Problem 2676: Throttle

Problem Information

Difficulty: Medium
Acceptance Rate: 0.00%
Paid Only: No

Problem Description

Given a function

fn

and a time in milliseconds

t

, return a

throttled

version of that function.

A

throttled

function is first called without delay and then, for a time interval of

t

milliseconds, can't be executed but should store the latest function arguments provided to call

fn

with them after the end of the delay.

For instance,

t = 50ms

, and the function was called at

30ms

,

40ms

, and

60ms

.

At

30ms

, without delay, the

throttled

function

fn

should be called with the arguments, and calling the

throttled

function

fn

should be blocked for the following

t

milliseconds.

At

40ms

, the function should just save arguments.

At

60ms

, arguments should overwrite currently stored arguments from the second call because the second and third calls are made before

80ms

. Once the delay has passed, the

throttled

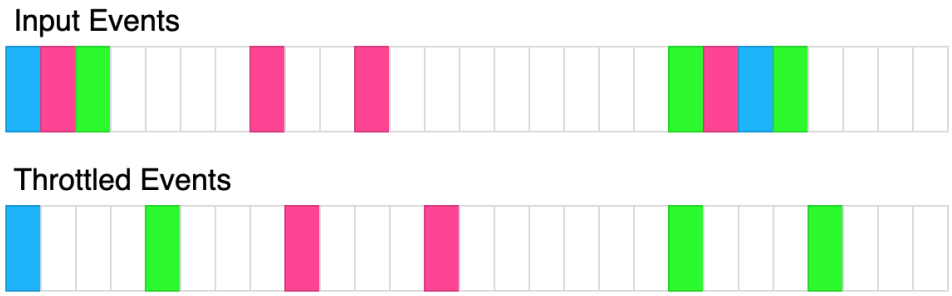
function

fn

should be called with the latest arguments provided during the delay period, and it should also create another delay period of

80ms + t

.



The above diagram shows how throttle will transform events. Each rectangle represents 100ms and the throttle time is 400ms. Each color represents a different set of inputs.

Example 1:

Input:

t = 100, calls = [{"t":20,"inputs":[1]}]

Output:

[{"t":20,"inputs":[1]}]

Explanation:

The 1st call is always called without delay

Example 2:

Input:

t = 50, calls = [{"t":50,"inputs":[1]}, {"t":75,"inputs":[2]}]

Output:

[{"t":50,"inputs":[1]},{"t":100,"inputs":[2]}]

Explanation:

The 1st is called a function with arguments (1) without delay. The 2nd is called at 75ms, within the delay period because 50ms + 50ms = 100ms, so the next call can be reached at 100ms. Therefore, we save arguments from the 2nd call to use them at the callback of the 1st call.

Example 3:

Input:

t = 70, calls = [{"t":50,"inputs":[1]}, {"t":75,"inputs":[2]}, {"t":90,"inputs":[8]}, {"t": 140, "inputs":[5,7]}, {"t": 300, "inputs": [9,4]}]

Output:

[{"t":50,"inputs":[1]},{"t":120,"inputs":[8]},{"t":190,"inputs":[5,7]},{"t":300,"inputs":[9,4]}]

Explanation:

The 1st is called a function with arguments (1) without delay. The 2nd is called at 75ms within the delay period because 50ms + 70ms = 120ms, so it should only save arguments. The 3rd is also called within the delay period, and because we need just the latest function arguments, we overwrite previous ones. After the delay period, we do a callback at 120ms with saved arguments. That callback makes another delay period of 120ms + 70ms = 190ms so that the next function can be called at 190ms. The 4th is called at 140ms in the delay period, so it should be called as a callback at 190ms. That will create another delay period of 190ms + 70ms = 260ms. The 5th is called at 300ms, but it is after 260ms, so it should be called immediately and should create another delay period of 300ms + 70ms = 370ms.

Constraints:

0 <= t <= 1000

1 <= calls.length <= 10

0 <= calls[i].t <= 1000

0 <= calls[i].inputs[j], calls[i].inputs.length <= 10

Code Snippets

JavaScript:

```
/**
* @param {Function} fn
* @param {number} t
* @return {Function}
*/
var throttle = function(fn, t) {

return function(...args) {

}
};

/**
* const throttled = throttle(console.log, 100);
* throttled("log"); // logged immediately.
* throttled("log"); // logged at t=100ms.
*/
```

TypeScript:

```
type F = (...args: number[]) => void

function throttle(fn: F, t: number): F {

return function (...args) {

}
};

/**
* const throttled = throttle(console.log, 100);
* throttled("log"); // logged immediately.
* throttled("log"); // logged at t=100ms.
*/
```

Solutions

JavaScript Solution:

```
/**
* Problem: Throttle
```

```
* Difficulty: Medium
* Tags: general
*
* Approach: Optimized algorithm based on problem constraints
* Time Complexity: O(n) to O(n^2) depending on approach
* Space Complexity: O(1) to O(n) depending on approach
*/

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* @param {Function} fn
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TypeScript Solution:

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* Problem: Throttle
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* Approach: Optimized algorithm based on problem constraints
* Time Complexity: O(n) to O(n^2) depending on approach
* Space Complexity: O(1) to O(n) depending on approach
*/

type F = (...args: number[]) => void

function throttle(fn: F, t: number): F {
```

```
return function (...args) {

}
};

/**
* const throttled = throttle(console.log, 100);
* throttled("log"); // logged immediately.
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