

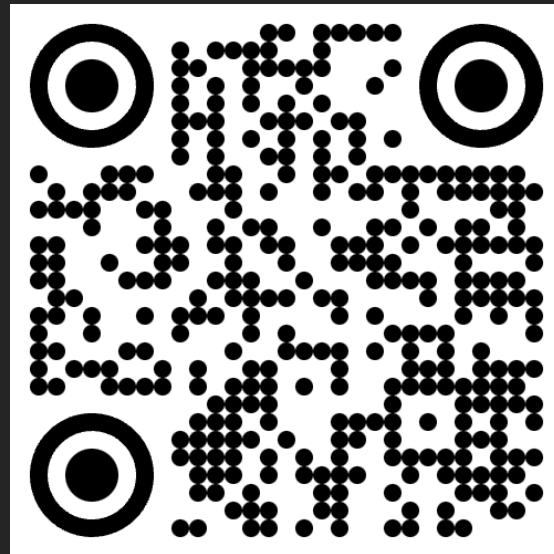
Who Am I?



Keyur Paralkar

Front-end developer 🧑💻; Book enthusiasts 📖; Love to Unravel and Build Complex UIs

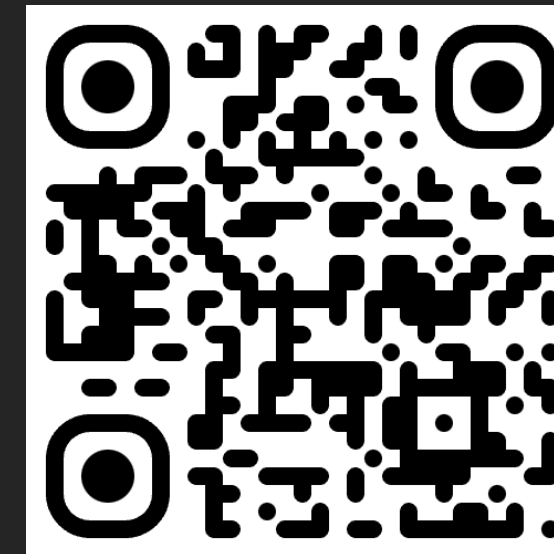
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Render Million Rows by Drawing

By Keyur Paralkar

The What?

- We are trying to solve a scenario where we need to render millions of rows on the browser

The Why?

- Exploring uncommon solutions
- Understanding products like: Google Sheets and [Glide Data Grids](#)
- Explore topics such as Infinite Scrolls in data grids

The How?



Loading the Data



The How?



Loading the Data



Initialising the canvases

The How?



Loading the Data



Drawing on Scroll



Initialising the canvases

Loading The Data

- Download the data on click of button

Initialising the canvases: The DOM structure

| Index | Customer Id | First Name | Last Name | Company | City | Country | Phone 1 |
|-------|-------------|------------|-----------|------------|------------|------------|------------|
| 1 | DD37Cf9... | Sheryl | Baxter | Rasmuss... | East Le... | Chile | 229.077... |
| 2 | 1Ef7b82... | Preston... | Lozano | Vega-Ge... | East Ji... | Djibout... | 5153435... |
| 3 | 6F94879... | Roy | Berry | Murillo... | Isabelb... | Antigua... | +1-539-... |
| 4 | 5Cef8BF... | Linda | Olsen | Domingu... | Bensonv... | Dominic... | 001-808... |
| 5 | 053d585... | Joanna | Bender | Martin,... | West Pr... | Slovaki... | 001-234... |
| 6 | 2d08FB1... | Aimee | Downs | Steele ... | Chavezb... | Bosnia ... | (283)43... |
| 7 | EA4d384... | Darren | Peck | Lester,... | Lake An... | Pitcair... | (496)45... |
| 8 | 0e04AFd... | Brett | Mullen | Sanford... | Kimport... | Bulgari... | 001-583... |
| 9 | C2dE4dE... | Sheryl | Meyers | Brownin... | Roberso... | Cyprus | 854-138... |
| 10 | 8C0811... | Melba | Quinn | Decker | Elmhor... | Turkey | 720-218... |

Initialising the canvases: The DOM structure

header-canvas

| Index | Customer Id | First Name | Last Name | Company | City | Country | Phone 1 |
|-------|-------------|------------|-----------|------------|------------|------------|------------|
| 1 | DD37Cf9... | Sheryl | Baxter | Rasmuss... | East Le... | Chile | 229.077... |
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| 9 | C2dE4dE... | Sheryl | Meyers | Brownin... | Roberso... | Cyprus | 854-138... |
| 10 | 8C0011... | Melba | Quinn | Decker | Elm... | Texas | 720-210... |

Initialising the canvases: The DOM structure

| Index | Customer Id | First Name | Last Name | Company | City | Country | Phone 1 |
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|-------|-------------|------------|-----------|---------|------|---------|---------|

header-canvas

| | | | | | | | |
|----|------------|------------|--------|------------|------------|------------|------------|
| 1 | DD37Cf9... | Sheryl | Baxter | Rasmuss... | East Le... | Chile | 229.077... |
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| 9 | C2dE4dE... | Sheryl | Meyers | Brownin... | Roberso... | Cyprus | 854-138... |
| 10 | 8C2811... | M...H | G...H | D...H | F...H | T...H | 720-218... |

target-canvas

Initialising the canvases: The DOM structure

| Index | Customer Id | First Name | Last Name | Company | City | Country | Phone 1 |
|-------|-------------|------------|-----------|---------|------|---------|---------|
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header-canvas

| | | | | | | | |
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| 1 | DD37Cf9... | Sheryl | Baxter | Rasmuss... | East Le... | Chile | 229.077... |
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| 9 | C2dE4dE... | Sheryl | Meyers | Brownin... | Roberso... | Cyprus | 854-138... |
| 10 | 8C2811... | Melba | Callahan | DeL... .. | Flint... | Texas | 730-218... |

main-container

target-canvas

Initialising the canvases: The DOM structure

| Index | Customer Id | First Name | Last Name | Company | City | Country | Phone 1 |
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|-------|-------------|------------|-----------|---------|------|---------|---------|

header-canvas

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| 9 | C2dE4dE... | Sheryl | Meyers | Brownin... | Roberso... | Cyprus | 854-138... |
| 10 | 8C2811... | M... .. | G... .. | D... .. | Fl... .. | T... .. | 720-218... |

main-container

scrollbar-container

target-canvas

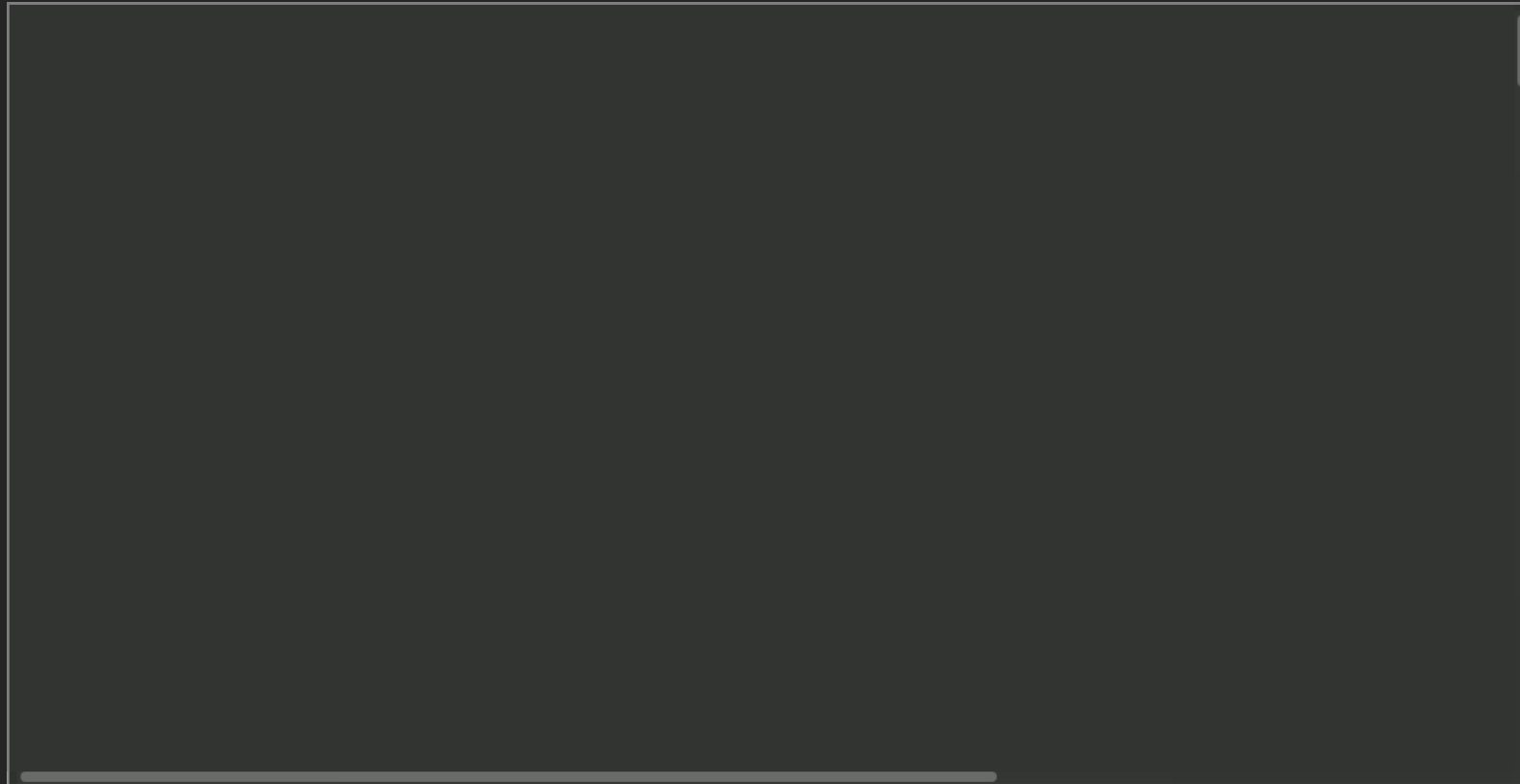
Initialising the canvases: On load of data



Big Brain Time

Understanding the scrollbar-container

scrollbar-container

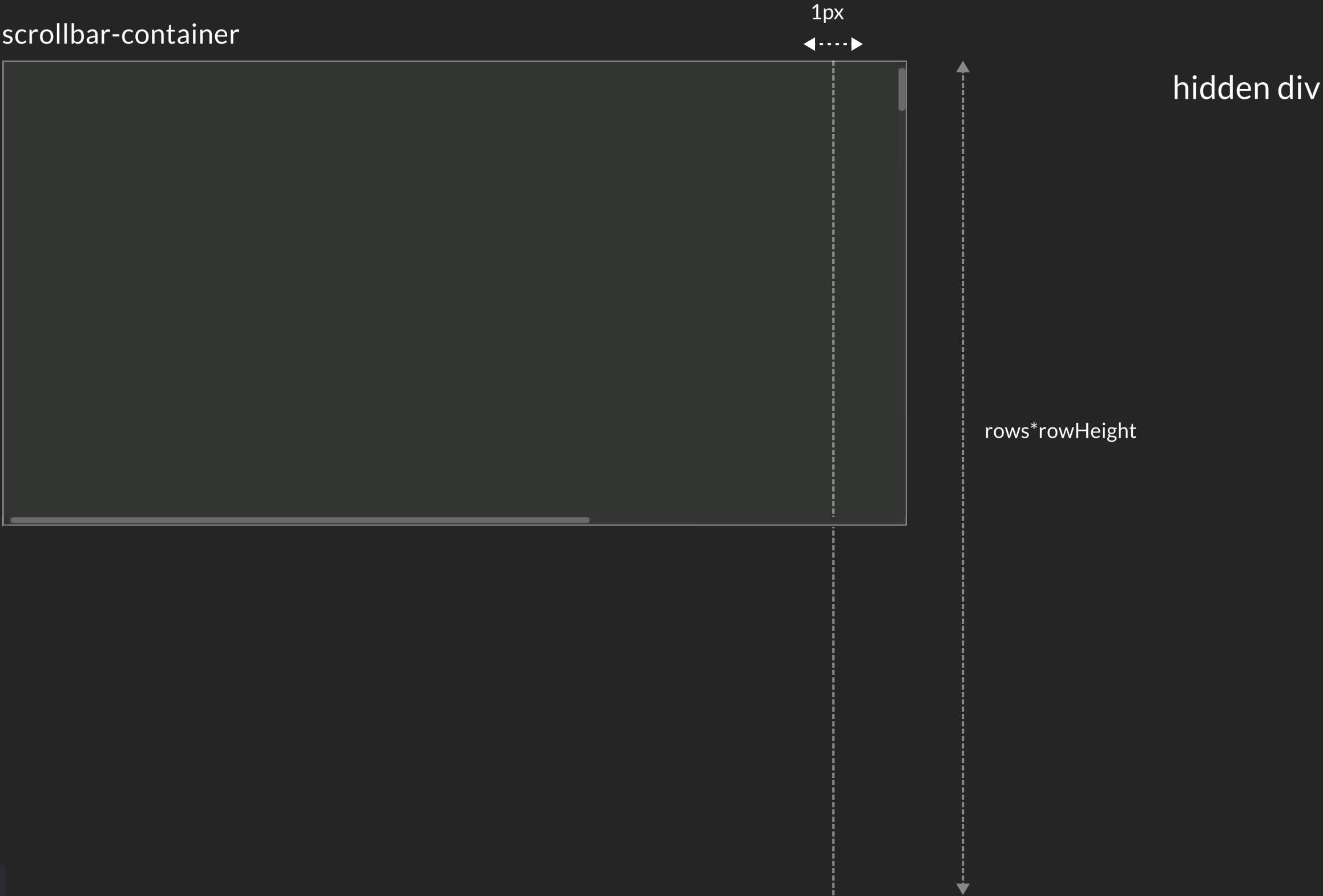


Normal container would have scrollbar height equal to the content in it.

What if there is no overflow content? But we still want the scrollbar to scroll as per our height

But HOW?

Understanding the scrollbar-container



Understanding the Drawing Mechanism

Approach 1



| |
|----|
| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |
| 7 |
| 8 |
| . |
| . |
| . |
| 1M |

Understanding the Drawing Mechanism

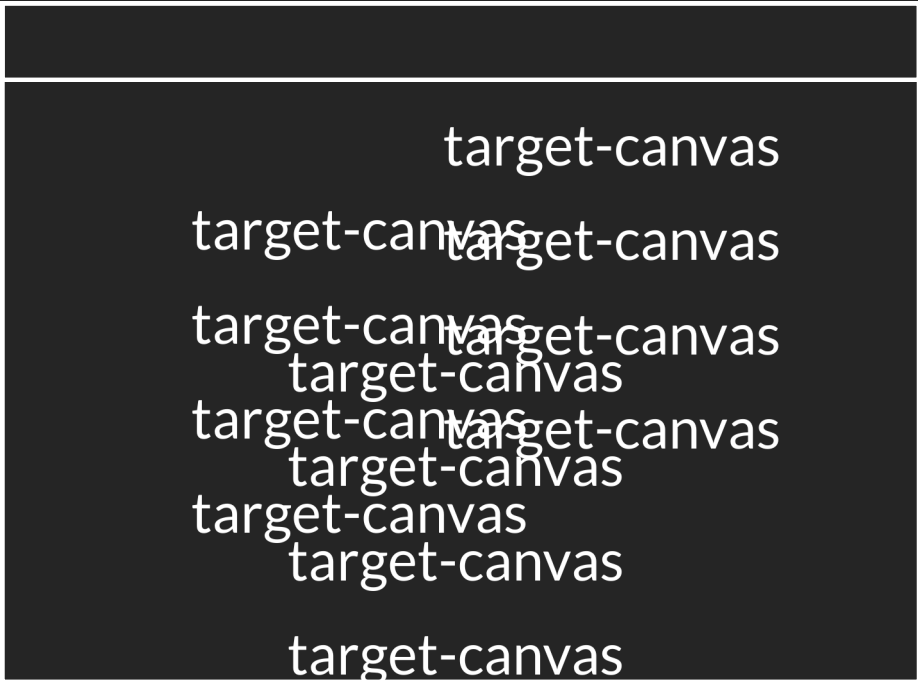
Approach 1



Understanding the Drawing Mechanism

Approach 1

csvData



Draw all the data

| |
|----|
| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |
| 7 |
| 8 |
| . |
| . |
| . |
| 1M |

Canvas redraws on itself leading to distorted image

Understanding the Drawing Mechanism

Approach 2

csvData



draws chunk of data

| |
|----|
| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |
| 7 |
| 8 |
| . |
| . |
| . |
| 1M |

Understanding the Drawing Mechanism

Approach 2



Understanding the Drawing Mechanism

Approach 2



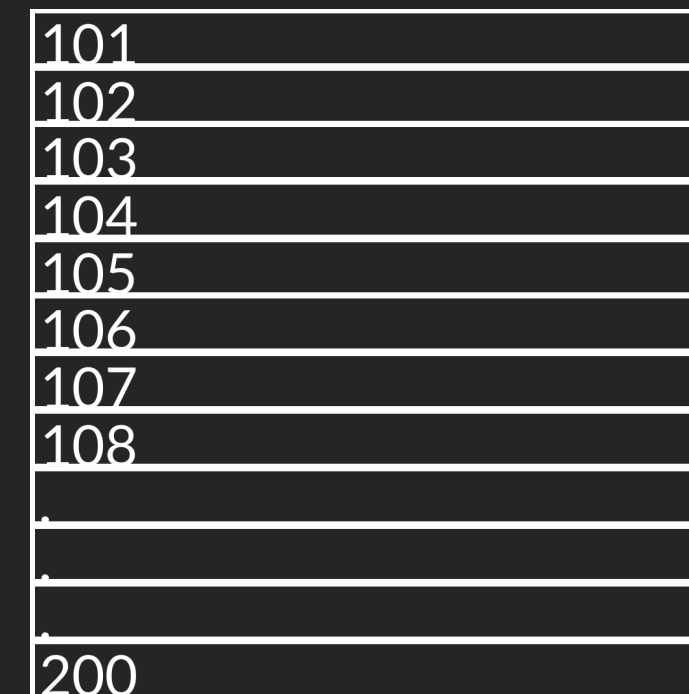
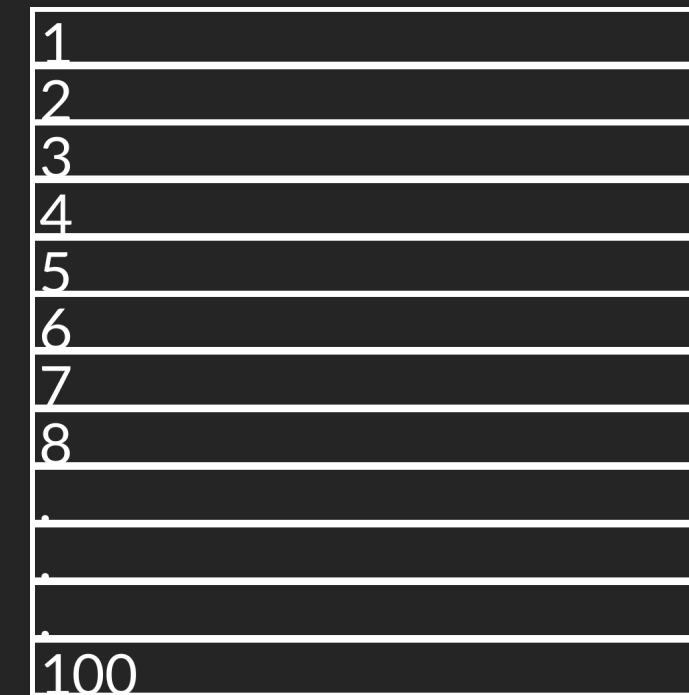
This method becomes expensive due to clearRect and strokeRect + fillRect

Understanding the Drawing Mechanism

Approach 3

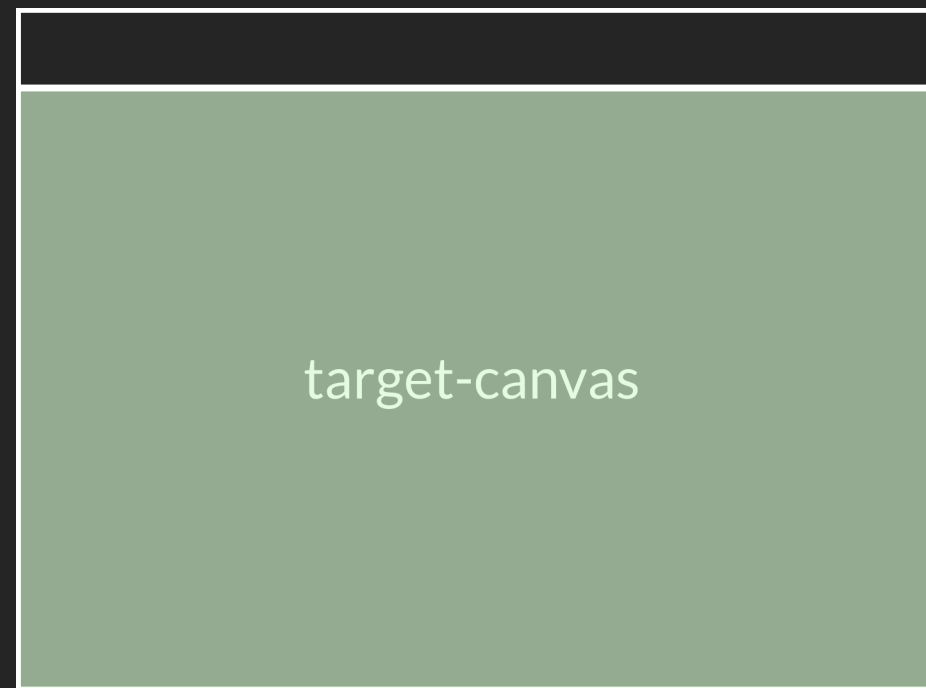


OffscreenCanvas Slices

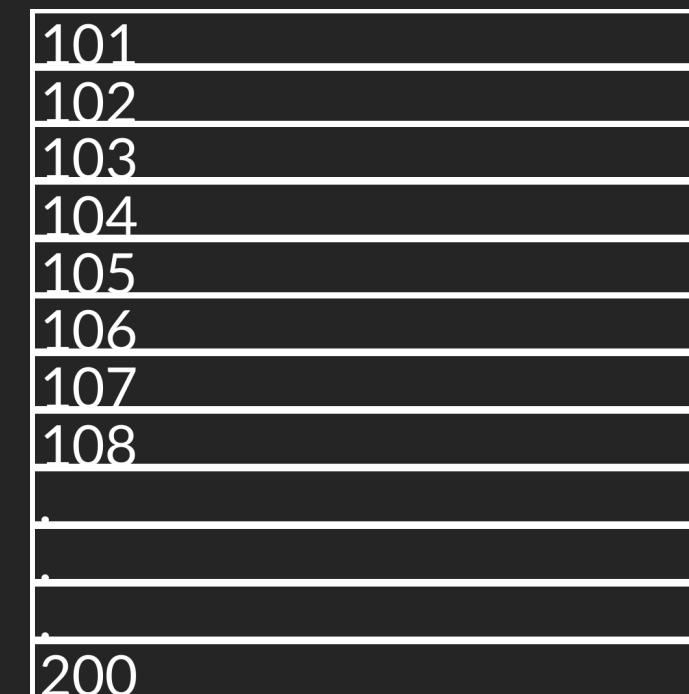
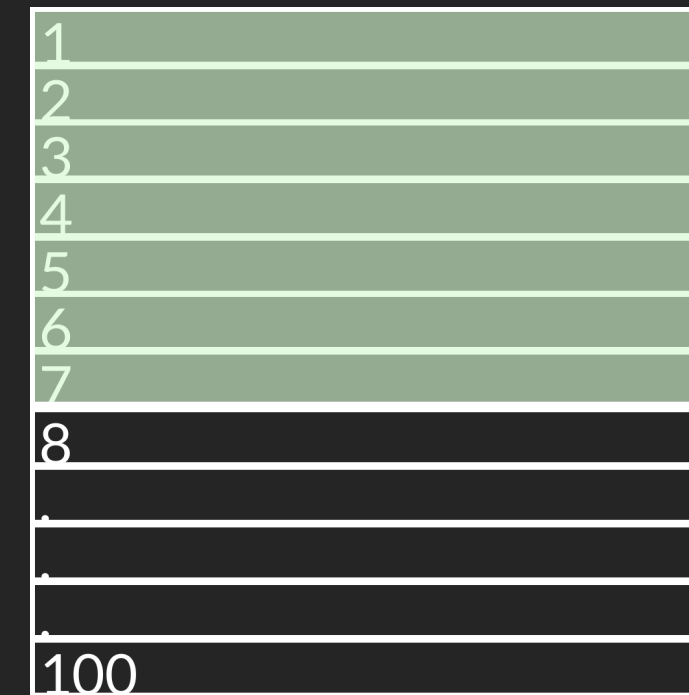


Understanding the Drawing Mechanism

Approach 3

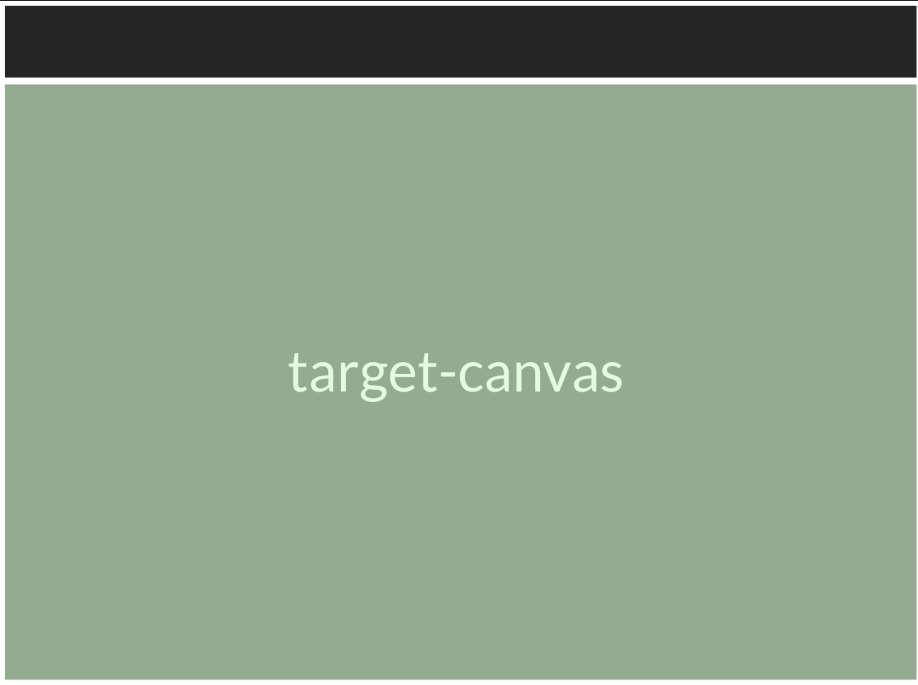


OffscreenCanvas Slices

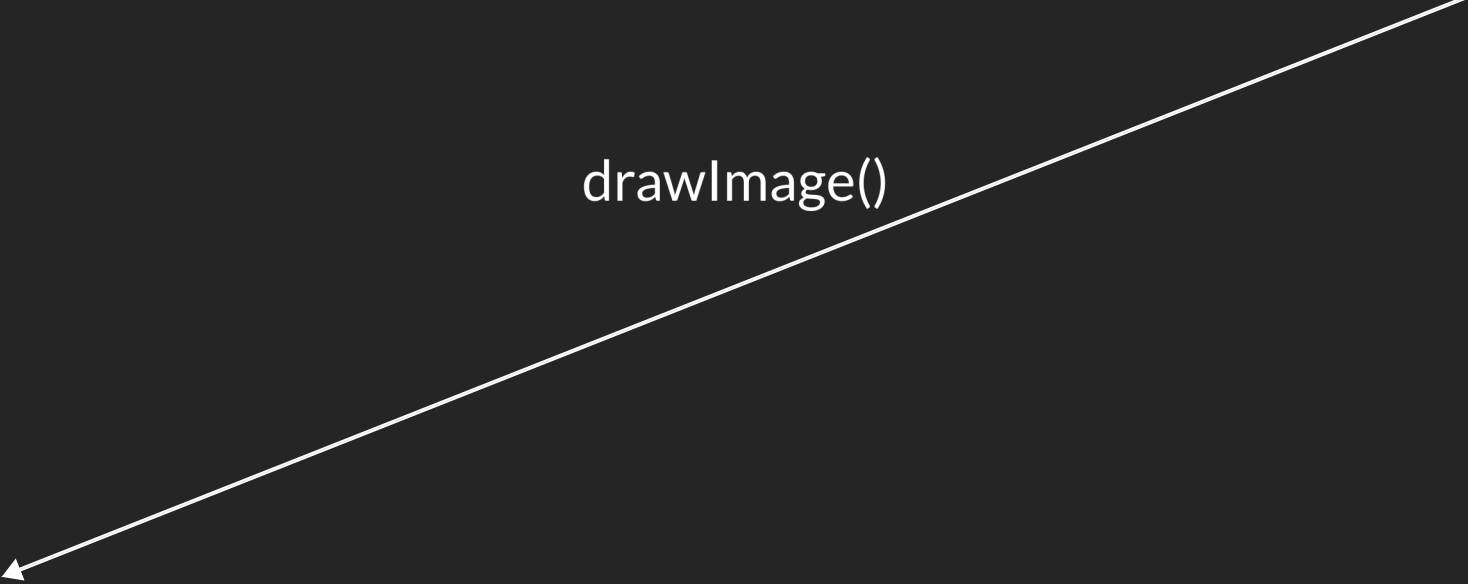


Understanding the Drawing Mechanism

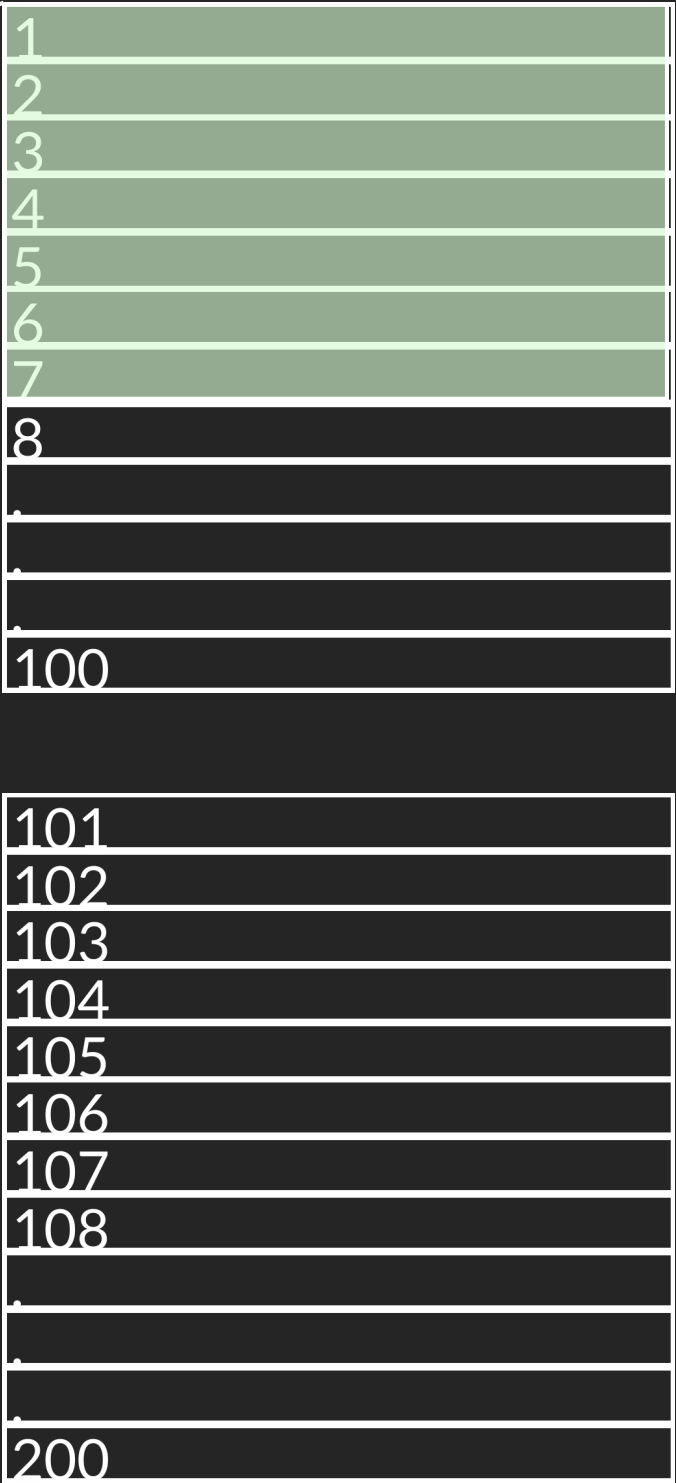
Approach 3



drawImage()

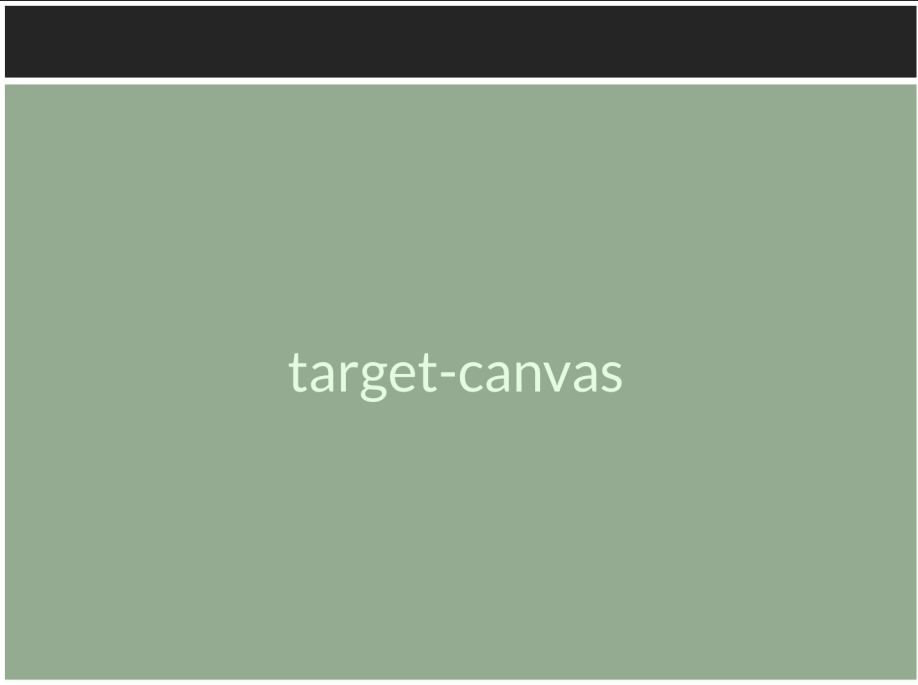


OffscreenCanvas Slices

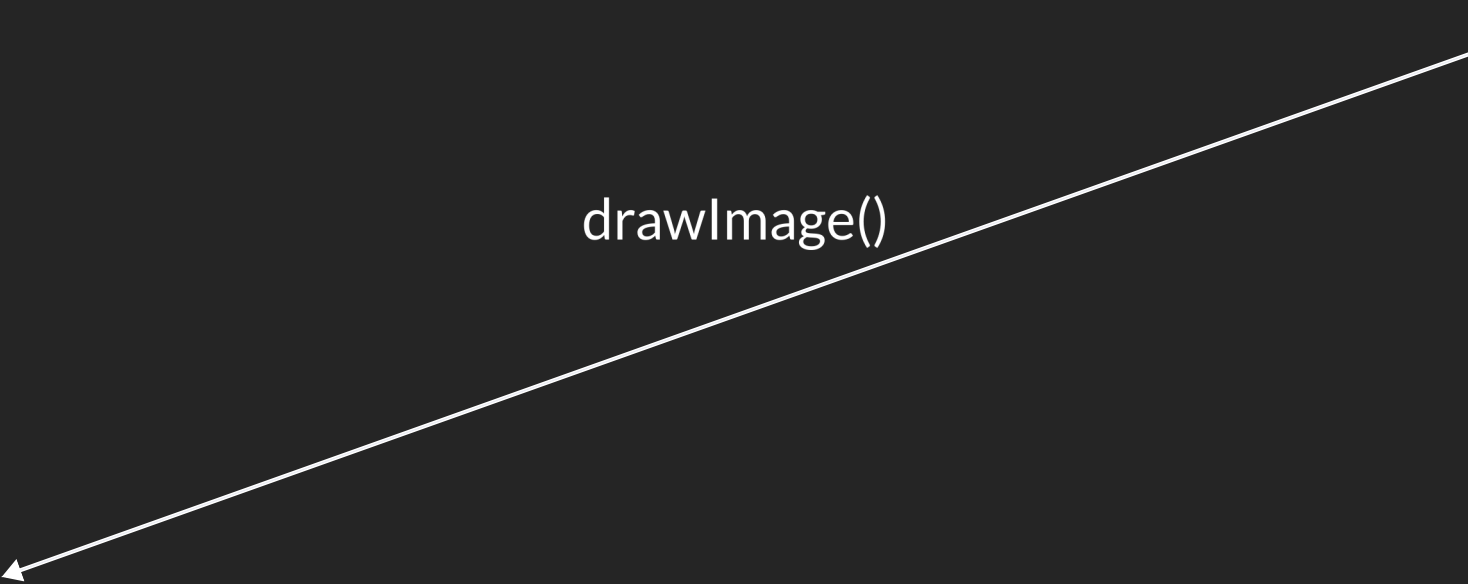


Understanding the Drawing Mechanism

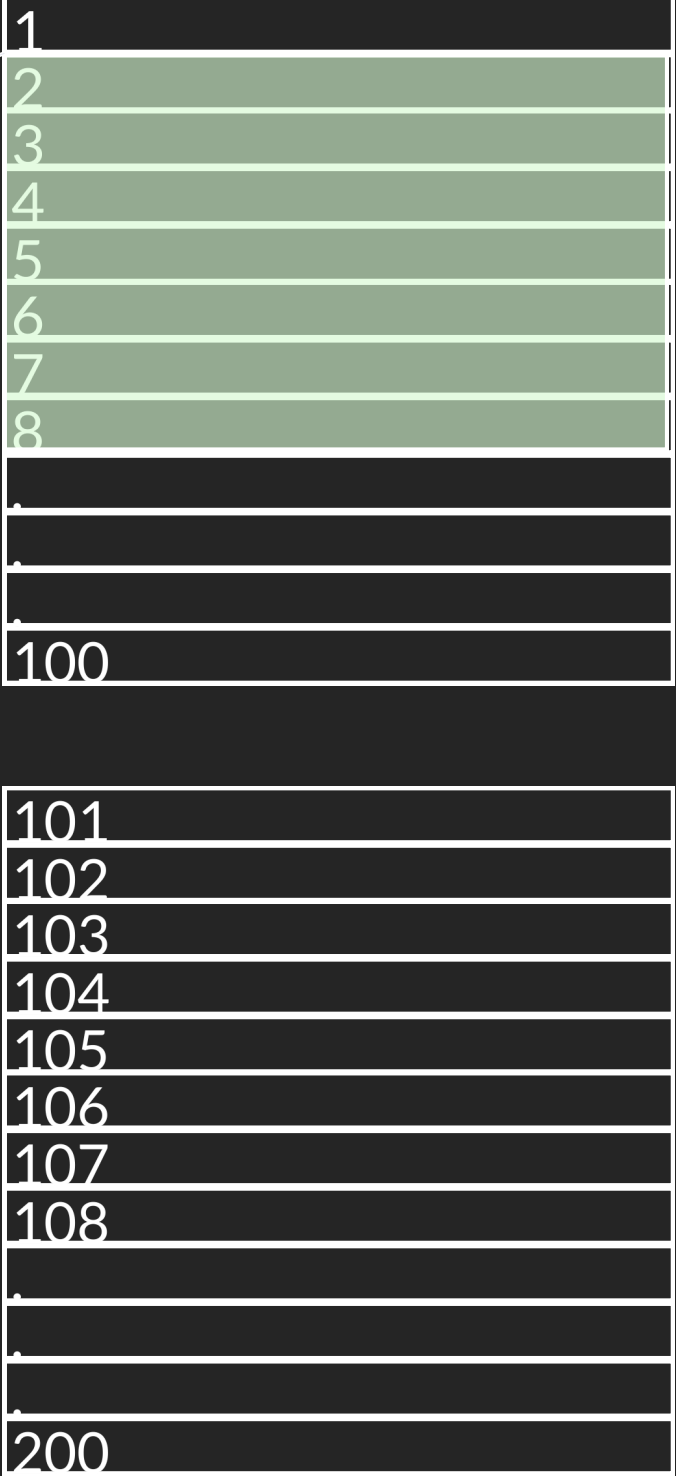
Approach 3



drawImage()

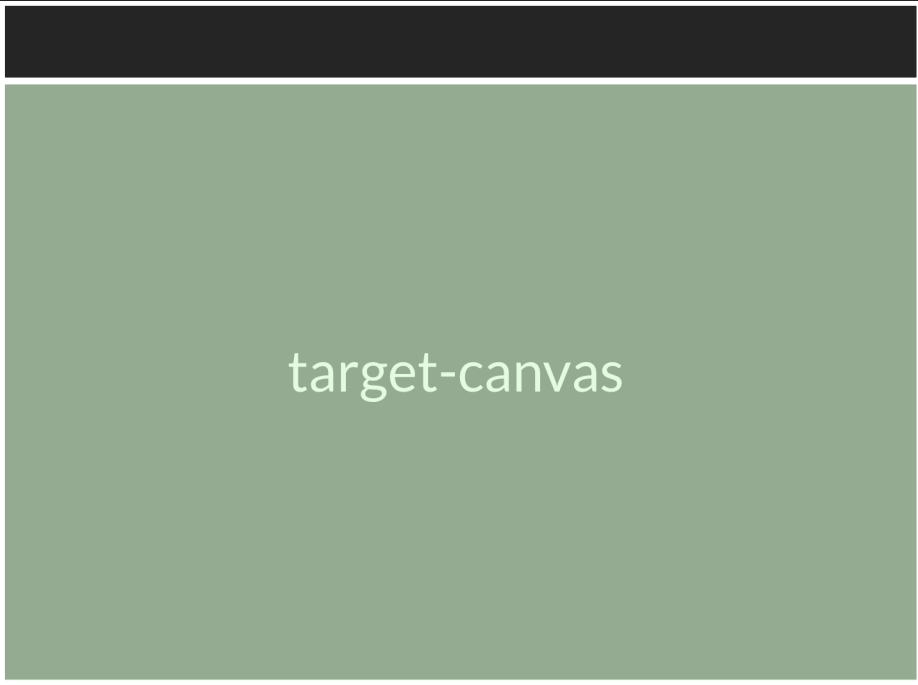


OffscreenCanvas Slices



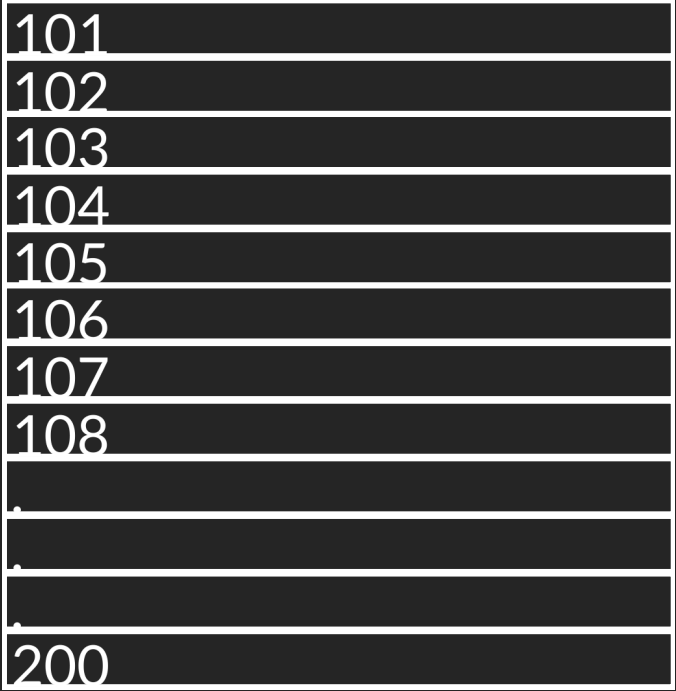
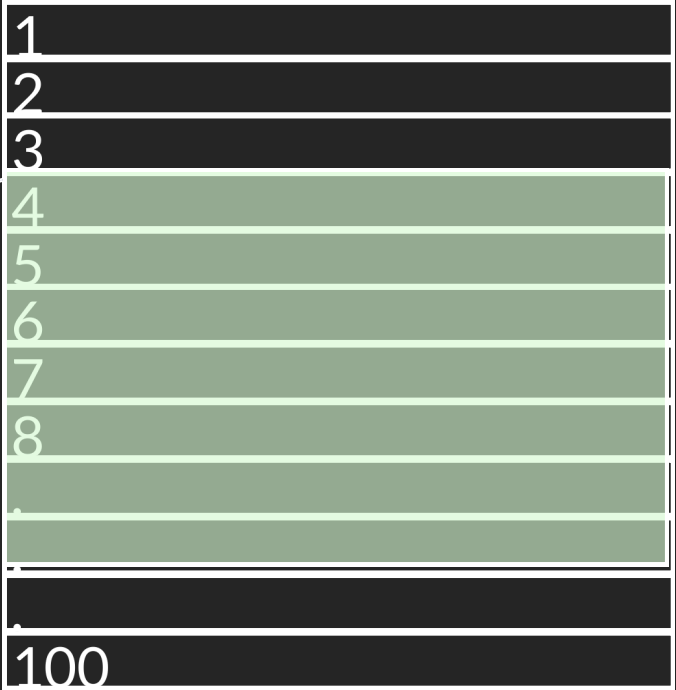
Understanding the Drawing Mechanism

Approach 3



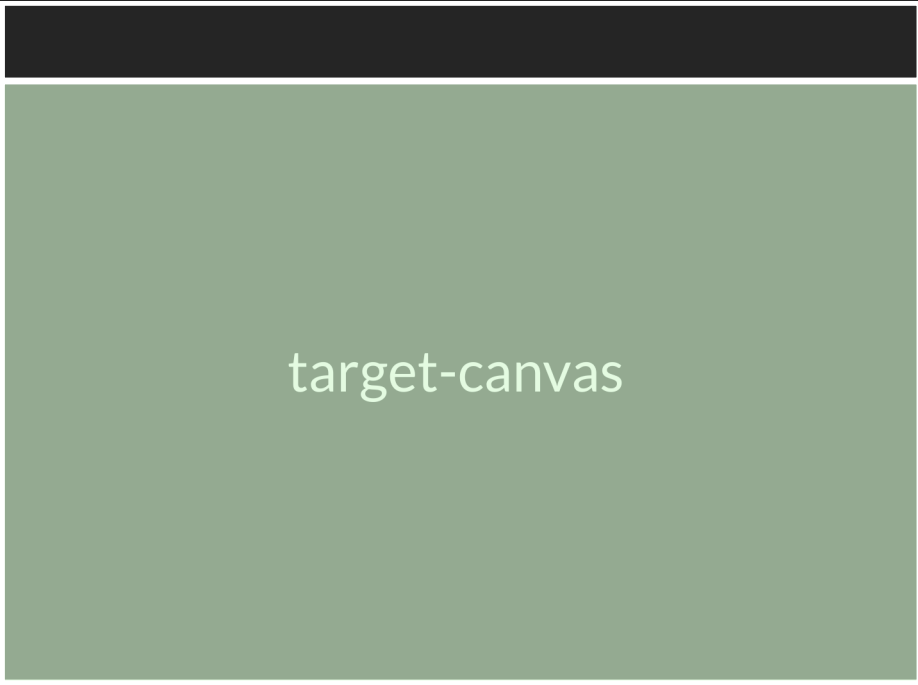
drawImage()

OffscreenCanvas Slices



Understanding the Drawing Mechanism

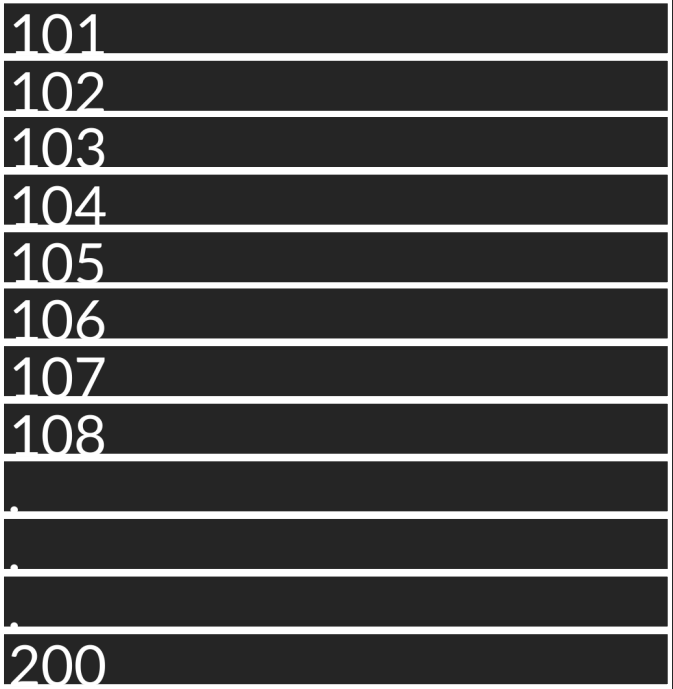
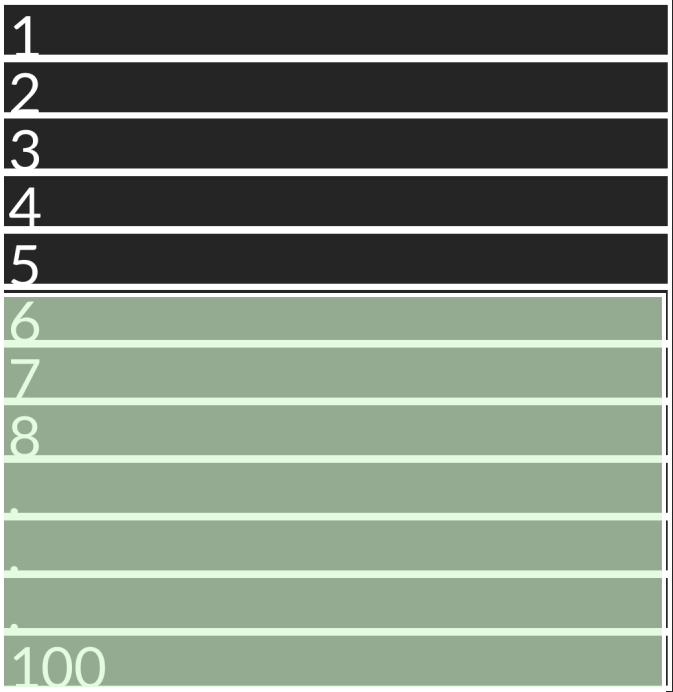
Approach 3



drawImage()

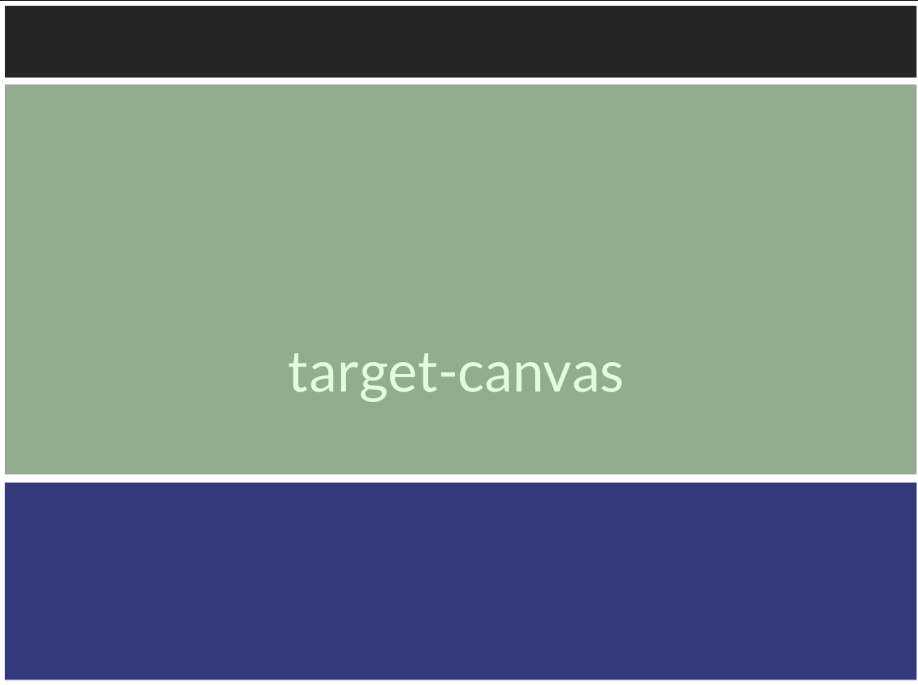


OffscreenCanvas Slices

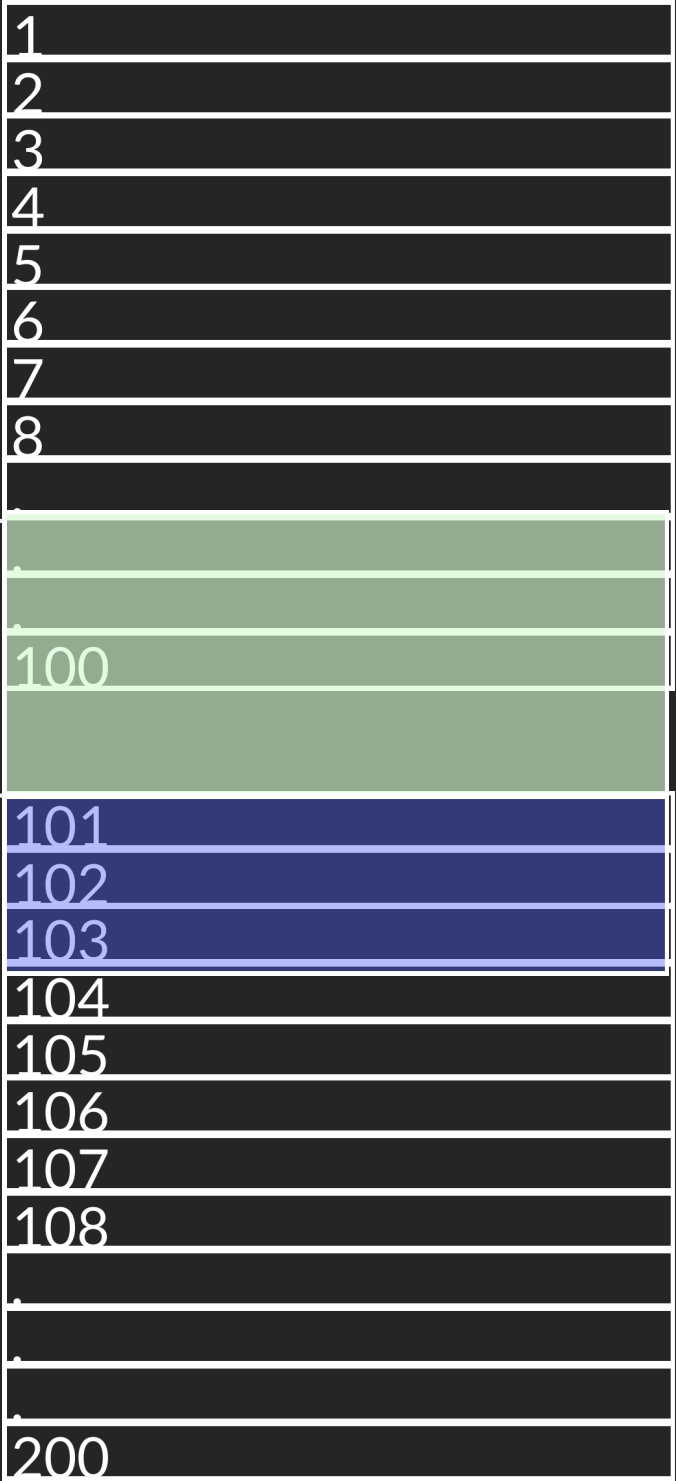


Understanding the Drawing Mechanism

Approach 3



OffscreenCanvas Slices

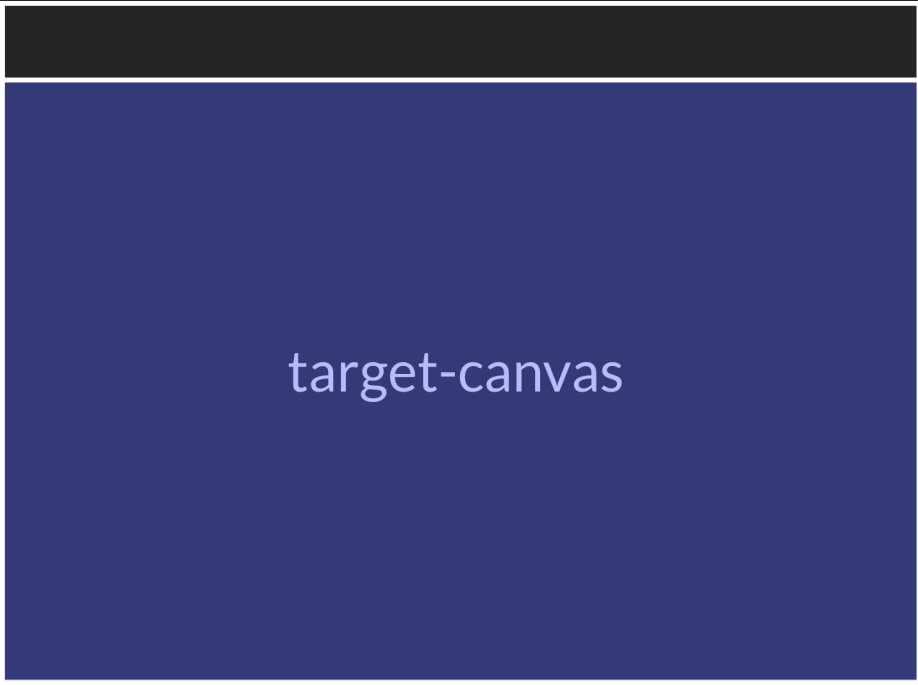


drawImage()

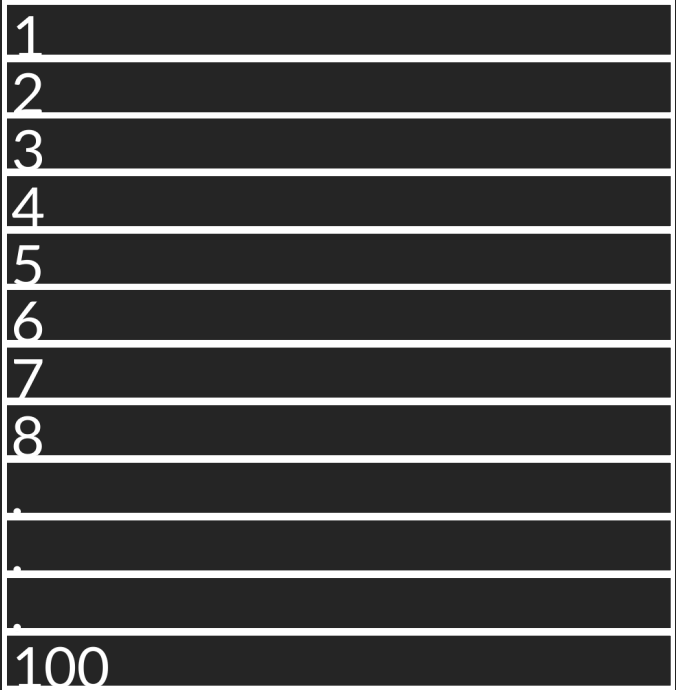
drawImage()

Understanding the Drawing Mechanism

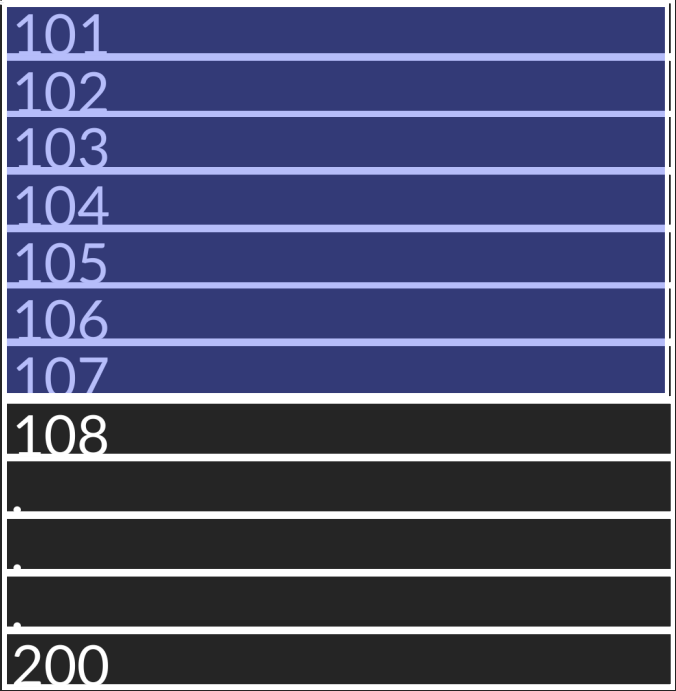
Approach 3



OffscreenCanvas Slices



drawImage()



Let's Dive into the Code

Render Million Rows Github



Do  the Repo