

# DEBUGGING

PREVENTION  
DETECTION  
DIAGNOSIS  
FIXING



# DETECTION

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

# DIAGNOSIS



# MANDATORY



Browser console open



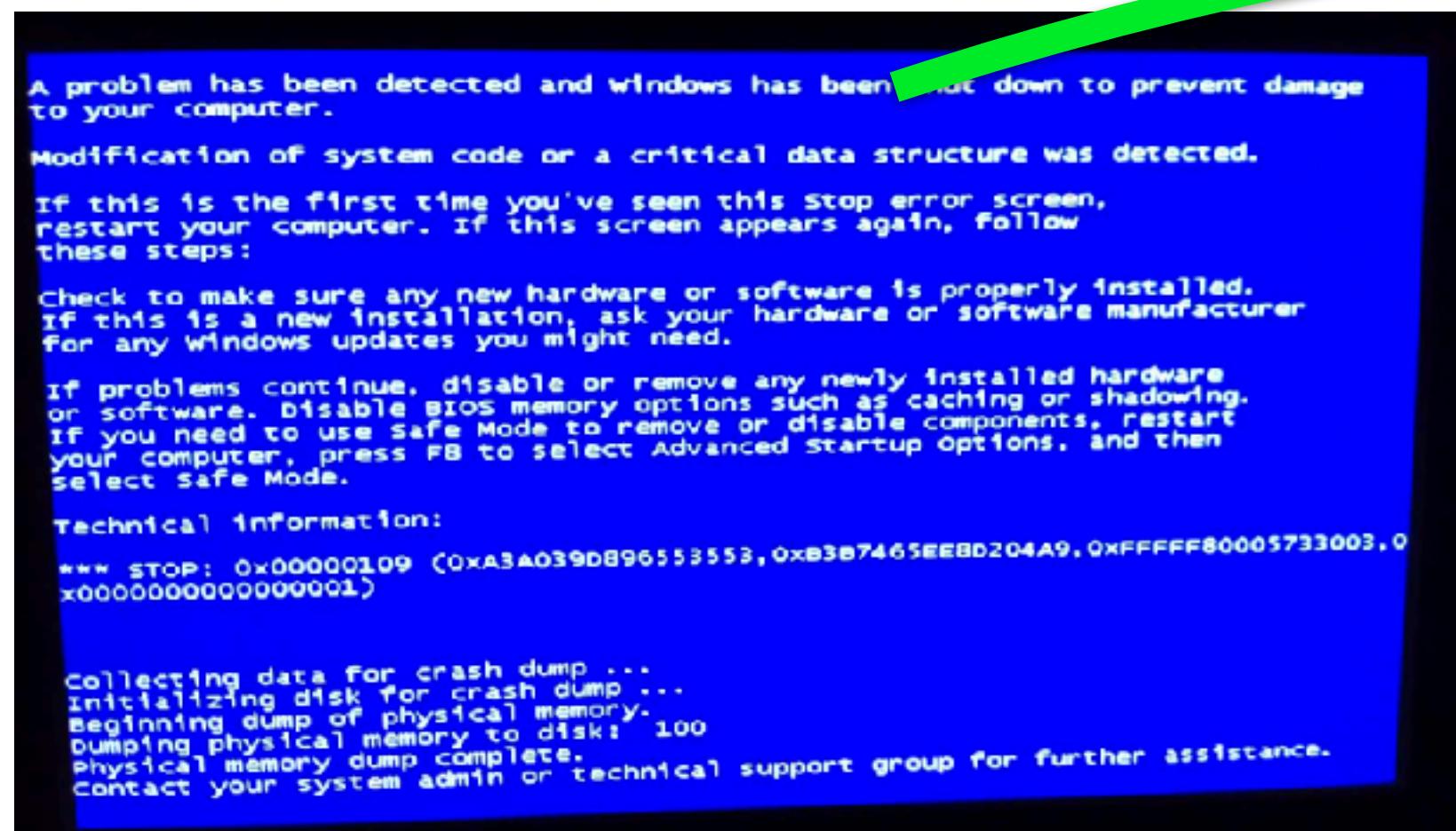
Server console open



Read the stack trace

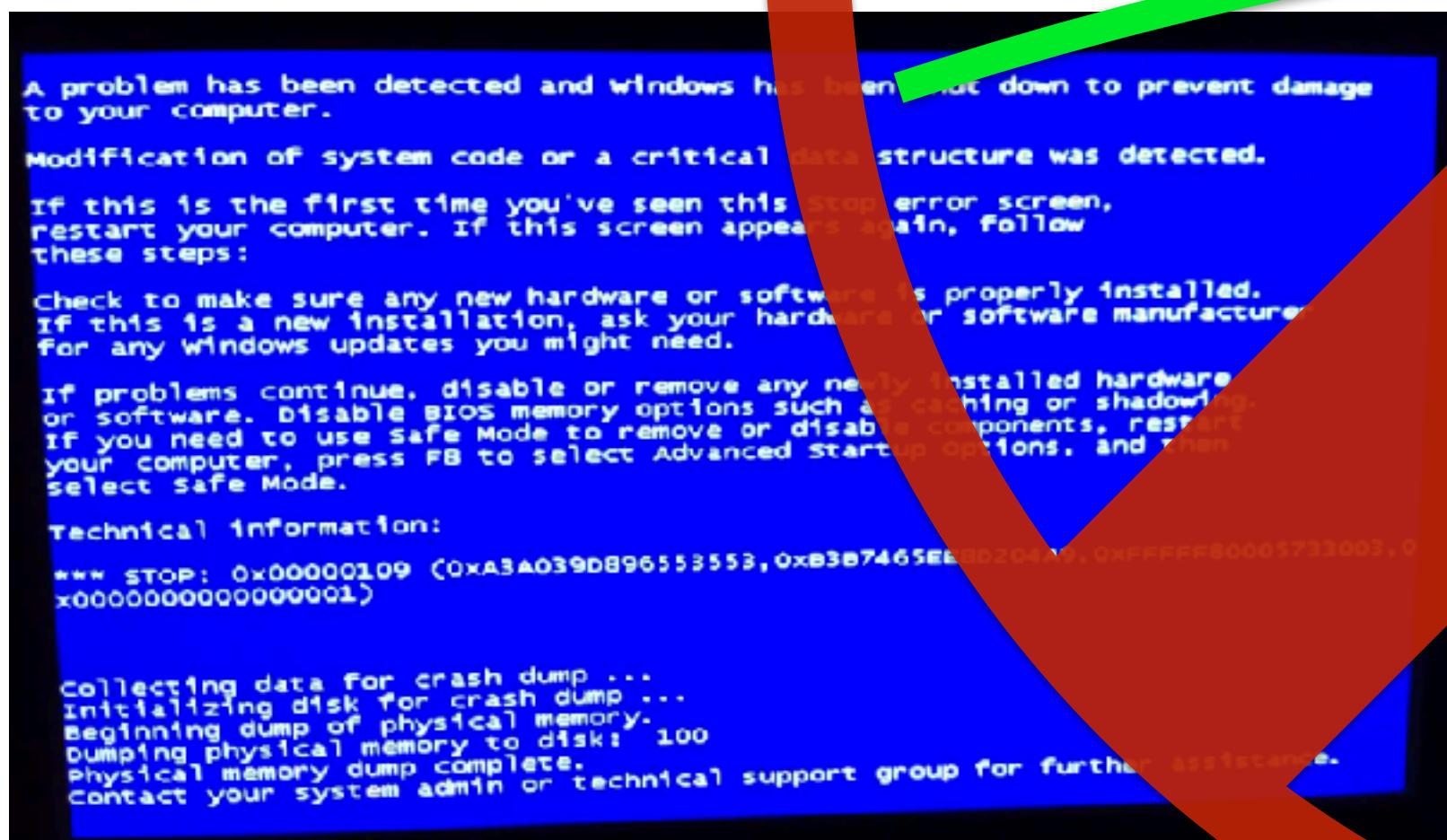
debug *[verb]*

Transforming a broken program  
into a working program.



debug *[verb]*

Transforming a broken program  
into a working program.



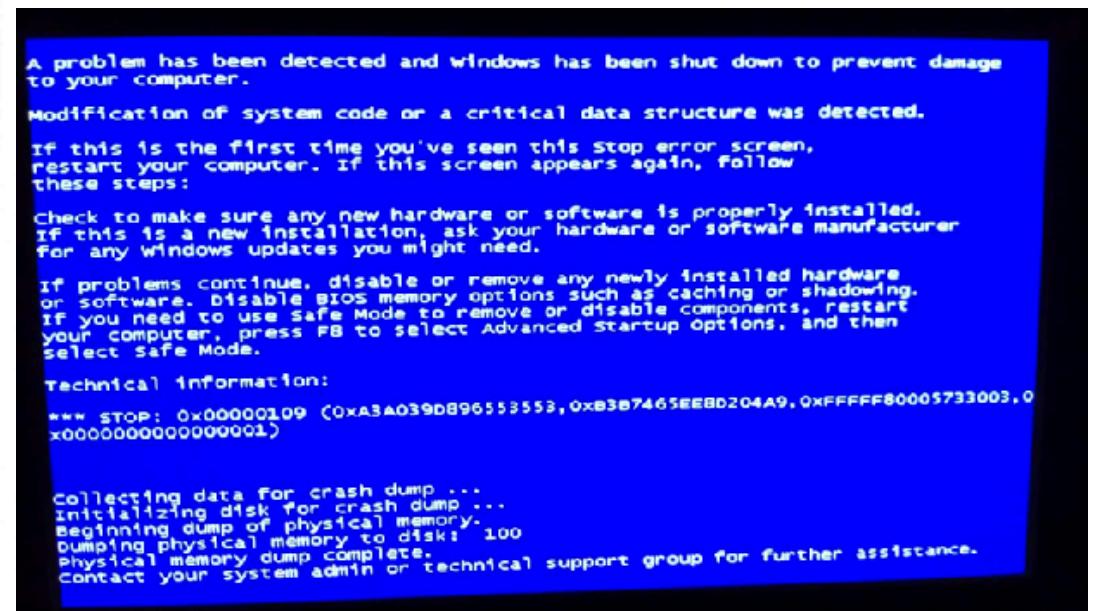
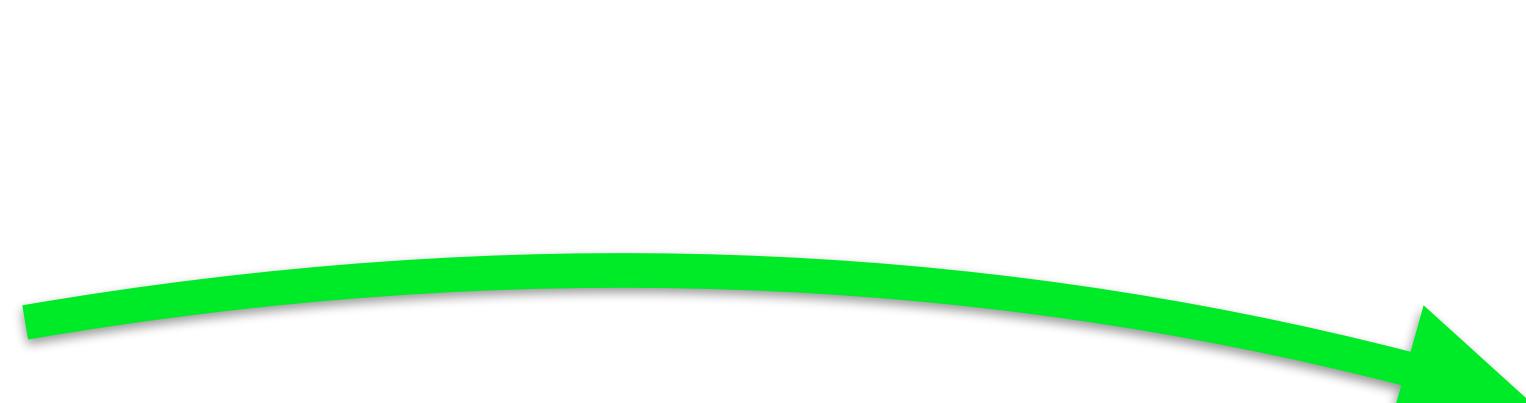
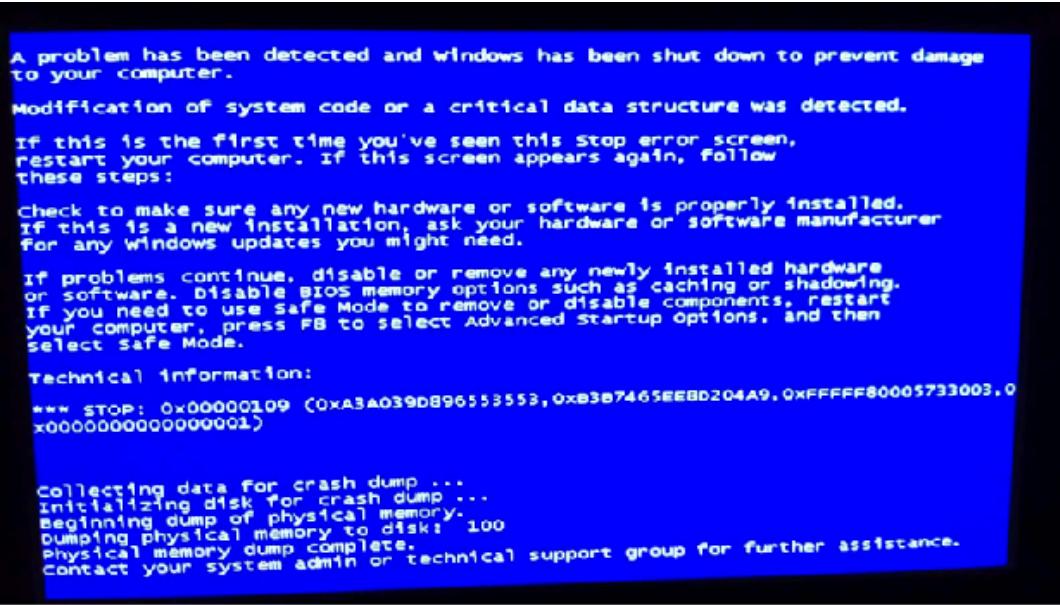
You understand the program will run in a particular way.

*But you are wrong.*

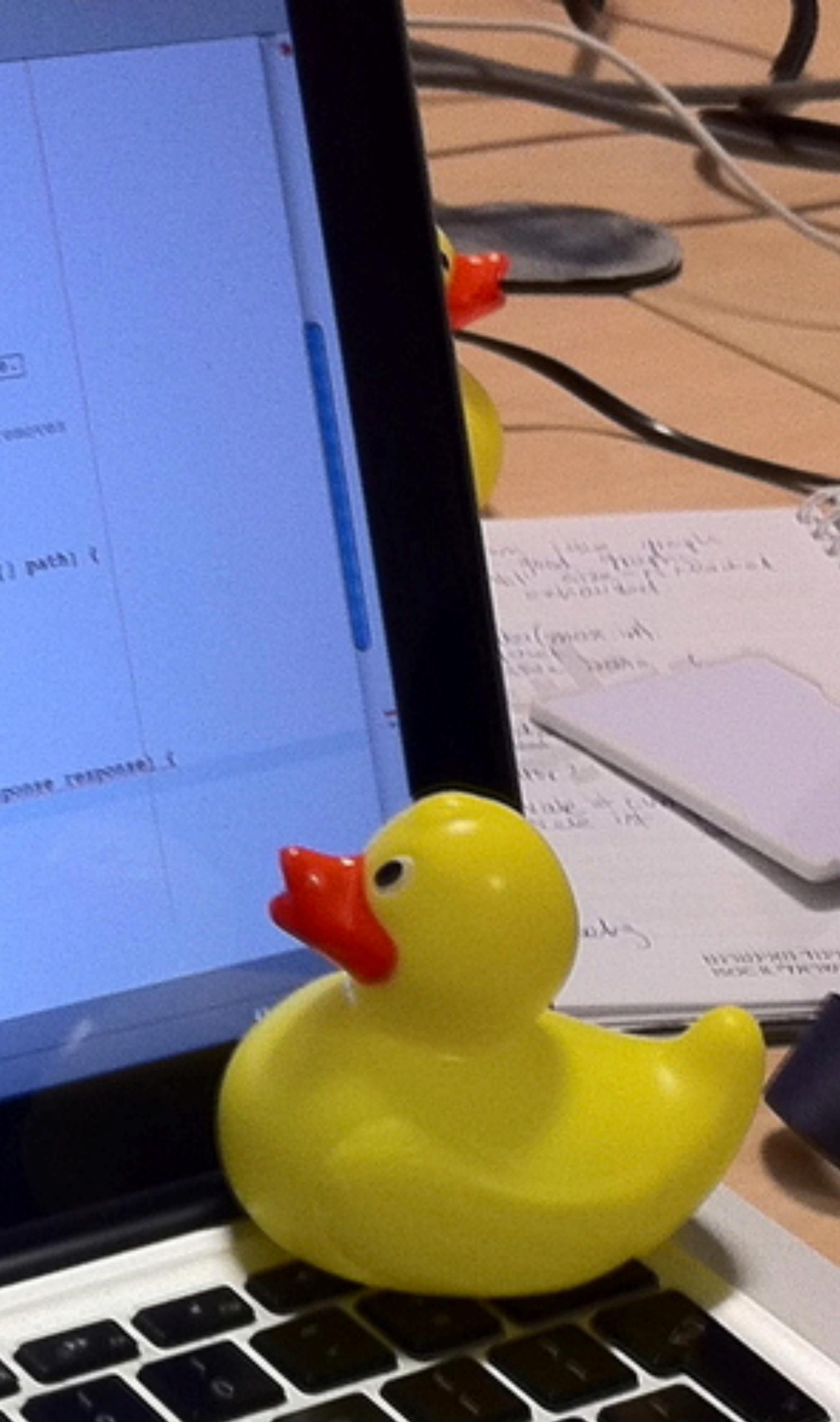
Bug!

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)

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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:

- Network
- Filesystem
- Overrides >

The Network tab displays a tree view of network resources:

- top
  - learn.fullstackacademy.com
    - assets/images
    - bower\_components/font-awesome/fonts
    - build
    - public/images
    - workshop
  - (no domain)
  - avatars2.githubusercontent.com
  - cdn.heapanalytics.com
  - embed.runkit.com
  - gleam.io
  - heapanalytics.com
  - js-agent.newrelic.com
  - learndot-artwork.s3.amazonaws.com
  - s.ytimg.com
  - s3.amazonaws.com
  - use.typekit.net
  - www.google-analytics.com
  - www.youtube.com

The code editor shows a file named `contentScript.js` with the following content:

```
41         });
42     }
43     return value;
44 }, set: function (target, property, value) {
45     globalContext[property] = value;
46     delete proxiedFunctions[property];
47 }, has: function () {
48     return true;
49 }
50 );
51 return proxy;
52 }
53 }(this)
54 )
55 function lp_deepCopy(e){var t=e;if(e&&"object"==typeof e){t=="[object Array]"==Object.
56 LPVARS.g_form.eventdata2.value=e.key,LPVARS.g_form.eventdata3.value=e.version,LPVARS.g
57 var m="data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAABAAAAAAQCAYAAAAf8/9hAAABYkLEQVR42
58 ;if(P&&n&&void 0!=P.m_checkfillformresult&&P.m_checkfillformnumforms==y.length)retur
59 o+1<a.length&&a[o+1]&&"password"==a[o+1].type&&(r=a[o+1])&&r.ownerDocument&&r.ownerDo
60 ;return{is_special_site:LPVARS.g_is_specialsite,in_cpwbot:LPVARS.g_in_cpwbot,tutorial_
61 var n=gettldcached(e.location.href)}catch(e){return!1}var i=LP_pickFormName(e,t),r=for
62 if(null!=t&&is_valid_input_indexes(e))return LPMAGICINPUTIDX+t}function LP_name_is_in
63 LPVARS.g_20logo_2x="data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAACACAAAAAgCAYAAABzenr0
64 textChoice:""},IntroTutorialHelpDialog.prototype.setBackgroundTransparent=function(e,t
65 if(!fe.radioValue&&"radio"==t&&r(e,"input")){var n=e.value;return e.setAttribute("typ
66 bg.LPTabState.getSiteNotification({callback:s}),1e3,!0);return Topics.get(Topics.INIT
67 }
68 }
69 }
70 }
71 }
```

The status bar at the bottom indicates: {} 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 complex structure, including multiple levels of shadow roots and various CSS classes and IDs. The right pane shows the 'Styles' tab of the DevTools, which includes the 'Computed' tab and a list of styles from different CSS files. The styles listed include:

- body { min-height: 100%; display: flex; display: flex; -webkit-flex-flow: column nowrap; flex-flow: column nowrap; background: #FFF; min-width: 1075px; } primary.css?v=60e037d8f55b:1
- html, body { font-family: Arial, "Helvetica Neue", Helvetica, sans-serif; font-size: 13px; line-height: 1.26666667; color: #242729; } primary.css?v=60e037d8f55b:1
- body { box-sizing: border-box; min-height: 100%; background: #FFF; } primary.css?v=60e037d8f55b:1
- html, body { font-family: Arial, "Helvetica Neue", Helvetica, sans-serif; font-size: 13px; line-height: 1.30769231; color: #242729; } primary.css?v=60e037d8f55b:1
- body { line-height: 1; } stacks.css?v=1701303ff37d:1
- html, body, div, span, apple, object, iframe, h1, h2, h3, h4, h5, h6, p, blockquote, pre, a, abbr, acronym, address, big, cite, code, del, dfn, em, img, ins, kbd, q, s, samp, small, strike, strong, sub, sup, tt, var, b, u, i, center, dl, dt, dd, ol, ul, li, fieldset, form, label, legend, table, caption, tbody, tfoot, thead, tr, th, td, article, aside, canvas, details, embed, figure, figcaption, footer, header, hgroup, menu, nav, output, ruby, section, summary, time, mark, audio, video { margin: 0; padding: 0; border: 0; font-size: 100%; font: inherit; vertical-align: baseline; } stacks.css?v=1701303ff37d:1

The bottom status bar indicates the current file is 'body.question-page.new-topbar'.

# 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 section displays various HTTP headers such as Accept-Ranges, Cache-Control, Content-Encoding, Content-Length, Content-Type, Date, Etag, Last-Modified, Status, Vary, Via, X-Cache, X-Cache-Hits, X-Served-By, and X-Timer. The Request Headers section shows the client's headers including Authority, Method, Path, Scheme, Accept, Accept-Encoding, Accept-Language, Cache-Control, Pragma, Referer, and User-Agent. The Query String Parameters section shows the value "v: 910753217649". At the bottom left, it indicates 62 requests, 670 KB transferred, and a finish time of 3.12 s. There is also a link to "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



**B**U**J****G**

The letters B, U, J, G are rendered in a large, bold, dark gray font. Each letter has a small, vibrant blue butterfly resting on it: one on the top left of B, one on the middle left of U, one on the bottom left of J, and one on the top right of G.

Prevention  
Detection  
Diagnosis  
Fixing

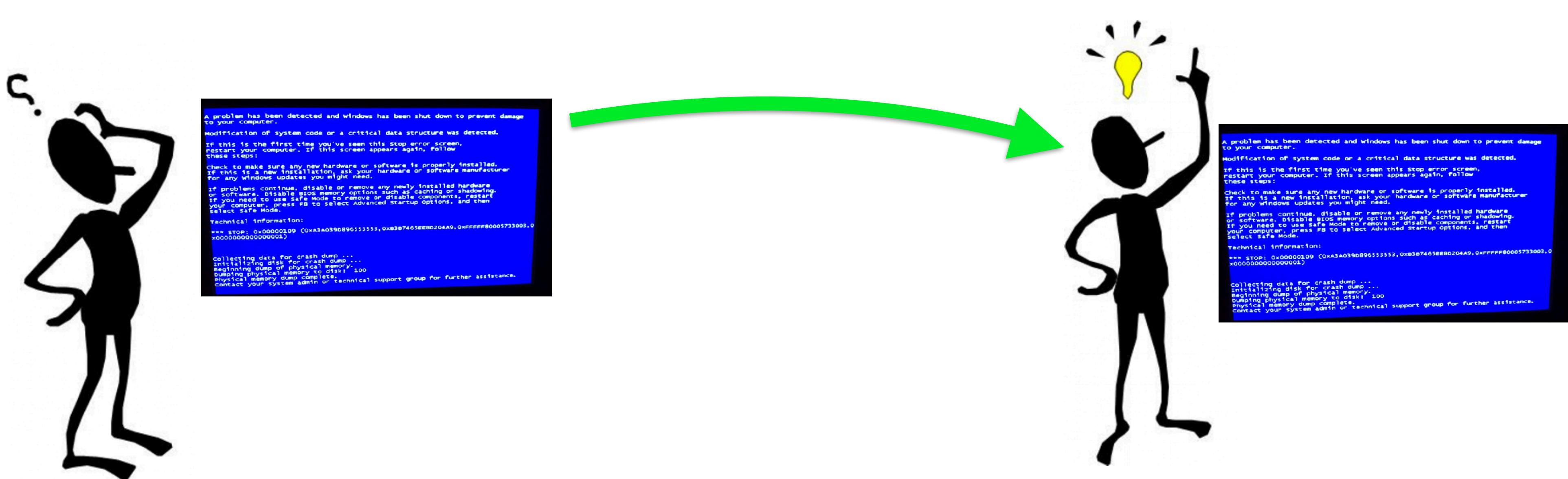


# If you only remember one thing



## 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