

---

**Software Engineering**

<http://proglang.informatik.uni-freiburg.de/teaching/swt/2005/>

---

## Exercise Sheet 1

Deadline: April 20th, 2005

**Exercise 1 – Software Bugs:**

In the lecture you have seen some disasters caused by software bugs. Search the internet for another bug like this, describe and analyze it:

1. Where/when happened the incident?
2. What kind of bug caused the problem?
3. What triggered the disaster?
4. What was the result?
5. How would you categorize the bug?
6. Was the disaster avertable?
7. How?
8. ...

**Solution:**

On June 4, 1996 an unmanned Ariane 5 rocket launched by the European Space Agency exploded just forty seconds after its lift-off from Kourou, French Guiana. The cause of the failure was a software error in the inertial reference system. Specifically a 64 bit floating point number relating to the horizontal velocity of the rocket with respect to the platform was converted to a 16 bit signed integer. The number was larger than 32.767, the largest integer storeable in a 16 bit signed integer, and thus the conversion failed.

As a result the launcher veered off its flight path, broke up and exploded. The development of the rocket had cost \$7 billion.

The bug can be categorized as a “bad numerics” bug, especially connected to storing or converting a number to an inappropriate format.

There would have been several possibilities to avert this error:

1. If the specification had been more exact on the velocity the rocket may reach, it would have been clear, that a 16 bit integer can not hold the value. The specifications used were those of Ariane 4, which was slower than Ariane 5.

2. If a program converts data from one format to another, the conversions should be protected by extra lines of code that watch for errors and recover gracefully.
3. A backup system failed, because it was implemented in the same way - so if there's a backup system, don't make it identical to the one it shall replace in case of misbehaviour.

**Exercise 2 – subversion:**

1. Find out how to create a new repository. (You can assume that subversion is already installed).
2. A typical problem one encounters while using subversion is the “working copy locked” error. It occurs if a commit or update was interrupted and therefore some locks haven't been removed. How can you remove the locks manually?

**Solution:**

1. To create a repository, you run

```
$ svnadmin create /path/to/repository
```

where `/path/to/repository` is the directory in which the repository is placed.

2. Simply run

```
$ svn cleanup
```

in the locked directory.