

Stencil

A build time approach to the Web



Manu Mtz.-Almeida

Senior Software Engineer on the
Ionic Framework Team

 @manucorporat

 @manucorporat

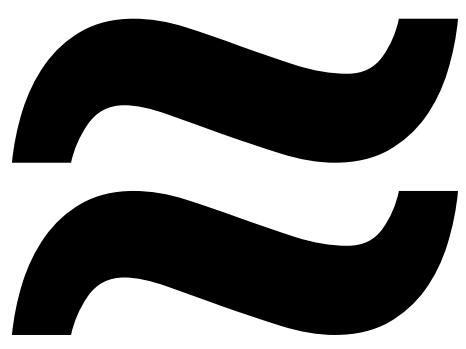


Based on a true story.

12 years ago



jQuery

The jQuery logo consists of the word "jQuery" in a dark navy blue, italicized sans-serif font. Above the letter "j", there are four interlocking blue crescent shapes.

JS

The JS logo features the letters "JS" in a large, bold, black sans-serif font. It is set against a solid yellow rectangular background.



codiqa

Saving... Welcome, Rio | Dashboard | Log out

d.school

Theme Device Size Rotate Device Design Preview Inspector

Pages Components

Page Header Page Footer Tab Bar

Nav Bar Button Text Link

Map H1 H2 H3 Heading Text

Image Collapsible Grid

<form> Form Control Text Input

List View Search Text Area Toggle Switch

LIST VIEW

Items

- + Divider
- Button

Text

Button

Link to page: Home

Link transition: Slide

Theme C (default: Gi)

Count Bubble Text

Delete button

New button

New divider

Id

The screenshot shows the codiqa mobile application builder interface. The top navigation bar includes 'Welcome, Rio', 'Dashboard', and 'Log out'. Below it, the page title is 'd.school'. The main area features a smartphone mockup displaying a website with a blue header and a group of people working at a table. To the left is a sidebar with categories like 'Pages' and 'Components', and specific icons for 'Page Header', 'Nav Bar', 'Map', 'Image', etc. On the right, a 'LIST VIEW' panel lists components with their details. A 'Button' component is currently selected, showing options for text, link, theme, and transitions.

Some years later...





DIRECTIVES







ionic

A close-up portrait of a woman with long, wavy brown hair and dark-rimmed glasses. She is wearing a dark-colored top with a small, thin necklace featuring a single circular pendant. The background is a solid, muted purple.

Angular 2!!

A close-up portrait of a woman with long, wavy brown hair and dark-rimmed glasses. She is wearing a dark-colored top with a small, thin necklace featuring a single circular pendant. The background is a solid, muted purple.

Angular 2!!



Ember

Vue

React

Preact

Polymer

 ionic vue ionic react ionic _____





Frameworks

- 👍 Great for final products
- 👎 Not great for reusable components

Web Components



HTML <template>	26	13	22	8
Shadow DOM	53	Beta	63	10.1
Custom Elements	54	Beta	63	10.1
ES Modules	61	16	60	10.1



Problem:
WC is a low level API.

Solution:

Create an abstraction.

New Problem:
Overhead.

Unless...
Build-time abstraction!

Stencil

A Build-time Abstraction

Highly optimized components

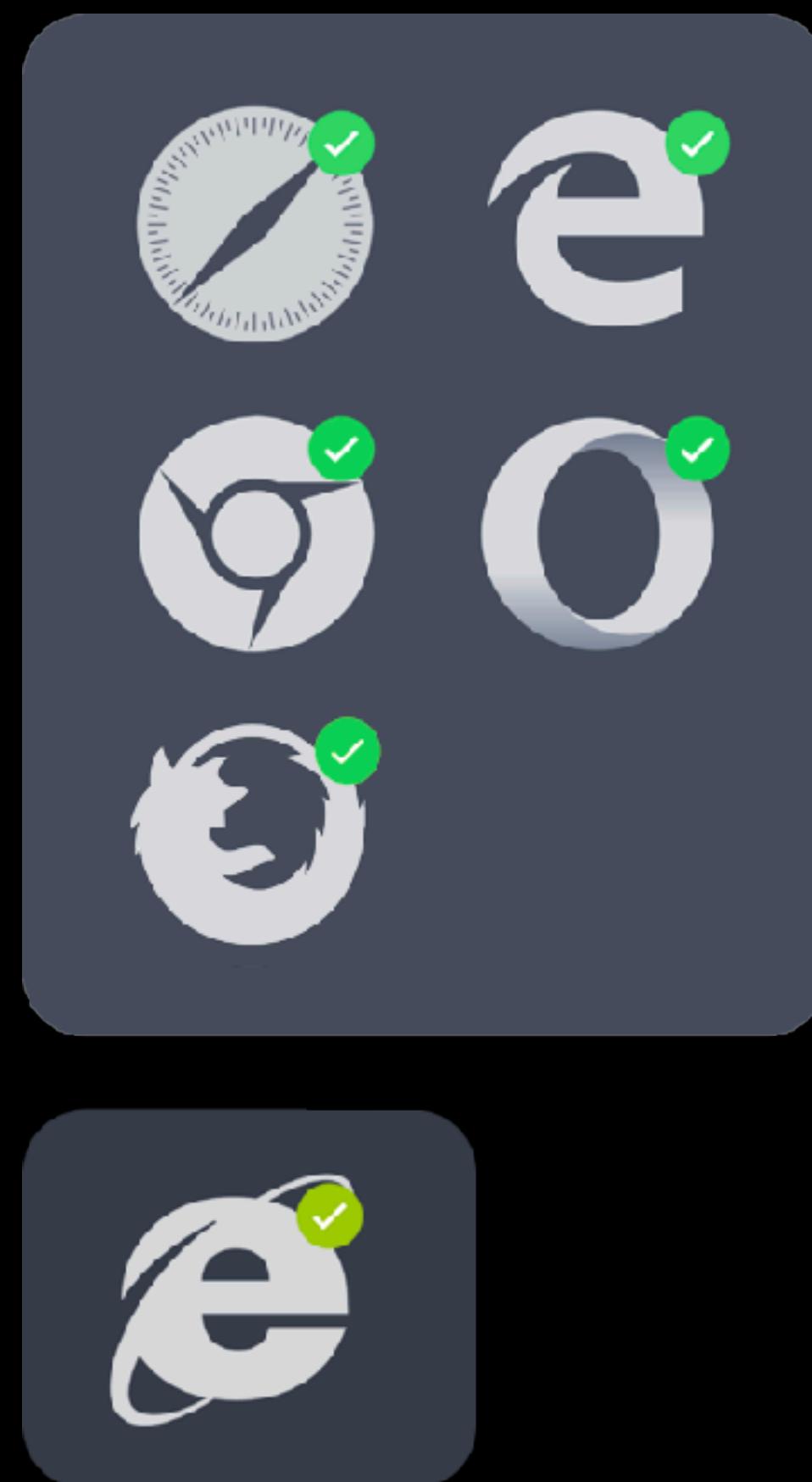
No breaking changes

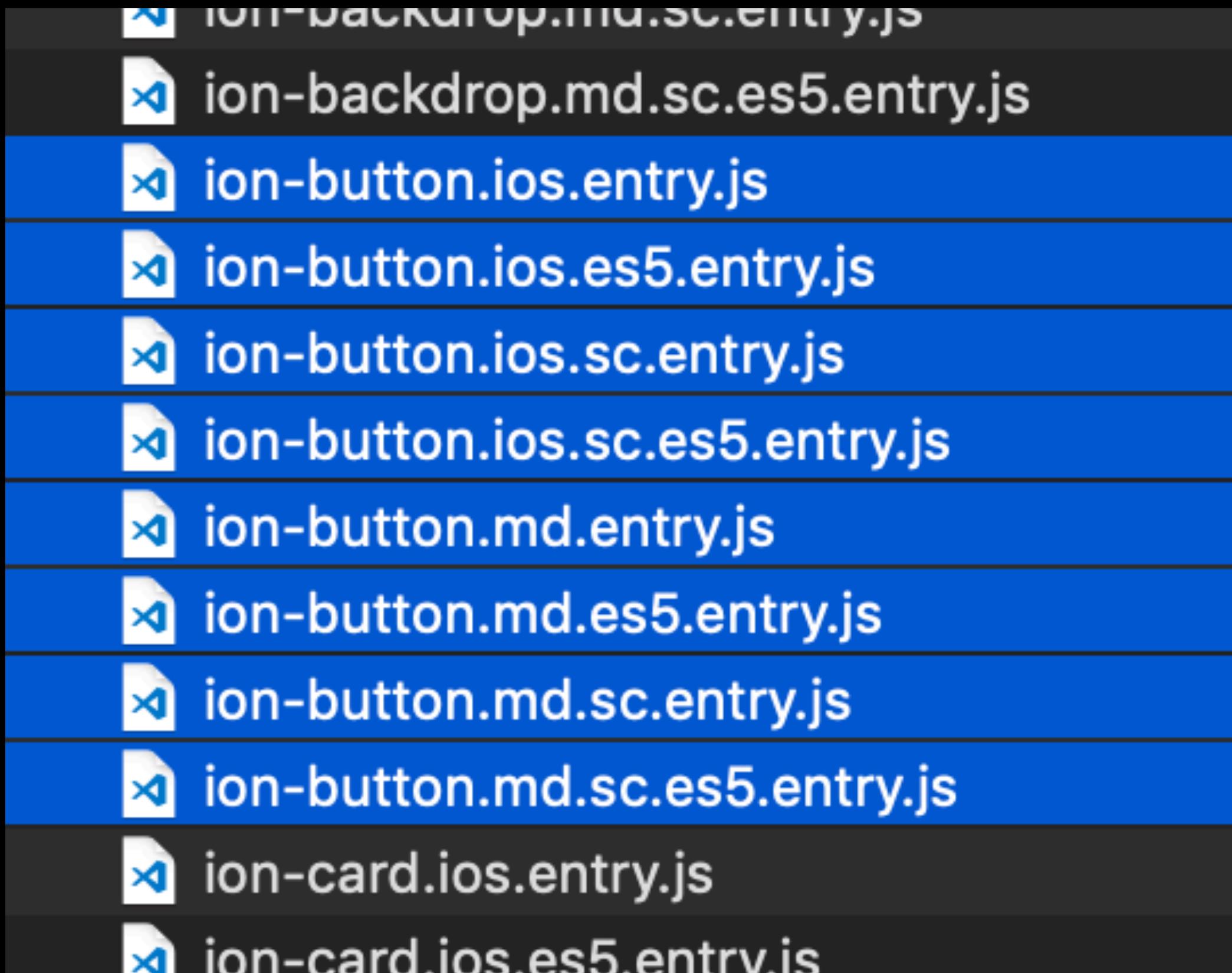
Zero dependencies

Wide browser support

Differential Builds

- Modern browsers
 - ES Modules nativos
 - No polyfills
- Legacy
 - System
 - Polyfills





- Build with iOS and MD styles
- Build in ESM (modern)
- Build in ES5 (legacy, IE11)
- Build SC: browser that doesn't support native shadow-dom

Hot Module Replacement

Service Worker generation

Deep TS integration

Prerendering



Fast incremental builds

Familiar API

Docs generation

Visual-diff testing

E2E testing

Docs generation

The screenshot shows the Ionic Framework documentation for the 'ion-radio' component. At the top, there's a code editor window displaying a configuration file:

```
export const config = {
  outputTargets: [
    {
      type: 'docs',
    }
  ],
};
```

Below the code editor is the main content area for the 'ion-radio' component. It features a title 'ion-radio' and a sidebar with navigation links: CONTENTS, Usage, Properties, Events, and CSS Custom Properties. The main content area contains two sections: 'Usage' and 'Events'. The 'Usage' section includes a paragraph about radios being used as groups or alone, and a detailed explanation of the 'ion-radio-group' behavior. The 'Events' section lists 'Checked', 'Disabled', 'Print', and 'Color' events.

On the right side of the content area, there's a screenshot of a mobile device displaying a radio button interface. The device screen shows a 'Radio' section with three groups: 'Fruits (Group w/ values)', 'Extra Pizza Topping (Group w/ no values)', and 'Veggies (Group w/ allow empty)'. Under each group, there are radio buttons labeled 'Apple', 'Grape, checked, disabled', and 'Cherry'; 'Pepperoni', 'Sausage'; and 'Carrot', 'Tomato', 'Broccoli'. Below the radio buttons are buttons for 'Checked', 'Disabled', 'Print', and 'Color'. At the bottom of the device screen, there's a 'Values:' section with code snippets: 'fruitRadio: grape', 'pizzaRadio: ion-rb-14', and 'veggiesRadio: broccoli'.

The screenshot shows a 'readme.md' file for the 'ion-radio' component. The title is 'ion-radio'. The content describes radios as being used in groups or alone, with a note about programmatically checking them via the 'checked' property. It explains that an 'ion-radio-group' can group radios, and only one radio in a group can be checked at a time. If a radio is not in a group with another radio, both can be checked simultaneously.

Properties

Property	Attribute	Description
checked	checked	If <code>true</code> , the radio is selected. Defaults to <code>false</code> .
color	color	The color to use from your application's color palette. Default options are: "primary", "secondary", "tertiary", "success", "warning", "danger", "light", "medium", and "dark". For more information on colors, see theming .
disabled	disabled	If <code>true</code> , the user cannot interact with the radio. Defaults to <code>false</code> .
mode	mode	The mode determines which platform styles to use. Possible values are: "ios" or "md".
name	name	The name of the control, which is submitted with the form data.
value	--	the value of the radio.

Events

Bonus: CSS variables

Name	Description
--background	Background of the button
--background-activated	Background of the button when activated
--background-focused	Background of the button when focused
--border-color	Border color of the button
--border-radius	Border radius of the button
--border-style	Border style of the button
--border-width	Border width of the button
--box-shadow	Box shadow of the button
--color	Text color of the button

Visual Diff testing

The screenshot shows a visual diff testing interface comparing two versions of an Ionic component, specifically the `Item Divider`.

Left Column: Shows various divider configurations:

- Divider by itself
- Divider in List
- Danger Divider in List** (highlighted in red)
- Divider in Item Group
- Secondary Divider in Item Group** (highlighted in teal)
- Secondary header
Plain Ol' div with some text
- Item Divider Danger Span
- Multiline text that should wrap when it is too long to fit on one line in the item. Attribute on .item

Middle Column: Shows the same configurations as the left column, but with styling changes:

- DIVIDER BY ITSELF
- DIVIDER IN LIST
- DANGER DIVIDER IN LIST** (highlighted in red)
- DIVIDER IN ITEM GROUP
- SECONDARY DIVIDER IN ITEM GROUP** (highlighted in teal)
- Secondary header
Plain Ol' div with some text
- ITEM DIVIDER DANGER SPAN
- Multiline text that should wrap when it is too long to fit on one line in the item. Attribute on .item

Right Column: Shows the differences between the two columns. The differences are highlighted in orange.

Diff	3974d7ff
Mismatched Pixels	248188
Mismatched Ratio	0.1939
Device	iPhone
Width	400
Height	800
Device Scale Factor	2
Left Preview	HTML
Right Preview	HTML
Description	item: dividers

Bottom Row: Shows the primary and dark themes for the component.

Dark	Primary h5
H1 Title Text	
Light	
Primary	

Dark	DARK	PRIMARY H5
H1 Title Text		
LIGHT		
PRIMARY		



Consolidation of the API

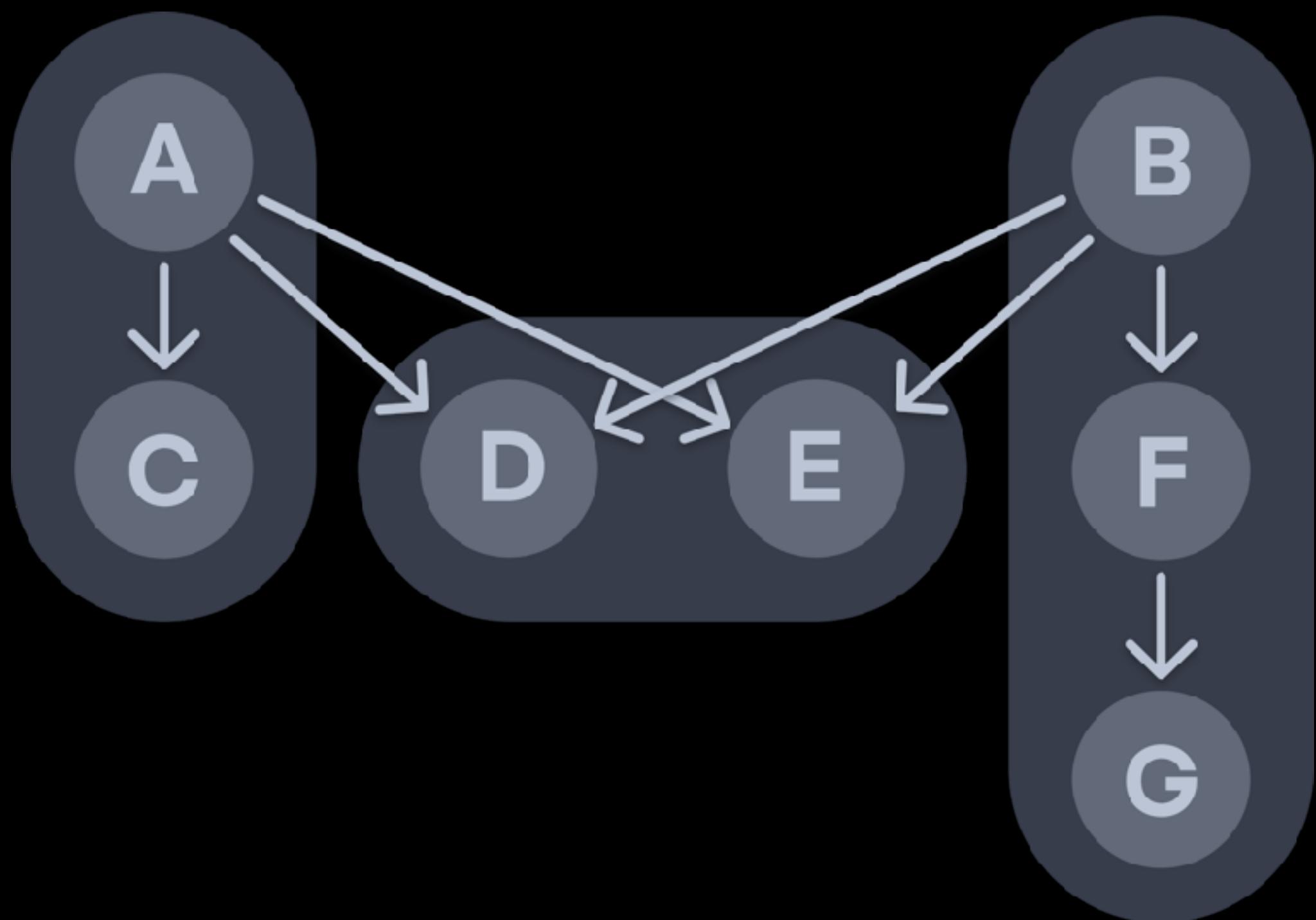
1.0 backcompatibility promise

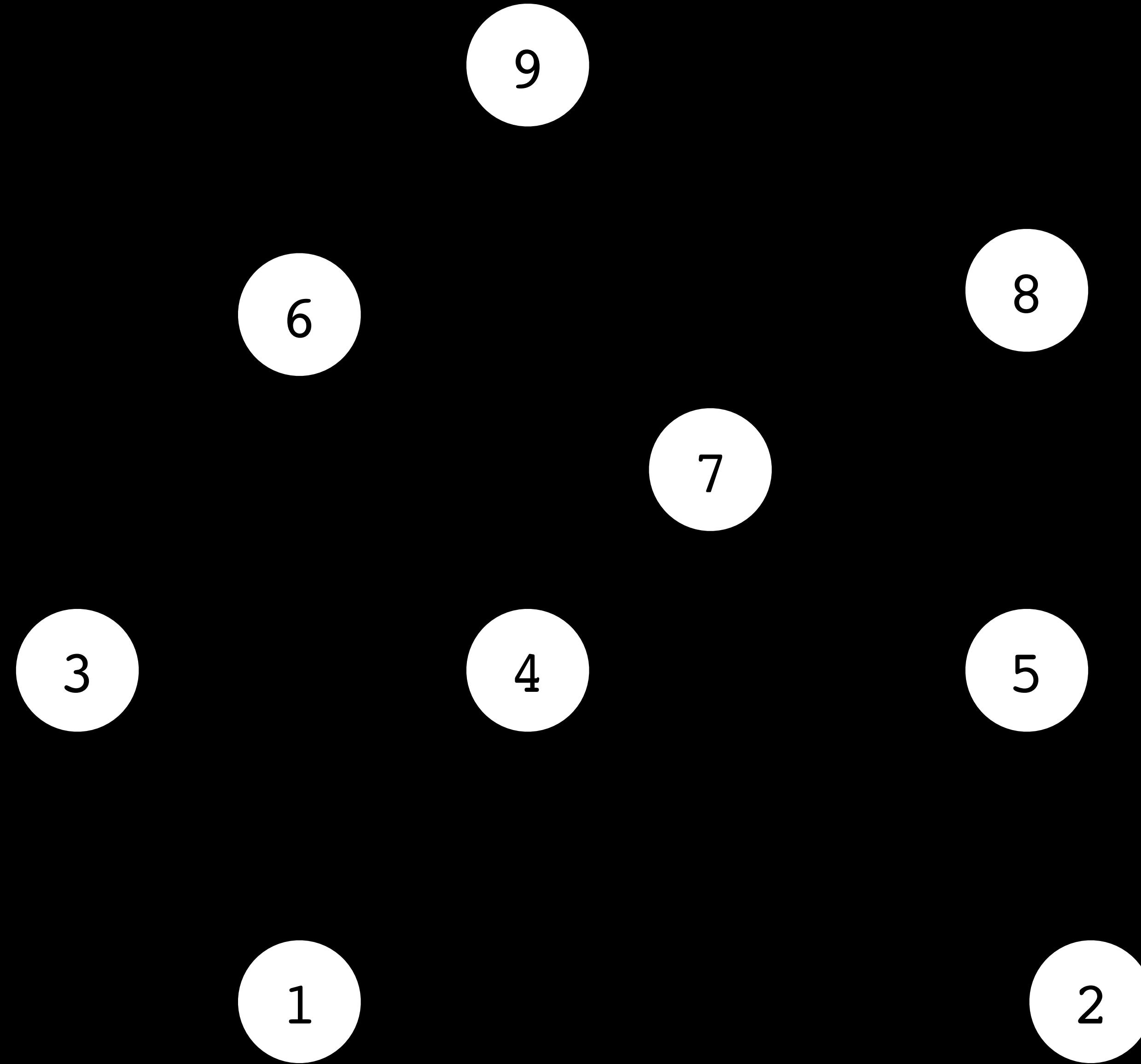
Faster/smaller runtime

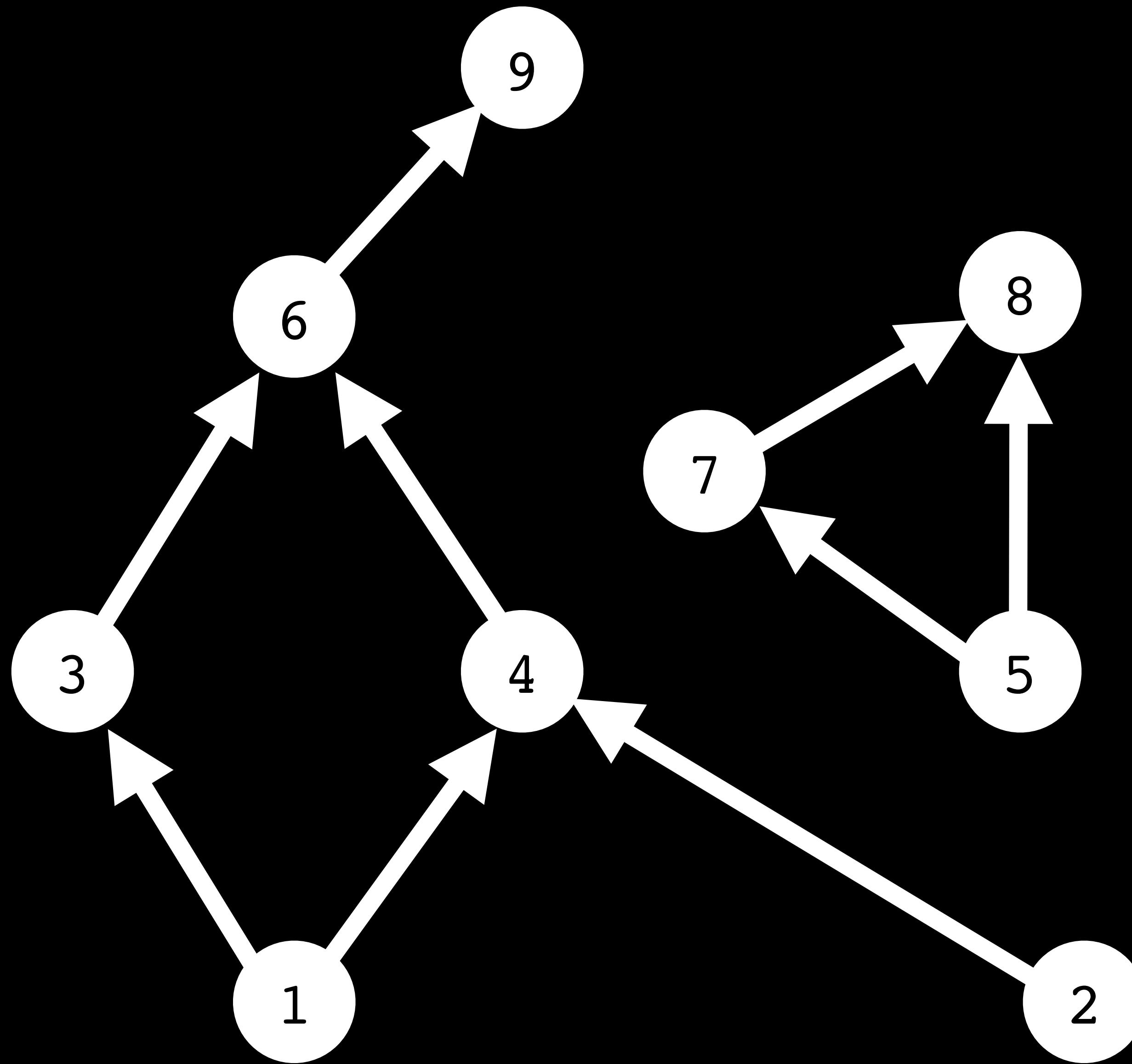
Completely new compiler architecture

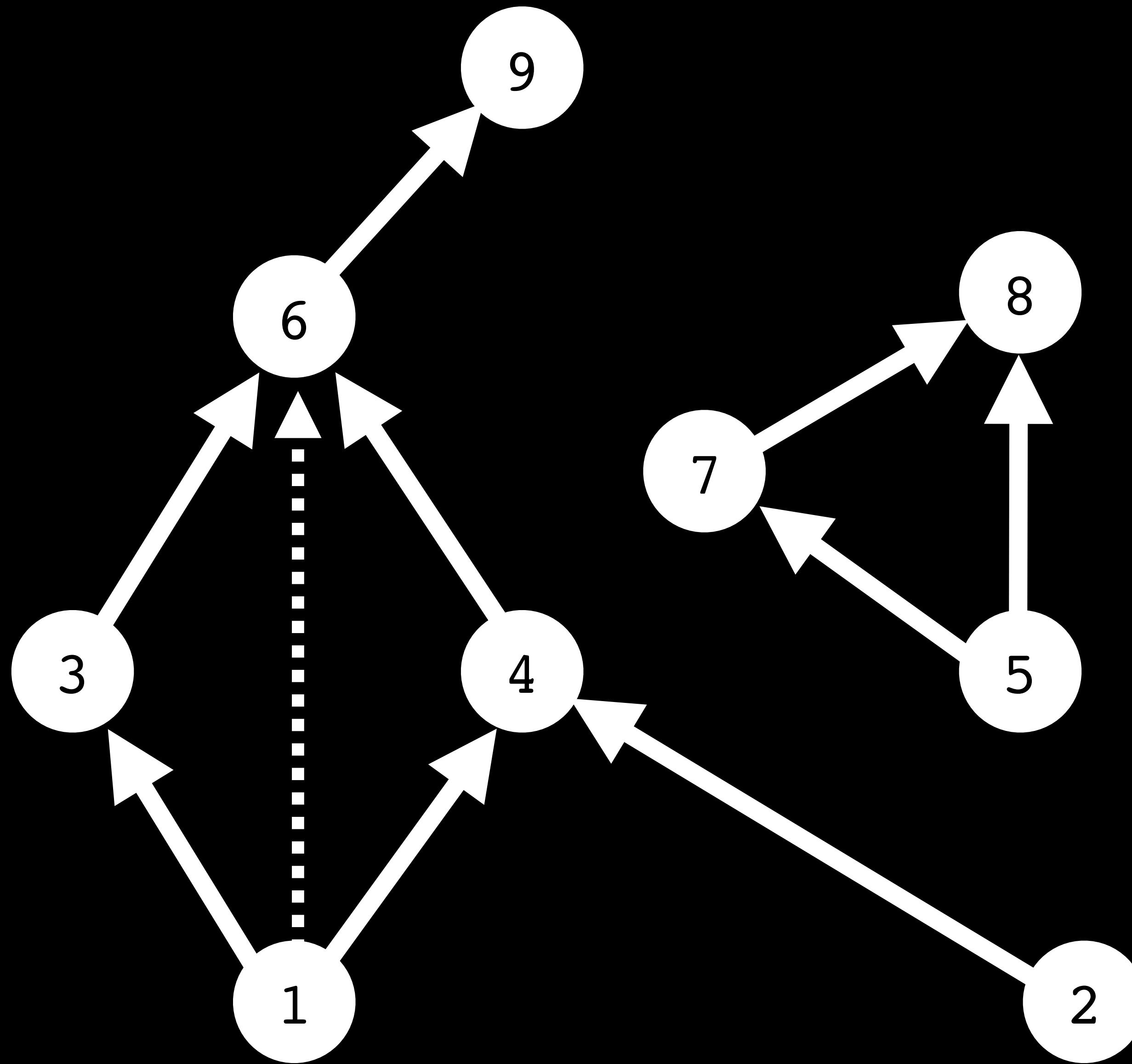
Graph analysis

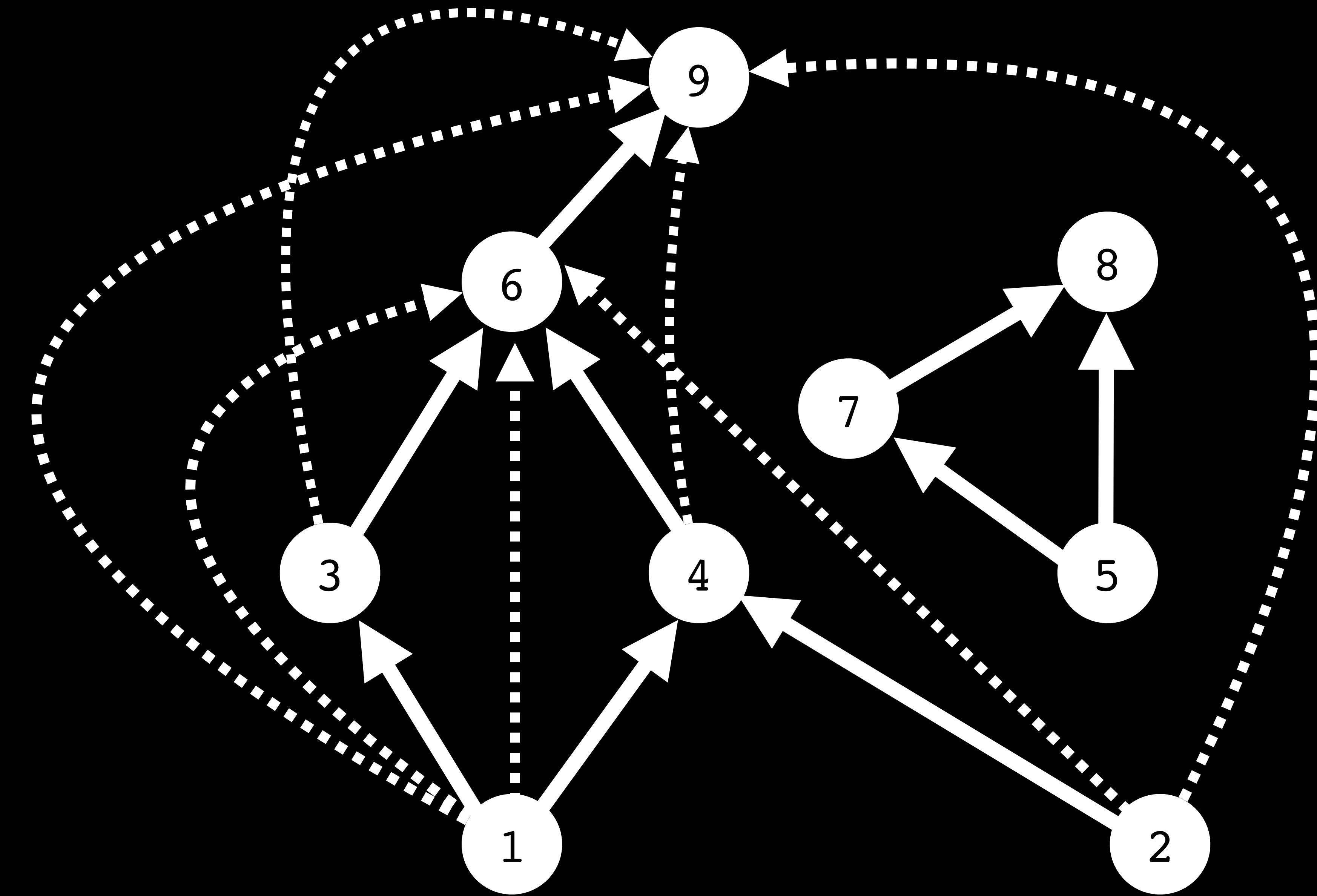
- The compiler generates a dependency graph based in a static analysis
- Components are optimized further by groups them optimally
- HTTP network requests and resource chain are reduced

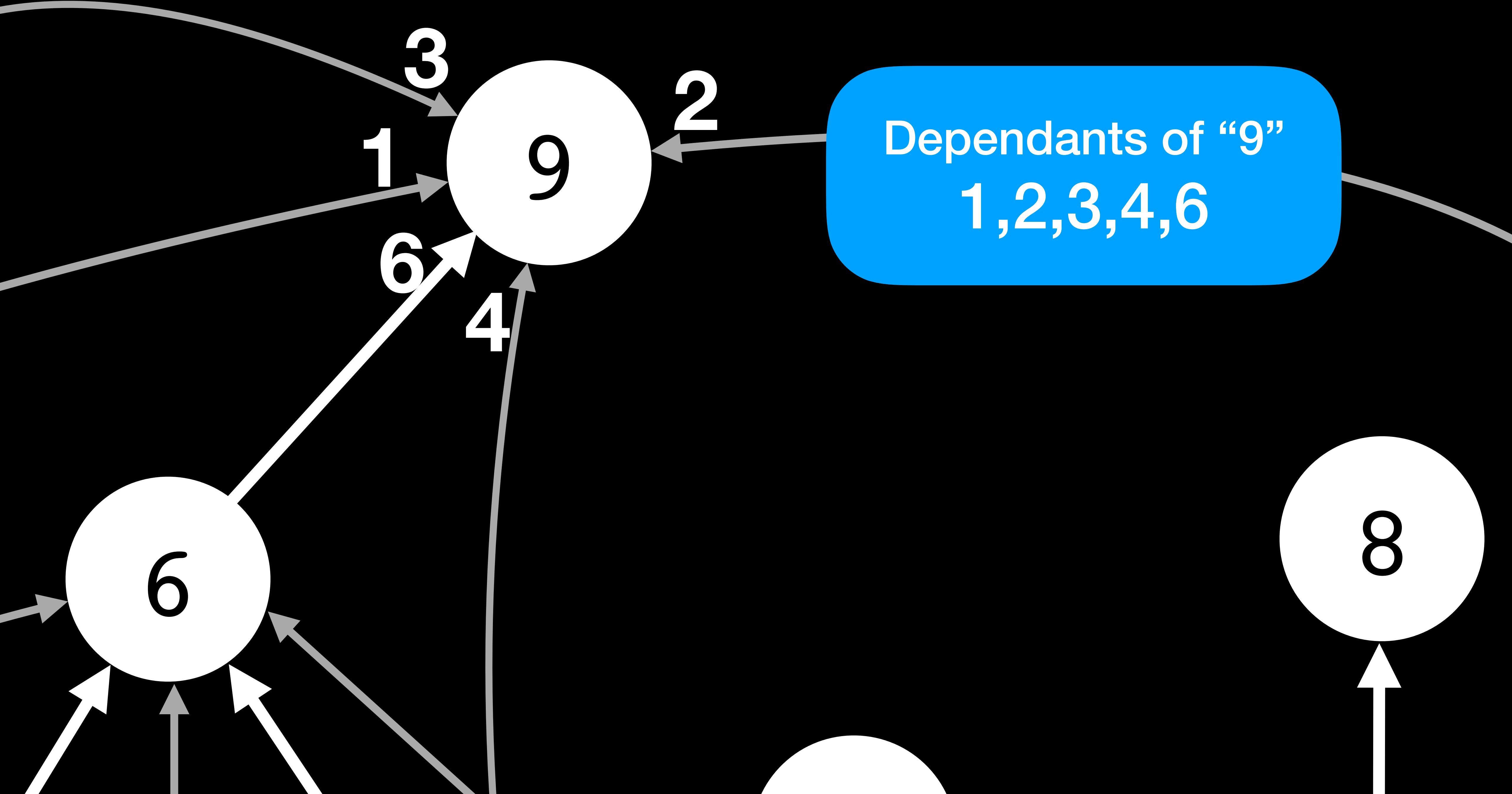


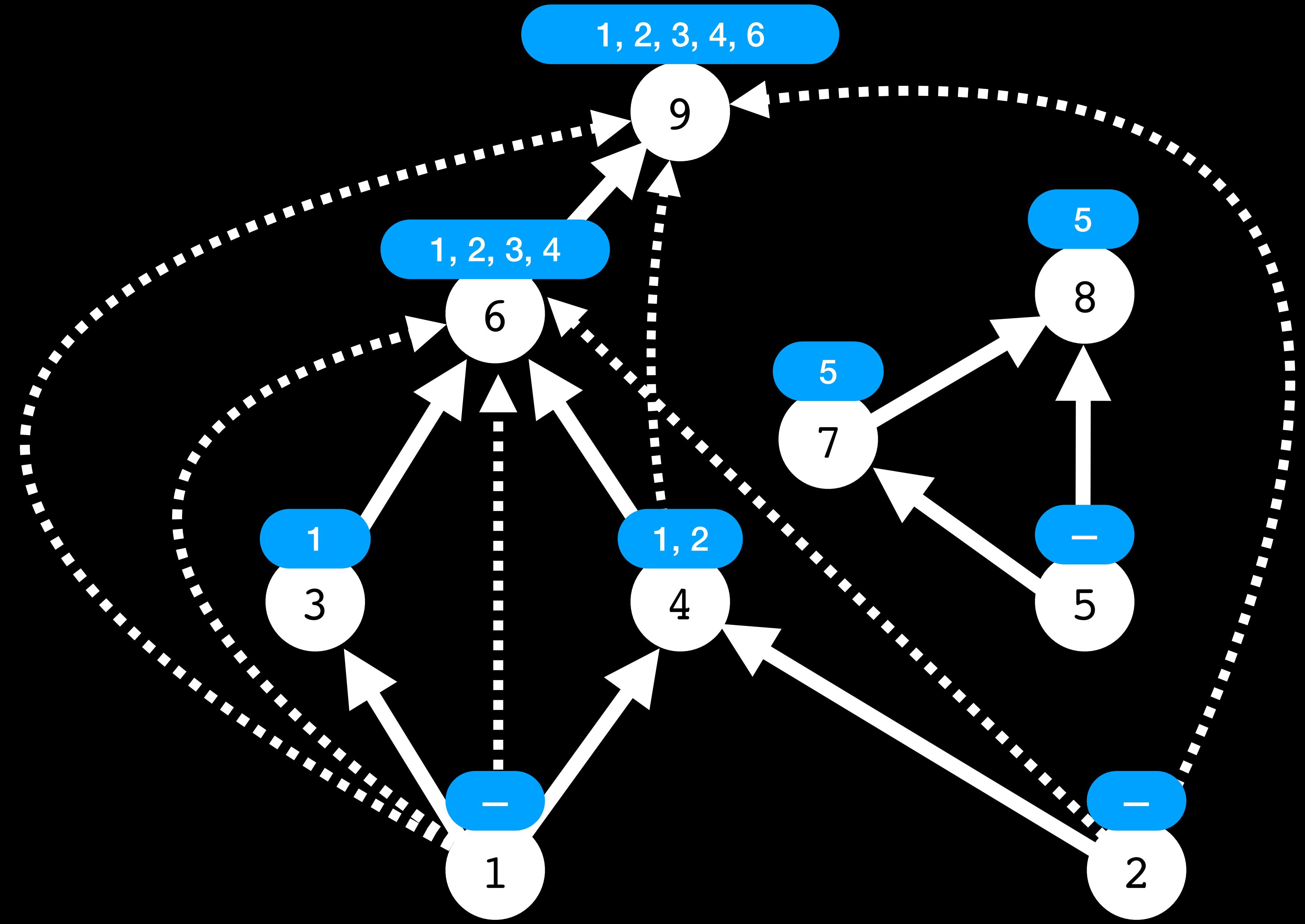












1, 2, 3, 4, 6

1, 2, 3, 4, 6

(_,_,_,_,_,_,_,_,_,_)

1, 2, 3, 4, 6

(1, __, __, __, __, __, __, __, __)

1, 2, 3, 4, 6

(1,1,_,_,_,_,_,_,_,_)

1, 2, 3, 4, 6

(1,1,1,_,_,_,_,_,_,_)

1, 2, 3, 4, 6

(1,1,1,1,_,_,_,_,_,_)

1, 2, 3, 4, 6

(1,1,1,1,0,_,_,_,_,_)

1, 2, 3, 4, 6

(1,1,1,1,0,1,_,_,_,_)

1, 2, 3, 4, 6

(1,1,1,1,0,1,0,_,_)

1, 2, 3, 4, 6

(1,1,1,1,0,1,0,0,_)

1, 2, 3, 4, 6

(1,1,1,1,0,1,0,0,0)

1, 2, 3, 4, 6

(0,0,0,0,1,0,0,0,0)

(0,0,0,0,1,0,0,0,0)

(1,1,1,1,0,0,0,0,0)

(0,0,0,0,0,0,0,0,0)

(1,1,1,1,0,1,0,0,0)

(1,1,0,0,0,0,0,0,0)

(1,0,0,0,0,0,0,0,0)

(0,0,0,0,0,0,0,0,0)

(0,0,0,0,0,0,0,0,0)

**Components
in our space**

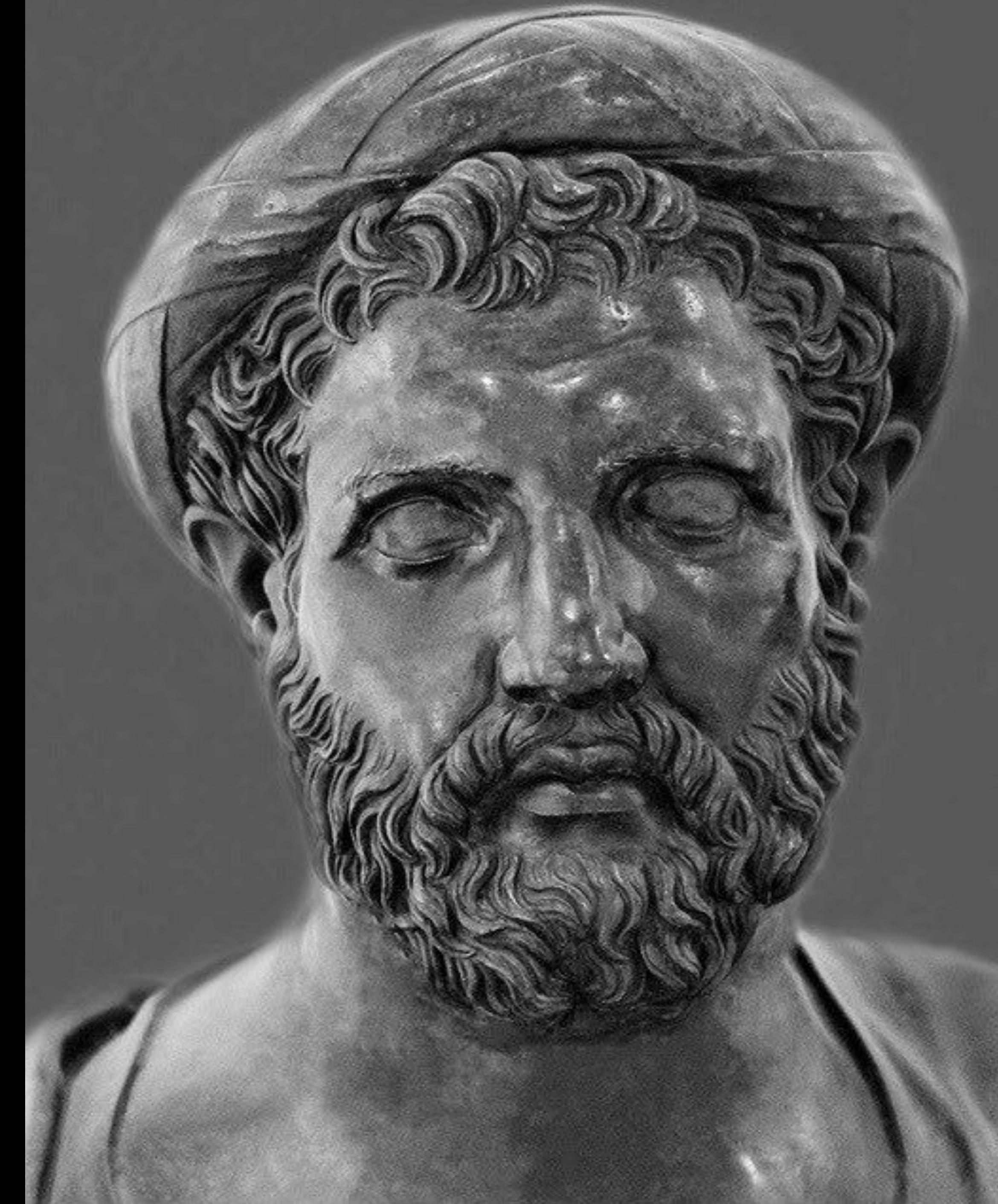
Pythagoras

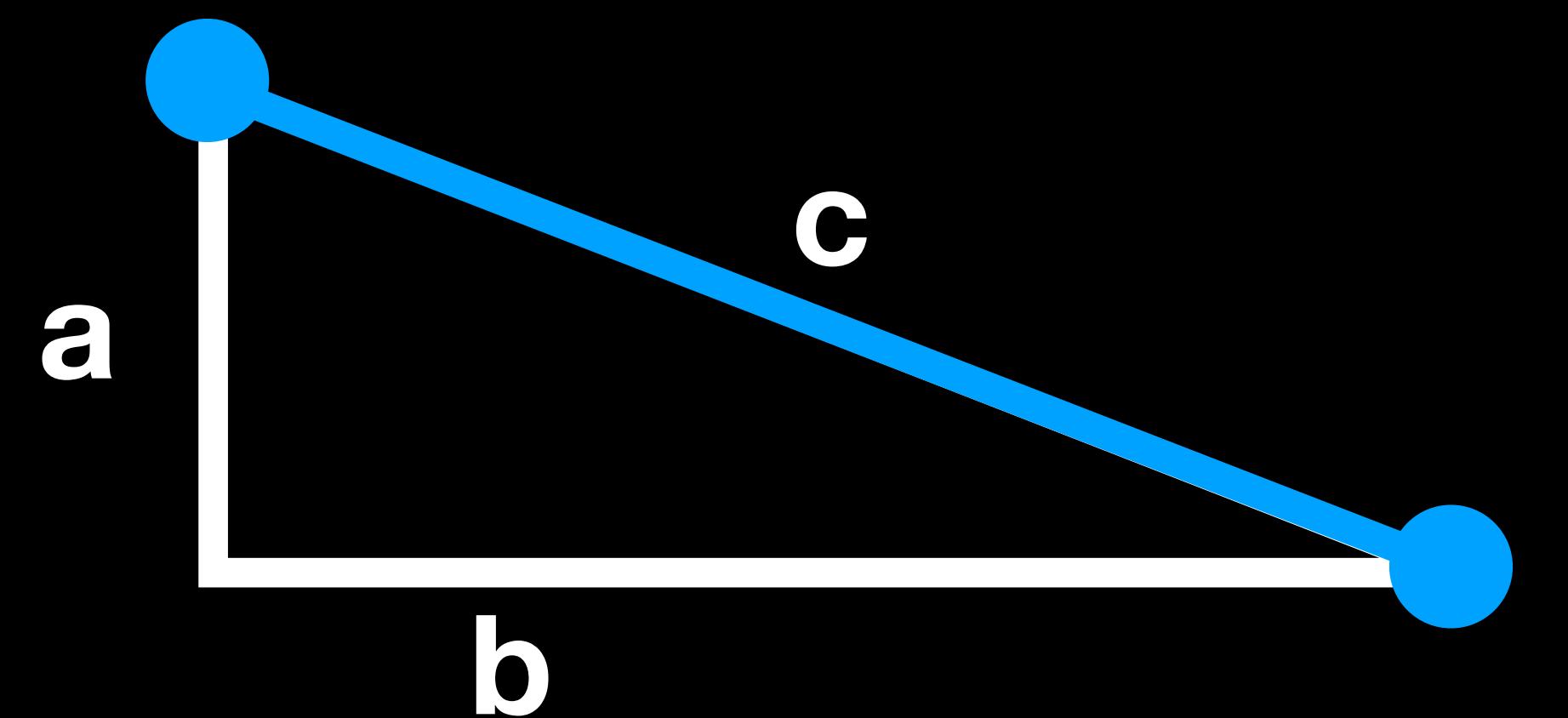
Philosopher and Mathematician at
Ancient Greek

Founder of Pythagoreanism

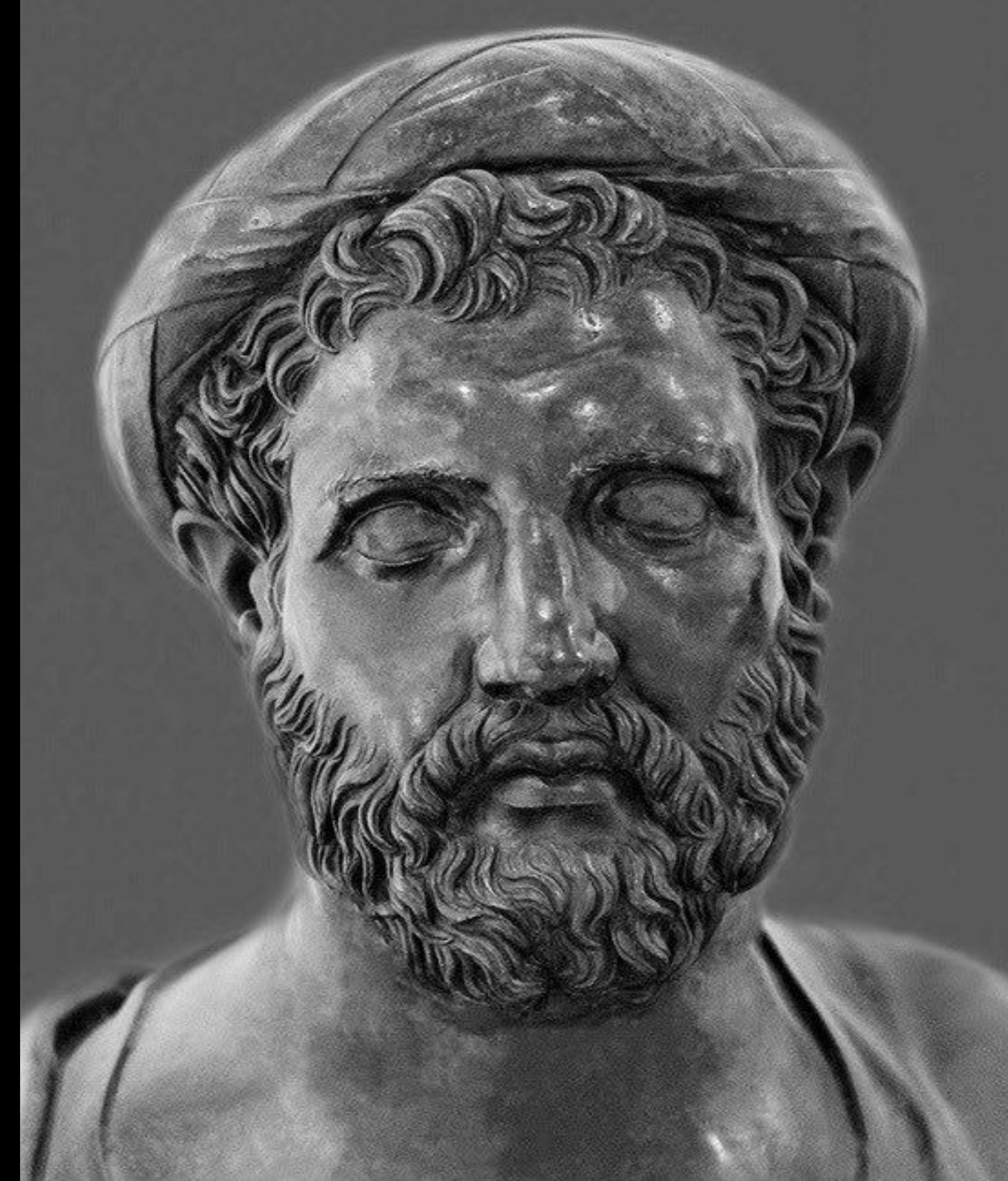
 @pythagoras

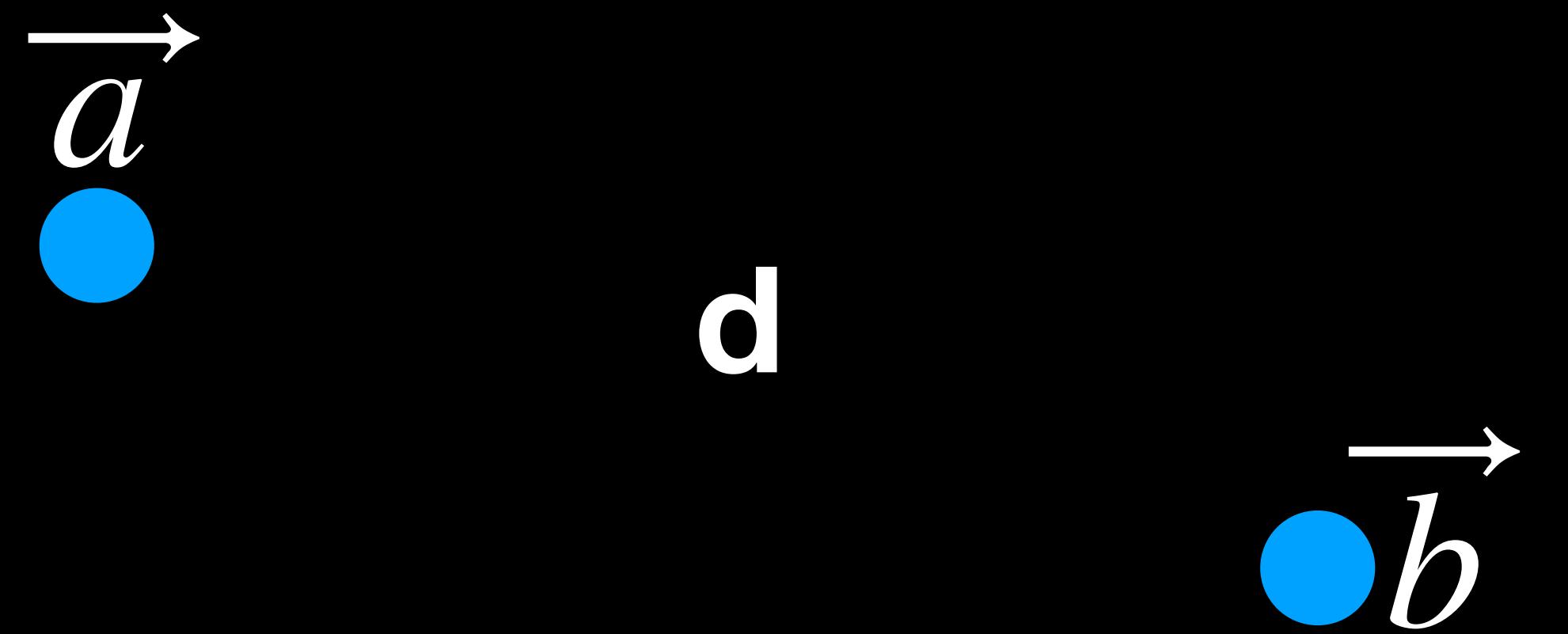
 @pythagoras_570bc





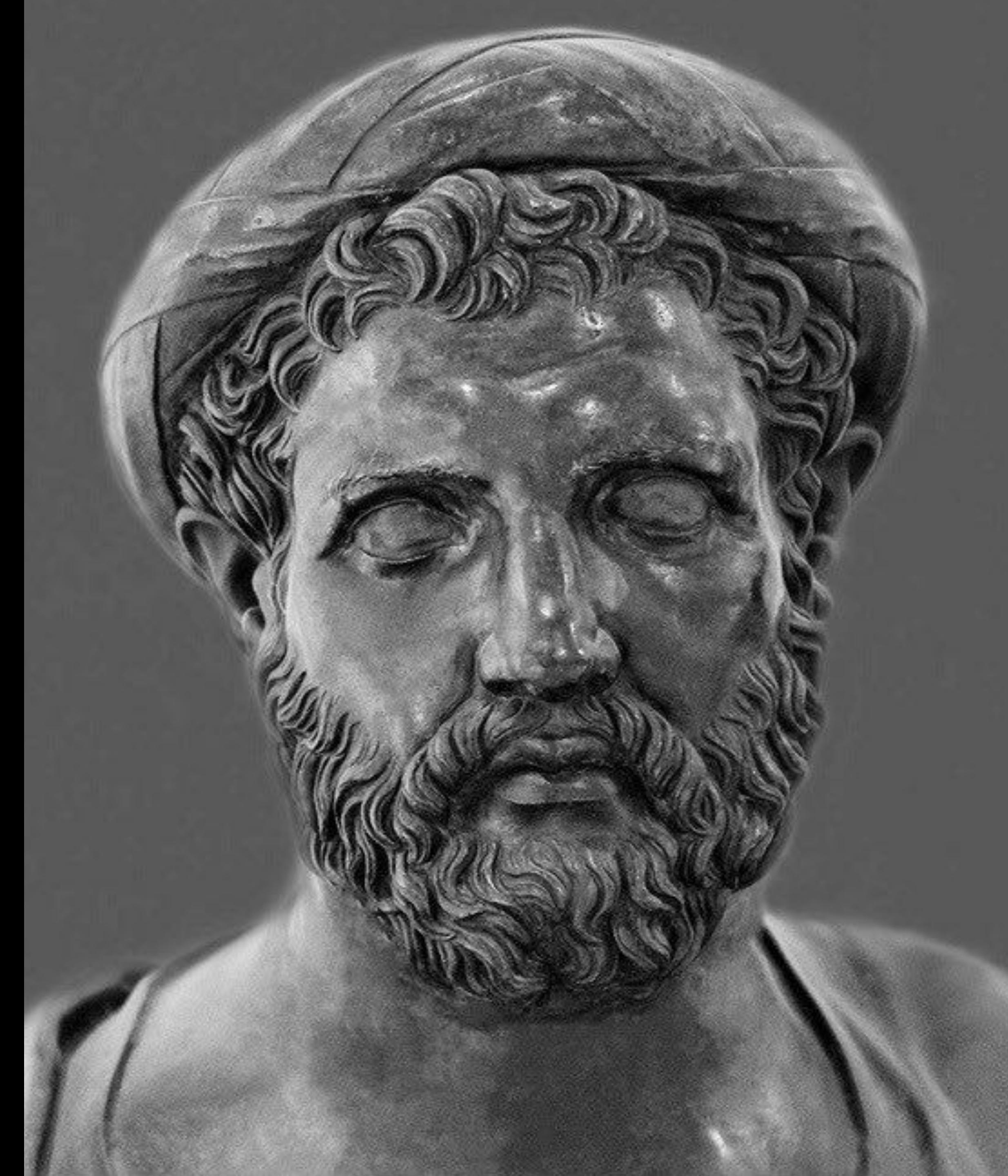
$$c = \sqrt{a^2 + b^2}$$

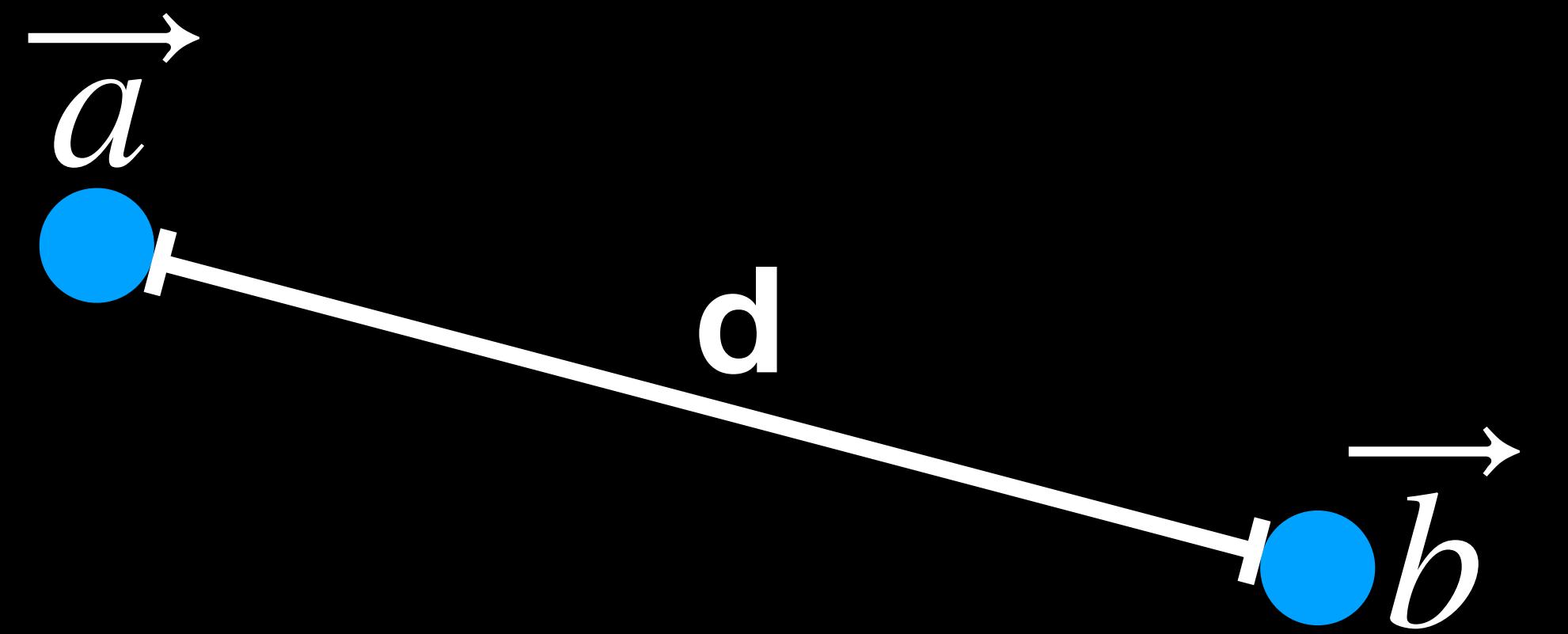




$$d = \| \vec{a} - \vec{b} \|$$

$$d = \sqrt{\sum_{i=2}^N (\vec{a}_i - \vec{b}_i)^2}$$

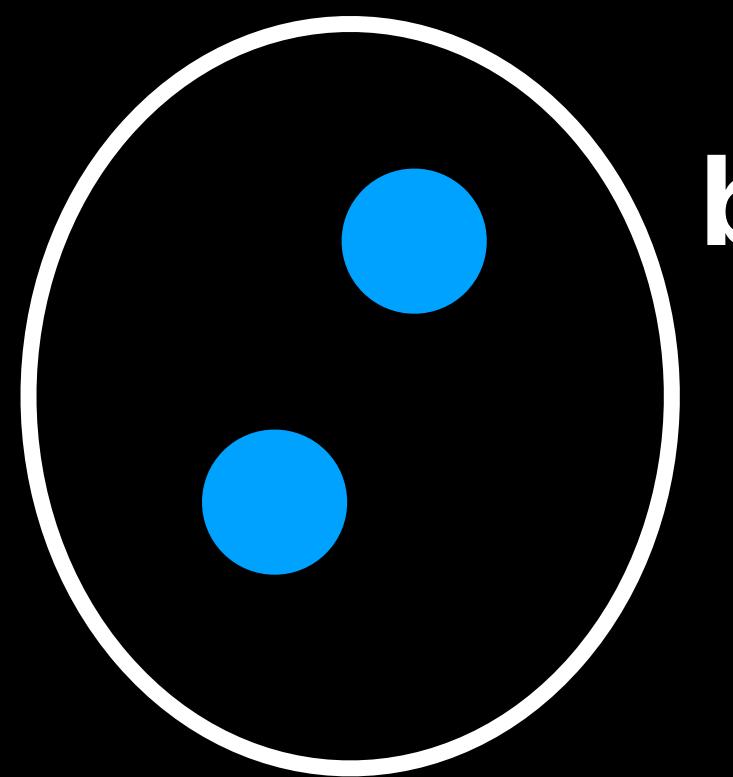




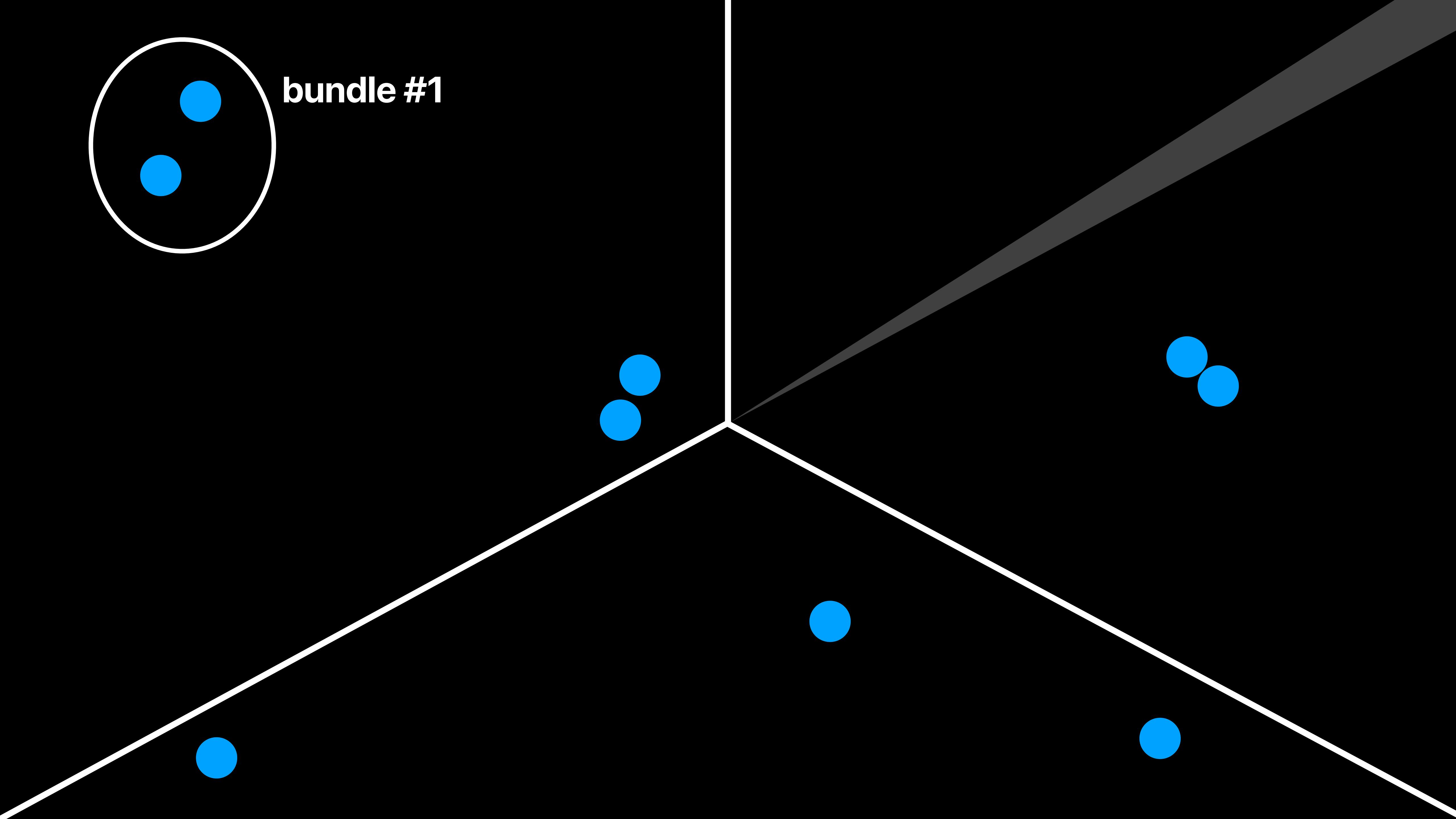
$$d = \| \vec{a} - \vec{b} \|$$

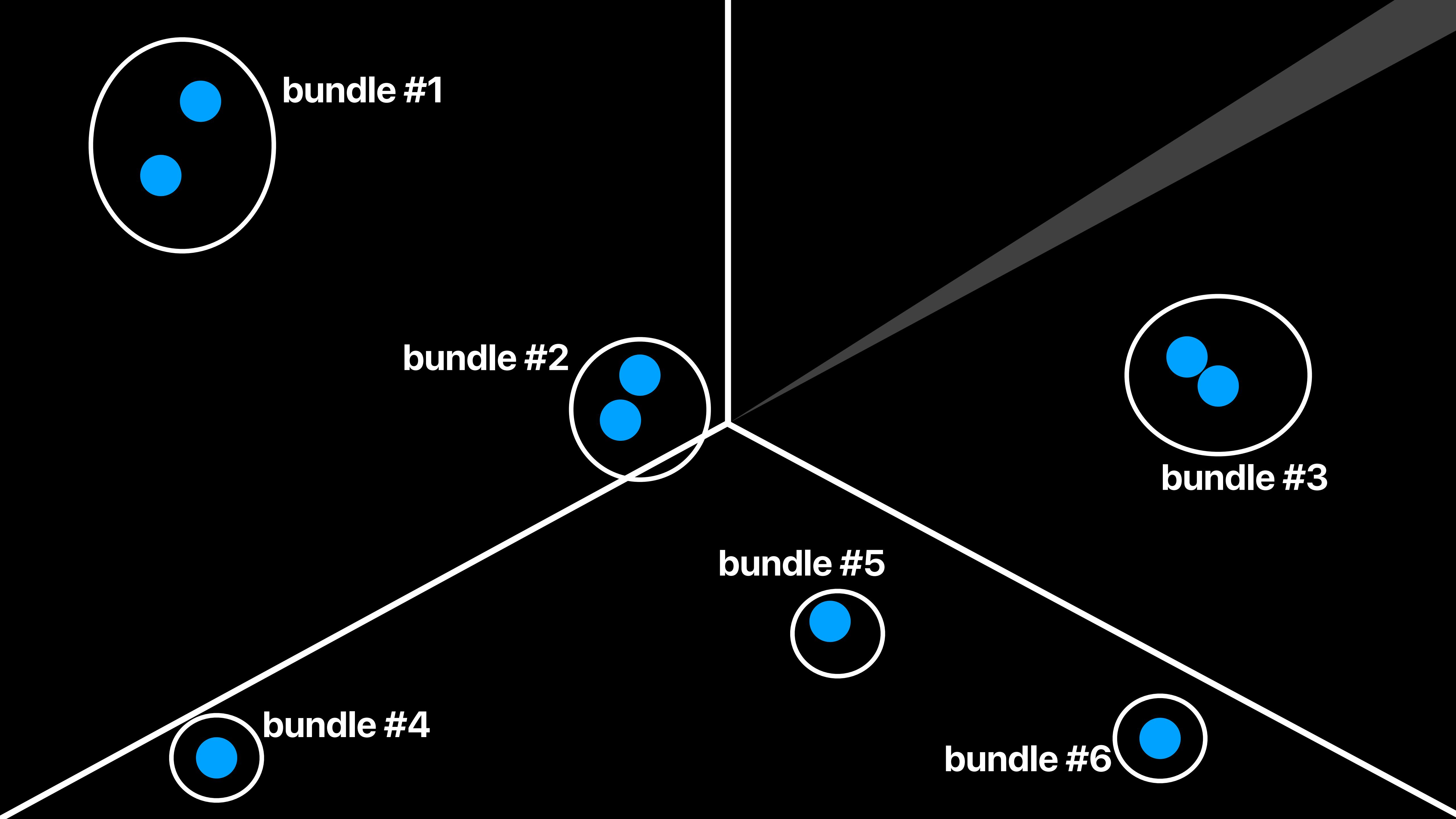
$$d = \sqrt{\sum_{i=2}^N (\vec{a}_i - \vec{b}_i)^2}$$





bundle #1





Module preloading

The screenshot shows a web browser interface with developer tools open. The top navigation bar includes tabs for Work, Performance, Memory, Application, Security, Audits, and more. The Network tab is active, showing a list of resources and their details. A performance timeline at the bottom tracks resource loading over time, with a red vertical line indicating a specific point. A large oval highlights the waterfall chart on the right, which visualizes the loading sequence of scripts. The main content area displays code snippets related to module preloading and a brief description of Stencil's design system.

Stencil

encil

Systems and F

Design Systems by combining the best and frameworks but generating Web parity component model. Stencil-built Web modern browsers and popular frontend free from framework-churn.

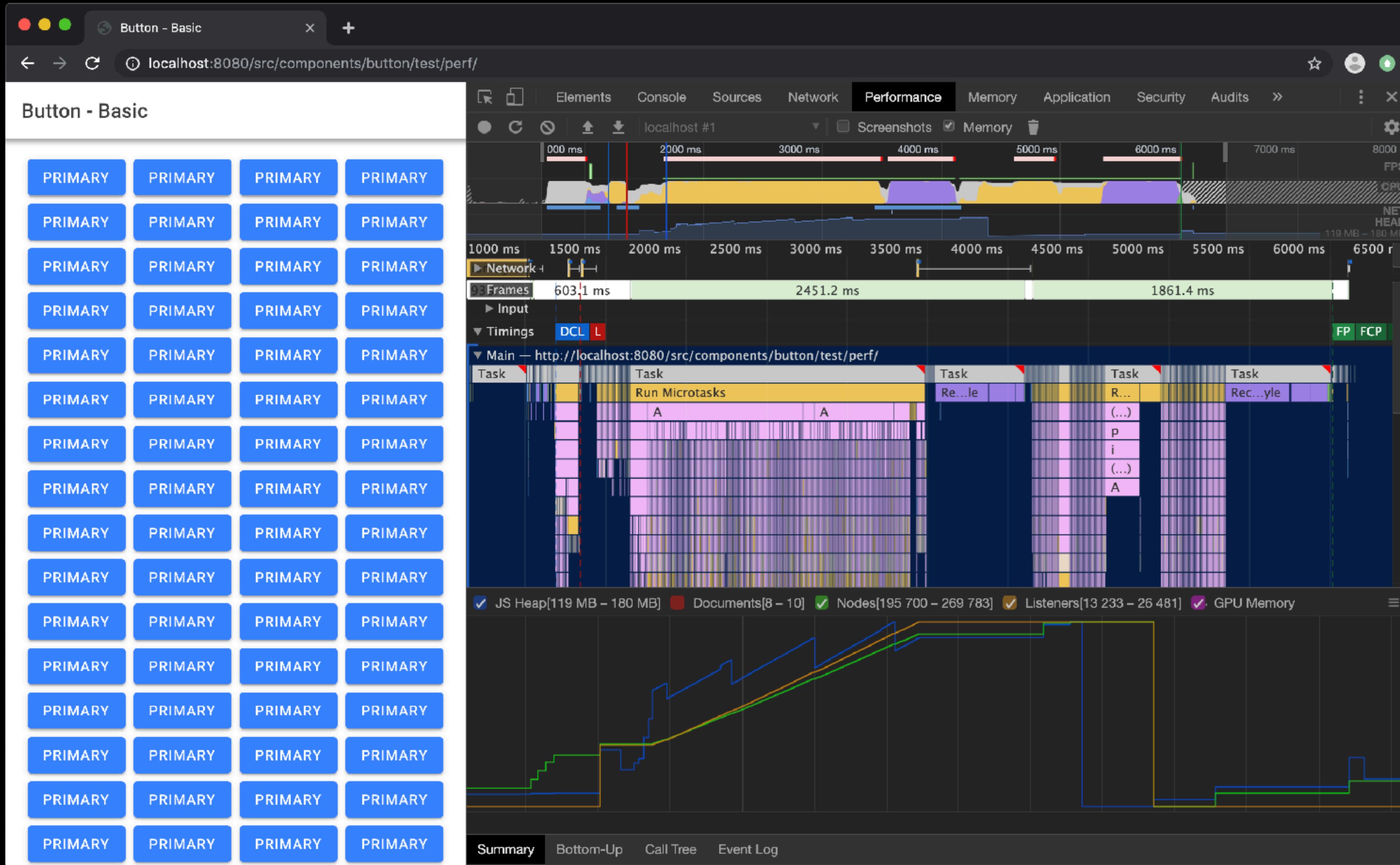
generation of [Ionic Framework](#), one of the first Design Systems in the world.

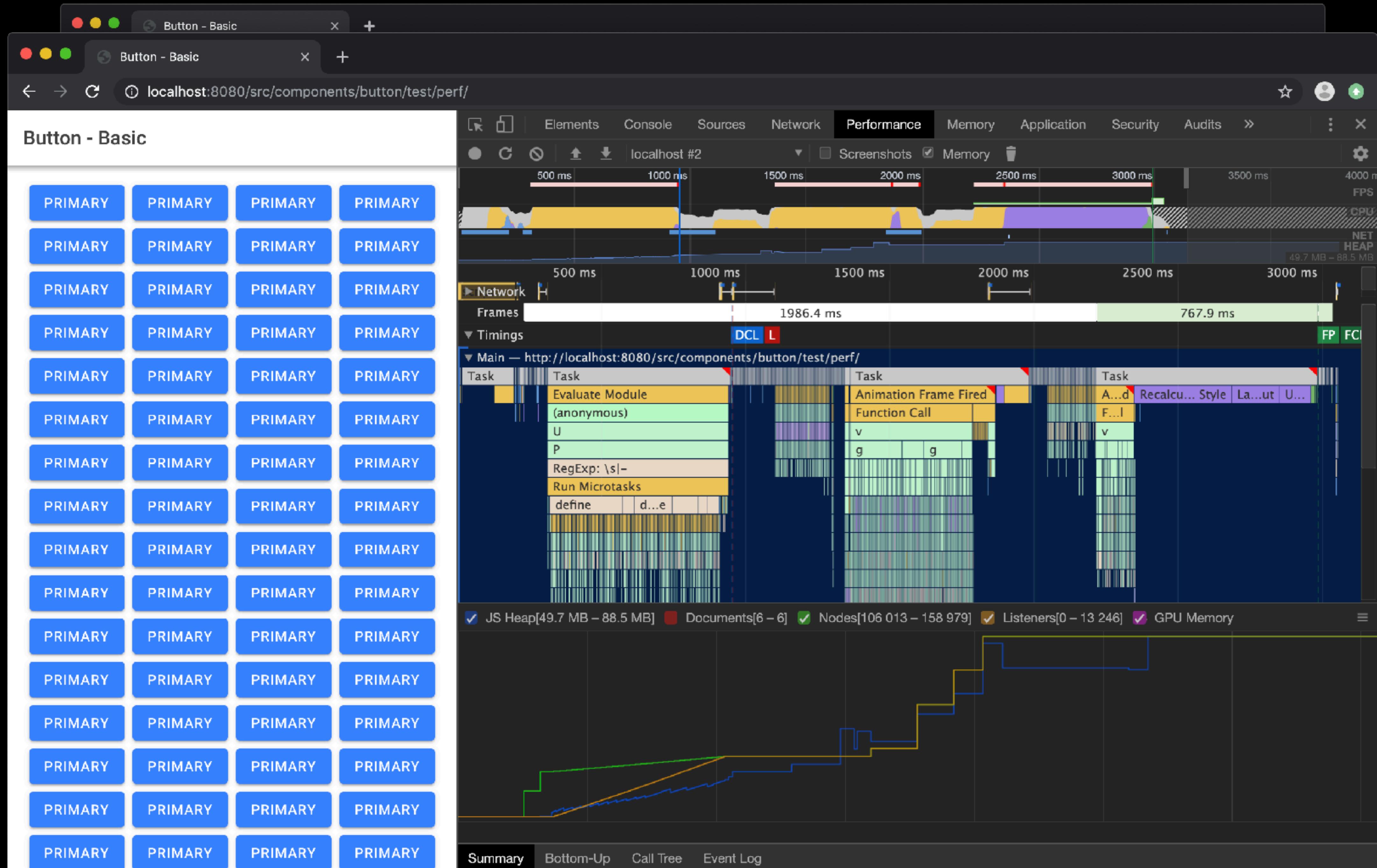
- ✓ Framework-free
- ✓ Asynchronous rendering pipeline
- ✓ One-way data binding

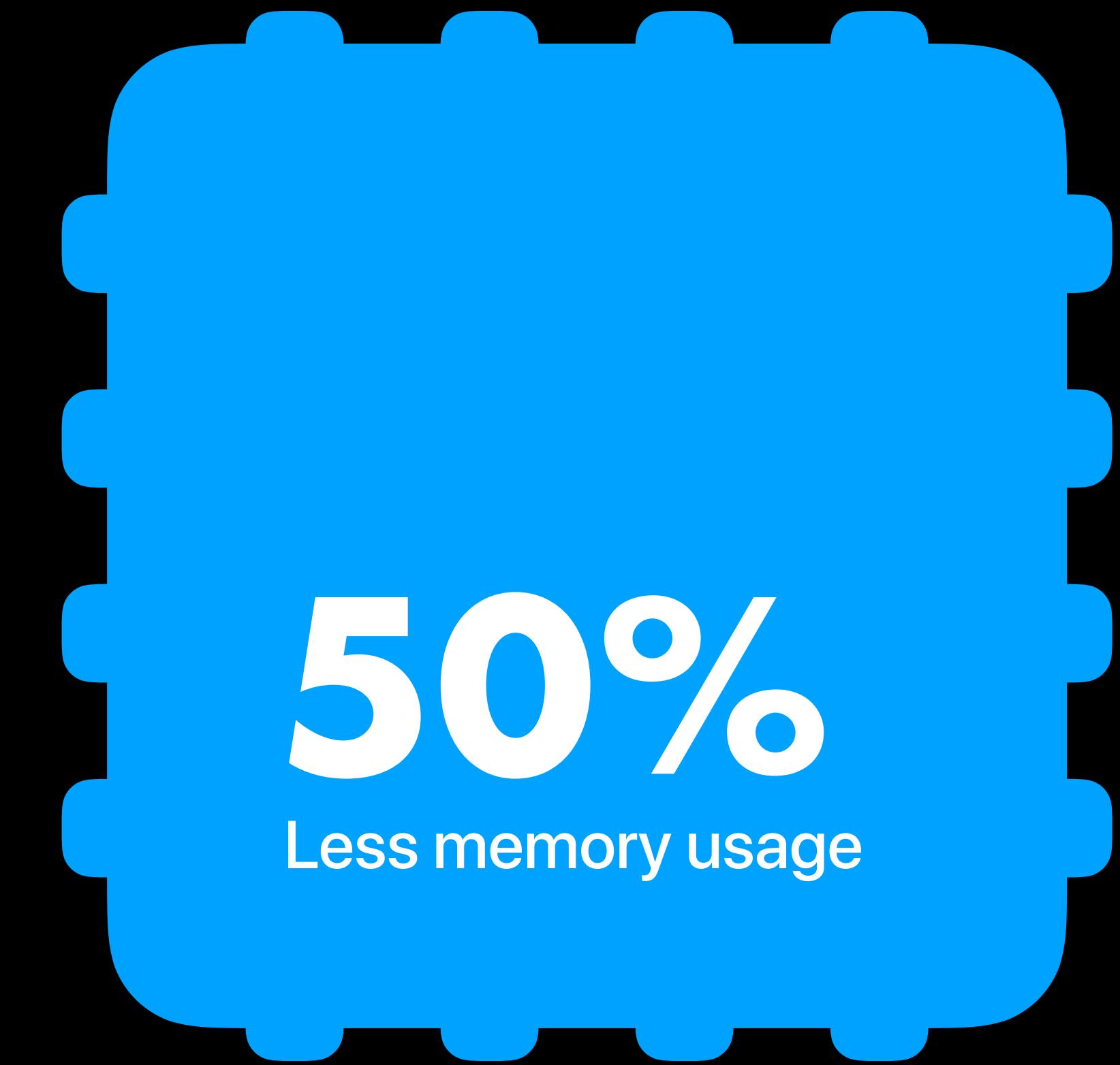
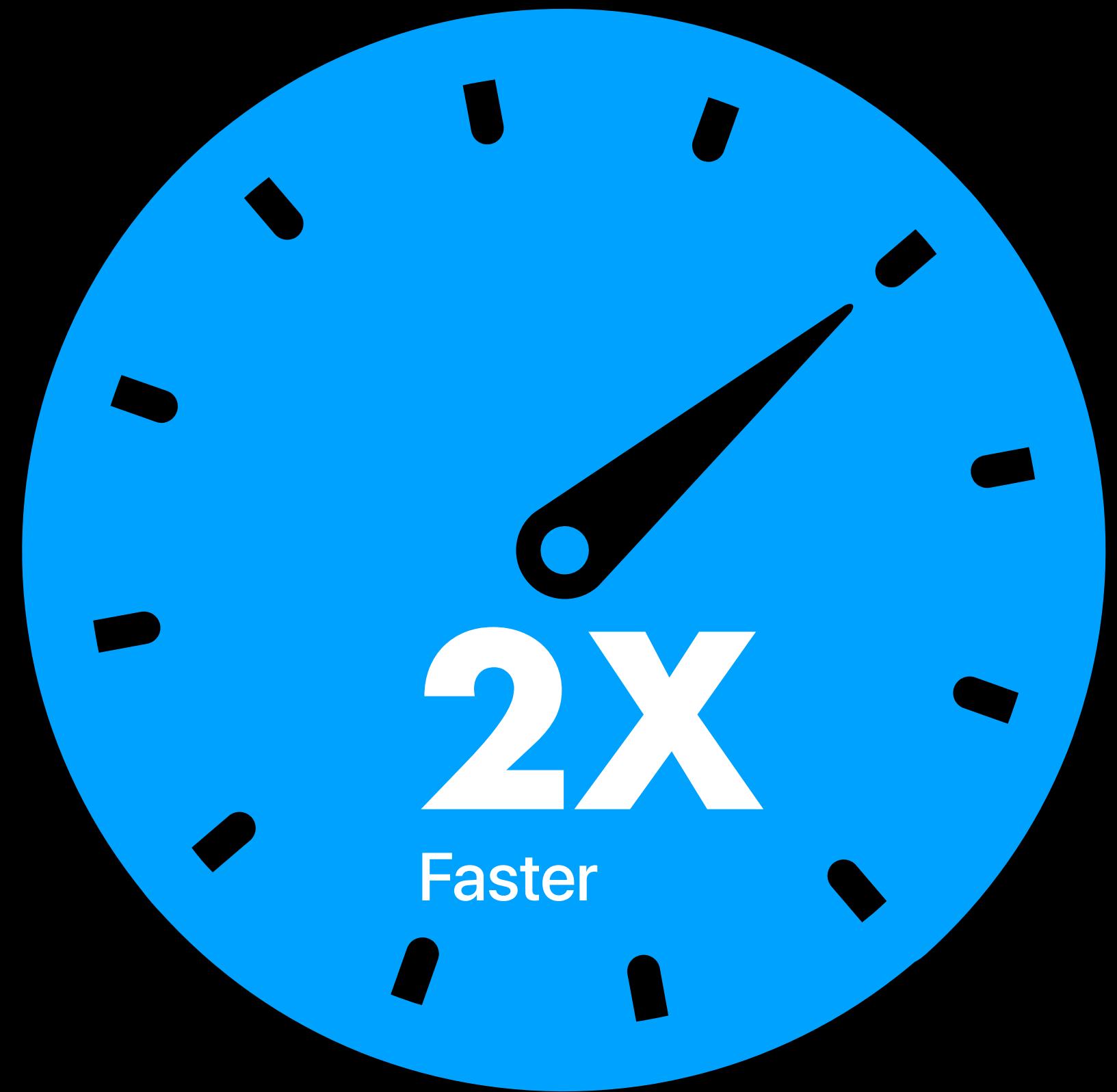
Name	Status	Protocol	Type	Size	Time	Priority	Waterfall
p-6e903510.js	200	h2	script	(...)	619 B	19 ms	High
p-c463f5bb.js	200	h2	script	(...)	717 B	21 ms	High
js?id=UA-44023830-34	(blocked...)		script	(...)	0 B	19 ms	Low
p-df3aa99b.js	200	h2	script	(...)	6.5 KB	42 ms	High
p-mkwblafb.entry.js	200	h2	script	(...)	12.7 KB	26 ms	High
p-yexd90t8.entry.js	200	h2	script	(...)	4.0 KB	22 ms	High

Faster & smaller runtime

- JIT friendly runtime
- Async scheduler
- Native async/await
- Constructible Stylesheets







Advanced code removal

$f(components, jsV, type) \Rightarrow core$



133 bytes
hello-world
(uncompressed)

133 bytes
hello-world
(uncompressed)

87 bytes
hello-world
(compressed)

Todos Stencil



What needs to be done?



Prepare talk for JSconf EU

Todos Stencil



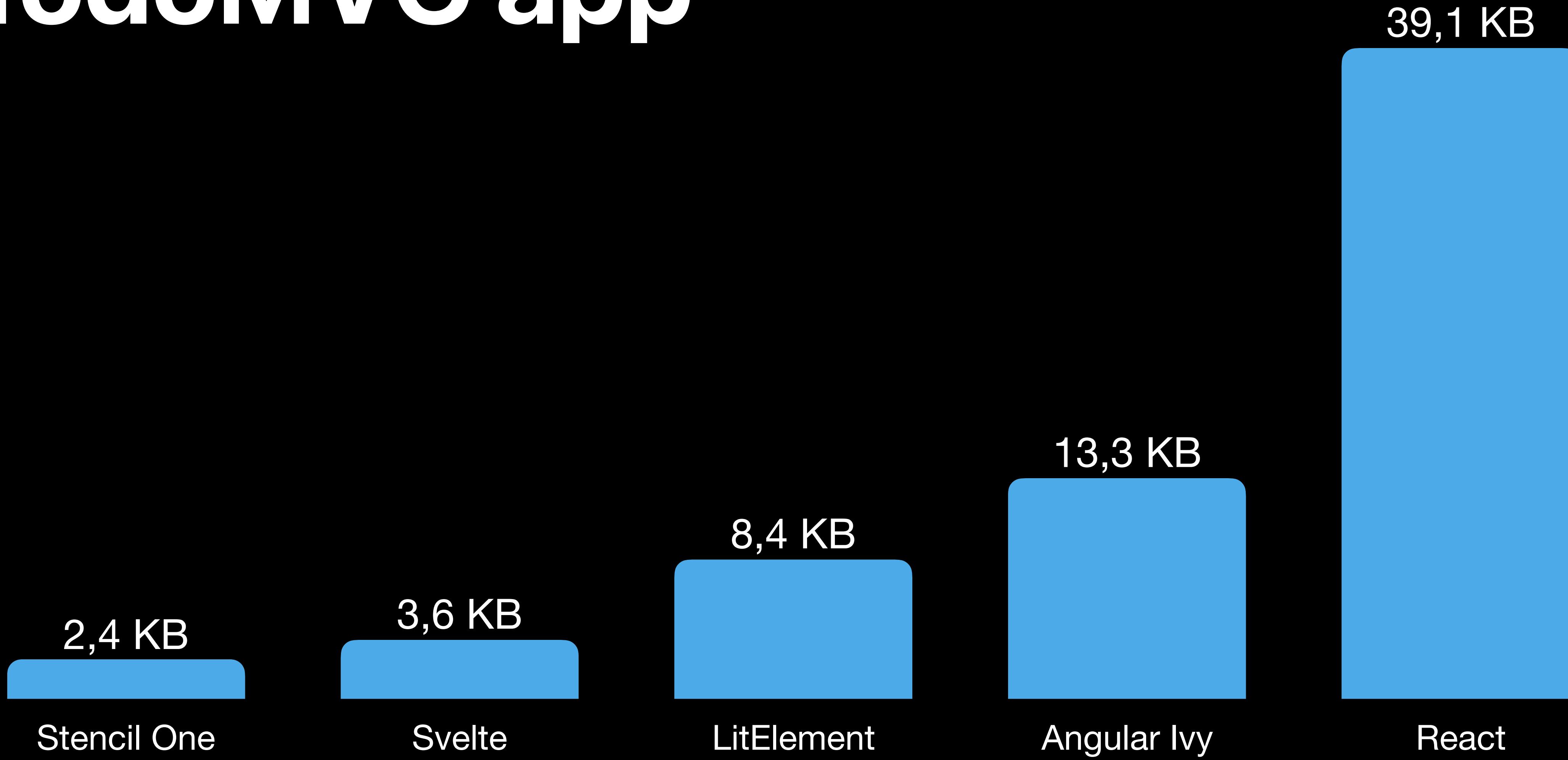
What needs to be done?

2.4 KB

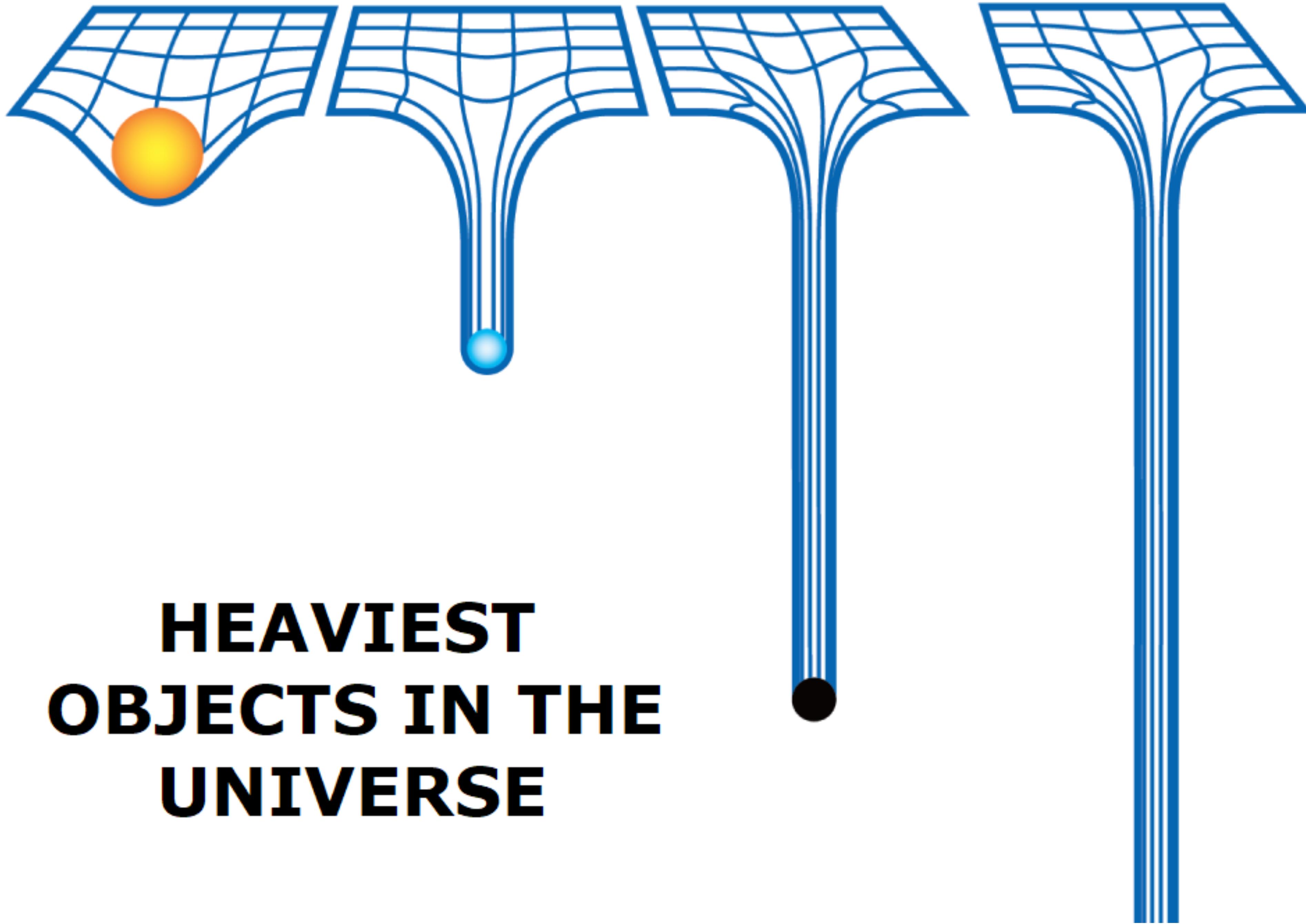


Prepare talk for JSconf EU

TodoMVC app



Sun Neutron star Black hole node_modules



**HEAVIEST
OBJECTS IN THE
UNIVERSE**

Sun Neutron star Black hole node_modules



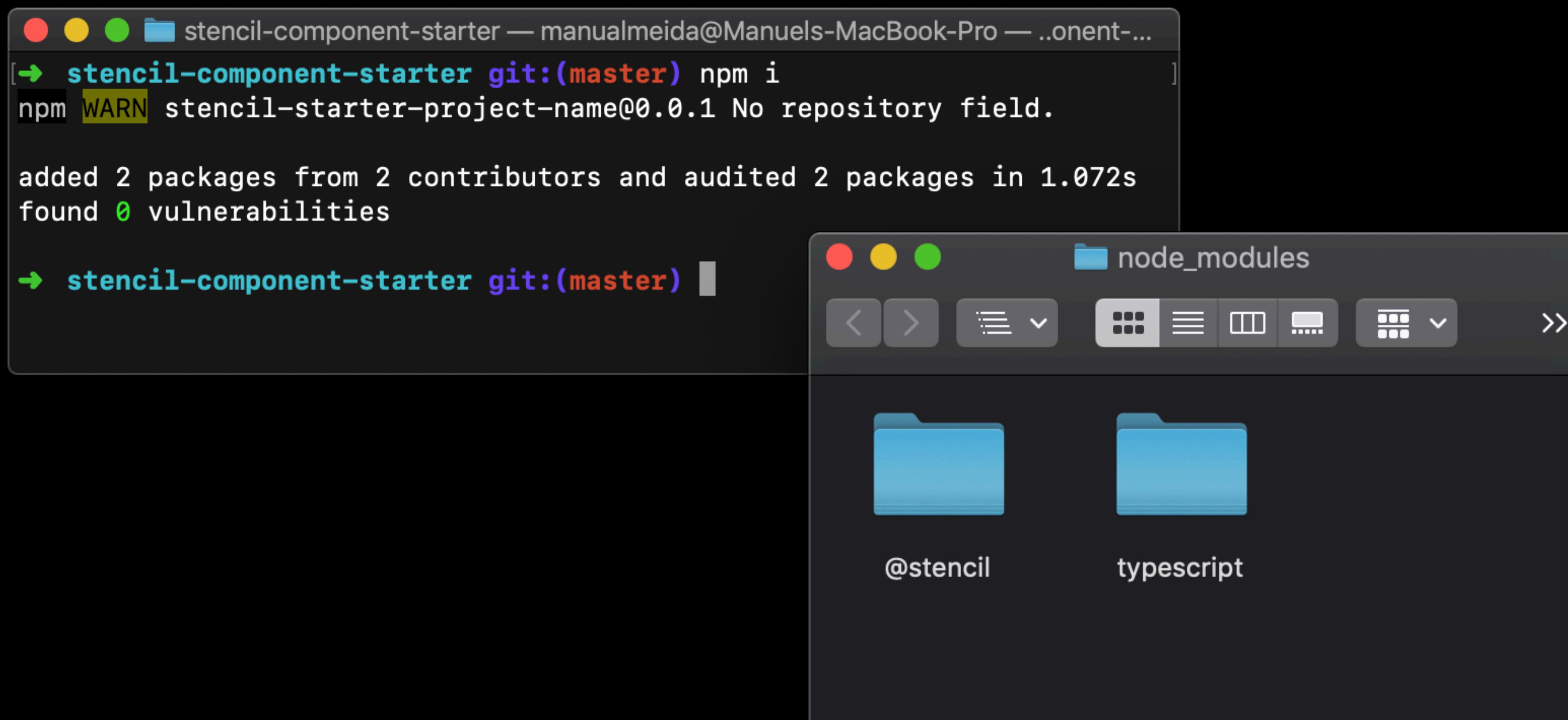
Josh Morony
@joshuamorony

Finally invested time into finding a script that would recursively delete 'node_modules' folders. Hello 30GB of freed space 😊

2:12 AM · Mar 8, 2018 · Twitter Web Client

**OBJECTS IN THE
UNIVERSE**

Dependency free



A screenshot of a Mac desktop displaying a terminal window and a Finder window.

The terminal window shows the command `npm i` being run in the directory `stencil-component-starter`. The output indicates that 2 packages were added from 2 contributors, audited in 1.072s, and found 0 vulnerabilities.

```
stencil-component-starter — manualmeida@Manuels-MacBook-Pro — ..onent-...
[→ stencil-component-starter git:(master) npm i
npm WARN stencil-starter-project-name@0.0.1 No repository field.

added 2 packages from 2 contributors and audited 2 packages in 1.072s
found 0 vulnerabilities

→ stencil-component-starter git:(master)
```

The Finder window shows a folder named `node_modules` containing two sub-folders: `@stencil` and `typescript`.

File browser toolbar:

- < >
- ☰ ▾
- grid
- list
- card
- grid



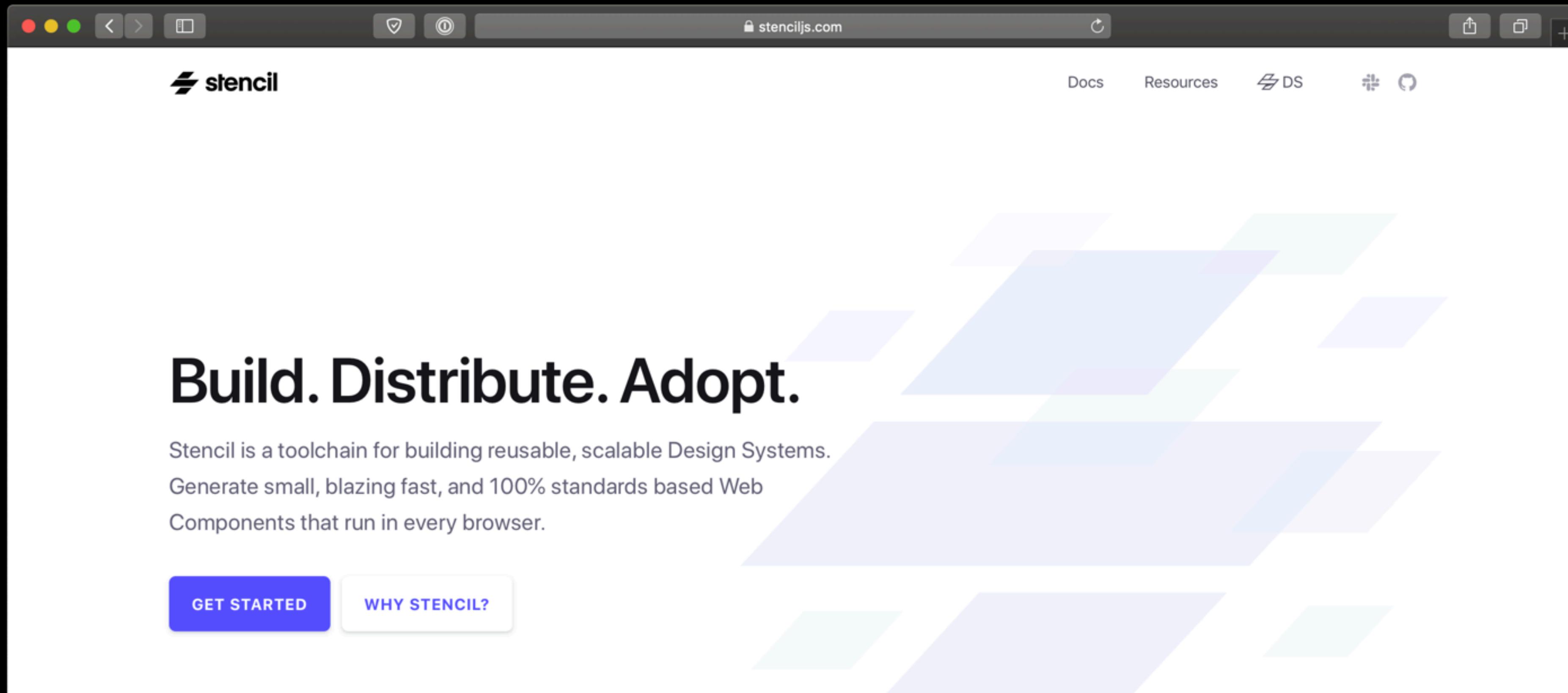
Components generated by
Stencil are dependency free

DEMO

```
$ npm init stencil
```

stenciljs.com

\$ npm init stencil



stenciljs.com

\$ npm init stencil



Thank You

@manucorporat

