

THE COST OF ABSTRACTIONS

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ONCE UPON A TIME...

A photograph of a high-speed train, specifically a Trenord train, stopped at a station platform. The train is white with green and blue accents. A sign above the platform reads "Lecco". In the background, there are mountains and trees. The overall scene is bright and sunny.

WHAT IS THE COST OF ABSTRACTIONS?



ehm...

[SLIDE PRESENTAZIONE MASSI]

[SLIDE PRESENTAZIONE GIANLUCA]



WHAT COST MEANS?

A cyclist in a green and white Speed Skinsuit is performing a wheelie on a track. The cyclist is leaning forward, holding onto the handlebars. The bicycle has "PINARELLO" and "SKY" written on it. The background is blurred, suggesting motion.

IT'S NOT ALL ABOUT PERFORMANCES

TYPESCRIPT

```
const processor: AsyncProcessor = async (
  orderId: string
): Promise<PlacedOrderResult> => {
  const order = await orderService(orderId)
  if (order == null) {
    return {
      success: false
    }
  }
  const validationResult = await validationService(order)
  if (!validationResult.valid) {
    return placedOrderFailed
  }
  return await placeOrderService(order)
}
```

JAVASCRIPT

```
const processor = async (orderId) => {
  const order = await orderService(orderId)
  if (order == null) {
    return {
      success: false
    }
  }
  const validationResult = await validationService(order)
  if (!validationResult.valid) {
    return placedOrderFailed
  }
  return await placeOrderService(order)
}
```

TYPESCRIPT

- > NO PERFORMANCE PENALTY

TYPESCRIPT

- > NO PERFORMANCE PENALTY
- > COGNITIVE OVERHEAD



PERFORMANCES MATTER

LET'S GO TO MEASURE

"BUY A BOOK" USE CASE

> CREATE AN ORDER OF BOOKS

"BUY A BOOK" USE CASE

- > CREATE AN ORDER OF BOOKS
- > VALIDATE THE ORDER

"BUY A BOOK" USE CASE

- > CREATE AN ORDER OF BOOKS
 - > VALIDATE THE ORDER
 - > PLACE THE ORDER

BENCHMARK

- > 'BUY A BOOK' USE CASE

BENCHMARK

- > 'BUY A BOOK' USE CASE
- > [XXX] ITERATIONS

BENCHMARK

- > 'BUY A BOOK' USE CASE
- > [XXX] ITERATIONS
- > [YYY]% OF FAILURE ORDERS

[SLIDE WITH QR CODE WHERE DOWNLOAD SLIDES&CODE]

A dynamic photograph of a runner in motion on a blue track. The runner's legs are extended forward, and their arms are pumping. They are wearing a dark singlet and shorts. In the background, there are yellow starting blocks with the word "SEIKO" printed on them, and a scoreboard with various numbers and names. The scene is set outdoors on a sunny day.

READY
STEADY
GO!

ASYNC TYPESCRIPT

```
const order = await orderService(orderId)
if (order == null) {
  return {
    success: false
  }
}
const validationResult = await validationService(order)
if (!validationResult.valid) {
  return placedOrderFailed
}
return await placeOrderService(order)
```

A photograph of a person's legs and feet as they climb a set of stone steps. The person is wearing blue jeans and grey sneakers with three dark stripes on the side. The steps are made of large, rectangular, reddish-brown stones. In the background, there are more stone structures and some green grass. The overall scene suggests a historical or archaeological site.

NEXT STEP

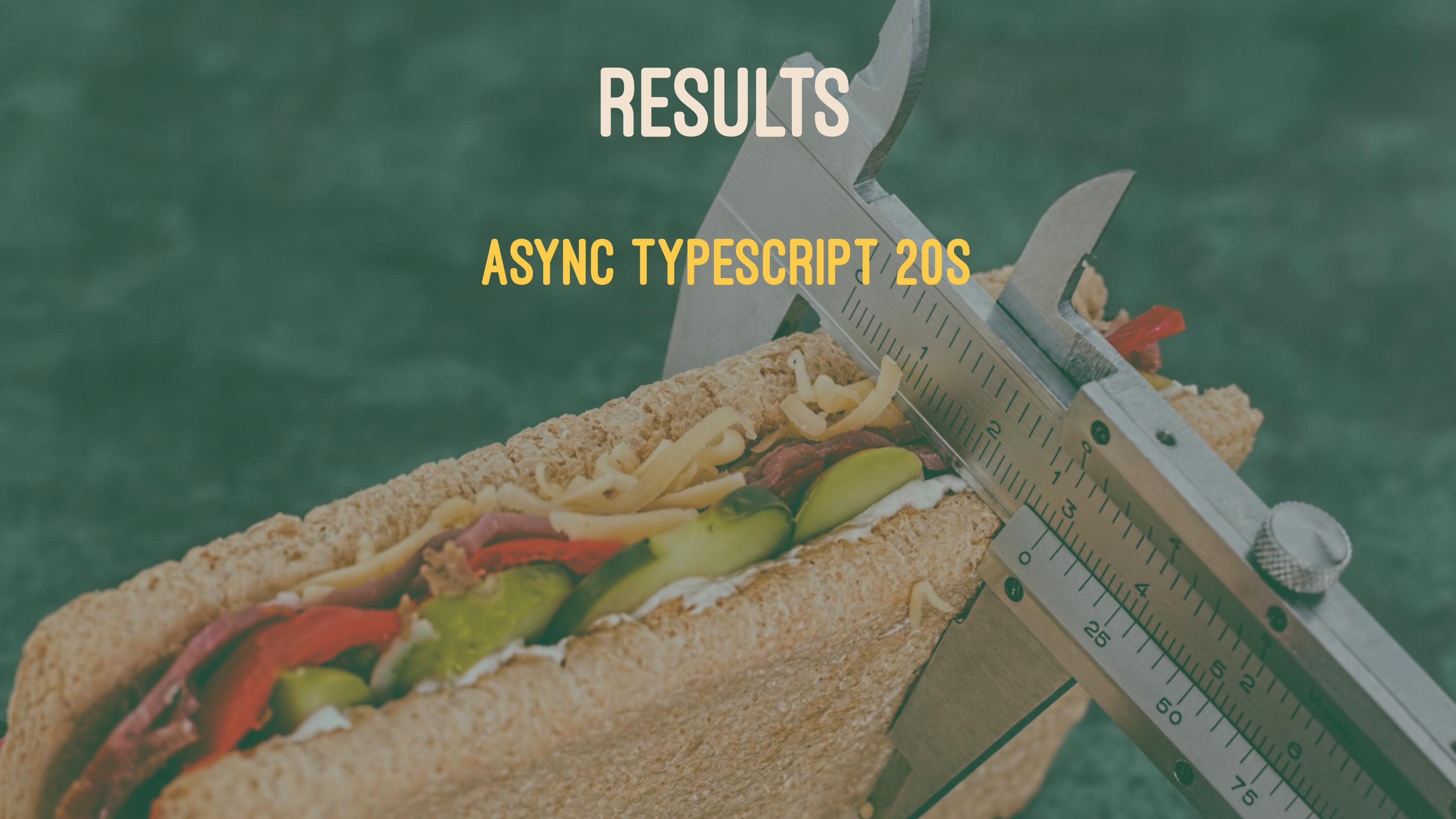
ADD AN ABSTRACTION LAYER (FP-TS)

FUNCTIONAL JAVASCRIPT

```
return pipe(  
    orderService(orderId),  
    chain(validationService),  
    chain(placeOrderService)  
)
```

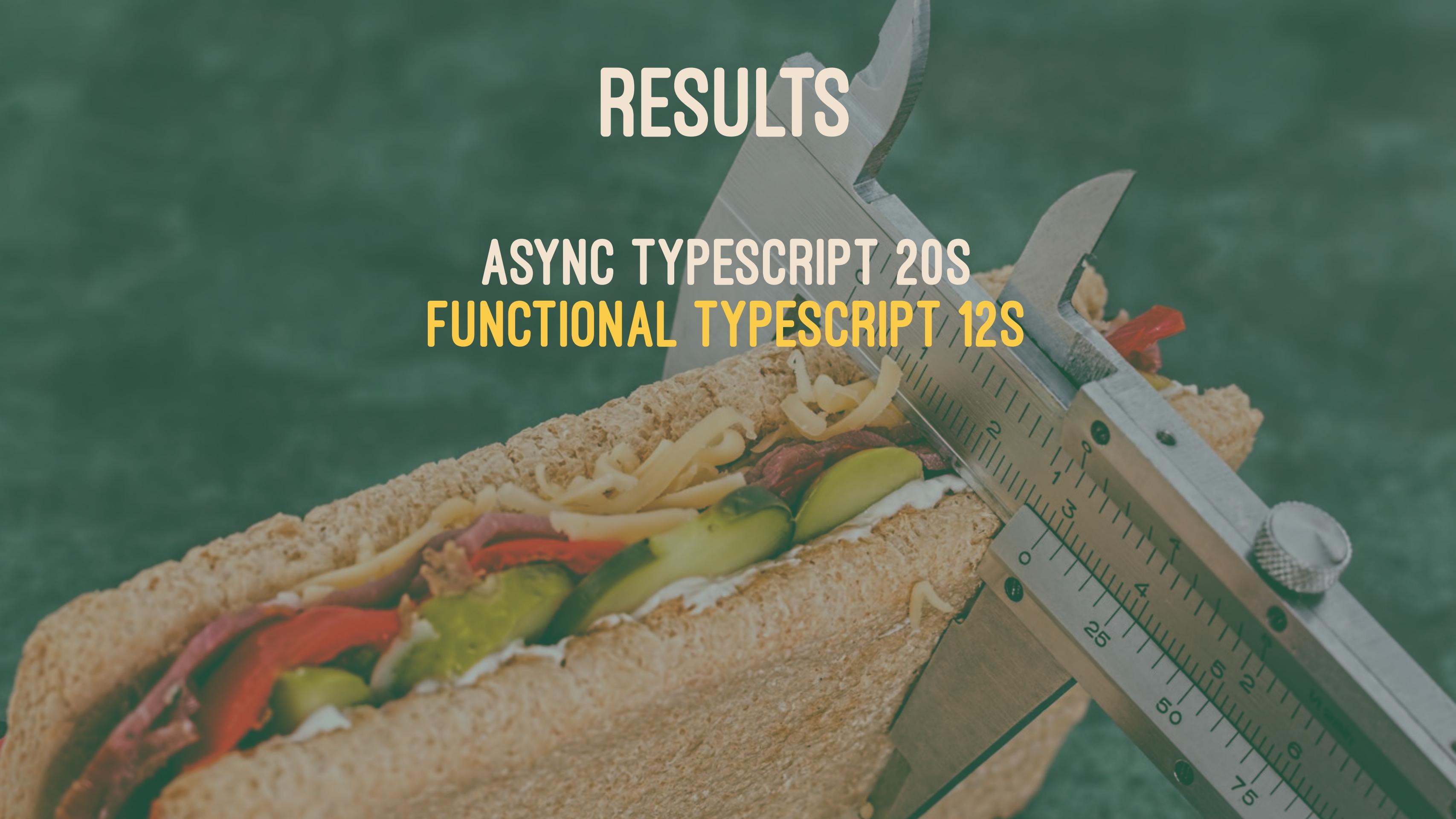
RESULTS

ASYNC TYPESCRIPT 20S



RESULTS

ASYNC TYPESCRIPT 20S
FUNCTIONAL TYPESCRIPT 12S



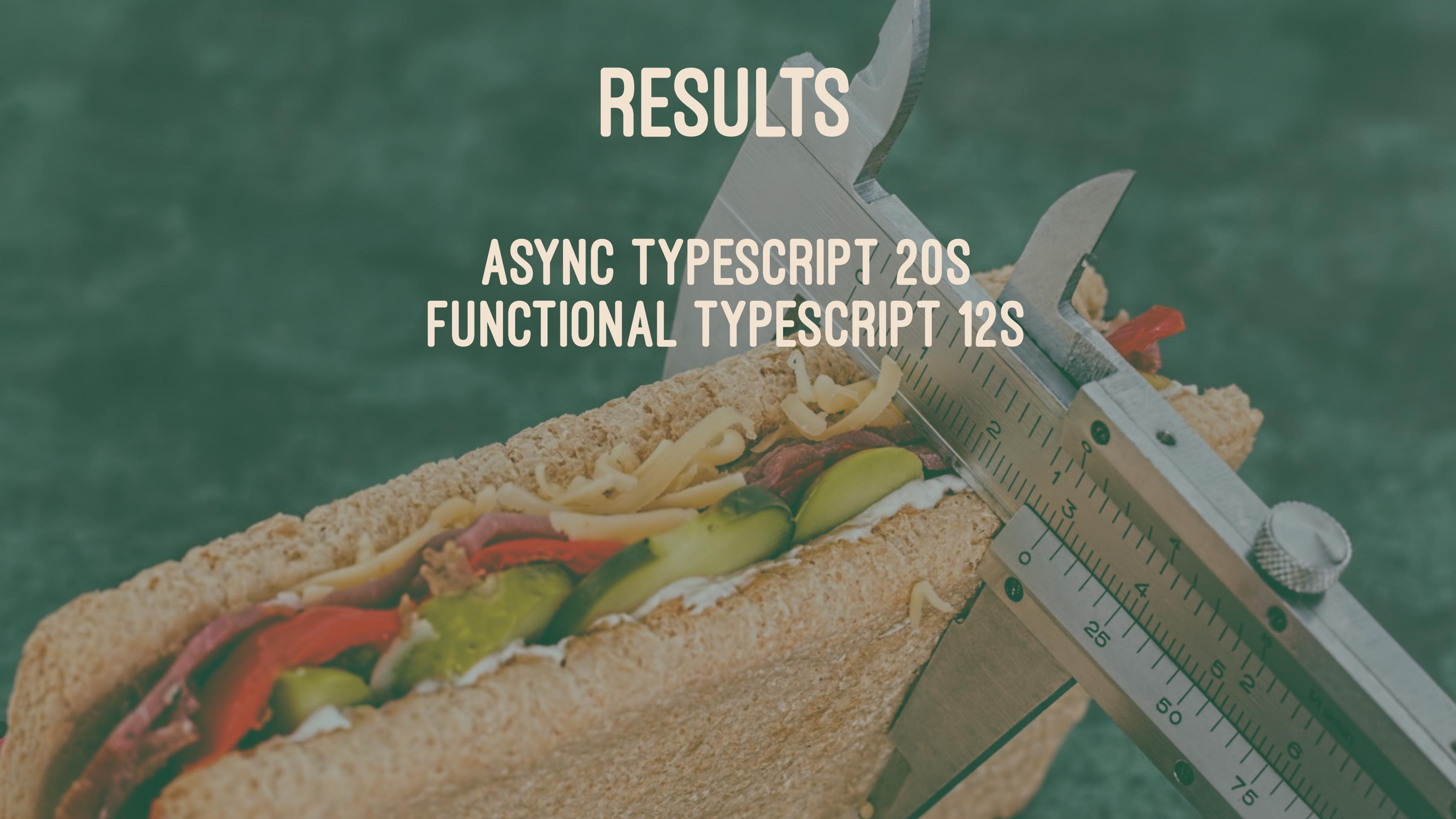
WTF

SOUNDS STRANGE

IS THIS SHIT?

RESULTS

ASYNC TYPESCRIPT 20S
FUNCTIONAL TYPESCRIPT 12S



RESULTS

ASYNC TARGET ES3 TYPESCRIPT 20S
FUNCTIONAL TYPESCRIPT 12S



RESULTS

ASYNC TARGET ES3 TYPESCRIPT 20S
ASYNC TARGET ES6 TYPESCRIPT 5S
FUNCTIONAL TYPESCRIPT 12S



LESSONS LEARNED

> SAME CODE COULD HAVE (HUGE) DIFFERENT PERFORMANCE

LESSONS LEARNED

-
- LESSONS LEARNED
- SAME CODE COULD HAVE (HUGE) DIFFERENT PERFORMANCE
 - CHECK DEFAULT COMPILER OPTIONS

A photograph of a person's legs and feet as they climb a set of ancient, weathered stone steps. The person is wearing blue jeans and light-colored sneakers with dark stripes. The steps are made of large, rectangular stones and lead up to a grassy area with more ancient structures in the background under a clear sky.

NEXT STEP

ENFORCE BUSINESS RULES AT COMPILE TIME

CHECKED FUNCTIONAL JAVASCRIPT

```
type NotValid = Left<Error>
type Valid<A> = Right<A>
type Validated<A> = Either<Error, A>

function validationService (o: Order): Validated<Order> {
  const r = validateOrder(order)
  if (r.valid) {
    return valid<Order>(order)
  } else {
    return notvalid(` ${r.error} `)
  }
}
```

CHECKED FUNCTIONAL JAVASCRIPT

```
function calculateAmountService (order: Valid<Order>) {
  return pipe(
    order.right.items.map(item =>
      pipe(
        bookService(item.bookId),
        map(b => b.price * item.quantity)
      )
    ),
    array.sequence(taskEither),
    map(amounts => {
      return amounts.reduce((a, b) => a + b, 0)
    })
  )
}

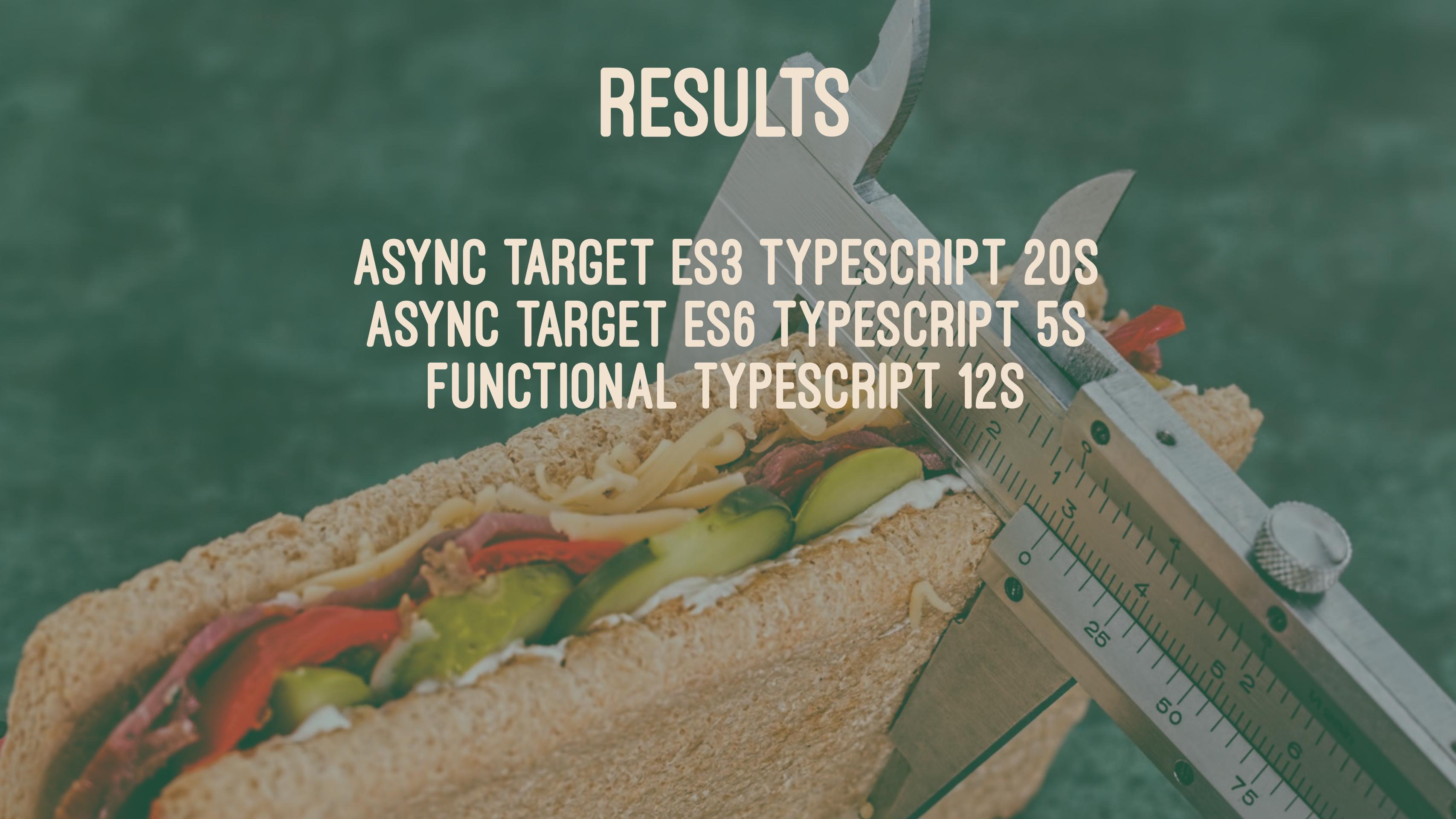
function placeOrderService (order: Valid<Order>) {
  return pipe(
    calculateAmountService(order),
    map(placedOrderSuccess)
  )
}
```

CHECKED FUNCTIONAL JAVASCRIPT

```
return pipe(  
  orderId,  
  orderService,  
  map(validationService),  
  chain(mapTask(placeOrderService))  
)
```

RESULTS

ASYNC TARGET ES3 TYPESCRIPT 20S
ASYNC TARGET ES6 TYPESCRIPT 5S
FUNCTIONAL TYPESCRIPT 12S



RESULTS

ASYNC TARGET ES3 TYPESCRIPT 20S

ASYNC TARGET ES6 TYPESCRIPT 5S

FUNCTIONAL TYPESCRIPT 12S

CHECKED FUNCTIONAL TYPESCRIPT 12.1S

RESULTS

- > NO PERFORMANCE PENALTY
- > COGNITIVE OVERHEAD



A close-up photograph of a man's face and upper body. He has a well-groomed beard and mustache, and is looking directly at the camera with a serious expression. He is wearing a long-sleeved plaid shirt. His hands are visible, holding a fan of playing cards. The cards are clearly visible, showing various suits and values, including hearts, diamonds, clubs, and spades. The background is dark and out of focus.

HOW CAN ACHIEVE
THE BEST OF
THE TWO WORLD?

GRAHAM CHAPMAN · JOHN CLESE · TERRY GILLIAM · ERIC IDLE · TERRY JONES · MICHAEL PALIN

MONTY PYTHON'S
**AND NOW FOR
SOMETHING
COMPLETELY
DIFFERENT**



A photograph of a person's legs and feet walking up a set of ancient stone steps. The person is wearing blue jeans and grey sneakers with three dark stripes. The steps are made of large, rectangular stones. In the background, there are more stone structures and some green grass. The overall atmosphere is historical and architectural.

NEXT STEP

CHANGE LANGUAGE

The **Rust** programming language



Jump to: [Rust and the future of systems programming](#) [Unlocking the power of parallel](#)

[Safe systems programming with Rust](#) [Growing the Rust community](#) [Putting Rust into p](#)



☞ Rust is a new open-source systems programming language created by Mozilla and a community of volunteers, designed to help developers create fast, secure applications which take full advantage of the powerful features of modern multi-core processors. It prevents segmentation faults and guarantees thread safety, all with an easy-to-learn syntax.

In addition, **Rust offers zero-cost abstractions**, move semantics, guaranteed memory safety, threads with no data races, trait-based generics, pattern matching, type inference, and efficient C bindings, with a minimum runtime size.

overhead



To learn more about Rust, you can:

- Watch the videos below for a closer look at the power and benefits Rust provides.
- Read the book ☞ *The Rust Programming Language* online.
- Download the Rust compiler, check out examples, and learn everything you could

[TBD]

[TBD]

RESULT

ASYNC TARGET ES3 TYPESCRIPT 20S
ASYNC TARGET ES6 TYPESCRIPT 5S
FUNCTIONAL TYPESCRIPT 12S
CHECKED FUNCTIONAL TYPESCRIPT 12.1S

RESULT

ASYNC TARGET ES3 TYPESCRIPT 20S

ASYNC TARGET ES6 TYPESCRIPT 5S

FUNCTIONAL TYPESCRIPT 12S

CHECKED FUNCTIONAL TYPESCRIPT 12.1S

RUST NATIVE [X]S

SAMSUNG

www.google.pl/?gfe_rd=cr&ei=uU1RV7_nJ8av8wf78Z3QDA

Google
Poison

WHAT ABOUT THE WEB?

A photograph of a person's legs and feet as they climb up a set of large, weathered stone steps. The person is wearing blue jeans, white socks, and light-colored sneakers with dark stripes. In the background, the tiered stone structures of an ancient temple complex are visible under a clear sky.

NEXT STEP

WEBASSEMBLY (SAME CODE BASE DIFFERENT HOST)

RESULT

ASYNC TARGET ES3 TYPESCRIPT 20S

ASYNC TARGET ES6 TYPESCRIPT 5S

FUNCTIONAL TYPESCRIPT 12S

CHECKED FUNCTIONAL TYPESCRIPT 12.1S

RUST NATIVE [X]S

RESULT

ASYNC TARGET ES3 TYPESCRIPT 20S

ASYNC TARGET ES6 TYPESCRIPT 5S

FUNCTIONAL TYPESCRIPT 12S

CHECKED FUNCTIONAL TYPESCRIPT 12.1S

RUST NATIVE [X]S

RUST WASM [Y]S

[VOGLIAMO SOFTWARE MIGLIORE]

[MA COSA SIGNIFICA MIGLIORE?]

]**PROFIT = REVENUE * TIME^{TO}MARKET - COST**

TIME TO MARKET: [0...1]

MIGLIORE PROFIT MASSIMO]

[COME LO MASSIMIZZIAMO?]

[PERFORMANCE VS MANTENIBILITÀ]

[POSSIAMO OTTENERE ENTRAMBE?]

[NO PERCHÈ OGNI ASTRAZIONE INCIDE POSITIVAMENTE O SULLE
PERFORMANCE O SULLA MANTENIBILITÀ. NON SU ENTRAMBE]

ONE MORE THING

[COME INCIDE L'OVERHEAD COGNITIVO? [

