

DevFest 2025

Font Optimizations in React Apps

Igor Alekseev
Frontend Developer

Performance - Lighthouse



Performance - Lighthouse



Performland



Who am I?



- frontend developer
- video games lover

Who am I?

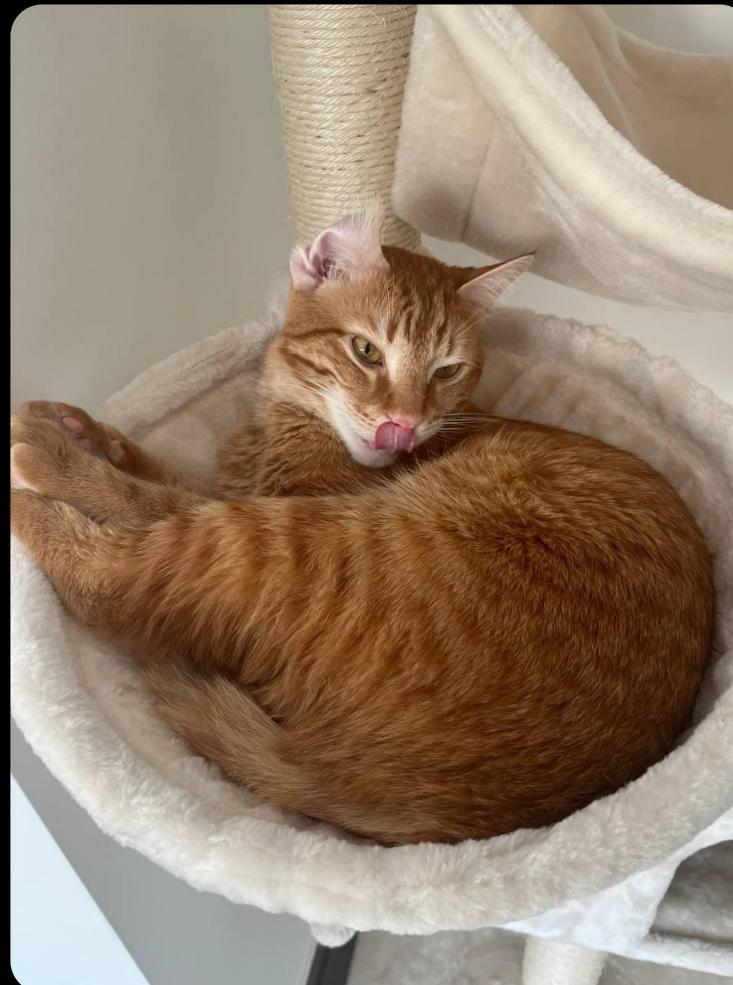
- crazy ginger cat owner



- frontend developer
- video games lover

Who am I?

- crazy ginger cat owner
- crazy white dog owner



- frontend developer
- video games lover

Who am I?

- crazy ginger cat owner
- crazy white dog owner



- frontend developer
- video games lover
- obsessing over web apps performance
- always searching for free food on meetups!

A rich suite of tools that provide an exceptional developer experience



IntelliJ IDEA

IDE for Java and Kotlin



PyCharm

IDE for Python



DataGrip

Tool for multiple databases



WebStorm

IDE for JavaScript

Free for non-commercial use



Rider

IDE for .NET and game dev

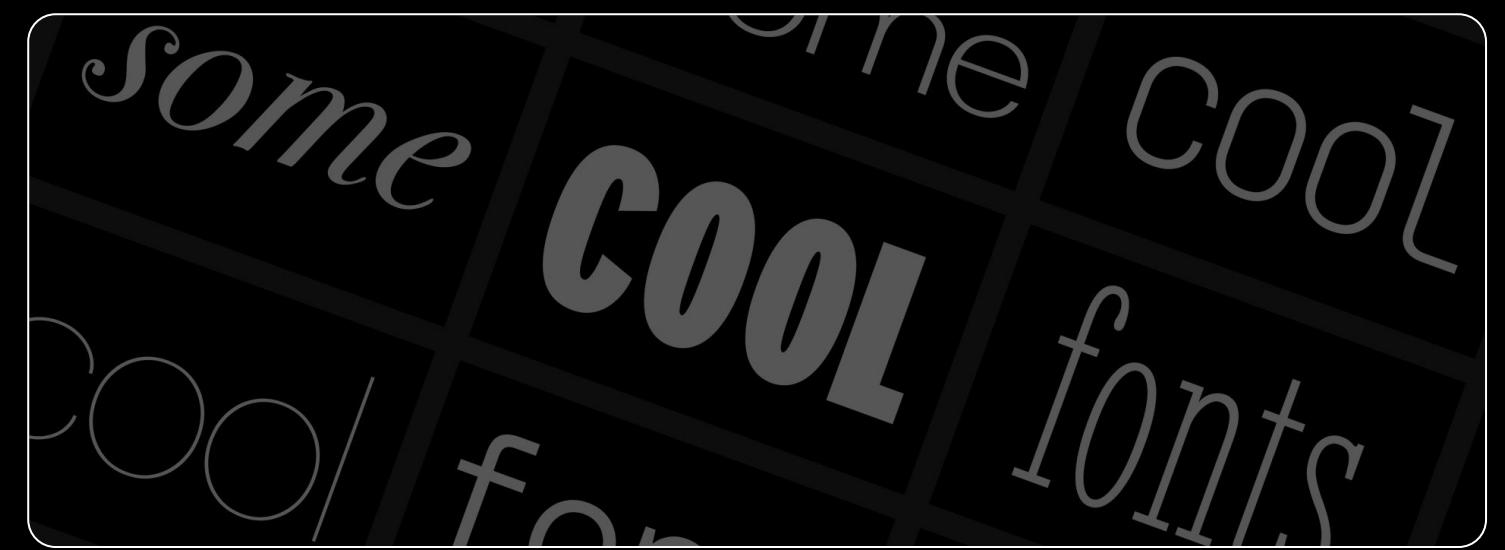


CLion

IDE for C and C++ developers

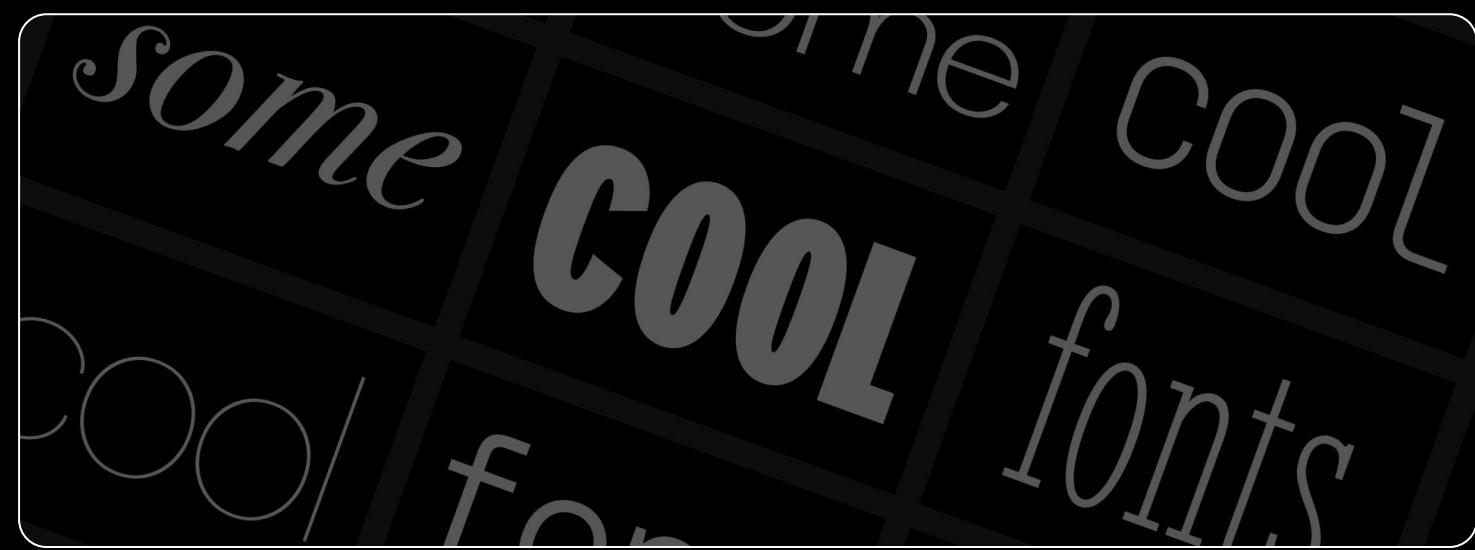
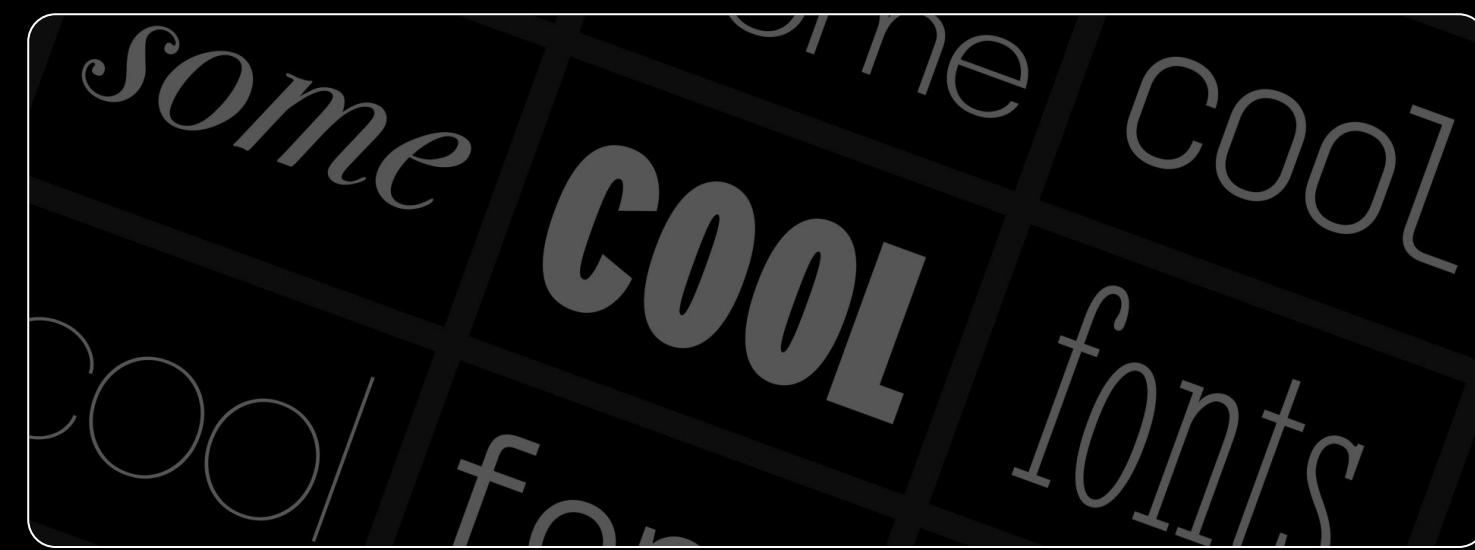
Free for non-commercial use

Our topic - Web fonts



Key to effective
design, branding

Our topic - Web fonts

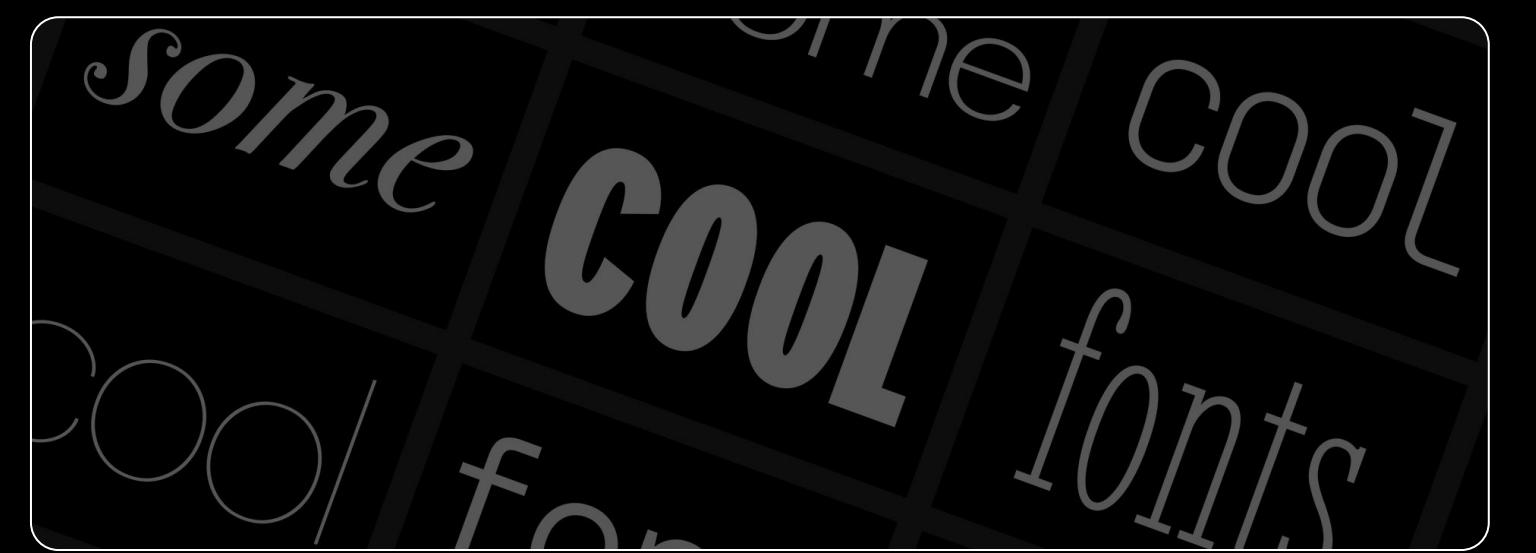
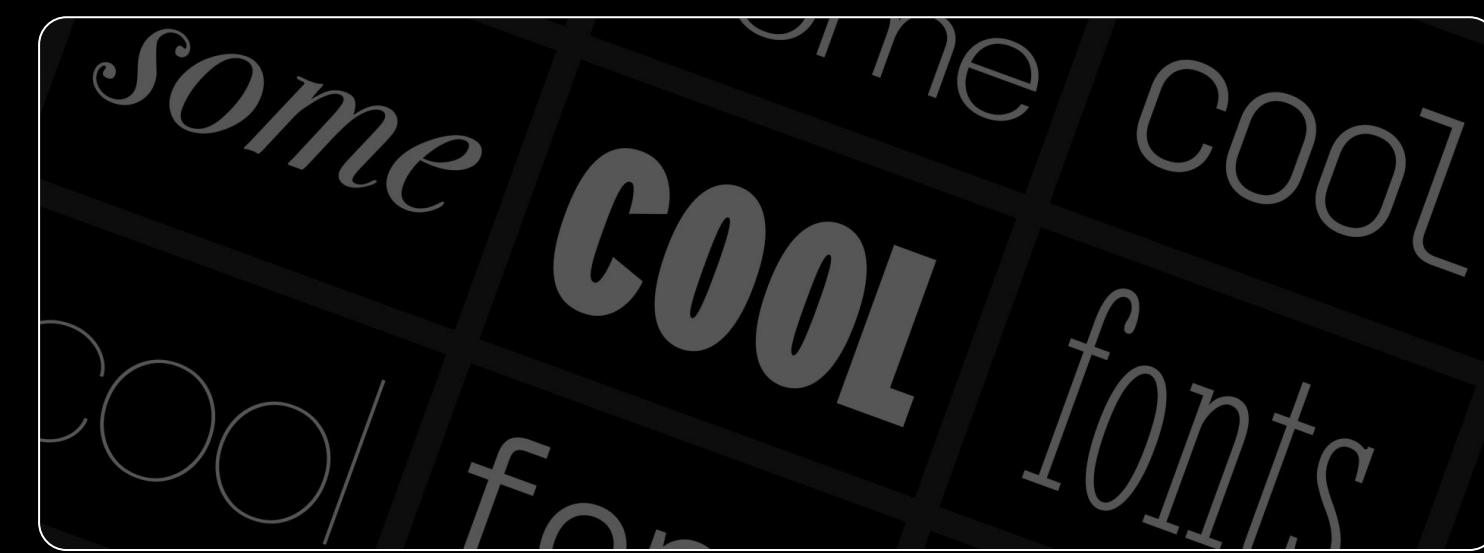
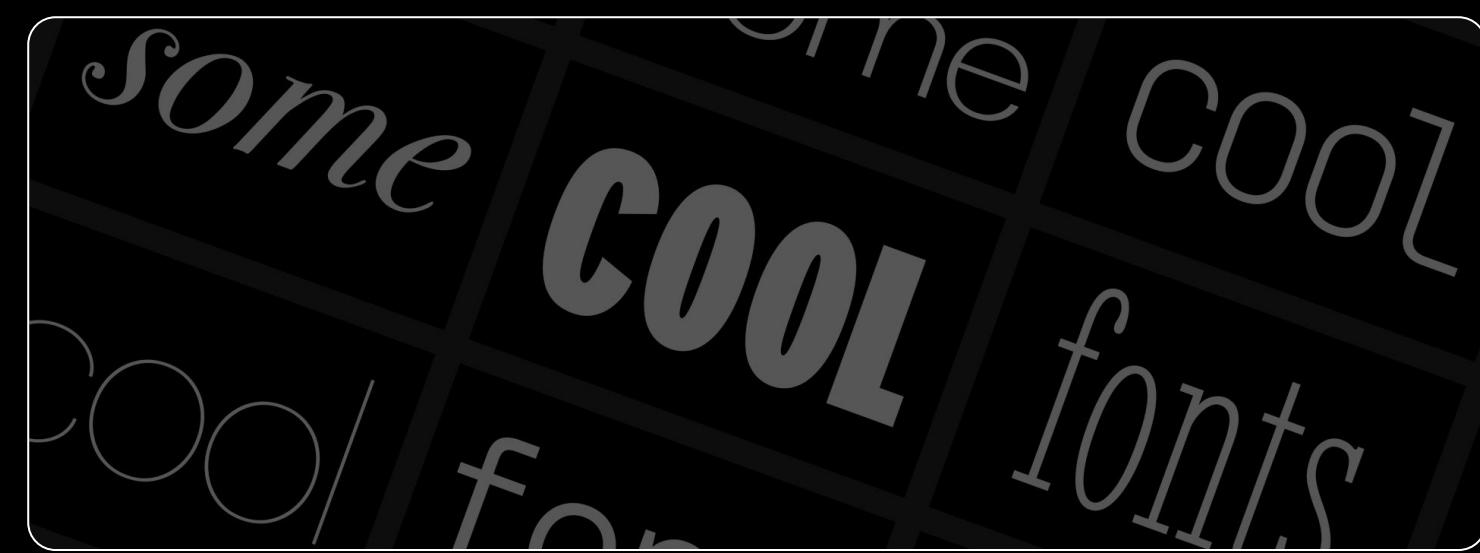


Key to effective
design, branding

Used on 87%
of all websites*

* Source: <https://almanac.httparchive.org/en/2024/fonts>

Our topic - Web fonts



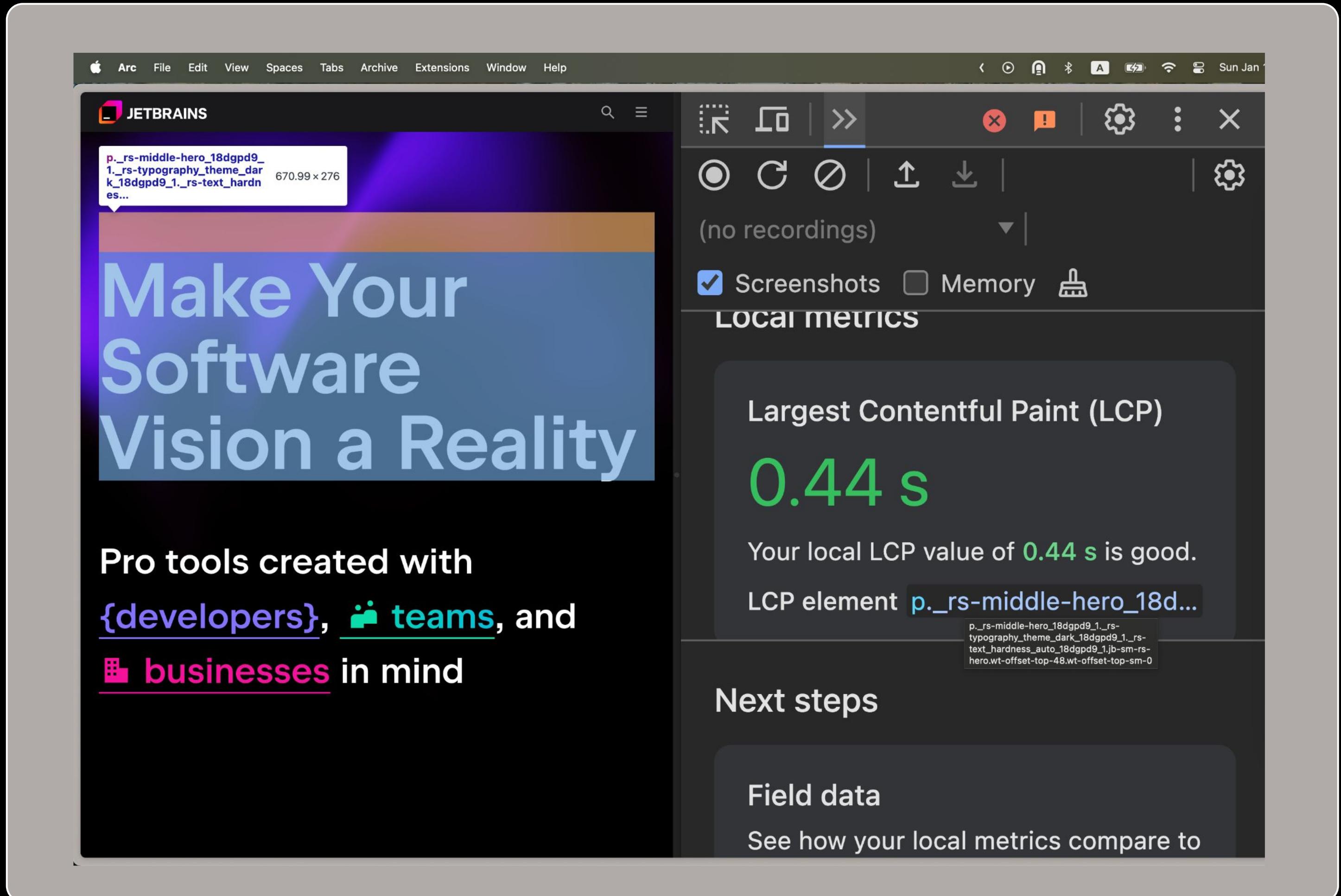
Key to effective
design, branding

Used on 87%
of all websites*

Impact performance
by delaying text
rendering

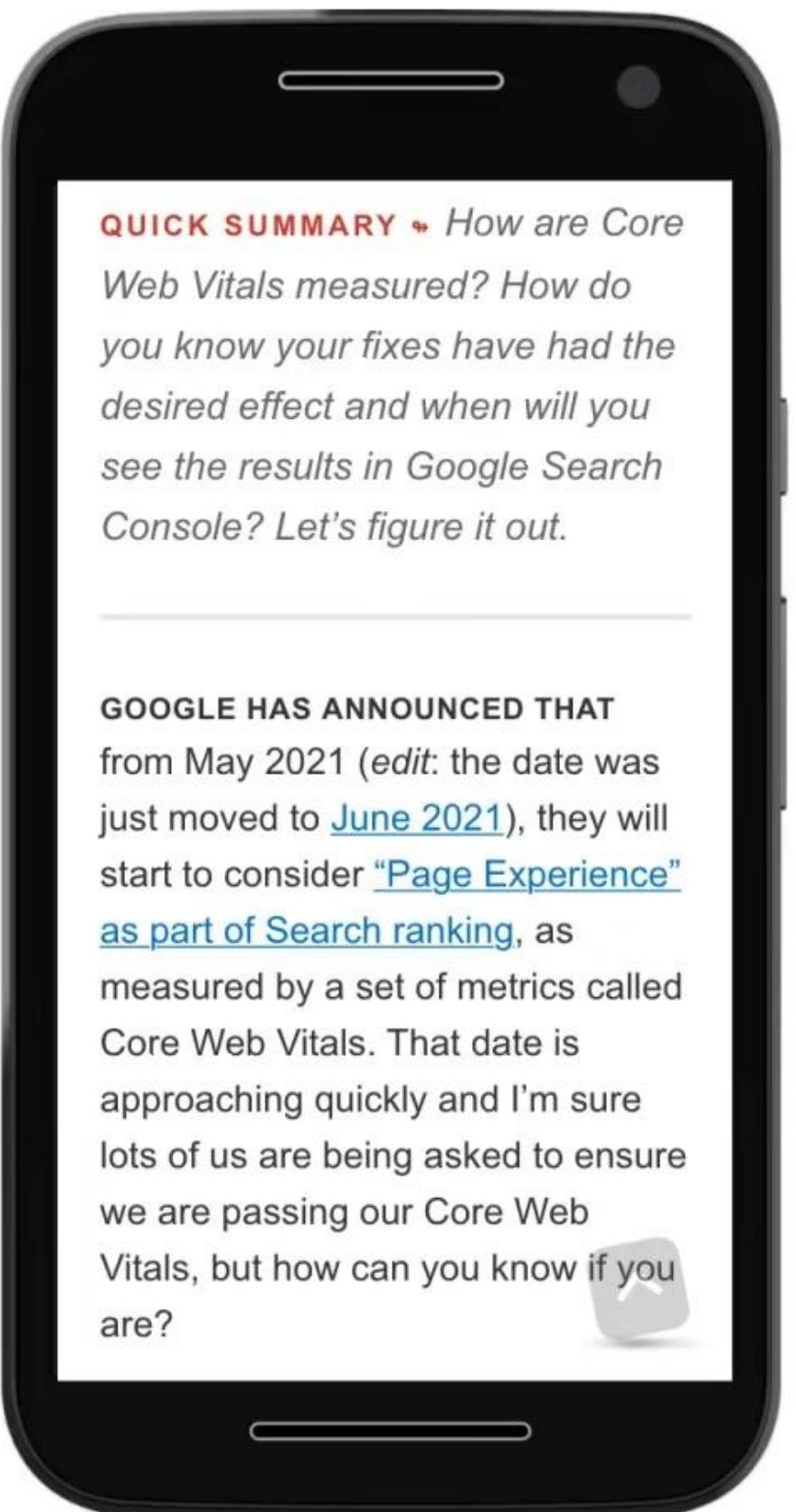
* Source: <https://almanac.httparchive.org/en/2024/fonts>

Impact on Core Web Vitals



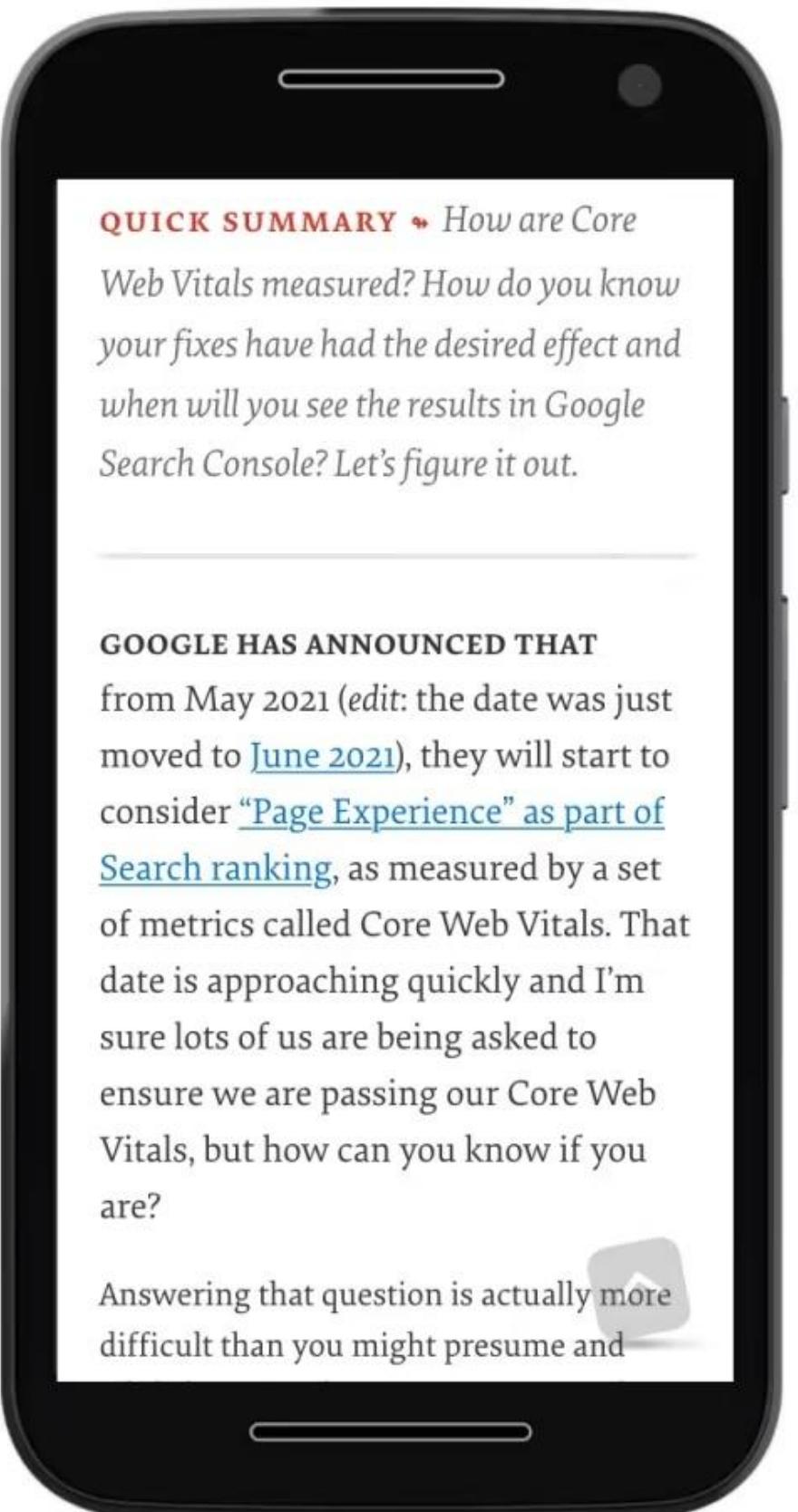
Largest
Contentful
Paint
(LCP)

Impact on Core Web Vitals



Cumulative Layout Shift (CLS)

Impact on Core Web Vitals



Cumulative Layout Shift (CLS)

Our plan

How to reach PerformLand



Easy level



Hard level



Side quests

Easy level

How to reach PerformLand



Easy level



Hard level



Side quests

Easy level: quests



1. Choose a font
2. Choose the most effective font format
3. Write a font definition in CSS
4. Prioritize font loading

Easy level: quests

1. Choose a font

Can we use system fonts?

- + No fonts are loaded
- Inconsistent design

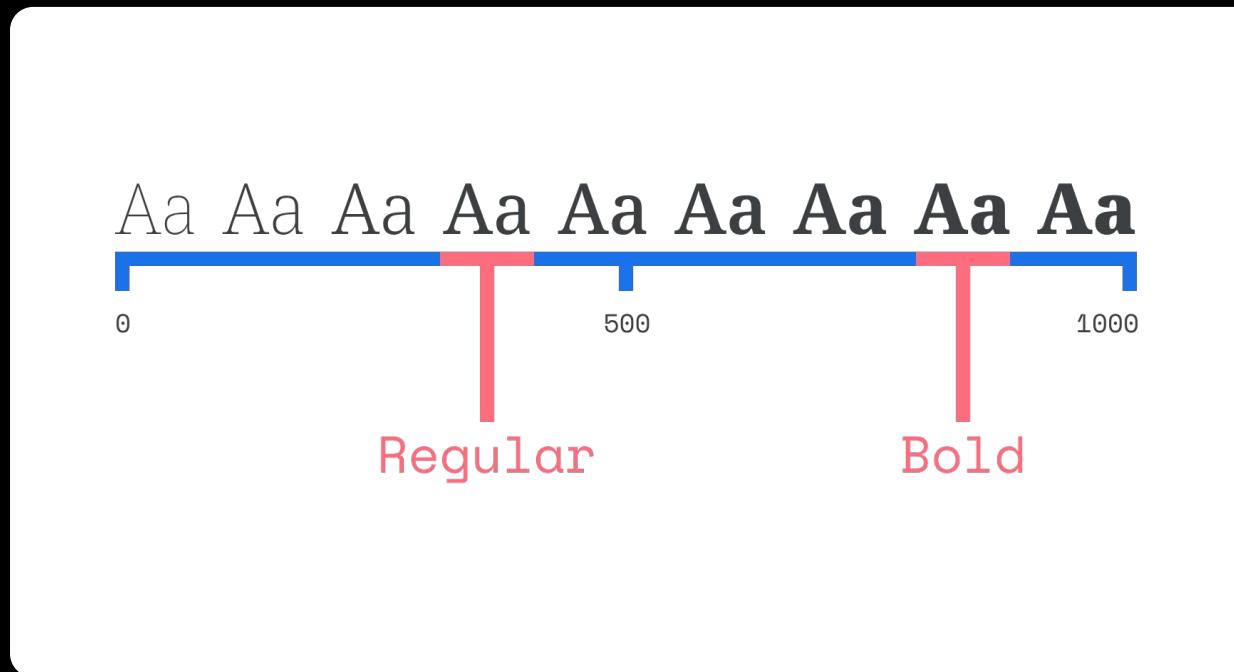


Easy level: quests

1. Choose a font

Can we use variable fonts?

- + Flexible
- Larger size than single static font



Variable fonts WD

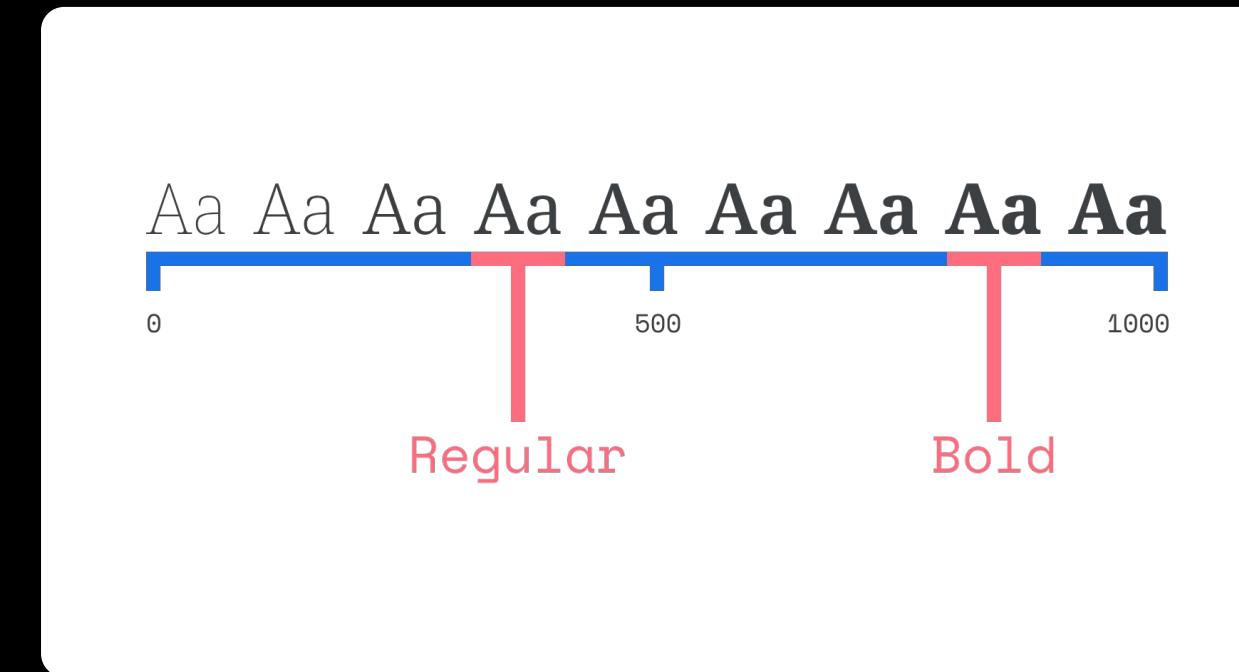
 **Baseline** Widely available across major browsers ? | <https://caniuse.com/variable-fonts>

Easy level: quests

1. Choose a font

Can we use variable fonts?

- + Flexible
- Larger size than single static font



Variable fonts

Baseline Widely available across major browsers [?](#) | <https://caniuse.com/variable-fonts>

JetBrainsSans-Variable

59KB



JetBrainsSans-Regular + JetBrainsSans-Bold

76KB (37KB+39KB)

Easy level: quests



1. Choose a font
2. Choose the most effective font format
3. Write a font definition in CSS
4. Prioritize font loading

Easy level: quests

2. Choose the most effective font format

"Use only WOFF2 and forget about everything else." – Bram Stein, 2022 Web Almanac

- Modern compressed format
- Wide browser support
- Can be converted from other formats

OTF to WOFF2 Converter

CloudConvert converts your font files online. Amongst many others, we support TTF, OTF and WOFF. No need to download any software.

convert to

<https://cloudconvert.com/woff2-converter>

<https://caniuse.com/woff2>

Easy level: quests



1. Choose a font
2. Choose the most effective font format
3. Write a font definition in CSS
4. Prioritize font loading

Easy level: quests

3. Write a font definition in CSS

Define font:

```
@font-face {  
    font-family: 'JetBrains Sans';  
    src: url('/path/to/fonts/JetBrainsSans-Variable.woff2') format('woff2-variations');  
    font-display: swap;  
    font-weight: 100 900;  
    font-style: normal;  
}
```

Apply font:

```
body {  
    font-family: 'JetBrains Sans', 'Arial', sans-serif;  
}
```

Easy level: quests

3. Write a font definition in CSS

Define font:

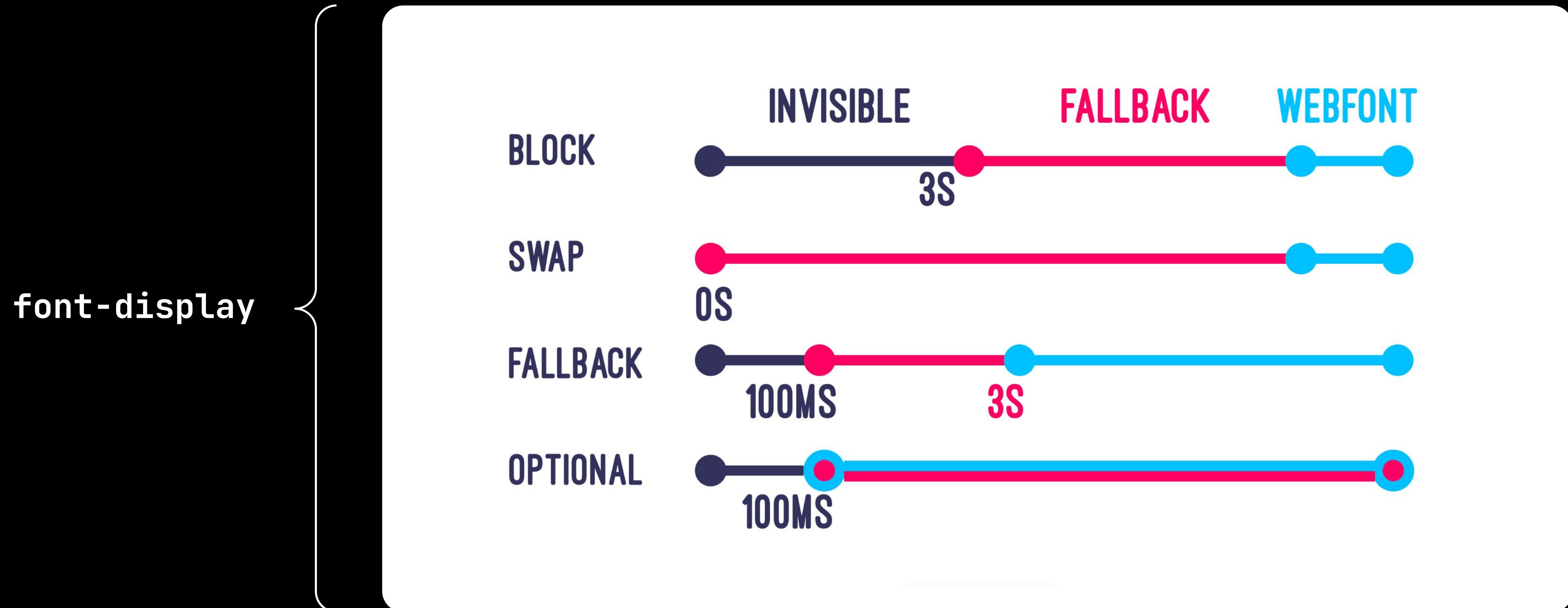
```
@font-face {  
    font-family: 'JetBrains Sans';  
    src: url('/path/to/fonts/JetBrainsSans-Variable.woff2') format('woff2-variations');  
    font-display: swap;  
    font-weight: 100 900;  
    font-style: normal;  
}
```

Apply font:

```
body {  
    font-family: 'JetBrains Sans', 'Arial', sans-serif;  
}
```

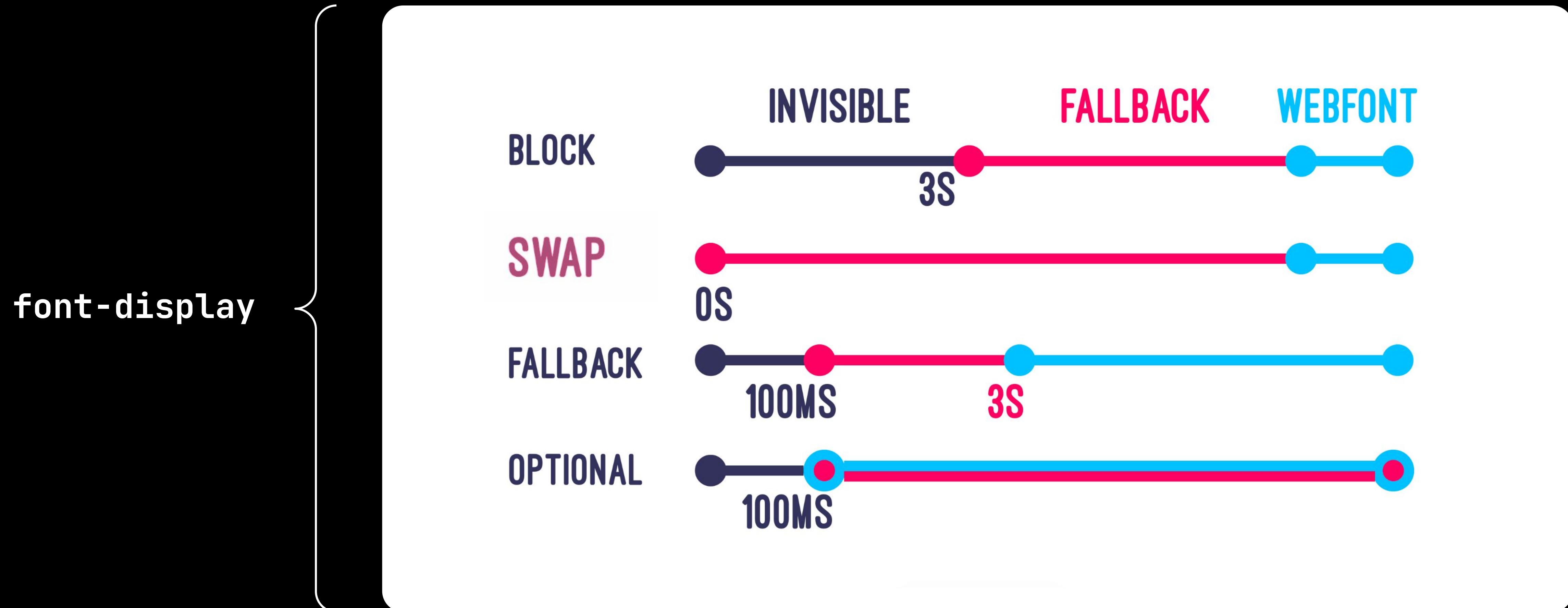
Easy level: quests

3. Write a font definition in CSS



Easy level: quests

3. Write a font definition in CSS



Easy level: quests

3. Write a font definition in CSS

font-display: block;

Invisible



Web font



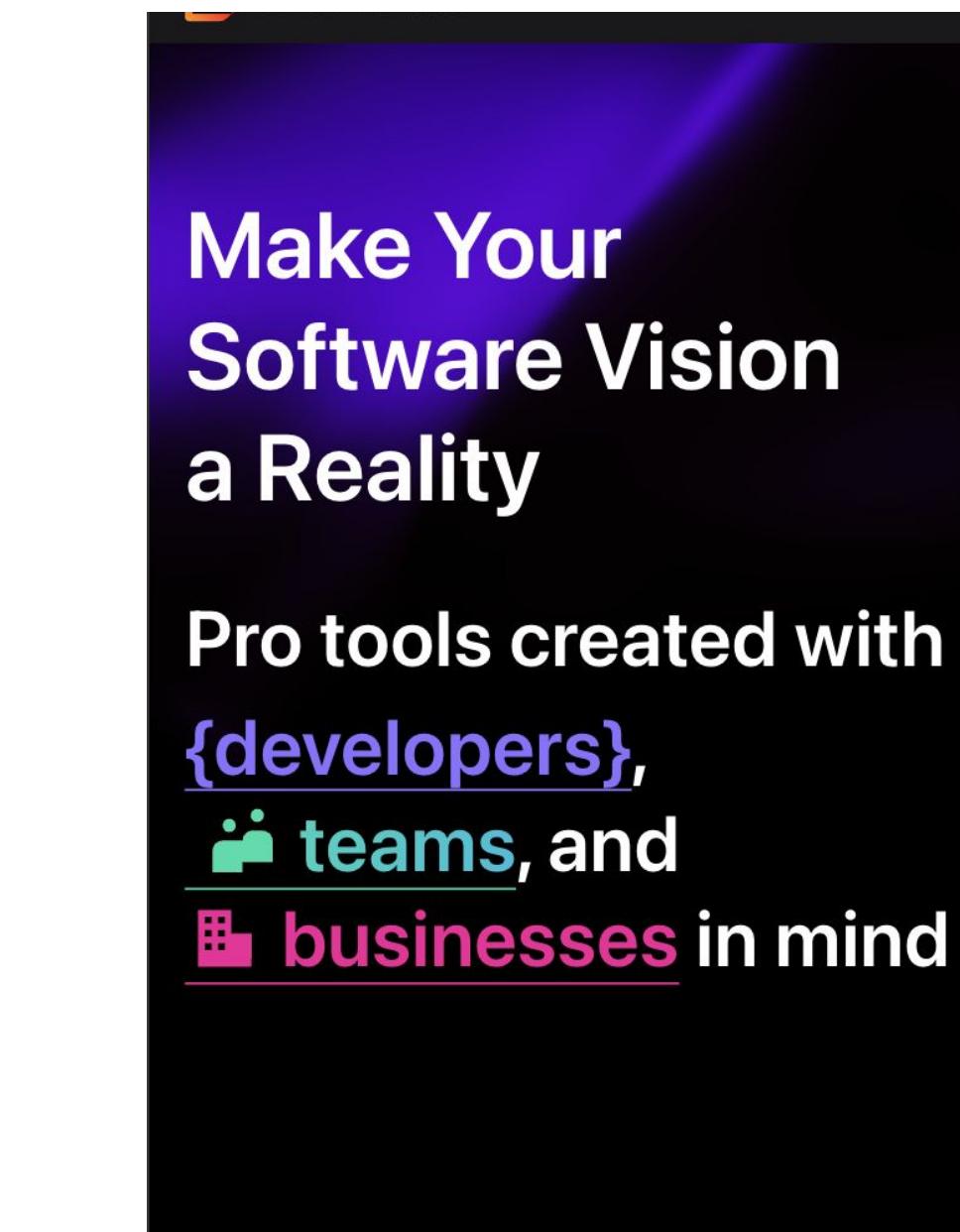
JetBrains Sans

Easy level: quests

3. Write a font definition in CSS

`font-display: swap;`

Fallback



Arial

Web font



JetBrains Sans

Easy level: quests



- 1. Choose a font**
- 2. Choose the most effective font format**
- 3. Write a font definition in CSS**
- 4. Prioritize font loading**

Easy level: quests

4. Prioritize font loading

Preload font:

```
<link rel="preload" as="font"  
      href="https://resources.jetbrains.com/.../JetBrainsSans[wght].woff2"  
      crossorigin>
```

Easy level: quests

4. Prioritize font loading

Preload font:

```
<link rel="preload" as="font"  
      href="https://resources.jetbrains.com/.../JetBrainsSans[wght].woff2"  
      crossorigin>
```

Before you preload:

- self-host Google fonts ([fontsource.org](#))
- inline @font-face definitions in HTML
- preconnect to third-party (Google)

Easy level: quests

4. Prioritize font loading

Before:

Name
www.jetbrains.com
26613100737.js
common.1db201859752f631904d.css
default-page.06f0ccfa34bde55ea699.css
index.entry.645d144d6d5fdcb0fafa.css
common.cefeb1437f7443ff671f.js
default-page.f3bf6e0f9ddf6aba01a1.js
index.entry.ee0397916dc44b1883ce.js
banner-rotator.entry.525d050d4d6ff023d38...
banner-rotator.entry.2c27e4c156d93fcbb75cf....
geo4.js
gtm.js?id=GTM-5P98
a26669750187.html
39827.06226a3079d4b5fa87bb.js
data:image/png;base...
countries.json?locale=en-us
cart.json
JetBrainsSans-SemiBold.woff2
JetBrainsSans-Regular.woff2
ide-services-ba-sm.png
JetBrainsSans[wght].woff2
ai-screen.svg
pycharm.svg
webstorm.svg
idea.svg
rider.gif

After:

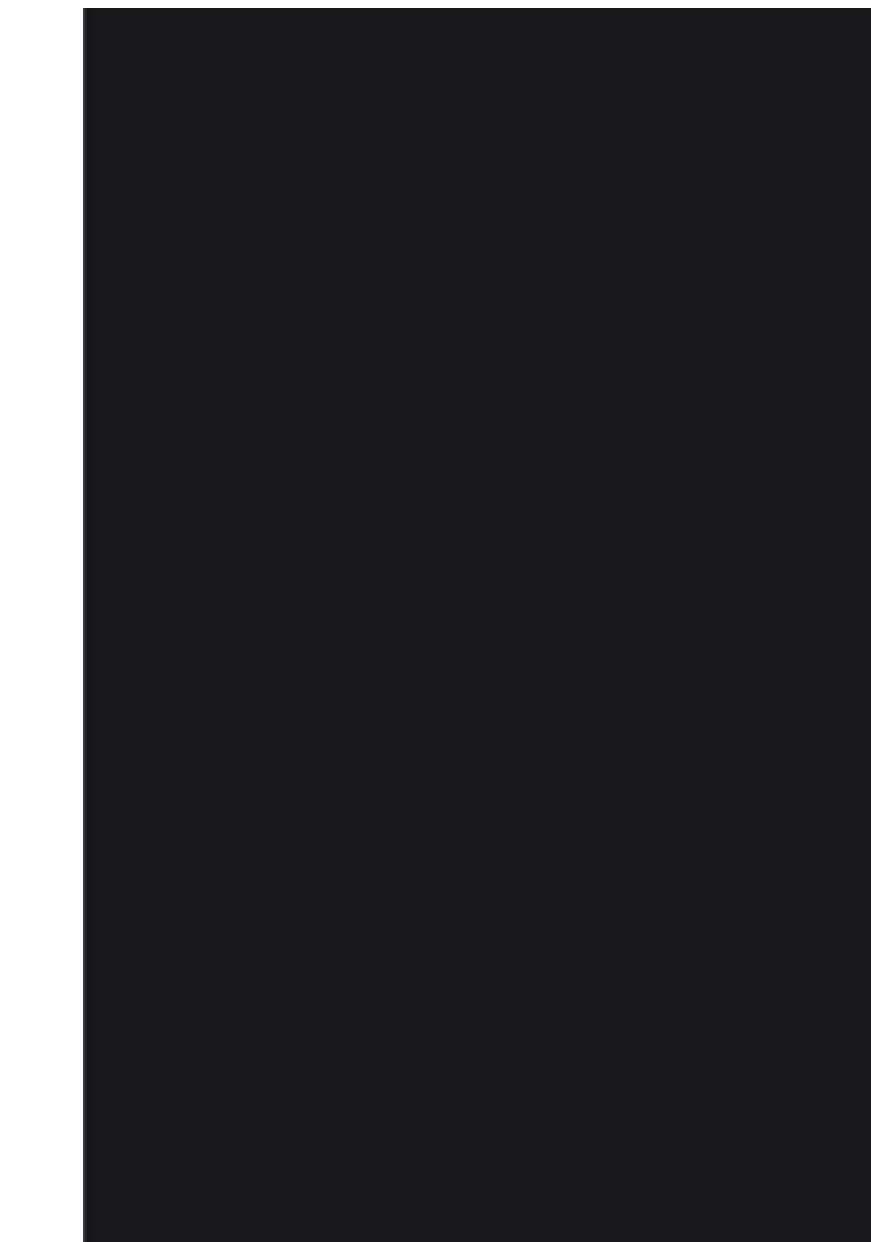
Name
www.jetbrains.com
JetBrainsSans[wght].woff2
default-page.06f0ccfa34bde55ea699.css
26613100737.js
common.1db201859752f631904d.css
index.entry.645d144d6d5fdcb0fafa.css
common.cefeb1437f7443ff671f.js
default-page.f3bf6e0f9ddf6aba01a1.js
index.entry.ee0397916dc44b1883ce.js
banner-rotator.entry.525d050d4d6ff023d38...
banner-rotator.entry.2c27e4c156d93fcbb75cf....
geo4.js
gtm.js?id=GTM-5P98
events
collect?en=page_view&dl=https%3A%2F%2...
js?id=G-9J976DJZ68&l=dataLayer&cx=c>...
sw_iframe.html?origin=https%3A%2F%2Fww...
js?id=G-M8TDRXFQH&l=dataLayer&cx=c&g...
collect?v=2&tid=G-M8TDRXFQH>m=45je...
39827.06226a3079d4b5fa87bb.js
data:image/png;base...
destination?id=AW-1071903267&l=dataLayer...
countries.json?locale=en-us
cart.json
ide-services-bg-sm.png
ai-screen.svg

Easy level: quests

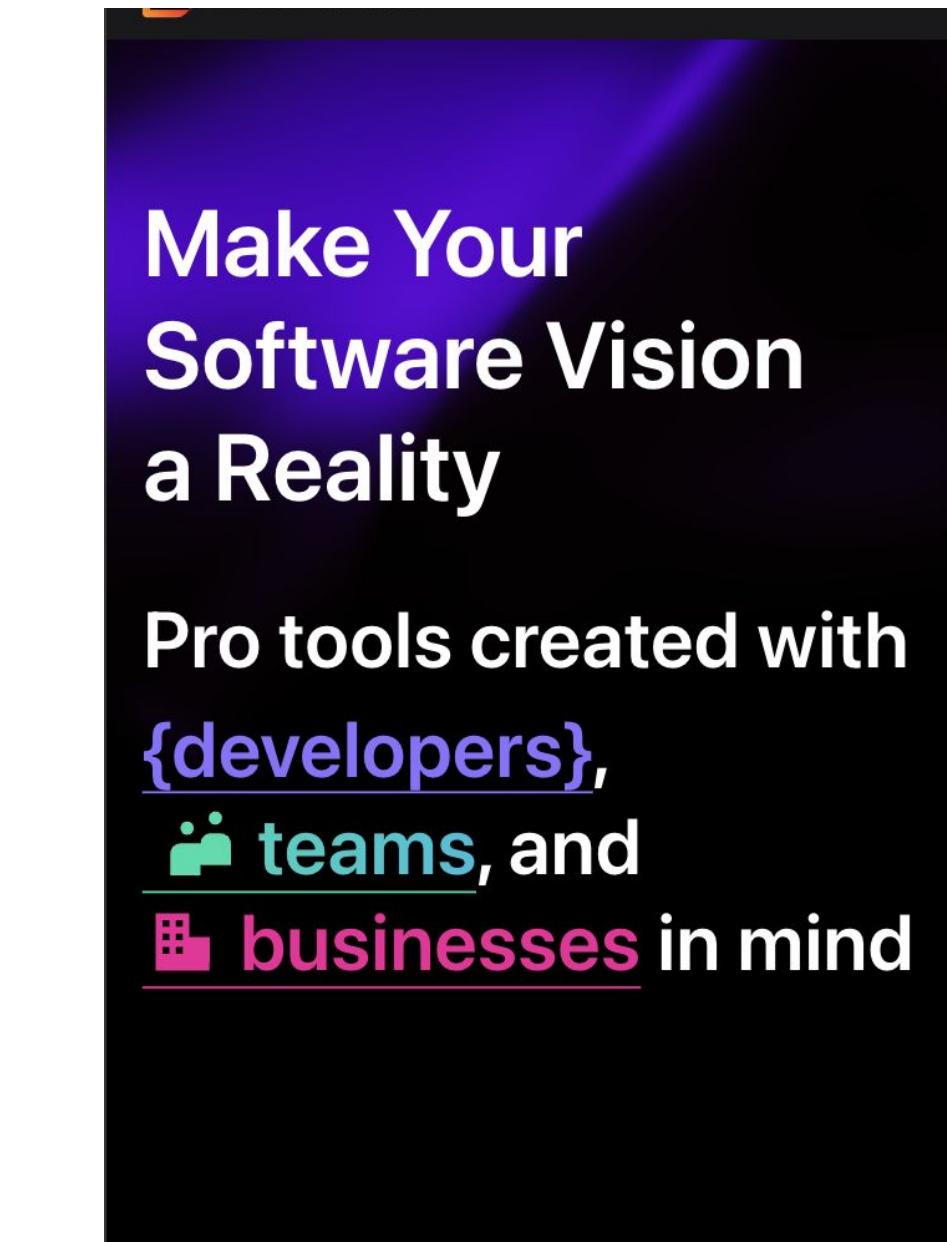
4. Prioritize font loading

No preloading

Initial



Fallback



Arial

Web font



JetBrains Sans

Easy level: quests

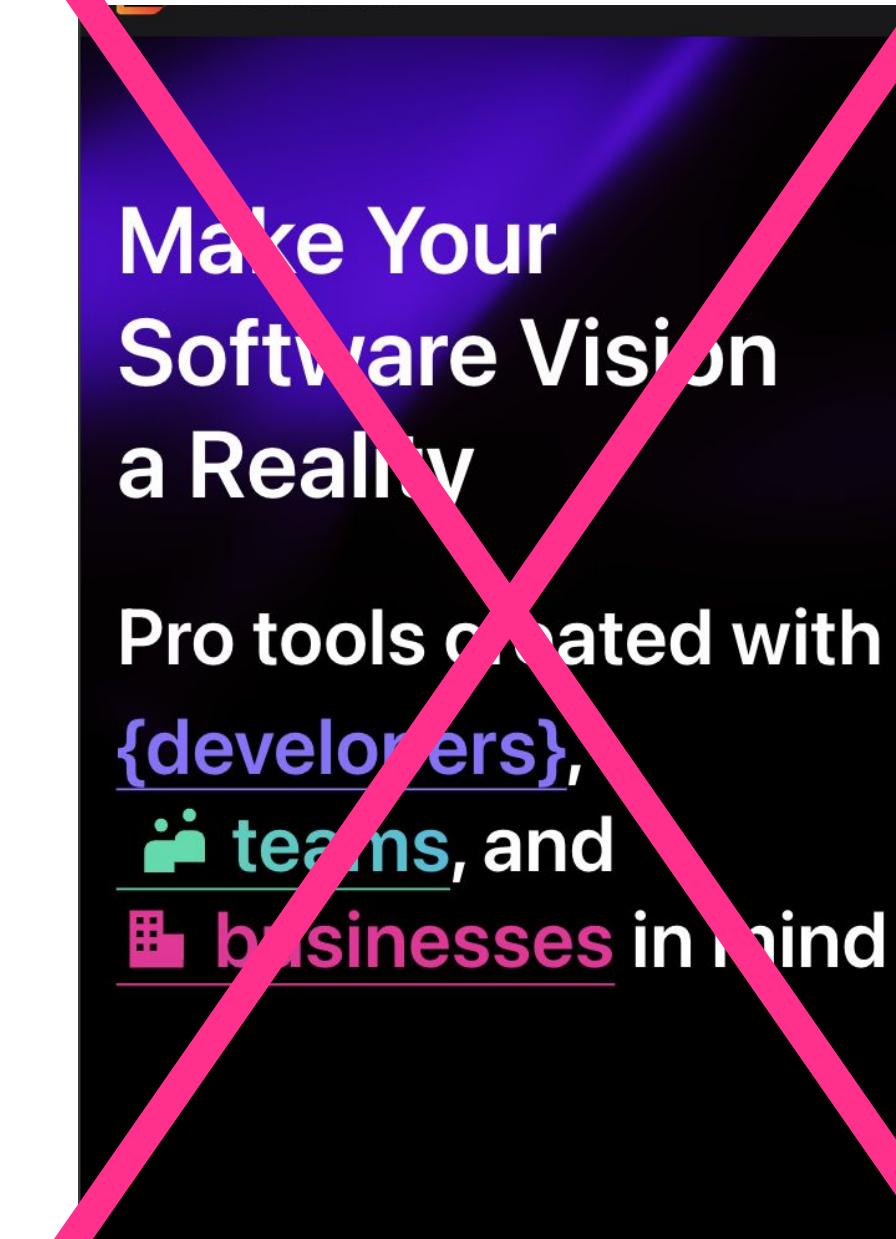
4. Prioritize font loading

With preloading

Initial



Fallback



Arial

Web font



JetBrains Sans

Easy level: quests



1. Choose a font
2. Choose the most effective font format
3. Write a font definition in CSS
4. Prioritize font loading

Easy level: quests



1. Choose a font
2. Choose the most effective font format
3. Write a font definition in CSS
4. Prioritize font loading



ACHIEVEMENT UNLOCKED
Completed the easy level

Easy level: quests



1. Choose a font
System font / Variable font
2. Choose the most effective font format
3. Write a font definition in CSS
4. Prioritize font loading

Easy level: quests



1. Choose a font
System font / Variable font
2. Choose the most effective font format
WOFF2
3. Write a font definition in CSS
4. Prioritize font loading

Easy level: quests



1. Choose a font
System font / Variable font
2. Choose the most effective font format
WOFF2
3. Write a font definition in CSS
font-display: swap
4. Prioritize font loading

Easy level: quests



1. Choose a font
System font / Variable font
2. Choose the most effective font format
WOFF2
3. Write a font definition in CSS
font-display: swap
4. Prioritize font loading
<link rel=preload>

Easy level

How to reach PerformLand



Easy level



Hard level



Side quests

Hard level

How to reach PerformLand



Easy level



Hard level



Side quests

Hard level: quests



1. Reduce the file size of fonts
2. Prevent layout shift
3. Cache fonts

Hard level: quests

1. Reduce the file size of fonts

Cookie banner on [JetBrains.com](#)



JetBrainsMono-Bold.woff2 - 92KB

Hard level: quests

1. Reduce the file size of fonts



wakamaifondue.com

Hard level: quests

1. Reduce the file size of fonts

1362 characters														<input type="checkbox"/> Layout features	
D	!	"	#	\$	%	&	'	()	*					
20	21	22	23	24	25	26	27	28	29	2A					
+	,	-	.	/	0	1	2	3	4	5	6				
2B	2C	2D	2E	2F	30	31	32	33	34	35	36				
7	8	9	:	;	<	=	>	?	@	A	B				
37	38	39	3A	3B	3C	3D	3E	3F	40	41	42				
C	D	E	F	G	H	I	J	K	L	M	N				
43	44	45	46	47	48	49	4A	4B	4C	4D	4E				
O	P	Q	R	S	T	U	V	W	X	Y	Z				
4F	50	51	52	53	54	55	56	57	58	59	5A				

- 1362 characters
- 48 languages with latin and cyrillic alphabet
- Many specific characters

Hard level: quests

1. Reduce the file size of fonts

Subsetting - removing unused characters from the font.

Tool for subsetting - Glyphhanger (github.com/zachleat/glyphhanger)

```
glyphhanger --subset=JetBrainsMono-Bold.woff2 --LATIN
```

Hard level: quests

1. Reduce the file size of fonts

Subsetting - removing unused characters from the font.

Tool for subsetting - Glyphhanger (github.com/zachleat/glyphhanger)

```
glyphhanger --subset=JetBrainsMono-Bold.woff2 --LATIN
```

Initial font	
Characters	1362
Size	92KB
Languages	48

Hard level: quests

1. Reduce the file size of fonts

Subsetting - removing unused characters from the font.

Tool for subsetting - Glyphhanger (github.com/zachleat/glyphhanger)

```
glyphhanger --subset=JetBrainsMono-Bold.woff2 --LATIN
```

	Initial font	Subset
Characters	1362	240
Size	92KB	35KB
Languages	48	22

Hard level: quests

1. Reduce the file size of fonts

Generate CSS font definition:

```
glyphhanger --subset=./JetBrainsMono-Bold.woff2 --LATIN --css --formats=woff2
```

Output:

```
@font-face {  
    src: url(JetBrainsMono-Bold.woff2) format("woff2");  
    unicode-range:  
        U+0-FF, U+131, U+152, U+153, U+2BB, U+2BC, U+2C6, U+2DA, U+2DC, U+2000-206F,  
        U+2074, U+20AC, U+2122, U+2191, U+2193, U+2212, U+2215, U+FEFF, U+FFF; }  
}
```

Hard level: quests

1. Reduce the file size of fonts

Generate CSS font definition:

```
glyphhanger --subset=./JetBrainsMono-Bold.woff2 --LATIN --css --formats=woff2
```

Output:

```
@font-face {  
    src: url(JetBrainsMono-Bold.woff2) format("woff2");  
    unicode-range:  
        U+0-FF, U+131, U+152, U+153, U+2BB, U+2BC, U+2C6, U+2DA, U+2DC, U+2000-206F,  
        U+2074, U+20AC, U+2122, U+2191, U+2193, U+2212, U+2215, U+FEFF, U+FFF0;  
}
```

Hard level: quests



1. Reduce the file size of fonts
2. Prevent layout shift
3. Cache fonts

Hard level: quests

2. Prevent layout shift

Define font:

```
@font-face {  
    font-family: 'JetBrains Sans';  
    src: url('/path/to/fonts/JetBrainsSans-Variable.woff2') format('woff2-variations');  
    font-display: swap;  
    font-weight: 100 900;  
    font-style: normal;  
}
```

Apply font:

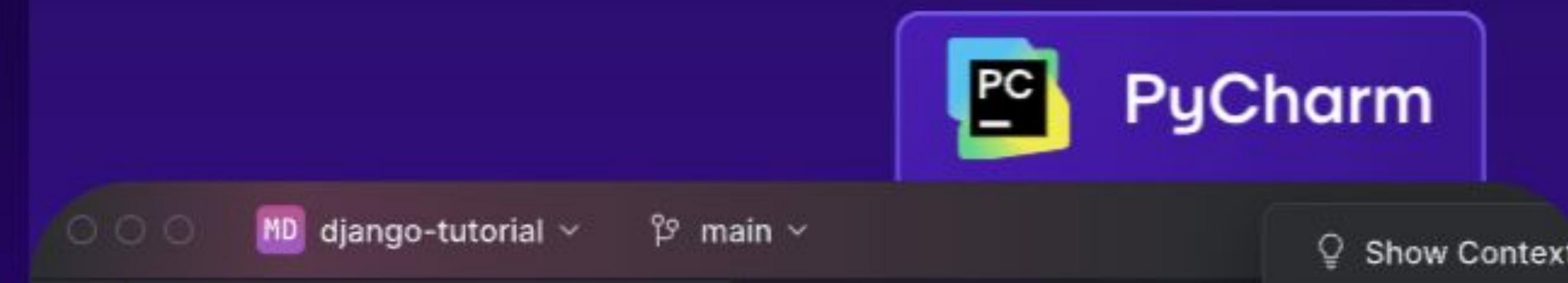
```
body {  
    font-family: 'JetBrains Sans', 'Arial', sans-serif;  
}
```

Hard level: quests

2. Prevent layout shift

Fallback:

Mission-critical tools and a wide variety of supported languages and frameworks are at your fingertips – no plugin hassle included.



Hard level: quests

2. Prevent layout shift

Web font:

Mission-critical tools and a wide variety of supported languages and frameworks are at your fingertips – no plugin hassle included.

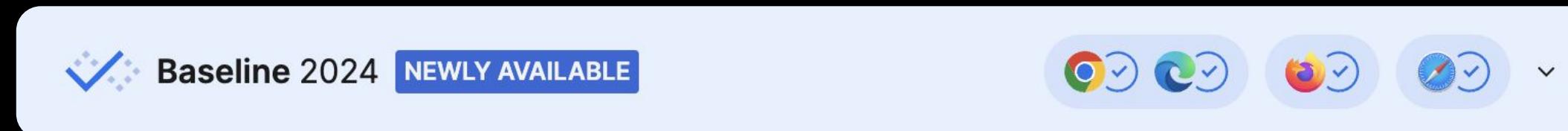


PyCharm

Hard level: quests

2. Prevent layout shift

size-adjust



ascent-override / descent-override



line-gap-override



```
@font-face {  
  font-family: 'Adjusted Arial Fallback';  
  src: local(Arial);  
  size-adjust: 110%;  
  ascent-override: 88%;  
  descent-override: normal;  
  line-gap-override: 0%;  
}
```

Mission critical tools and wide variety of supported languages and frameworks are at your fingertips - no plugin hassle included

Fallback Font (adjusted)

Preview Toggle Brand Font

Fallback Font: Arial

Adjust Fallback:

Ascent Override:

Descent Override:

Line-Gap Override:

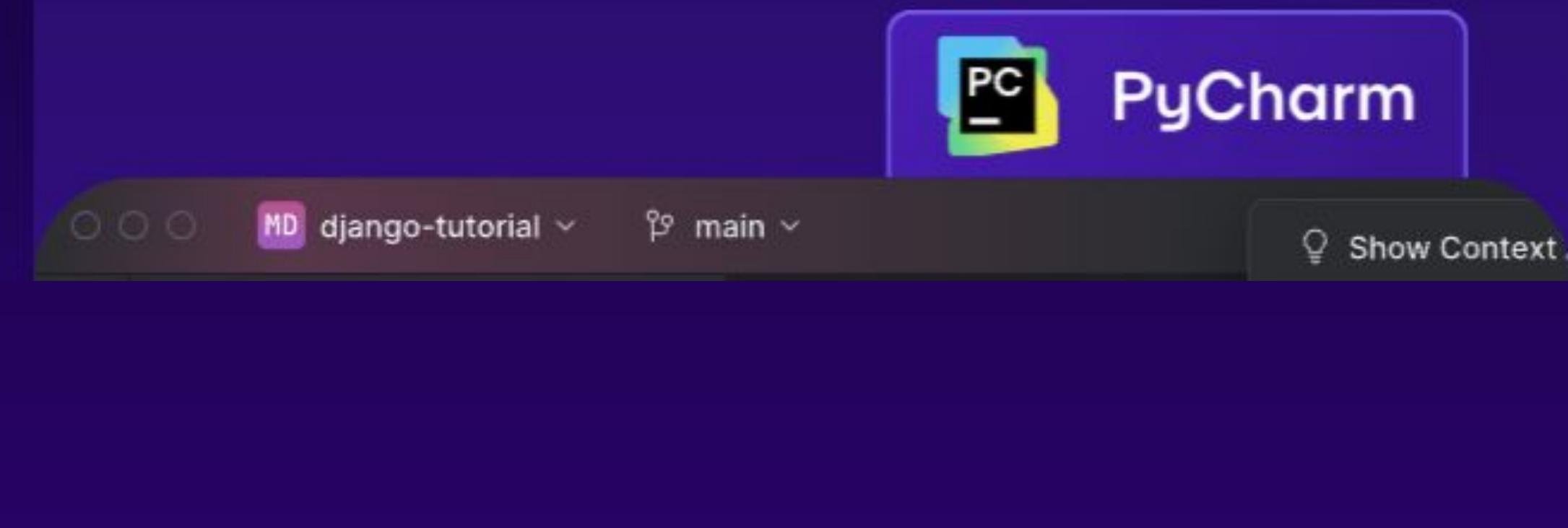
Font Size Adjust

Hard level: quests

2. Prevent layout shift

Fallback

Mission-critical tools and a wide variety of supported languages and frameworks are at your fingertips – no plugin hassle included.



```
.block {  
    font-family: 'JetBrains Sans', 'Arial',  
    sans-serif;  
}
```

Hard level: quests

2. Prevent layout shift

Adjusted fallback

Mission-critical tools and a wide variety of supported languages and frameworks are at your fingertips – no plugin hassle included.



PyCharm

```
.block {  
    font-family: 'JetBrains Sans', 'Adjusted  
    Arial Fallback', 'Arial', sans-serif;  
}
```

Hard level: quests

2. Prevent layout shift

Web font

Mission-critical tools and a wide variety of supported languages and frameworks are at your fingertips – no plugin hassle included.



```
.block {  
    font-family: 'JetBrains Sans', 'Adjusted  
    Arial Fallback', 'Arial', sans-serif;  
}
```

Hard level: quests



1. Reduce the file size of fonts
2. Prevent layout shift
3. Cache fonts

Hard level: quests

3. Cache fonts

Cache fonts for 1 year with HTTP header

```
Cache-Control = "public, max-age=31536000"
```

Hard level: quests



1. Reduce the file size of fonts
2. Prevent layout shift
3. Cache fonts

Hard level: quests



1. Reduce the file size of fonts
2. Prevent layout shift
3. Cache fonts



ACHIEVEMENT UNLOCKED
Completed the hard level

Hard level: quests



1. Reduce the file size of fonts
Subsetting

2. Prevent layout shift

3. Cache fonts

Hard level: quests



1. Reduce the file size of fonts
Subsetting

2. Prevent layout shift
Modern CSS (size-adjust)

3. Cache fonts

Hard level: quests



1. Reduce the file size of fonts
Subsetting

2. Prevent layout shift
Modern CSS (size-adjust)

3. Cache fonts
Cache-Control = "public, max-age=31536000"

Hard level

How to reach PerformLand



Easy level



Hard level



Side quests

Side quests

How to reach PerformLand



Easy level



Hard level



Side quests

Side quests: automation for font optimizations



1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests

1. Load font data from providers

unifont - *Framework agnostic tools for accessing data from font CDNs and providers*

```
import { createUnifont, providers } from 'unifont'

const unifont = await createUnifont([
  providers.google(),
])

const fonts = await unifont.resolveFont('Poppins')

console.log(fonts)
```

github.com/unjs/unifont

Side quests: automation for font optimizations

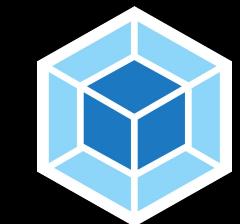


1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests

2. Apply font fallbacks automatically

fontaine - *Automatic font fallback based on font metrics*



```
import { FontaineTransform } from 'fontaine'
import { defineConfig } from 'vite'

export default defineConfig({
  plugins: [
    FontaineTransform.vite({
      fallbacks: ['Arial'],
      // resolve absolute URL → file
      resolvePath: id => new URL(`.${id}`, import.meta.url),
    }),
  ],
})
```

github.com/unjs/fontaine

Side quests



1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests

3. Generate @font-face automatically

fontless - *Magical plug-and-play font optimization for modern web applications*



```
import react from '@vitejs/plugin-react-swc'  
import { fontless } from 'fontless'  
import { defineConfig } from 'vite'  
  
export default defineConfig({  
  plugins: [react(), fontless()],  
})
```

github.com/unjs/fontaine/tree/main/packages/fontless

Side quests: automation for font optimizations



Daniel Roe

1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests: automation for font optimizations



Daniel Roe

1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests

4. Use framework plugin

next/font plugin - Optimization of fonts and removal of external network requests



```
import { Inter } from "next/font/google";

const inter = Inter({ subsets: ["latin"], display: "swap" });

export default function RootLayout({ children }: { children: React.ReactNode }) {
  return (
    <html lang="en" className={inter.className}>
      <body>{children}</body>
    </html>
  );
}
```

[Next.js - next/font](#)

Side quests: automation for font optimizations



1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests: automation for font optimizations



1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin



ACHIEVEMENT UNLOCKED
Completed the side quests

Side quests: automation for font optimizations



1. Load font data from providers
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests: automation for font optimizations



1. Load font data from providers
unifont
2. Apply font fallbacks automatically
3. Generate @font-face automatically
4. Use framework plugin

Side quests: automation for font optimizations



1. Load font data from providers
unifont
2. Apply font fallbacks automatically
fontaine
3. Generate @font-face automatically
4. Use framework plugin

Side quests: automation for font optimizations



1. Load font data from providers
unifont
2. Apply font fallbacks automatically
fontaine
3. Generate @font-face automatically
fontless
4. Use framework plugin

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1. Load font data from providers
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next/font

Performland



Final thoughts

How to reach PerformLand



Easy level



Hard level



Side quest

Final thoughts

How to reach PerformLand

- System font / Variable font
- WOFF2
- font-display: swap
- <link rel=reload>

- Subsetting
- Modern CSS (size-adjust)
- Cache-Control = "public, max-age=31536000"

- unifont
- fontaine
- fontless
- next/font

Thank you!



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Links and Slides



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