Example of Numerical Algorithmic Error

What do you mean, "leap year?"

Oh … so … in some years,
we change by two days of the week?

That's an **example of** a fairly simple
numerical algorithmic error.

Example of Numerical Algorithmic Error

Here's a story about a more complex one…

In the mid-1990s,
◦ US National Labs were moving from
◦ Cray supercomputers to MPPs.*

They wanted some assurance that their
programs produced the same results.

*Massively parallel processors, supercomputers
built from collections of smaller nodes.

Example of Numerical Algorithmic Error

At the Supercomputing conference in 1995
(or maybe it was 1996),
◦ David Abramson presented "differential
  debugging:"
◦ run a program on both machines and
  compare the results visually.

Then he said (paraphrased from memory),
◦ "I didn't write this example code.
◦ I just want to show you how differential
  debugging works."

Example of Numerical Algorithmic Error

As I recall, he showed results from a code that
◦ predicted how smog (air pollution)
◦ changed over time
◦ in the LA basin.

The two machines
◦ produced results of predicted smog
  (parts per million of particulate matter)
◦ that differed by 30%.