

debugging



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What is debugging?

bug?

프로그램 내의 결함이나 문제점을 이야기하는 것으로
프로그래밍 언어 COBOL의 개발을 주도한
그레이스 호퍼가 1945년 Mark II의 오작동 원인을
찾다가 컴퓨터에 나방이 껴있는 걸 발견한 것

bug?

0800 Antran started
1000 " stopped - antran ✓
13" 00 (032) MP - MC
(033) PRO 2
coset

$\left\{ \begin{array}{l} 1.2700 \quad 9.037847025 \\ 9.037846795 \end{array} \right.$ coset
~~1.982147000~~
~~2.130476715(-3)~~ 4.615925059(-2)
2.130476415
2.130676415

Relays 6-2 in 033 failed special speed test
in relay

Relay
2145
Relay 3370

1100 Started Cosine Tape (Sine check)
1525 Started Multi Adder Test.

1545



Relay #70 Panel F
(moth) in relay.

1630 Antran started.
1700 closed down.

First actual case of bug being found.

debugging === **remove bug**

컴퓨터 프로그램의 정확성이나
논리적인 오류(버그)를 검출하여 제거하는 과정

How to debugging?



Chrome Dev Tools



Chrome Dev Tools

- `alert();`
- `console`
- Network
- Breakpoint
- Blackboxing

```
alert();
```

PASS 😊

console



Chrome Dev Tools > `console`

`console.log();`

`console.dir();`

`console.time();`

`console.group();`

`console.table();`



`console.log();` // 로그

`console.dir();` // 폴더화(객체)

`console.time();` // 경과시간

`console.group();` // 그룹지정

`console.table();` // 데이터 시각화

```
console.log();
```

 **Chrome Dev Tools > console > console.log()**

```
console.log(arr[2]);
```

```
console.log('이름: ' + obj.name);
```

```
if (goal === true) {  
    console.log('성공');  
} else {  
    console.log('실패');  
}
```

```
console.dir();
```



Chrome Dev Tools > `console` > `console.dir();`

```
var el = document.getElementById('name');

console.log(el);
console.dir(el);
```



Chrome Dev Tools > `console` > `console.dir();`

```
> console.log(el);
  ▼<div id="header">
    ►<div class="header_inner">...</div>
    ►<div id="gnb" style="height: 1259px;">...</div>
  </div>
```



Chrome Dev Tools > `console` > `console.dir();`

```
> console.dir(el);
  ▼div#header ⓘ
    accessKey: ""
    align: ""
    assignedSlot: null
  ►attributeStyleMap: StylePropertyMap {size: 0}
  ►attributes: NamedNodeMap {0: id, id: id, length: 1}
    autocapitalize: ""
    baseURI: "http://210.16.195.78:8040/converter/simulation-tool.do"
    childElementCount: 2
  ►childNodes: NodeList(5) [text, div.header_inner, text, div#gnb, text]
  ►children: HTMLCollection(2) [div.header_inner, div#gnb, gnb: div#gnb]
```

```
console.time();
```



Chrome Dev Tools > `console` > `console.time();`

```
console.time('반복문 경과 시간');

var arr = [];
for (var i = 1; i < 1000; i++) {
    for (var j = 1; j < 1000; j++) {
        arr.push(j);
    }
}

console.timeEnd('반복문 경과 시간');
```



Chrome Dev Tools > `console` > `console.time();`

```
> console.time('반복문 경과 시간');

var arr = [];
for (var i = 1; i < 1000; i++) {
    for (var j = 1; j < 1000; j++) {
        arr.push(j);
    }
}

console.timeEnd('반복문 경과 시간');
```

반복문 경과 시간: 20.490234375ms

VM167:10

```
console.group();
```

 **Chrome Dev Tools > console > console.group();**

```
var _name = ['박진형', '김혜인', '김웅진', '최지영'];
var _location = ['하남', '청주', '인천', '경기'];

console.group('이름');
console.log(_name);
console.groupEnd('이름');

console.group('지역');
console.log(_location);
console.groupEnd('지역');
```

 Chrome Dev Tools > `console` > `console.group();`

```
> var _name = ['박진형', '김혜인', '김웅진', '최지영'];
var _location = ['하남', '청주', '인천', '경기'];

console.group('이름');
console.log(_name);
console.groupEnd('이름');

console.group('지역');
console.log(_location);
console.groupEnd('지역');
```

▼ 이름

VM737:

```
▶ (4) ["박진형", "김혜인", "김웅진", "최지영"]
```

VM737:

▼ 지역

VM737:

```
▶ (4) ["하남", "청주", "인천", "경기"]
```

VM737:

```
console.table();
```

 **Chrome Dev Tools > console > console.table();**

```
var data = [
  {
    "name": "박진형",
    "location": "하남",
    "tel": "4989"
  },
  {
    "name": "정혜윤",
    "location": "남양주",
    "tel": "4987"
  },
  {
    "name": "김웅진",
    "location": "일산",
    "tel": "4978"
  }
];
```



Chrome Dev Tools > `console` > `console.table();`

```
> console.table(data);
```

VM9116:1

(index)	name	location	tel
0	"박진형"	"하남"	"4989"
1	"정혜윤"	"남양주"	"4987"
2	"김웅진"	"일산"	"4978"

▶ Array(3)

Network



Chrome Dev Tools > Network

The screenshot shows the Network tab in the Chrome Dev Tools interface. At the top, there are tabs for Elements, Console, Sources, Network (which is selected), Memory, Performance, Application, Security, Audits, and Adblock Plus. Below the tabs is a toolbar with icons for play, stop, and search, followed by a 'View' section containing 'Group by frame', 'Preserve log', 'Disable cache', and 'Offline' checkboxes. A dropdown menu labeled 'No throttling' is open, showing options: Disabled (selected), No throttling (highlighted in blue), Presets, Fast 3G, Slow 3G, Offline, Custom, test_loading, and Add... . The main area displays a timeline from 10 ms to 50 ms with various network requests listed below it. The columns in the list are Status, Type, and several others that are mostly hidden or collapsed.



Breakpoints





Chrome Dev Tools > Breakpoints



The screenshot shows the Chrome DevTools interface with the Sources tab selected. The left sidebar displays the file structure, and the main pane shows the code for `common_chart.js`. A red arrow points to line 673, column 75, where a breakpoint is set. The right sidebar contains sections for Watch, Call Stack, Scope, and Breakpoints, all currently empty. The bottom console pane shows the message "Console was cleared".

DevTools - 210.16.195.78:8040/converter/simulation-tool.do

Elements Console Sources Network Memory Performance Application Security Audits Adblock Plus HTML validator

Page Filesystem Overrides >

top
210.16.195.78:8040
converter
simulation-tool.do
resources
www.google-analytics.com
www.googletagmanager.com

simulation-tool.do polyfill.js common.js common_chart.js

650 /**
651 * Frequency
652 * 允許한 min 이상, max 이하
653 */
654 freqMin = 0.01;
655 freqMax = 10;
656 if (freqMin > frequency || frequency > freqMax) { // 이상,
657 _htmlItem.push(''Freq.'')
658 _listAddFlag = false;
659 }
660
661 _htmlItem = _htmlItem.join('\n');
662
663 /* 범위를 벗어난 항목이 한개라도 존재하면 팝업내 목록에 표시 */
664 if (!listAddFlag) {
665 _html.push('');
666 _html.push(''<div class="partname">' + _partsName + '</div>'')
667 _html.push(''<div class="condition">' + _partsCondition + '</div>'')
668 _html.push('');
669 }

{ } Line 673, Column 75

Watch
No watch expressions

Call Stack
Not paused

Scope
Not paused

Breakpoints
No breakpoints

XHR/fetch Breakpoints

DOM Breakpoints

Global Listeners

Event Listener Breakpoints

Console What's New Search

top Filter Default levels ▾ VM849:1

Console was cleared

< undefined

>



Chrome Dev Tools > Breakpoints



The screenshot shows the Chrome DevTools interface with the following tabs open:

- Sources**: The active tab, showing the file structure and code for `simulation-tool.do`. A blue box highlights the "File Navigation" section in the left sidebar.
- Console**: Shows the message "Console was cleared".
- Network**: Shows network activity for the URL `210.16.195.78:8040/converter/simulation-tool.do`.

The code editor displays the following snippet from `common_chart.js`:

```
650      /**
651       * Frequency
652       * 유도값: min 0 이상, max 0 이하
653       */
654   freqMin = 0.01;
655   freqMax = 10;
656   if (freqMin > frequency || frequency > freqMax) { // 이상,
657     _htmlItem.push('      <span class="item">Freq.</span>');
658     _listAddFlag = false;
659   }
660
661   _htmlItem = _htmlItem.join('\n');
662
663   /* 범위를 벗어난 항목이 한개라도 존재하면 팝업내 목록에 표시 */
664   if (!_listAddFlag) {
665     _html.push('<li>');
666     _html.push('      <div class="partname">' + _partsName +
667     _html.push('      <div class="condition">');
668     _html.push('        <input type="checkbox" /> ' + name);
669   }
670
```

The status bar at the bottom right indicates `VM849:1`.



Chrome Dev Tools > Breakpoints



The screenshot shows the Chrome DevTools interface with the Sources tab selected. The left sidebar lists the project structure, including files like simulation-tool.do, polyfill.js, common.js, and common_chart.js. The common_chart.js file is currently open in the Source Editor, showing code related to frequency calculations and HTML generation. A blue callout box highlights the "Source Editor" label. The right panel contains the Breakpoints sidebar, which is currently empty, indicating no breakpoints have been set.

DevTools - 210.16.195.78:8040/converter/simulation-tool.do

Elements Console Sources Network Memory Performance Application Security Audits Adblock Plus HTML validator

Page Filesystem Overrides »

top
210.16.195.78:8040
converter
resources
www.google-analytics.com
www.googletagmanager.com

simulation-tool.do polyfill.js common.js common_chart.js »

650 /*
651 * Frequency
652 * 允許한 min 이상, max 이하
653 */
654 freqMin = 0.01;
655 freqMax = 10;
656 if (freqMin > frequency || frequency > freqMax) { // 이상,
657 _htmlItem.push(''Freq.'');
658 _listAddFlag = false;
659 }
660
661 _htmlItem = _htmlItem.join('');
662
663 // 업데이트에 표시
664
665 _html.push('');
666 _html.push(''<div class="partname">' + _partsName + '</div>');
667 _html.push(''<div class="condition">' + _partsCondition + '</div>');

{ } Line 673, Column 75

Console What's New Search

Default levels ▾

Console was cleared

< undefined

>

Watch No watch expressions

Call Stack Not paused

Scope Not paused

Breakpoints No breakpoints

XHR/fetch Breakpoints

DOM Breakpoints

Global Listeners

Event Listener Breakpoints

VM849:1



Chrome Dev Tools > Breakpoints



The screenshot shows the Chrome DevTools interface with the Sources tab selected. The left sidebar displays the file structure, and the main pane shows the code for `common_chart.js`. A red arrow points to line 673, which contains a conditional statement. A blue box labeled "Debug Info" covers the right sidebar, which includes sections for Watch, Call Stack, Scope, and Breakpoints.

DevTools - 210.16.195.78:8040/converter/simulation-tool.do

Elements Console Sources Network Memory Performance Application Security Audits Adblock Plus HTML validator

Page Filesystem Overrides »

top
210.16.195.78:8040
converter
resources
www.google-analytics.com
www.googletagmanager.com

simulation-tool.do polyfill.js common.js common_chart.js

650 `/*`
651 `* Frequency`
652 `* 유도값: min 0 이상, max 0.8`
653 `*/`
654 `freqMin = 0.01;`
655 `freqMax = 10;`
656 `if (freqMin > frequency || frequency > freqMax) { // 이상,`
657 `_htmlItem.push(''Freq.'`
658 `_listAddFlag = false;`
659 }
660
661 `_htmlItem = _htmlItem.join('\n');`
662
663 `/* 범위를 벗어난 항목이 한개라도 존재하면 팝업내 목록에 표시 */`
664 `if (!_listAddFlag) {`
665 `_html.push('');`
666 `_html.push(''<div class="partname">' + _partsName + '`
667 `_html.push(''<div class="condition">');`
668 `_html.push('');`
669 }

{ } Line 673, Column 75

Console What's New Search

Default levels ▾

Console was cleared

< undefined

>

Watch No watch expressions

Call Stack Not paused

Scope Not paused

Breakpoints

XHR/fetch Breakpoints

DOM Breakpoints

Global Listeners

Event Listener Breakpoints

VM849:1



Chrome Dev Tools > Breakpoints



The screenshot shows the Chrome DevTools interface with the Sources tab selected. The left sidebar displays the file structure: top, 210.16.195.78:8040, converter, simulation-tool.do, resources, www.google-analytics.com, and www.googletagmanager.com. The main pane shows the code for `common_chart.js`, specifically lines 650 through 673. A red arrow points to line 665, which contains the condition for adding an item to the list. The right sidebar contains sections for Watch, Call Stack, Scope, and Breakpoints, all currently empty. The bottom pane shows the Console tab with the message "Console was cleared" and a single entry: "`< undefined`". The status bar at the bottom right indicates "VM849:1".

```
650      /**
651       * Frequency
652       * 允許範囲: min 0 이상, max 10
653       */
654   freqMin = 0.01;
655   freqMax = 10;
656   if (freqMin > frequency || frequency > freqMax) { // 이상,
657     _htmlItem.push('      <span class="item">Freq.</span>');
658     _listAddFlag = false;
659   }
660
661   _htmlItem = _htmlItem.join('\n');
662
663   /* 범위를 벗어난 항목이 한개라도 존재하면 팝업내 목록에 표시 */
664   if (!_listAddFlag) {
665     _html.push('<li>');
666     _html.push('      <div class="partname">' + _partsName);
667     _html.push('      <div class="condition">');
668     _html.push('        <input type="checkbox" checked="checked" /> ');
669   }
670 }
```

{ } Line 673, Column 75

Console What's New Search

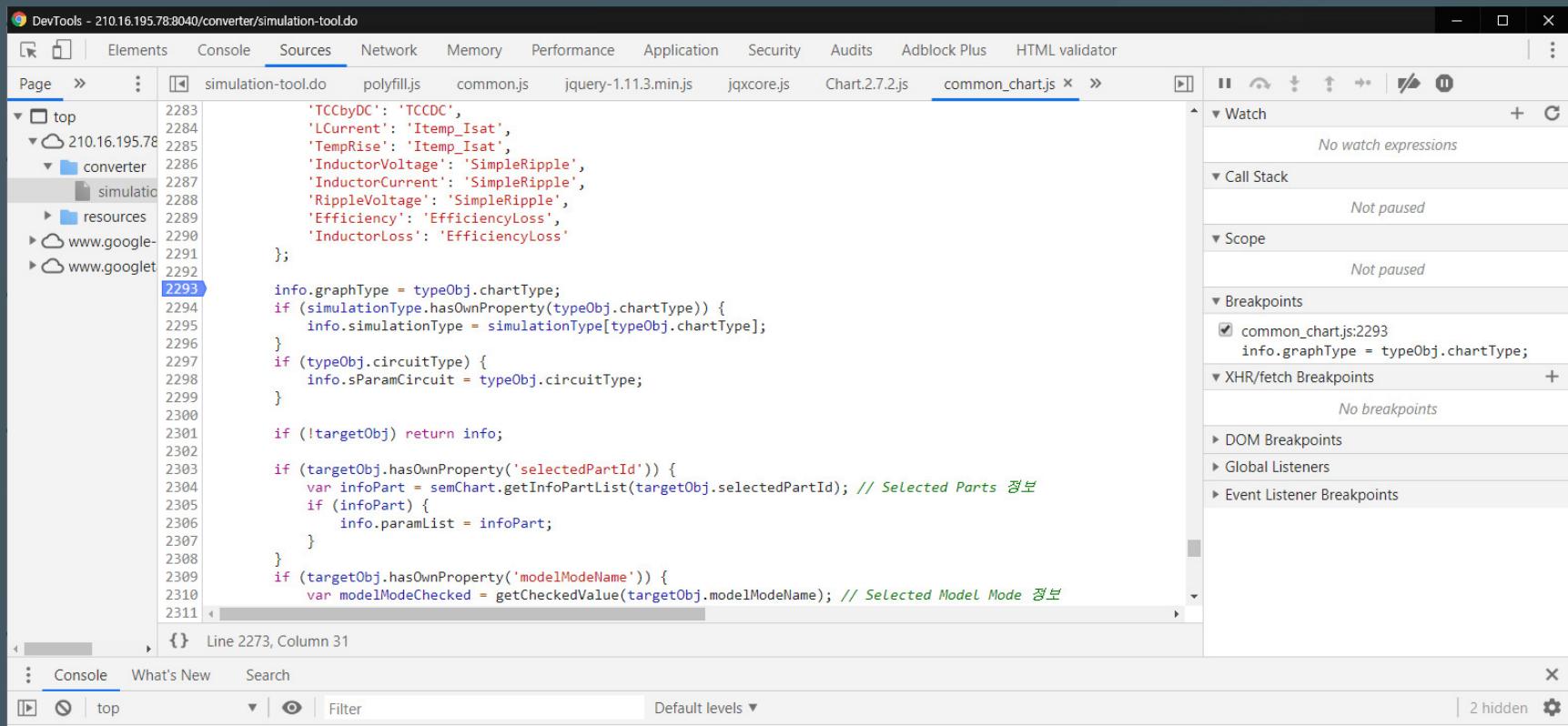
Console was cleared

< undefined

Default levels ▾

VM849:1

Chrome Dev Tools > Breakpoints



The screenshot shows the Chrome DevTools interface with the "Sources" tab selected. The left sidebar displays the file structure of the page being debugged, which is `simulation-tool.do`. The main pane shows the source code for `common_chart.js`, specifically line 2293:

```
info.graphType = typeObj.chartType;
if (simulationType.hasOwnProperty(typeObj.chartType)) {
  info.simulationType = simulationType[typeObj.chartType];
}
if (typeObj.circuitType) {
  info.sParamCircuit = typeObj.circuitType;
}

if (!targetObj) return info;

if (targetObj.hasOwnProperty('selectedPartId')) {
  var infoPart = semChart.getInfoPartList(targetObj.selectedPartId); // Selected Parts 정보
  if (infoPart) {
    info.paramList = infoPart;
  }
}
if (targetObj.hasOwnProperty('modelModeName')) {
  var modelModeChecked = getCheckedValue(targetObj.modelModeName); // Selected Model Mode 정보
}
```

The line number 2293 is highlighted with a blue selection bar. The right sidebar contains the "Breakpoints" section, which shows a single checked breakpoint at line 2293 of `common_chart.js`:

- Watch: No watch expressions
- Call Stack: Not paused
- Scope: Not paused
- Breakpoints:
 - common_chart.js:2293
info.graphType = typeObj.chartType;
- XHR/fetch Breakpoints: No breakpoints
- DOM Breakpoints
- Global Listeners
- Event Listener Breakpoints

At the bottom of the DevTools interface, there are tabs for "Console", "What's New", and "Search". The "Console" tab is active. The status bar at the bottom right shows "Default levels" and "2 hidden".





Chrome Dev Tools > Breakpoints



 **Chrome Dev Tools > Breakpoints** 

Resume script execution

Step over next function call

Step into next function call

Step out of current function

Step

Deactivate breakpoints

Pause on exceptions

Blackboxing



Chrome Dev Tools > Blackboxing

The screenshot shows the Chrome DevTools interface with the Sources tab selected. The left sidebar lists files: top, 210.16.195.78:8040, converter (with simulation-tool.do selected), resources, www.google-analytics.com, and www.googletagmanager.com. The main pane displays the content of common_chart.js, specifically lines 650 to 673. The code handles frequency calculations and HTML item generation. The right sidebar contains various developer tools like Watch, Call Stack, Scope, Breakpoints, and Network. A context menu is open over the sidebar, showing options such as Dock side, Focus debugger, Hide console drawer, and Shortcuts.

```
650      /**
651       * Frequency
652       * 允許範囲: min 0 이상, max 100%
653       */
654   freqMin = 0.01;
655   freqMax = 10;
656   if (freqMin > frequency || frequency > freqMax) { // 이상,
657     _htmlItem.push('      <span class="item">Freq.</span>');
658     _listAddFlag = false;
659   }
660
661   _htmlItem = _htmlItem.join('\n');
662
663   /* 범위를 벗어난 항목이 한개라도 존재하면 팝업내 목록에 표시 */
664   if (!_listAddFlag) {
665     _html.push('<li>');
666     _html.push('      <div class="partname">' + _partsName +
667               '</div> <div class="condition">');
668     _html.push('      <div class="value">' + value + '</div>');
669   }
670 }
```

Line 673, Column 75

Console was cleared

Default levels ▾

VM849:1

2 hidden



Chrome Dev Tools > Blackboxing

The screenshot shows the 'Blackboxing' settings page in the Chrome DevTools. The left sidebar lists various settings like 'Preferences', 'Workspace', and 'Blackboxing' (which is selected). The main area is titled 'Framework Blackbox Patterns' and contains a table with three rows:

Pattern	Action
./jquery.*\.js\$	Blackbox
bundle.js	Blackbox
./jqx*.js\$	Blackbox

Below the table is a blue 'Add pattern...' button.

arctan started

" stopped - arctan ✓

{ 1.2700 9.037 847 025
9.037 846 795 com

example (console)

(033) PRO 2

~~1.682147000
1.3476715(-2)~~ 4.615925059(-2)

com ct

2.130476415

2.130676415

=====

Relays 6-2 in 033 failed special sped test

in relay

" 10.000 test

example1

Started Cosine Tape (Sine check)
example2 Mult + Adder Test.



Relay #70 Panel F
(moth) in relay.

First actual case of bug being found.

arctangent started.

closed down.

참고

git블로그

github

END

