

CSE-4805 || Computer Ethics || Final Term Note

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Part-A**Segment-4****Question| What is the Therac-25 & what was incident happened about it? Write the case study of Therac-25 for this incident.**

Answer: The Therac-25 was a software-controlled radiation-therapy machine used to treat people with cancer. Between 1985 and 1987, Therac-25 machines at four medical centres gave massive overdoses of radiation to six patients. In some cases, the operator repeated an overdose because the machine's display said that no dose had been given. Medical personnel later estimated that some patients received between 13,000 and 25,000 rads," where the intended dose was in the 100-200 rad range. These incidents caused severe and painful injuries and the deaths of three patients.

Case Study:**Software and Design problems:**

Re-used software from older systems, unaware of bugs in previous software. Weaknesses in design of operator interface. There were bugs in software. Allowed beam to deploy when table not in proper position. Ignored changes and corrections operators made at console.

Observations and Perspective:

Minor design and implementation errors usually occur in complex systems, they are to be expected. The problems in the Therac-25 case were not minor and suggest irresponsibility. Accidents occurred on other radiation treatment equipment without computer controls when the technicians:

- Left a patient after treatment started to attend a party.
- Did not properly measure the radioactive drugs.
- Confused micro-curies and milli-curies.

AU-21|1.a| Assume that the family of one of the victims of the Therac-25 has filed 10 three lawsuits. They are suing a hospital that used the machine, the company that made the machine (AECL), and the programmer who wrote the Therac-25 software. As a programmer what you will do?

Answer: As a programmer who is hypothetically being sued in association with the Therac-25 incidents, the following steps should be considered:

1. **Legal Counsel:** Immediately seek expert legal advice.

2. **Documentation:** Gather all relevant documentation including:

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| - Software design documents | - Test plans and test results |
| - Code repositories | - Documentation of known bugs and the steps taken to solve them |
| - Version control history | |
| - Communication with the employer and clients | |

3. **Communication:** Public statements can be used in court and it is best to let your attorney handle all communication.

4. **Insurance:** Check if there is professional liability that might needed for legal defence and any possible settlements or judgments.

5. **Expert Witnesses:** Your attorney might want to employ expert witnesses in the field of software engineering, specifically those with experience in safety-critical systems, to testify about the complexity of software development.

6. **Review the Allegations:** With your attorney, carefully review each lawsuit's allegations for elements such as duty of care, breach, causation, and damages.

7. **Emotional Support:** Consider seeking emotional and psychological support, as being involved in a lawsuit, particularly one as serious as this, is a major stressor.

SP-22|1.b| Discuss few current cases similar with Therac-25. Give some remedies to overcome from such cases in future.

Answer: There are no specific cases that have gained as much notoriety as the Therac-25 accidents that occurred in the 1980s, but few cases from different periods that, while not directly similar to the Therac-25 incidents, do involve similar themes of technology-driven risk:

1. **Boeing 737 MAX crashes:** The two fatal crashes involving the Boeing 737 MAX, Lion Air Flight 610 and Ethiopian Airlines Flight 302, were linked to the Manoeuvring Characteristics Augmentation System (MCAS). The MCAS was designed to activate based on input from a single angle of attack sensor, which, in these cases, provided wrong data, leading the system to forcefully and repeatedly push the nose of the plane down.

2. **St. Jude Medical's cardiac devices:** These devices were found to have vulnerabilities that could potentially allow a hacker to consume the. This raised concerns about the cybersecurity of insert medical devices.

3. **Volkswagen emissions scandal:** this case involved Volkswagen cars equipped with software that could detect when they were undergoing official emissions testing and alter the performance accordingly to improve results. While not a safety issue per se, it was a massive ethics and compliance failure with indirect health implications due to increased pollution.

To overcome such cases in the future, here are some remedies and best practices:

1. **Testing and Verification:** Implement comprehensive testing procedures, including static code analysis, dynamic testing, and formal methods where appropriate, to ensure that software behaves correctly under all conditions.
2. **Redundancy and Fail-Safes:** Critical systems should have redundancy, or fail-safes, so that if one component fails, others will prevent a catastrophe. For example, in the case of the Boeing 737 MAX.
3. **Ethical Design and Corporate Responsibility:** Incorporate ethical considerations into the design and development process and establish a culture of responsibility.
4. **Cybersecurity Measures:** For connected devices, robust cybersecurity protocols are essential to protect against unauthorized access and tampering.
5. **User Training and Error Reporting:** Users of complex systems should be trained, and there should be clear protocols for reporting and addressing potential errors.

Question| What are the Increasing Reliability and Safety?**Answer:****Professional techniques:**

- Importance of good software engineering and professional responsibility.
- Redundancy and self-checking.
- Testing: Include real world testing with real users.

Law, Regulation and Markets:

- Criminal and civil penalties: Provide incentives to produce good systems, but shouldn't inhibit innovation.
- Warranties for consumer software: Most are sold 'as-is'.
- Regulation for safety-critical applications.
- Professional licensing: Arguments for and against.
- Taking responsibility.

Write about Dependence, Risk and Progress?

Answer: *Dependence:* Computers are tools, they are not the only dependence, they also depend on electricity.

Risk and Progress:

- Many new technologies were not very safe when they were first developed.
- We develop and improve new technologies in response to accidents and disasters.
- We should compare the risks of using computers with the risks of other methods and the benefits to be gained.

Segment-5**Question| Discuss the difference between copyright and patent.****Answer:**

Copyright	Patent
A bundle of rights granted to the creator of original work, which excludes others from performing, selling or producing the work, is known as Copyright	A legal grant given by the government to the inventor which excludes others from making, utilizing or trading the invention for a set period, is called a patent
Covers artistic and literary/writers works	Covers inventions
Copyright protection is automatic, no formality is required	Patent protection requires registration
Excludes Others from copying or trading the product	Excludes others from manufacturing or using the product
Subject matter is expression	Subject matter is ideas
Copyright, in general, is granted for 60 years	Patent is granted for 20 years

AU-22|2.b| How does new technology threaten the protection of copyrighted materials?

- The emergence of digital technologies towards the concluding decades of the twentieth century raised a whole new set of challenges to copyright regimes.
- All works can now be digitalized whether they comprise texts, images, sound or diagrams.
- Once digitalized the various elements such as images are all 'equal' and can be merged, transformed, manipulated or mixed to create an endless variety of new works.
- With the advent of the digital environment, the access, use, duplication or modification of the original work has become really easy
- Digital environment has created a platform for people for widespread cost-effective distribution of the original works, posing serious threats to the interest of the creator.
- With the emergence of the Internet and increasing use of the world wide web possibilities of infringement of copyright have become mind boggling free and easy.
- Taking content from one site, modifying it or just reproducing it on another site has been made possible by digital technology.
- Piracy occurs when copyrighted software is made available to users to download without the express permission of the copyright owner. Such illegal software is offered over online sources
- Piracy hampers creativity, hinders/decrease the development of new software and local software industry and ultimately effects e-commerce.

Question| Define Software piracy and Intellectual property.

Answer: The term "piracy" describes the act of reproducing copyrighted works without permission from the copyright owner. **Software piracy** is a term that is frequently used to describe the illegal copying, distribution or use of computer software in violation of its license (commonly referred to as an end user licensing agreement or EULA). Most software programs purchased are licensed for use by just one user or at just one computer site. Moreover, when someone buys software, he or she is known as a "licensed user" rather than as an owner of the software.

Intellectual property:

Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce. Intellectual property rights (IPRs) are the rights granted to the creators of Intellectual property, and include trademarks, copyright, patents, industrial design rights, and in some jurisdictions trade secrets. Artistic works including music and literature, as well as discoveries, inventions, software, words, phrases, symbols, and designs can all be protected as intellectual property. The key to understanding intellectual property protection is to understand that the thing protected is the intangible creative work—not its particular physical form.

Question| Describe the benefits of copyright protection.

1. Copyright protection provides a vital incentive/security for the creation of many intellectual works.
2. Without copyright protection, it would be easy for others to exploit/use these works without paying any royalties or remuneration to the owner of the work.
3. Copyright encourages enterprise and creates a favourable climate to stimulate economic activity.
4. Copyright protection provides benefits in the form of economic rights which entitle the creators to control use of their literary and artistic material and to obtain an appropriate economic reward.
5. Creators can therefore be rewarded for their creativity and investment.
6. Copyright also gives moral rights to the creator. An author's right to object to the modification of his or her work is known as an integrity right.

Note Regarding Question: *jototuku khobor jani j question besirbag analytical hbe, I mean topics buja lagbe- tailei answer kra jabe. So this notes covers all topics suggested by Arfanul Islam sir and also some previous questions.*

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Sorowar Mind kriona, Mind krle Shine krte parbana, hihhehehehe!

Thank You. Assalamualaikum Waa Rahmatullah.