# 자바스크립트 비동기

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인간중심
윤주형 김성진 정구범

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# javascript의 비동기
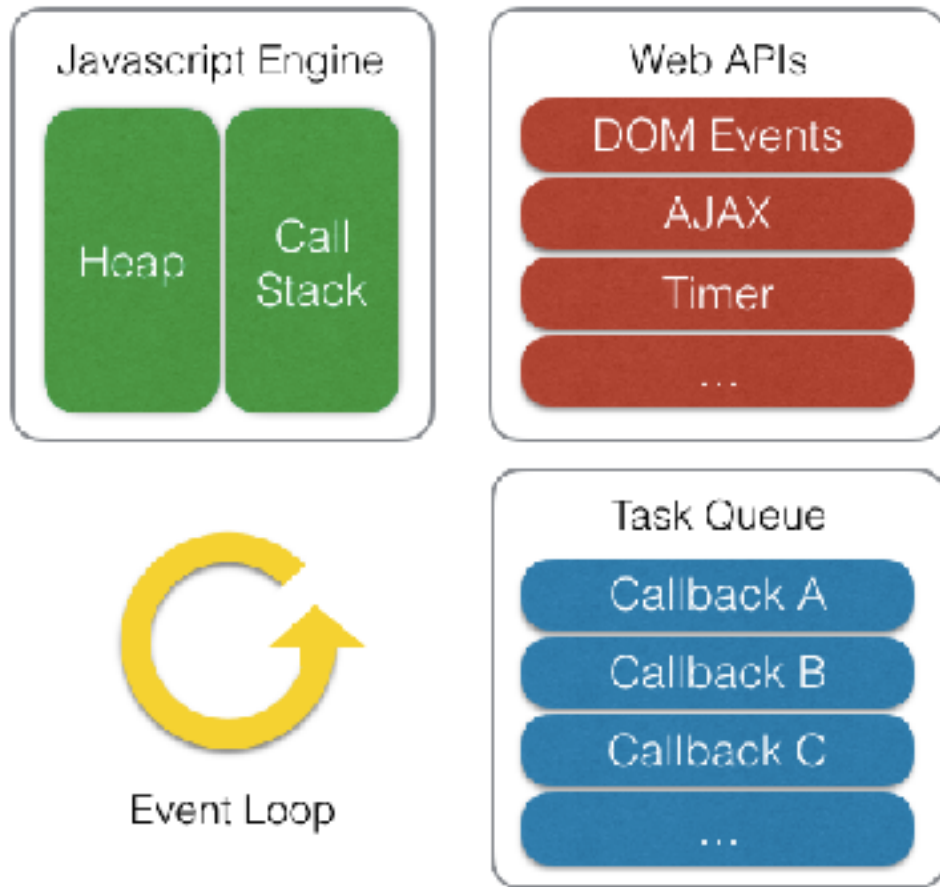
# javascript의 비동기

비동기의 필요성



(a) 동기

(b) 비동기

•orderCoffee()

•makeCoffee()

# javascript의 비동기

비동기의 처리



```
setTimeout(function(){
    console.log("hello world");
}, 3000);
```

- Call Stack

- Web API

- Callback

- Event Loop

# Callback

# Callback

일반적인 콜백 사용

```
function setEvent(){
  let text = "click";
  $("button").on("click", function(){
      console.log(text);
  });
}
//es5
$("button").on("click", this.clicked.bind(this));
//es6
$("button").on("click", (e) => clicked(e));
```

- 인자로 함수사용

- 실행 순서 보장

# Callback

일반적인 콜백 사용 한계

```
setTimeout(function (ch) {
    var boostCamp = ch;
        setTimeout(function (ch) {
            boostCamp += ch;
                setTimeout(function (ch) {
                    boostCamp += ch;
                        setTimeout(function (ch) {
                            boostCamp += ch;
                                setTimeout(function (ch) {
                                    boostCamp += ch;
                                    console.log(boostCamp);
                                }, 1, 'camp');
                        }, 1, ' ');
                }, 1, 'st');
        }, 1, 'oo');
}, 1, 'B');
```

- 콜백 지옥

- 가독성이 안좋다.

# **Callback**

콜백 개선 방법

# 1. 동기로 처리

# Callback

동기로 처리

```javascript
function(url){
    getName(url, function(result){
        name = result.name;
        getAge(name, function(result){
            age = result.age;
            getEmail(age, function(result){
                email = result.email;
                getPhone(email, function(result){
                    address = result.address;
                    console.log("end");
                })
            });
        });
    });
};
```

```javascript
function(url){
    let name = getName(url);
    let age = getAge(name);
    let email = getEmail(age);
    let phone = getPhone(email);
    let address = getAdress(phone);
    console.log("end");
}
```

# 2. 콜백 함수 분리

# Callback

## 콜백 함수 분리

```javascript
function(url){
    getName(url, function(result){
        name = result.name;
        getAge(name, function(result){
            age = result.age;
            getEmail(age, function(result){
                email = result.email;
                getPhone(email, function(result){
                    address = result.address;
                    console.log("end");
                })
            });
        });
    });
};
```

```javascript
function getData(url){
    getName(url, getNameCallback);
};
```

```javascript
function getNameCallback(result) {
    getAge(result.name, getAgeCallback);
};
function getAgeCallback(result) {
    getEmail(result.age, getEmailCallback);
};
function getEmail(result) {
    getAge(result.email, getPhoneCallback);
};
function getPhone(result) {
    getEmail(result.phone, getAddressCallback);
};
function getAddress(result) {
    getAge(result.address);
    console.log("end");
};
```

# Promise

# Promise

ES6의 Promise 사용

```
let _promise = new Promise(function (resolve, reject) {
    window.setTimeout(function () {
        if (true) {
            resolve("complete");
        }
        else {
            reject(Error("error"));
        }
    }, 3000);
});
```

# Promise

ES6의 Promise 사용

```
let _promise = new Promise(function (resolve, reject) {
    window.setTimeout(function () {
        if (true) {
            resolve("complete");
        }
        else {
            reject(Error("error"));
        }
    }, 3000);
});
```

```
> _promise
< ▶ Promise {[[PromiseStatus]]: "pending", [[PromiseValue]]: undefined}
```

# Promise

## ES6의 Promise 사용

```javascript
let _promise = new Promise(function (resolve, reject) {
    window.setTimeout(function () {
        if (true) {
            resolve("complete");
        }
        else {
            reject(Error("error"));
        }
    }, 3000);
});
```

```
> _promise
< ▶ Promise {[[PromiseStatus]]: "pending", [[PromiseValue]]: undefined}
```

⬇ 3초 후

```
> _promise
< ▶ Promise {[[PromiseStatus]]: "resolved", [[PromiseValue]]: "complete"}
```

# Promise

## ES6의 Promise 사용

```
let _promise = new Promise(function (resolve, reject) {
    window.setTimeout(function () {
        if (true) {
            resolve("complete");
        }
        else {
            reject(Error("error"));
        }
    }, 3000);
});
```

```
> _promise
<- ▶ Promise {[[PromiseStatus]]: "pending", [[PromiseValue]]: undefined}
```

⬇ 3초 후

```
> _promise
<- ▶ Promise {[[PromiseStatus]]: "resolved", [[PromiseValue]]: "complete"}
```

```
▶ _promise.then(function(result){
    console.log(result);
});
```

```
complete
<- ▶ Promise {[[PromiseStatus]]: "resolved", [[PromiseValue]]: undefined}
```

# Promise

ES6의 Promise 사용

```javascript
var _promise = function (param) {
    return new Promise(function (resolve, reject) {
        window.setTimeout(function () {
            if (param) {
                resolve("complete");
            }
            else {
                reject(Error("error"));
            }
        }, 3000);
    });
};
```

```javascript
_promise(true)
.then(function (text) {
    console.log(text);
}, function (error) {
    console.error(error);
});
```

# Promise

promise chain

```
function(url){
    getName(url, function(result){
        name = result.name;
        getAge(name, function(result){
            age = result.age;
            getEmail(age, function(result){
                email = result.email;
                getPhone(email, function(result){
                    address = result.address;
                    console.log("end");
                })
            });
        });
    });
};
```

```
function(url){
    getName(url).then(function(result) {
        name = result.name;
        return getAge(name);
    })
    .then(function(result){
        age = result.age;
        return getEmail(age);
    })
    .then(function(result){
        email = result.email;
        return getPhone(email);
    })
    .then(function(result) {
        phone = result.phone;
        return getAddress(phone);
    })
    .then(function(result) {
        console.log("end");
    })
}
```

# Promise

동기인듯 동기아닌 동기같은 비동기

```
function(url){
    let name = getName(url);
    let age = getAge(name);
    let email = getEmail(age);
    let phone = getPhone(email);
    let address = getAdress(phone);
    console.log("end");
}
```

```
function(url){
    getName(url).then(function(result) {
        name = result.name;
        return getAge(name);
    })
    .then(function(result){
        age = result.age;
        return getEmail(age);
    })
    .then(function(result){
        email = result.email;
        return getPhone(email);
    })
    .then(function(result) {
        phone = result.phone;
        return getAddress(phone);
    })
    .then(function(result) {
        console.log("end");
    })
}
```

# Generator / Iterator

# Generator / Iterator

Generator / Iterator 기본 사용법

```
function* generator(){
  let a = yield 10;
  let b = yield a+20;
  let c = yield b+30;
  return a + b + c; //1 + 2 + 3
}

let iterator = generator();
console.log(iterator.next());  //done : false, value : 10;
console.log(iterator.next(1)); //done : false, value : 21;
console.log(iterator.next(2)); //done : false, value : 32;
console.log(iterator.next(3)); //done : true, value: : 6;
```

# Generator / Iterator

Generator / Iterator + Promise

```
function* generator(url){
  const name = yield getName(url);
  const age = yield getAge(name);
  const email = yield getEmail(age);
  const phone = yield getPhone(email);
  const address = yield getAdress(phone);
  console.log("end");
}
```
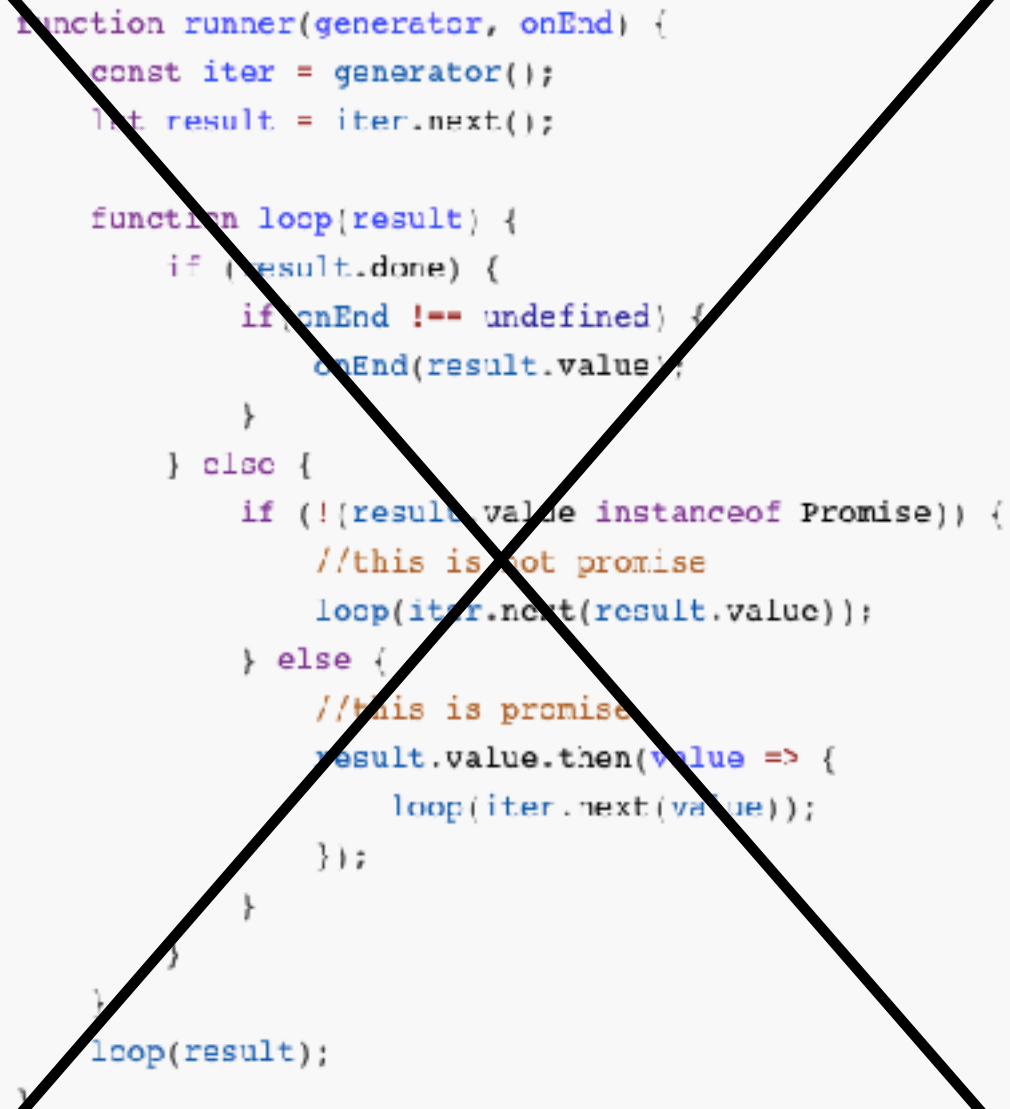
```
function runner(generator, onEnd) {
  const iter = generator();
  let result = iter.next();

  function loop(result) {
    if (result.done) {
      if(onEnd !== undefined) {
        onEnd(result.value);
      }
    } else {
      if (!(result.value instanceof Promise)) {
        //this is not promise
        loop(iter.next(result.value));
      } else {
        //this is promise
        result.value.then(value => {
          loop(iter.next(value));
        });
      }
    }
  }
  loop(result);
}
```

# async / await

# async / await

동기같은 코드

```javascript
function* generator(url){
  const name = yield getName(url);
  const age = yield getAge(name);
  const email = yield getEmail(age);
  const phone = yield getPhone(email);
  const address = yield getAdress(phone);
  console.log("end");
} =>  {
```

```javascript
function runner(generator, onEnd) {
    const iter = generator();
    let result = iter.next();

    function loop(result) {
        if (result.done) {
            if(onEnd !== undefined) {
                onEnd(result.value);
            }
        } else {
            if (!(result.value instanceof Promise)) {
                //this is not promise
                loop(iter.next(result.value));
            } else {
                //this is promise
                result.value.then(value => {
                    loop(iter.next(value));
                });
            }
        }
    }
    loop(result);
}
```
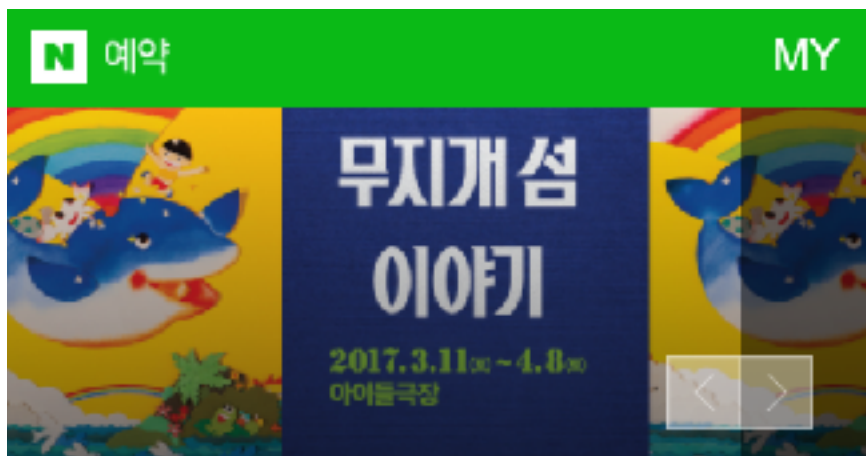
# async / await

동기같은 코드

```javascript
function* generator(url){
  const name = yield getName(url);
  const age = yield getAge(name);
  const email = yield getEmail(age);
  const phone = yield getPhone(email);
  const address = yield getAdress(phone);
  console.log("end");
}
```

```javascript
function runner(generator, onEnd) {
  const iter = generator();
  let result = iter.next();

  function loop(result) {
    if (result.done) {
      if (onEnd !== undefined) {
        onEnd(result.value)
      }
    } else {
      if (!(result.value instanceof Promise)) {
        //this is not promise
        loop(iter.next(result.value));
      } else {
        //this is promise
        result.value.then(value => {
          loop(iter.next(value));
        });
      }
    }
  }

  loop(result);
}
```
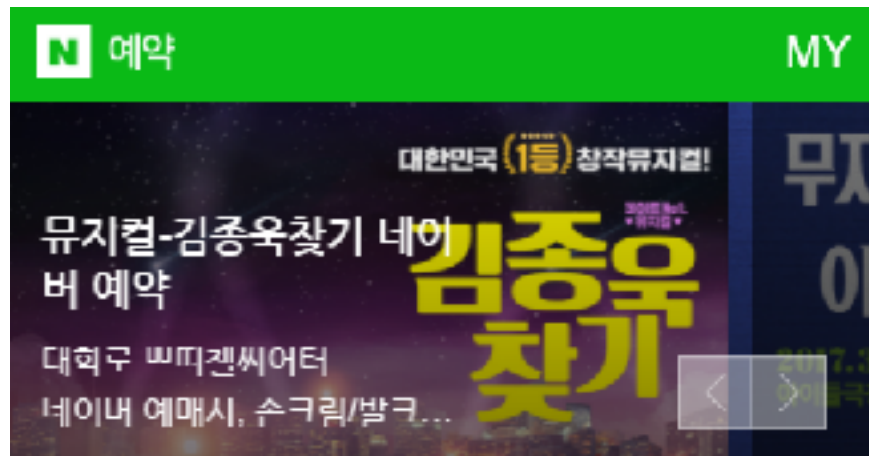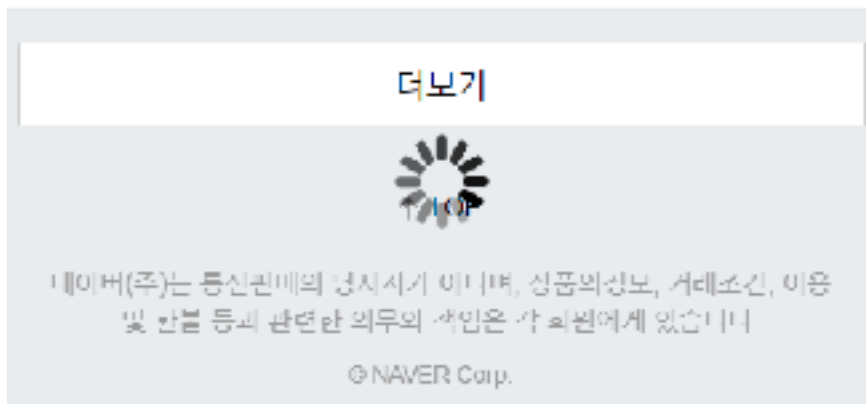
# 실제 코드에 적용

# 실제 코드에 적용

화면

# 실제 코드에 적용

Generator / iterator

```javascript
function* drawGenerator() {
    let data;
    let splitData = {leftData : [], rightData : []};
    let leftPromise;
    let rightPromise;
    if(page === 1) {
        emptyTarget();
    }
    data = yield MainpageModel.getProductsByCategoryId(activeCategoryIndex, page);
    splittingData(data,{leftData : splitData.leftData, rightData : splitData.rightData});
    leftPromise = HandlebarsWrapper.create("product-main-template", splitData.leftData, "append", left);
    rightPromise = HandlebarsWrapper.create("product-main-template", splitData.rightData, "append", right);
    yield Promise.all([leftPromise,rightPromise]);
    productCount =  categories.find("li[data-category=" + activeCategoryIndex + "]").data("productcount");
    productCountTarget.html(productCount);
}
```

# 실제 코드에 적용

Generator / iterator

```
function* drawGenerator() {
    let data;
    let splitData = {leftData : [
    let leftPromise;
    let rightPromise;
    if(page === 1) {
        emptyTarget();
    }
    data = yield MainpageModel.ge
    splittingData(data,{leftData :
    leftPromise = HandlebarsWrapp
    rightPromise = HandlebarsWrapp
    yield Promise.all([leftPromise
    productCount =  categories.fi
    productCountTarget.html(produ
}
```

```
function runGenerator(generator, onEnd) {
    let iter = generator();
    let result = iter.next();

    function loop(result) {
        if (result.done) {
            if(onEnd !== undefined) {
                onEnd(result.value);
            }
        } else {
            if (!(result.value instanceof Promise)) {
                console.log("this is not promise");     eft);
                loop(iter.next(result.value));           right);
            } else {
                console.log("this is promise");      ount");
                result.value.then(value => {
                    loop(iter.next(value));
                });
            }
        }
    }
    loop(result);
}
```

# 실제 코드에 적용

async / await

```javascript
async function drawAsync() {
    let data;
    let splitData = {leftData : [], rightData : []};
    let leftPromise;
    let rightPromise;
    if(page === 1) {
        emptyTarget();
    }
    data = await MainpageModel.getProductsByCategoryId(activeCategoryIndex, page);
    splittingData(data,{leftData : splitData.leftData, rightData : splitData.rightData});
    leftPromise = HandlebarsWrapper.create("product-main-template", splitData.leftData, "append", left);
    rightPromise = HandlebarsWrapper.create("product-main-template", splitData.rightData, "append", right);
    await Promise.all([leftPromise,rightPromise]);
    productCount =  categories.find("li[data-category=" + activeCategoryIndex + "]").data("productcount");
    productCountTarget.html(productCount);
}
```

# Thank you