

Webpack-Day3

webpack打包原理分析

webpack 在执行npx webpack进行打包后，都干了什么事情？

```
(function(modules) {  
  var installedModules = {};  
  
  function __webpack_require__(moduleId) {  
    if (installedModules[moduleId]) {  
      return installedModules[moduleId].exports;  
    }  
    var module = (installedModules[moduleId] = {  
      i: moduleId,  
      l: false,  
      exports: {}  
    });  
    modules[moduleId].call(  
      module.exports,  
      module,  
      module.exports,  
      __webpack_require__  
    );  
    installedModules[moduleId].l = true;  
    return module.exports;  
  }  
})
```

```

    );
    module.l = true;
    return module.exports;
}
return __webpack_require__((__webpack_require__.s =
"./index.js"));
})(({
  "./index.js": function(module, exports) {
    eval(
      '// import a from "./a";\n\nconsole.log("hello\nword");\n\n\n// # sourceMappingURL=webpack:///./index.js?'
    );
  }
}));

```

大概的意思就是，我们实现了一个**webpack_require** 来实现自己的模块化，把代码都缓存在**installedModules**里，代码文件以对象传递进来，key是路径，value是包裹的代码字符串，并且代码内部的require，都被替换成了**webpack_require**

自己实现一个**bundle.js**

- 模块分析：读取入口文件，分析代码

```
const fs = require("fs");

const fenximokuai = filename => {
  const content = fs.readFileSync(filename, "utf-8");
  console.log(content);
};

fenximokuai("./index.js");
```

- 拿到文件中依赖，这里我们不推荐使用字符串截取，引入的模块名越多，就越麻烦，不灵活，这里我们推荐使用@babel/parser，这是babel7的工具，来帮助我们分析内部的语法，包括es6，返回一个ast抽象语法树

@babel/parser:<https://babeljs.io/docs/en/babel-parser>

```
//安装@babel/parser
npm install @babel/parser --save

//bundle.js
const fs = require("fs");
const parser = require("@babel/parser");

const fenximokuai = filename => {
  const content = fs.readFileSync(filename, "utf-8");

  const Ast = parser.parse(content, {
    sourceType: "module"
  });
  console.log(Ast.program.body);
};

fenximokuai("./index.js");
```

- 接下来我们就可以根据body里面的分析结果，遍历出所有的引入模块，但是比较麻烦，这里还是推荐babel推荐的一个模块@babel/traverse，来帮我们处理。

```
npm install @babel/traverse --save
```

```
const fs = require("fs");
const path = require("path");
const parser = require("@babel/parser");
const traverse = require("@babel/traverse").default;

const fenximokuai = filename => {
  const content = fs.readFileSync(filename, "utf-8");

  const Ast = parser.parse(content, {
    sourceType: "module"
  });

  const dependencies = [];
  //分析ast抽象语法树，根据需要返回对应数据，
  //根据结果返回对应的模块，定义一个数组，接受一下
  node.source.value的值
  traverse(Ast, {
    ImportDeclaration({ node }) {
      console.log(node);
      dependencies.push(node.source.value);
    }
  });
  console.log(dependencies);
};

fenximokuai("./index.js");
```

```
handeMacBook-Pro:webpack2 kele$ node bundle.js
{ filename: './src/index.js',
  dependencies: { './a.js': './src/a.js' },
  code: '"use strict";\n\nvar _a = _interopRequireDefault(require("./a.js"));
\nfunction _interopRequireDefault(obj) { return obj && obj.__esModule ? obj : { "
default": obj }; }\n\nconsole.log("hello kkb");' }
handeMacBook-Pro:webpack2 kele$
```

分析上图，我们要分析出信息：

- 入口文件
- 入口文件引入的模块
 - 引入路径
 - 在项目中的路径
- 可以在浏览器里执行的代码

处理现在的路径问题：

```
//需要用到path模块
const parser = require("@babel/parser");

//修改 dependencies 为对象，保存更多的信息
const dependencies = {};

//分析出引入模块，在项目中的路径
const newfilename =
    "./" + path.join(path.dirname(filename),
node.source.value);

//保存在dependencies里
dependencies[node.source.value] = newfilename;
```

把代码处理成浏览器可运行的代码，需要借助@babel/core，和@babel/preset-env，把ast语法树转换成合适的代码

```
const babel = require("@babel/core");

const { code } = babel.transformFromAst(Ast, null, {
  presets: ["@babel/preset-env"]
});
```

导出所有分析出的信息：

```
return {
  filename,
  dependencies,
  code
};
```

完成代码参考：

```
const fs = require('fs');
const path = require('path');
const parser = require('@babel/parser');
const traverse = require('@babel/traverse').default;
const babel = require('@babel/core');

const moduleAnalyser = (filename) => {
  const content = fs.readFileSync(filename, 'utf-8');
  const ast = parser.parse(content, {
    sourceType: 'module'
  });
  const dependencies = {};
  traverse(ast, {
```

```

    ImportDeclaration({ node }) {
      const dirname = path.dirname(filename);
      const newFile = './' + path.join(dirname,
node.source.value);
      dependencies[node.source.value] = newFile;
    }
  });
  const { code } = babel.transformFromAst(ast, null, {
    presets: ["@babel/preset-env"]
  });
  return {
    filename,
    dependencies,
    code
  }
}

const moduleInfo = moduleAnalyser('./src/index.js');
console.log(moduleInfo);

```

- 分析依赖

上一步我们已经完成了一个模块的分析，接下来我们要完成项目里所有模块的分析：

```

const fs = require('fs');
const path = require('path');
const parser = require('@babel/parser');
const traverse = require('@babel/traverse').default;
const babel = require('@babel/core');

```

```

const moduleAnalyser = (filename) => {
  const content = fs.readFileSync(filename, 'utf-8');
  const ast = parser.parse(content, {
    sourceType: 'module'
  });
  const dependencies = {};
  traverse(ast, {
    ImportDeclaration({ node }) {
      const dirname = path.dirname(filename);
      const newFile = './' + path.join(dirname,
node.source.value);
      dependencies[node.source.value] = newFile;
    }
  });
  const { code } = babel.transformFromAst(ast, null, {
    presets: ["@babel/preset-env"]
  });
  return {
    filename,
    dependencies,
    code
  }
}

const makeDependenciesGraph = (entry) => {
  const entryModule = moduleAnalyser(entry);
  const graphArray = [ entryModule ];
  for(let i = 0; i < graphArray.length; i++) {
    const item = graphArray[i];
    const { dependencies } = item;
    if(dependencies) {
      for(let j in dependencies) {
        graphArray.push(
          moduleAnalyser(dependencies[j])
        );
      }
    }
  }
}

```



```

    }
    const graph = {};
    graphArray.forEach(item => {
      graph[item.filename] = {
        dependencies: item.dependencies,
        code: item.code
      }
    });
    return graph;
  }

  const graphInfo = makeDependenciesGraph('./src/index.js');
  console.log(graphInfo);

```

- 生成代码

```

const fs = require('fs');
const path = require('path');
const parser = require('@babel/parser');
const traverse = require('@babel/traverse').default;
const babel = require('@babel/core');

const moduleAnalyser = (filename) => {
  const content = fs.readFileSync(filename, 'utf-8');
  const ast = parser.parse(content, {
    sourceType: 'module'
  });
  const dependencies = {};
  traverse(ast, {
    ImportDeclaration({ node }) {
      const dirname = path.dirname(filename);
      const newFile = './' + path.join(dirname,
node.source.value);
      dependencies[node.source.value] = newFile;
    }
  });

```

```

const { code } = babel.transformFromAst(ast, null, {
  presets: ["@babel/preset-env"]
});
return {
  filename,
  dependencies,
  code
}
}

const makeDependenciesGraph = (entry) => {
  const entryModule = moduleAnalyser(entry);
  const graphArray = [ entryModule ];
  for(let i = 0; i < graphArray.length; i++) {
    const item = graphArray[i];
    const { dependencies } = item;
    if(dependencies) {
      for(let j in dependencies) {
        graphArray.push(
          moduleAnalyser(dependencies[j])
        );
      }
    }
  }
  const graph = {};
  graphArray.forEach(item => {
    graph[item.filename] = {
      dependencies: item.dependencies,
      code: item.code
    }
  });
  return graph;
}

const generateCode = (entry) => {
  const graph =
  JSON.stringify(makeDependenciesGraph(entry));

```

```

return `
  (function(graph){
    function require(module) {
      function localRequire(relativePath) {
        return
require(graph[module].dependencies[relativePath]);
      }
      var exports = {};
      (function(require, exports, code){
        eval(code)
      })(localRequire, exports, graph[module].code);
      return exports;
    };
    require('${entry}')
  })(${graph});
`;

const code = generateCode('./src/index.js');
console.log(code);

```

node调试工具使用

- 修改scripts

```

"debug": "node --inspect --inspect-brk
node_modules/webpack/bin/webpack.js"

```

如何自己编写一个Loader

自己编写一个Loader的过程是比较简单的,

Loader就是一个函数, **声明式函数**, 不能用箭头函数

拿到源代码, 作进一步的修饰处理, 再返回处理后的源码就可以了

官方文档: <https://webpack.js.org/contribute/writing-a-loader/>

接口文档: <https://webpack.js.org/api/loaders/>

简单案例

- 创建一个替换源码中字符串的loader

```
//index.js
console.log("hello kkb");
```

```
//replaceLoader.js
module.exports = function(source) {
  console.log(source, this, this.query);
  return source.replace('kkb', '开课吧')
};
```

//需要用声明式函数, 因为要上到上下文的this, 用到this的数据, 该函数接受一个参数, 是源码

- 在配置文件中使用的loader

```
//需要使用node核心模块path来处理路径
const path = require('path')
module: {
  rules: [
    {
      test: /\.js$/,
      use: path.resolve(__dirname,
"./loader/replaceLoader.js")
    }
  ]
},
```

- 如何给loader配置参数，loader如何接受参数？
 - this.query
 - loader-utils

```
//webpack.config.js
module: {
  rules: [
    {
      test: /\.js$/,
      use: [
        {
          loader: path.resolve(__dirname,
"./loader/replaceLoader.js"),
          options: {
            name: "开课吧"
          }
        }
      ]
    }
  ]
},
```

```
//replaceLoader.js
```

```
//const loaderUtils = require("loader-utils");//官方推荐处理
loader,query的工具

module.exports = function(source) {
  //this.query 通过this.query来接受配置文件传递进来的参数

  //return source.replace("kkb", this.query.name);
  const options = loaderUtils.getOptions(this);
  const result = source.replace("kkb", options.name);
  return source.replace("kkb", options.name);
}
```

- **this.callback** :如何返回多个信息，不止是处理好的源码呢，可以使用 this.callback来处理

```
//replaceLoader.js
const loaderUtils = require("loader-utils");//官方推荐处理
loader,query的工具

module.exports = function(source) {
  const options = loaderUtils.getOptions(this);
  const result = source.replace("kkb", options.name);
  this.callback(null, result);
};

//this.callback(
  err: Error | null,
  content: string | Buffer,
  sourceMap?: SourceMap,
  meta?: any
);
```

- **this.async**: 如果loader里面有异步的事情要怎么处理呢

```
const loaderUtils = require("loader-utils");

module.exports = function(source) {
  const options = loaderUtils.getOptions(this);
  setTimeout(() => {
    const result = source.replace("kkb", options.name);

    return result;
  }, 1000);
};
//先用setTimeout处理下试试, 发现会报错
```

我们使用this.async来处理, 他会返回this.callback

```
const loaderUtils = require("loader-utils");

module.exports = function(source) {
  const options = loaderUtils.getOptions(this);

  //定义一个异步处理, 告诉webpack, 这个loader里有异步事件, 在里面调用下这个异步
  //callback 就是 this.callback 注意参数的使用
  const callback = this.async();
  setTimeout(() => {
    const result = source.replace("kkb", options.name);
    callback(null, result);
  }, 3000);
};
```

- 多个loader的使用

```
//replaceLoader.js
module.exports = function(source) {
```

```

    return source.replace("开课吧", "word");
};
//replaceLoaderAsync.js
const loaderUtils = require("loader-utils");
module.exports = function(source) {
    const options = loaderUtils.getOptions(this);
    //定义一个异步处理, 告诉webpack, 这个loader里有异步事件, 在里面调用
    下这个异步
    const callback = this.async();
    setTimeout(() => {
        const result = source.replace("kkb", options.name);
        callback(null, result);
    }, 3000);
};

//webpack.config.js
module: {
    rules: [
        {
            test: /\.js$/,
            use: [
                path.resolve(__dirname,
"./loader/replaceLoader.js"),
                {
                    loader: path.resolve(__dirname,
"./loader/replaceLoaderAsync.js"),
                    options: {
                        name: "开课吧"
                    }
                }
            ]
            // use: [path.resolve(__dirname,
"./loader/replaceLoader.js")]
        }
    ]
},

```


顺序，自下而上，自右到左

- 处理loader的路径问题

```
resolveLoader: {
  modules: ["node_modules", "./loader"],
},
module: {
  rules: [
    {
      test: /\.js$/,
      use: [
        "replaceLoader",
        {
          loader: "replaceLoaderAsync",
          options: {
            name: "开课吧"
          }
        }
      ]
      // use: [path.resolve(__dirname,
      // "./loader/replaceLoader.js")]
    }
  ]
},
```

参考：loader API

<https://webpack.js.org/api/loaders>

如何自己编写一个Plugins

Plugin: 开始打包，在某个时刻，帮助我们处理一些什么事情的机制

plugin要比loader稍微复杂一些，在webpack的源码中，用plugin的机制还是占有非常大的场景，可以说plugin是webpack的灵魂

设计模式

事件驱动

发布订阅

plugin是一个类，里面包含一个apply函数，接受一个参数，compiler

官方文档: <https://webpack.js.org/contribute/writing-a-plugin/>

案例:

- 创建copyright-webpack-plugin.js

```
class CopyrightWebpackPlugin {
  constructor() {
  }

  //compiler: webpack实例
  apply(compiler) {

  }
}
module.exports = CopyrightWebpackPlugin;
```

- 配置文件里使用

```
const CopyrightWebpackPlugin = require("../plugin/copyright-  
webpack-plugin");  
  
plugins: [new CopyrightWebpackPlugin()]
```

- 如何传递参数

```
//webpack配置文件  
plugins: [  
  new CopyrightWebpackPlugin({  
    name: "开课吧"  
  })  
]  
  
//copyright-webpack-plugin.js  
class CopyrightWebpackPlugin {  
  constructor(options) {  
    //接受参数  
    console.log(options);  
  }  
  
  apply(compiler) {}  
}  
module.exports = CopyrightWebpackPlugin;
```

- 配置plugin在什么时刻进行

```
class CopyrightWebpackPlugin {  
  constructor(options) {  
    // console.log(options);  
  }  
}
```

```

apply(compiler) {
  //hooks.emit 定义在某个时刻
  compiler.hooks.emit.tapAsync(
    "CopyrightWebpackPlugin",
    (compilation, cb) => {
      compilation.assets["copyright.txt"] = {
        source: function() {
          return "hello copy";
        },
        size: function() {
          return 20;
        }
      };
      cb();
    }
  );

  //同步的写法
  //compiler.hooks.compile.tap("CopyrightWebpackPlugin",
  compilation => {
    // console.log("开始了");
    //});
  }
}
module.exports = CopyrightWebpackPlugin;

```

参考：compiler-hooks

<https://webpack.js.org/api/compiler-hooks>

end
