

DEBUGGING

PREVENTION
DETECTION
DIAGNOSIS
FIXING



DETECTION

- 🐛 Program crashes or “bugs out”
- 🐛 Build/compile error
- 🐛 Automated testing fails

DIAGNOSIS



MANDATORY



Browser console open



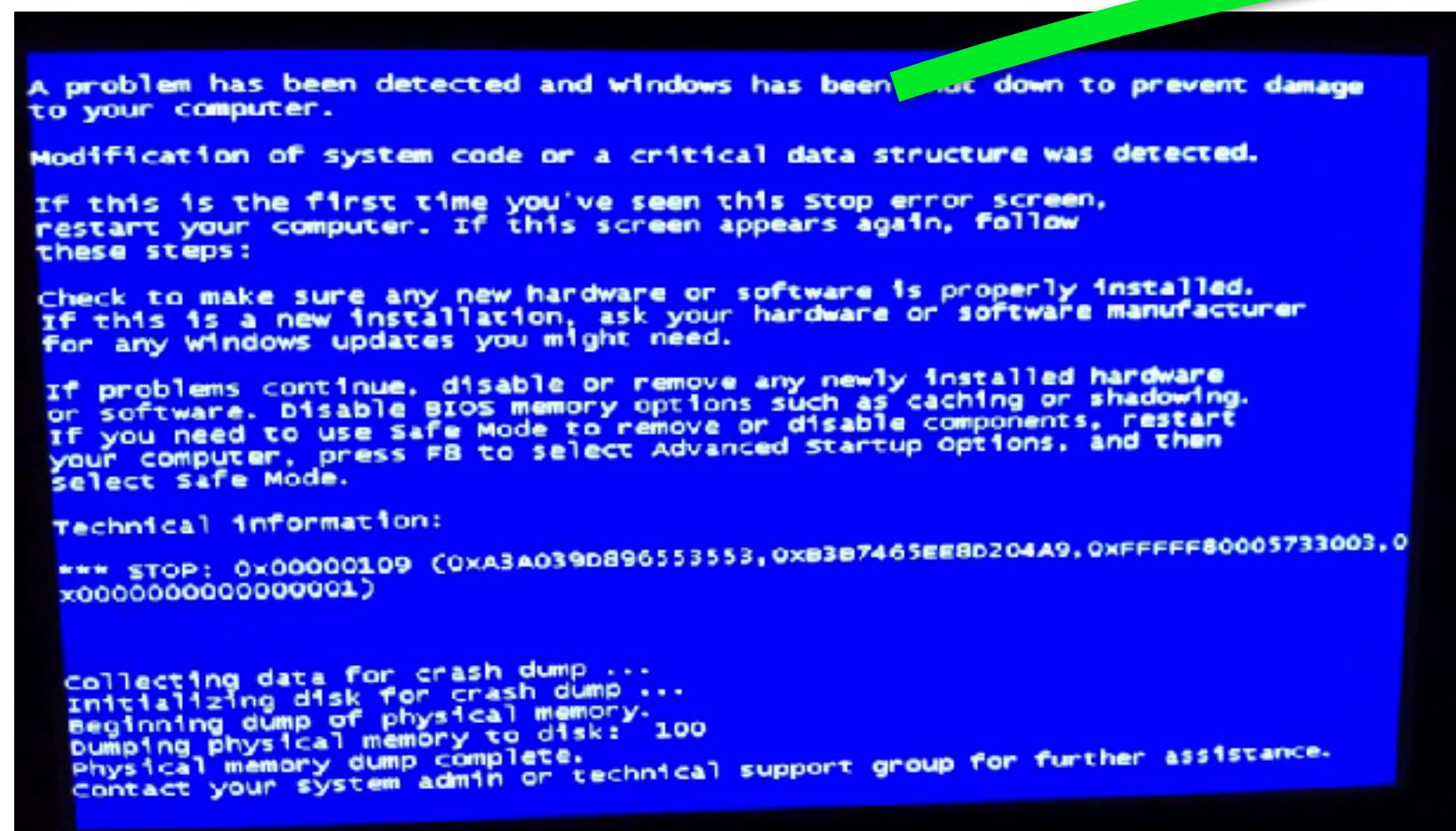
Server console open



Read the stack trace

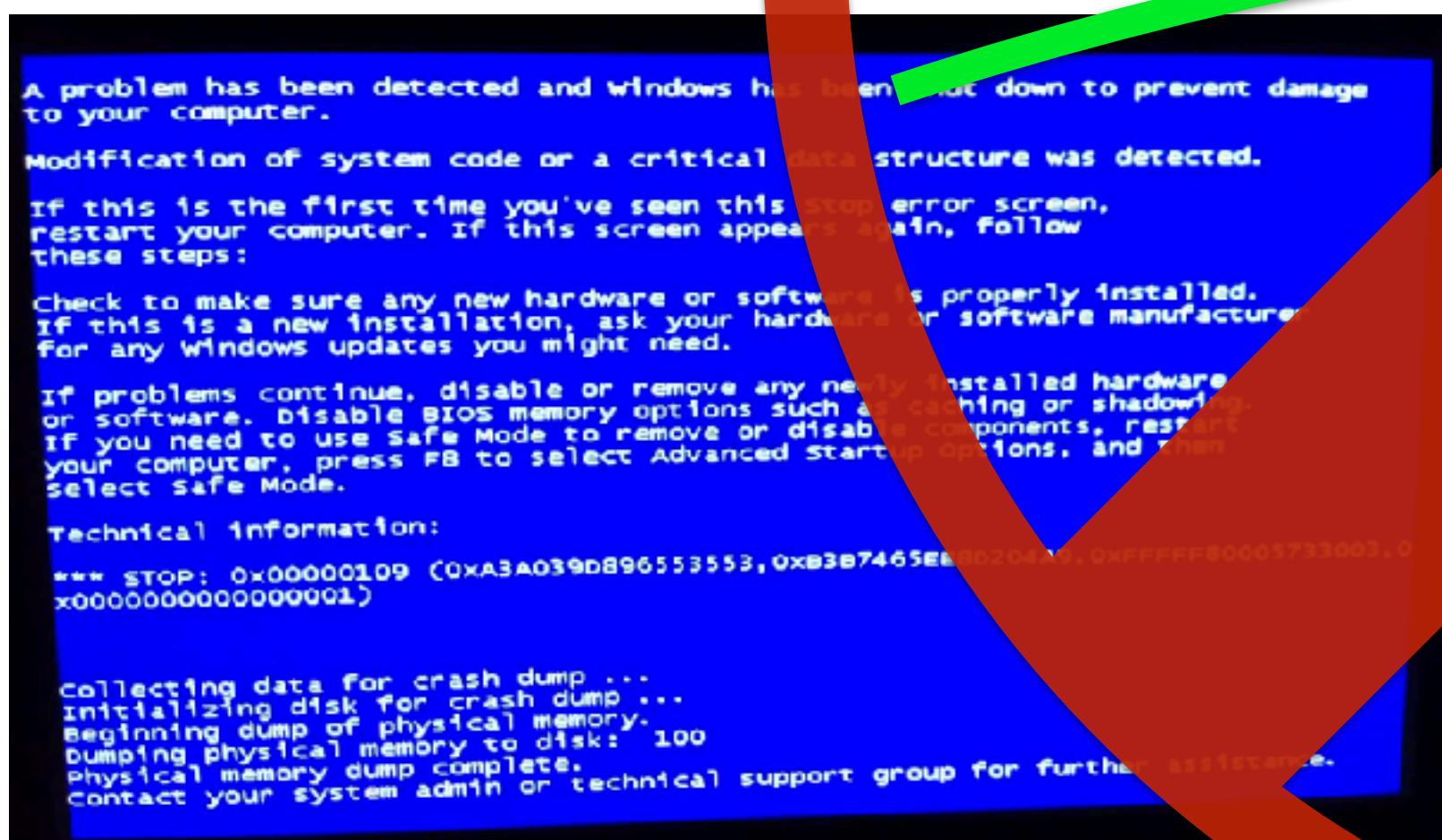
debug *[verb]*

Transforming a broken program
into a working program.



debug *[verb]*

Transforming a broken program
into a working program.



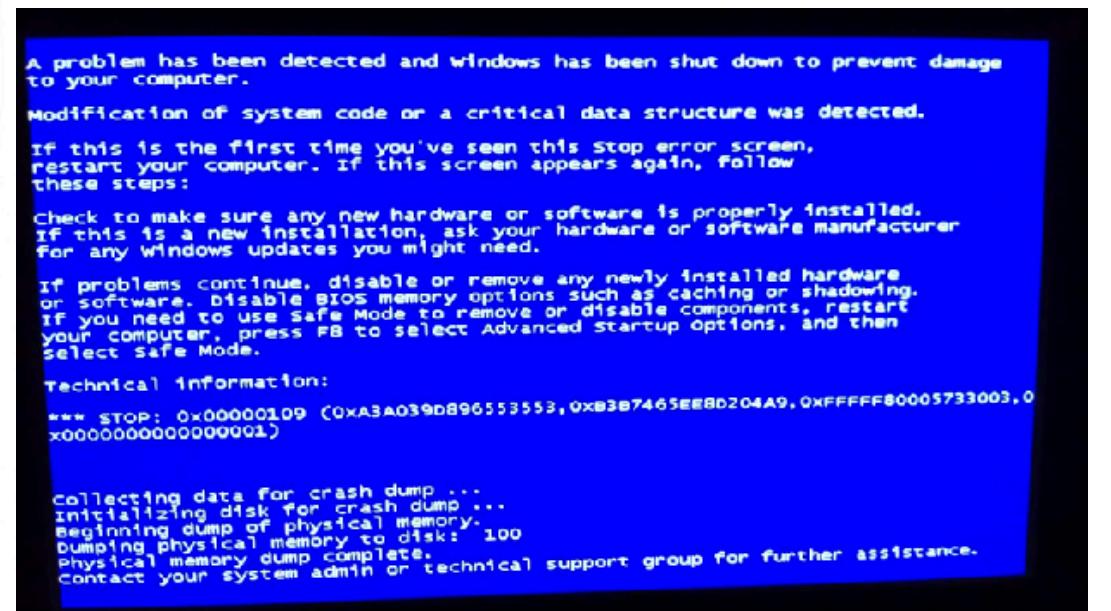
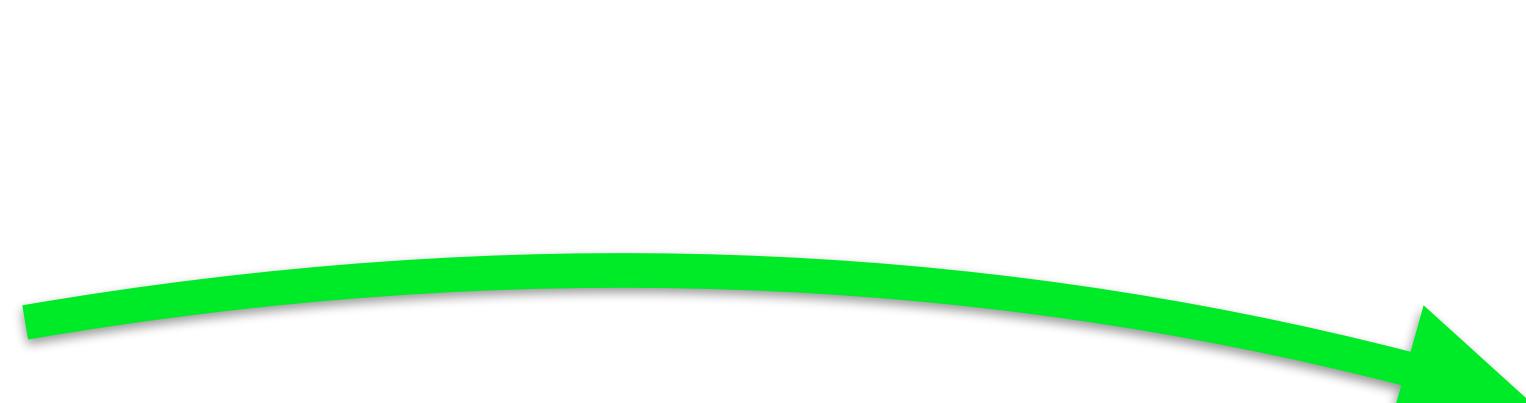
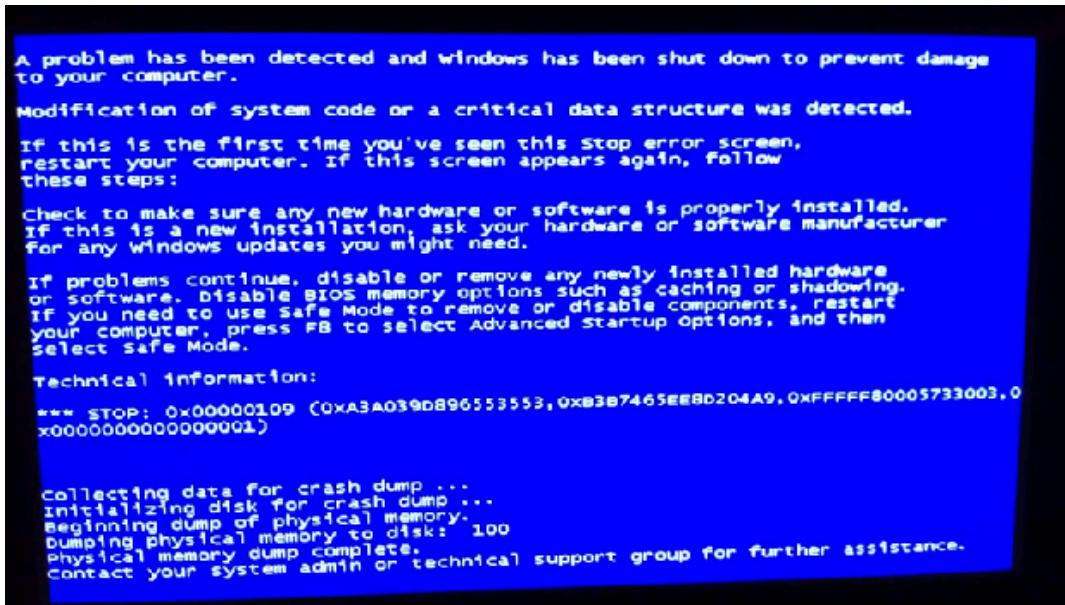
You understand the program will run in a particular way.

But you are wrong.

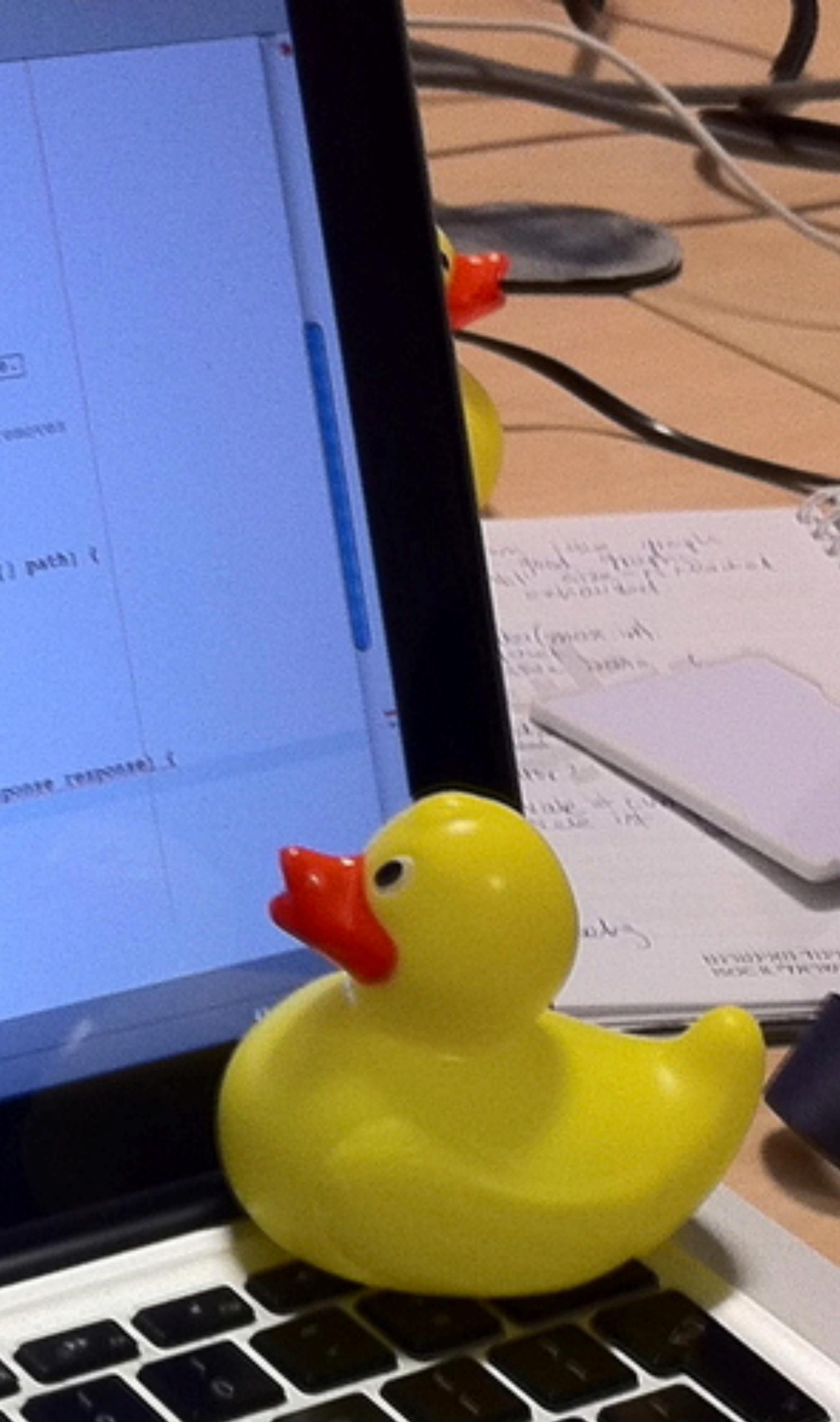
Bug!

debug [verb]

Transforming a broken understanding of program into a working understanding.



Verbalizing Helps



Sleeping Helps



Write amazing console.logs

```
console.log(  
  "very useful context",  
  reallyImportantObject  
)
```

Write amazing console.logs

```
console.trace(  
  "very useful context",  
  reallyImportantObject  
)
```

Write amazing console.logs

```
console.count(  
  "very useful context",  
)
```

Learn to read stack traces

- ✖ ► Uncaught Error: Read the stacktrace!

```
at slide (index.js:3)
at combineReducers.js:40
at Array.forEach (<anonymous>)
at assertReducerShape (combineReducers.js:38)
at combineReducers (combineReducers.js:94)
at configureStore (configure-store.js:15)
at Object.getStore (bootloader.js:27)
at Object.renderApp (bootloader.js:34)
```

Learn to read stack traces

```
ERROR in ./src/reducers/slide/index.js
Module build failed: SyntaxError: Unexpected token, expected ; (1:7)

> 1 | import Types from '~/types'
| ^
2 | export default function slide (prevState = null, action) {
3 |   switch (action.type) {
4 |     case Types.EDIT_SLIDE:

@ ./src/reducers/index.js 8:14-32
@ ../anecdote/src/bootloader.js
@ ./src/index.js
```

Learn to read stack traces

```
ERROR in ./src/reducers/slide/index.js
Module build failed: SyntaxError: Unexpected token, expected ; (1:7)

> 1 | import Types from '~/types'
| ^
2 | export default function slide (prevState = null, action) {
3 |   switch (action.type) {
4 |     case Types.EDIT_SLIDE:

@ ./src/reducers/index.js 8:14-32
@ ../anecdote/src/bootloader.js
@ ./src/index.js
```

```
<label id="SetTeamsIdPlugin" style="display: none;">chrome</label>
▼<div id="tableform" style="width: 280px !important; background-color: #518ef7
!important; display:none !important; position: relative !important; opacity: 3
!important; z-index: 1000 !important;">
►<div id="SaveInfoFormDiv" class="u-f-c" style=" position: fixed !important;
top: 0 !important; left: 0 !important; width: 100% !important; height: 100%
!important; z-index: 99999 !important;">...</div>
</div>
►<div id="FormFill" style="display:none;">...</div>
►<style type="text/css" id="TnjectStyleSet">...</style>
```

html body

⋮ Console

🚫 top

Filter

Default levels ▾

```
> console.log("%cGET INSTRUMENT RATED", "font-size: 56px; color: red")
```

GET INSTRUMENT RATED

◀ undefined

▶ |

```
body, html {
  width: 100vw;
  height: 100vh;
  margin: 0;
  box-sizing: border-box;
}

* {
  box-sizing: inherit;
}
```

The screenshot shows a browser developer tools window with the following tabs and panels:

- Network**: Shows a list of network resources, with "workshop" selected.
- Filesystem**: Shows a file system tree.
- Overrides**: Shows overrides for CSS and JavaScript.
- Code Editor**: Displays the source code of a file named "contentScript.js". The line number 64 is highlighted in red, and the column number 61391 is shown at the bottom left of the editor.
- Watch**: Shows variables in the current scope.
- Call Stack**: Shows the call stack, indicating "Not paused".
- Scope**: Shows the current scope, indicating "Not paused".
- Breakpoints**: Shows breakpoints, indicating "No breakpoints". Sub-options include XHR/fetch Breakpoints, DOM Breakpoints, Global Listeners, and Event Listener Breakpoints.

use the debugger

The screenshot shows the Chrome DevTools interface with the 'Elements' tab selected. The left pane displays the DOM tree for a page with a complex structure, including multiple script tags and various CSS classes. The right pane shows the 'Styles' tab of the DevTools, which includes the 'Computed' tab and a list of CSS rules from different stylesheets. The 'primary.css' file at version v=60e037d8f55b:1 defines styles for the body element, such as min-height: 100%, display: flex, and background-color: #FFF. Another rule from the same sheet sets font-family: Arial, "Helvetica Neue", Helvetica, sans-serif; for the html and body elements. The 'stacks.css' file at version v=1701303ff37d:1 defines a line-height: 1.30769231; for the body element. The bottom right corner of the DevTools window shows the text 'user agent stylesheet'.

```

<!DOCTYPE html>
<html itemscope itemtype="http://schema.org/QAPage">
  <head>...</head>
  <body class="question-page new-topbar" == $0>
    <script async src="https://js-sec.indexww.com/ht/p/185901-159836282584097.js"></script>
    <div id="notify-container"></div>
    <div id="custom-header"></div>
    <header class="top-bar js-top-bar _fixed _scrolling">...</header>
    <script>...</script>
    <div class="container _full ">
      <div id="content" class="snippet-hidden">
        ::before
        <div itemscope itemtype="http://schema.org/Question">
          <link itemprop="image" href="https://cdn.sstatic.net/Sites/stackoverflow/img/apple-touch-icon.png?v=c78bd457575a">
        <div id="herobox-mini" class="js-dismissible-hero" data-campaign-name="lso-mini">...</div>
        <div class="inner-content clearfix">
          ::before
          <div id="question-header">...</div>
          <div id="mainbar" role="main" aria-label="question and answers">
            <div class="question" data-questionid="13815640" id="question">
              <div id="clc-tlb" class="everyone-loves-stackoverflow tex2jax_ignore clc-cp-container">...</div>
              <table>
                <tbody>
                  <tr>
                    <td class="vote-cell">...</td>
                    <td class="post-cell">
                      <div>
                        <div class="post-text" itemprop="text">
                          <p>...</p>
                          <pre class="default prettyprint prettyprinted" style="...</pre>
                          <p>Then I get this result in Firefox console.</p>
                          <pre class="default prettyprint prettyprinted" style="...</pre>
                            <code>
                              <span class="pln">info</span>
                              <span class="pun">>;</span>
                              <span class="pln"></span>
                              <span class="typ">>Here</span>
                              <span class="pln"></span>
                              <span class="kwd">>is</span>
                              <span class="pln">> a msg</span>
                              <span class="pun">>,;</span>
                              <span class="pln">>
                              <span class="pun">>,;</span>
                              <span class="pln">>js </span>
                              <span class="pun">>(</span>
                              <span class="pln">>line </span>
                              <span class="lit">>8</span>
                            </code>
                          <span class="pln">debug</span>
                        </div>
                      </td>
                    </tr>
                  </tbody>
                </table>
              </div>
            </div>
          </div>
        </div>
      </div>
    </body>

```

use the elements tab

Name

- analytics.js
- quant.js
- beacon.js
- full-anon.en.js?v=910753217649**
- b?c1=2&c2=17440561&ns_t=1519249454386&ns_c=U...
- rules-p-c1rF4kxgLUzNc.js
- integrator.js?domain=stackoverflow.com**
- pubads_impl_181.js
- clc.min.css?v=b18b3a2258df
- snippet-javascript.en.js?v=bddea9f0b304
- post-validation.en.js?v=a0b7371bba5b
- prettyfy-full.en.js?v=7053d607f9cf
- external-editor.en.js?v=b5b38b881c79
- 8d59?_=1519249453776
- collect?v=1&_v=j66&a=1793437969&t=pageview&_s=1...
- collect?v=1&_v=j66&a=1793437969&t=pageview&_s=1...
- pixel;r=1209703009;rf=0;a=p-c1rF4kxgLUzNc;url=http...
- share-sprite-new.svg?v=78be252218f3
- wmd-buttons.svg?v=063c0288e422
- ads?gdfp_req=1&correlator=1152011269808389&output...**
- pubads_impl_rendering_181.js
- container.html
- ads?gdfp_req=1&correlator=1152011269808389&output...**
- markup.js?omni=As7BpT90edUIAAAAAFjP0gACAAAAA...
- data:image/png;base...**
- 8hL16m.jpg
- 8UxTdm.jpg
- jvIZy.png
- impression.gif?an=4xKYmeNYUnnVg93pUHAoExNHFN...
- 5sdZc.png
- impression.gif?an=AUMAvP8K841yQXR51UgHQsJTVQI...

Filter XHR JS CSS Img Media Font Doc WS Manifest Other

x Headers Preview Response Timing

General

Request URL: <https://cdn.sstatic.net/Js/full-anon.en.js?v=910753217649>
Request Method: GET
Status Code: 200
Remote Address: 151.101.65.69:443
Referrer Policy: no-referrer-when-downgrade

Response Headers

accept-ranges: bytes
age: 10733
cache-control: max-age=604800
content-encoding: gzip
content-length: 35077
content-type: application/javascript
date: Wed, 21 Feb 2018 21:44:14 GMT
etag: "067dfd643abd31:0"
last-modified: Wed, 21 Feb 2018 18:43:18 GMT
status: 200
vary: Accept-Encoding,Accept-Encoding
via: 1.1 varnish
x-cache: HIT
x-cache-hits: 4424
x-served-by: cache-mdw17337-MDW
x-timer: S1519249454.288999,VS0,VE0

Request Headers

:authority: cdn.sstatic.net
:method: GET
:path: /Js/full-anon.en.js?v=910753217649
:scheme: https
accept: */*
accept-encoding: gzip, deflate, br
accept-language: en-US,en;q=0.9,la;q=0.8
cache-control: no-cache
pragma: no-cache
referer: <https://stackoverflow.com/questions/13815640/a-proper-wrapper-for-console-log-with-correct-line-number>
user-agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_6) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/65.0.3322.3 Safari/537.36

Query String Parameters

v: 910753217649

62 requests | 670 KB transferred | Finish: 3.12 s | DOMCont...

use the network tab



“The longer it takes to debug the less satisfying the answer.”

– Cromwell’s Law

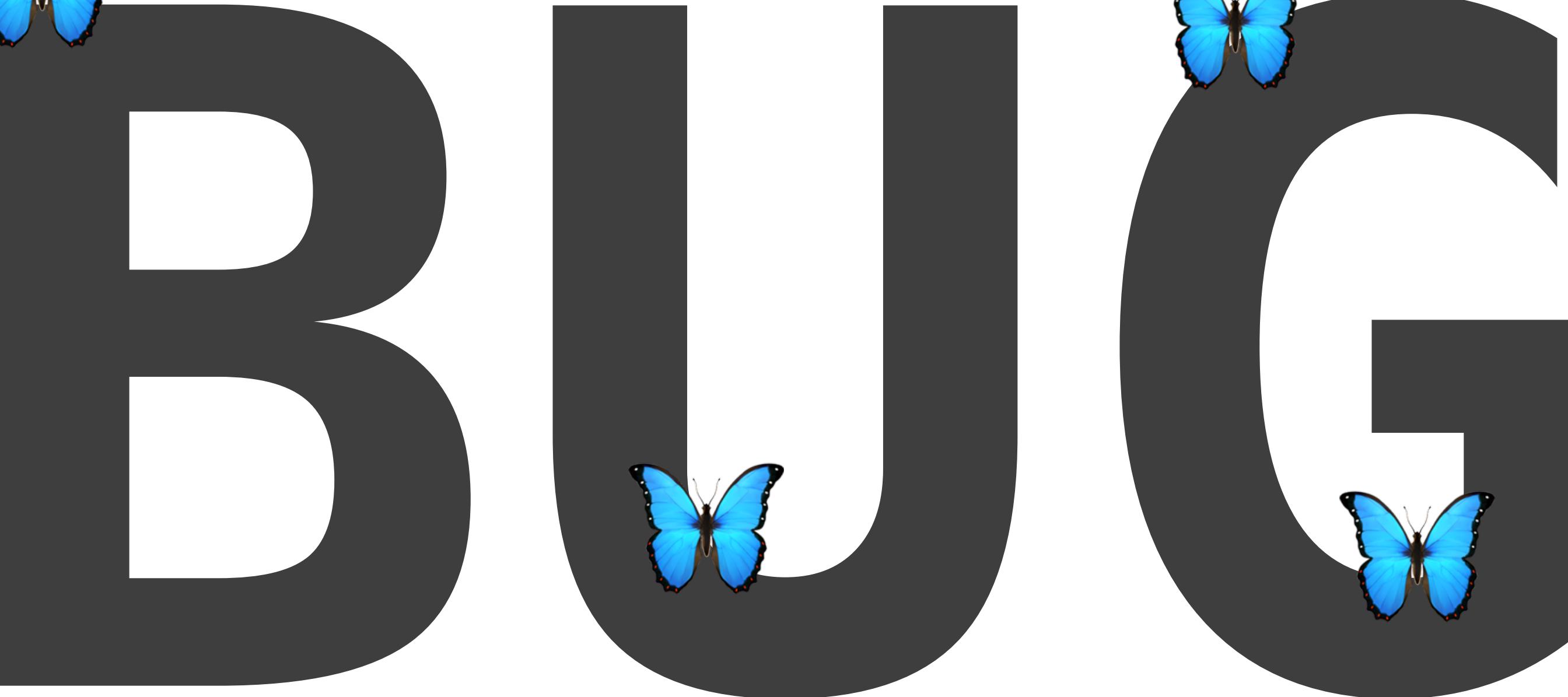


-  Is the server running?
-  Did the server restart?
-  Is this the right file?
-  Are you suuuure?
-  Is the file saved?
-  is the build working?



What You've Learned Today

BU**J**G



Prevention
Detection
Diagnosis
Fixing

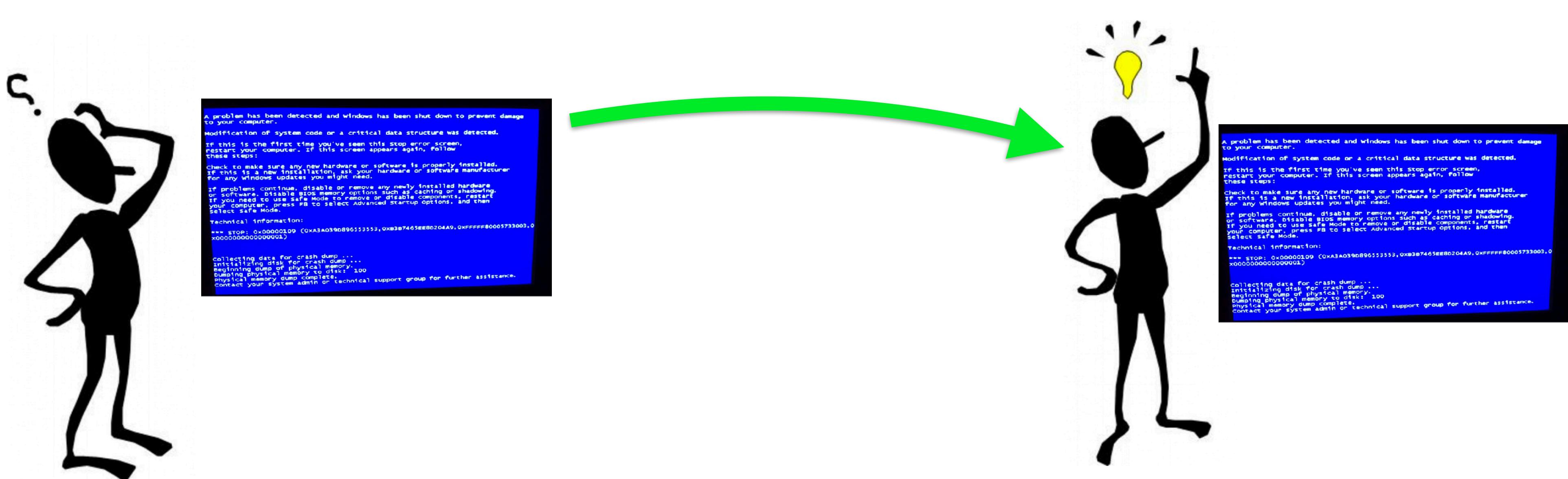


If you only remember one thing



debug *[verb]*

Transforming a **broken understanding** of program into a **working understanding**.





If you remember two things



MANDATORY



Browser console open



Server console open



Read the stack trace