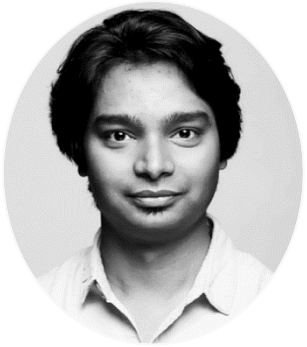
Understanding TensorFlow.js Core Concepts



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DATA SCIENTIST | AUTHOR | SPEAKER

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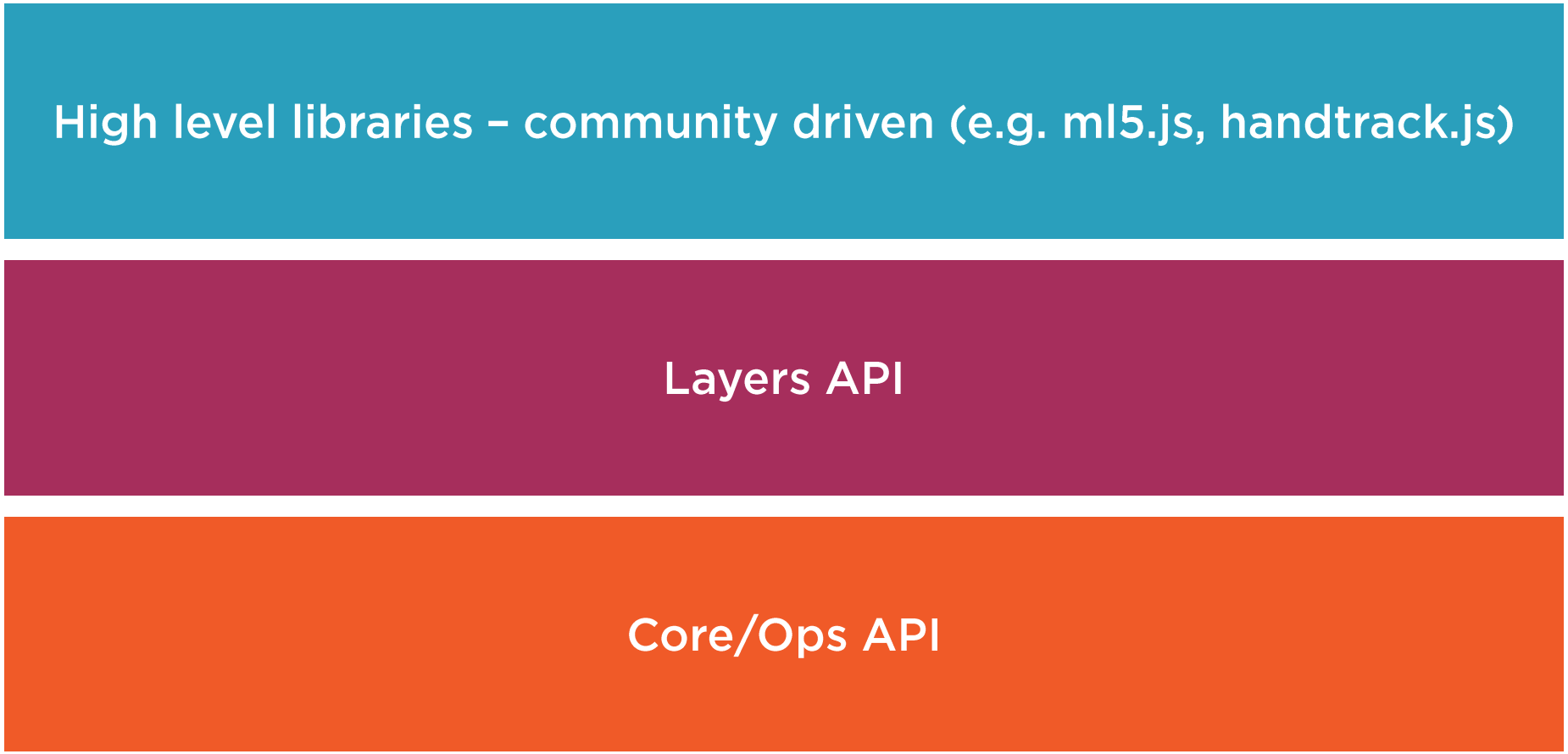
TensorFlow.js APIs



TensorFlow.js APIs

High level libraries – community driven (e.g. ml5.js, handtrack.js)

Layers API

Core/Ops API

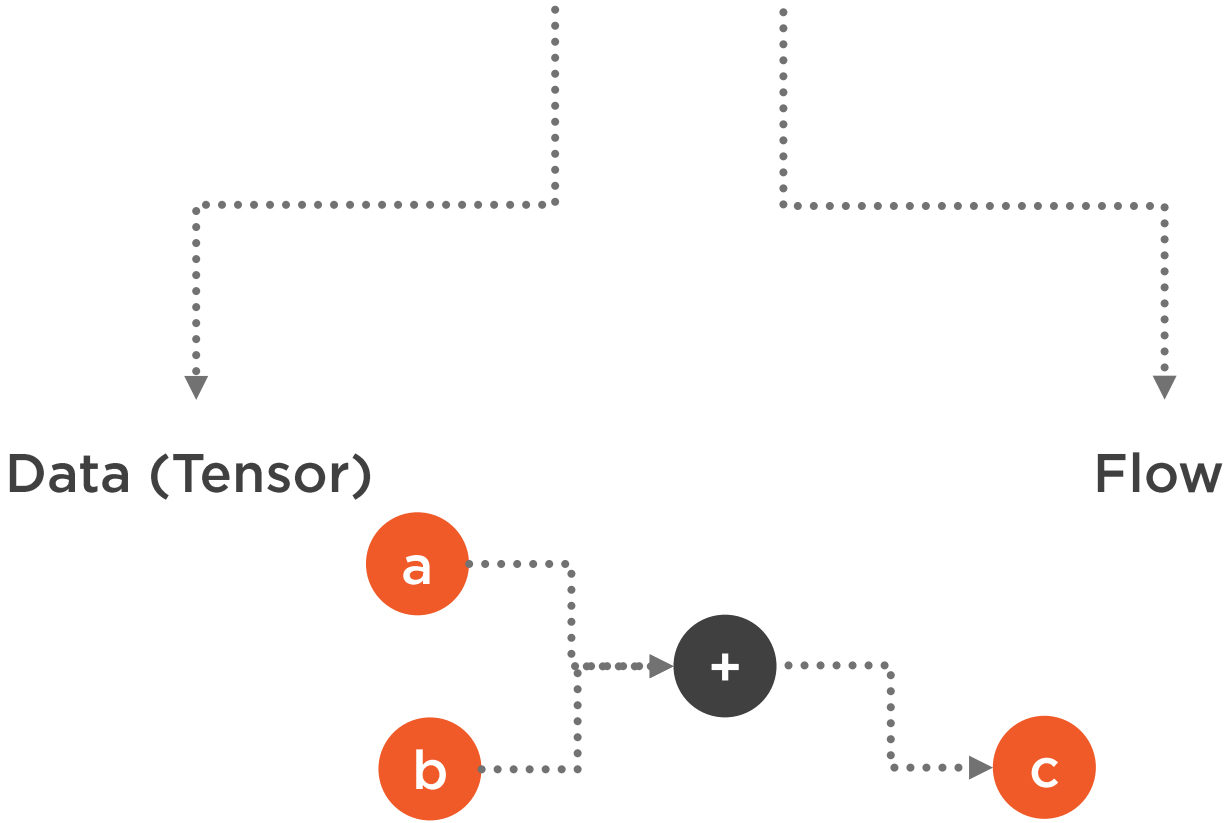
Overview

Tensor overview

Basic tensor operations

Memory management

TensorFlow



Tensor

	Age
	30
	35

[30 35]

Properties

Array

Dimension: 1
Rank: 1

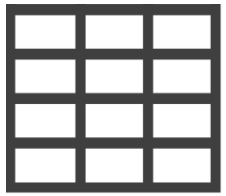
Data type: Integer

Shape: [2]

tf.Tensor1d

Tensor

	Age	Income	Height
	30	1000	170
	35	2000	168



Properties

Matrix

Dimension: 2
Rank: 2

Data type: Integer

Shape: [2,3]

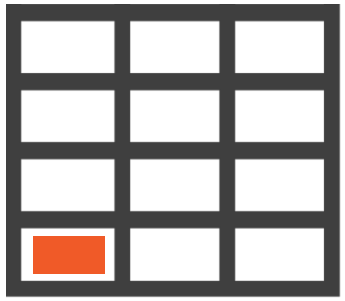
tf.Tensor2d

Tensor

28 x 28 pixels

28 columns

28
rows



Properties

Matrix

Dimension: 2
Rank: 2

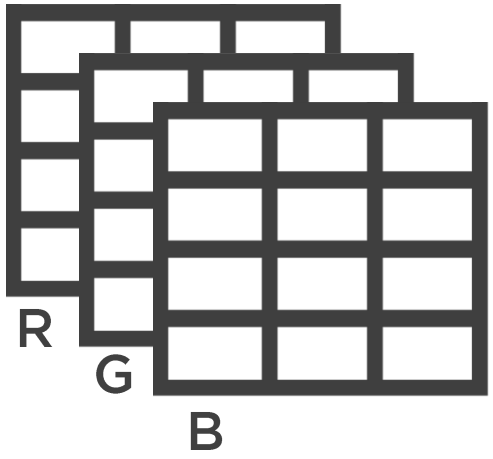
Data type: Float

Shape : [28,28]

tf.Tensor2d

Tensor

28 x 28 pixels
3 channel (RGB)



Properties

Sheets of matrices

Dimension: 3
Rank: 3

Data type: Float

Shape: [28,28,3]

tf.Tensor3d

More Tensors

Tensor4d

Tensor5d

Tensor6d

Tensor

Scalar Is Also Tensor

Height(cm)

170

168

Multiplier = 0.01

Properties

Single value

Dimension: 0
Rank: 0

Data type: Float

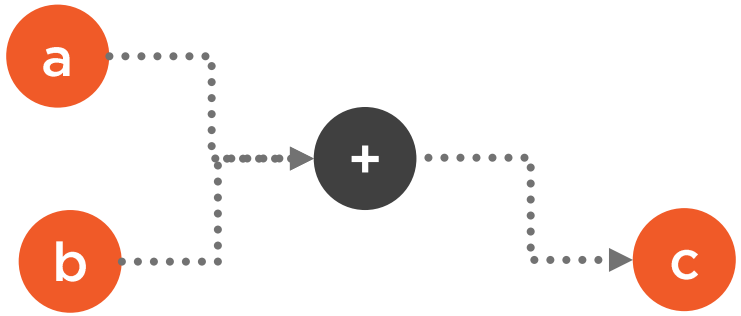
~~Shape~~

tf.Scalar

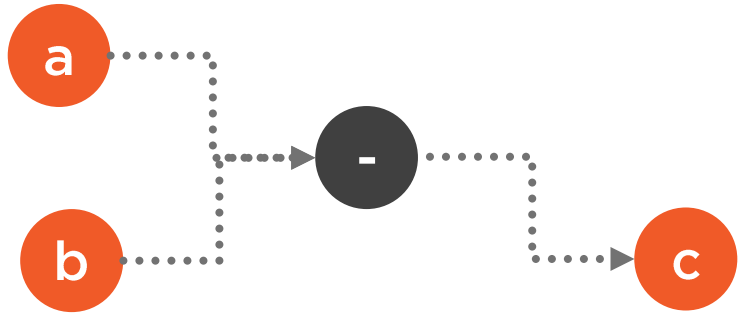
Demo

Working with Tensors

Tensor Operations



Addition



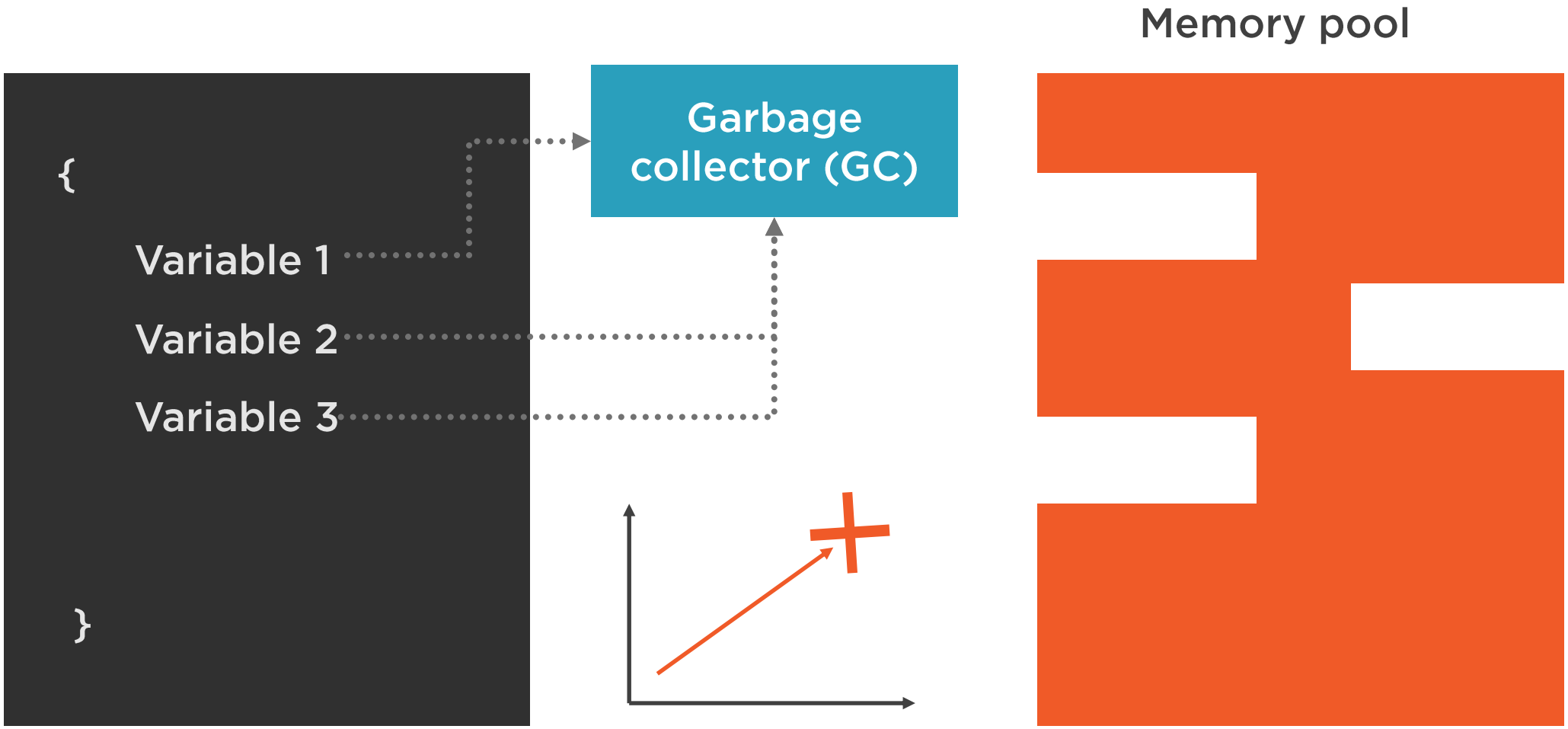
Subtraction

Tensors are immutable.
Any operation on tensors
create new tensors.

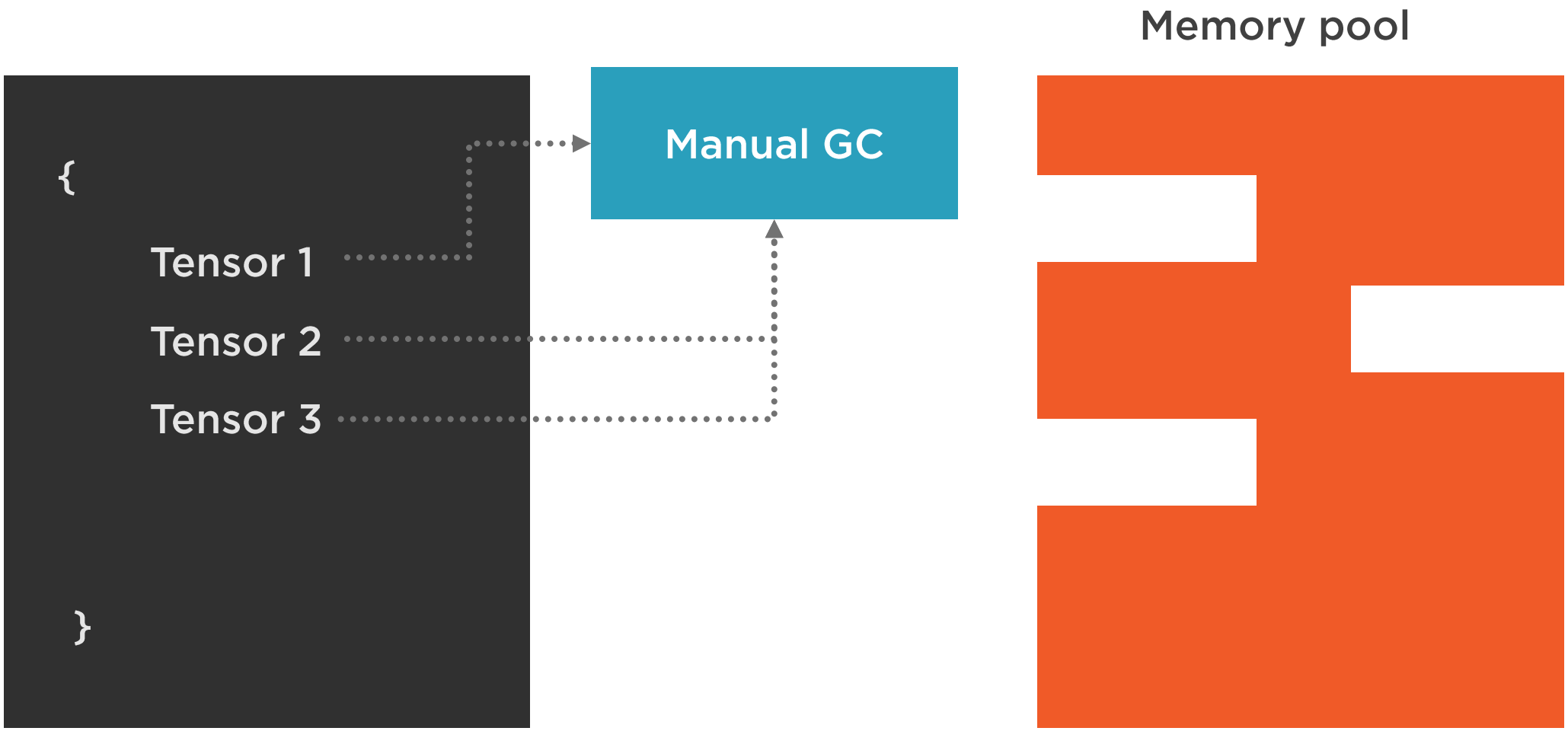
Demo

Performing basic Tensor operations

Memory Management



Memory Management with WebGL



Improper garbage collection can lead to memory leak.

```
const x = tf.tensor1d([1,2,3]);

x.dispose()
```

Memory Management

Dispose used memory by a tensor

```
tf.tidy(() => {
    const x = tf.tensor1d([1,2,3]);
    const y = tf.scalar(10);
});
```

Memory Management

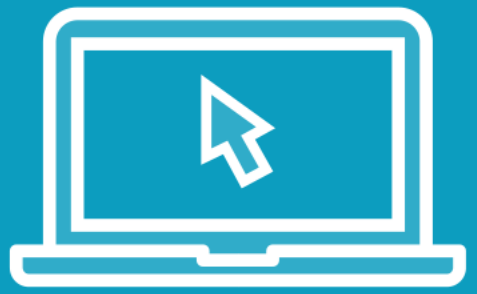
Dispose used memory generated inside tf.tidy()

```
tf.tidy(() => {
    const x = tf.tensor1d([1,2,3]);
    const y = tf.scalar(10);
    z = tf.keep(x.square()); //keep this tensor in memory
});
```

Memory Management

Use tf.keep to keep a tensor in memory

Demo



Managing memory with TensorFlow.js

Summary

Tensor

- Value, data type, dimension, shape
- Scalar
- Variable
- Immutable

Memory management

- WebGL
- Functions : tf.dispose(), tf.tidy()

Up Next:
Preparing Data for Machine Learning Model