

DEBUGGING

PREVENTION
DETECTION
DIAGNOSIS
FIXING



DETECTION

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

DIAGNOSIS



MANDATORY



Browser console open



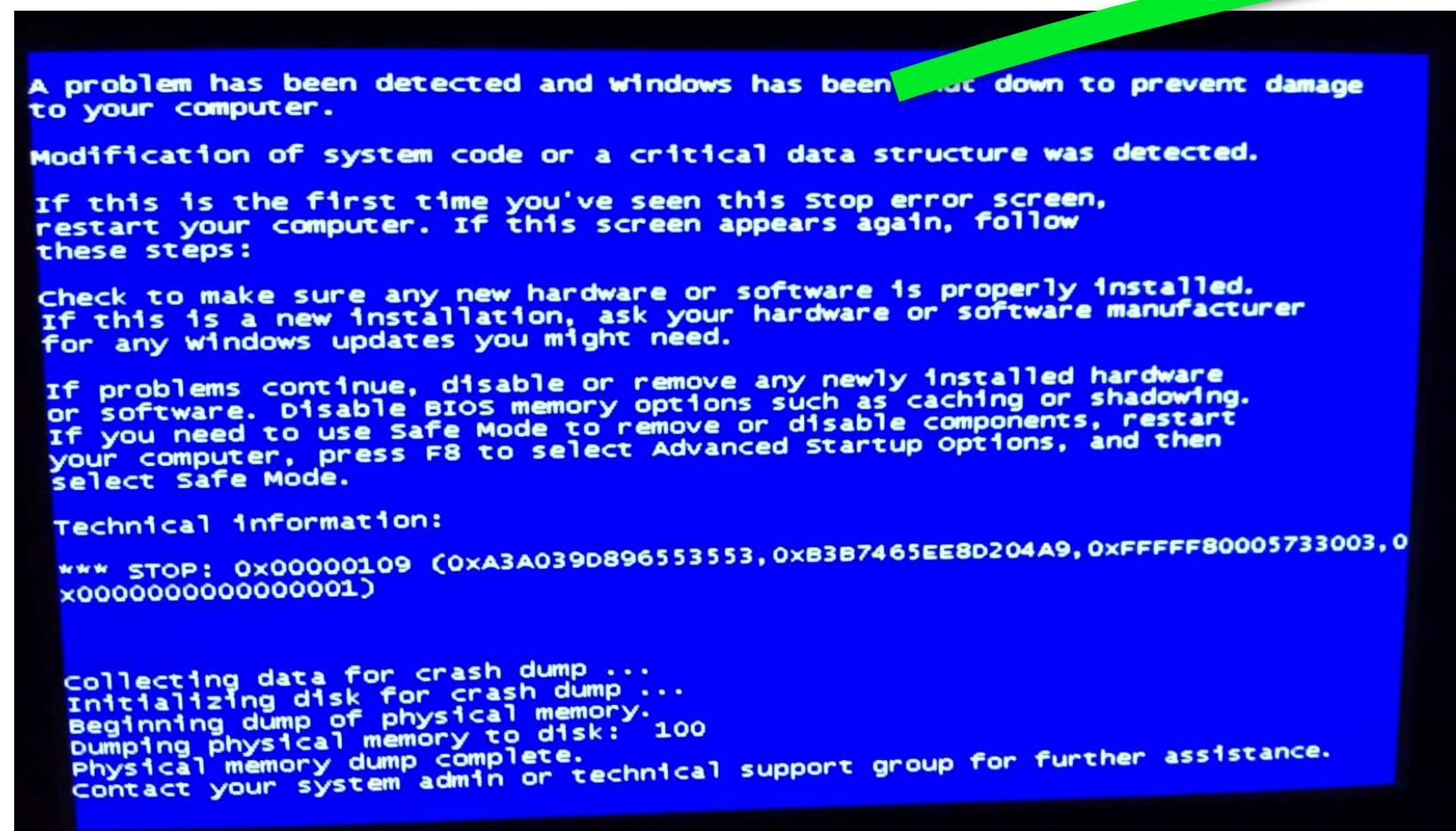
Server console open



Read the stack trace

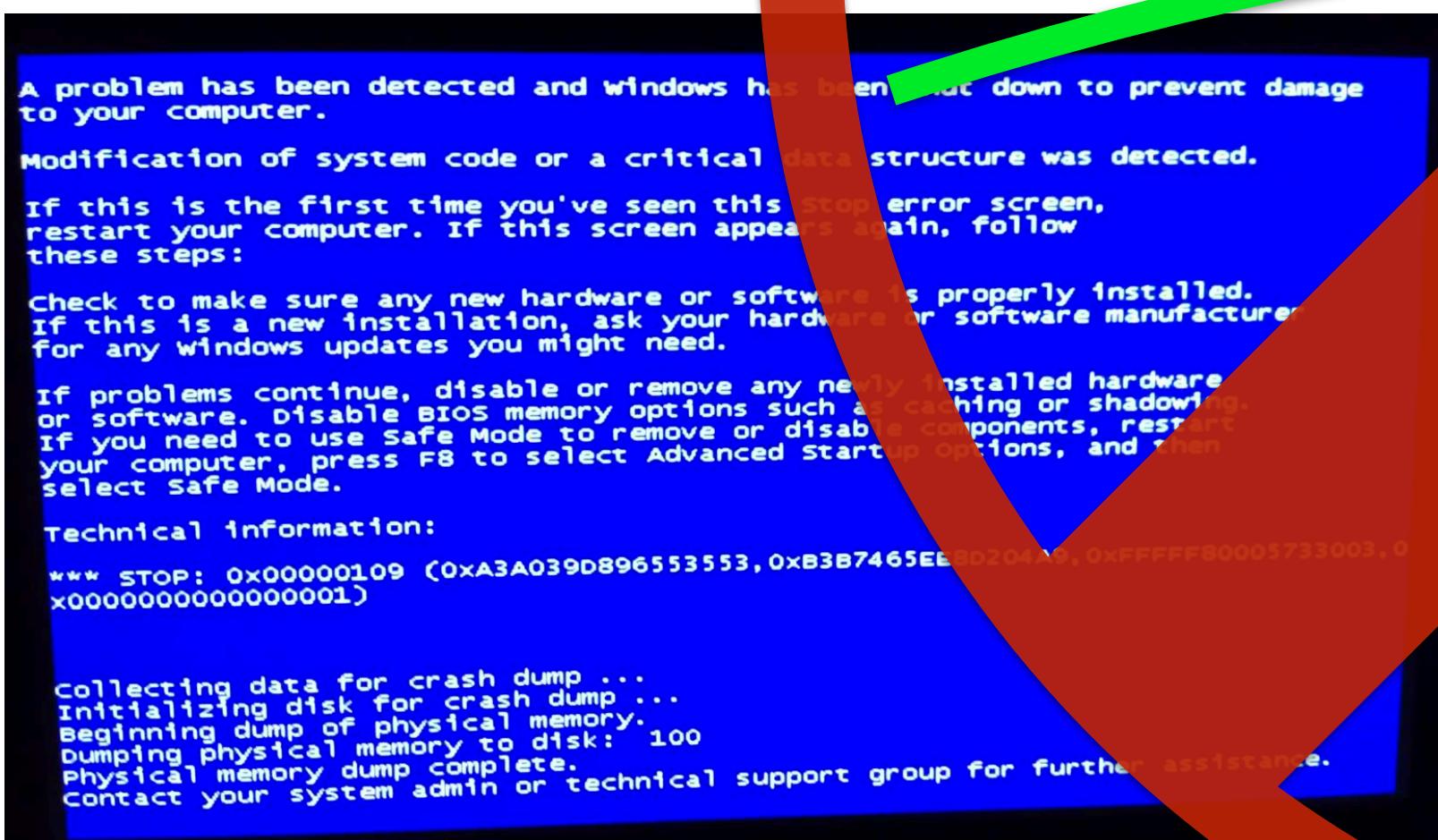
debug [*verb*]

Transforming a broken program
into a working program.



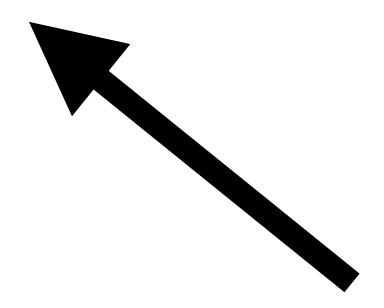
debug *[verb]*

Transforming a broken program
into a working program.



You understand the program will run in a particular way.

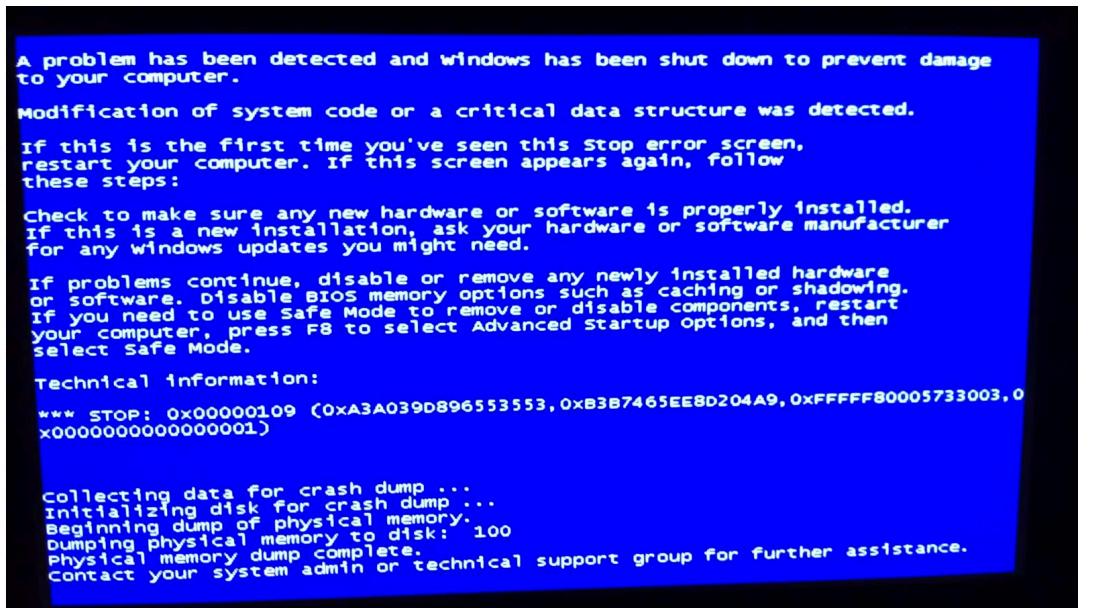
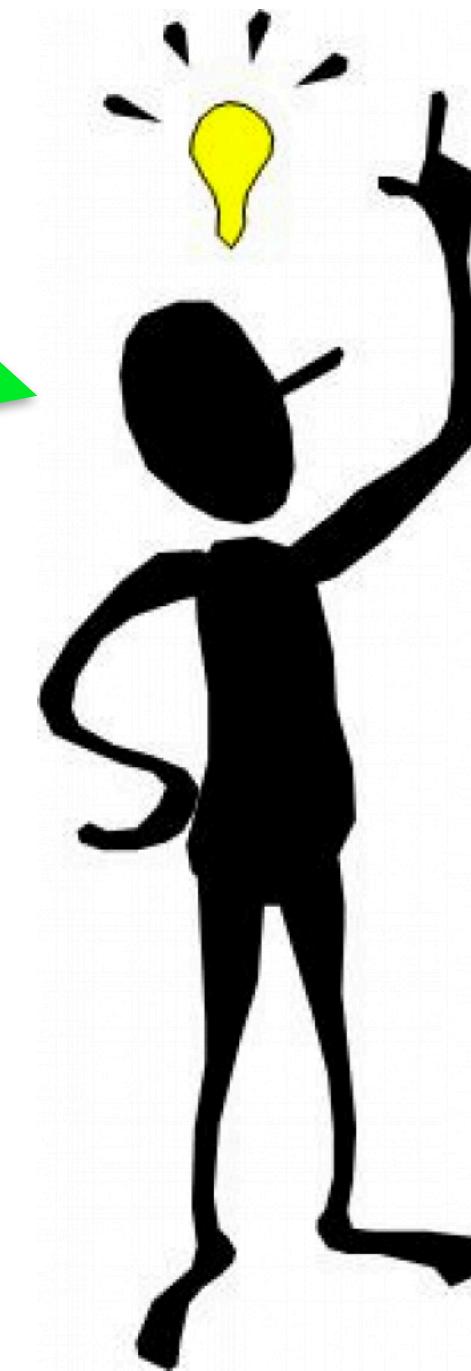
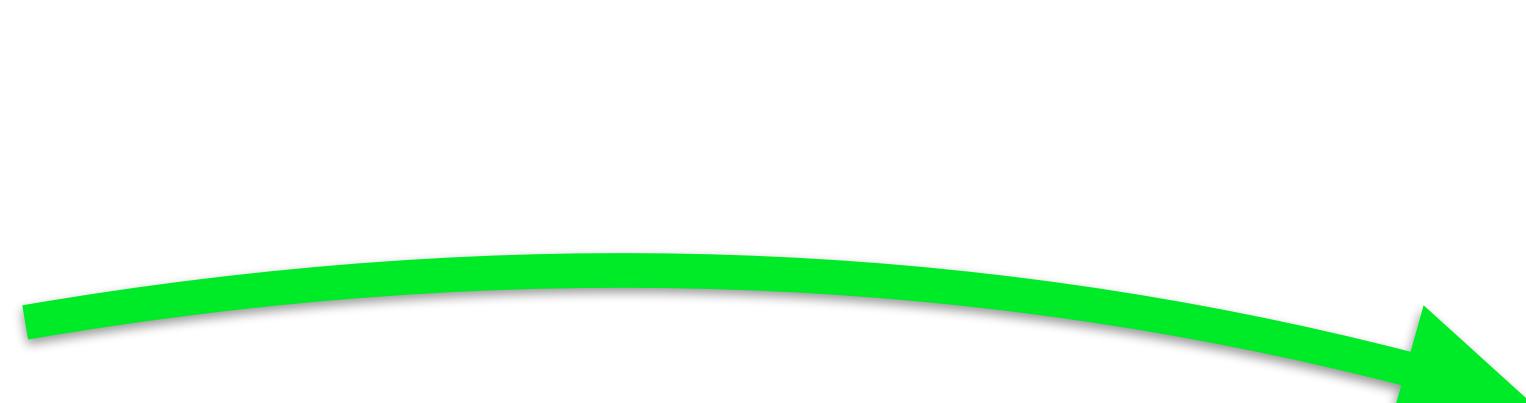
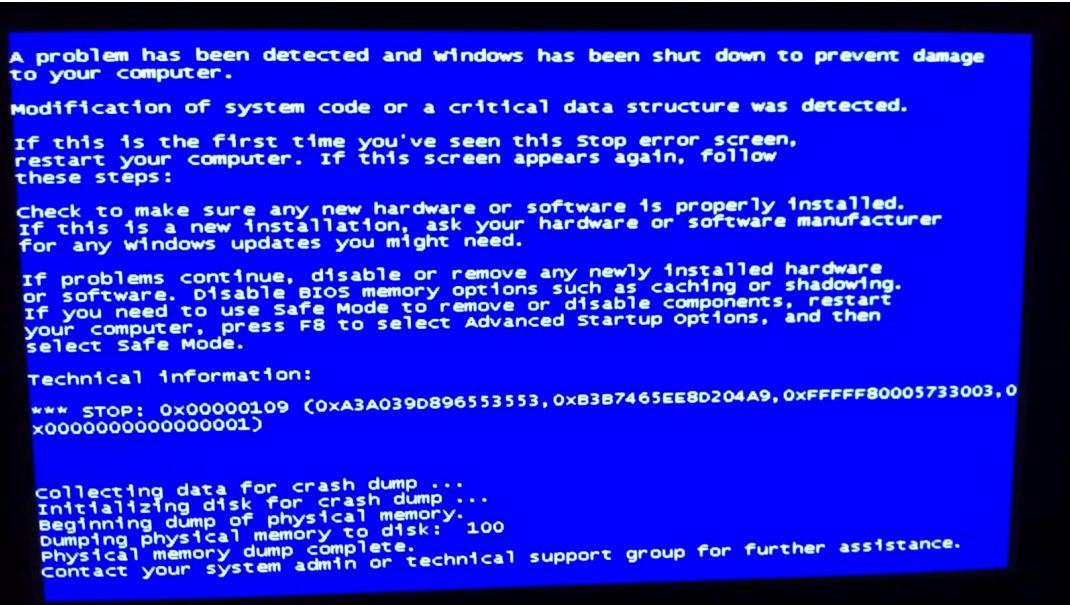
But you are wrong.



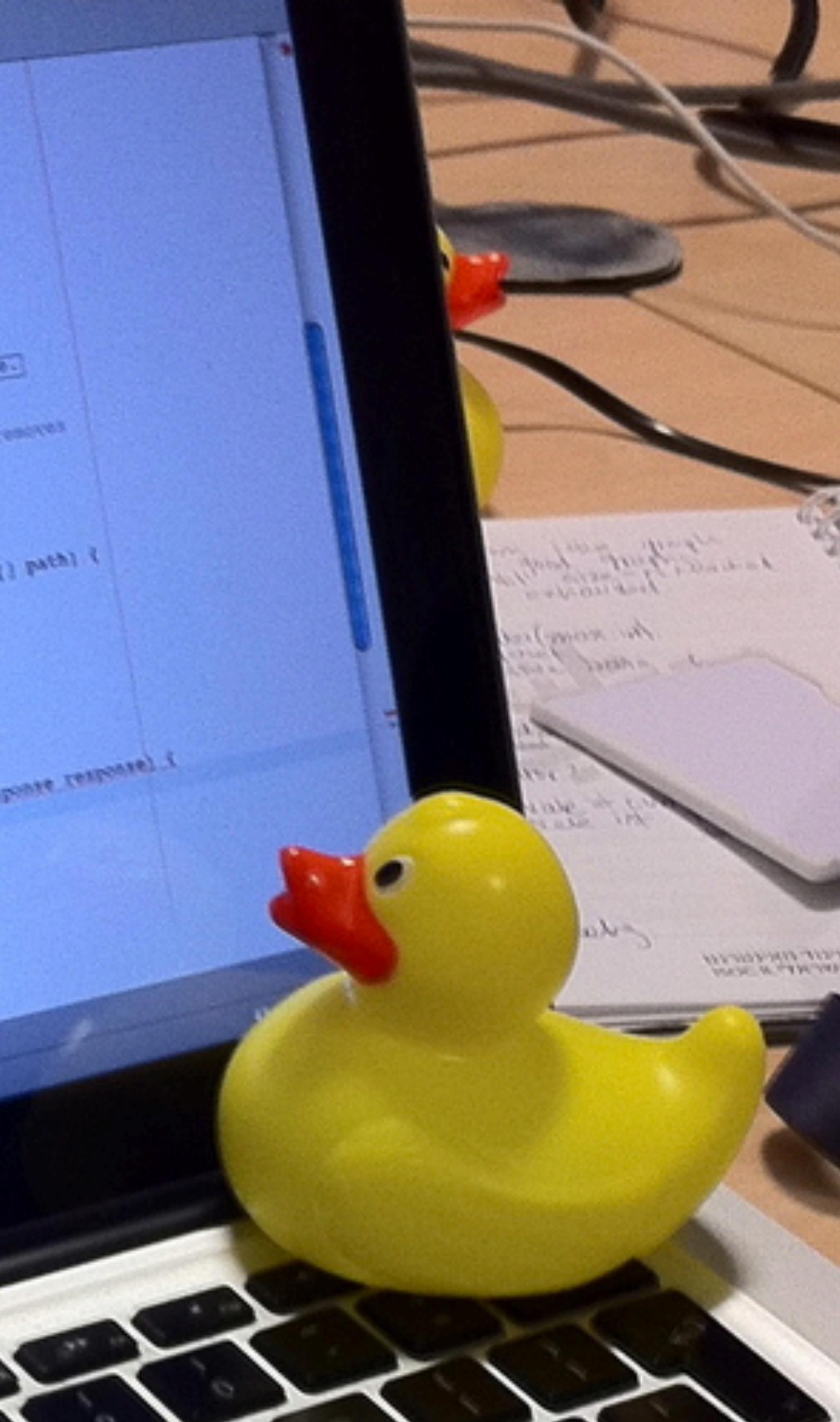
Bug!

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  
)
```

console.trace()

Example

```
1 | function foo() {
2 |   function bar() {
3 |     console.trace();
4 |   }
5 |   bar();
6 |
7 |
8 | foo();
```

In the console, the following trace will be displayed:

```
1 | bar
2 | foo
3 | <anonymous>
```

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)

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2 | export default function slide (prevState = null, action) {
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@ ./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 requests and responses.
- Filesystem**: Shows a file system tree.
- Overrides**: Shows a list of overrides.
- Code Editor**: Displays the source code of a file named `contentScript.js`. Line 64 is highlighted with a blue background. The code is heavily obfuscated, containing many variables and functions with random names.
- Watch**: A panel for watching variables.
- Call Stack**: A panel showing the call stack, which is currently "Not paused".
- Scope**: A panel showing the current scope, which is also "Not paused".
- Breakpoints**: A panel showing breakpoints, which are "No breakpoints". It includes sections for XHR/fetch Breakpoints, DOM Breakpoints, Global Listeners, and Event Listener Breakpoints.

At the bottom of the code editor, it says "Line 64, Column 61391".

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 body class of 'question-page new-topbar'. The right pane shows the 'Styles' tab of the DevTools, which includes the current element's style (element.style), the global styles for 'html' and 'body' (primary.css), and the stack of styles (stacks.css). The 'Computed' tab shows the final applied styles.

```

<!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">>debug</span>
                            <span class="pun">>,</span>
                            <span class="pln">>js </span>
                            <span class="pun">>(</span>
                            <span class="pln">>line </span>
                            <span class="lit">>8</span>
                          </code>
                        </div>
                      </td>
                    </tr>
                  </tbody>
                </table>
              </div>
            </div>
          </div>
        </div>
      </div>
    </body>

```

use the elements tab

The screenshot shows the Network tab in the Chrome DevTools developer console. A specific request, "full-anon.en.js?v=910753217649", is selected and expanded. The Headers panel displays the following details:

- 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

The Response Headers section includes:

- 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

The Request Headers section shows:

- :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

The Query String Parameters section shows:

- v: 910753217649

At the bottom left, it says "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

The letters B, U, J, G are rendered in a large, bold, dark gray font. Four blue butterflies are placed on the letters: one on the top left of the B, one on the bottom left of the U, one on the top left of the J, and one on the bottom left of the G.

Prevention
Detection
Diagnosis
Fixing

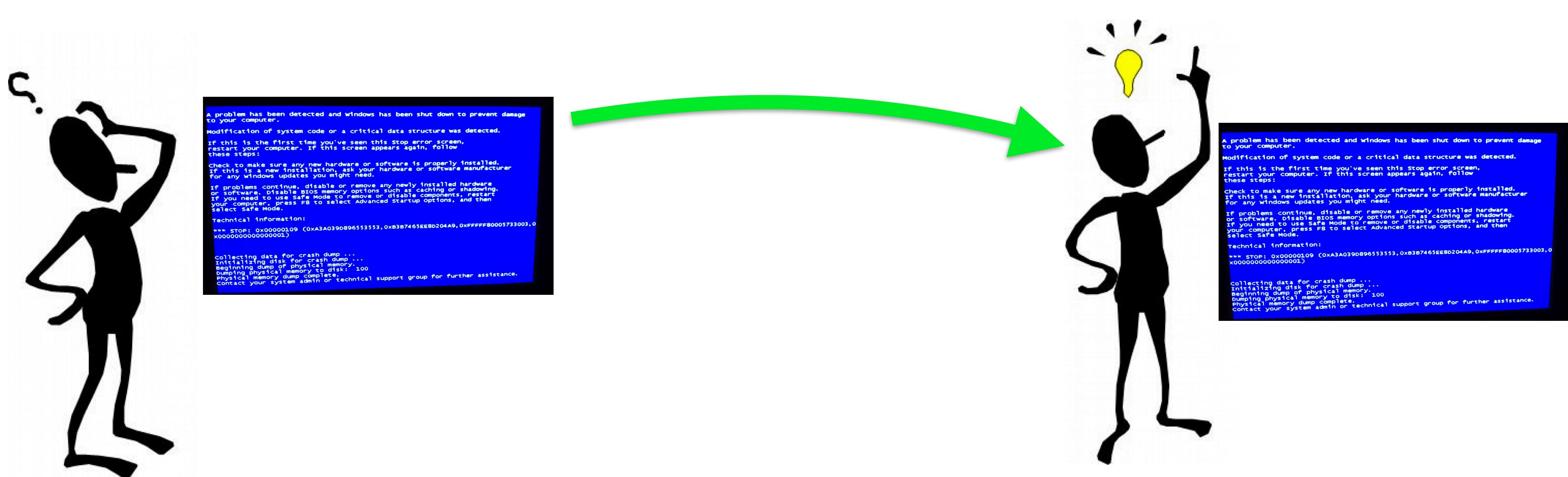


If you only remember one thing



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