



Software Quality Assurance & Testing

TOPIC 1-LECTURE 3

Adverse Effects of Faulty Software

- ▶ **Communications**: Loss or corruption of communication media, non delivery of data.
- ▶ **Space Applications**: Lost lives, launch delays.
- ▶ **Defense and Warfare**: Misidentification of friend or foe.
- ▶ **Transportation**: Deaths, delays, sudden acceleration, inability to brake.
- ▶ **Safety-critical Applications**: Death, injuries.
- ▶ **Electric Power**: Death, injuries, power outages, long-term health hazards (radiation).

Adverse Effects of Faulty Software (Cont'd)

- ▶ **Money Management:** Fraud, violation of privacy, shutdown of stock exchanges and banks, negative interest rates.
- ▶ **Control of Elections:** Wrong results (intentional or non-intentional).
- ▶ **Control of Jails:** Technology-aided escape attempts and successes, accidental release of inmates, failures in software controlled locks.
- ▶ **Law Enforcement:** False arrests and imprisonments.

Bug in Space Code

- ▶ Project Mercury's FORTRAN code had the following fault:

`DO I=1.10` instead of ... `DO I=1,10`

- ▶ The fault was discovered in an analysis of why the software did not seem to generate results that were sufficiently accurate.
- ▶ The erroneous 1.10 would cause the loop to be executed exactly once!

Military Aviation Problems

- ▶ An F-18 crashed because of a missing exception condition: `if ... then ...` without the `else` clause that was thought could not possibly arise.
- ▶ In simulation, an F-16 program bug caused the virtual plane to flip over whenever it crossed the equator, as a result of a missing minus sign to indicate south latitude.

Shaky Math

- ▶ In the US, five nuclear power plants were shut down in 1979 because of a program fault in a simulation program used to design nuclear reactor to withstand earthquakes.
- ▶ This program fault was, unfortunately, discovered after the power plants were built!

Shaky Math (Cont'd)

- ▶ Apparently, the arithmetic sum of a set of numbers was taken, instead of the sum of the absolute values.
- ▶ The five reactors would probably not have survived an earthquake that was as strong as the strongest earthquake ever recorded in the area.

Making Rupee!

- ▶ An Australian man purchased \$104,500 worth of Sri Lankan Rupees.
- ▶ The next day he sold the Rupees to another bank for \$440,258.
- ▶ The first bank's software had displayed a bogus exchange rate in the Rupee position!
- ▶ A judge ruled that the man had acted without intended fraud and could keep the extra \$335,758!