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Tackle Complex Async Tasks with Less Code

The Pragmatic Bookshelf

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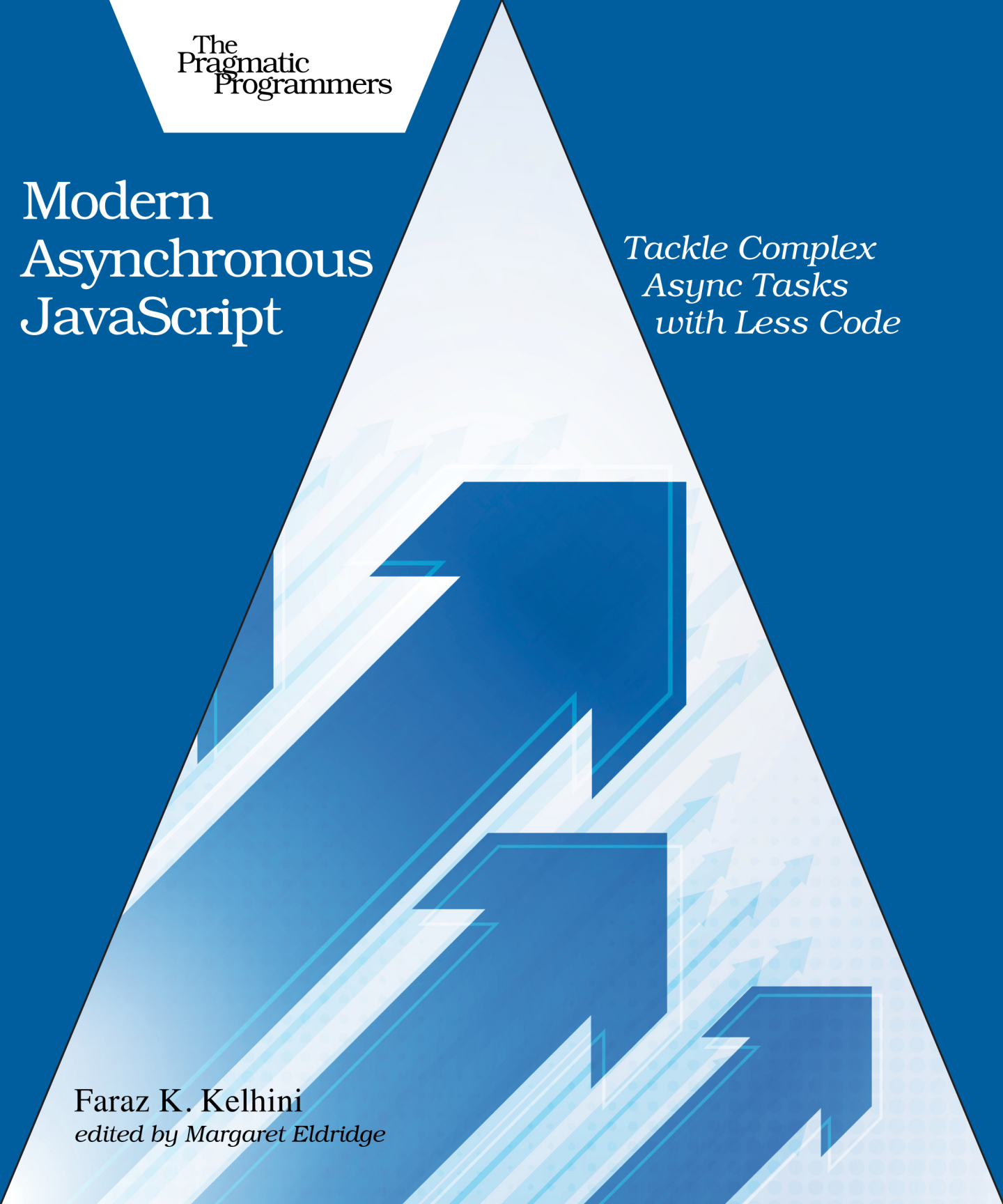

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edited by Margaret Eldridge

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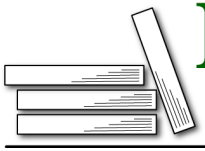

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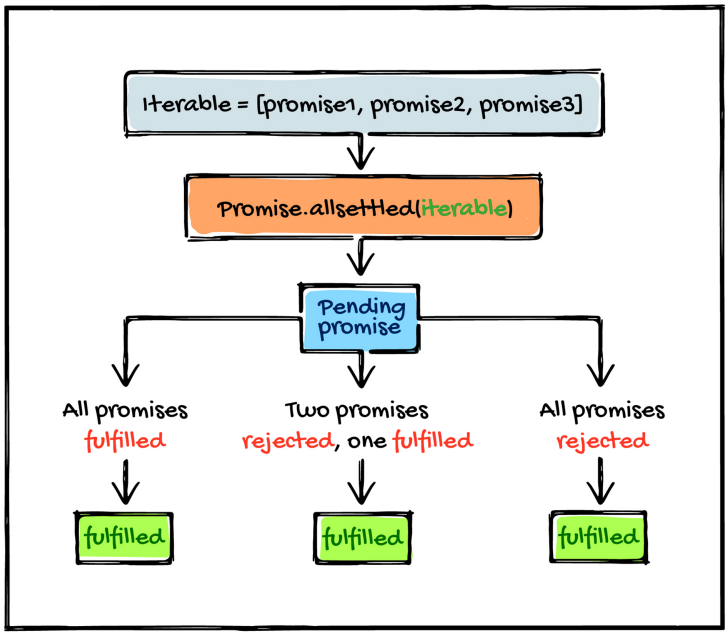
Using Promise.allSettled() to Fetch Multiple Resources

The Promise.allSettled() method returns a pending promise that resolves when all of the given promises have either successfully fulfilled or rejected ("settled," in other words). This behavior is very useful to track multiple asynchronous tasks that are not dependent on one another to complete.

The following image shows how the Promise.allSettled() method resolves a pending promise:



In the following example, we attempt to fetch three resources, one of which doesn't exist. Notice how Promise.allSettled() reports the result of every promise:

promise.allSettled/tracking_promises_ex04.js

```
const promises = [
  fetch('https://picsum.photos/200', {mode: "no-cors"}),
  fetch('https://does-not-exist', {mode: "no-cors"}),
  fetch('https://picsum.photos/100/200', {mode: "no-cors"})
];

Promise.allSettled(promises).
  then((results) => results.forEach((result) => console.log(result)));

// logs:
// => { status: "fulfilled", value: Response }
// => { status: "rejected", reason: TypeError }
// => { status: "fulfilled", value: Response }
```

Rather than immediately rejecting when one of the promises fails, Promise.allSettled() waits until they all have completed.

Notice how the result of all promises is passed as an array to then() and how they are in the same order as the iterable that was given even though they settled out of order. The outcome of each promise has a status property, indicating whether the promise has fulfilled. When a promise is rejected, the result won't have a value property. Instead, it has a reason property containing the rejection reason.

Keep in mind that the promise returned by Promise.allSettled() will almost always be fulfilled. The promise will reject if and only if we pass a value that's not iterable, such as a plain object.

Let's look at the rewritten version of this code, this time with the Promise.all() method:

promise.allSettled/tracking_promises_ex05.js

```
const promises = [
  fetch('https://picsum.photos/200', {mode: "no-cors"}),
  fetch('https://does-not-exist', {mode: "no-cors"}),
  fetch('https://picsum.photos/100/200', {mode: "no-cors"})
];

Promise.all(promises).
  then((results) => results.forEach((result) => console.log(result)));

// logs:
// => Uncaught (in promise) TypeError: Failed to fetch
```

This time, the promise rejects immediately upon the second input promise rejecting. One important difference between these two methods is that Promise.allSettled() has an extra property that Promise.all() doesn't: status. In fact, Promise.all() returns the raw value that Promise.allSettled() tucks into its resulting object. Compare:

promise.allSettled/tracking_promises_ex06.js

```
const promises = [
  Promise.resolve(1),
  Promise.resolve(2)
];

Promise.allSettled(promises).
  then((results) => results.forEach((result) => console.log(result)));

// logs:
// => { status: "fulfilled", value: 1 }
// => { status: "fulfilled", value: 2 }

Promise.all(promises).
  then((results) => results.forEach((result) => console.log(result)));
```

```
// logs:
// => 1
// => 2
```

Notice how Promise.all() directly returns the response. If you're in an old JavaScript environment that doesn't support Promise.allSettled() or if you'd like to directly return the promises, there's a simple workaround for you. Consider the following code:

promise.allSettled/tracking_promises_ex07.js

```
const promises = [
  fetch('https://picsum.photos/200', {mode: "no-cors"}),
  fetch('https://does-not-exist', {mode: "no-cors"}),
  fetch('https://picsum.photos/100/200', {mode: "no-cors"})
].map(p => p.catch(e => e));

Promise.all(promises).
  then((results) => results.forEach((result) => console.log(result)));
```

Here, we've applied the map() method to an iterable of promises. Within the method, we use catch() to return promises that resolve with an error value. This way, we can simulate the behavior of Promise.allSettled() while being able to directly access the result of promises.

Often, we use Promise.all() and Promise.allSettled() with similar types of requests, but there's no written rule that we should. You may find yourself in a situation where you need to read a local file, retrieve a JSON document from a web API, and load an XML document from another API. Once you obtain data from all three async requests, you want to process them. Promise.all() and Promise.allSettled() are ideal for such scenarios.

Keep in mind that you will want to use these methods only when you need to process the result of multiple async requests together. If it's possible to process the result of each async request individually, then handle each promise with its own then() handler. This way, you can execute your code as soon as each promise is resolved.

Wrapping Up

In this chapter, we looked at potential pitfalls when executing multiple promises at the same time. We learned why looping over asynchronous tasks could be a bad idea because it will cause the promises to run sequentially. Then we learned about the Promise.allSettled() method and compared it to Promise.all().

While Promise.all() is very strict in its execution policy, Promise.allSettled() is forgiving. That doesn't mean Promise.allSettled() is superior to Promise.all(): they comple-

ment each other. Using Promise.all() is more appropriate when you have essential async tasks that are dependent on each other. On the other hand, Promise.allSettled() is more suitable for async tasks that might fail but are not essential for your program to function.

As of ES2021, the ECMAScript standard includes one more method for the promise object: Promise.any(). This method is the opposite of Promise.all(). In the next chapter, we're going to learn how Promise.any() can help you when you need to focus on the promise that resolves first.