DART

Lars Bak & Gilad Bracha

DART: A STRUCTURED WEB PROGRAMMING LANGUAGE

- *New programming language*
- *New programming tools*
- *New open source project*

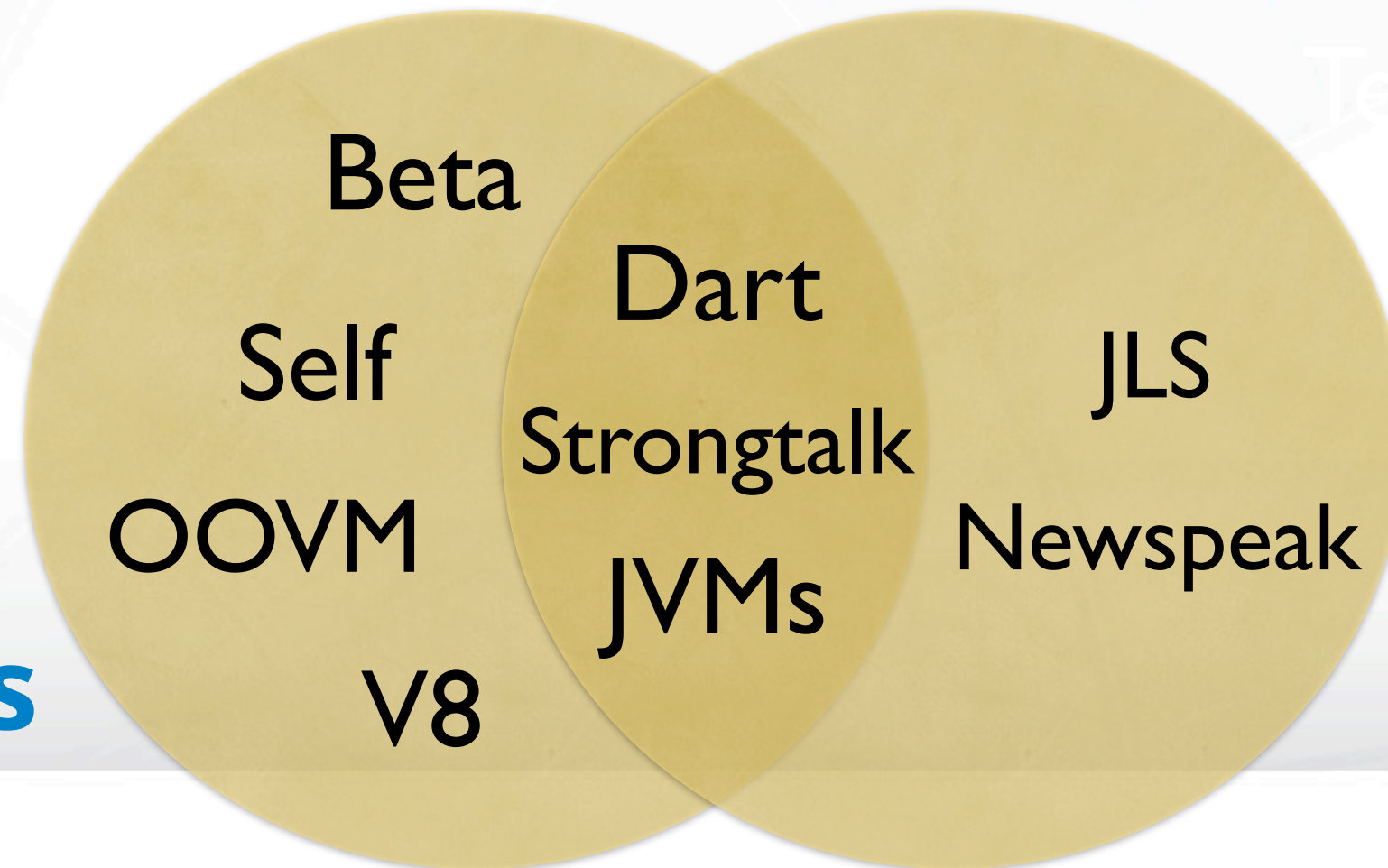# WARNING: THIS IS ONLY A TECHNOLOGY PREVIEW

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SPEAKER INTRODUCTION

Lars Bak

Gilad Bracha

Beta

Self

OOVM

V8

Dart

Strongtalk

JVMs

JLS

Newspeak

25 years

25 years

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DART AGENDA

- *The motivation*

- *The language*

- *Code samples*

- *Demos*

- *The open source project*

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CURRENT WEB: THE GOOD PARTS

- *Developing small applications is easy*
  - *Platform independence*
  - *No installation of applications*
  - *Supports incremental development*
  - *... and it is everywhere*

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CURRENT WEB: THE BAD PARTS

- *Developing large scale applications is hard*
  - *Hard to find the program structure*
  - *Lack of static types*
  - *No support for libraries*
  - *Tools support is weak*
  - *Startup performance is bad*

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INNOVATION IS ESSENTIAL

- *We believe Dart fills a vacuum*

- *The competition is NOT JavaScript*

- *... but fragmented mobile platforms*

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HISTORY BEHIND DART

I'm Kasper

- *After several years working on V8 for Chrome*

- *Last year, Kasper Lund & I experimented with Spot*

  - *a new simple language for the web*

  - *based on the experiences from JavaScript*

- *Spot was the prelude for the Dart project*

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SO WHAT IS DART?

- *A simple and unsurprising OO programming language*
  - *Class-based single inheritance with interfaces*
  - *Optional static types*
  - *Real lexical scoping*
  - *Single-threaded*
  - *Familiar syntax*

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A DIFFERENT TYPE-CHECKER

- *A conventional type-checker is a lobotomized theorem prover*

  - *Tries to prove program obeys type system*

  - *If it can't construct a proof - program is considered invalid "Guilty until proven innocent"*

- *In Dart, you are **innocent until proven guilty***

DART TYPES AT RUNTIME

- *During development one can choose to validate types*

  - `T x = o;` ⟶ `assert(o === null || o is T);`

- *By default, type annotations have no effect and no cost*

- *Code runs free*

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OPTIONAL TYPES

- *Static checker provides warnings; tuned to be unobtrusive*

- *Type annotations have no effect except ...*

- *During development, you can check dynamic types against declarations*

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ISOLATES

- *Inspired by Erlang, Dart has isolates*

- *Lightweight units of execution*

  - *Each isolate is conceptually a process*

  - *Nothing is shared*

  - *All communication takes place via message passing*

- *Isolates support concurrent execution*
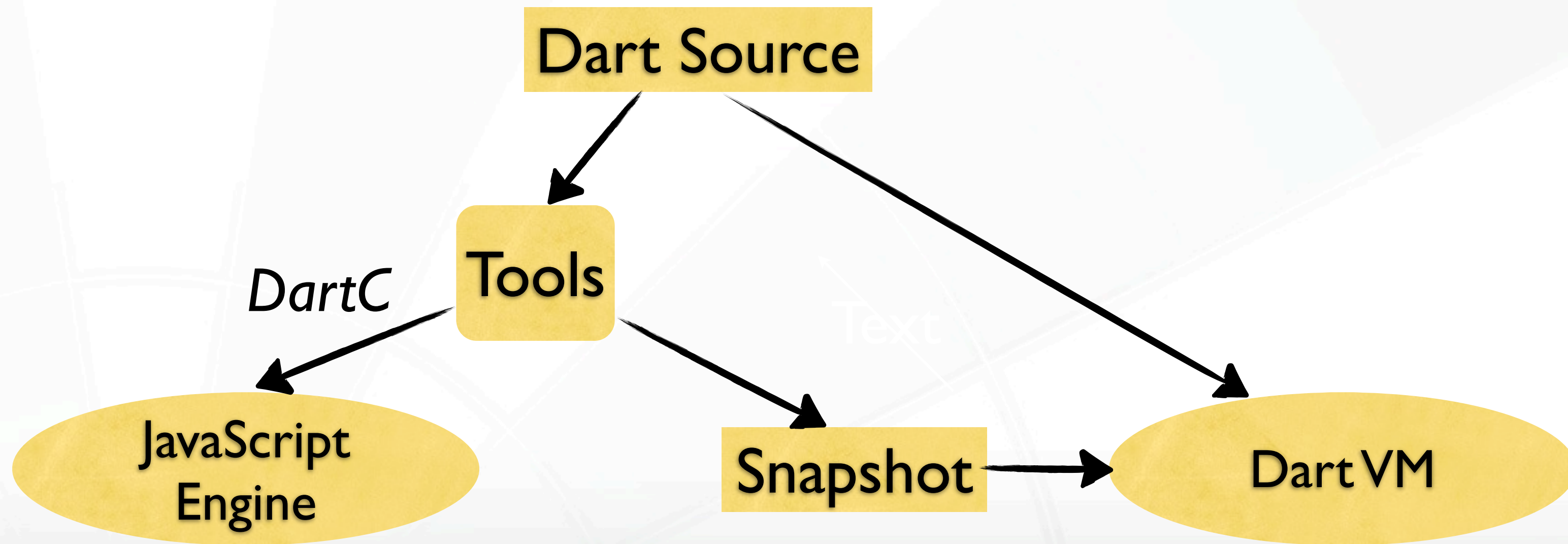
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DART IS NOT DONE

- *Reflection support?*

- *Rest arguments and enums?*

- *Pattern matching for easy message decoding like in Erlang?*

- *What about Chrome?*

- *... please give feedback by joining the discussions*

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DART EXECUTION

DART PERFORMANCE

```
        Relative performance compared to JavaScript on V8
Benchmark              VM      DartC
Mandelbrot:          18.2%    88.7%
DeltaBlue:           56.6%    52.2%
Richards:            46.0%    70.9%
NBody:               35.8%    63.6%
BinaryTrees:         77.3%   104.3%
Fannkuch:            53.8%    22.3%
Meteor:              50.3%    42.1%

Details:
  - V8 revision 3.5.5.
  - DartC used with the -optimize flag
```

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SNAPSHOTTING IN THE DART VM

- *Process of serializing the heap after loading the application*

- *Loading 54173 lines of Dart code takes 640 ms*

- *Loading same application from a snapshot takes 60 ms*

- *Startup > 10x faster*

WEB APPLICATION IN DART

- *Newsreader completely written in Dart*

- *App code: 3210 LOC*

- *UI library code: 13200 LOC*

- *Animation yields 30 fps*

- *Code is part of the open source project*

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DART EDITOR

- *Editor for constructing and browsing Dart applications*

- *Lightweight editor based on Eclipse components*

- *Code is part of the open source project*

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DART OPEN SOURCE PROJECT

- *The Dart web site: http://dartlang.org*

  - *Dart language specification*

  - *Dart language tutorial*

- *The Dart project: http://dart.googlecode.com*

  - *Libraries and code samples*

  - *Dart virtual machine*

  - *Dart to JavaScript compiler*

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DART IS A TECHNOLOGY PREVIEW

- *Dart: a programming language for the web*
  - *Two execution modes, Dart VM or JS Engine*
  - *Compatible with the current web*
- *Please try it out and participate*

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Q & A

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