A Mini-tutorial for JavaScript Promise

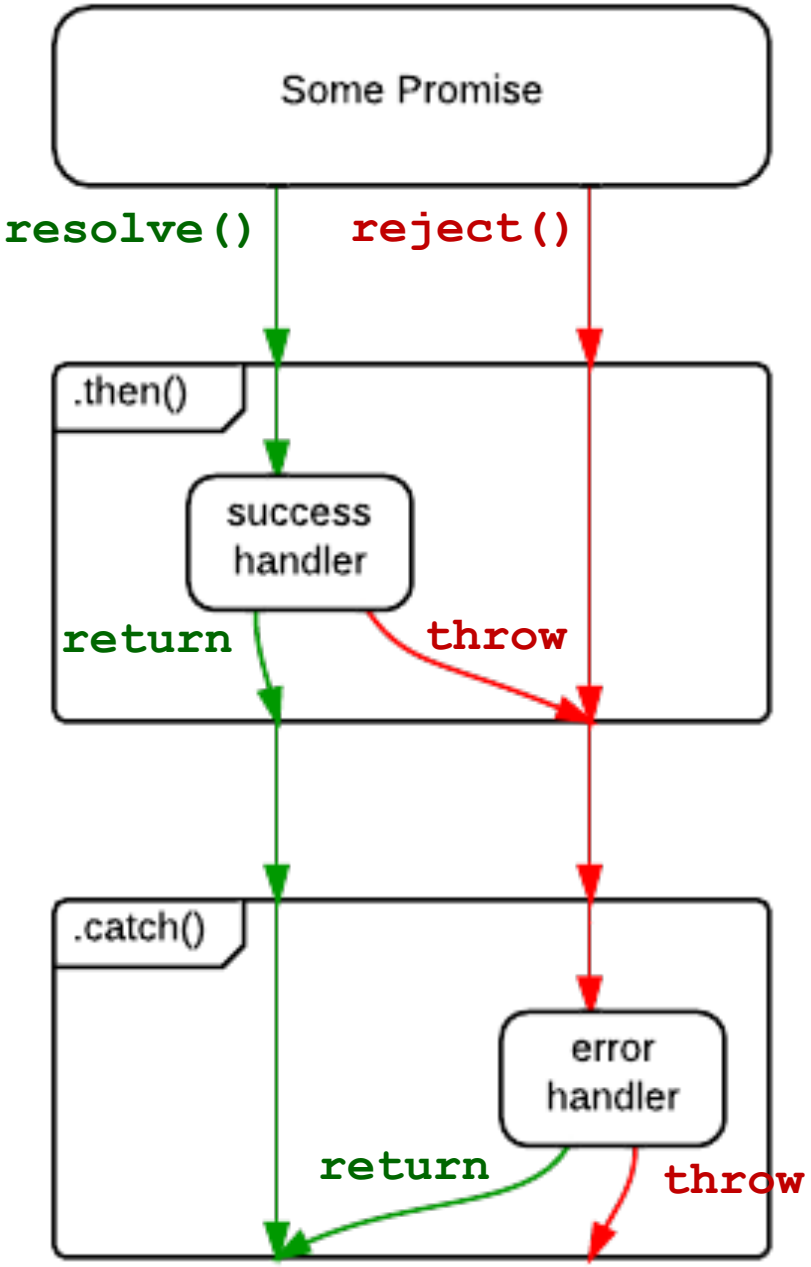
```
// in method1()
const p = new Promise((resolve, reject) => {
  ... // do asynchronous job here
  if (success) resolve(data);
  else reject(err);
});
return p;

// in method2(p)
const p2 = p.then(data => {
   ... // process data
  return data2
}); // always returns a new Promise
return p2;

// in method3(p2)
p2.then(data2 => {
  ... process data2
}).catch(err => {
  ... // handle err
}); // always returns a new Promise
```

ES6 Promise

- A value available ***in the future***
- Separation of concerns
  - Handlers can be written in different places
- Use arrow func for `this`



Execution Flow

- Chain `then` and/or `catch` as long as you like
- Reject mode:
  - `throw new Error()`
- Resolve mode:
  - `return`

Making HTTP Requests

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

// GET request
axios.get('...url...').then(res => {
  res.status  // HTTP response code (e.g., 200, 401)
  res.data    // object parsed from HTTP response body
  res.headers // HTTP presonse headers
}).catch(err => {
  console.log(err.response.status);
});

// POST request
axios.post('...url...', {
  ... // request body
}).then(...).catch(...);
```

- Requests can be canceled

Async & Await

- Make asynchronous code looks more consistent with synchronous code
- Supported by major browsers and Node.JS v7.6+

Example

```
// ES6 Promise
function getFirstUser() {
  return getUsers().then(users => users[0].name)
                   .catch(err => ({
                     name: 'default user'
                   }));
}

// ES8 Async/Await
async function getFirstUser() {
  try {
    // line blocked until promise
    // resolved/rejected.
    let users = await getUsers();
    return users[0].name;
  } catch (err) {
    return {
      name: 'default user'
    };
  }
}
```

- An ***async*** function returns a promise
- ***Await*** on a promise until value available
- ***Try/catch*** for resolve/reject

HTTP Request, the Async/Await Style

```
const axios = require('axios’);

async function getFirstUser() {
  try {
    let users = await axios.get('...url...');
    return users[0].name;
  } catch (err) {
    console.log(err.response.status);
    return {
      name: 'default user'
    };
  }
}
```

Pitfall: Reduced Parallelism

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

async function getUsers(ids) {
  let users = [];
  try {
    for (let id of ids) {
      let user = await axios.get('...url...');
      users.push(user);
    }
  } catch (err) {...}
  return users;
}
const vips = await getUsers(...);
```

- If order doesn't matter, why get `user` sequentially?

Parallel Awaiting

```
// get a user object; blocked
let fu = await getFirstUser();

// get a promise immediately; async jobs starts
let fp = getFirstUser();

// sequential awaiting
let fu = await getFirstUser();
let lu = await getLastUser();

// parallel awaiting
let fp = getFirstUser(); // async jobs starts
let lp = getLastUser(); // async jobs starts
let [fu, lu] = await Promise.all([fp, lp]);
```

- `Promise.all()` creates a promise that resolves only when all child promises resolve

Solution

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

async function getUsers(ids) {
  let promises = [];
  try {
    for (let id of ids) {
      let promise = axios.get('...url...');
      promises.push(promise);
    }
  } catch (err) {...}
  return await Promise.all(promises);;
}
const vips = await getUsers(...);
```