

Fault tree analysis

Practice in the course "Software Quality and Standards"

The latest version is on [Moodle](#) course "Software quality (Tarkvara kvaliteet)" and on tepani.ee

Understand, propose, build, evaluate, and use a simple fault tree

1. Analyse the Projector Lamp Outage fault tree ([http://tepani.ee/Jaak Tepandi Sw QS 13.pdf](http://tepani.ee/Jaak_Tepandi_Sw_QS_13.pdf))
2. Analyse the attack tree for attacking a server in the server room (Fig 1.3 from PhD Thesis by A. Jürgenson on <https://digi.lib.ttu.ee/i/?496>)
3. Propose a problem for fault tree analysis
 - 3.1. Select a critical task
 - 3.2. Understand the system
 - 3.3. Define the undesired outcome that should be avoided
4. Build a simple fault tree
 - 4.1. The undesired outcome is the root
 - 4.2. And-Or tree
 - 4.3. Probabilities are assigned to the causing effects (leaves)
5. Evaluate the fault tree
 - 5.1. What is the accepted probability of the undesired outcome?
 - 5.2. What is the expected probability of the undesired outcome according to the fault tree?
 - 5.3. Is the expected outcome acceptable?
6. Propose modifications to the system
 - 6.1. Which causing effects are the most influential?
 - 6.2. Can they be changed?
 - 6.3. Propose the most cost-effective changes to the system

Use a fault tree analysis application

7. Download and install demo version of the fault tree analysis software TopEvent FTA 2016: <http://www.topeventfta.com/download>
8. Work with provided examples
 - 8.1. Understand the Pressure Tank Example (Fig 10-1 on p. 113, simplified tree Fig 10-14 on p. 124 of <http://www.hq.nasa.gov/office/codeq/doctree/fthb.pdf>)
 - 8.2. Open the *NASA Pressure Tank Example.tefta* (provided with the downloaded TopEvent FTA 2016 zip-file)

- 8.3. Compare the fault tree (*E1* on leftmost menu) and the fault tree on Fig 10-14
- 8.4. Add evaluations (*E1 Classical Evaluation* on the leftmost menu)
- 8.5. Analyse the results (*Fault Tree* under *E1 Classical Evaluation* on the leftmost menu). Compare resulting probabilities of AND/OR nodes
9. Solve a task from points 1-3 above with this software
 - 9.1. Does the software enables building the fault tree?
 - 9.2. Does the software provides the analysis capabilities?
10. Propose and analyse a more complex task
11. More examples of fault tree analysis software:
<https://www.smartdraw.com/downloads/>
 - 11.1. Solve the above task with this software
 - 11.2. Does the software enables building the fault tree?
 - 11.3. Does the software provides the analysis capabilities?