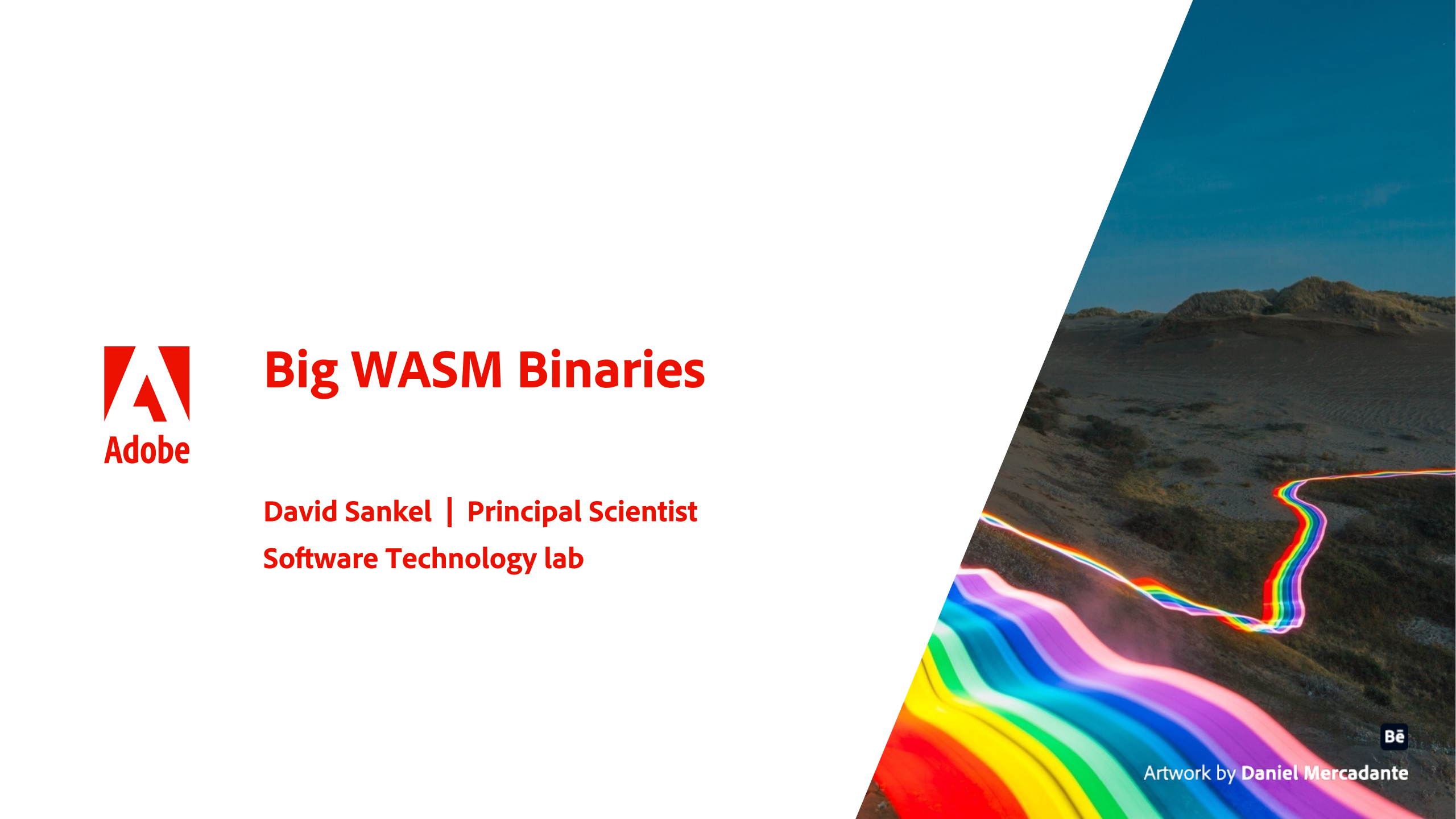
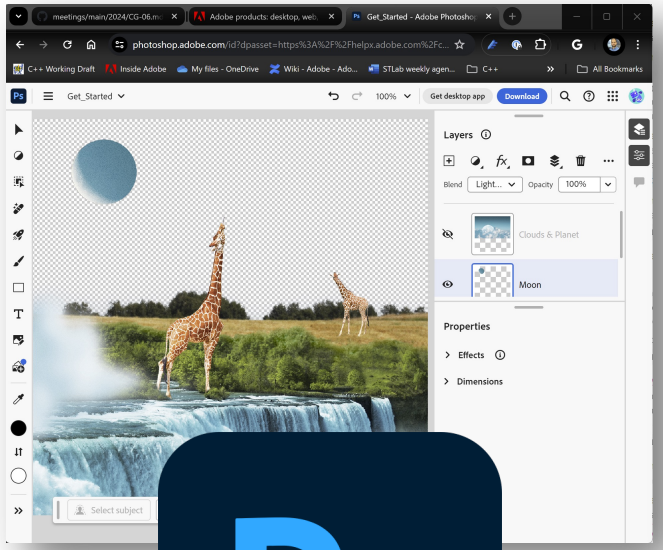

Adobe
Big WASM Binaries
David Sankel | Principal Scientist
Software Technology lab
Bē
Artwork by Daniel Mercadante

Photoshop



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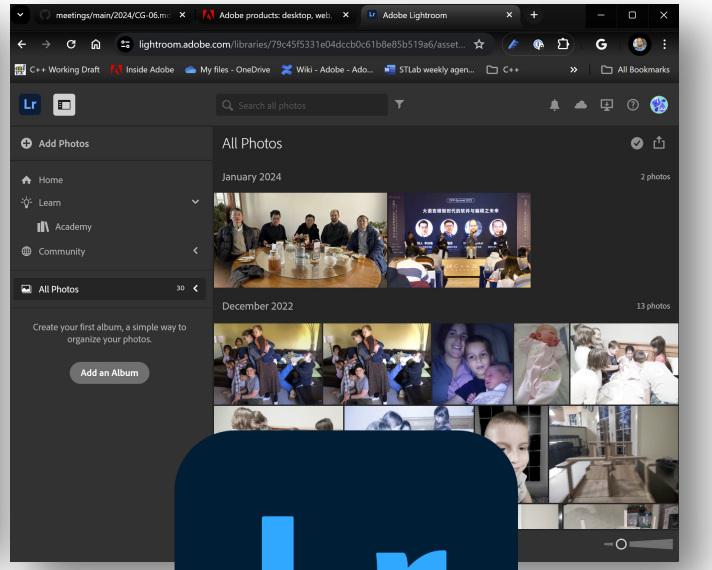
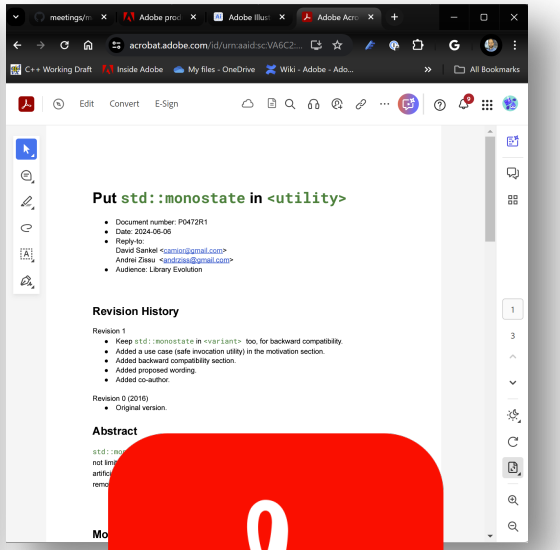
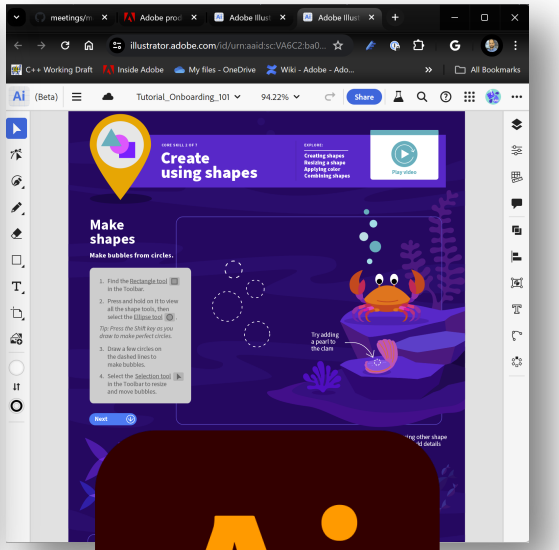
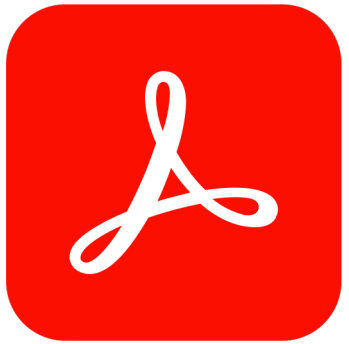


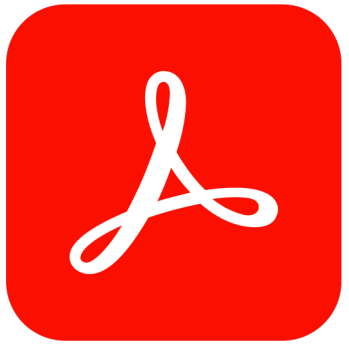
Acrobat



Illustrator





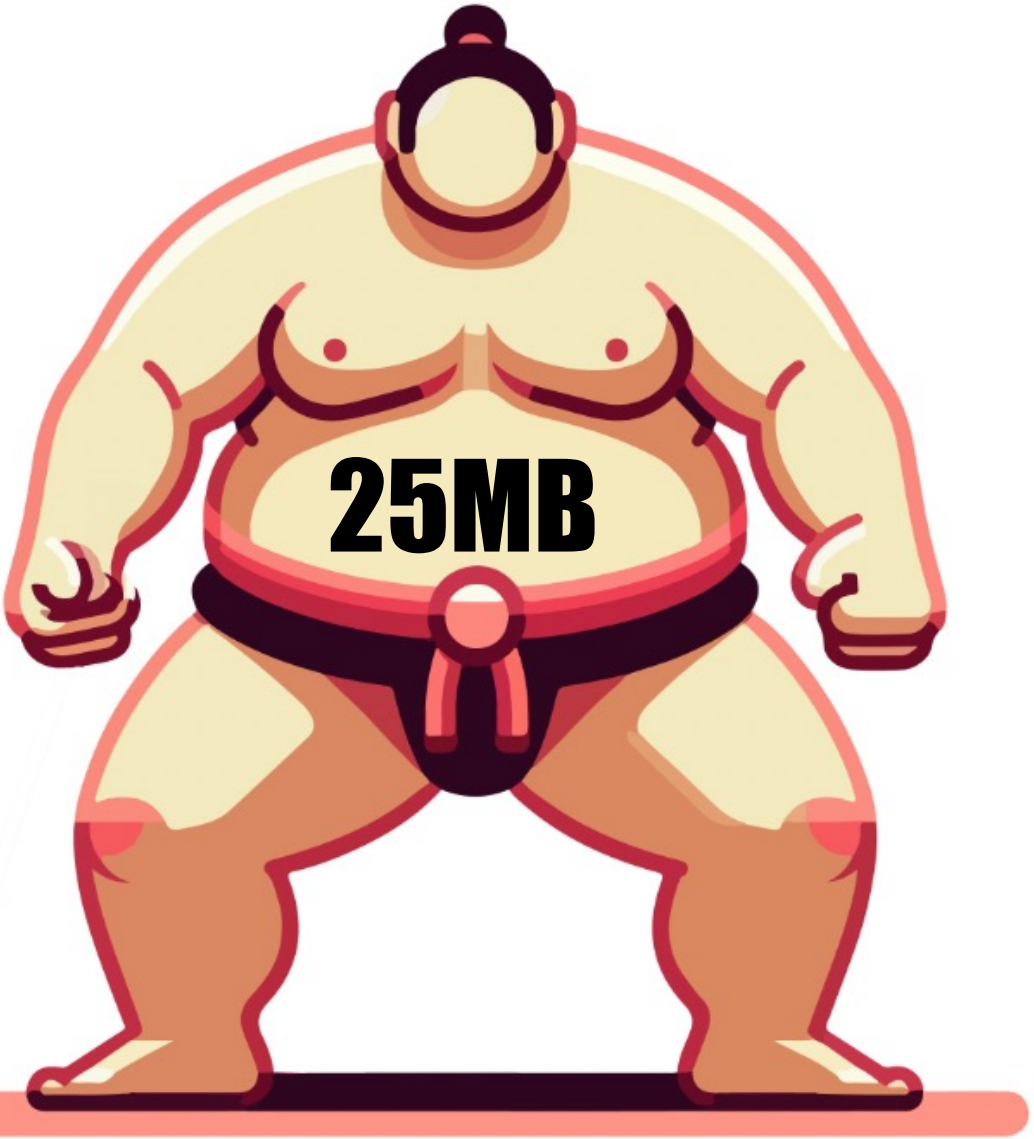




We put the *Web* back into *Web* Assembly

Our formula

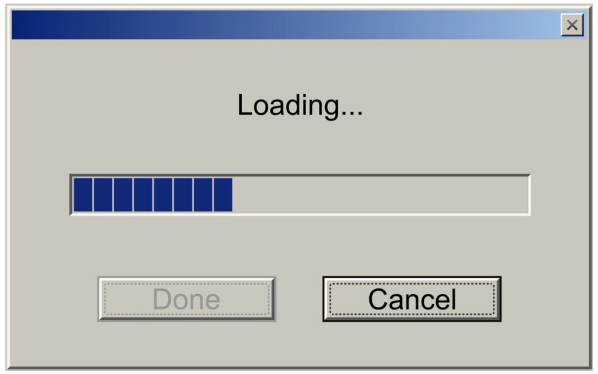
1. Collect the source code for our flagship applications
2. Compile to WASM and deploy to the Web
3. ???
4. Profit!!!

We’ve got a problem



Big WASM binaries

Well...



Long loading time

Implications…

- Users will either give up after waiting or not return due to bad experience
- We're missing out on providing value to our users

How do you get the "instant web" experience for 2GB+ desktop applications?

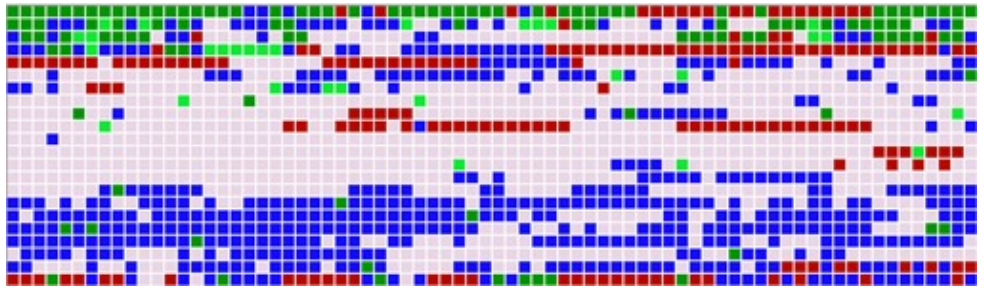
Three observations

- Hypothesis: most WASM code is never used
  - 30+ years of accumulation
  - A small fraction of capabilities is exposed
- We can collect massive usage data
  - Action recording
  - Images used
- Code analysis and transformation tooling exists
  - wasm-split and conventional code coverage profiling
  - Clang and Wasm-based code transformation libraries

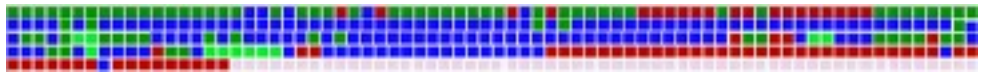
Basic idea: reduce the Wasm binary size

Step 1: Collect massive usage data in a way that can be replayed

Step 2: Replay the actions on an instrumented build that tracks code usage



Step 3: Use profile to automatically remove or sidecar unused code



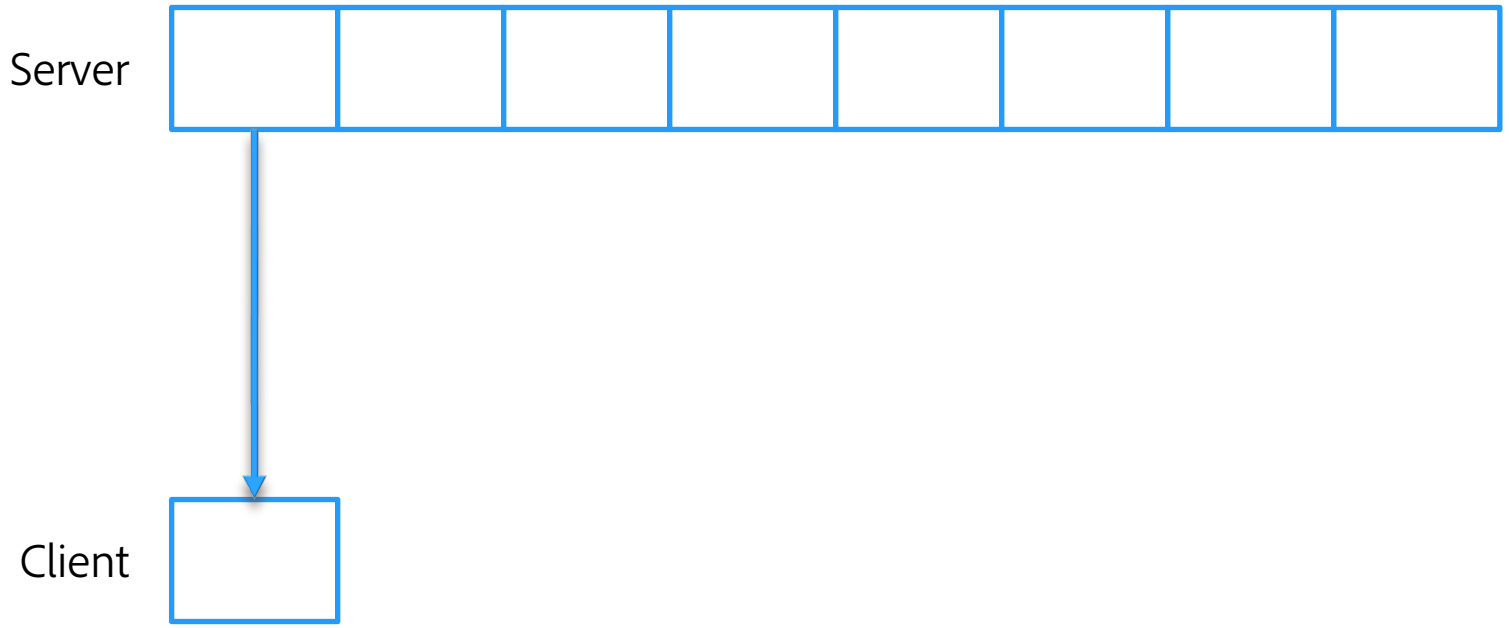
That's great, but…

- Splitting a binary in two is very coarse grained
- Function calls between binaries are heavy
- Threads cause problems
- It's intrusive

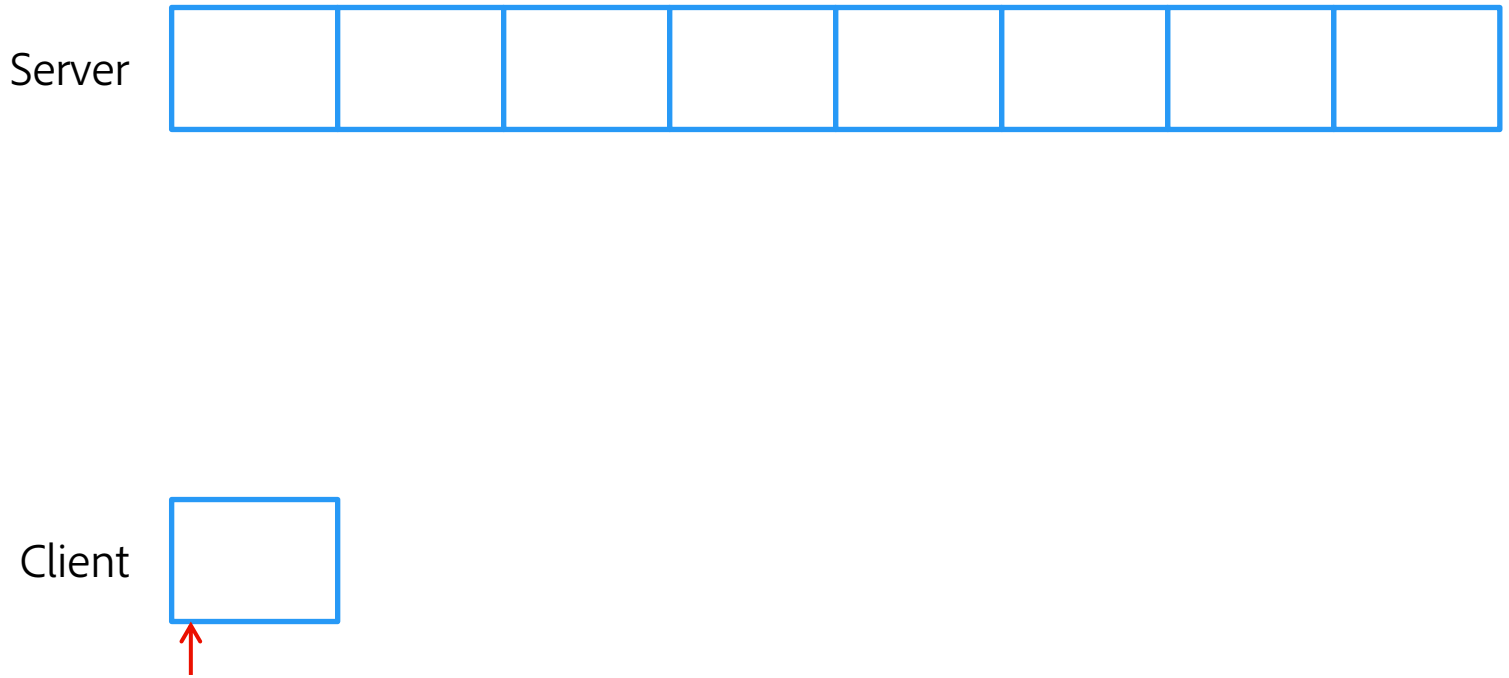
What about virtual memory?

Client

What about virtual memory?



What about virtual memory?



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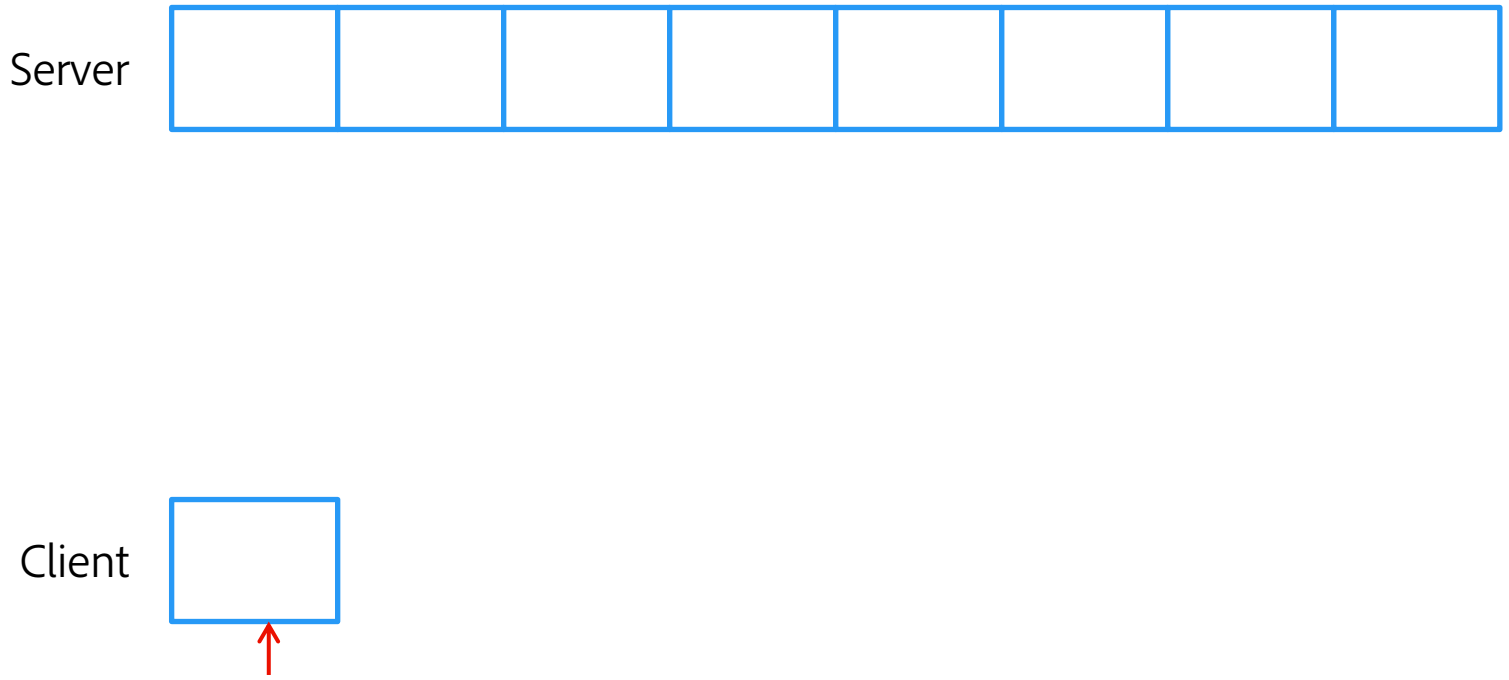

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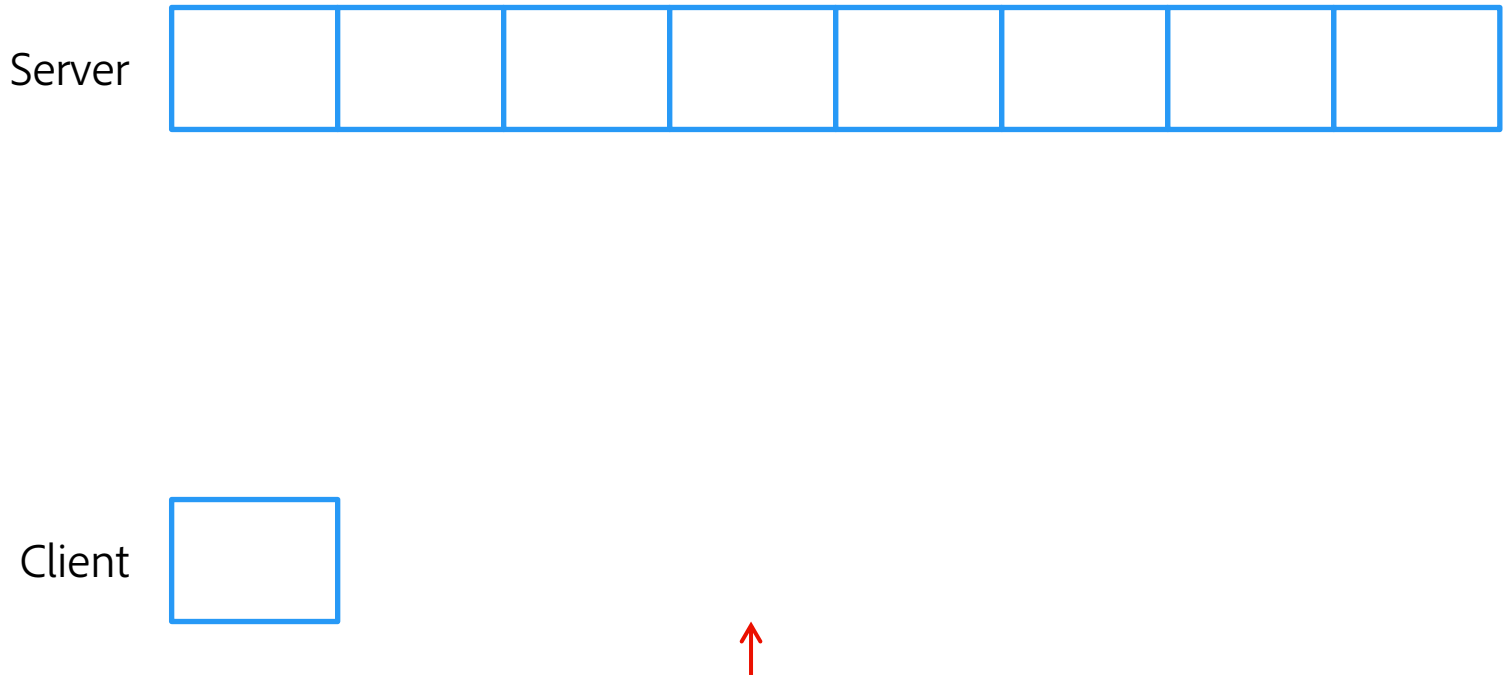

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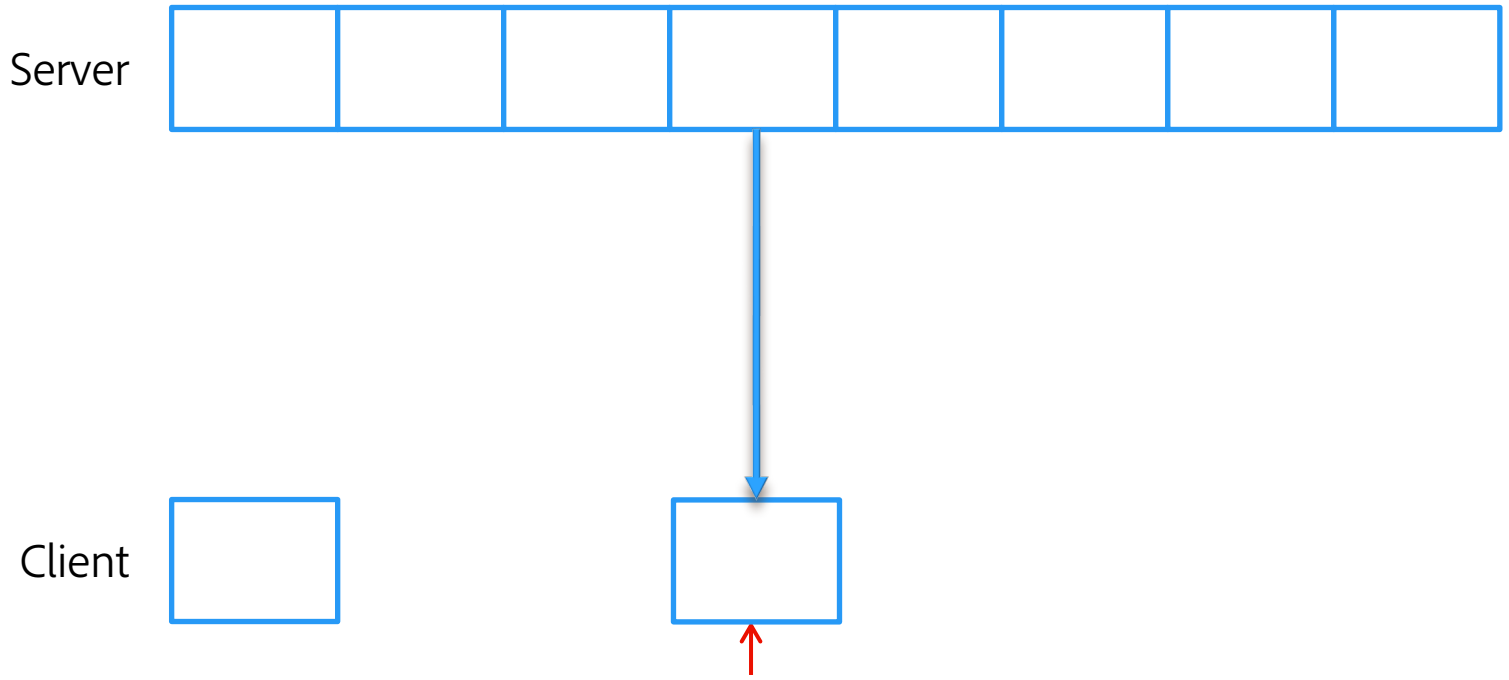

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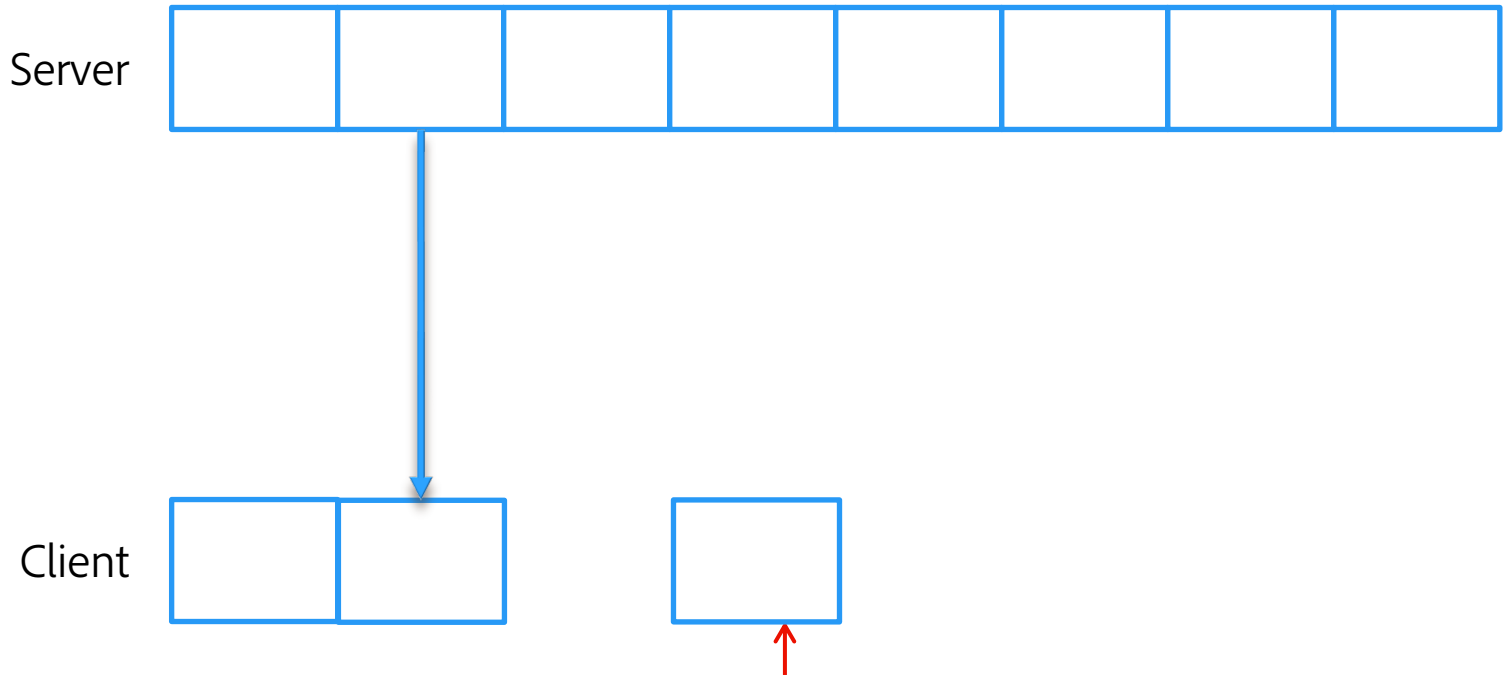

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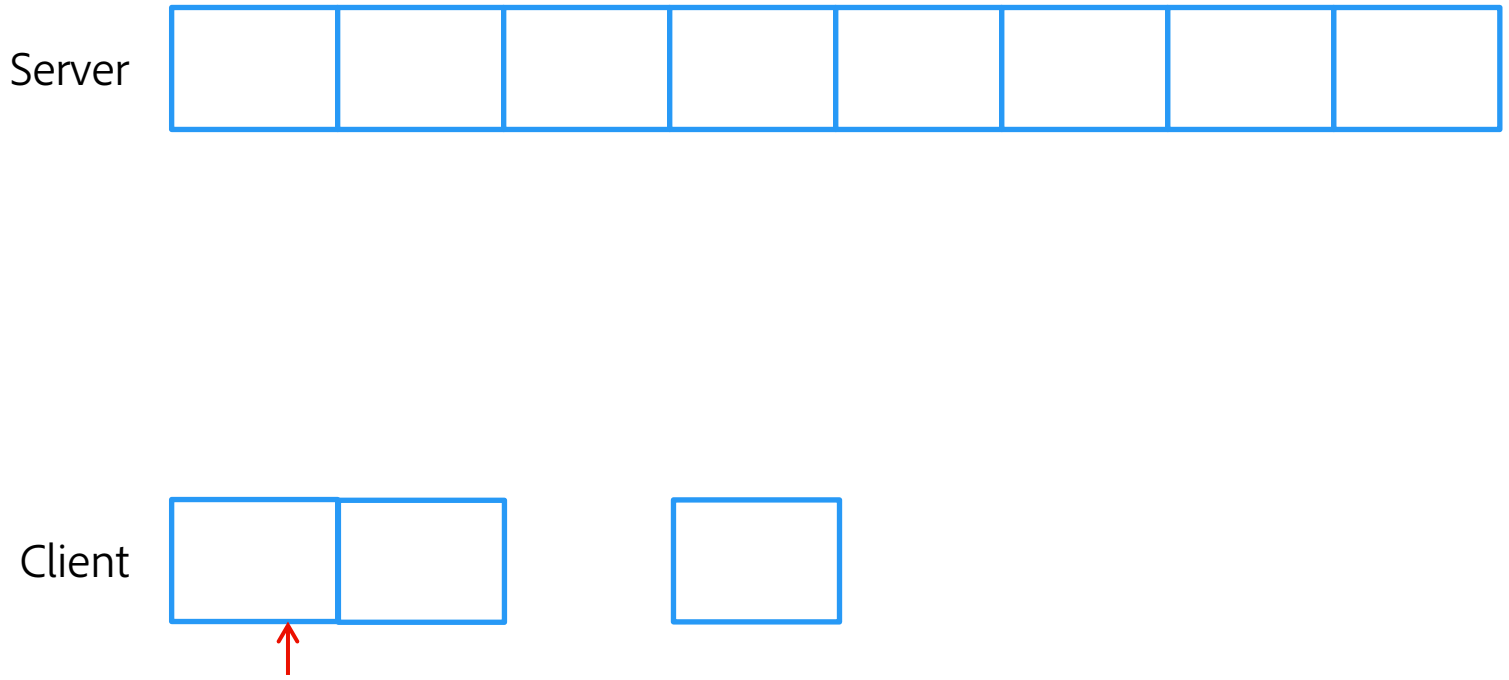

WASM virtual memory for instructions

- Non-intrusive
  - WASM code doesn't change, just how it is executed
  - Transparent to threads
- Fine grained
- Adaptive
  - Fetch based on usage pattern
  - Pre-fetch based on profile-based optimizations

How can we make this a reality?

(I have no idea)

Please help


Adobe
Bē
Artwork by Daniel Mercadante