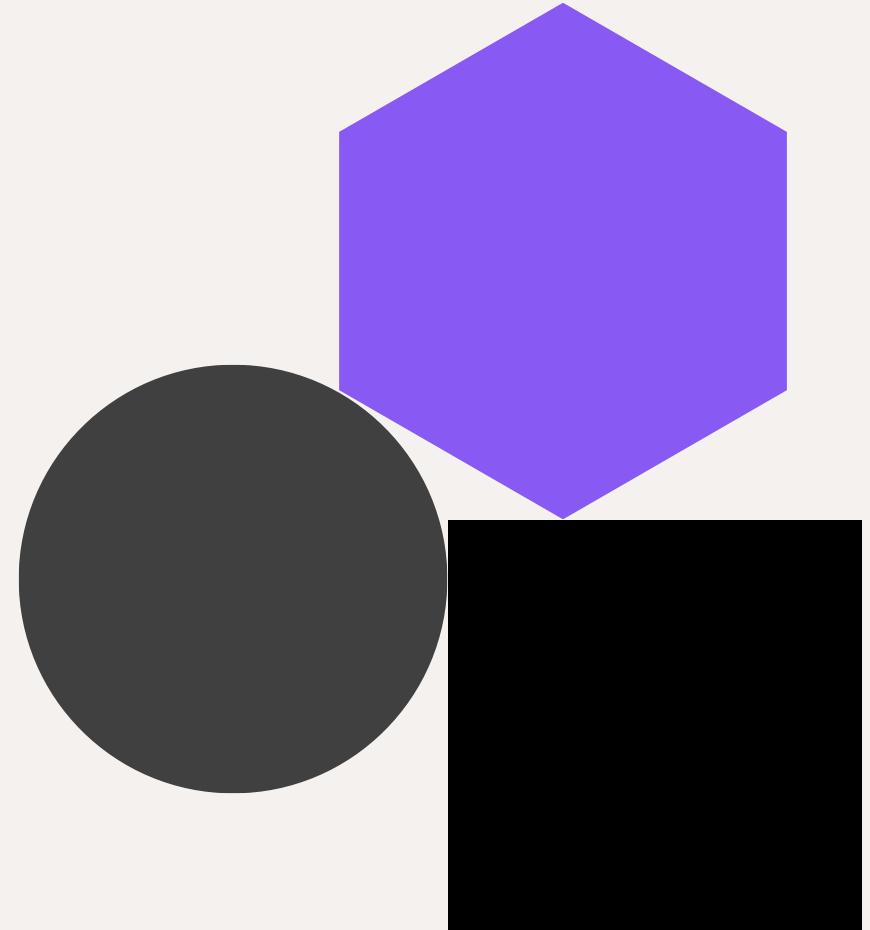




CHERI performance



Dr Carl Shaw

CHERItech'25, November 2025

→ Product selection



→ Product selection



Ford UK (modified!)

→ Product selection



Fuel efficiency
Speed
Price
Safety
Security
Delivery time

"Job to be done" (JTBD)

People buy products that meet their needs to do something specific

→ Job to be done



Photo by [serjan midili](#) on [Unsplash](#)



Photo by [Caleb White](#) on [Unsplash](#)



Photo by [Philip Myrtorp](#) on [Unsplash](#)

→ Job to be done



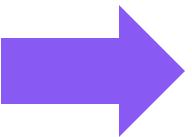
Photo by [Gabriel Tovar](#) on [Unsplash](#)

If two cars meet our needs but one has lower performance and higher fuel costs – would you buy it?

→ Electronic product development



Fuel efficiency
Speed
Price
Safety
Security
Delivery time



Power
Performance
Area
Safety
Security
Schedule

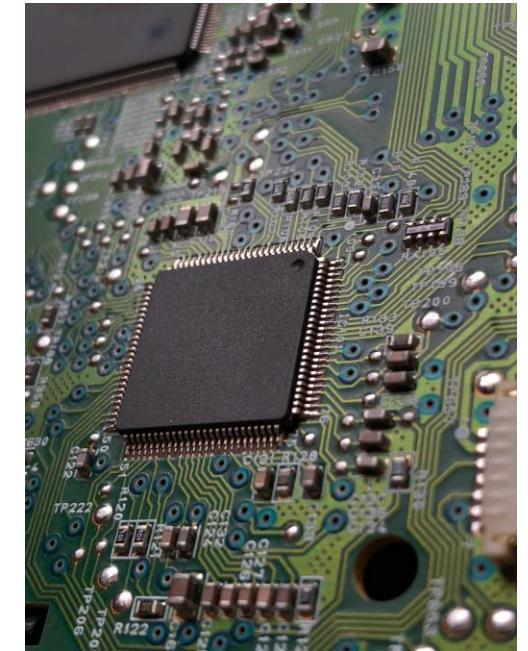


Photo by [alerkiv](#) on [Unsplash](#)

→ CHERI compute
performance

→ The Hardware

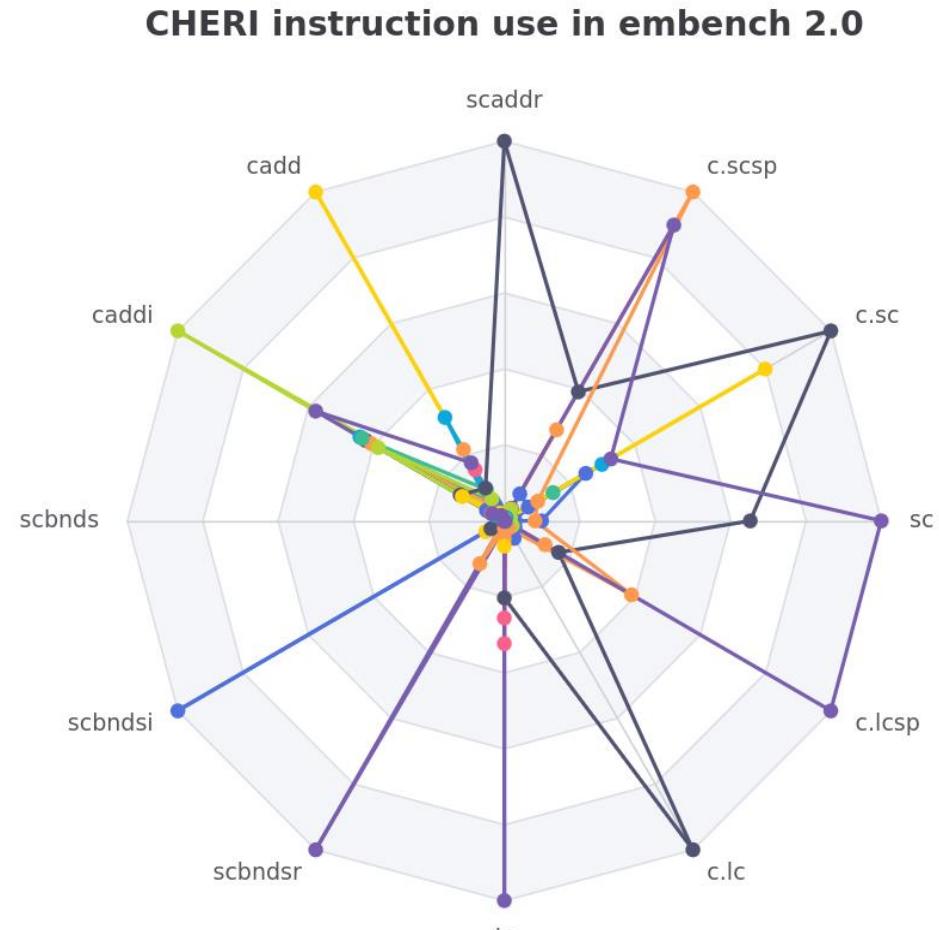
- **Design for CHERI, don't retrofit**

Microarchitecture

- Design
- Model
- Iterate

Make data-driven decisions

→ The Hardware



Microarchitecture

→ The Hardware

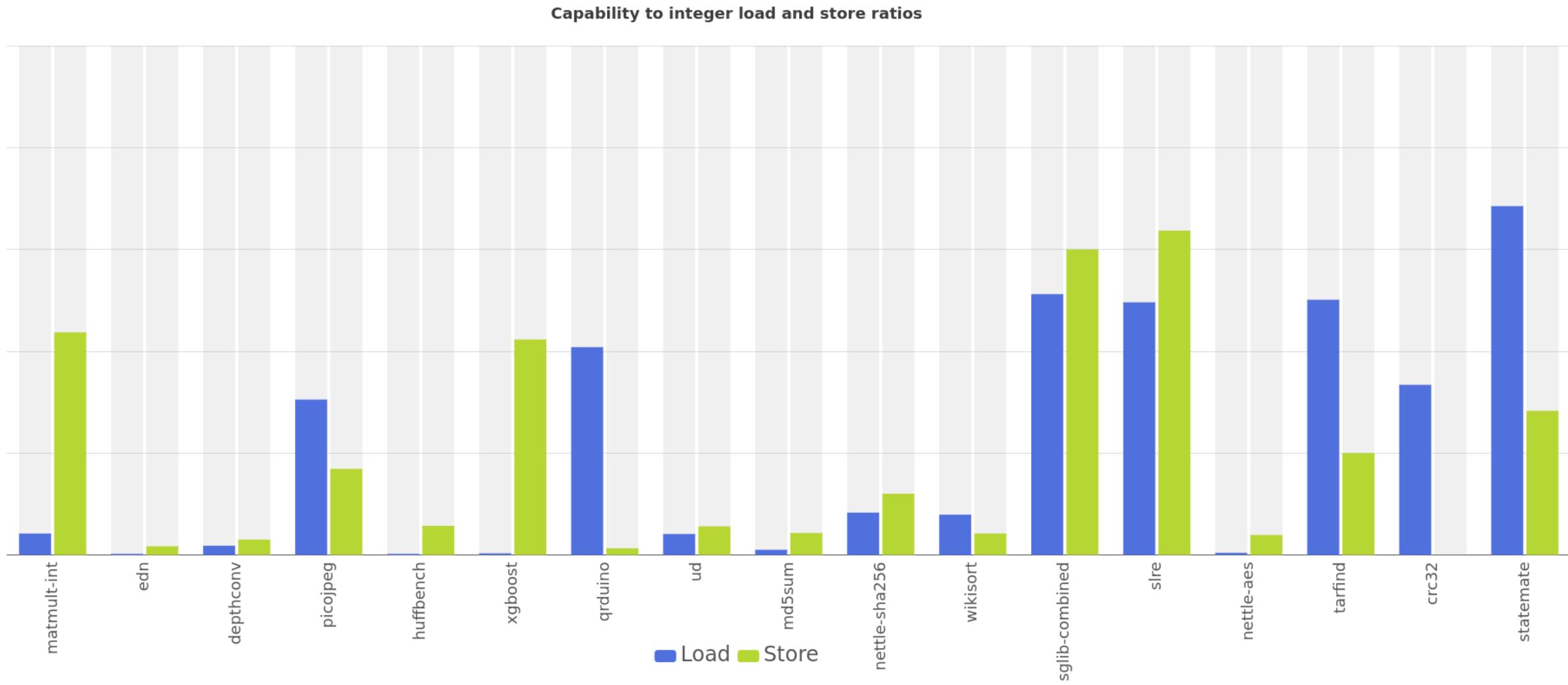
- **CHERI is not just the core**

- Memory tagging
- Revocation

Microarchitecture

System architecture

→ The Hardware



→ The Architecture

• Optimise the ISA

- CHERI-RISC-V specification
- Evolving use cases

Microarchitecture

System architecture

ISA

CHERI needs hardware/software co-design

→ The Compiler

• **Optimise the compiler**

- Best use of ISA
- Microarchitecture specific

Microarchitecture

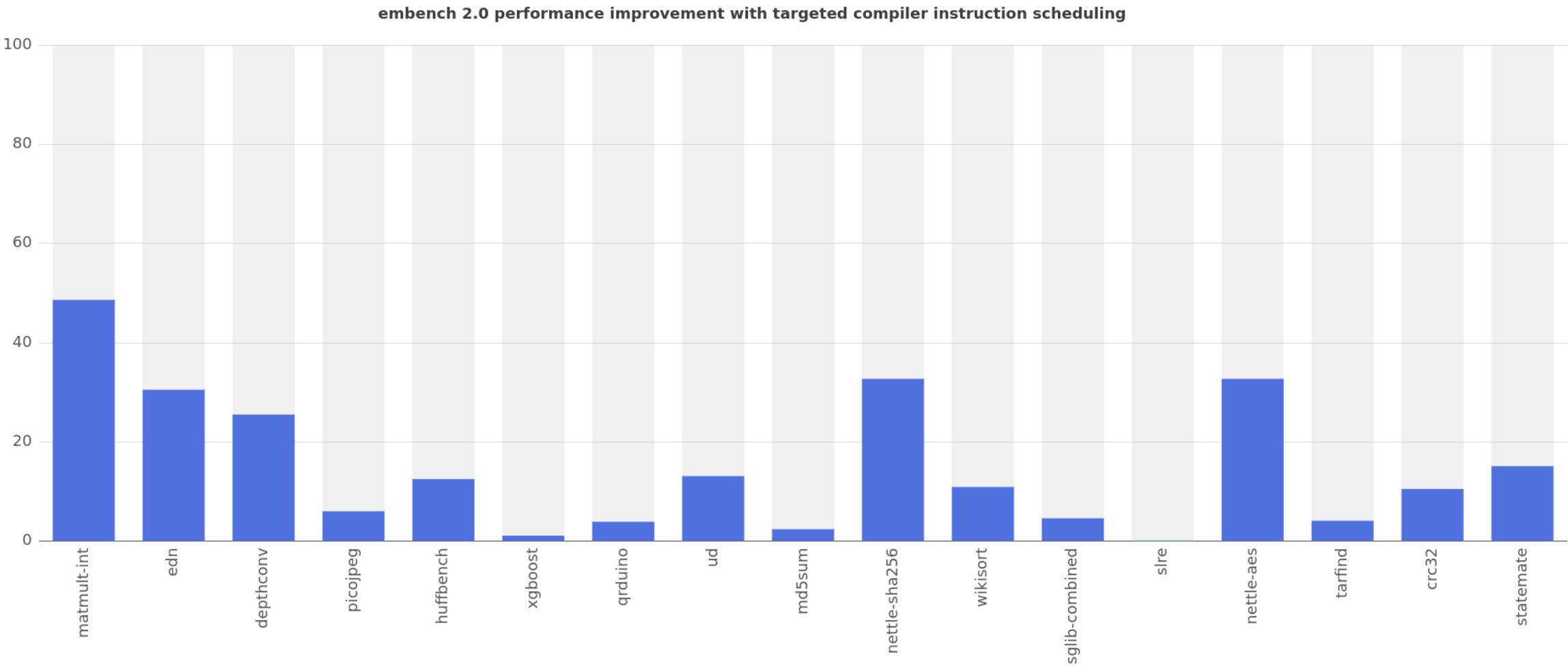
System architecture

ISA

Compiler

Can we use the hardware more effectively?

→ The Compiler



→ The Software

- **Optimise the software**
 - Common functions and libraries
 - It must be easy for people to use

Microarchitecture

System architecture

ISA

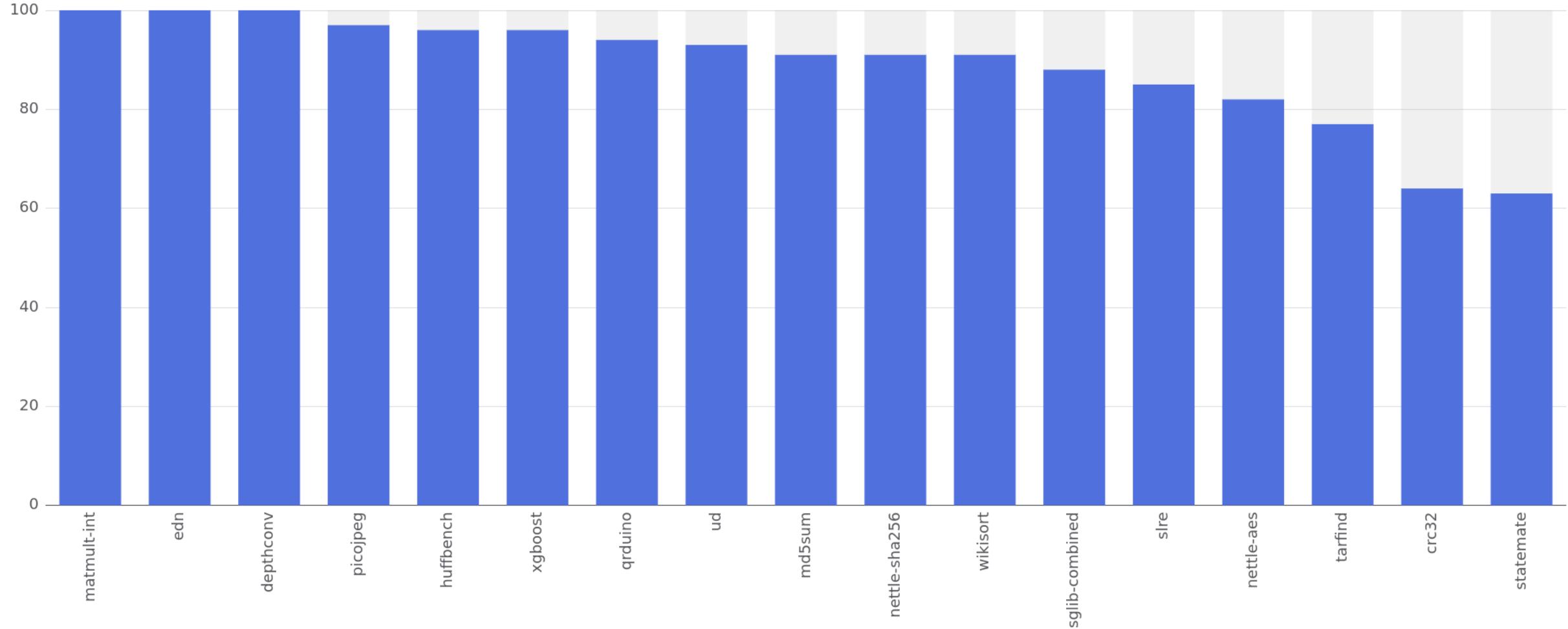
Compiler

Software

What can we remove from software when we have CHERI?

→ The Results

embench 2.0 purecap vs integer mode performance ratios



→ Change how we do things

- **Is modern hardware and software up to the job?**

And how can CHERI help ?

Microarchitecture

System architecture

ISA

Compiler

Software

Evolve



Thank you!

carl.shaw@codasip.com