Finding Broken Promises In Asynchronous JavaScript Programs

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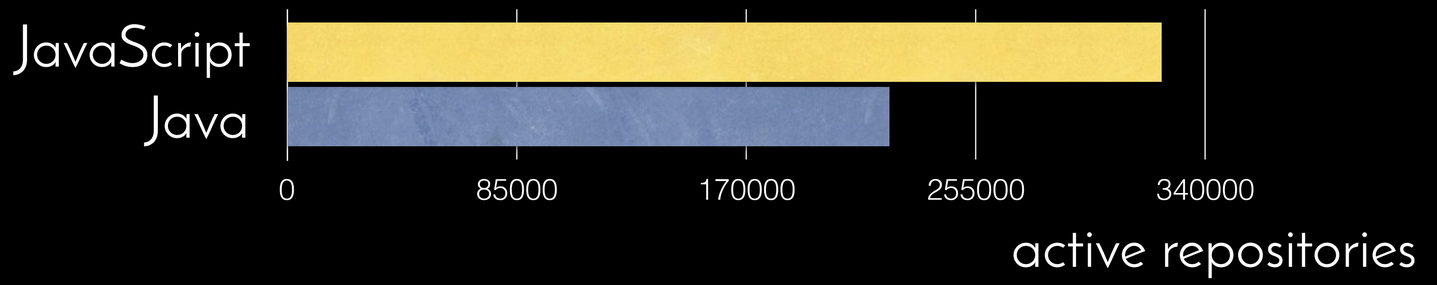
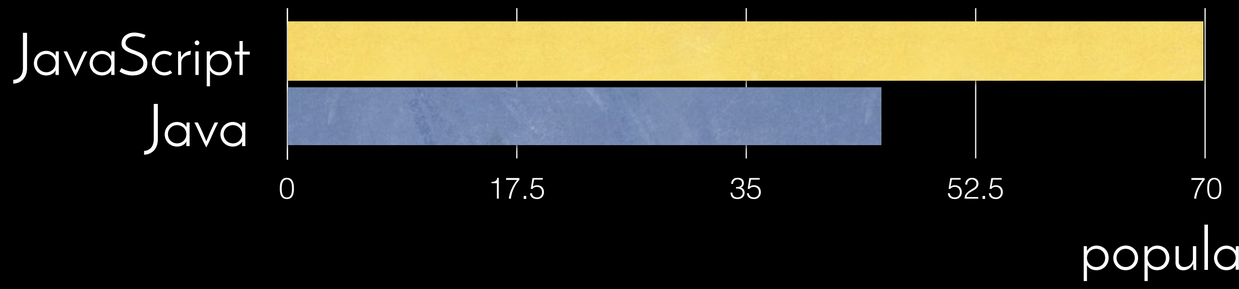
AARHUS UNIVERSITET


JavaScript
Java
0
85000
170000
255000
340000
active repositories


JavaScript
Java
0
17.5
35
52.5
70
popularity %

JS

Asynchronous JavaScript

```
fs.readdir(source, function (err, files) {
    files.forEach(function (fileName, fileIndex) {
        gm(source + fileName).size(function (err, values) {
            widths.forEach(function (width, widthIndex) {
                this.resize(w, h).write(nameName, function (err) {
                })
            })
        })
    })
})
```

little pyramid of doom!

// example from callbackhell.com (simplified)

Promise

JavaScript Promises


```
let p = new Promise(function (resolve, reject) {
});

let p2 = p.then(handleSuccess)  ;
           .then(soMuchSuccess, handleRejection)  ;
           .catch(moreRejection);
```

```
tcpPortUsed.check(port, 'localhost')
    .then(function (inUse) {
        if (inUse) {
            printErrorAndExit();
        } else {
            printSuccessMessage();
            startServer(port);
        }
})
```

simplified and modified example from:
https://github.com/facebook/Docusaurus

```
tcpPortUsed.check(port, 'localhost')
    .then(function (inUse) {
        if (inUse) {
            printErrorAndExit();
        } else {
            printSuccessMessage();
            startServer(port);
        }
})
```

> *Currently any exceptions thrown during server startup cause the process to silently exit. This makes tracking down bugs in config files super frustrating.*

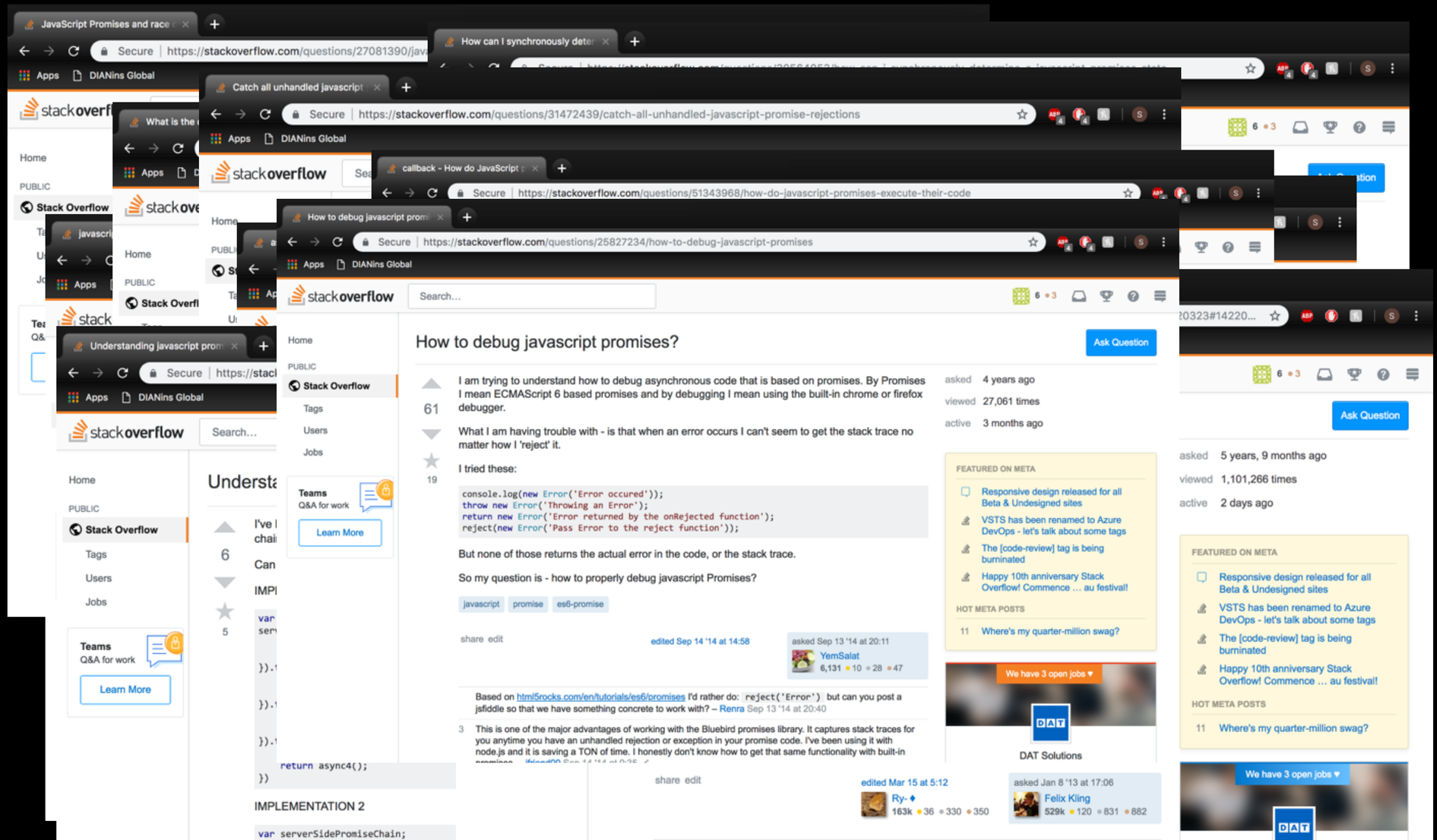
simplified and modified example from:
https://github.com/facebook/Docusaurus

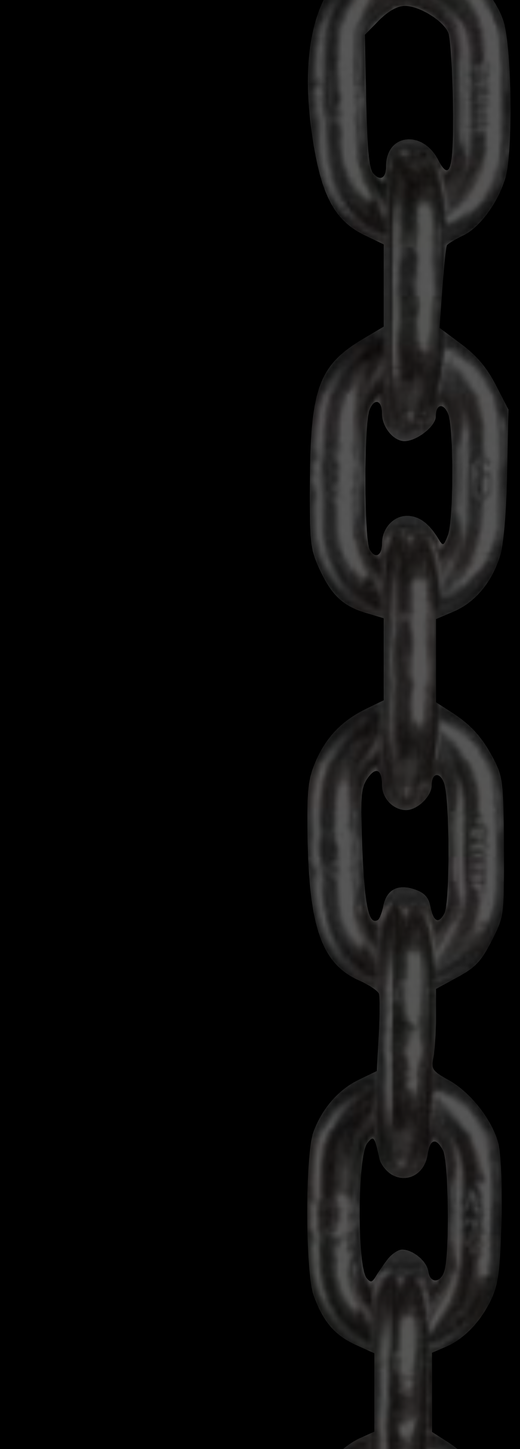
```
tcpPortUsed.check(port, 'localhost')
    .then(function (inUse) {
        if (inUse) {
            printErrorAndExit();
        } else {
            printSuccessMessage();
            startServer(port);
        }
})
+ .catch(function (ex) {
+     handleException(ex);
+ });
```

> *Currently any exceptions thrown during server startup cause the process to silently exit. This makes tracking down bugs in config files super frustrating.*

simplified and modified example from:
https://github.com/facebook/Docusaurus

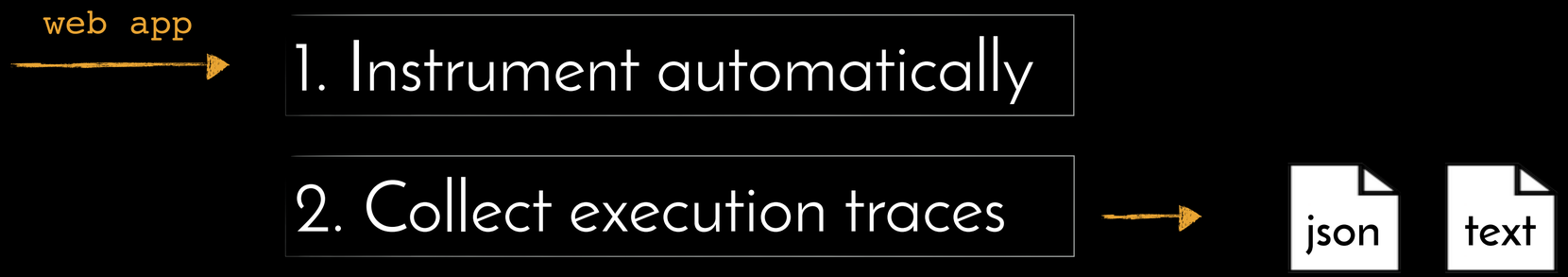
In Practice


How to debug javascript promises?
Ask Question
I am trying to understand how to debug asynchronous code that is based on promises. By Promises I mean ECMAScript 6 based promises and by debugging I mean using the built-in chrome or firefox debugger.
What I am having trouble with - is that when an error occurs I can't seem to get the stack trace no matter how I 'reject' it.
I tried these:
console.log(new Error('Error occured'));
throw new Error('Throwing an Error');
return new Error('Error returned by the onRejected function');
reject(new Error('Pass Error to the reject function'));
But none of those returns the actual error in the code, or the stack trace.
So my question is - how to properly debug javascript Promises?
javascript
promise
es6-promise
asked 4 years ago
viewed 27,061 times
active 3 months ago
FEATURED ON META
Responsive design released for all Beta & Undesigned sites
VSTS has been renamed to Azure DevOps - let's talk about some tags
The [code-review] tag is being burninated
Happy 10th anniversary Stack Overflow! Commence ... au festival!
HOT META POSTS
11 Where's my quarter-million swag?
We have 3 open jobs
DAT Solutions
asked 5 years, 9 months ago
viewed 1,101,266 times
active 2 days ago
IMPLEMENTATION 2
var serverSidePromiseChain;

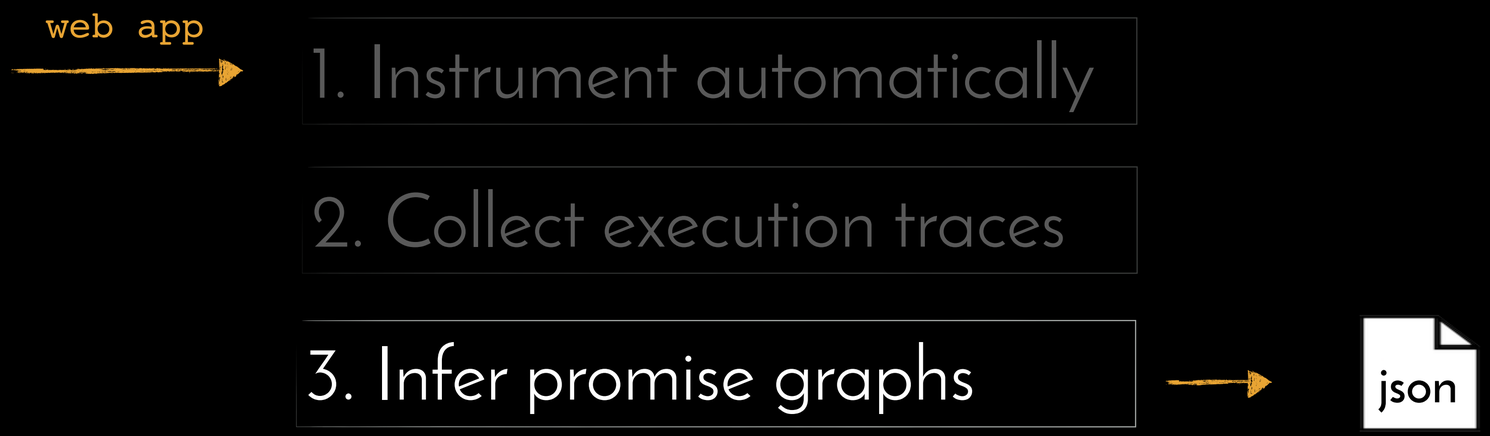


PromiseKeeper

PromiseKeeper



PromiseKeeper



[Madsen et al., 2017]

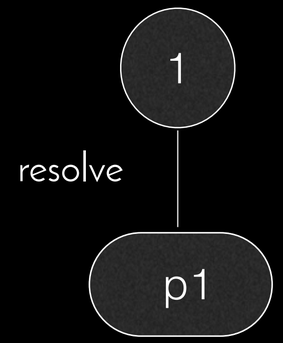
PromiseKeeper

web app

1. Instrument automatically

2. Collect execution traces

3. Infer promise graphs




```
let p1 = Promise.resolve(1);
```

PromiseKeeper

web app

1. Instrument automatically

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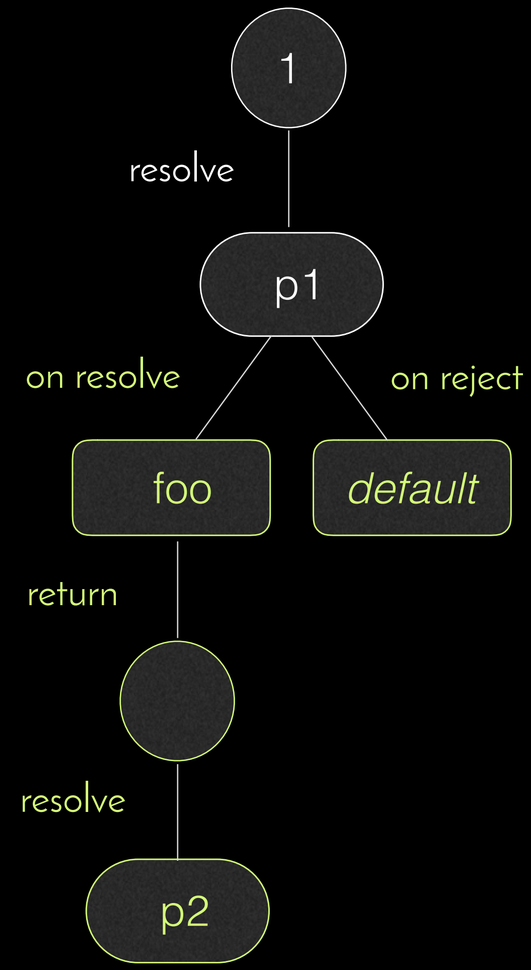
```
let p1 = Promise.resolve(1);
let p2 = p1.then(foo);
function foo (x) {
}
```



PromiseKeeper

web app

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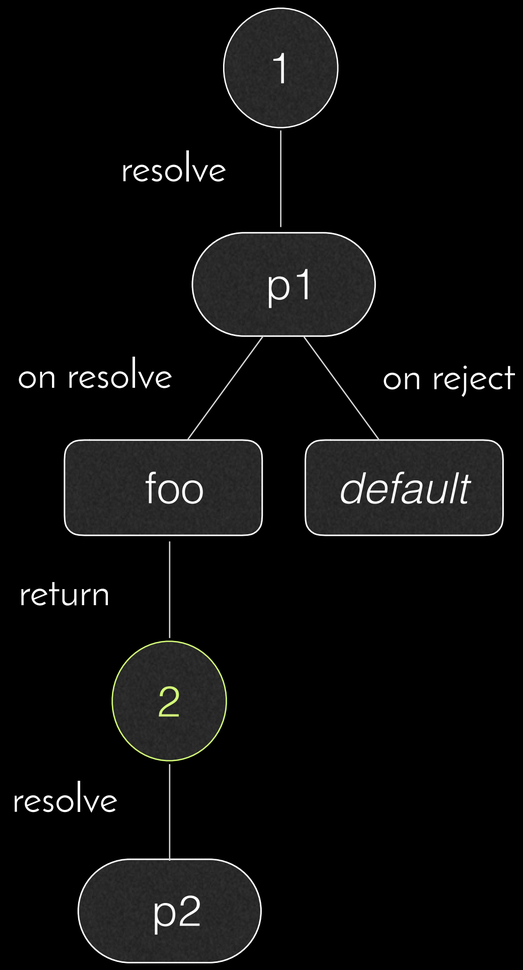
```
let p1 = Promise.resolve(1);
let p2 = p1.then(foo);
function foo (x) {
  return x + 1;
}
```



PromiseKeeper

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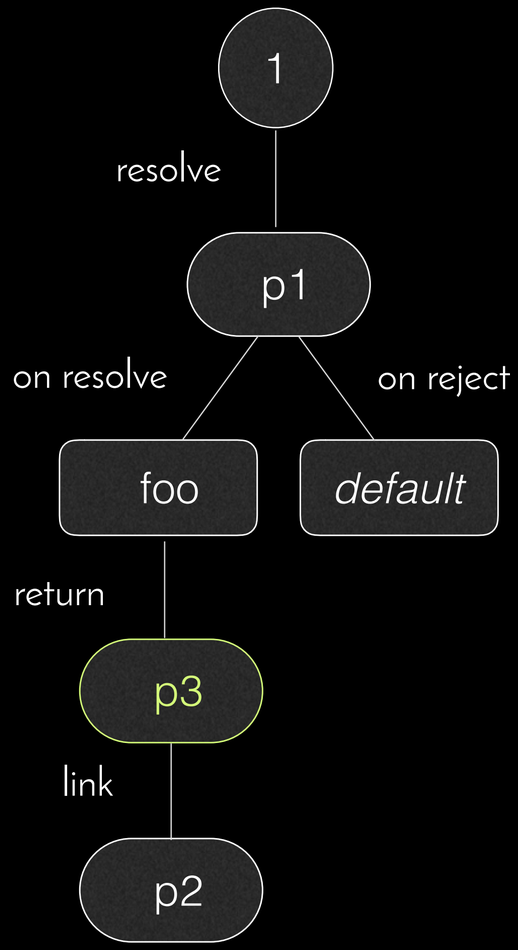
```
let p1 = Promise.resolve(1);
let p2 = p1.then(foo);
function foo (x) {
   let p3 = Promise.resolve(x);
   return p3;
}
```



PromiseKeeper

web app

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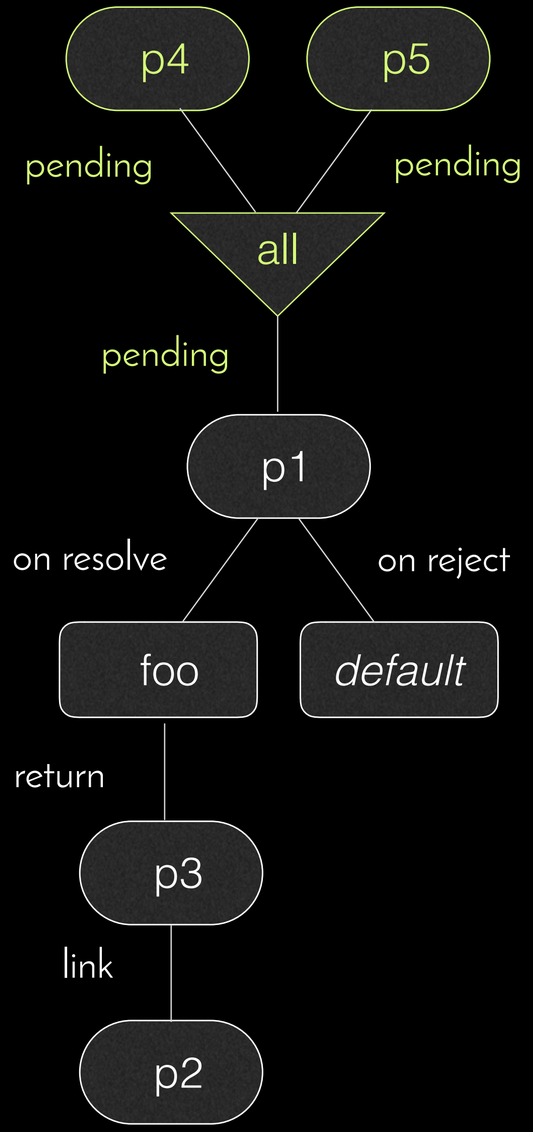
```
let p1 = Promise.all(p4, p5);
let p2 = p1.then(foo);
function foo (x) {
   let p3 = Promise.resolve(x);
   return p3;
}
```



PromiseKeeper

web app

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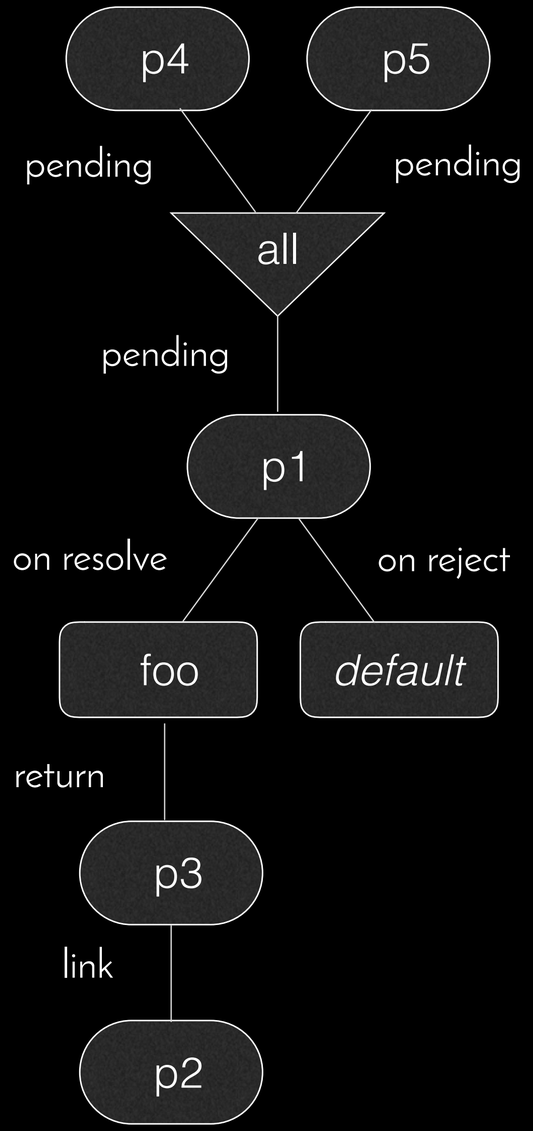
2. Collect execution traces
3. Infer promise graphs
4. Analyze anti-patterns



PromiseKeeper

web app

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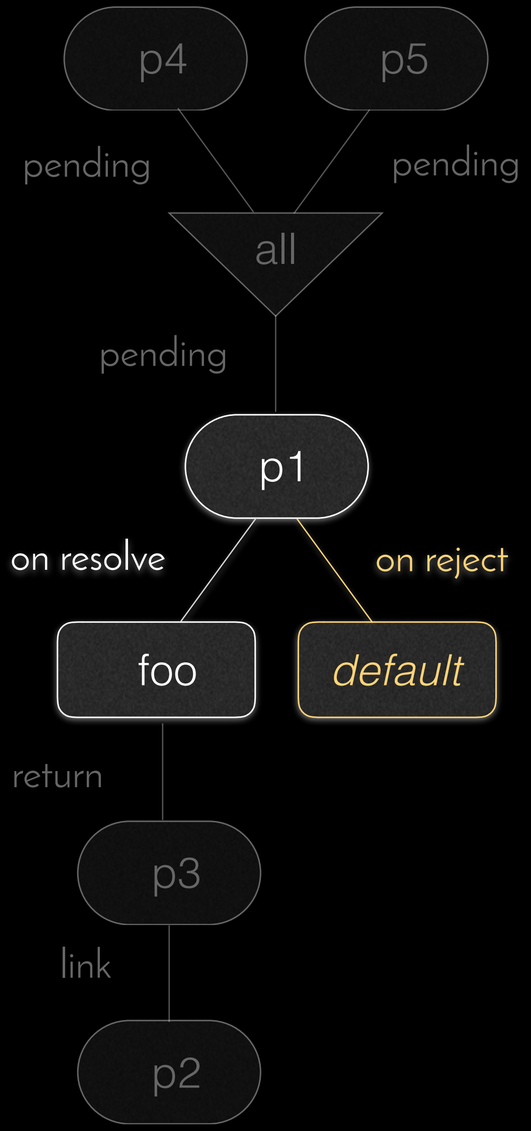
unhandled promise rejections



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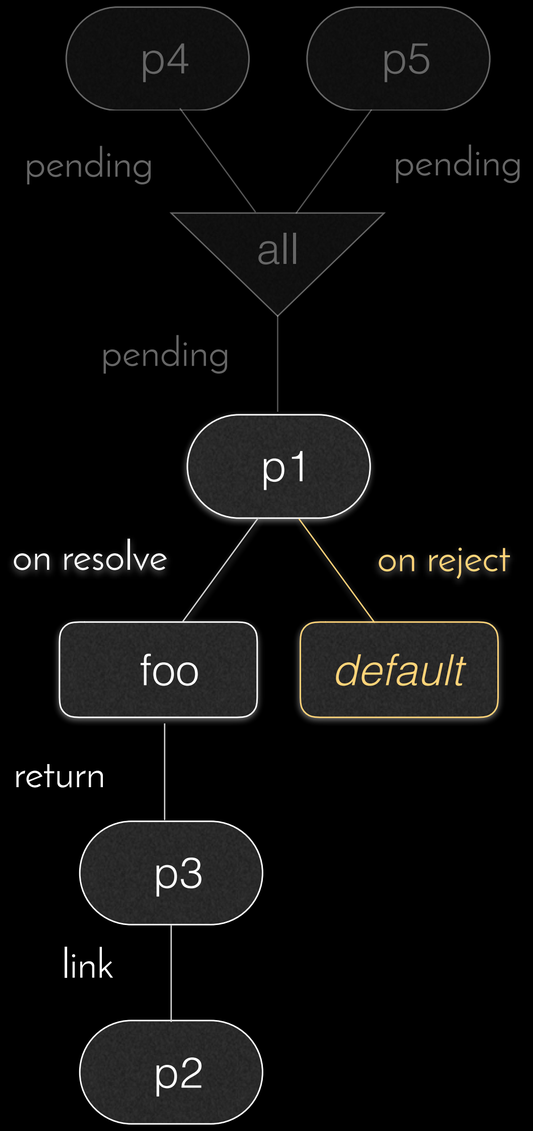
unhandled promise rejections



PromiseKeeper

web app

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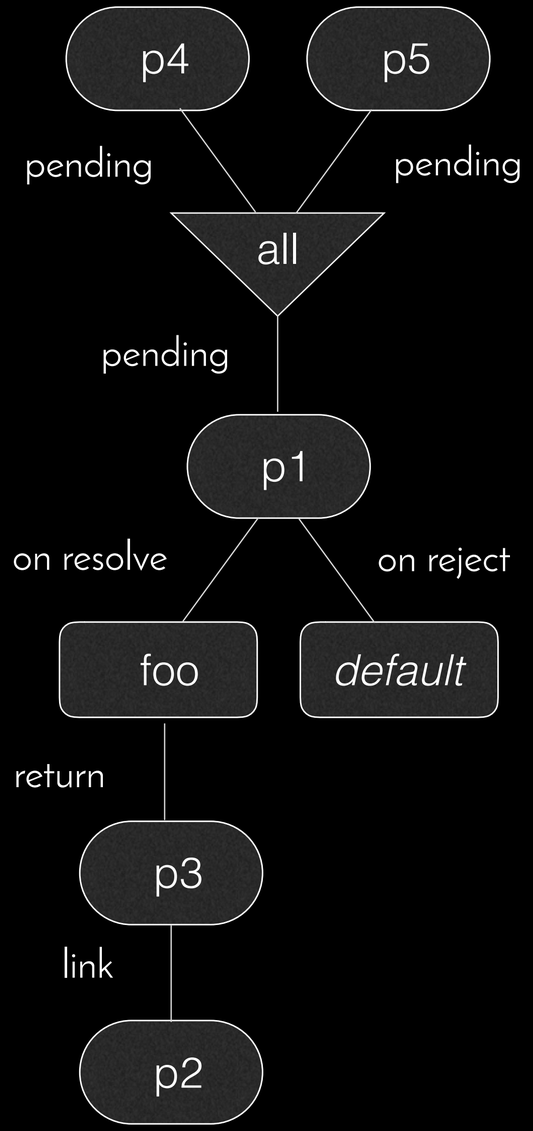
unsettled promises



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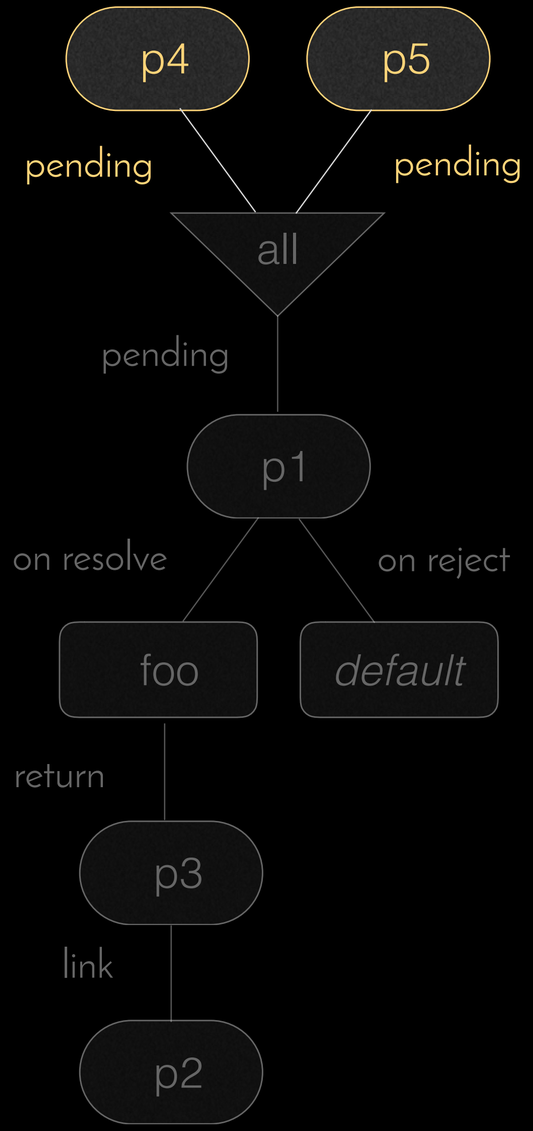

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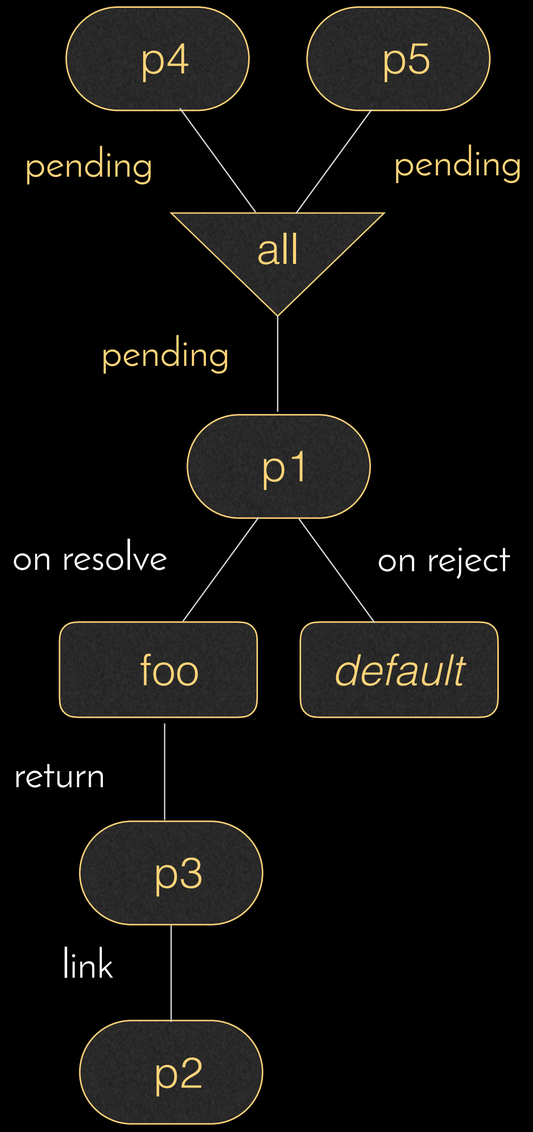
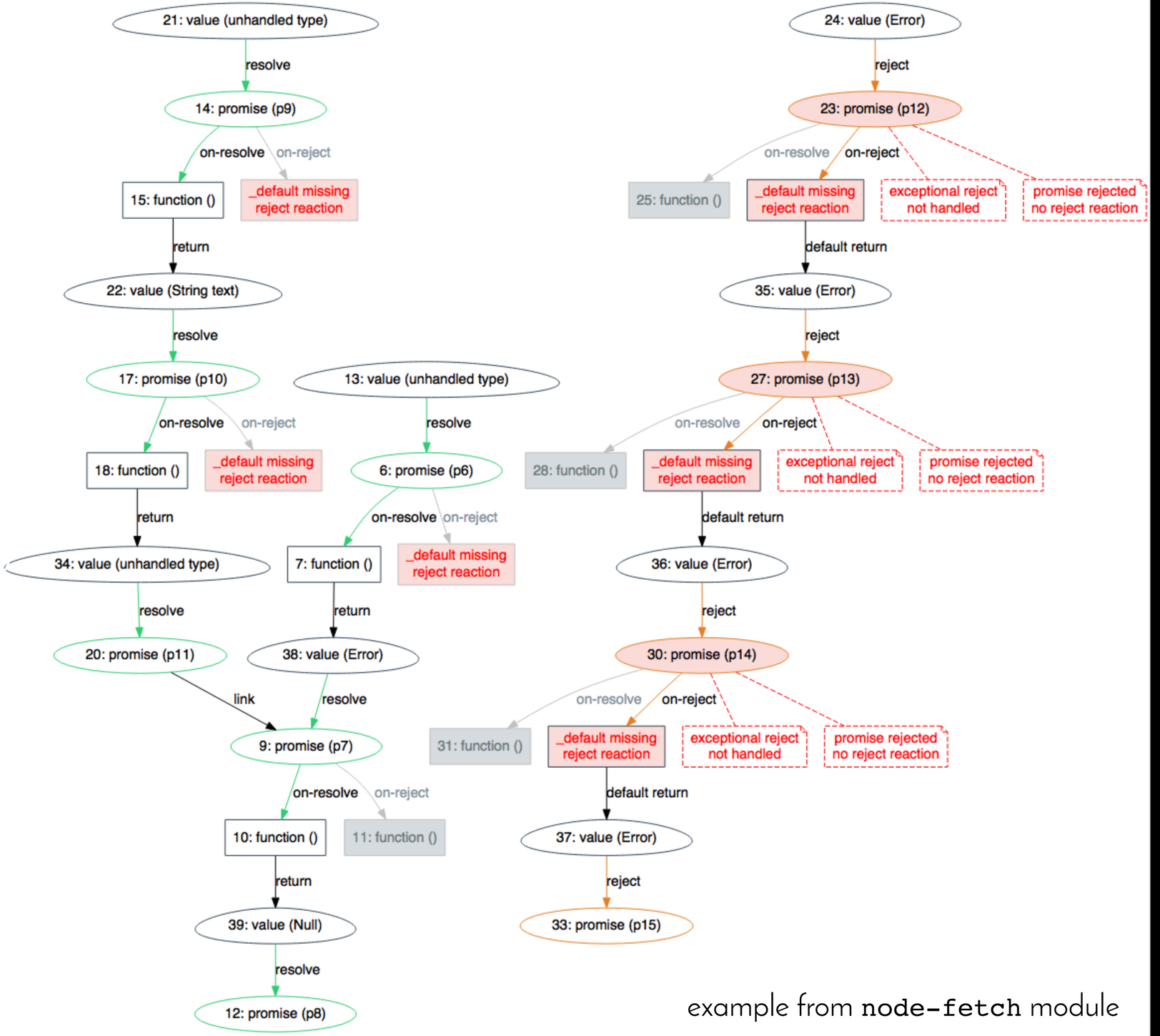
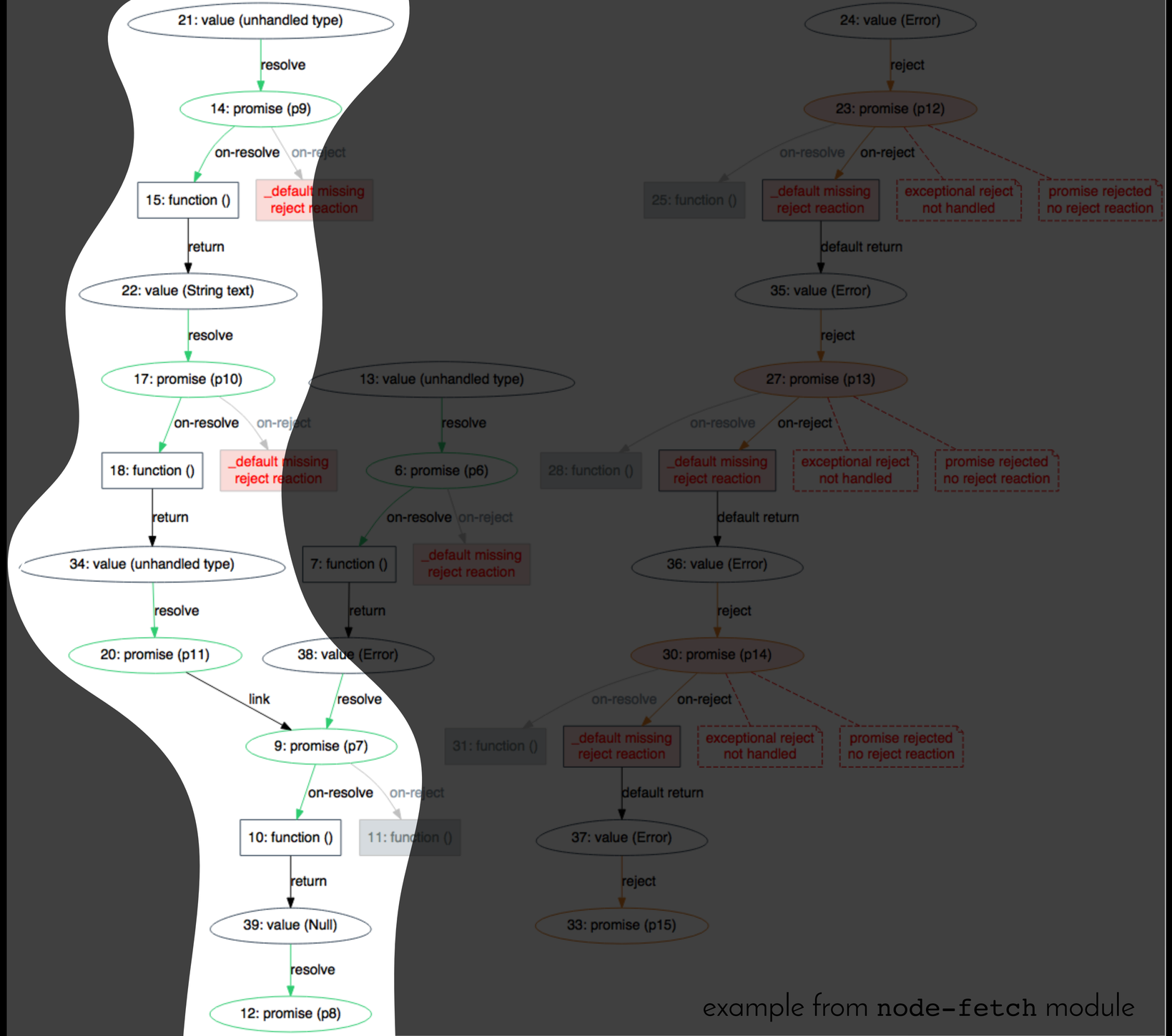




example from `node-fetch` module



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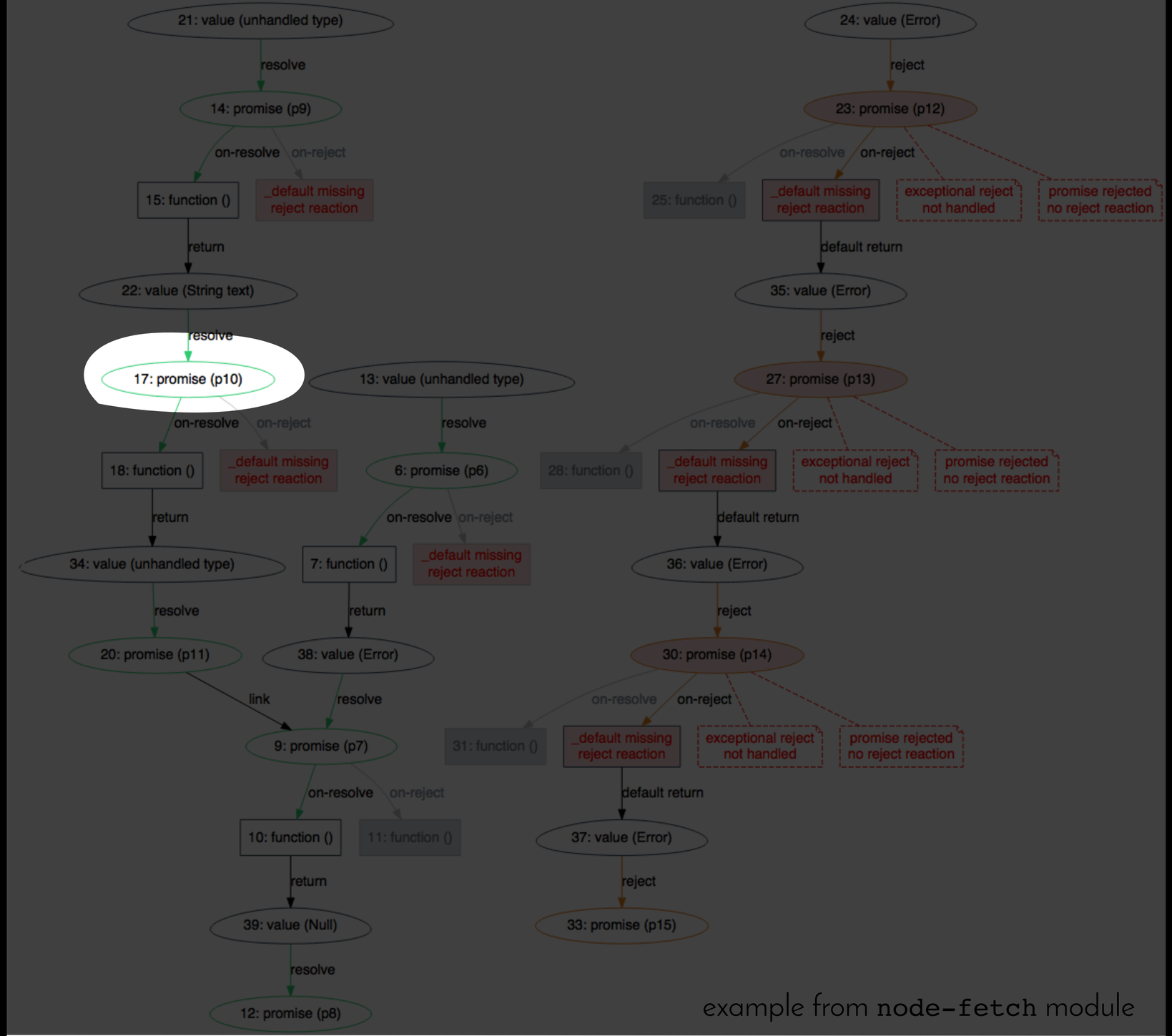

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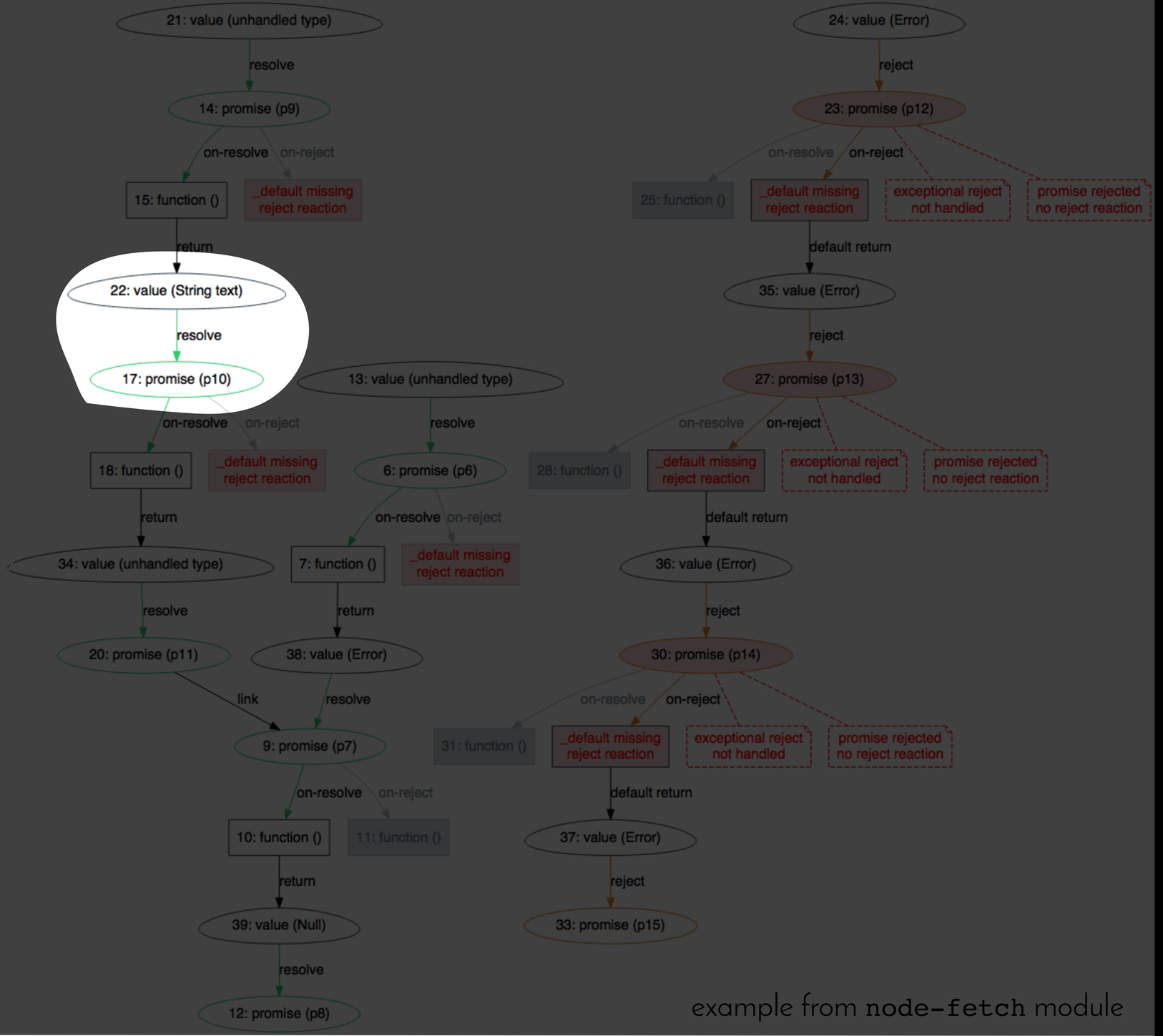
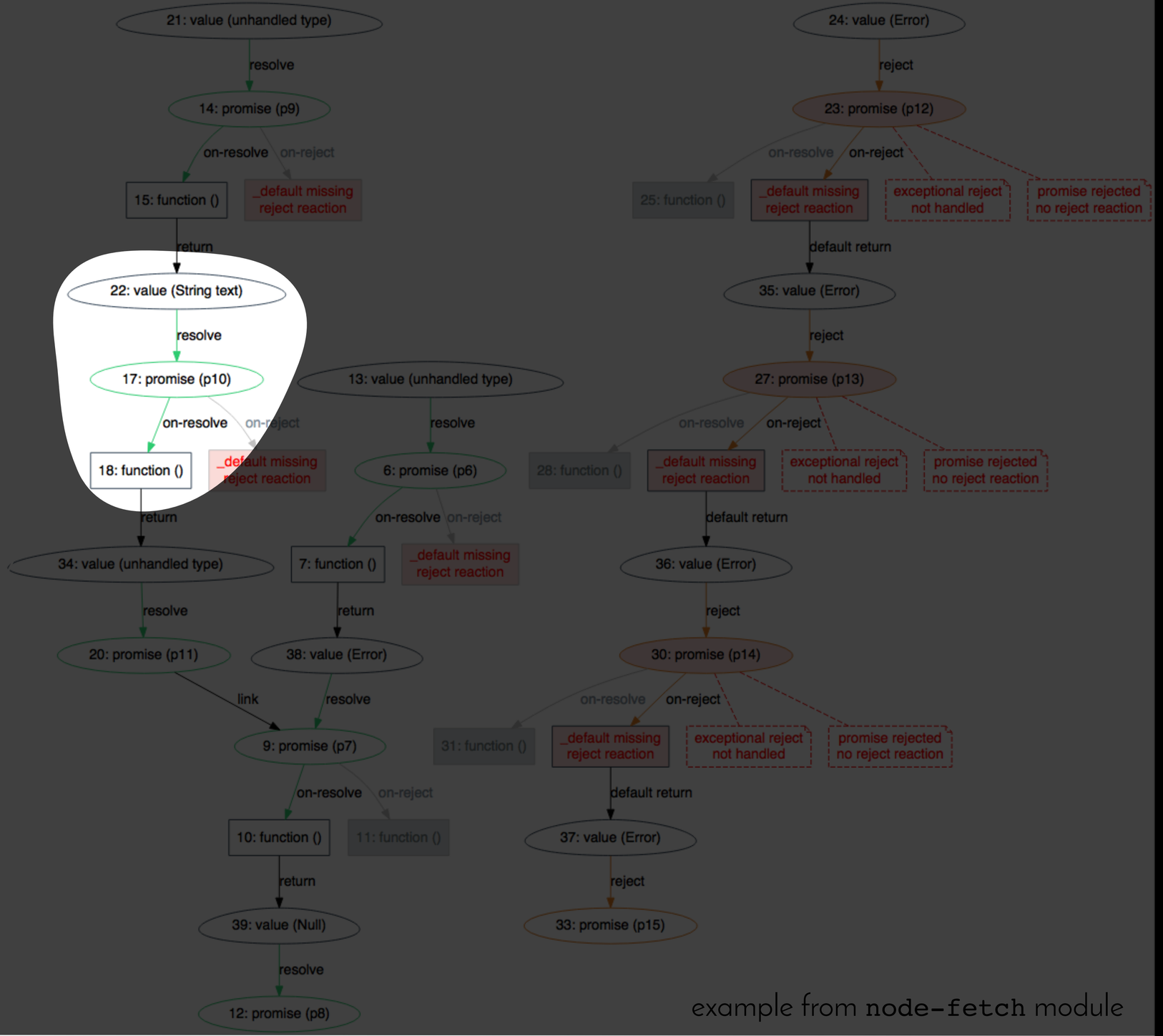


example from `node-fetch` module



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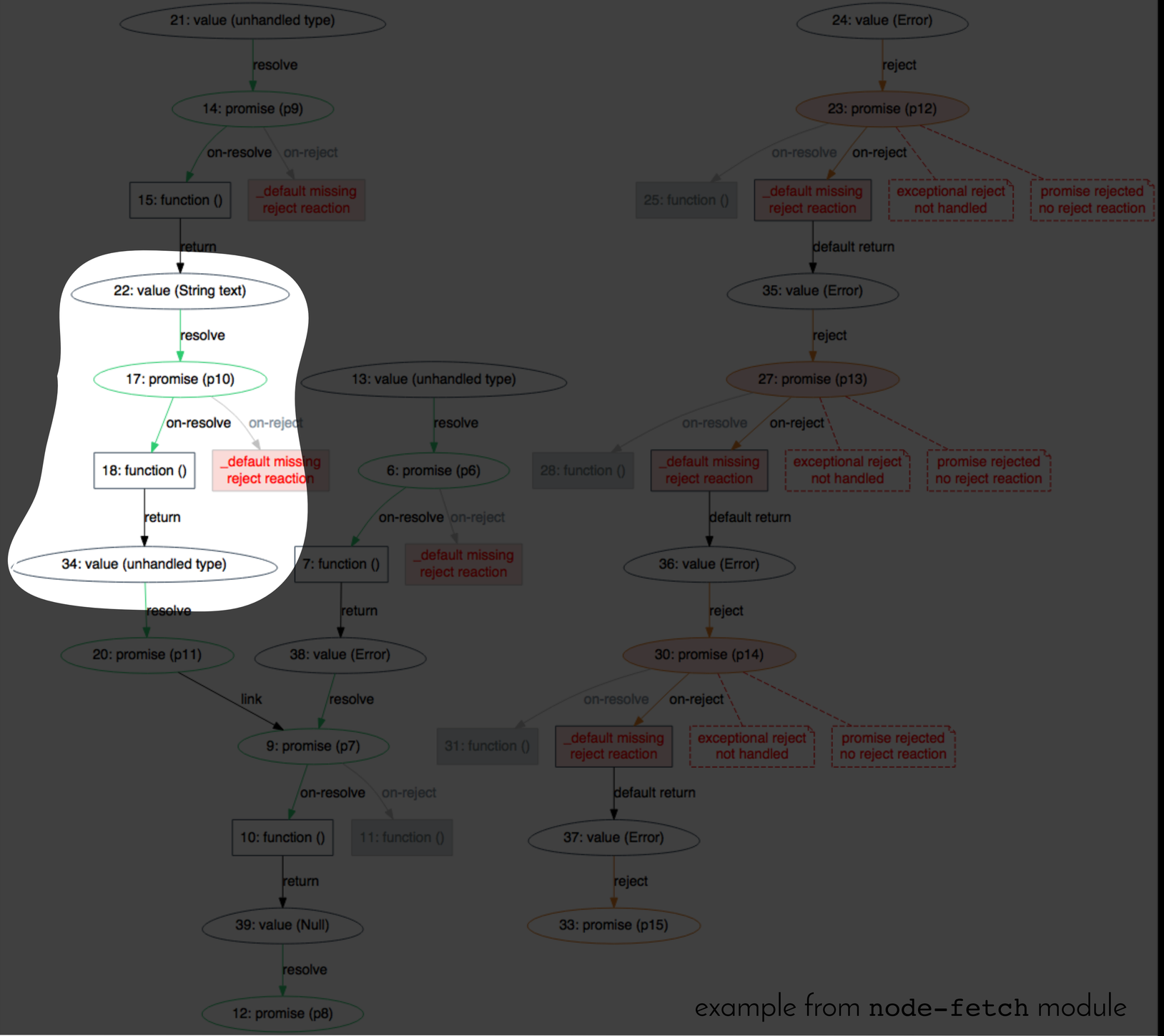
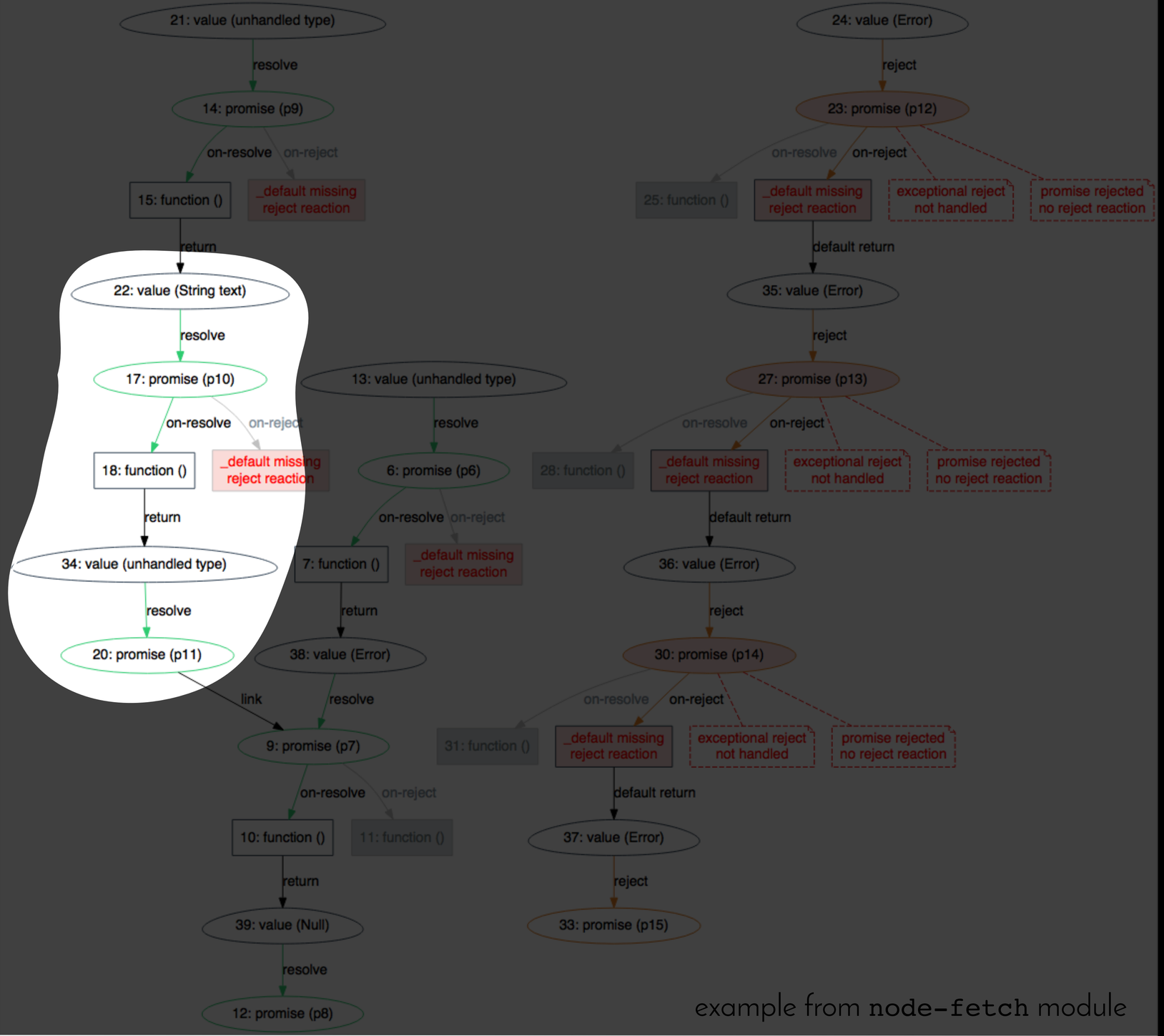


example from `node-fetch` module



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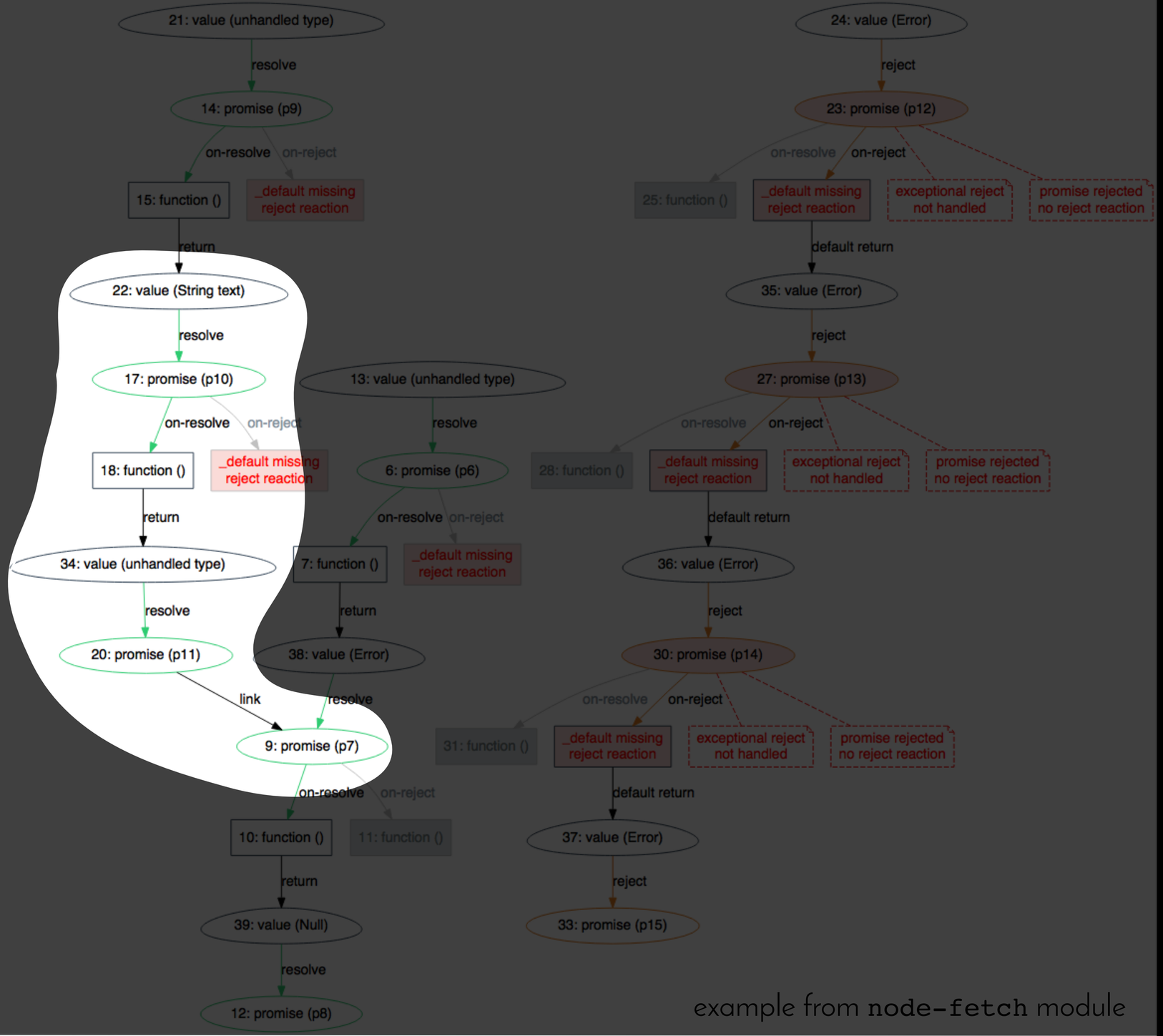
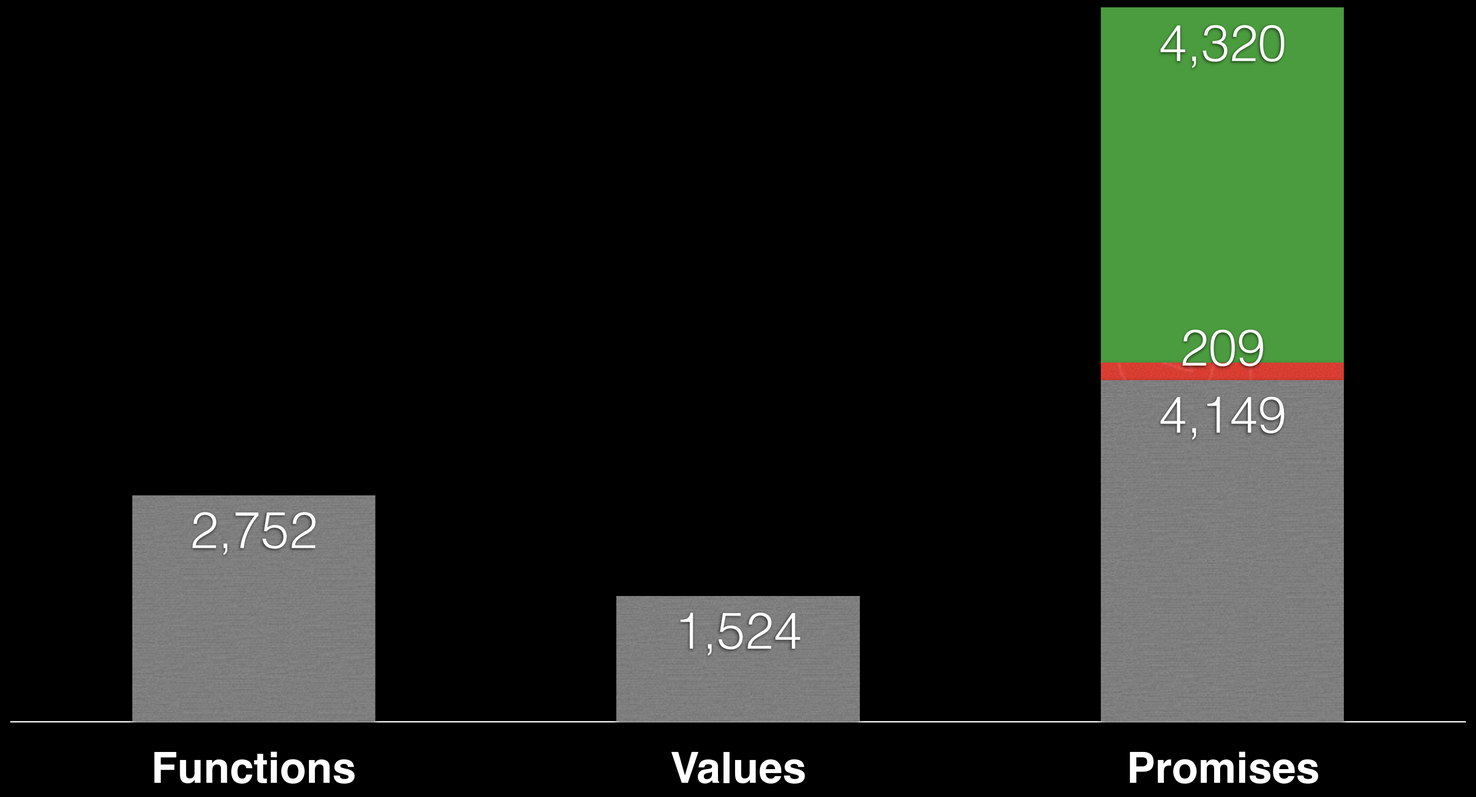


example from `node-fetch` module

Broken Promises



115,000
Lines of

209

rejected promises

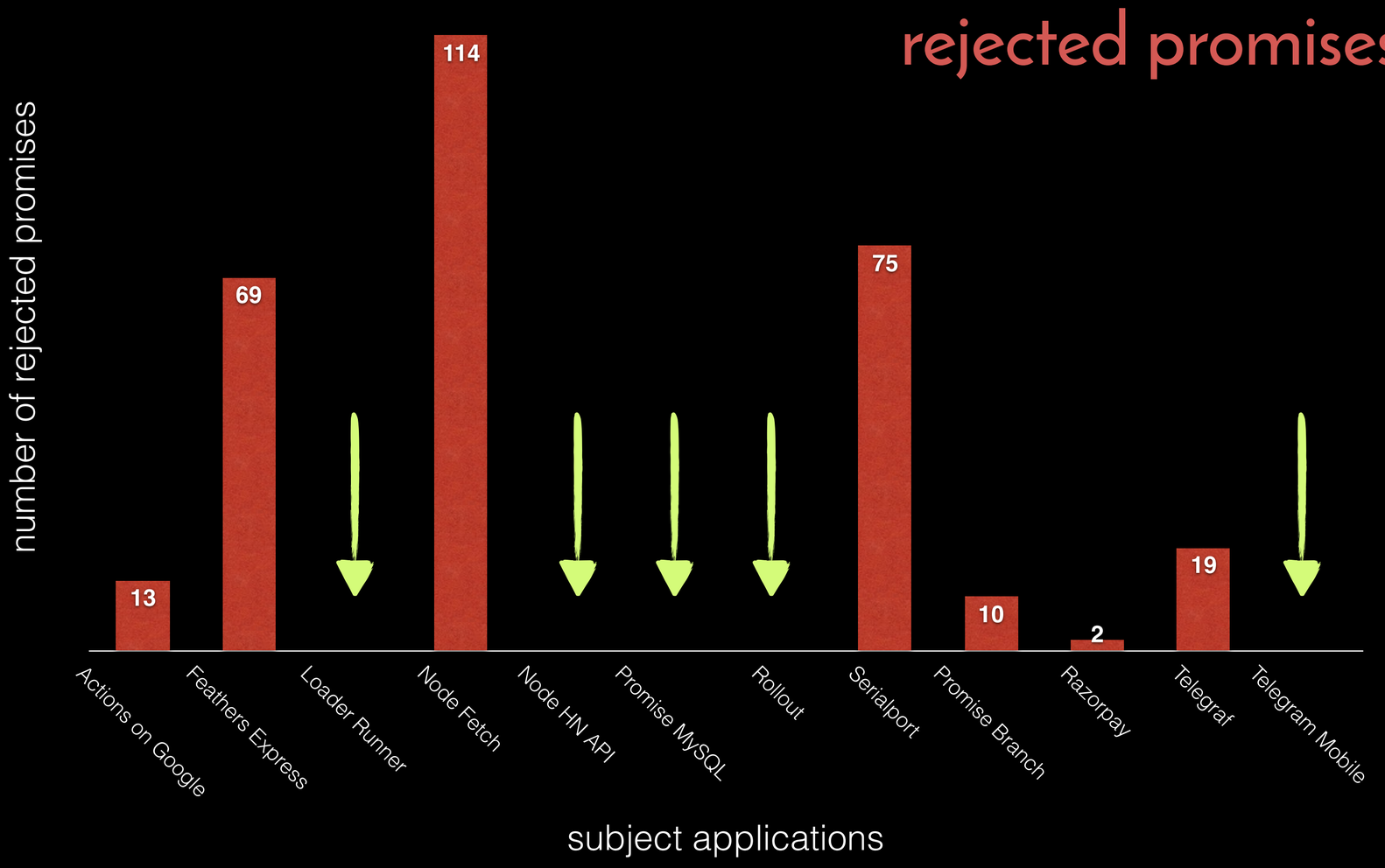
209

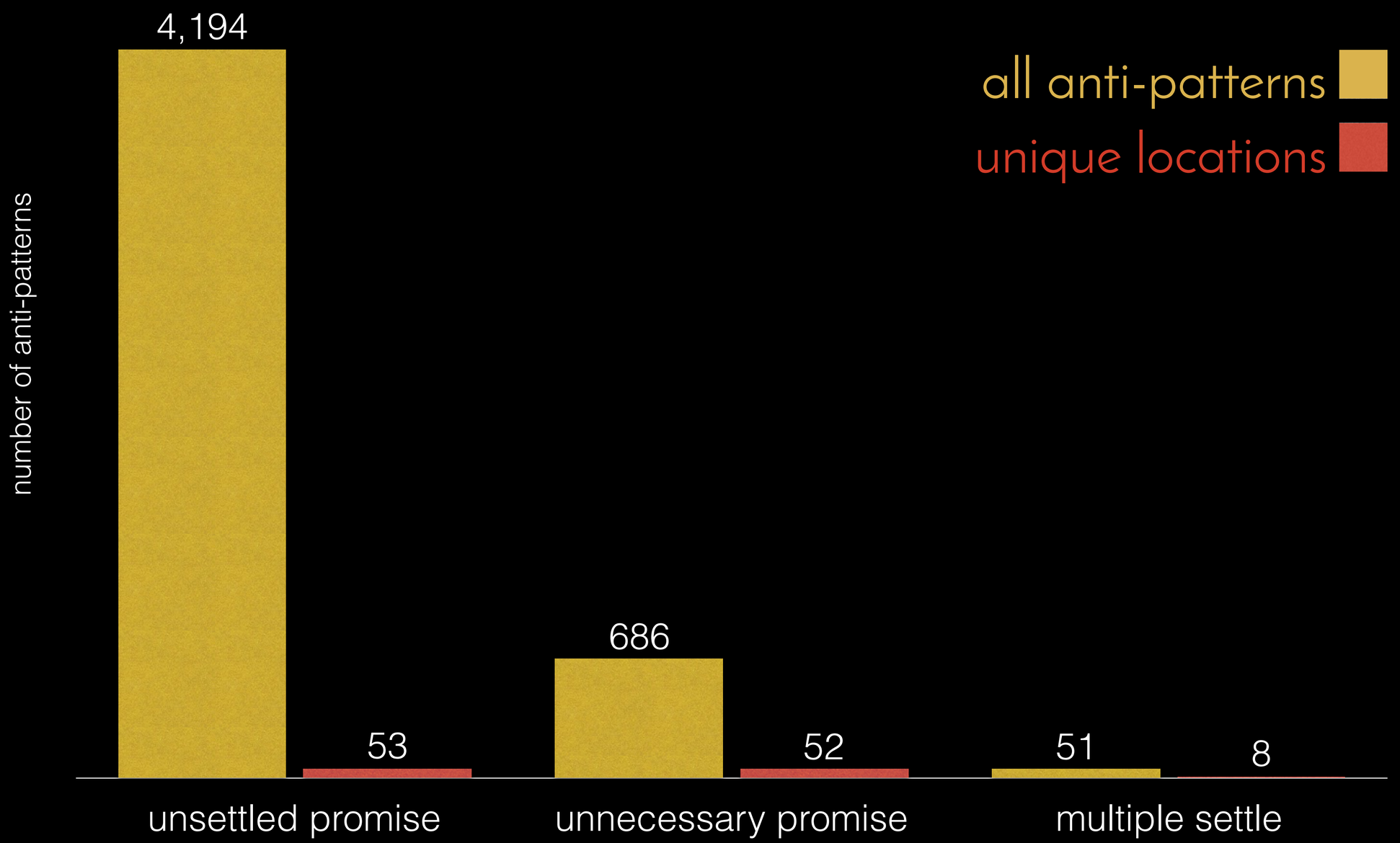
rejected promises

total

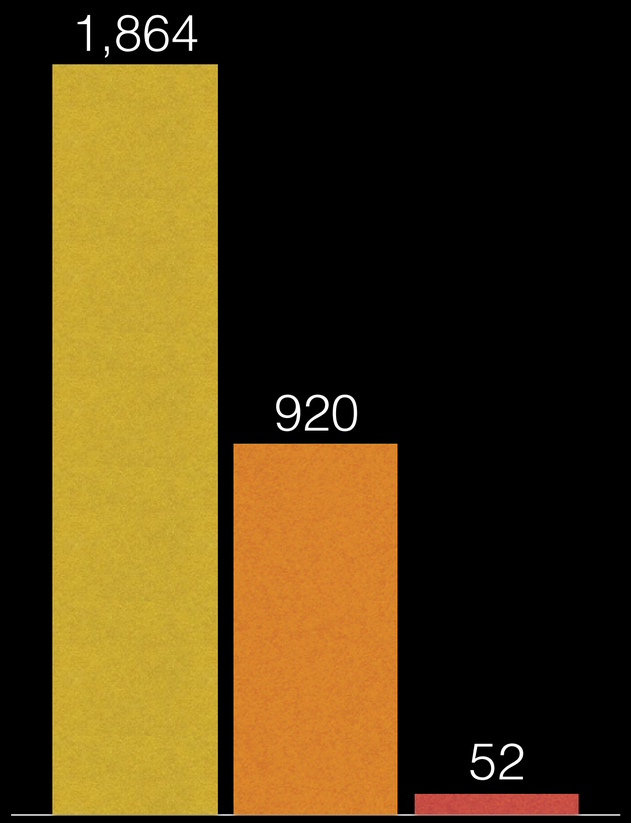
8698

rejected promises




4,194
53
686
52
51
8
all anti-patterns
unique locations
number of anti-patterns
unsettled promise
unnecessary promise
multiple settle


infer anti-patterns
apply heuristics
detect unique locations
number of anti-patterns
2,224
185
88
1,864
920
52
632
456
143
unreachable reaction
missing reject reaction
broken chain


1,864
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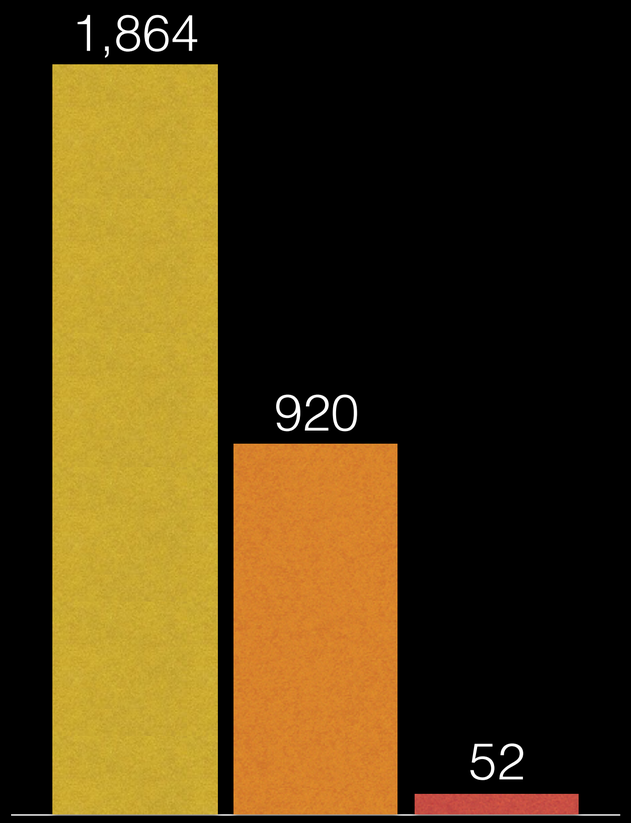
missing reject reaction


1,864
920
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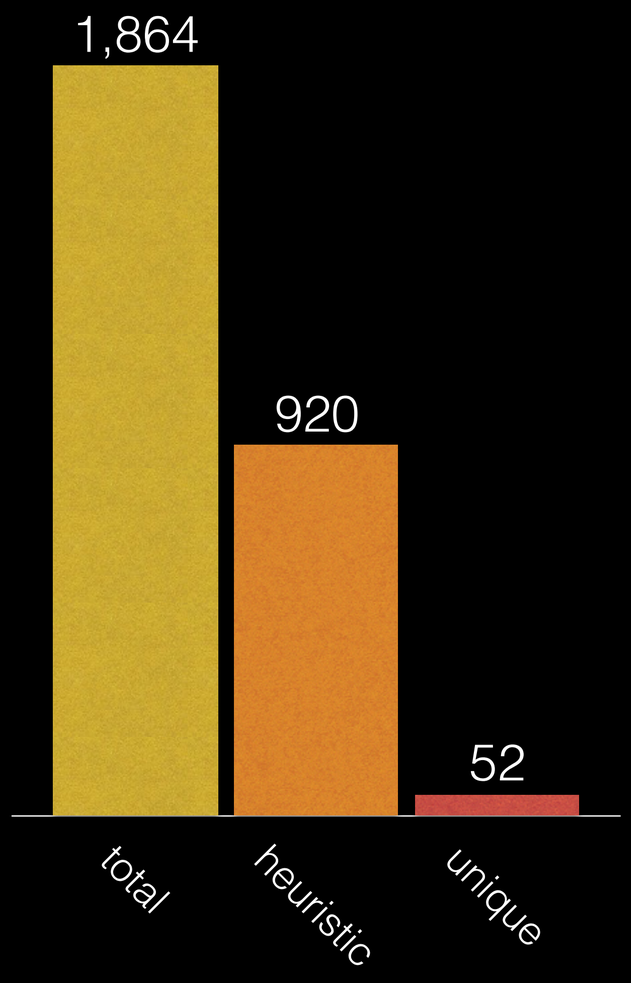
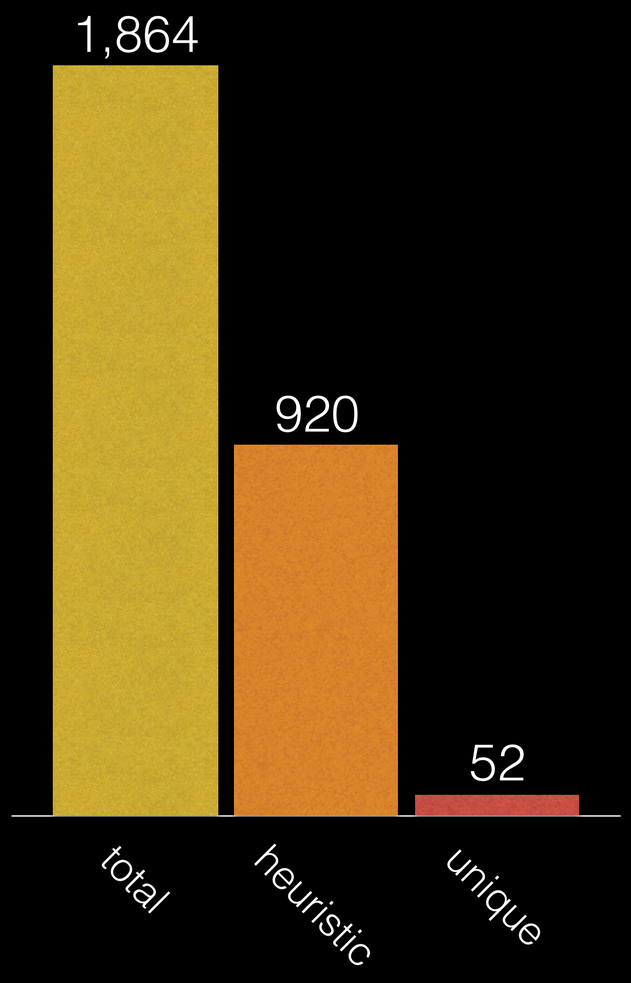
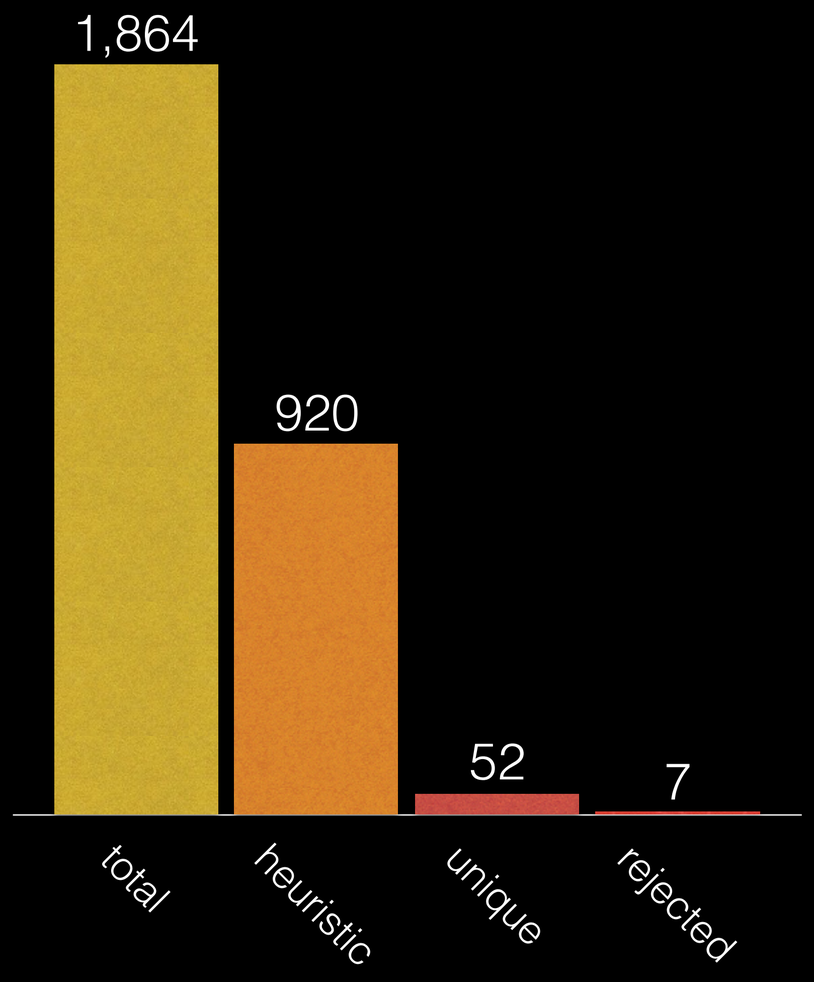
missing reject reactions

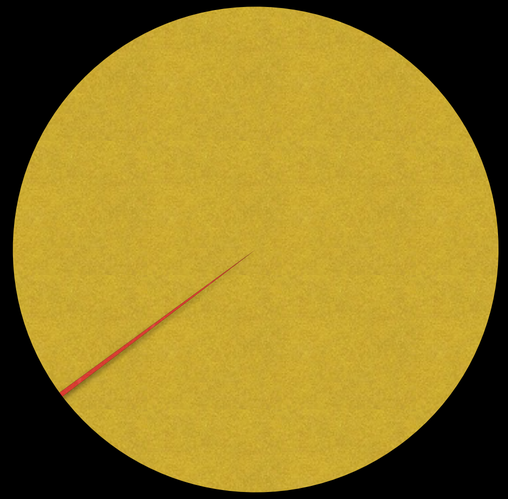


missing reject reactions

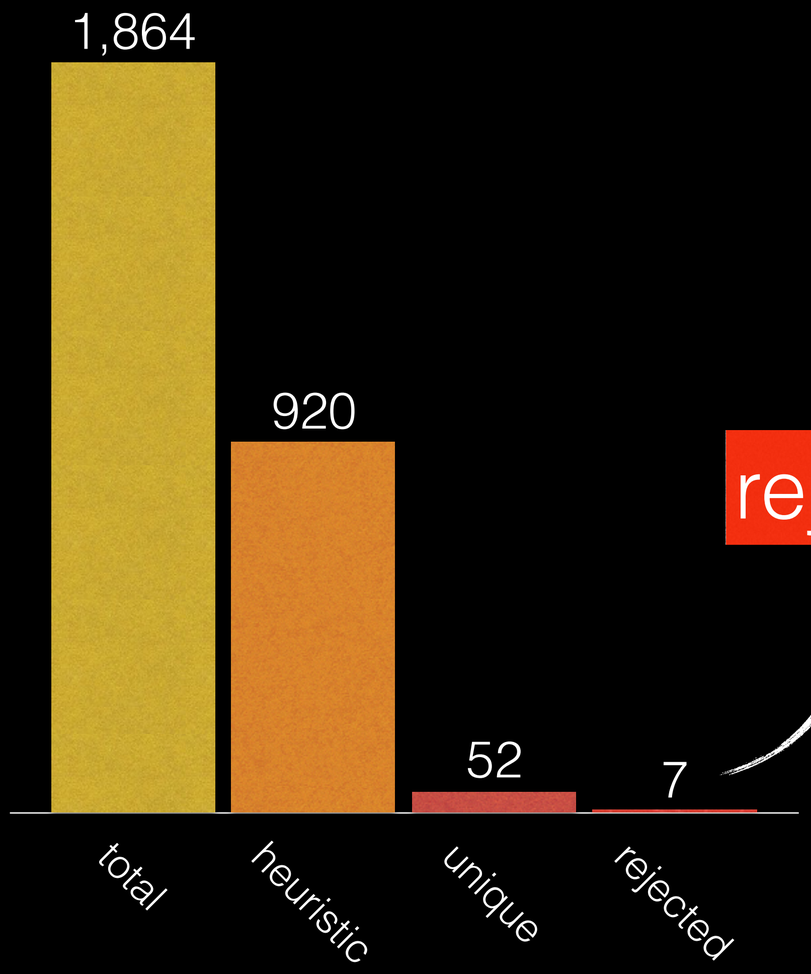


missing reject reactions

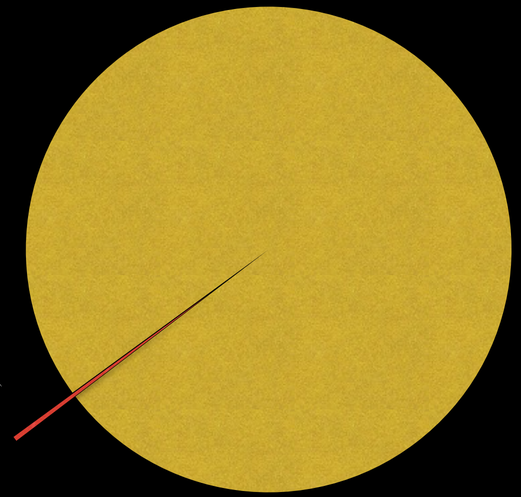




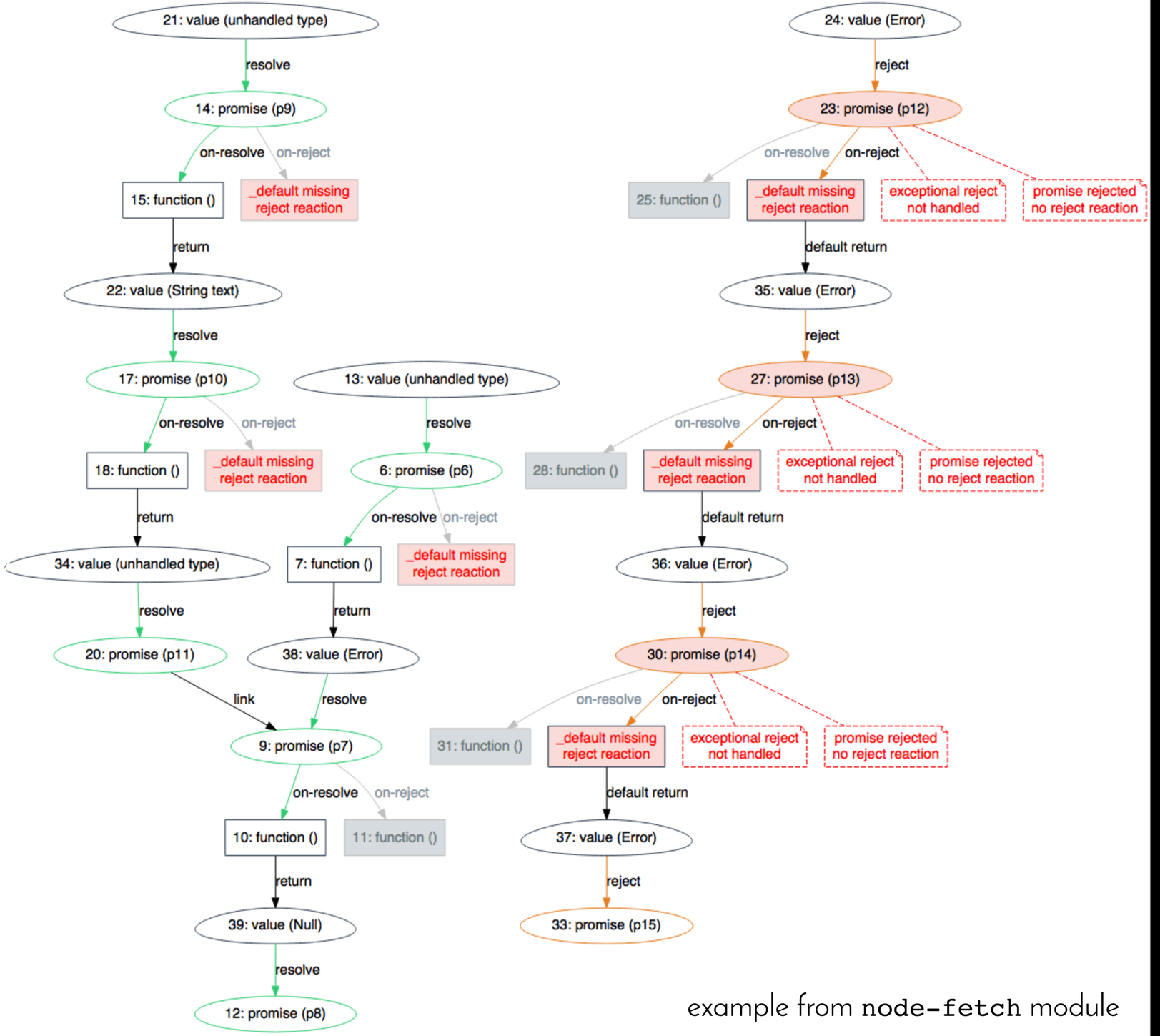
missing reject reactions



rejected



node-fetch
> 4,632,000 weekly downloads



example from `node-fetch` module

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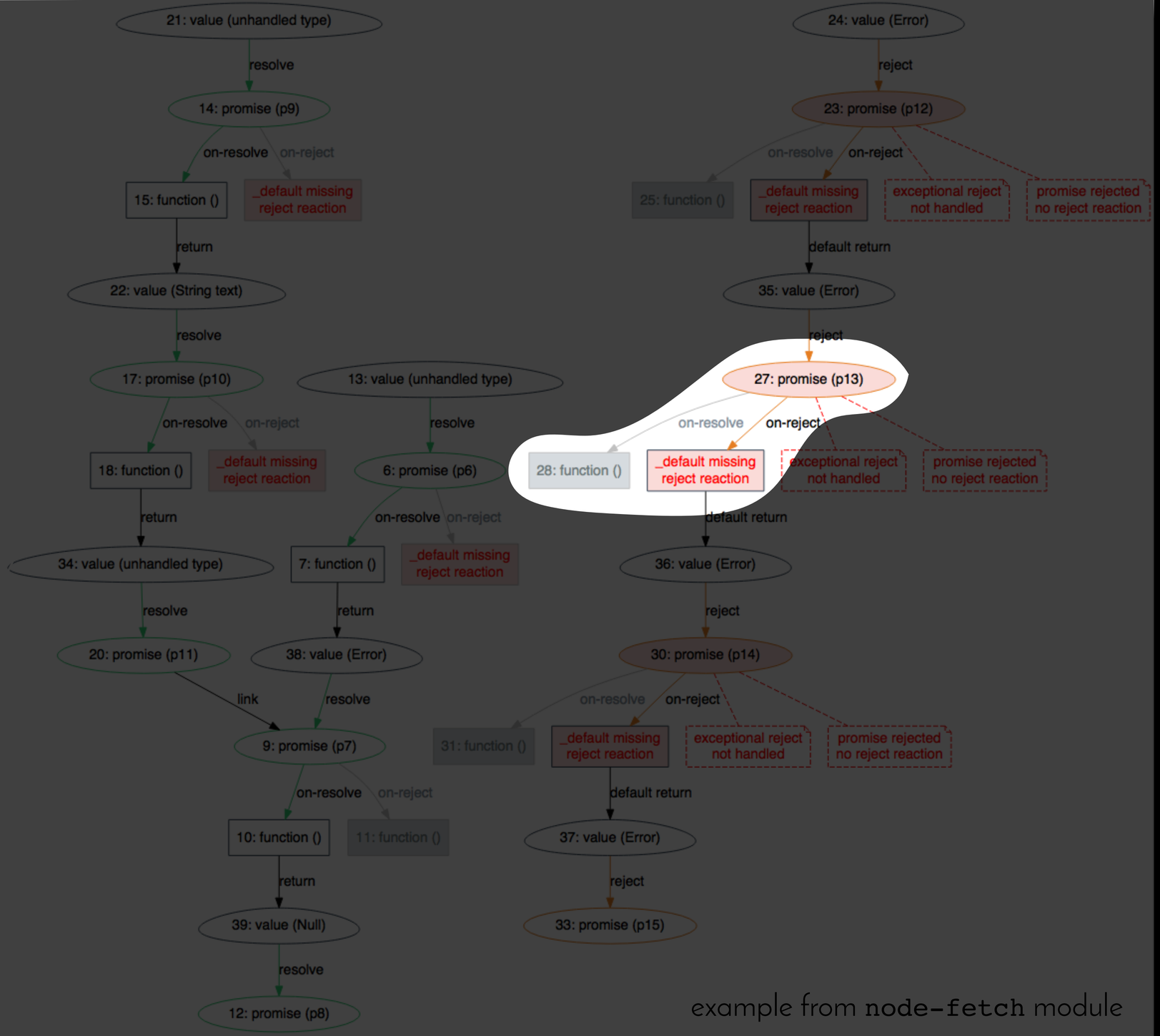

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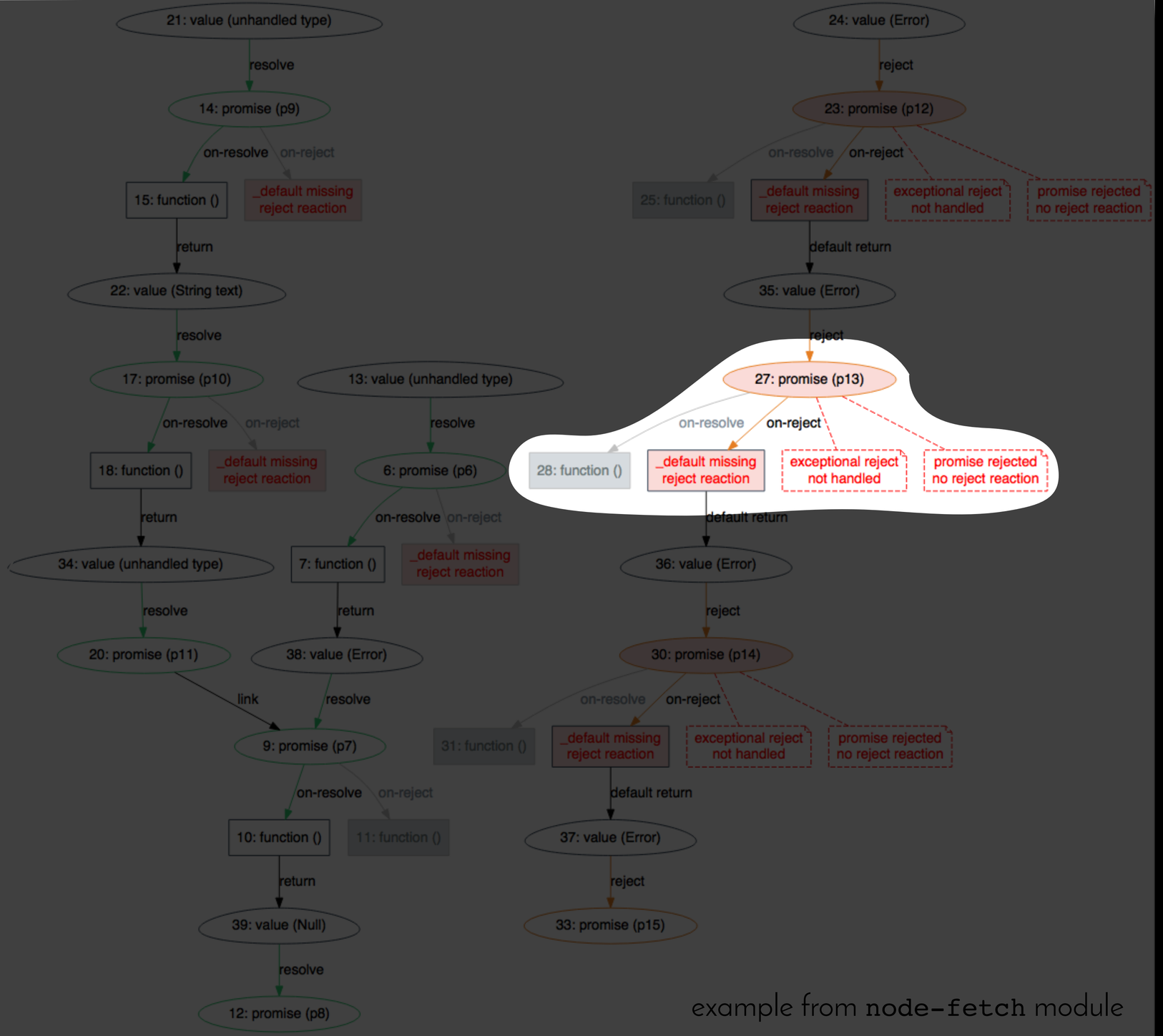

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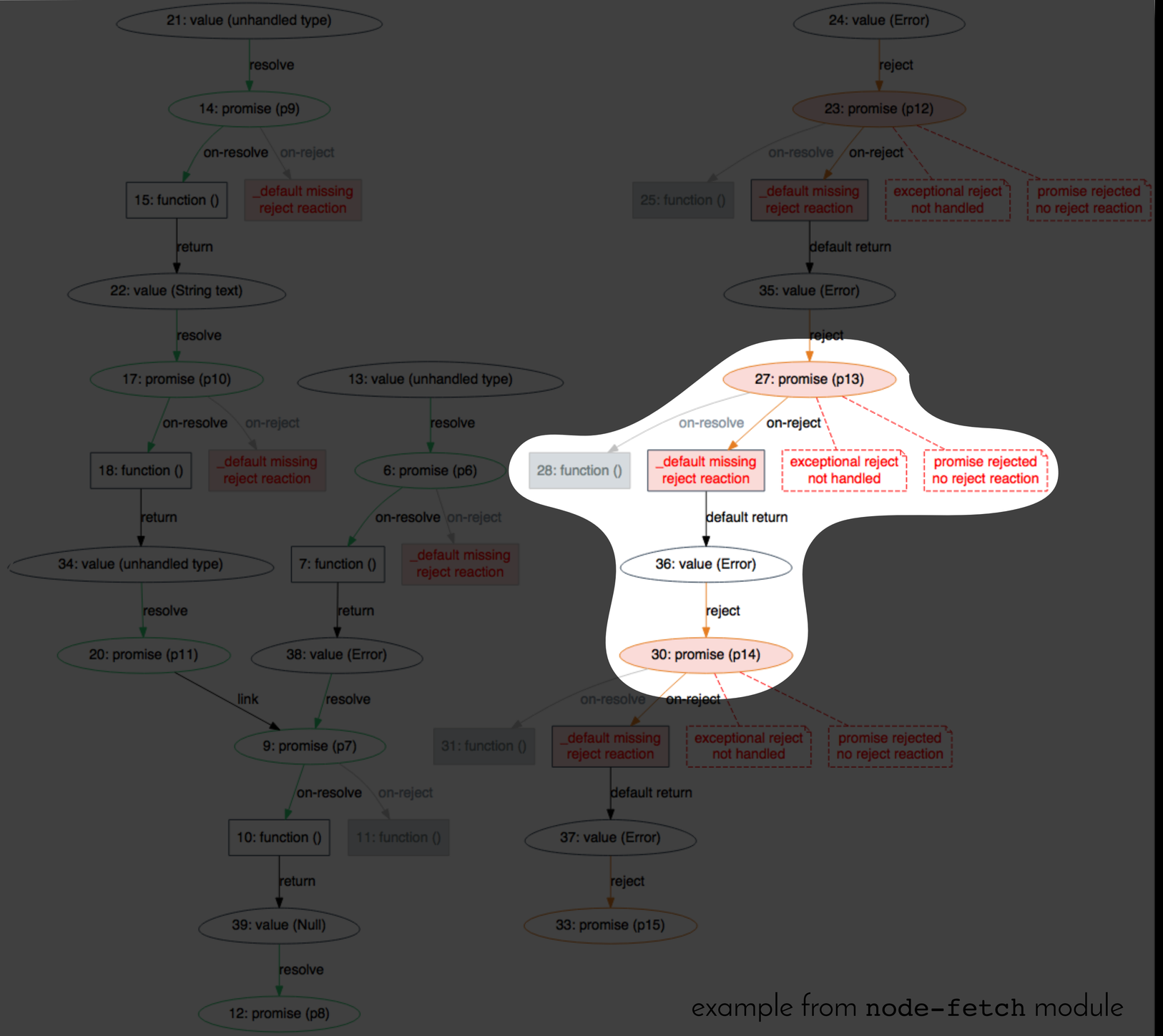
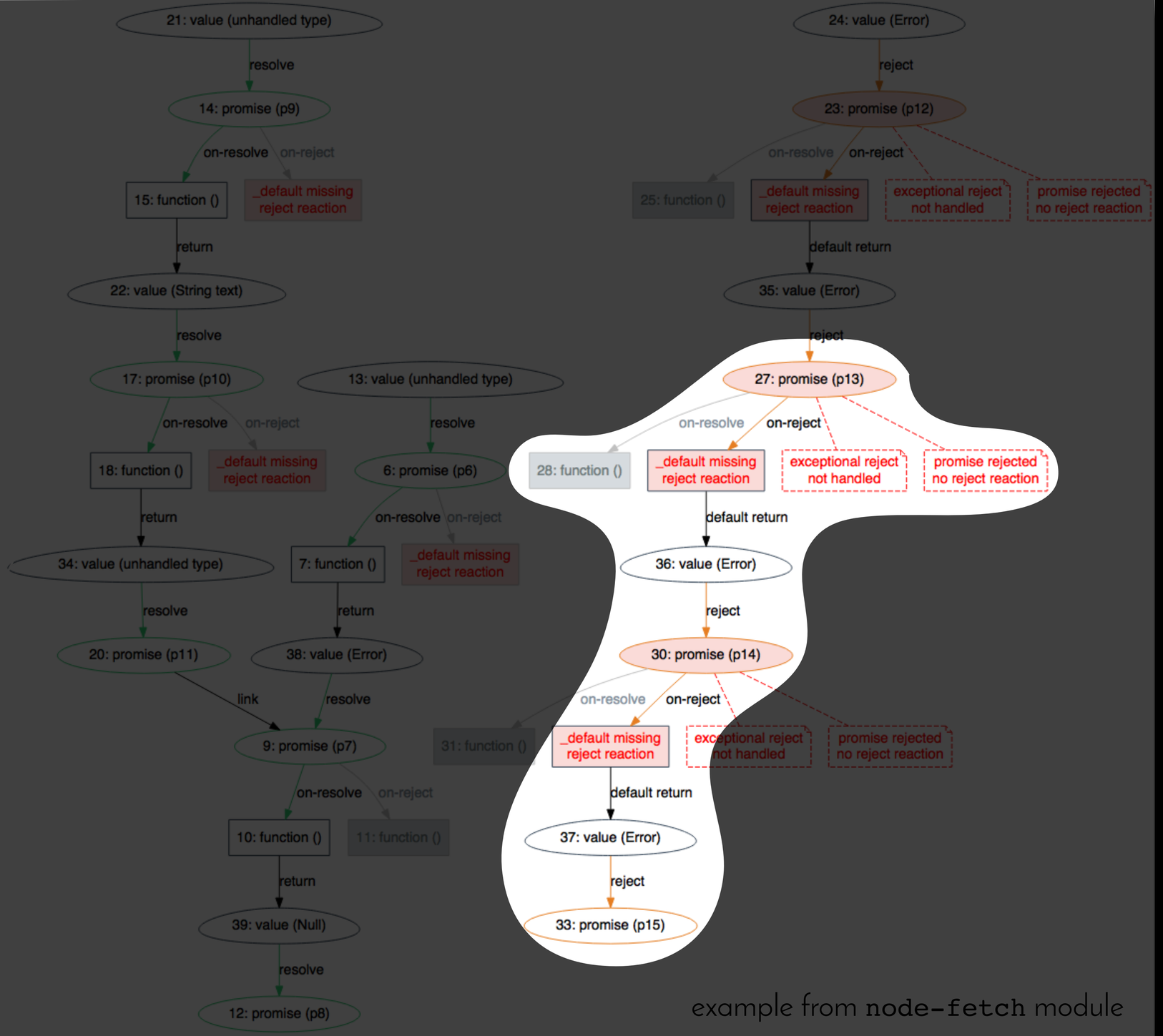
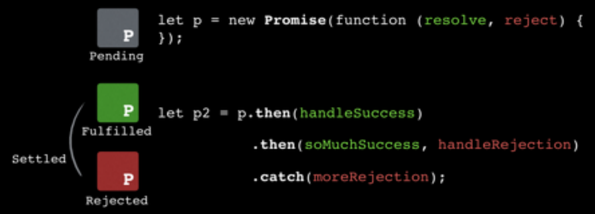


example from `node-fetch` module



example from `node-fetch` module

JavaScript Promises

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```

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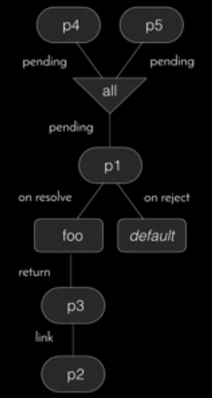

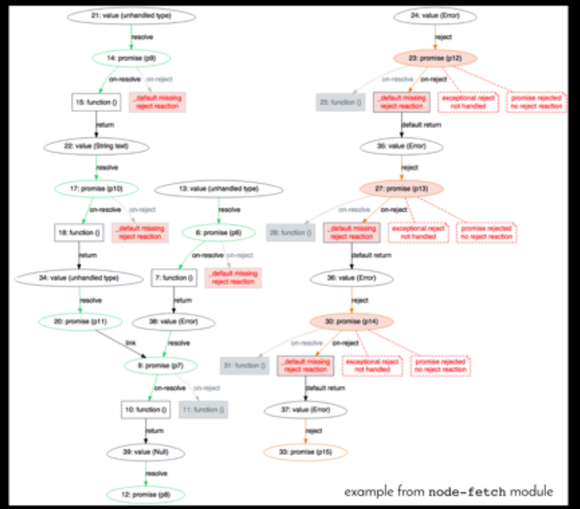

HIRE ME!

@saba_a