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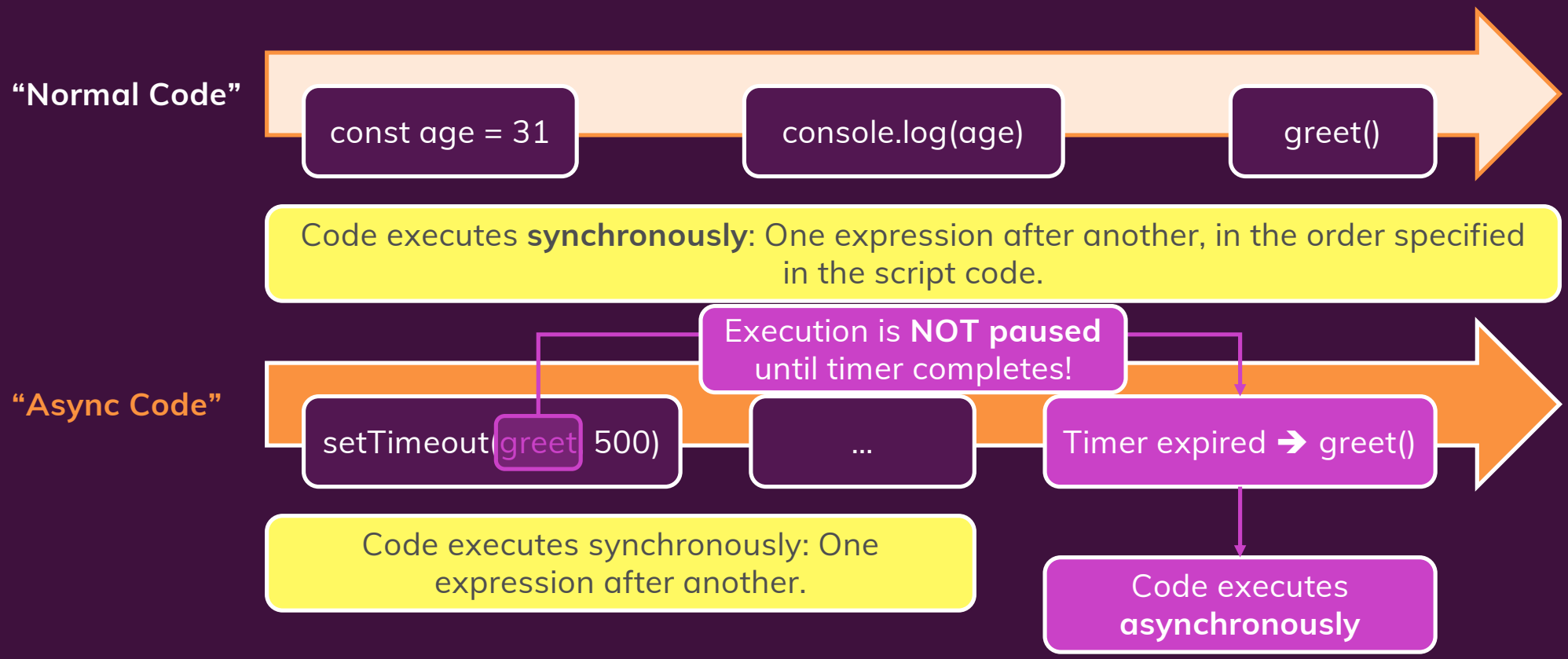
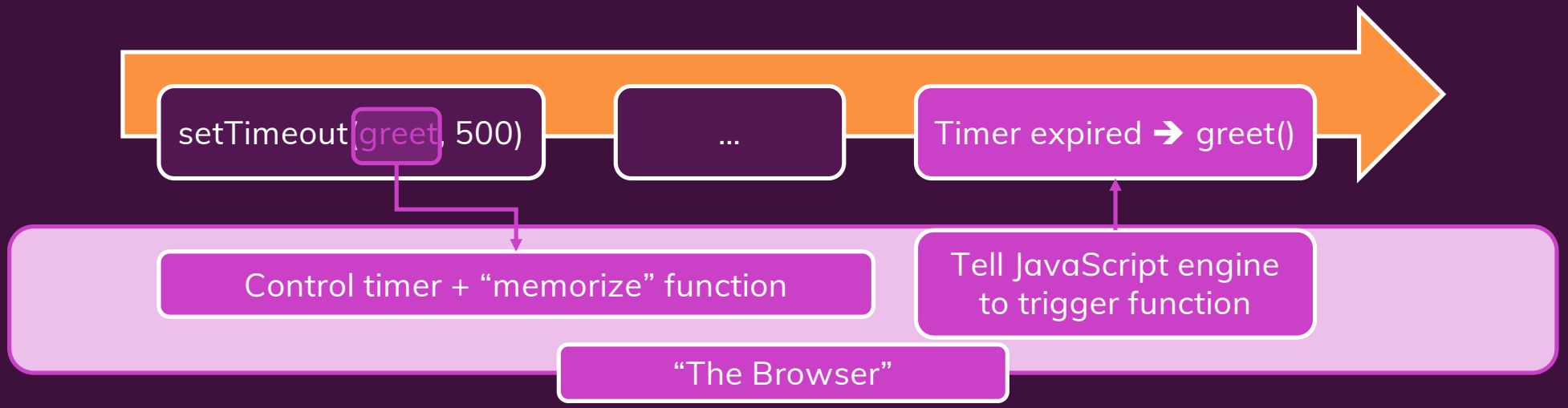
Understanding Asynchronous Code



But JavaScript is Single-Threaded!



Only one action at a time can be performed. JavaScript **can’t** keep a timer running and do something else at the same time.

But the browser is able to do that!

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Dealing with Asynchronous Operations

Callback Functions	Define which function should eventually be executed. *Examples: setTimeout(), addEventListener()*
Promises	Define a step-by-step “chain” for async operations. *Example: fetch()*
async/ await	Syntactic sugar for Promises to simplify using them *Example: fetch()*

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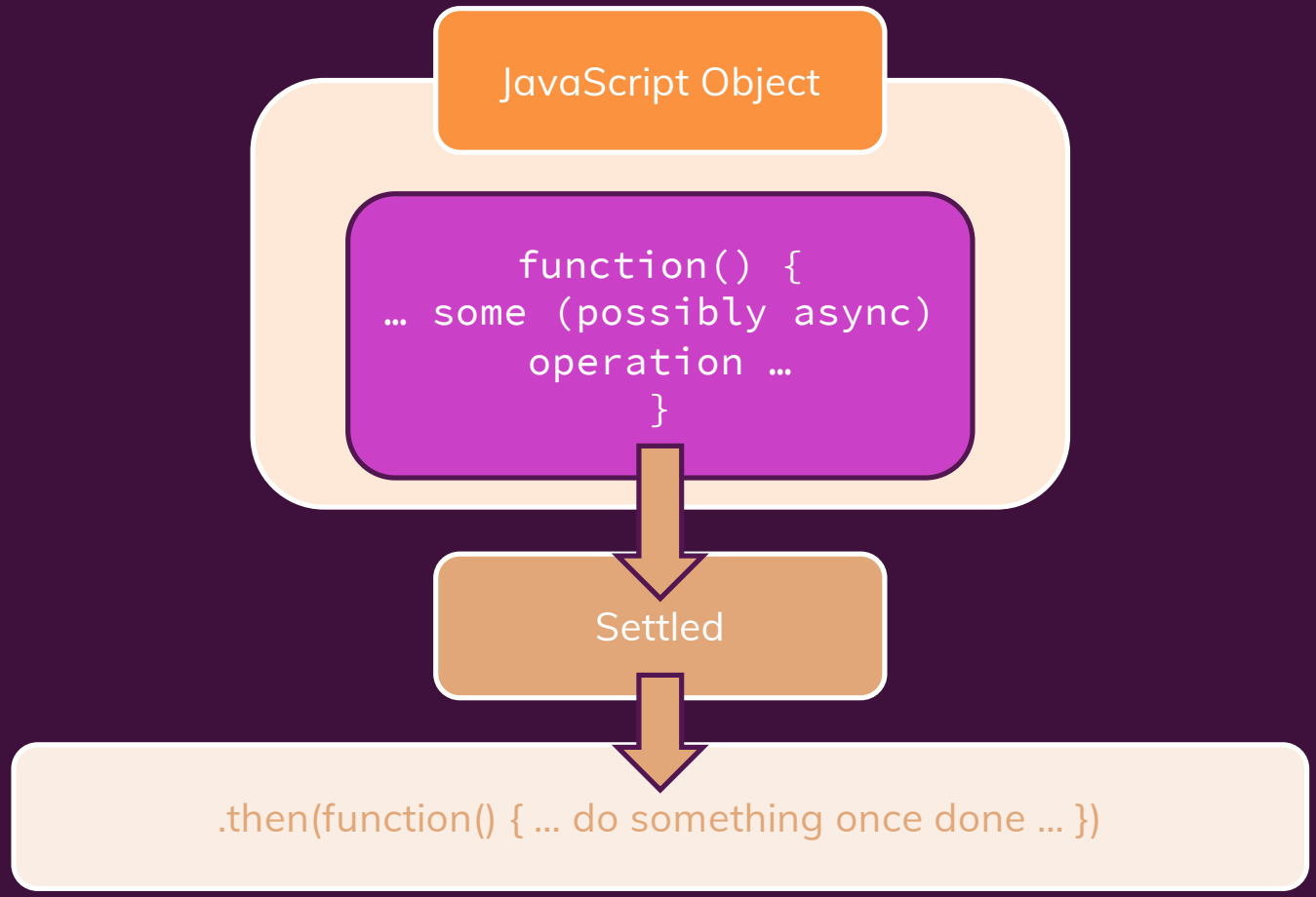
Callback Hell

```
el.addEventListener('click', function() {
  setTimeout(function() {
    doSomethingElse(function() {
      …
    });
  }, 2000);
})
```

```
addListener(el, 'click')
  .then(function() {
    return setTimer(2000);
  })
  .then(function() {
    return doSomethingElse();
  })
  .then(…);
```

What's a Promise?



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Promise States

Pending		Initial state, code in promise has not produced a result yet
Fulfilled	Settled	Promise has been resolved (i.e. the operation completed successfully)
Rejected		Promise has been rejected (i.e. the operation failed)

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Summary – Async Code

Asynchronous code is code that "**doesn't finish immediately**" (e.g. a timer, a http request, ...). JavaScript handles such code by **NOT pausing execution** but instead by **handing the task off** to the engine environment (e.g. to the browser).

JavaScript **is single-threaded**, hence it can only **do one thing at a time** – therefore it **can't manage** a timer and continue executing other code.

Hence async operations are **handed off to the environment** (e.g. browser) which is not single-threaded.

Async operations can be handled **with two key features** (which are also available for non-async tasks): **Callback functions** and **Promises**.

For **built-in APIs** (e.g. `setTimeout()`, `fetch()`), you **can't choose which mechanism** you want to use.

Instead of `then()` / `catch()`, you can use **`async/await`** (with `try-catch`) to work with **Promises**.