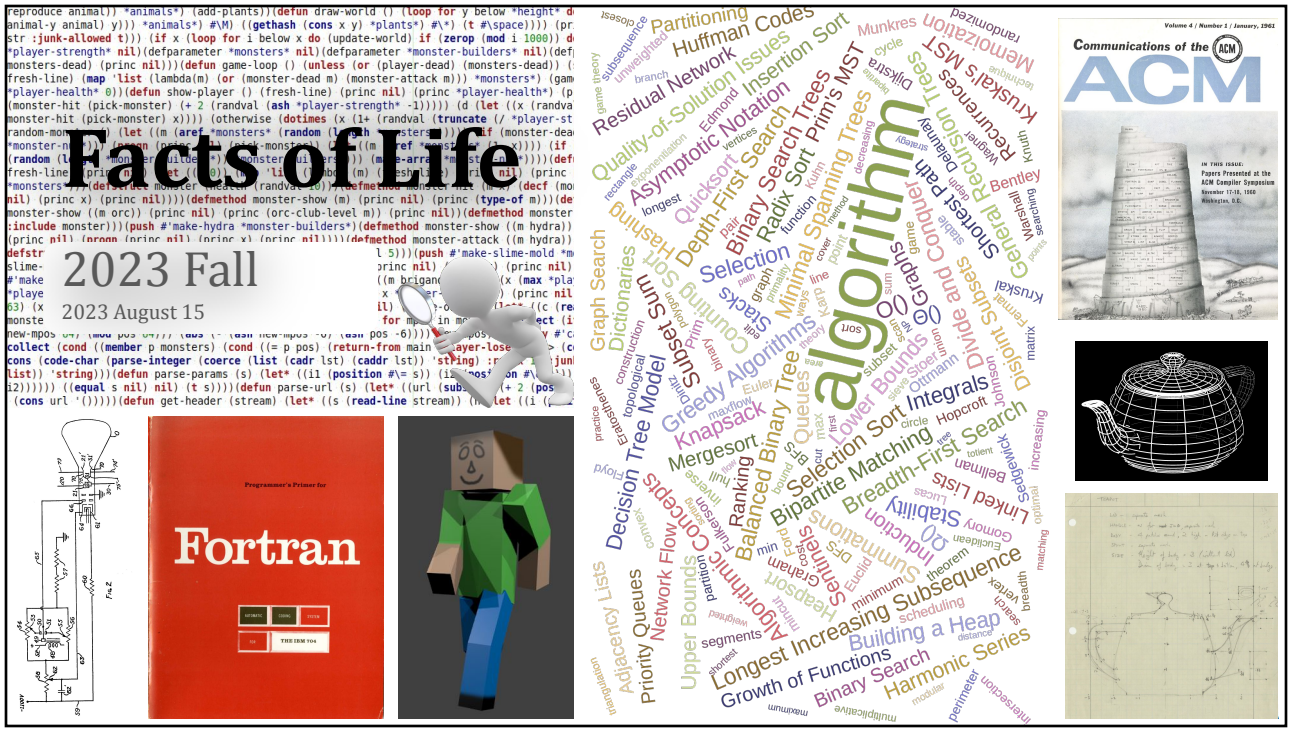


Facts of Life

Simple Mistakes

Simple Mistakes

Aerospace

Mariner 1—1962 July 22

- Venus fly-by mission
- ~18.5M US$ (1962)
  - ~178M US$ (2023)

https://nssdc.gsfc.nasa.gov/image/spacecraft/mariner02.gif

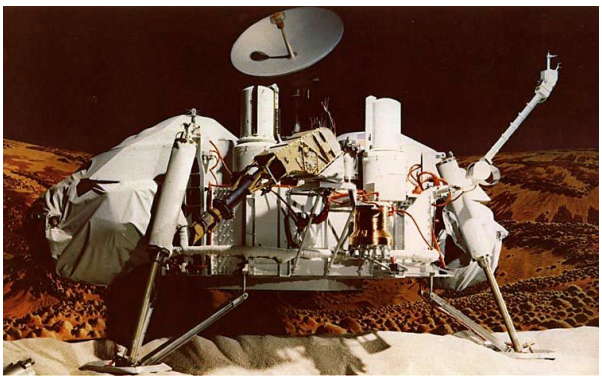
Mariner 1—1962 July 22

- On-board systems began over-correcting for slight variations in flight path.
- Destroyed 293 seconds into the mission.
- A *single character* had been omitted from the translation of hand-written information into program form.

https://nssdc.gsfc.nasa.gov/image/spacecraft/mariner02.gif

Viking 1 Lander—1982 November 19

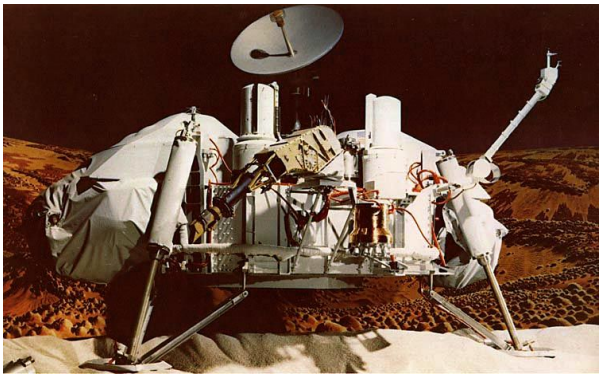
- Mars landing mission
- Entire Viking project ~1B US$ (1975)
  - ~5.4B US$ (2023)



https://nssdc.gsfc.nasa.gov/image/spacecraft/viking_lander_model.jpg

Viking 1 Lander—1982 November 19

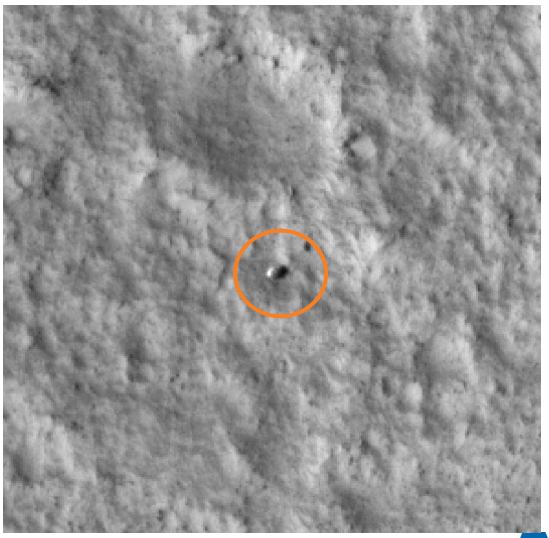
- Worked fine from 1972 July 20.
- A software update 1982 November 19 was written into the *wrong memory location* and broke the antenna aiming software.
- All contact was lost.



https://nssdc.gsfc.nasa.gov/image/spacecraft/viking_lander_model.jpg

Viking 1 Lander

- The Viking 1 lander is still there on Mars, of course. It might even still be trying to transmit, though *in the wrong direction*.
- The Mars Reconnaissance Orbiter took a picture of the Viking 1 lander in November 2006.



https://www.nasa.gov/images/content/163925main_PSP_001521_2025_RED_VL-1_lander.tif

Фобос 1 (Phobos 1)—1988 August 28

- Martian moon mission
- Entire Фобос project ~300M US$ (1988)
  - ~740M US$ (2023)

http://www.russianspaceweb.com/images/spacecraft/planetary/mars/fobos/fobos_1.jpg

Фобос 1 (Phobos 1)—1988 August 28

- About 7 weeks into the mission, a ground operator omitted a *single hyphen character* from a command.
- The new command disabled the craft's attitude thrusters. Its solar array tilted *away* from the Sun. Eventually the batteries were depleted.
- All contact was lost.

http://www.russianspaceweb.com/images/spacecraft/planetary/mars/fobos/fobos_1.jpg

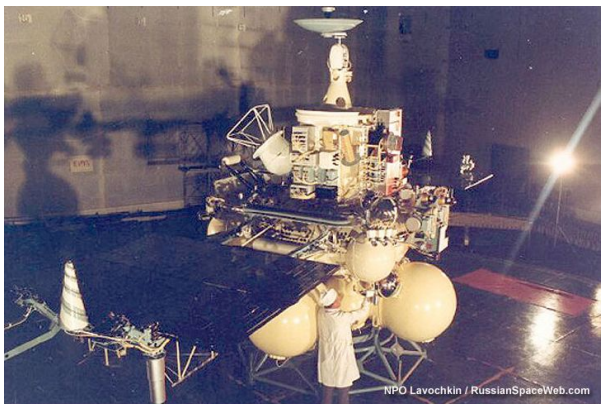
Фобос 1 (Phobos 1)—1988 August 28

- All commands were supposed to be proofed before sending, but the checking computer was not working and the operator forced the send.
- The code to turn off the thrusters was for testing purposes only and should have been deleted before launch.
- The software was in PROMs, though, and to save time they were not reprogrammed.

http://www.russianspaceweb.com/images/spacecraft/planetary/mars/fobos/fobos_1.jpg

Фобос 2 (Phobos 2)—1989 March 27

- Companion craft to Фобос 1.
- By the time it reached Mars, *two of the three* onboard computers were malfunctioning.
- The working computer was helpless as the three computers "voted" on what to do and the failing computers outvoted it.
- All contact was lost.



http://www.russianspaceweb.com/images/spacecraft/planetary/mars/fobos/prototype_assembly_1.jpg

Cluster—1996 June 04

- Earth magnetosphere research mission. Four satellites that were to deploy in a tetrahedral formation.
- ~370M US$ (1996)
  - ~688M US$ (2023)

https://commons.wikimedia.org/wiki/File:Ariane_501_Cluster.svg

Cluster—1996 June 04

- 36.7 seconds into the launch the conversion of a 64-bit FP number to a 16-bit integer caused an overflow.
- Garbage got sent from the Inertial Reference System to the On-Board Computer.
- The OBC mispositioned the engine nozzles which caused the disintegration of the craft.

https://commons.wikimedia.org/wiki/File:Ariane_501_Cluster.svg

Milstar—1999 April 30

- Military communications
- ~800M US$ (1999) for each satellite (doesn't include launch vehicle, etc.)
  - ~1.4B US$ (2023)

https://media.defense.gov/2003/Mar/28/2000031174/-1/-1/0/030328-F-JZ000-059.JPG

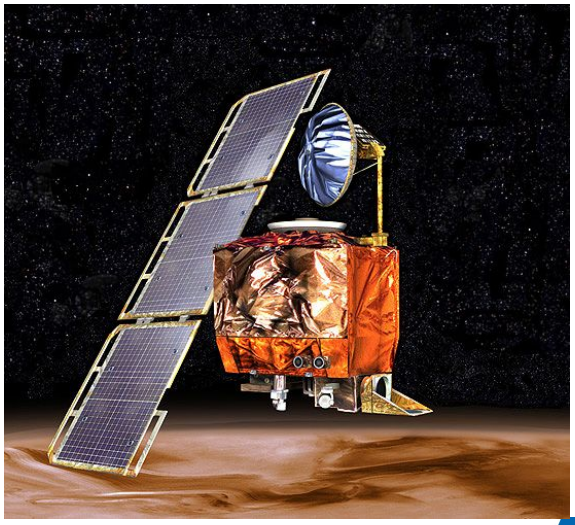
Milstar—1999 April 30

- Five of six satellites were successfully launched. The third launch failed.
- Its Centaur/Titan IV-B launch vehicle fired its roll thrusters open-loop until all fuel was depleted.
- A parameter that should have been `-1.992476` had been entered as `-0.992476`.

https://media.defense.gov/2003/Mar/28/2000031174/-1/-1/0/030328-F-JZ000-059.JPG

Mars Climate Orbiter—1999 September 23

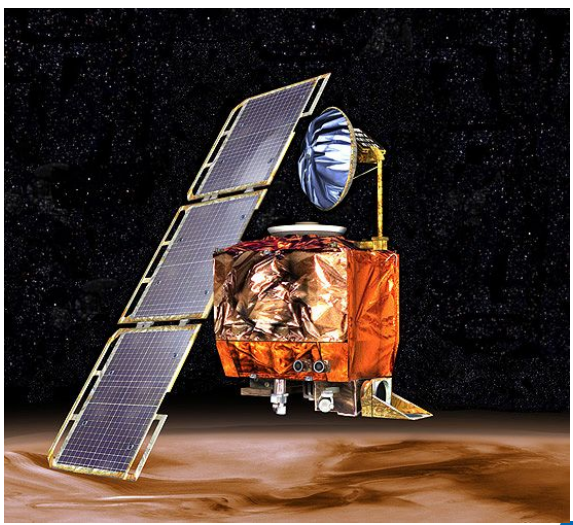
- Martian climate observation from orbit
- ~330M US$ for program (1998)
  - ~591M US$ (2023)



https://nssdc.gsfc.nasa.gov/image/spacecraft/mars98orb.jpg

Mars Climate Orbiter—1999 September 23

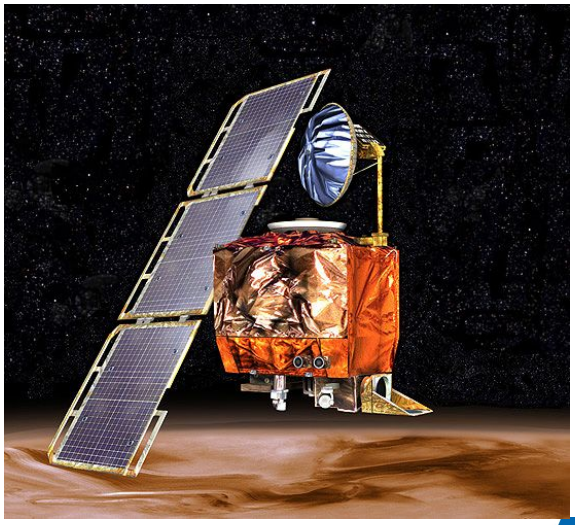
- After 286 days in transit, the craft fired its engine to enter orbit.
- One piece of ground software generated results in “US Customary Units”, another expected input in “SI Units”.
- The orbiter was much closer to Mars than thought, skipped off Mars’ atmosphere, and (probably) entered solar orbit.



https://nssdc.gsfc.nasa.gov/image/spacecraft/mars98orb.jpg

Mars Climate Orbiter—1999 September 23

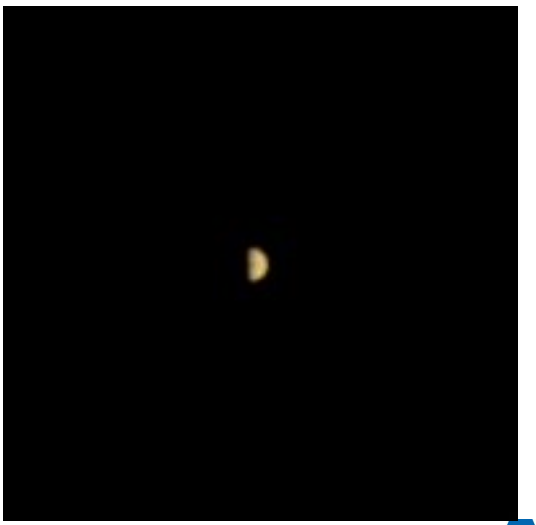
- What makes this failure extra tragic is that the discrepancy between actual and expected position had been noticed at least *twice* before the failure.
- Concerns by personnel had been dismissed because they "did not follow the rules about filling out [the] form to document their concerns".†



†https://spectrum.ieee.org/aerospace/robotic-exploration/why-the-mars-probe-went-off-course
https://nssdc.gsfc.nasa.gov/image/spacecraft/mars98orb.jpg

Mars Climate Orbiter—1999 September 23

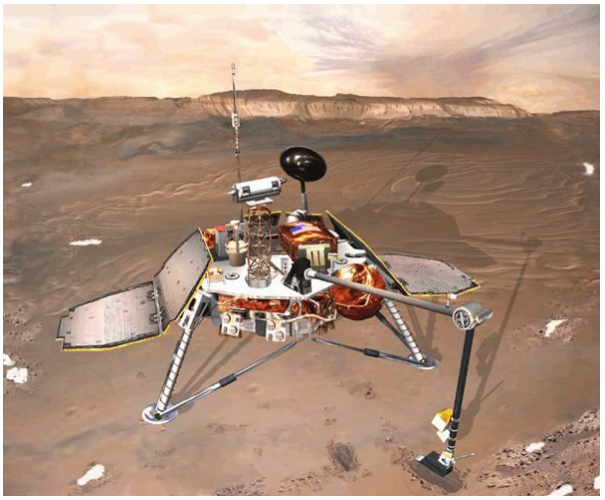
- The Mars Climate Orbiter captured exactly one image on its mission, on 1999 September 7 when it was about 4.5 million km from Mars.
  - Not bad for 600 M$ (2023)! :)



http://photojournal.jpl.nasa.gov/tiff/PIA02330.tif

Mars Polar Lander—1999 December 03

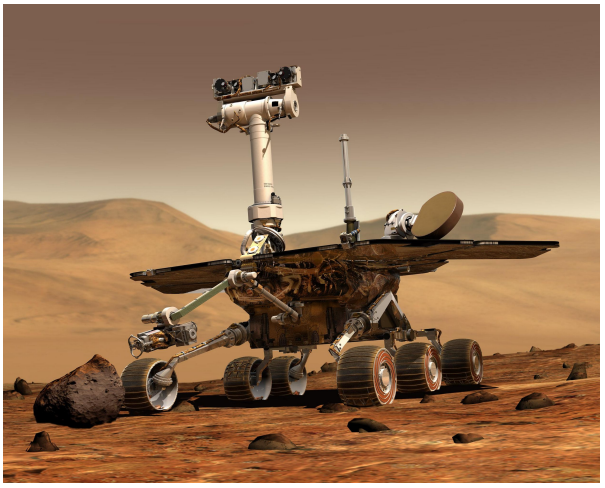
- Surface half of the Mars Climate Orbiter mission
- Deployment of the landing legs generated a false “landed” signal.
- The descent engine shut off at (probably) 40m altitude and the craft crashed.
- Was a “known” problem. A fix had been made, but the tests *were not rerun*.



https://nssdc.gsfc.nasa.gov/image/spacecraft/mars_polar_lander.jpg

Mars Spirit Rover—2004 January 21

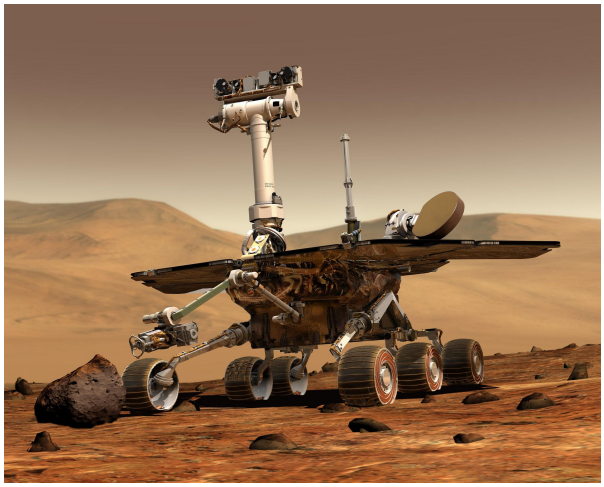
- Mars robot rover mission
- ~400M US$ (2004)
  - ~618M US$ (2023)



https://www.jpl.nasa.gov/missions/web/mer.jpg

Mars Spirit Rover—2004 January 21

- Data was collected in Flash memory. On boot, this was copied to RAM.
- The Flash memory was bigger than the RAM, so eventually this copying overran the RAM, which caused an error.
- On error the unit rebooted, which caused an overrun error and a reboot, which caused an overrun error and a reboot, which …
- Eventually control was restored.



https://www.jpl.nasa.gov/missions/web/mer.jpg

Mars Global Surveyor—2006 June 02

- Mars global mapping mission
- ~220M US$ (1996)
  - ~409M US$ (2023)

https://nssdc.gsfc.nasa.gov/planetary/image/mars_global_surveyor.jpg

Mars Global Surveyor—2006 June 02

- After working fine since 1996 November, a software update in 2005 November incorrectly updated *a single parameter*.
- Supposedly fixed in 2006 June, a mistake in *that* update caused the *wrong memory addresses* to be used.

https://nssdc.gsfc.nasa.gov/planetary/image/mars_global_surveyor.jpg

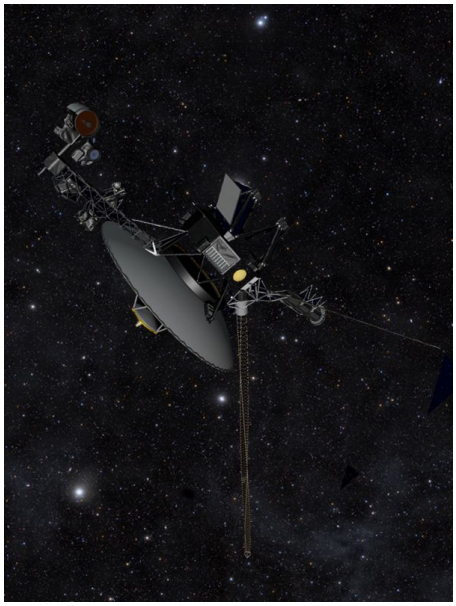
Mars Global Surveyor—2006 June 02

- On 2006 November 06 a routine communication used these *wrong addresses* and turned the craft so that its *sole* working battery was *exposed to direct sunlight*.
- The battery overheated and failed in about 11 hours.

https://nssdc.gsfc.nasa.gov/planetary/image/mars_global_surveyor.jpg

Voyager 2—2023 July 21

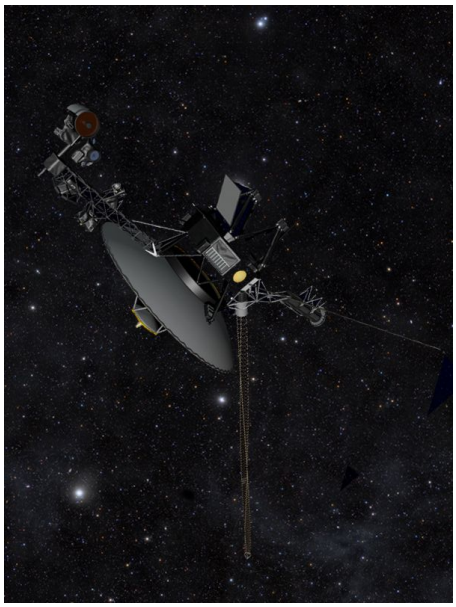
- Outer planets / interstellar space survey craft.
- ~865M US$ (1977) for both Voyager 1 and 2.
  - ~4.6***B*** US$ (2023)



https://photojournal.jpl.nasa.gov/jpeg/PIA17036.jpg

Voyager 2—2023 July 21

- After working fine† since 1977 August, on 2023 July 21 an incorrect command caused the craft to aim its antenna 2° off Earth. Oops!
- The error in the command had been detected and fixed, *but the original wrong command was transmitted*. Oops, oops, oops!

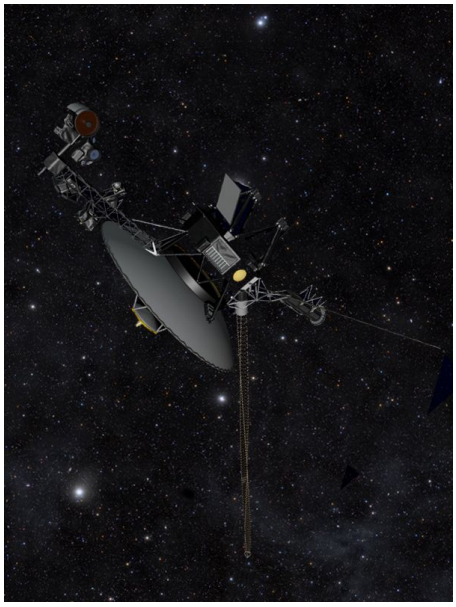


†Well, the primary receiver failed in 1978 but even with a failed capacitor the secondary receiver has been usable.

https://nssdc.gsfc.nasa.gov/planetary/image/mars_global_surveyor.jpg

Voyager 2—2023 July 21

- On August 4, NASA's Deep Space Network "shouted" a command at the craft to force an immediate reorientation. Even off-aligned, the craft heard this command. (Phew!)
- Even if it hadn't the craft automatically reorients several times per year, the next being on October 15. (Smart, eh?)



https://blogs.nasa.gov/sunspot/2023/07/28/mission-update-voyager-2-communications-pause/
https://nssdc.gsfc.nasa.gov/planetary/image/mars_global_surveyor.jpg

Simple Mistakes—Aerospace

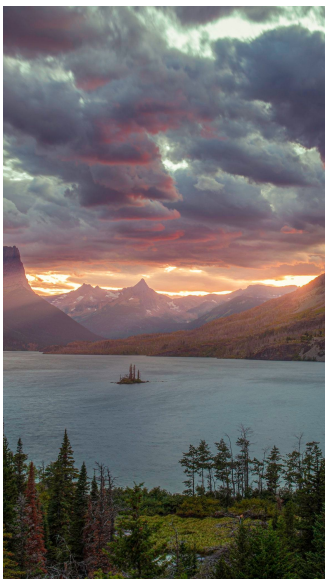
- There are a number of "simple mistakes" listed for various Aerospace endeavors.
- This is *not* because the Aerospace area is more susceptible to error.
- Quite the contrary: Aerospace software overall tends to be written by very smart persons who are very good at what they do.
- More items are listed simply because they tend to be *big* failures that tend to get noticed.
- Further, investigatory bodies tend to get to the bottom of what happened. We simply know more about these failures.

Simple Mistakes

Mobile Phones

Image Soft-Bricks Android—2020 May 30

- Trying to set this image as the background wallpaper “soft-bricks” Android phones.
- First discovered affecting the latest Samsung Galaxy, quickly shown to affect *all* standard Android ≤ 10 phones.
- (Android 11 preview seems OK.)



https://twitter.com/UniverseIce/status/1266943909499826176

Image Soft-Bricks Android—2020 May 30

There's an uncaught exception when setting the wallpaper.
Crash.
Reboot.

There's an uncaught exception when setting the wallpaper.
Crash.
Reboot.

There's an uncaught exception when setting the wallpaper.
Crash.
Reboot.

There's an uncaught exception when setting the wallpaper.
Crash.
Reboot.

...

https://pbs.twimg.com/media/EZU0R8eXkAEMm9l?format=jpg&name=large

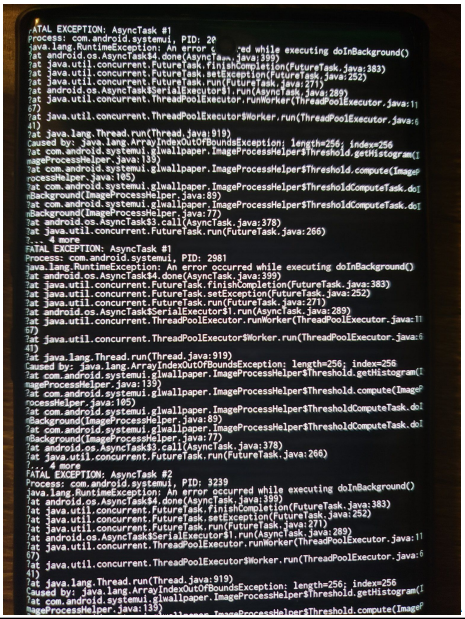


Image Soft-Bricks Android—2020 May 30

- `getHistogram()` doesn't allow a pixel to have an intensity of ≥ 256. (Should it?)

```
129         private int[] getHistogram(Bitmap grayscale) {
130             int width = grayscale.getWidth();
131             int height = grayscale.getHeight();
132
133             // TODO: Fine tune the performance here, tracking on b/123615079.
134             int[] histogram = new int[256];
135             for (int row = 0; row < height; row++) {
136                 for (int col = 0; col < width; col++) {
137                     int pixel = grayscale.getPixel(col, row);
138                     int y = Color.red(pixel) + Color.green(pixel) + Color.blue(pixel);
139                     histogram[y]++;
140                 }
141             }
142
143             return histogram;
144         }
```

https://android.googlesource.com/platform/frameworks/base/+/refs/heads/master/packages/SystemUI/src/com/android/systemui/glwallpaper/ImageProcessHelper.java

Image Soft-Bricks Android—2020 May 30

- It's a one-line fix. (But *why* does this happen?)

```
129         private int[] getHistogram(Bitmap grayscale) {
130             int width = grayscale.getWidth();
131             int height = grayscale.getHeight();
132
133             // TODO: Fine tune the performance here, tracking on b/123615079.
134             int[] histogram = new int[256];
135             for (int row = 0; row < height; row++) {
136                 for (int col = 0; col < width; col++) {
137                     int pixel = grayscale.getPixel(col, row);
138                     int y = Color.red(pixel) + Color.green(pixel) + Color.blue(pixel);
139                     if (y > 255) y = 255;
140                     histogram[y]++;
141                 }
142             }
143
144             return histogram;
145         }
```

https://android-review.googlesource.com/c/platform/frameworks/base/+/1321016/1/packages/SystemUI/src/com/android/systemui/glwallpaper/ImageProcessHelper.java

Simple Mistakes

Insurance

“Double Rounding” Litigation—1995 August 28

- Premiums for automobile insurance were being “double rounded”.
  - E.g., `9.46` rounded to one decimal place is `9.5`. Then rounded to zero decimal places, this becomes `10`.
  - On the other hand, `9.46` directly rounded to zero decimal places is `9`.
- This allowed the insurance companies to collect excess premiums from consumers.

“Double Rounding” Litigation—1995 August 28

- Though this had been “common practice” for quite some time, the statute of limitations restricted the ensuing litigation to only two (2) years of alleged wrongdoing.
- Even so, the insurance companies involved agreed that *tens of millions of dollars* of excess premium had been collected during the litigated period.
- The result was a class action lawsuit on behalf of 4,401,817 policy holders.

“Double Rounding” Litigation—1995 August 28

- The eventual settlement by the insurance companies was for 35,659,878 US$ (1998), or about 64M US$ (2023).
  - This does not include how much the insurance companies spent trying to defend themselves.
- Of that 35,659,878 US$, the attorneys got 10,349,430 US$.
- The remaining 25,310,448 US$ was split amongst the injured parties, who got on average 5.75 US$ each.
  - Hmm. It’s better to be the *lawyer* than the *victim*. :)

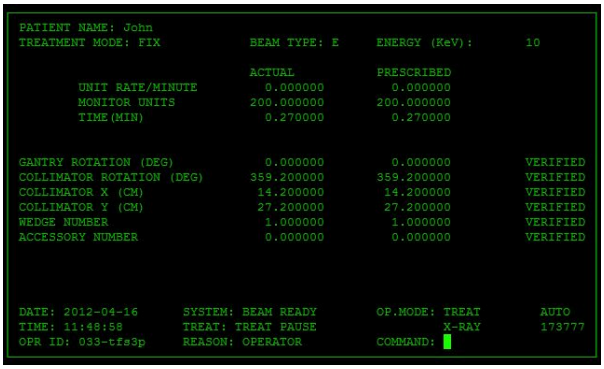
https://www.rand.org/content/dam/rand/pubs/monograph_reports/MR969/MR969.ch10.pdf

Simple Mistakes

Medical

Therac-25—1985 June 03

- The Therac-25 was a radiation therapy device.
- In certain circumstances, it delivered *100x* the intended dose of radiation.



http://sunnyday.mit.edu/papers/therac.pdf
https://commons.wikimedia.org/wiki/File:Therac25_Interface.png

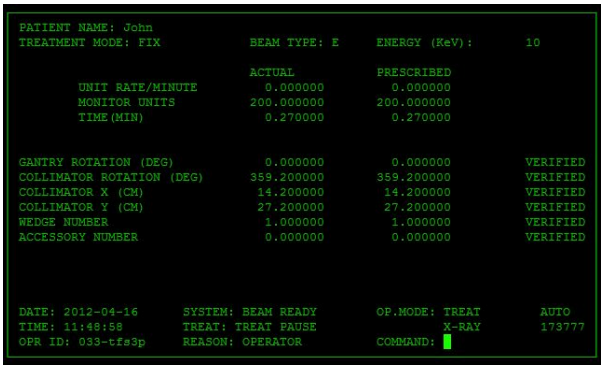
Therac-25—1985 June 03

- Hardware interlocks which prevented this in previous models had been removed in favor of software checks.
- The software had been created by *a single individual who was also responsible for all testing*.
- Later review identified three major contributing factors,
  - Developer overconfidence
  - A lack of a rigorous testing methodology
  - Company history of *ignoring* operator / patient complaints.

http://sunnyday.mit.edu/papers/therac.pdf

Therac-25—1985 June 03

- Three persons died, one was crippled, one would have been crippled but died of something else, one recovered.
- Cost unclear—all lawsuits were settled out-of-court and the details are sealed.



http://sunnyday.mit.edu/papers/therac.pdf
https://commons.wikimedia.org/wiki/File:Therac25_Interface.png

Simple Mistakes

General Software

Bugs …

- The following is a summary of a bug release for a fairly widely-used piece of software.
  - It's been around for *years*.

[redacted] 2.3.0 release

Sun 22 March 2020
By [redacted]
In News.

The [redacted] team is proud to announce the 2.3.0 release of [redacted].

Security related fixes:

- *Double-free vulnerability in* [redacted].
- *Null pointer reference at* [redacted].
- *Integer signedness error.*
- *Using uninitialized variables.*
- *Heap-based buffer overflow.*
- *Double-free in* [redacted].

For full list of changes, see CHANGELOG.md.

This is a recommended update.

You can download the 2.3.0 version of [redacted] from the [redacted].

Check out the full commits list since the previous release.

Simple Mistakes
Financial

Citibank — 2020 August 11

- Citibank was acting as an agent for Revlon, a company that had borrowed about 1.8 *billion* US$ total from a syndicate of lenders.
- An interest payment of about 7.8 *million* US$ was due.
  - The loan itself didn't mature until 2023 September 7.
- In order to pay the interest, Citibank had to "pretend" to be paying off the *entire* loan amount (principal *and* interest) but "redirect" the principal payment back to Citibank.

Citibank — 2020 August 11

- The "`Internal GL`" field is the account number in Citibank's internal general ledger.
- Looks OK, right? The principal payment is set to go to an internal account.
- (Ugly GUI, eh?)

https://arstechnica.com/tech-policy/2021/02/citibank-just-got-a-500-million-lesson-in-the-importance-of-ui-design/
https://www.courtlistener.com/recap/gov.uscourts.nysd.542310/gov.uscourts.nysd.542310.243.0_2.pdf

Citibank — 2020 August 11

- Bzzt! It's *not* OK.
- For whatever bizarre reason, the GUI requires that not only the `PRINCIPAL` box should be checked, but also the `FRONT` and `FUND` boxes.
- Too bad, *all* of the money left Citibank. (893,944,008.52 US$)
  - *And* it came out of Citibank's wallet, *not* Revlon's.
    - The only Revlon money that Citibank had was the 7.8 million US$ for the required interest payment.
  - Oops!

Citibank — 2020 August 11

- Citibank sued in an attempt to get the money back.
- Citibank claimed the recipients should have known it was a mistake and the recipients should return the money.
- The recipients laughed so hard they did themselves multiple internal injuries. They then refused to return the money.
  - Revlon debt was trading at about *40 cents on the dollar*. (!)
- The court case dragged on and eventually the judge ruled …

Citibank — 2020 August 11

The transfers matched — to the penny — the amount of principal and interest outstanding on the loan. The accompanying notices referred to interest being "due," and the only way in which that would have been accurate was if Revlon was making a principal prepayment. And it appears that no mistake of the size or nature of Citibank's had ever happened before. Faced with these circumstances, the Non-Returning Lenders believed, and were justified in believing, that the payments were intentional. Indeed, to believe otherwise — to believe that Citibank, one of the most sophisticated financial institutions in the world, had made a mistake that had never happened before, to the tune of nearly $1 billion — would have been borderline irrational.

Accordingly, and for the reasons discussed above, the Court holds that the August 11th wire transfers at issue were "final and complete transaction[s], not subject to revocation."

https://www.courtlistener.com/recap/gov.uscourts.nysd.542310/gov.uscourts.nysd.542310.243.0_2.pdf

Wells Fargo

- From 2010 April 13 through 2015 October 20, Wells Fargo screwed up whether or not home owners were eligible for mortgage modifications. (5 years, 6 months, 8 days!)
- About 625 families were denied modifications for which they were actually eligible.
- About 400 of those families *lost their homes*.
- Oops!

Wells Fargo

- An expanded review revealed the problem actually occurred from 2010 March 15 through 2018 April 30. (8 years, 1 month, 16 days!)
- Now it's about 870 affected families.
- And about 545 of those families *lost their homes*.
- Oops! Oops! Oops!

Wells Fargo

- So what happened?
- Wells Fargo won't say *exactly* but they do say it was a "calculation error" in a "mortgage loan modification underwriting tool".
- AKA … a ***bug*** in the software!

Wells Fargo

- There are multiple lawsuits pending and at least one class action lawsuit in progress.
- Wells Fargo initially set aside 8 M$ to take care of this but independent observers say it's going to cost plenty more than that.

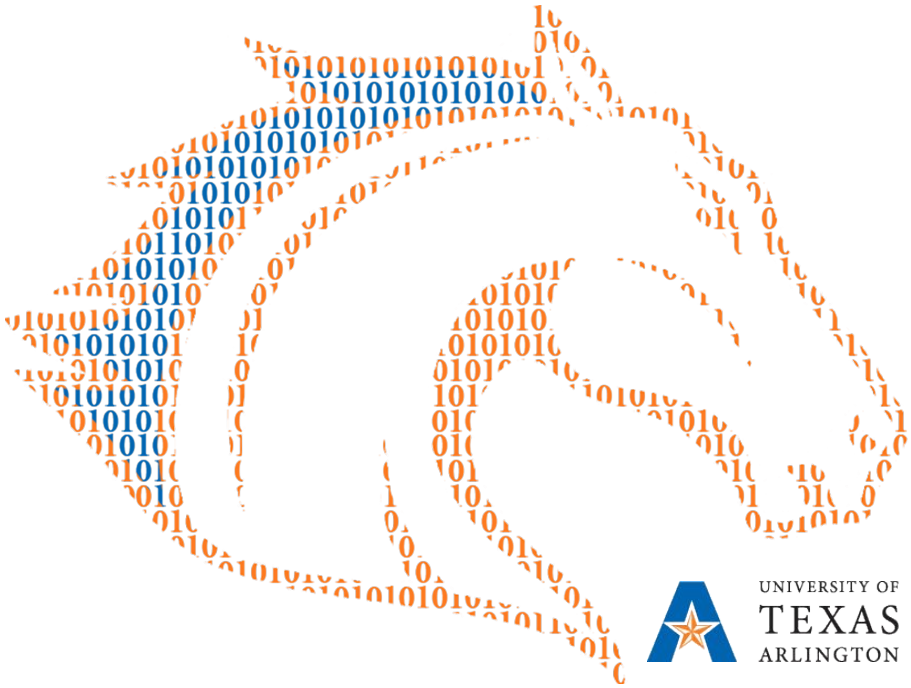
Wells Fargo Form 10-Q for quarter ending 2018 Sep 30, page 6.

- **Mortgage Loan Modifications** An internal review of the Company's use of a mortgage loan modification underwriting tool identified a calculation error regarding foreclosure attorneys' fees affecting certain accounts that were in the foreclosure process between April 13, 2010, and October 2, 2015, when the error was corrected. A subsequent expanded review identified related errors regarding the maximum allowable foreclosure attorneys' fees permitted for certain accounts that were in the foreclosure process between March 15, 2010, and April 30, 2018, when new controls were implemented. Similar to the initial calculation error, these errors caused an overstatement of the attorneys' fees that were included for purposes of determining whether a customer qualified for a mortgage loan modification or repayment plan pursuant to the requirements of government-sponsored enterprises (such as Fannie Mae and Freddie Mac), the Federal Housing Administration (FHA), and the U.S. Department of Treasury's Home Affordable Modification Program (HAMP). Customers were not actually charged the incorrect attorneys' fees. As a result of these errors, taken together and subject to final validation, approximately 870 customers were incorrectly denied a loan modification or were not offered a loan modification or repayment plan in cases where they otherwise would have qualified. In approximately 545 of these instances, after the loan modification was denied or the customer was deemed ineligible to be offered a loan modification or repayment plan, a foreclosure was completed. The Company has contacted a substantial majority of the approximately 870 affected customers to provide remediation and the option also to pursue no-cost mediation with an independent mediator. Attempts to contact the remaining affected customers are ongoing. Also, the Company's review of these matters is ongoing, including a review of its mortgage loan modification tools.

Wells Fargo

- Guess what? It *did* end up costing more than 8 M$.
- After years of litigation and negotiation, Wells Fargo has finally settled with the *Consumer Financial Protection Bureau*.
- The settlement included consumer abuses not only in its mortgage program but also in auto loans and bank accounts.
- Cost? ***3.7 B$!*** (2022) That's "**billion**" with a "**B**"!
- This is on top of another ***3 B$*** penalty in 2020 for other abuses. (Hard to believe, eh?)

https://www.consumeraffairs.com/news/wells-fargo-fined-37-billion-with-2-billion-going-to-customers-122022.html
https://www.consumerfinance.gov/about-us/newsroom/cfpb-orders-wells-fargo-to-pay-37-billion-for-widespread-mismanagement-of-auto-loans-mortgages-and-deposit-accounts/



UNIVERSITY OF TEXAS ARLINGTON | DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Simple Mistakes
QuadrigaCX

[*QuadrigaCX*]

- As more of the QuadrigaCX case unfolds it seems to be more of an out-and-out ***fraud*** rather than a "simple mistake".
- However there's *just enough* "weirdness" to make it an interesting case study.

QuadrigaCX

- QuadrigaCX was a Canadian Cryptocurrency exchange, founded by Gerald Cotten.
- Mr. Cotten died on 2018 December 9 due to complications from Crohn's disease.
- So that's that, right?
  - After all, people die every day.

QuadrigaCX

- No one knows how to unlock the cryptocurrency wallets.
- Mr. Cotten took all the keys with him to the grave.
- He ran the entire *billion dollar enterprise* from his MacBook.
- Various security experts have tried to decrypt the laptop.
  - No success.
- An estimated 190 M$ worth of cryptocurrency is unable to be accessed by anyone.

QuadrigaCX

- On 2019 January 31, QuadrigaCX's board of directors was forced to apply for creditor protection, saying …

> ***"For the past weeks, we have worked extensively to address our liquidity issues, which include attempting to locate and secure our very significant cryptocurrency reserves held in cold wallets, and that are required to satisfy customer cryptocurrency balances on deposit, as well as sourcing a financial institution to accept the bank drafts that are to be transferred to us.***
>
> ***Unfortunately, these efforts have not been successful."***

https://news.sky.com/story/crypto-trader-boss-dies-with-password-to-clients-110m-11628106

QuadrigaCX

- Some clients question whether or not Mr. Cotten is even dead.
  - They are openly speculating it was all an elaborate scam.
  - After all, he "died" (on his *honeymoon*) in Jaipur, India, not in Canada.
  - He wrote his will only *four days* before taking the trip.
  - His funeral was closed casket.
  - His wife didn't announce his death for more than a *month*.
  - QuadrigaCX continued to accept deposits during that month.
    - They didn't honor any withdrawal requests though.
- Lots more (sordid :) details at Amy Castor's detailed timeline:

  https://amycastor.com/2019/02/12/how-the-hell-did-we-get-here-a-timeline-of-quadrigacx-events/

https://www.theglobeandmail.com/world/article-how-did-gerald-cotten-die-a-quadriga-mystery-from-india-to-canada/
https://www.investinblockchain.com/is-quadriga-ceo-actually-dead-or-140-million-exit-scam/

[*QuadrigaCX*]

So what really happened?

QuadrigaCX — Yep, it was *Fraud*

- The *Ontario Securities Commission* investigated QuadrigaCX's business operations.
- Cotten was fraudulently trading for *years*. (At *least* from 2015 through 2018.)
  - He opened accounts using aliases and credited them with fictitious currency and crypto assets.
  - He traded these fictitious assets with unsuspecting clients.
  - He traded badly and suffered severe losses as the prices of crypto currencies shifted, creating shortfalls in excess of 115 M$C. (This "trading" has been characterized as "gambling".)
  - He covered the shortfalls with other clients' real assets.
  - He traded real client assets (without authorization) on at least three external exchanges, losing at least an additional 28 M$C.
- In its last days, QuadrigaCX operated as a classic Ponzi scheme: new deposits were immediately used to cover withdrawals.

Ontario Securities Commission, 2020 April 14: https://www.osc.ca/quadrigacxreport/
https://www.vanityfair.com/news/2019/11/the-strange-tale-of-quadriga-gerald-cotten

QuadrigaCX — Yep, it was *Fraud*

> "What happened at Quadriga was an old-fashioned ***fraud*** wrapped in modern technology. There is nothing new about ***Ponzi*** schemes, unauthorized trading with client funds and misappropriation of assets. Crypto asset trading platforms, however, are novel and the regulatory framework for these platforms is evolving. Quadriga did not consider its business to involve securities trading and it did not register with any securities regulator. This lack of registration facilitated Cotten's ability to commit a large-scale fraud without detection. So did the absence of internal oversight over Cotten. From 2016 onwards, Cotten was in ***sole control*** of a company that had hundreds of thousands of clients and transacted over a billion dollars of fiat currency-denominated assets and over five million crypto asset units. He ran the business as he saw fit, with no proper system of internal oversight or controls or proper books and records."

Ontario Securities Commission, 2020 April 14: https://www.osc.ca/quadrigacxreport/

QuadrigaCX — Yep, it was *Fraud*

- The *Ontario Securities Commission* did not speculate on whether Mr. Cotten is "really" dead.
- To them, it didn't really seem to matter.
- Even if he isn't, he certainly didn't "get away with" millions of dollars in "stolen" cryptocurrency.
- To their satisfaction, they were able to trace what happened and determine that he *lost* it all effectively "gambling" with his clients' money.
  - There didn't seem to be any significant funds "missing".

QuadrigaCX — Yep, it was *Fraud*

- How was he able to get away with this fraud?
- QuadrigaCX operated as an *unregulated* crypto exchange.
  - Many (most? all?) crypto exchanges are unregulated.
  - Many exchanges *brag* about being unregulated.
- You might as well hand over your cash to some random person standing on a street corner …

QuadrigaCX — Now what? 2022 December 19

"More than 100 bitcoins tied to the defunct Canadian crypto exchange QuadrigaCX were transferred out of cold wallets thought to be beyond anyone's control … after sitting dormant for more than three years. The company's bankruptcy trustee, Ernst and Young, did not initiate the transfers …

In total, 104.34 BTC worth around $1.7 million (C$2.4 million) at press time has left Quadriga's wallets. …

In early reports, [Ernst and Young] said that Cotten … was the only person who could access [Quadriga] funds." — *Coindesk*, 2022 Dec 19

- Supposedly only Cotten himself knew the keys required to do transfers from these wallets.
- So is he still alive? Or, *what*?

https://www.coindesk.com/policy/2022/12/19/bitcoin-addresses-tied-to-defunct-canadian-crypto-exchange-quadrigacx-wake-up/
https://www.reddit.com/r/BitcoinCA/comments/zrvqew/more_than_100_bitcoins_linked_to_defunct/

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