Software Failures

From http://www.datareservoir.co.uk/bugs/

Y2K problem

Whilst costing the world economy an estimated $300 billion, to code around the lazy / economical (depending on your point-of-view) programming practice of storing the year portion of dates as two (99) rather than four (1999) digits, the most significant Y2K related failure was not the end of the western world as we know it, but rather the failure of the United States spy satellite system.

US Deputy Defense Secretary John Hamre said the satellites had continued to operate normally but that for two to three hours "we were not able to process information from that system."

Hamre had earlier stated: "The Y2K problem is the electronic equivalent of the El Nino and there will be nasty surprises around the globe."

1994 Intel Pentium microprocessor

An error in the silicon of the new Intel Pentium chip causes software errors when dividing floating-point numbers within a specific range. For example,
4195835.0/3145727.0 = 1.33374
NOT the correct answer 1.33382, an error of 0.006%.
In reality, the bug affects few users, but is a PR disaster. With up to 5 million defective chips sold, understandably, Intel is reluctant to replace faulty chips and offers to replace them for consumers who can prove that they need highly accurate output. Under public pressure, Intel eventually relents and replaces chips for anyone who complains. The eventual cost is $475 million.

1996: Ariane 5 failure

Software code that was used for the Ariane 4 rocket is reused in Ariane 5. Ariane 5 has faster engines than Ariane 4 and this triggers a bug in the arithmetic routine of the flight computer. The error is in an algorithm that converts a 64-bit floating-point number into a 16-bit signed integer. The Ariane 5 engines cause the 64-bit numbers to be larger than previously seen in the Ariane 4, causing an arithmetic overflow that leads to the flight computer crashing. The backup computer crashes and half a second later so does the primary flight computer. Without the flight computers the rocket's primary processor overpowers the engines which disintegrate 40 seconds after launch. BANG!

The Therac-25 Medical Accelerator, a radiation therapy device, delivers lethal radiation doses at several medical facilities. Due to a software bug (a race condition) in the Therac's operating system a quick-fingered typist could accidentally fire the machine in high-power mode with the metal X-ray target out of position, thus delivering lethal doses of radiation. Five patients die soon after treatment and others are seriously injured. Ironically, the faulty software sub-system was a replacement for the older Therac-20's electromechanical safety locks, a redesign made because software was seen as a more reliable solution.