

Mestrado em Engenharia Informática: Redes e Multimédia

6938 – Sistemas Distribuídos e Tolerância a Falhas (1º ano / 2º semestre)

2009/2010 - Avaliação:

1 - Trabalho individual sobre uma avaria originada por um ou dois bugs de software. Apresentação de 5 minutos - 1 valor.
Aulas de 9/3, 16/3, 23/3, 6/4 , 13/4.

Após a apresentação, o trabalho (ficheiro fonte) deverá ser enviado para o endereço: pprata-sdtf@di.ubi.pt Deverá também ser entregue uma versão em papel.

Atribuição dos temas (ver numeração em baixo):

Dia 9 de Março:

João Isento – Bug 1 e 17;
Ivo Miguel Lopes – 3 e 19;
João Alfredo Dias – 4 e 20;

Dia 10 de Março:

Fernando Geraldes – 2 e 18;

Dia 16 de Março:

David Bernardo – 5 e 21;
Ricardo Almeida – 6 e 22;
David Monteiro – 7 e 23;
Flávio Amorim – 8, 24;

Dia 23 de Março:

André Esteves – 9 e 25;
Ruben Silva – 10 e 26;
Fábio Campos – 11 e 27;
Rui Cunha – 12 e 28;

Dia 6 de Abril:

Pedro Rato – 13 e 29;
Mauro Ferrão – 14 e 30;
Pedro Pinho – 15 e 31;
Pedro Rosa – 16 e 32;

Dia 13 de Abril:

André Barbosa: 18 e 33;
Marco Ferreira – 19 e 34;

"40 IT failures caused by software bugs"

URL: <http://blogs.zdnet.com/projectfailures/?p=427>

- Some recent major computer system failures caused by software bugs
1. Email services of a major smartphone system were interrupted or unavailable for nine hours in December 2009, the second service interruption within a week, according to news reports. The problems were believed to be due to bugs in new versions of the email system software.
 2. It was reported in August 2009 that a large suburban school district introduced a new computer system that was 'plagued with bugs' and resulted in many students starting the school year without schedules or with incorrect schedules, and many problems with grades. Upset students and parents started a social networking site for sharing complaints.
 3. In February of 2009 users of a major search engine site were prevented from clicking through to sites listed in search results for part of a day. It was reportedly due to software that did not effectively handle a mistakenly-placed "/" in an internal ancillary reference file that was frequently updated for use by the search engine. Users, instead of being able to click thru to listed sites, were instead redirected to an intermediary site which, as a result of the suddenly enormous load, was rendered unusable.
 4. A large health insurance company was reportedly banned by regulators from selling certain types of insurance policies in January of 2009 due to ongoing computer system problems that resulted in denial of coverage for needed medications and mistaken overcharging or cancelation of benefits. The regulatory agency was quoted as stating that the problems were posing "a serious threat to the health and safety" of beneficiaries.
 5. A news report in January 2009 indicated that a major IT and management consulting company was still battling years of problems in implementing its own internal accounting systems, including a 2005 implementation that reportedly "was attempted without adequate testing".
 6. In August of 2008 it was reported that more than 600 U.S. airline flights were significantly delayed due to a software glitch in the U.S. FAA air traffic control system. The problem was claimed to be a 'packet switch' that 'failed due to a database mismatch', and occurred in the part of the system that handles required flight plans.
 7. Software system problems at a large health insurance company in August 2008 were the cause of a privacy breach of personal health information for several hundred thousand customers, according to news reports. It was claimed that the problem was due to software that 'was not comprehensively tested'.
 8. A major clothing retailer was reportedly hit with significant software and system problems when attempting to upgrade their online retailing systems in June 2008. Problems remained ongoing for some time. When the company made their public quarterly financial report, the software and system problems were claimed as the cause of the poor financial results.
 9. Software problems in the automated baggage sorting system of a major airport in February 2008 prevented thousands of passengers from checking baggage for

their flights. It was reported that the breakdown occurred during a software upgrade, despite pre-testing of the software. The system continued to have problems in subsequent months.

10. News reports in December of 2007 indicated that significant software problems were continuing to occur in a new ERP payroll system for a large urban school system. It was believed that more than one third of employees had received incorrect paychecks at various times since the new system went live the preceding January, resulting in overpayments of \$53 million, as well as underpayments. An employees' union brought a lawsuit against the school system, the cost of the ERP system was expected to rise by 40%, and the non-payroll part of the ERP system was delayed. Inadequate testing reportedly contributed to the problems. The school system was still working on cleaning up the aftermath of the problems in December 2009, going so far as to bring lawsuits against some employees to get them to return overpayments.
11. In November of 2007 a regional government reportedly brought a multi-million dollar lawsuit against a software services vendor, claiming that the vendor 'minimized quality' in delivering software for a large criminal justice information system and the system did not meet requirements. The vendor also sued its subcontractor on the project.
12. In June of 2007 news reports claimed that software flaws in a popular online stock-picking contest could be used to gain an unfair advantage in pursuit of the game's large cash prizes. Outside investigators were called in and in July the contest winner was announced. Reportedly the winner had previously been in 6th place, indicating that the top 5 contestants may have been disqualified.
13. A software problem contributed to a rail car fire in a major underground metro system in April of 2007 according to newspaper accounts. The software reportedly failed to perform as expected in detecting and preventing excess power usage in equipment on new passenger rail cars, resulting in overheating and fire in the rail car, and evacuation and shutdown of part of the system.
14. Tens of thousands of medical devices were recalled in March of 2007 to correct a software bug. According to news reports, the software would not reliably indicate when available power to the device was too low.
15. A September 2006 news report indicated problems with software utilized in a state government's primary election, resulting in periodic unexpected rebooting of voter checkin machines, which were separate from the electronic voting machines, and resulted in confusion and delays at voting sites. The problem was reportedly due to insufficient testing.
16. In August of 2006 a U.S. government student loan service erroneously made public the personal data of as many as 21,000 borrowers on it's web site, due to a software error. The bug was fixed and the government department subsequently offered to arrange for free credit monitoring services for those affected.
17. A software error reportedly resulted in overbilling of up to several thousand dollars to each of 11,000 customers of a major telecommunications company in June of 2006. It was reported that the software bug was fixed within days, but that correcting the billing errors would take much longer.
18. News reports in May of 2006 described a multi-million dollar lawsuit settlement paid by a healthcare software vendor to one of its customers. It was reported that the customer claimed there were problems with the software they had contracted for, including poor integration of software modules, and problems that resulted in missing or incorrect data used by medical personnel.
19. In early 2006 problems in a government's financial monitoring software resulted in incorrect election candidate financial reports being made available to the

- public. The government's election finance reporting web site had to be shut down until the software was repaired.
20. Trading on a major Asian stock exchange was brought to a halt in November of 2005, reportedly due to an error in a system software upgrade. The problem was rectified and trading resumed later the same day.
 21. A May 2005 newspaper article reported that a major hybrid car manufacturer had to install a software fix on 20,000 vehicles due to problems with invalid engine warning lights and occasional stalling. In the article, an automotive software specialist indicated that the automobile industry spends \$2 billion to \$3 billion per year fixing software problems.
 22. Media reports in January of 2005 detailed severe problems with a \$170 million high-profile U.S. government IT systems project. Software testing was one of the five major problem areas according to a report of the commission reviewing the project. In March of 2005 it was decided to scrap the entire project.
 23. In July 2004 newspapers reported that a new government welfare management system in Canada costing several hundred million dollars was unable to handle a simple benefits rate increase after being put into live operation. Reportedly the original contract allowed for only 6 weeks of acceptance testing and the system was never tested for its ability to handle a rate increase.
 24. Millions of bank accounts were impacted by errors due to installation of inadequately tested software code in the transaction processing system of a major North American bank, according to mid-2004 news reports. Articles about the incident stated that it took two weeks to fix all the resulting errors, that additional problems resulted when the incident drew a large number of e-mail phishing attacks against the bank's customers, and that the total cost of the incident could exceed \$100 million.
 25. A bug in site management software utilized by companies with a significant percentage of worldwide web traffic was reported in May of 2004. The bug resulted in performance problems for many of the sites simultaneously and required disabling of the software until the bug was fixed.
 26. According to news reports in April of 2004, a software bug was determined to be a major contributor to the 2003 Northeast blackout, the worst power system failure in North American history. The failure involved loss of electrical power to 50 million customers, forced shutdown of 100 power plants, and economic losses estimated at \$6 billion. The bug was reportedly in one utility company's vendor-supplied power monitoring and management system, which was unable to correctly handle and report on an unusual confluence of initially localized events. The error was found and corrected after examining millions of lines of code.
 27. In early 2004, news reports revealed the intentional use of a software bug as a counter-espionage tool. According to the report, in the early 1980's one nation surreptitiously allowed a hostile nation's espionage service to steal a version of sophisticated industrial software that had intentionally-added flaws. This eventually resulted in major industrial disruption in the country that used the stolen flawed software.
 28. A major U.S. retailer was reportedly hit with a large government fine in October of 2003 due to web site errors that enabled customers to view one another's online orders.
 29. News stories in the fall of 2003 stated that a manufacturing company recalled all their transportation products in order to fix a software problem causing instability in certain circumstances. The company found and reported the bug itself and initiated the recall procedure in which a software upgrade fixed the problems.

30. In August of 2003 a U.S. court ruled that a lawsuit against a large online brokerage company could proceed; the lawsuit reportedly involved claims that the company was not fixing system problems that sometimes resulted in failed stock trades, based on the experiences of 4 plaintiffs during an 8-month period. A previous lower court's ruling that "...six miscues out of more than 400 trades does not indicate negligence." was invalidated.
31. In April of 2003 it was announced that a large student loan company in the U.S. made a software error in calculating the monthly payments on 800,000 loans. Although borrowers were to be notified of an increase in their required payments, the company will still reportedly lose \$8 million in interest. The error was uncovered when borrowers began reporting inconsistencies in their bills.
32. News reports in February of 2003 revealed that the U.S. Treasury Department mailed 50,000 Social Security checks without any beneficiary names. A spokesperson indicated that the missing names were due to an error in a software change. Replacement checks were subsequently mailed out with the problem corrected, and recipients were then able to cash their Social Security checks.
33. In March of 2002 it was reported that software bugs in Britain's national tax system resulted in more than 100,000 erroneous tax overcharges. The problem was partly attributed to the difficulty of testing the integration of multiple systems.
34. A newspaper columnist reported in July 2001 that a serious flaw was found in off-the-shelf software that had long been used in systems for tracking certain U.S. nuclear materials. The same software had been recently donated to another country to be used in tracking their own nuclear materials, and it was not until scientists in that country discovered the problem, and shared the information, that U.S. officials became aware of the problems.
35. According to newspaper stories in mid-2001, a major systems development contractor was fired and sued over problems with a large retirement plan management system. According to the reports, the client claimed that system deliveries were late, the software had excessive defects, and it caused other systems to crash.
36. In January of 2001 newspapers reported that a major European railroad was hit by the aftereffects of the Y2K bug. The company found that many of their newer trains would not run due to their inability to recognize the date '31/12/2000'; the trains were started by altering the control system's date settings.
37. News reports in September of 2000 told of a software vendor settling a lawsuit with a large mortgage lender; the vendor had reportedly delivered an online mortgage processing system that did not meet specifications, was delivered late, and didn't work.
38. In early 2000, major problems were reported with a new computer system in a large suburban U.S. public school district with 100,000+ students; problems included 10,000 erroneous report cards and students left stranded by failed class registration systems; the district's CIO was fired. The school district decided to reinstate its original 25-year old system for at least a year until the bugs were worked out of the new system by the software vendors.
39. A review board concluded that the NASA Mars Polar Lander failed in December 1999 due to software problems that caused improper functioning of retro rockets utilized by the Lander as it entered the Martian atmosphere.
40. In October of 1999 the \$125 million NASA Mars Climate Orbiter spacecraft was believed to be lost in space due to a simple data conversion error. It was determined that spacecraft software used certain data in English units that should have been in metric units. Among other tasks, the orbiter was to serve as a communications relay for the Mars Polar Lander mission, which failed for

- unknown reasons in December 1999. Several investigating panels were convened to determine the process failures that allowed the error to go undetected.
41. Bugs in software supporting a large commercial high-speed data network affected 70,000 business customers over a period of 8 days in August of 1999. Among those affected was the electronic trading system of the largest U.S. futures exchange, which was shut down for most of a week as a result of the outages.
 42. In April of 1999 a software bug caused the failure of a \$1.2 billion U.S. military satellite launch, the costliest unmanned accident in the history of Cape Canaveral launches. The failure was the latest in a string of launch failures, triggering a complete military and industry review of U.S. space launch programs, including software integration and testing processes. Congressional oversight hearings were requested.
 43. A small town in Illinois in the U.S. received an unusually large monthly electric bill of \$7 million in March of 1999. This was about 700 times larger than its normal bill. It turned out to be due to bugs in new software that had been purchased by the local power company to deal with Y2K software issues.
 44. In early 1999 a major computer game company recalled all copies of a popular new product due to software problems. The company made a public apology for releasing a product before it was ready.
 45. The computer system of a major online U.S. stock trading service failed during trading hours several times over a period of days in February of 1999 according to nationwide news reports. The problem was reportedly due to bugs in a software upgrade intended to speed online trade confirmations.
 46. In April of 1998 a major U.S. data communications network failed for 24 hours, crippling a large part of some U.S. credit card transaction authorization systems as well as other large U.S. bank, retail, and government data systems. The cause was eventually traced to a software bug.
 47. January 1998 news reports told of software problems at a major U.S. telecommunications company that resulted in no charges for long distance calls for a month for 400,000 customers. The problem went undetected until customers called up with questions about their bills.
 48. In November of 1997 the stock of a major health industry company dropped 60% due to reports of failures in computer billing systems, problems with a large database conversion, and inadequate software testing. It was reported that more than \$100,000,000 in receivables had to be written off and that multi-million dollar fines were levied on the company by government agencies.
 49. A retail store chain filed suit in August of 1997 against a transaction processing system vendor (not a credit card company) due to the software's inability to handle credit cards with year 2000 expiration dates.
 50. In August of 1997 one of the leading consumer credit reporting companies reportedly shut down their new public web site after less than two days of operation due to software problems. The new site allowed web site visitors instant access, for a small fee, to their personal credit reports. However, a number of initial users ended up viewing each others' reports instead of their own, resulting in irate customers and nationwide publicity. The problem was attributed to "...unexpectedly high demand from consumers and faulty software that routed the files to the wrong computers."
 51. In November of 1996, newspapers reported that software bugs caused the 411 telephone information system of one of the U.S. RBOC's to fail for most of a day. Most of the 2000 operators had to search through phone books instead of using their 13,000,000-listing database. The bugs were introduced by new

software modifications and the problem software had been installed on both the production and backup systems. A spokesman for the software vendor reportedly stated that 'It had nothing to do with the integrity of the software. It was human error.'

52. On June 4 1996 the first flight of the European Space Agency's new Ariane 5 rocket failed shortly after launching, resulting in an estimated uninsured loss of a half billion dollars. It was reportedly due to the lack of exception handling of a floating-point error in a conversion from a 64-bit integer to a 16-bit signed integer.
53. Software bugs caused the bank accounts of 823 customers of a major U.S. bank to be credited with \$924,844,208.32 each in May of 1996, according to newspaper reports. The American Bankers Association claimed it was the largest such error in banking history. A bank spokesman said the programming errors were corrected and all funds were recovered.
54. In August 1991 the concrete base structure for a North Sea oil platform imploded and sank off the coast of Norway, reportedly due to errors in initially-used design software. The enormous structure, on hitting the seabed, reportedly was detected as a magnitude 3.0 seismic event and resulted in a loss of \$700 million. The base structure was eventually redesigned and the full platform was completed two years later, and was still in use as of 2008.
55. On January 1 1984 all computers produced by one of the leading minicomputer makers of the time reportedly failed worldwide. The cause was claimed to be a leap year bug in a date handling function utilized in deletion of temporary operating system files. Technicians throughout the world worked for several days to clear up the problem. It was also reported that the same bug affected many of the same computers four years later.
56. Software bugs in a Soviet early-warning monitoring system nearly brought on nuclear war in 1983, according to news reports in early 1999. The software was supposed to filter out false missile detections caused by Soviet satellites picking up sunlight reflections off cloud-tops, but failed to do so. Disaster was averted when a Soviet commander, based on what he said was a '...funny feeling in my gut', decided the apparent missile attack was a false alarm. The filtering software code was rewritten.