Debugging

The why, where && WTF
behind your error messages…

Topics Covered

- History
- Reading Error messages
- Different Debugging Strategies
- Tools
- Cleanup some code (maybe)
- Ten most common errors with examples

Why you care

- 80% of your time as a Dev is spent READING CODE
- 60% of that time is DEBUGGING

- Good Debugging skill is one of the things that will keep you sane in this job…

* All times estimated…. ☺

History

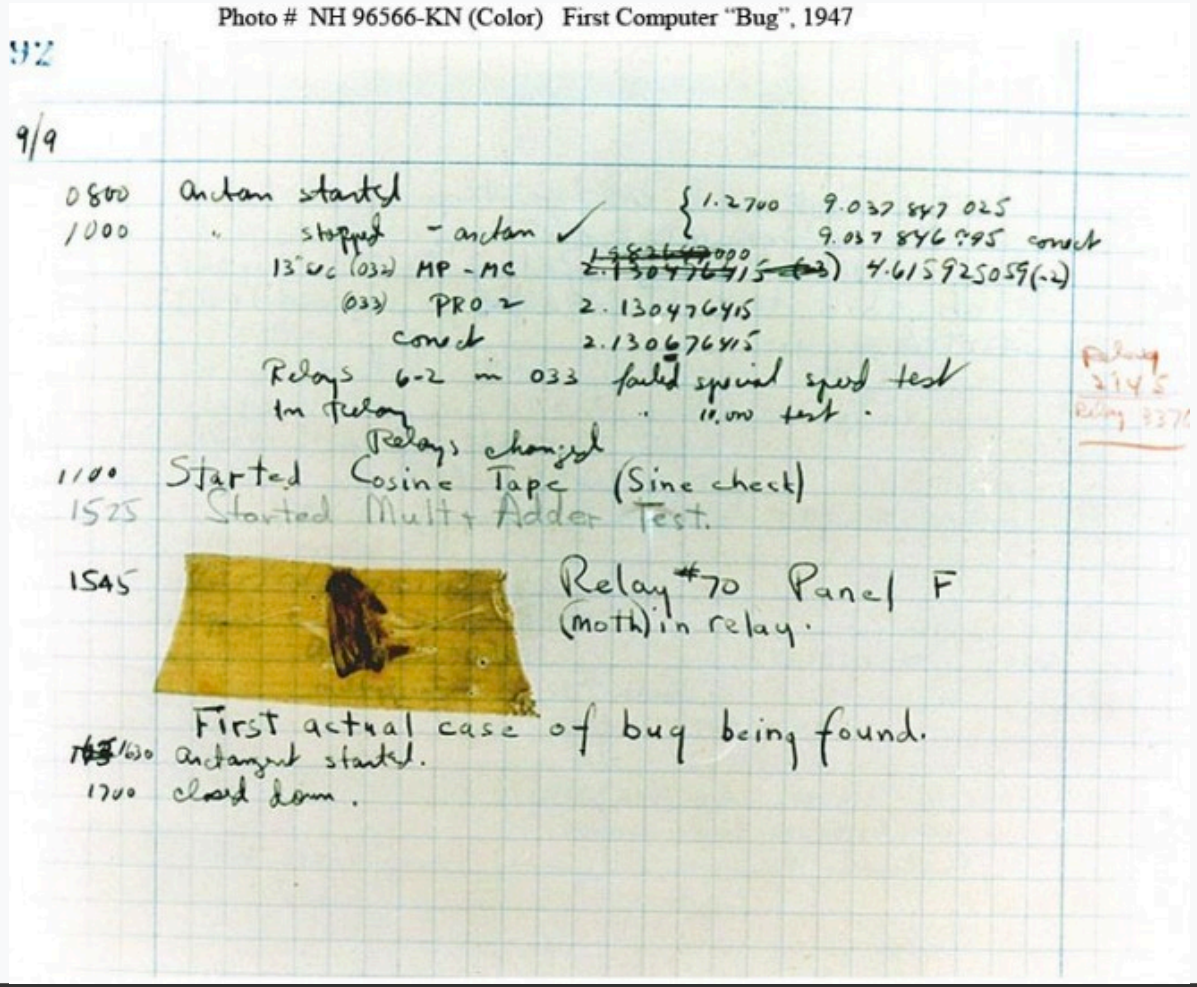


Photo # NH 96566-KN (Color) First Computer "Bug", 1947
9/9
0800 Arctan started
1000 " stopped - arctan ✓
1.2700 9.037 847 025
9.037 846 795 correct
13" wc (032) MP - MC 4.615925059(-2)
(033) PRO 2 2.13047 6415
correct 2.13067 6415
Relays 6-2 in 033 failed special speed test
In relay . 11.00 test .
Relays changed
1100 Started Cosine Tape (Sine check)
1525 Started Multy Adder Test.
1545 Relay #70 Panel F
(moth) in relay.
First actual case of bug being found.
1700 closed down.

Definitions:

BUG: Whenever a program/ system is not behaving the way we expect.

- DEBUGGING: Any systematic approach undertaken in the understanding and elimination of a BUG.

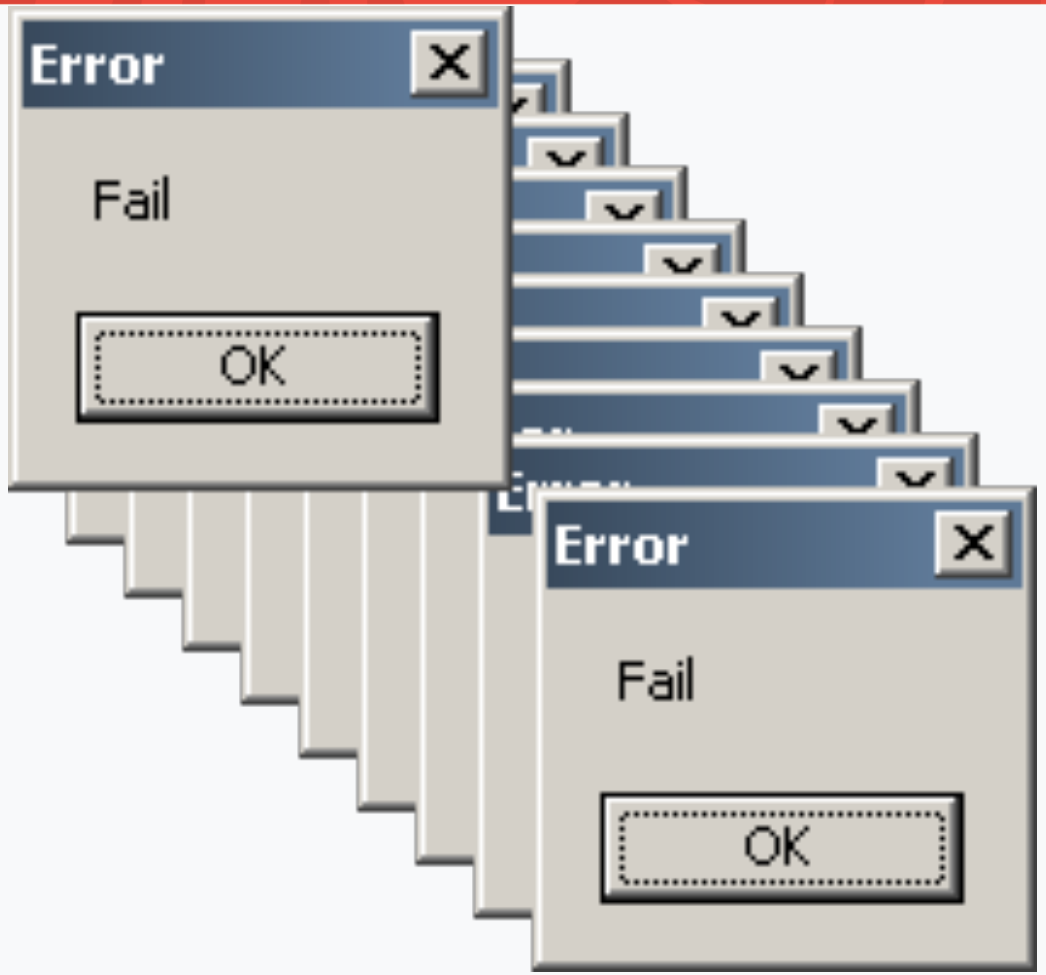
Gen Knowledge

- Debugging is the process of figuring out the source of the error and fixing it.

- Think of it as the disconnect between your assumptions and what the code is actually doing.

- It's a skill, so you'll need to practice it.
- FYI: Helping peers == super great way to improve.

Error Messages

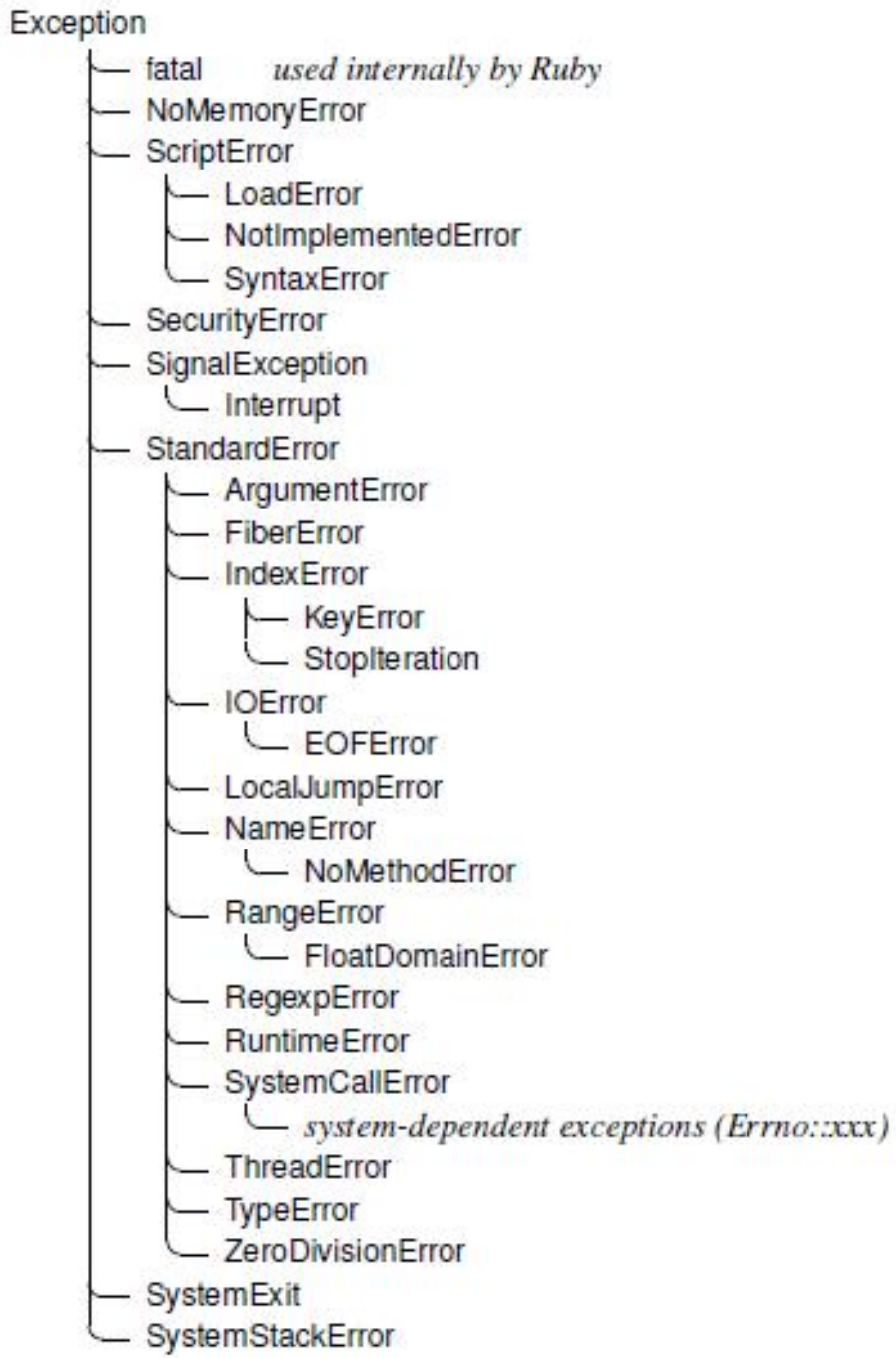


Stack Trace

Stack Trace (aka stack backtrace or stack traceback) is a report of the active stack frames upon error condition during a program's execution.

We follow this path back to find the offending code segment and correct it.

Ruby Exception Classes



Error Messages

The First rule of debugging:

Error Messages

The First rule of debugging:

- Read the error message!

Error Messages

The First rule of debugging:

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The Second rule of debugging:

Error Messages

The First rule of debugging:

- Read the error message!

The Second rule of debugging:

- Read the error message!

Error Messages

The Third rule of debugging:

- No matter how fucked you think you are….

Remain
CALM!

Errors are your friends!

- Don’t freak when you see an error

- Analyze the error:

- What are the line number(s)?
- What type of error is it?
- What specific message did you get?

Debugging Workflow

- Read your error messages!
- SPECIFICS: type, line #, error msg & filename
- Know what your expected behavior is.
- Shitcan your assumptions.
- Verify and understand the input(s).
- Verify the program / variable state.
- Make small incremental changes.

Strategies

- Debug “inline”
- Use the REPL (irb || pry)
- Guess && Check

Debugging “inline”

- Use p statements to quickly show variable’s value
  p “some_variable: #{@some_variable}”

- Quickly determine if you are reaching a method
- def some_method
  p “HIT: some_method”
  end

Debugging “inline”

- Terrific way to determine flow control around conditional statements

```
if num = 1
  p “inside if”
else
  p “inside else”
end
```

Debugging “inline”

- Use “signaling code” to easily flag your spot in conjunction with a variable check

```
p “~” * 80
p “var: #{var}”
p “~” * 80
```

Tip: Use different signal characters when looking at multiple points in your code.

- This is very useful in larger applications or when p-ing to a busy server console.

Tools

awesome_print

gem install awesome_print

require ‘awesome_print’
ap some_array
ap some_hash

PRY – The IRB Alternative

Pry is a REPL (Read-Eval-Print-Loop) much like IRB but with 3 additional key features:

- Syntax Highlighting
- Built in methods
- A Debugger
- Tabbed completion

PRY – Install

```
gem install pry
gem install pry-doc
gem install pry-byebug
rbenv rehash
```

PRY – terminal commands

ls (list methods)
_ (the last output)
? (show-doc)
. (send command to bash)
cat filename (displays the given file)
wtf? (wtf……)

pry-byebug

gem install pry-byebug

require "pry-byebug”

To stop execution and enter the REPL insert
binding.pry
as a breakpoint at the spot you wish to examine.

pry-byebug commands

!!!: Quit byebug session and resume

step: Step execution into the next line or method. Takes an optional numeric argument to step multiple times.

next: Step over to the next line within the same frame. Also takes an optional numeric argument to step multiple lines.

finish: Execute until current stack frame returns.

continue: Continue program execution and end the Pry session.

up: Moves the stack frame up. Takes an optional numeric argument to move multiple frames.

down: Moves the stack frame down. Takes an optional numeric argument to move multiple frames.

PRY#show-doc

```
[7] pry(main)> show-doc Array#each_with_index

From: enum.c (C Method):
Owner: Enumerable
Visibility: public
Signature: each_with_index(*arg1)
Number of lines: 11

Calls block with two arguments, the item and its index,
for each item in enum.  Given arguments are passed through
to #each().

If no block is given, an enumerator is returned instead.

   hash = Hash.new
   %w(cat dog wombat).each_with_index { |item, index|
     hash[item] = index
   }
   hash   #=> {"cat"=>0, "dog"=>1, "wombat"=>2}
[8] pry(main)>
```

Exceptions

- An instance of the Exception class
- A raised exception will propagate through each method in the call stack until it is stopped or reaches the point where the program started
- Exceptions can be **Raised && Rescued**

Debugging Wrapup

Questions?

Sweet Links

Pry Usage (youtube)

Replace IRB with PRY

Final Thought

Don’t like debugging…

A Strong test suite will greatly reduce the amount of debugging you do.

What now…