IT 303
Assignment 1

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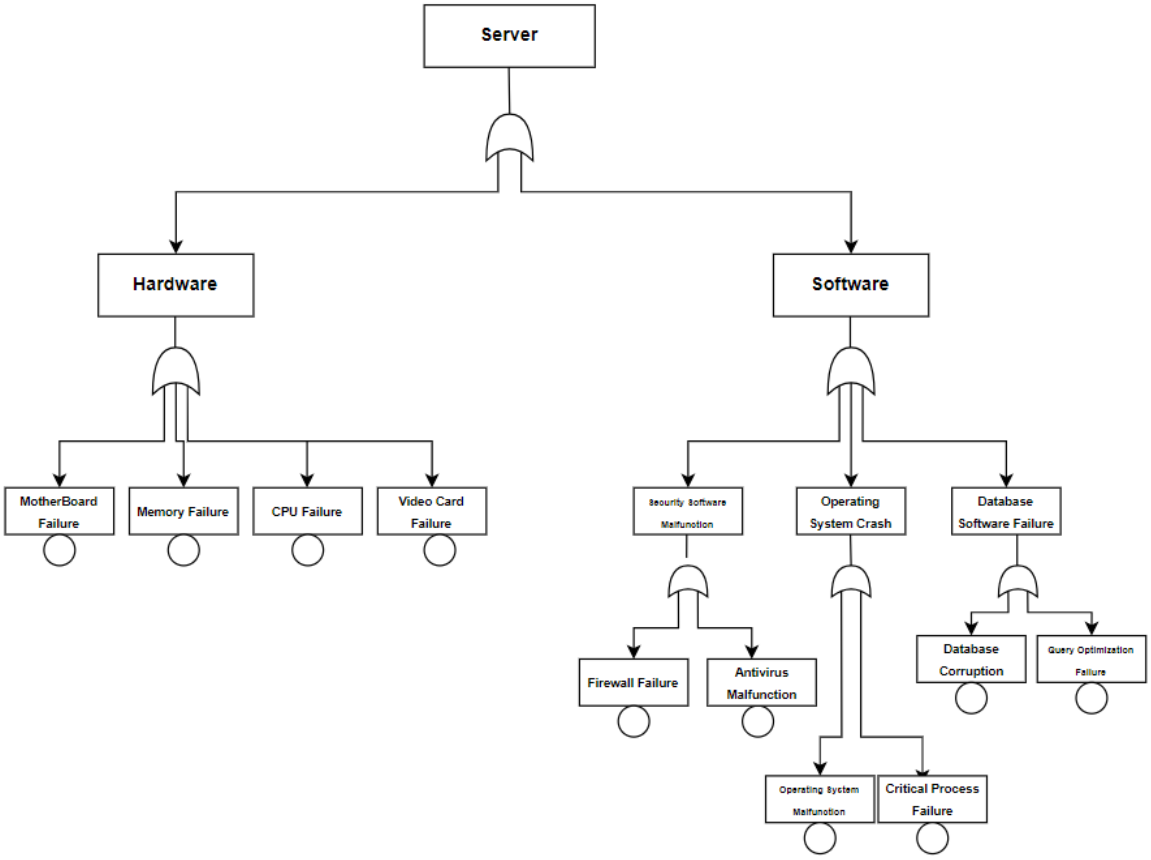
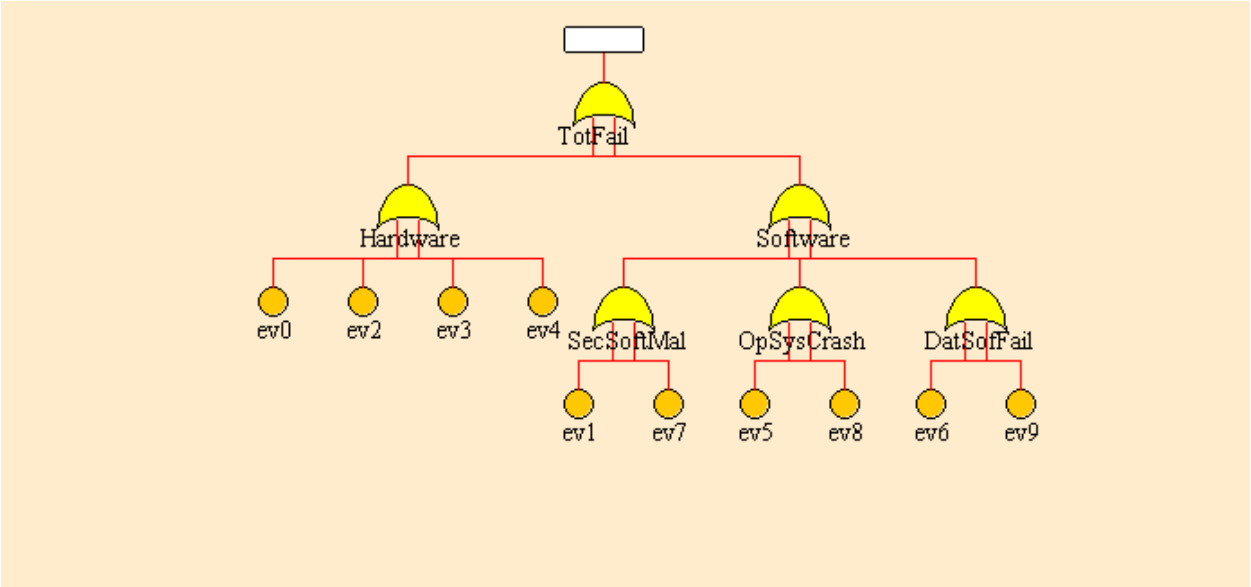
Question Statement: Implementation of Fault Tree Analysis (FTA), RBD, of Safety critical system using Sharpe tool. Evaluate the qualitative and quantitative analysis.

1. Server

(i) Plotting Fault Tree for Server



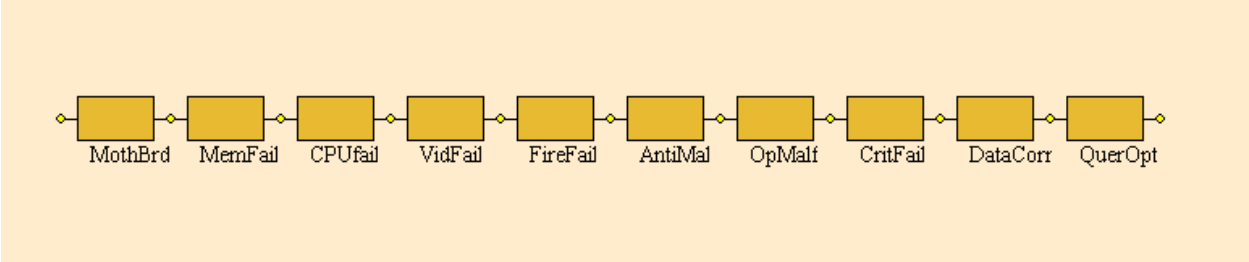
(ii) Fault Tree Analysis using Sharpe Tool*



Events glossary :

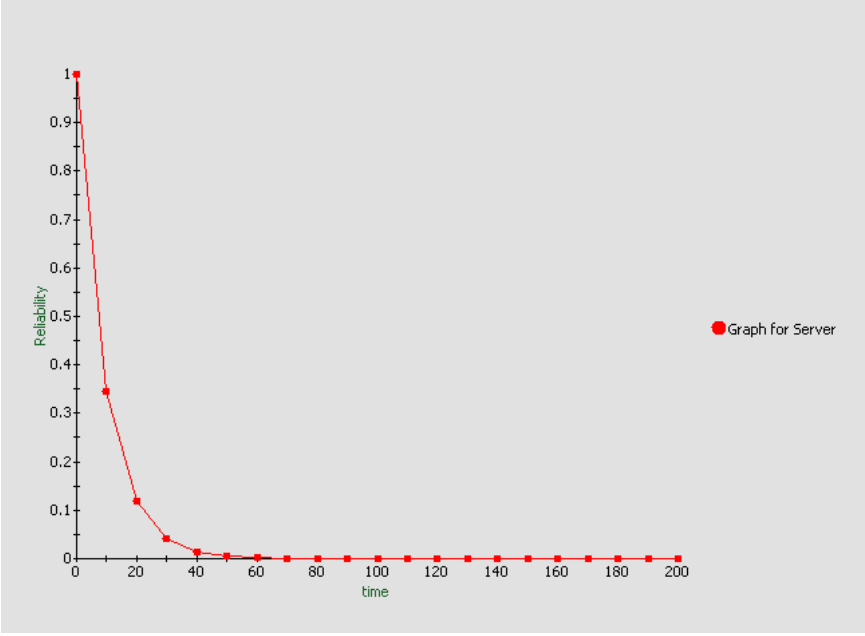
- ev0 : MotherBoard Failure
- ev1 : Firewall Failure
- ev2 : Memory Failure
- ev3 : CPU Failure
- ev4 : Video Card Failure
- ev5 : Operating System Malfunction
- ev6 : Database Corruption
- ev7 : Antivirus Malfunction
- ev8 : Critical Process Failure
- ev9 : Query Optimization Failure
- Hardware : Failure of the Hardware system of the Web server.
- SecSoftMal : Security Software Malfunction
- OpSysCrash : Operating System Crash
- DatSoFail : Database Software Failure
- Software : Software related failures
- TotFail : Total failure probability leading up to the failure of the Web Server.

(iii) Server RBD

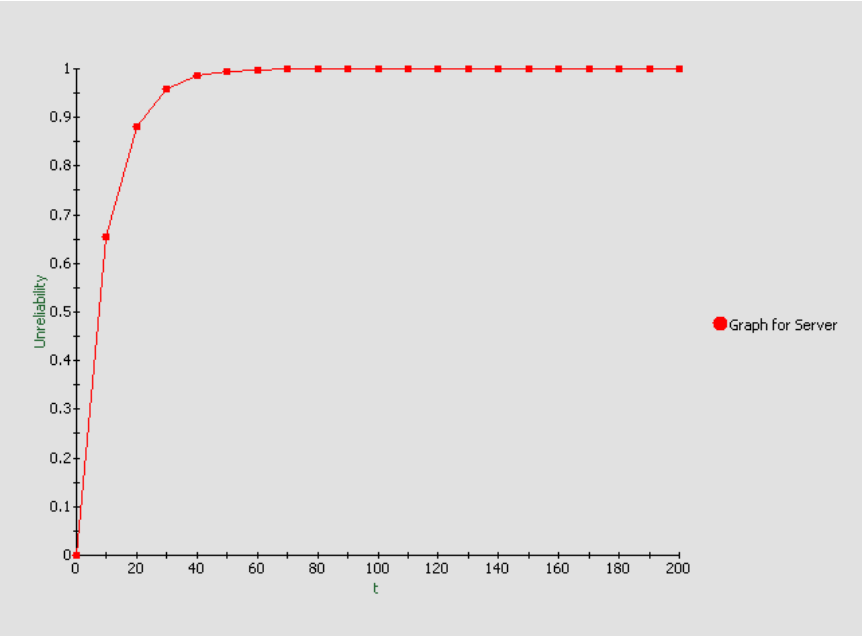


Quantitative Analysis:

(i) Reliability Plot



(ii) Unreliability Plot



(iii) Variance
8.90836654e+001

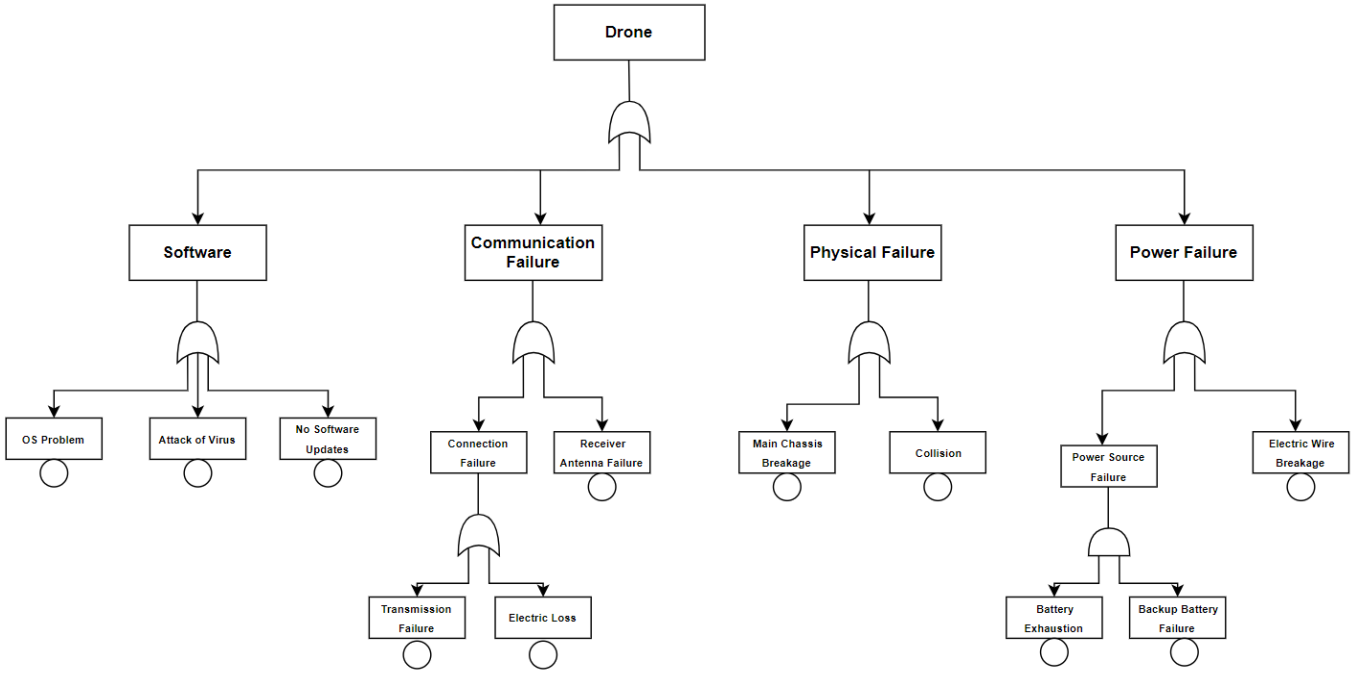
(iv) MTTFval
9.43841435e+000

Qualitative Analysis:

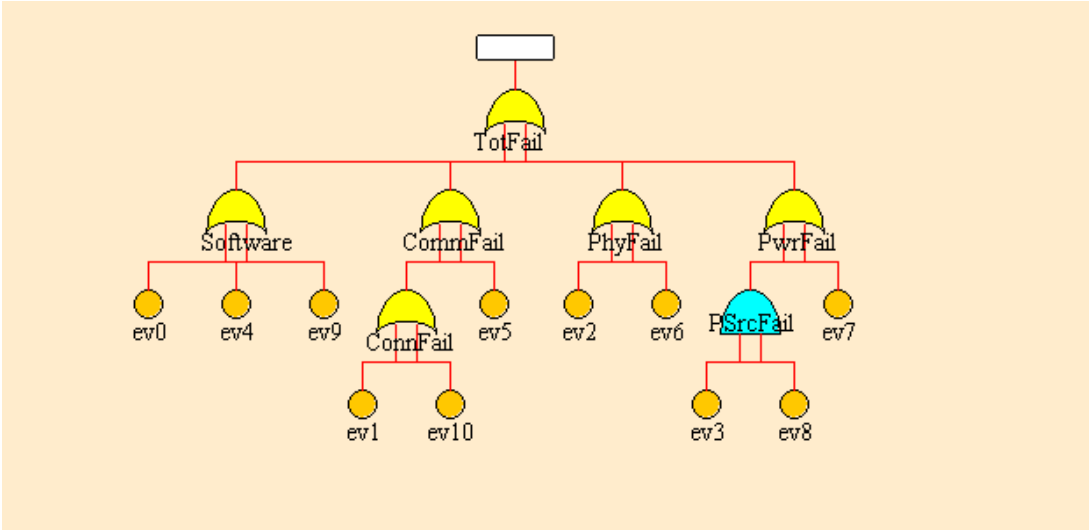
Using the FTA methodology deeply examines failure causes, emphasizing key triggers for significant events. The ongoing case study strongly advises against using the given computer as a web server due to its high likelihood of failing within the next 70 hours. This study helps choose the best hardware and software for server deployment.

2. Drone

(i) Plotting Flowchart for Drone



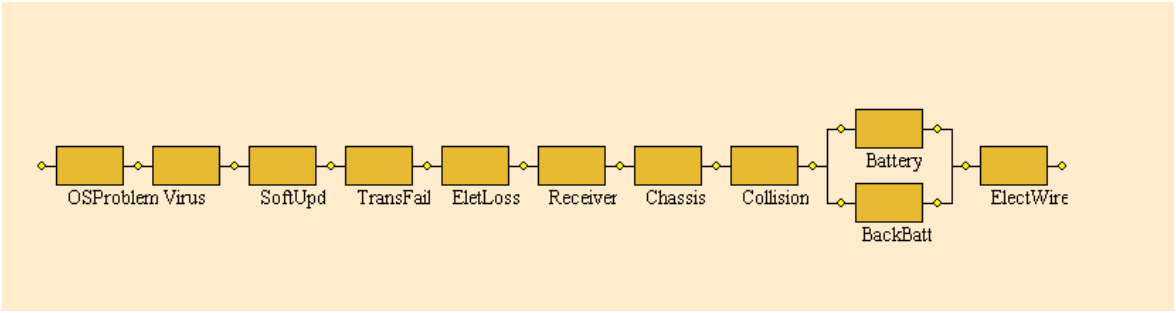
(ii) Fault Tree Analysis using Sharpe Tool



Events glossary :

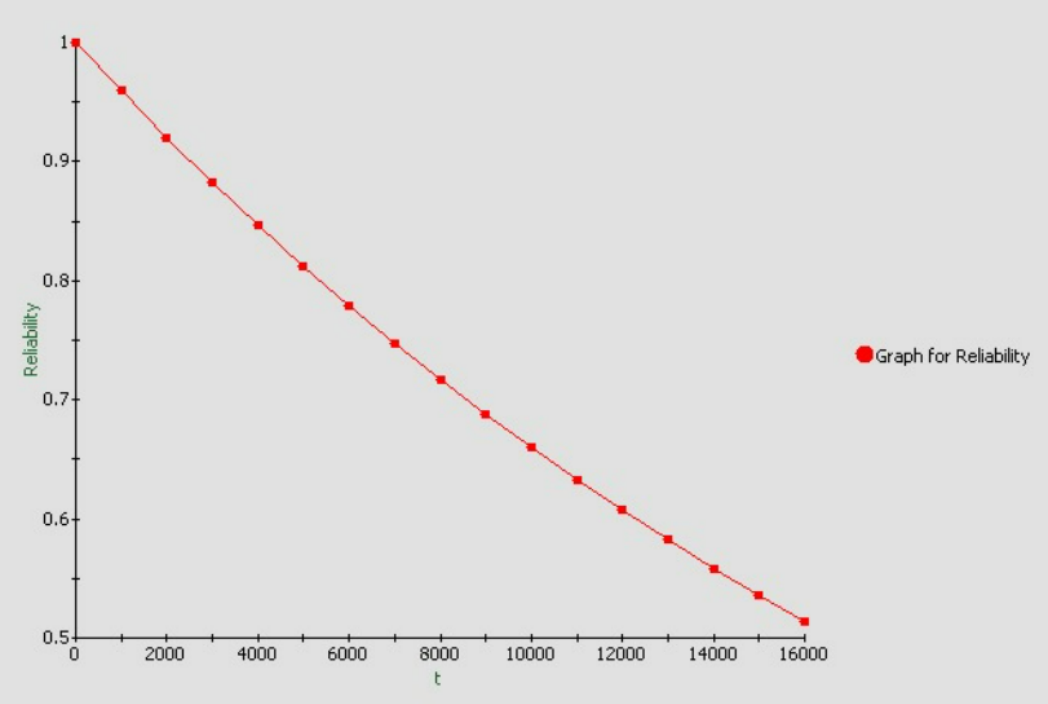
- ev0 : OS Problem
- ev1 : Transmission Failure
- ev2 : Main Chassis Breakage
- ev3 : Battery Exhaustion
- ev4 : Attack of Virus
- ev5 : Receiver Antenna Malfunction
- ev6 : Collision
- ev7 : Electric Wire Breakage
- ev8 : Backup Battery Failure
- ev9 : No software update
- ev10: Electric Loss
- ConnFail : Connection Failure
- CommFail:Communication Failure
- PhyFail : Physical Failure
- PSrcFail: Power Source Failure
- PwrFail : Power Failure
- Software : Software related failures
- TotFail : Total failure probability leading up to the failure of the Drone.

(iii) Drone RBD

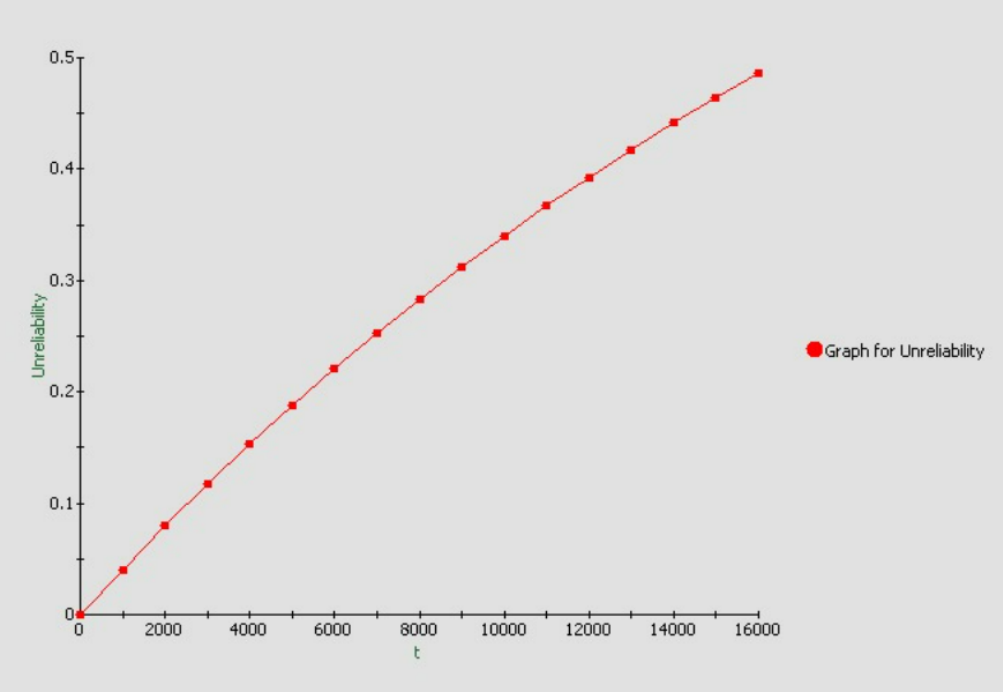


Quantitative Analysis:

(i) Reliability Plot



(ii) Unreliability Plot



Mean time to failure
MTTFval: 2.38743211e+004

Variance
Var: 5.60018155e+008

Qualitative Analysis:

Applying the FTA methodology entails a thorough analysis of failure factors, spotlighting pivotal catalysts for notable occurrences. The case study suggests that the reliability diminishes close to zero after approximately 16,000 hours of operation. This assessment guides the selection of optimal hardware and software configurations for drone deployment.

REFERENCES:

- Faculty of Electronics, Telecommunications and Information Technology, University POLITEHNICA of Bucharest, Romania. (2017). Reliability analysis of a Web server by FTA method. IEEE Xplore. Retrieved August 16, 2023, from https://ieeexplore.ieee.org/document/7905101

- Das, M., Mohan, B. R., & Guddeti, R. M. R. Qualitative and Quantitative Risk Assessment of Drone Crash System Using Fault Tree Analysis.

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