



Software Quality Assurance & Testing

TOPIC1-LECTURE 2

- What is the **COST** of a bug?

- Failure Example 01

- ▶ Flight Ariane 5

(Most Expensive Computer Bug in History)

On June 4, 1996, the rocket Ariane 5 tore itself apart 37 seconds after launch because of a malfunction in the control software making the fault most expensive computer bug in history.

==> mission critical issue

- Failure Example 02

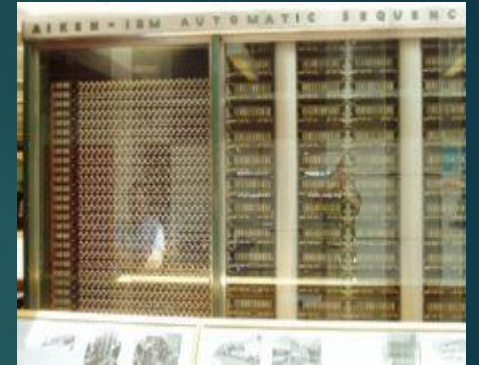
- ▶ Lethal X-Rays :**Therac-25 system**

Therac-25 was a radiation therapy machine produced by Atomic Energy of Canada Limited (AECL) in 1986. But initially lot of people died because of massive overdose of radiation. And this is happen because of a software bug.

==> safety critical issue

What is a computer bug?

- ▶ In 1947 Harvard University was operating a room-sized computer called the Mark II.
 - ▶ mechanical relays
 - ▶ glowing vacuum tubes
 - ▶ technicians program the computer by reconfiguring it
 - ▶ Technicians had to change the occasional vacuum tube.
- ▶ A moth flew into the computer and was zapped by the high voltage when it landed on a relay.
- ▶ Hence, the first computer bug!



Bugs a.k.a. ...

- Defect
- Fault
- Problem
- Error
- Incident
- Anomaly
- Variance
- Failure
- Inconsistency
- Product Anomaly
- Product Incidence

Defective Software

- ▶ We develop programs that contain defects
 - ▶ How many? What kind?
- ▶ Hard to predict the future, however...
it is highly likely, that the software we (including you!) will develop in the future will not be significantly better.

Sources of Problems

- ▶ **Requirements Definition:** Erroneous, incomplete, inconsistent requirements.
- ▶ **Design:** Fundamental design flaws in the software.
- ▶ **Implementation:** Mistakes in chip fabrication, wiring, programming faults, malicious code.
- ▶ **Support Systems:** Poor programming languages, faulty compilers and debuggers, misleading development tools.

Sources of Problems (Cont'd)

- ▶ **Inadequate Testing of Software:** Incomplete testing, poor verification, mistakes in debugging.
- ▶ **Evolution:** Sloppy redevelopment or maintenance, introduction of new flaws in attempts to fix old flaws, incremental escalation to inordinate complexity.