

Week_4_df

Using Google Scholar, search for a recent article about software engineering cases or case study that has to do with software testing techniques, methods, and practices. In your discussion:

1. Provide a summary of the case.

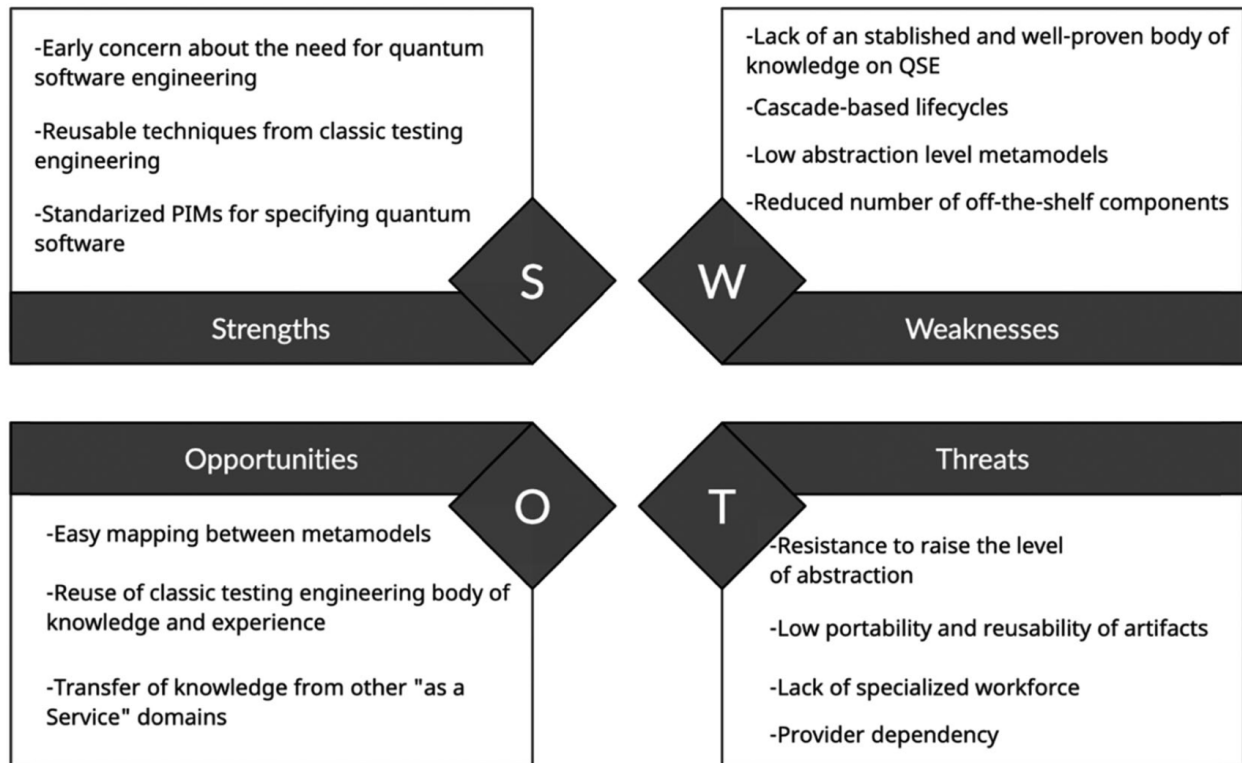
How about developing software that runs on Quantum Computer? If you are still bored, the next challenge would be testing the same software.

Antonio Garcia notes: "Testing quantum software raises a significant number of challenges due to the unique properties of quantum physics—such as superposition and entanglement and the stochastic behavior of quantum systems." He and his colleagues did research examining two methods: statistical approach and Hoare-like logics.

Krishnaswamy et al. propose a general fault modeling method to capture both probabilistic and deterministic faults. The authors discuss how the behavior of quantum circuits is inherently probabilistic and they state that, while the goal of traditional testing has always been to detect the presence of faults, probabilistic testing aims to estimate fault probability—what the authors call "track uncertainty." This work presents a technology-agnostic, probabilistic equivalent called the "Probabilistic Transfer Matrix" (PTM) method.

Kakutani presents a Hoare-style logic for the verification of quantum, probabilistic programs. Hartog's probabilistic Hoare logic is extended in this work, and the QPL language is taken as the target.

Their conclusion came in the form of SWOT (Strengths, Weakness, Opportunities and Threats)



2. Explain how the authors applied the concepts of SDLC.

Furthermore, in this article authors mentioned: "Dey et al. addressed the need for systematic techniques for cost-effective quantum software development, remarking how the different behavior of quantum systems causes a barrier in the adoption of classic software development life cycles (SDLCs). To this end, they propose a quantum development life cycle (QDLC) model based on classical waterfall models. For the testing stage, they propose the use of a state reconstruction technique named quantum-state tomography."

3. Share new software engineering concepts that you learned from the article or case study that are relevant to software testing.

Quantum computing I think is a very relevant topic. Because it beats our computing power in an unimaginable manner, to write software for it, and to test it is unbelievably difficult and unknown. However this article shedded light on existing frameworks, on testing philosophy and paradigms. Another interesting aspect was how they did research, how they did search, grouping, categorization and analyzing of results.

Finally they added: "This body of knowledge can be exploited while the models and programming languages used for quantum software keep representing computation in a low level of abstraction."

References:

1. García de la Barrera A, García-Rodríguez de Guzmán I, Polo M, Piattini M. Quantum software testing: State of the art. J Softw Evol Proc. 2023;35(4):e2419. doi:10.1002/smr.2419 <https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/smr.2419>
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