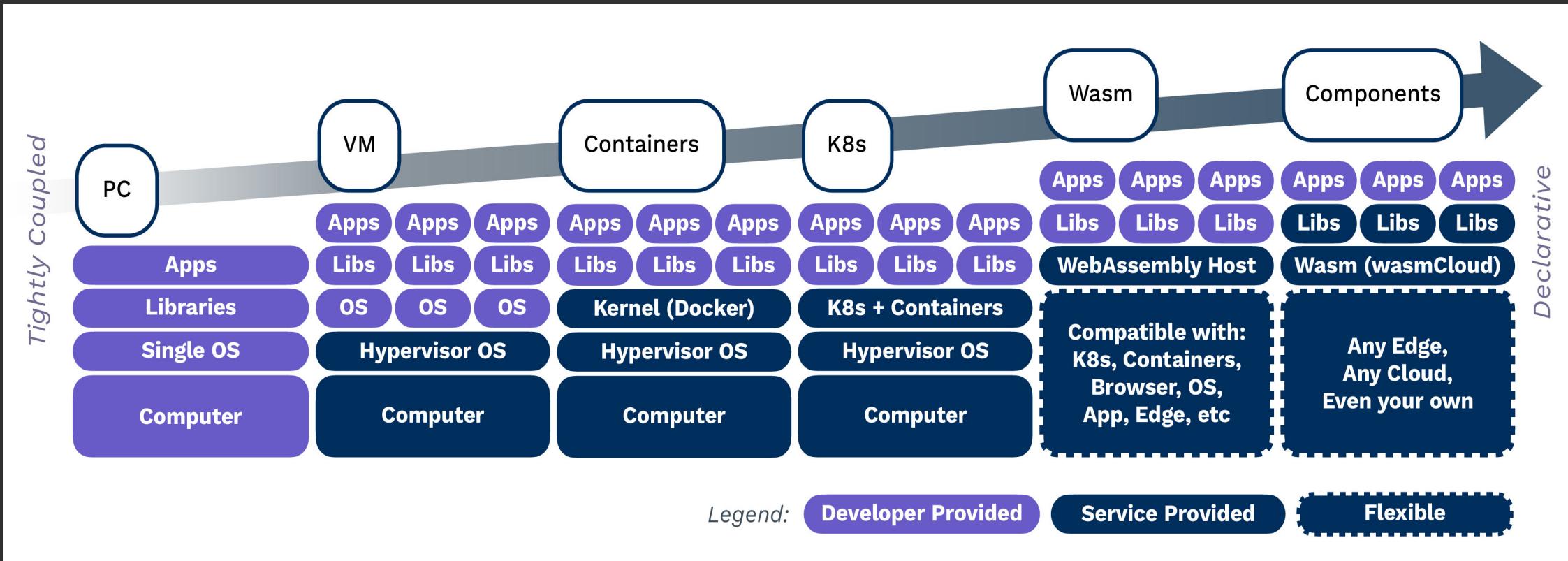
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3

Next-gen platforms are
a **revolution**

Pushing non-functionals down





Cosmonic and **wasmCloud**

"The next-gen Kubernetes"

<https://cosmonic.com/>, <https://wasmcloud.com/>

Fermyon and **Spin**

"The next-gen AWS Lambda"

<https://www.fermyon.com/>, <https://www.fermyon.com/spin>, <https://www.fermyon.com/cloud>

Three revolutions

- 1** Rust
- 2** WebAssembly
- 3** Next-gen platforms

Thank you!



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