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Async Programming

Classify your async code

Importance of async programming

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- Javascript is Single Threaded (not exactly), Event driven, Non-blocking
  - This means Javascript code is packed with asynchronous code and callbacks!
- Your code will become cleaner - no more callback hell
- Cleaner code means less bugs
- Understanding the async conventions means you can understand better libraries that use async patterns
- Understanding async conventions means you will be able to write code that will be easy to understand and use.

Motivation - why do I need to classify my async code?

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- We will look at our async code as a problem we need to solve
  - Sending ajax request, waiting for keyboard event, etc.
- To solve a problem properly we have to define and understand it.
- Only after defining it we will know which tools and patterns we can use to solve our problem

Asynchronous code

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- Code that will run in the future
- We have to consider the element of time
- Non blocking - will run in the future when the stack is empty
- Asynchronous code in Javascript, usually means running a **function** in the future

Asynchronous code example

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- Here's an example of async code that will print **hello world** in the future after 1 sec

```
setTimeout(function() {
    console.log('Hello World');
}, 1000);
console.log('This will be printed first');
```

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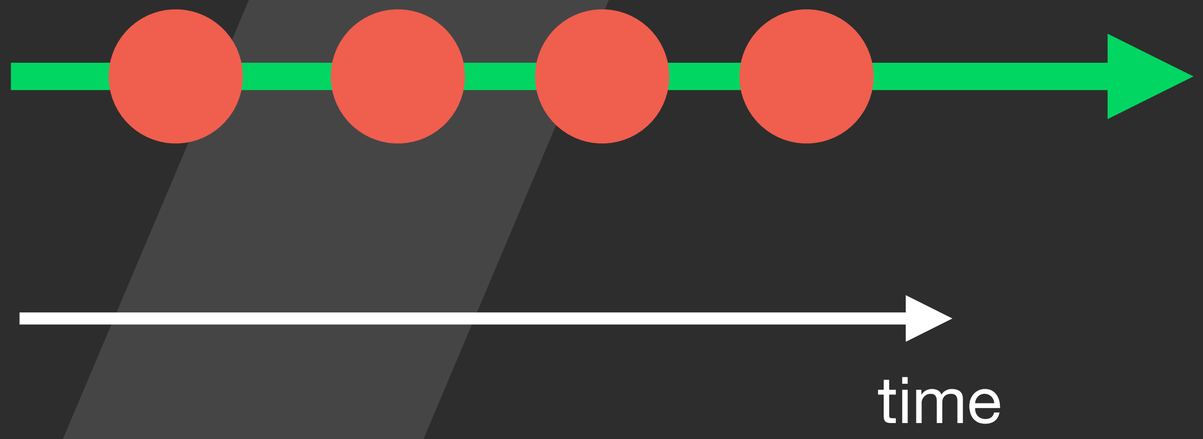
Async code diagram

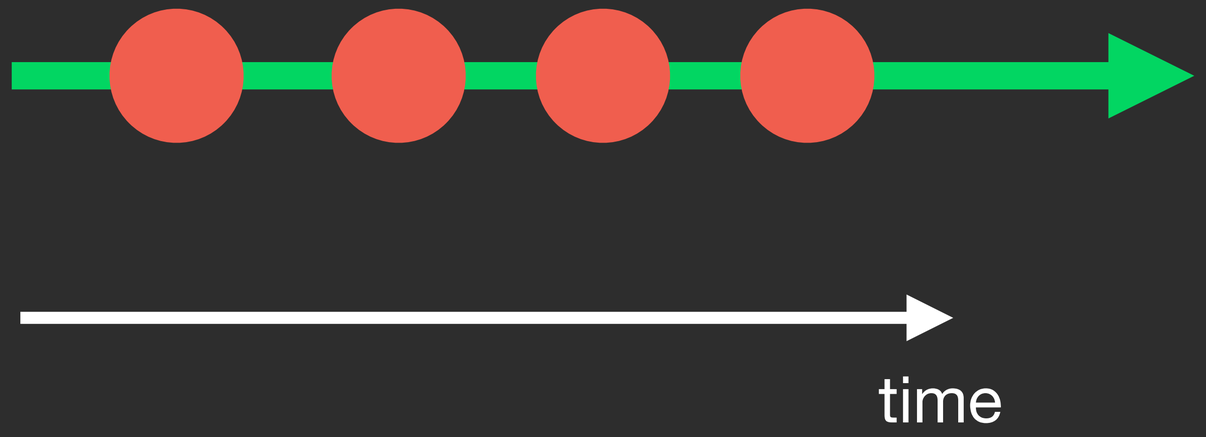


Async code diagram

- We are going to learn patterns to deal with async code properly, easy, and with less bugs
- To understand which pattern to use, we are going to have to categorise and identify our async code
  - Some patterns will be suited to certain types of async code
- We are going to use a diagram to help use identify our async code

How the diagram looks like

- Since async code will run in the future, we have to consider **time,** so time will be represented in the **X axis**
- Our async code is represented by the arrow with circles on it
  - The left side of the arrow is when the async code started to run
  - The circles represent our async code is running



Examples…

setTimeout

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- Async code that runs **once** after a period of time has passed


```
setTimeout(function() {
    console.log('Hello World');
}, 1000);
```

setInterval

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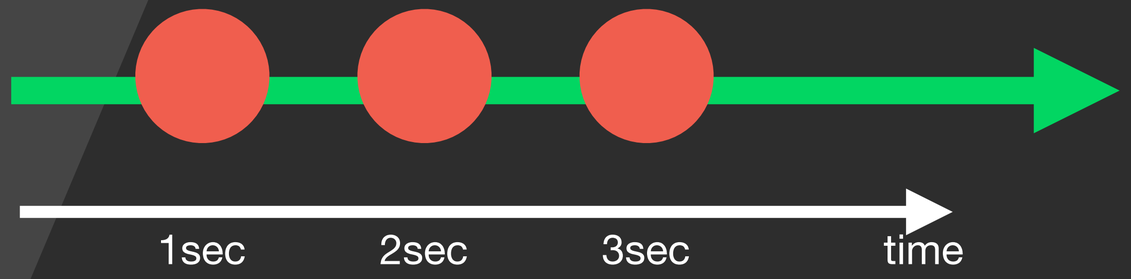
- Async code that runs **every time** a period of time has passed.




```
setInterval(function() {
    console.log('Hello World');
}, 1000);
```

Async code with data

Async code with data

- Some async code will transfer data along
- This means that (for the most part) our async code function will get the data as an argument of the function
- It’s common to keep the data consistent
- We can mark the data type in our diagram in these brackets: <string>

Async code with data - Example

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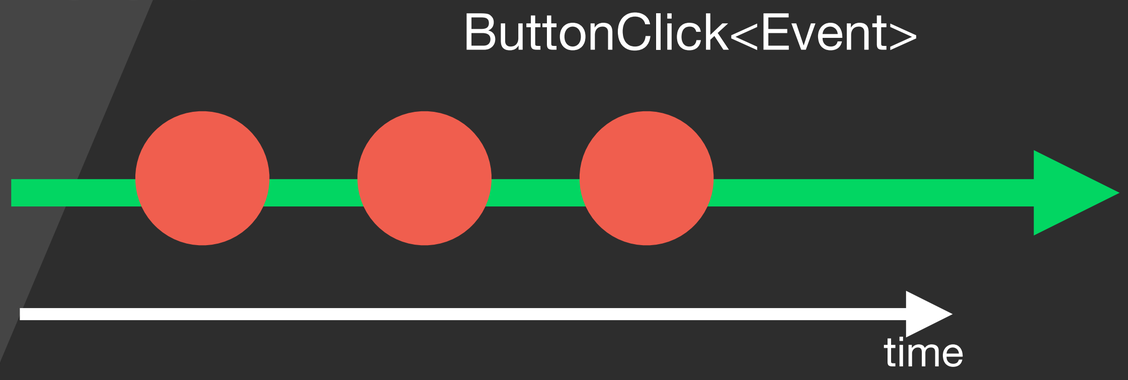
- Browser button click event




```
const button = document.getElementById('myButton');

button.addEventListener('click', function(event) {
    console.log('we are getting an event object describing the event');
});
```

Async code with data - Example

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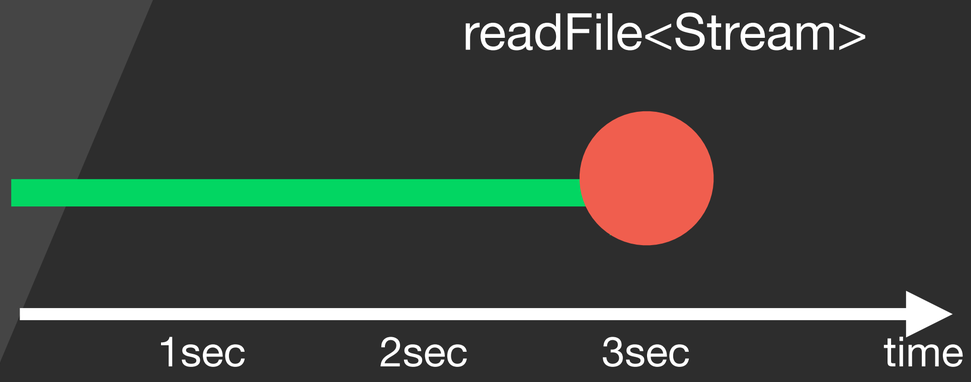
- Node.js reading file




```
const fs = require('fs');

fs.readFile('some-file.txt', function(err, data) {
    console.log(`The content of the file is: ${data.toString()}`);
});
```

Important questions

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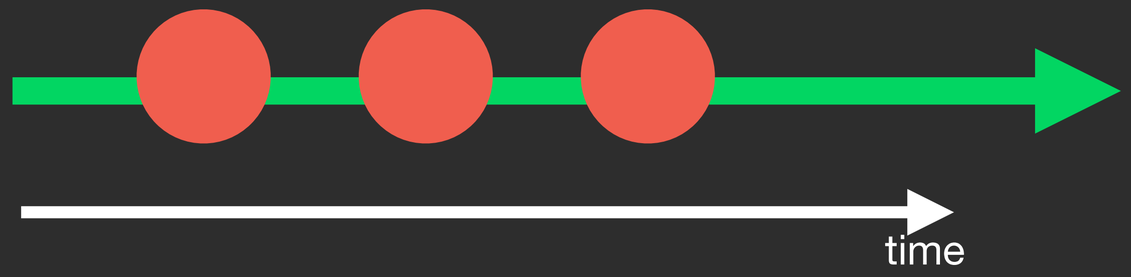
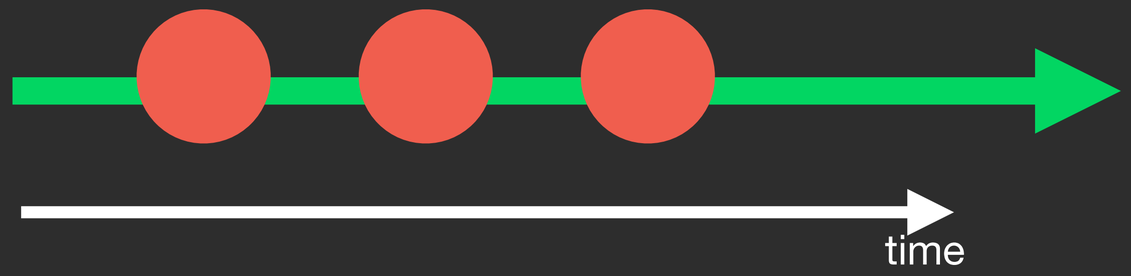
- Few important questions you have to ask yourself about your async code
  - Will my async code end?
  - How many pulses do I have?



Summary

- Async code will usually call a callback function sometime in the future
- Sometimes that callback function will get data in the arguments
- We can define our async code in a diagram, where we have a line in the timeline with pulse every time the callback is called



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Thank you

Next Lesson: Promise