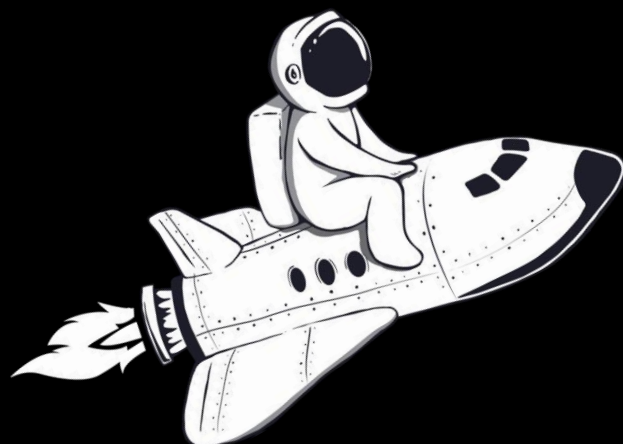TOKYO TEST FEST

Quantum Physics and the Parallel Universes of Software Testing

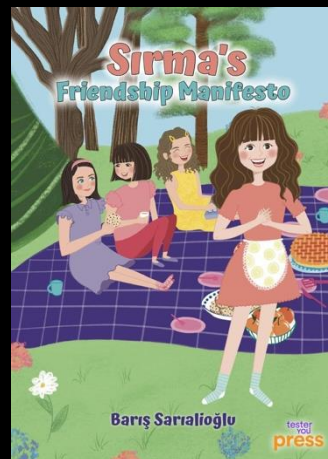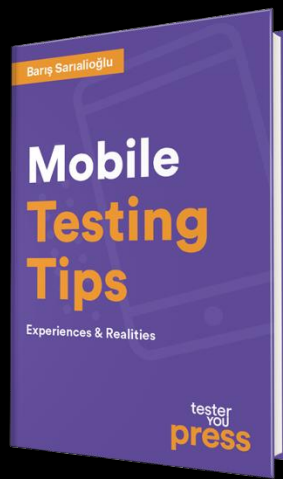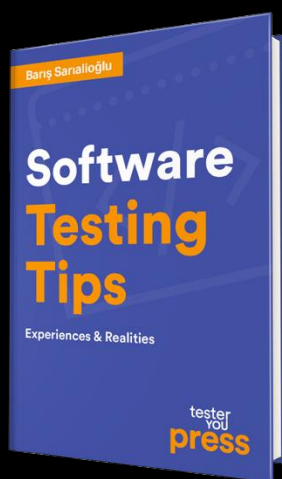Barış Sarıalioğlu
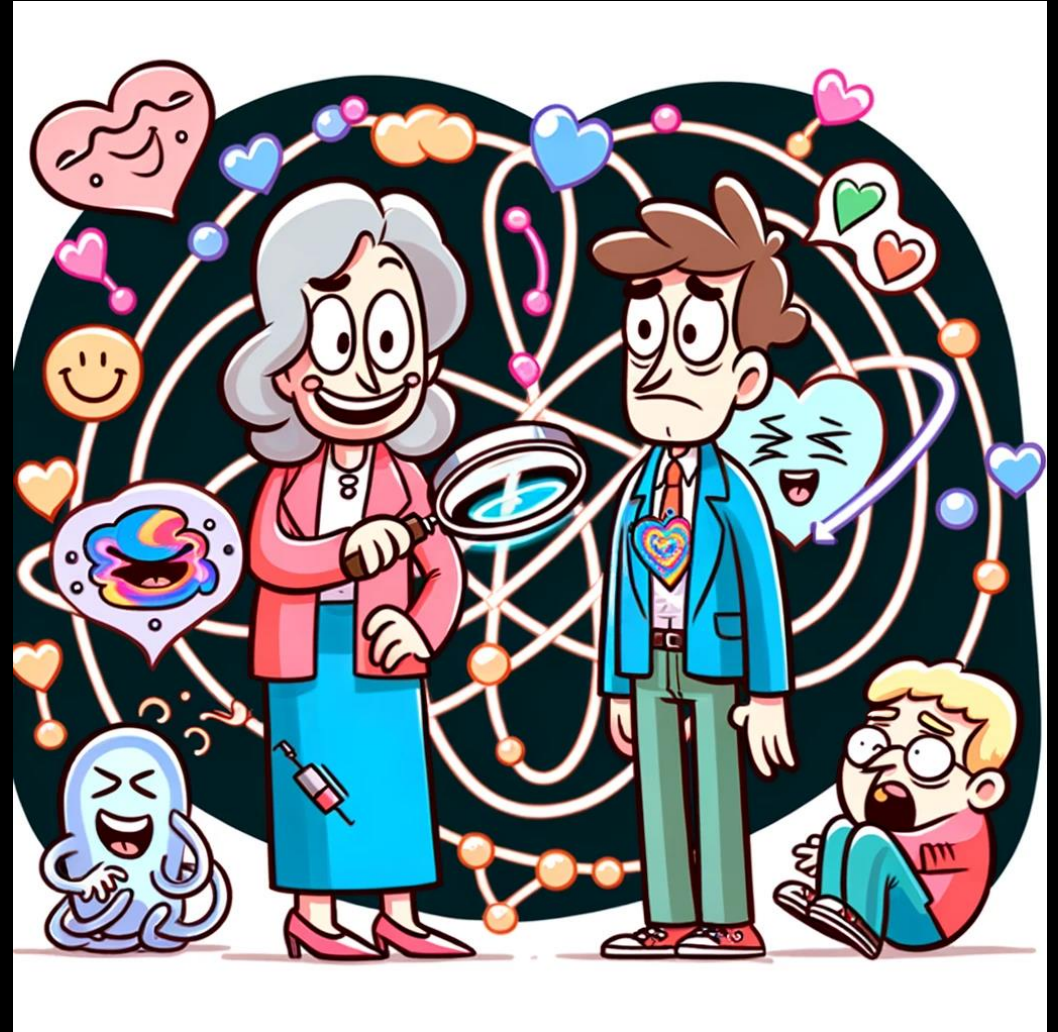
November 15th, 2024

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Barış Sarıalioğlu

IT professional with 20+ years of experience as a Software Engineer and consultant for many different organizations.

Managing Partner @ tester YOU codejust

Software Testing Tips
Experiences & Realities

Mobile Testing Tips
Experiences & Realities

Test Improvement Tips
Experiences & Realities

Sırma's Friendship Manifesto
Barış Sarıalioğlu

SELİM and the Seven Mystical Principles
Barış Sarıalioğlu
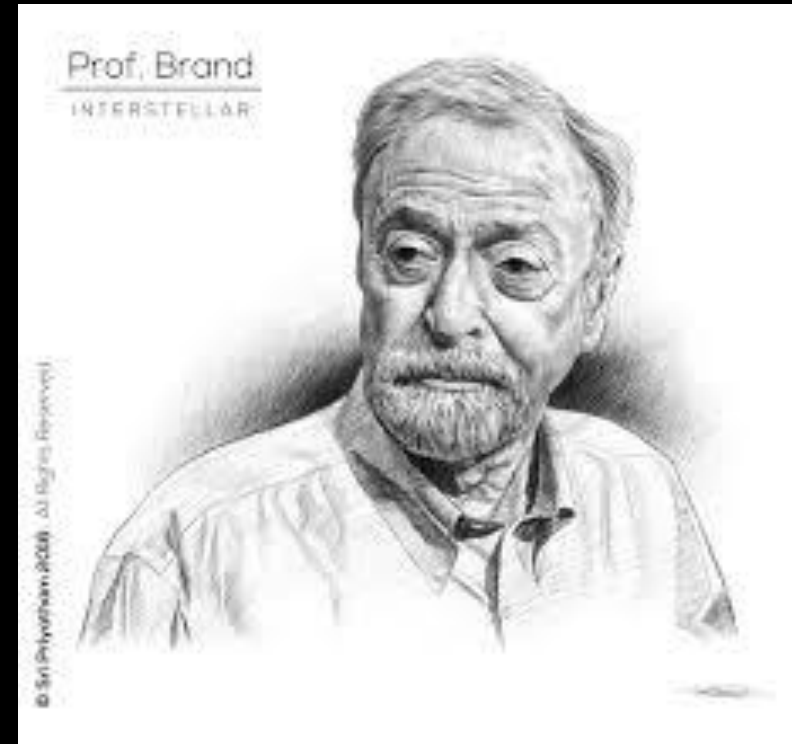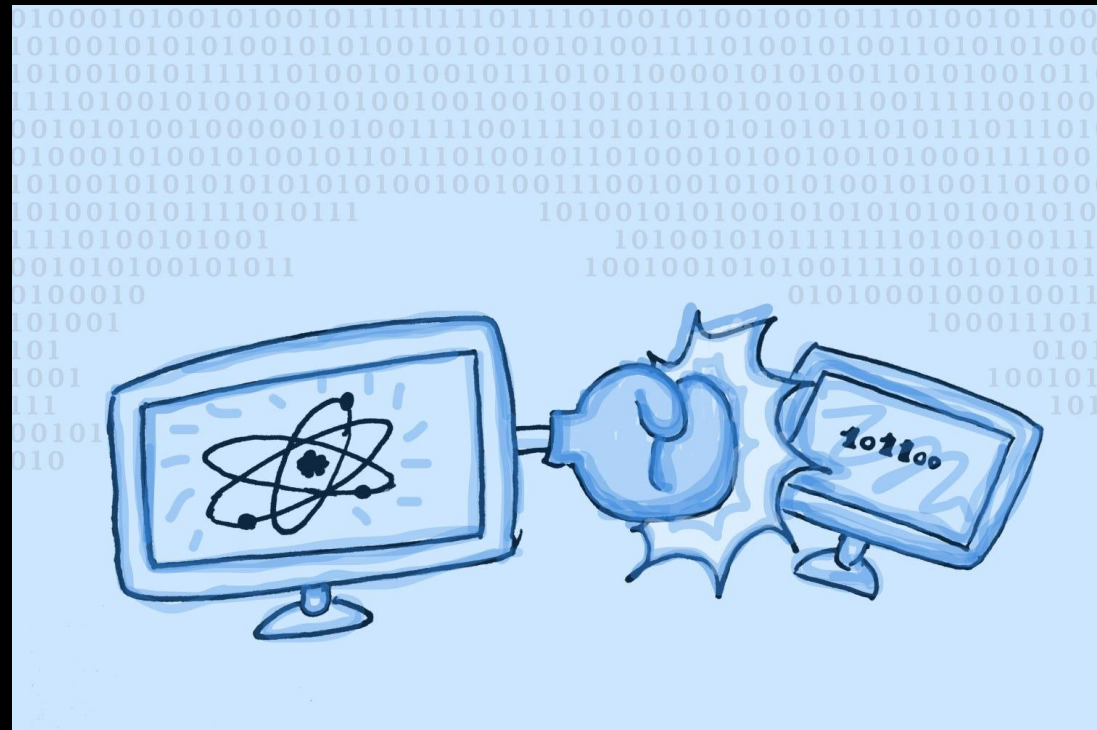
kahoot.it

We're still pioneers, we've barely begun. Our greatest accomplishments cannot be behind us, because our destiny lies above us!
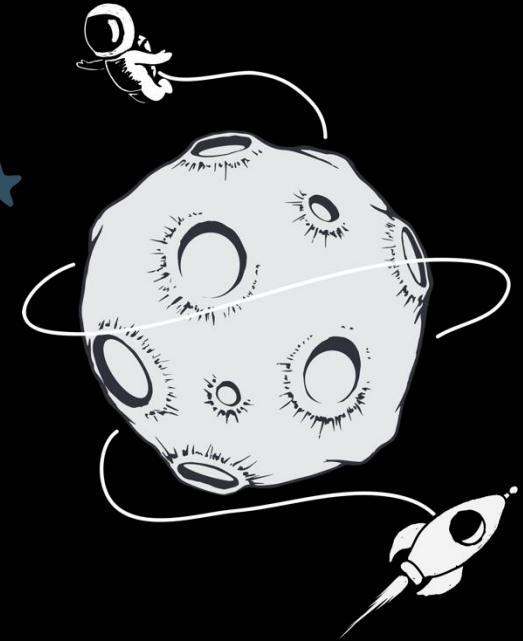
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Quantum vs. Classical Computing

- Speed
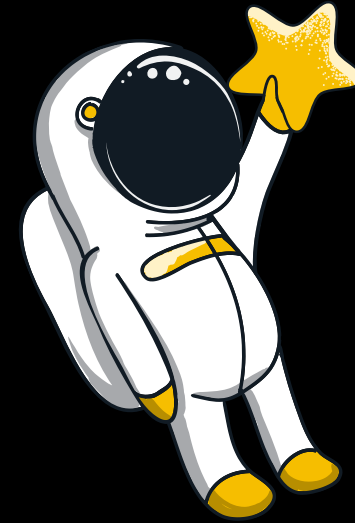- Parallelism
- Complexity
- Energy Efficiency

Why Quantum Physics & Testing?

- Top Trending
- Complexity and Uncertainty
- Holistic Approach
- Interconnectedness
- Educational Value
- Highlighting Paradoxes
- Metaphorical Richness
- Bridging Disciplines
- Universal Themes

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Let's Talk About Quantum Physics

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1 - Quantum Superposition

Quantum superposition is a fundamental principle in quantum physics where a particle can exist in multiple states simultaneously until it is observed or measured.

1 - Software Superposition

Software can exist in multiple states of functionality until tested. A test might reveal a bug or confirm proper functioning, collapsing the superposition into a single state.
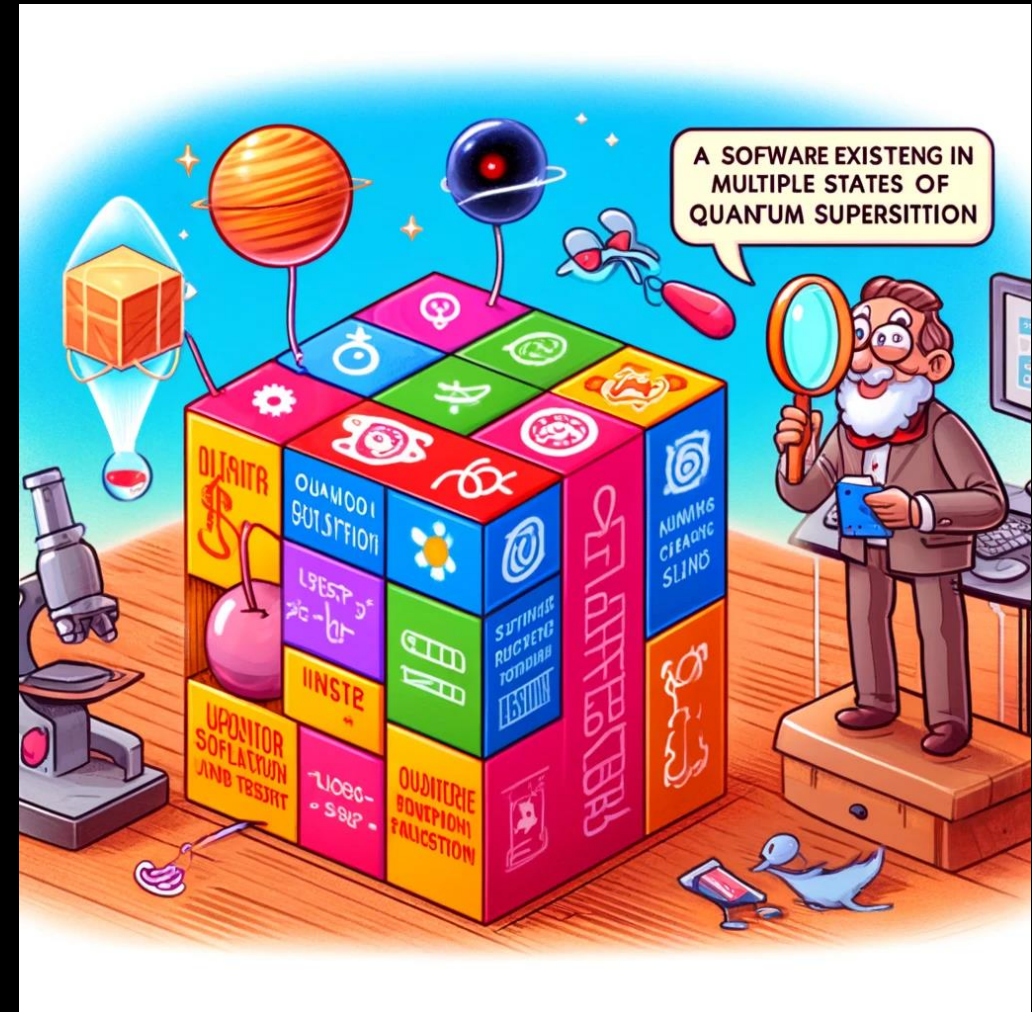
# 2 - Quantum Entanglement

Quantum entanglement is a phenomenon where two or more particles become interconnected in such a way that the state of one particle instantly influences the state of the other, regardless of the distance between them.

2 - Bug Entanglement

Bugs in one part of the system often seem mysteriously linked to behaviors in another. A change in one module can unexpectedly impact another, highlighting the interconnectedness of software components.
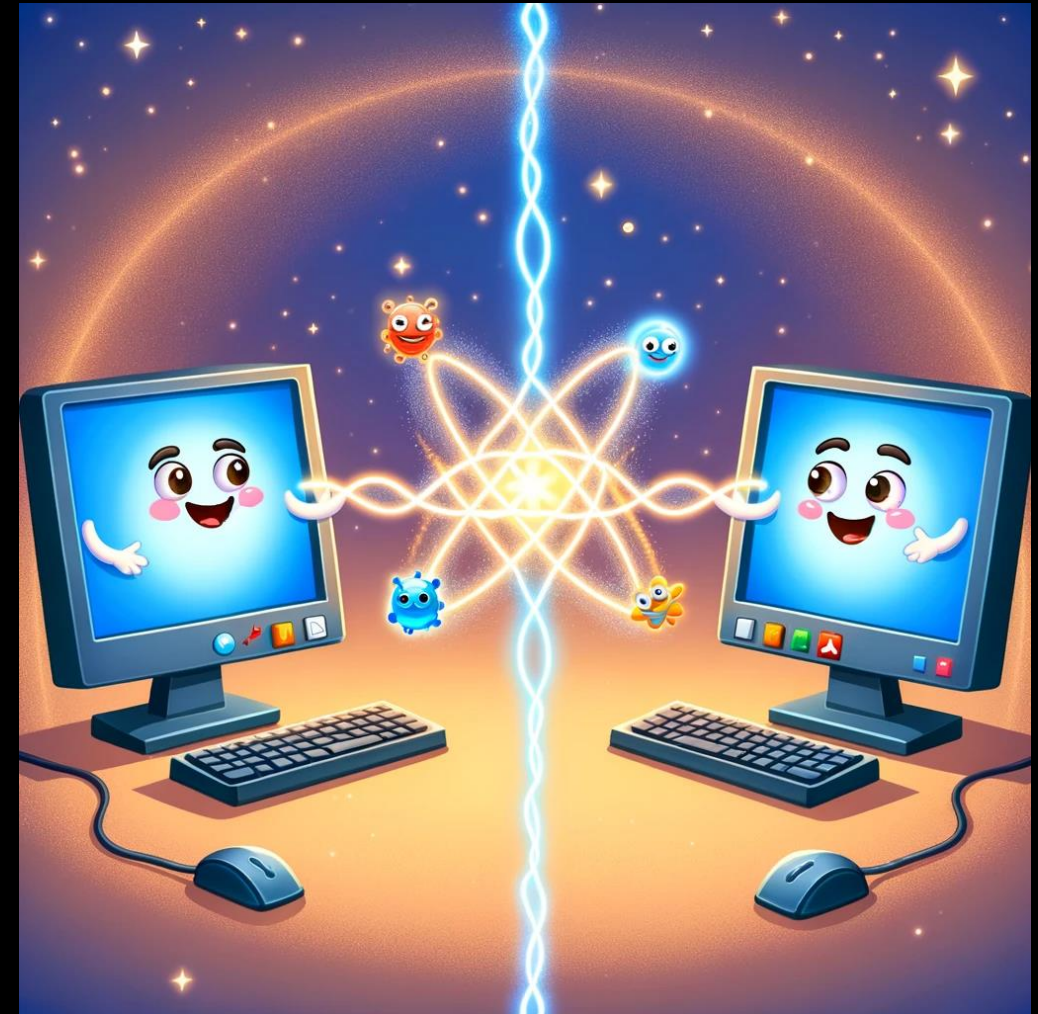
3 - Quantum Tunneling
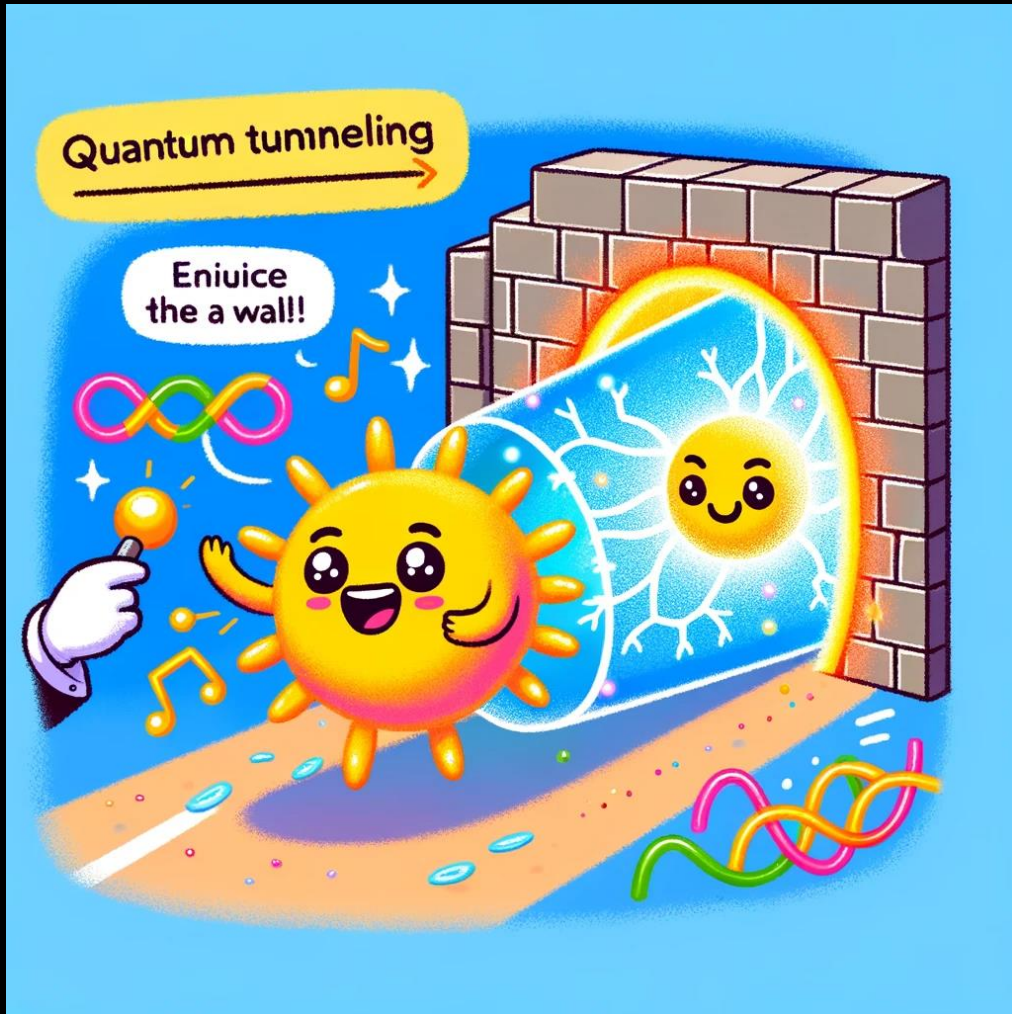
Quantum tunneling is a phenomenon where a particle can pass through a barrier that it classically shouldn't be able to.

3 - Bug Tunneling

Bugs sometimes bypass layers of testing and safeguards to appear in production. This illustrates the elusive nature of software defects.

4 - Heisenberg Uncertainty Principle

The Heisenberg Uncertainty Principle is a fundamental concept in quantum mechanics which states that it is impossible to simultaneously know both the exact position and exact momentum of a particle.

4 - Heisenbug Uncertainty Principle

A type of software bug that seems to disappear or alter its behavior when one attempts to study or debug it.

5 - Wave-Particle Duality
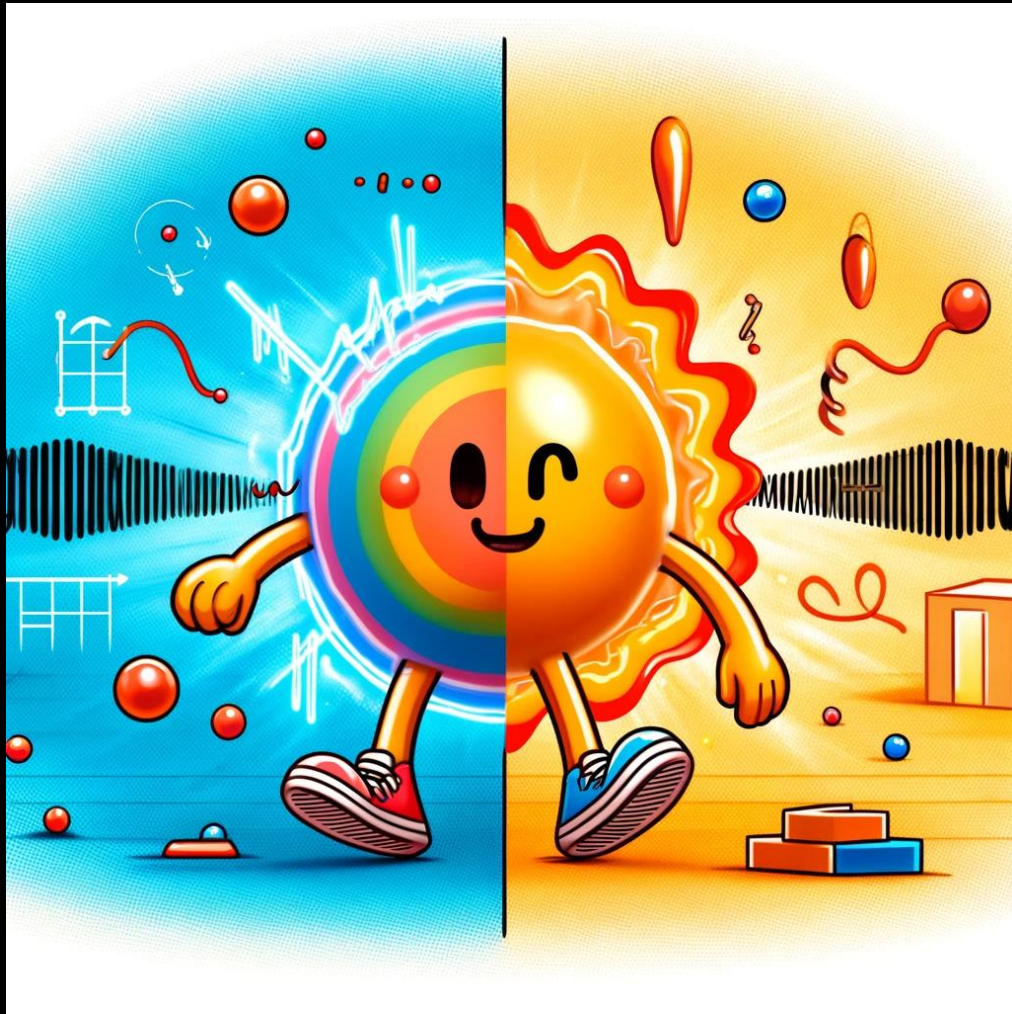
Wave-particle duality is a fundamental concept in quantum mechanics which states that particles, such as electrons and photons, exhibit both wave-like and particle-like properties.

5 - Static-Dynamic Testing Duality

Similarly, software can be seen as both a static entity (code) and a dynamic process (runtime behavior). Effective testing must consider both perspectives.
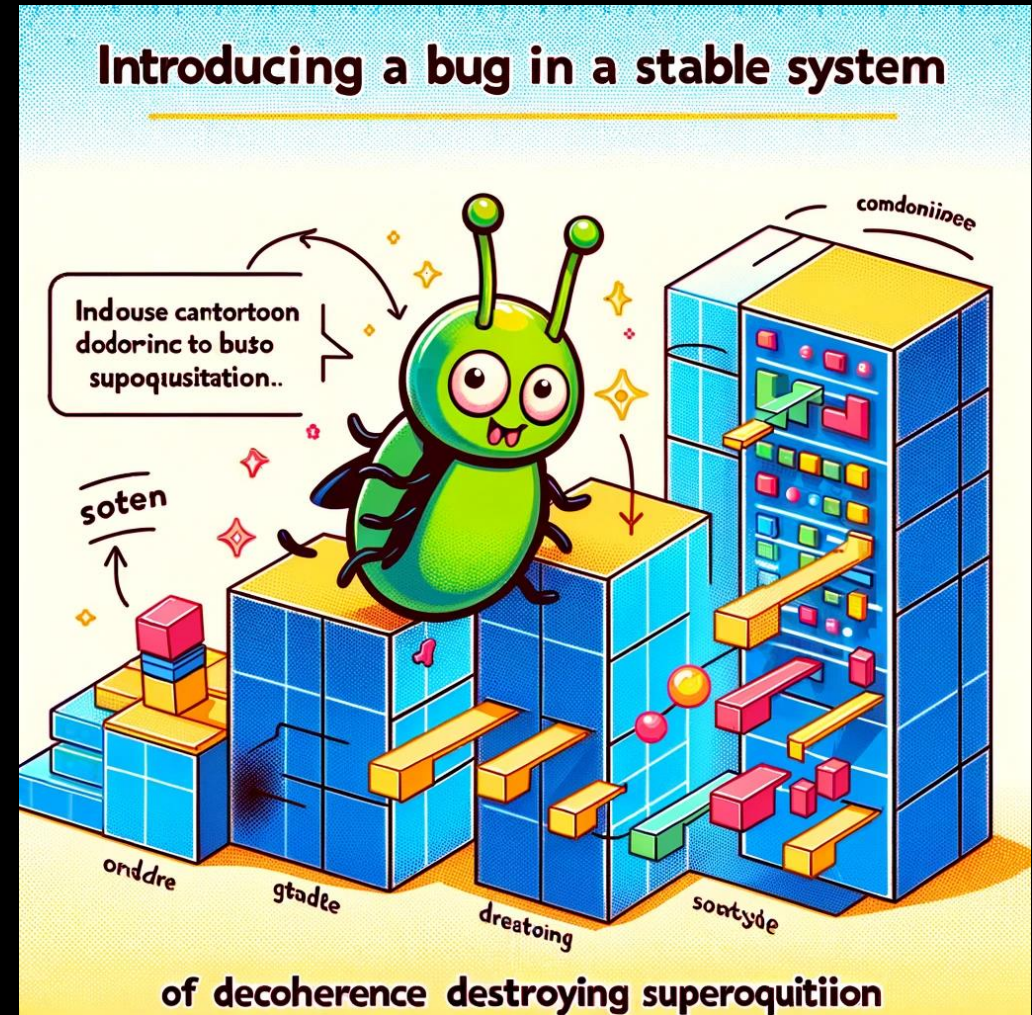
6 - Quantum Decoherence

Quantum decoherence is a process by which a quantum system loses its quantum properties due to interaction with its environment.

6 - Bug Decoherence

In testing, introducing a bug into a stable system can disrupt its functionality, very much like how decoherence destroys superposition.

7 - Quantum Measurement Problem

The Quantum Measurement Problem refers to the question of how and why the act of measurement causes a quantum system to transition from a superposition of multiple states to a single, definite state.

7 - Testing Measurement Problem

In testing, running a test can influence the software's behavior, such as timing issues or race conditions that only appear during testing and not in actual use.

8 - Quantum Zeno Effect
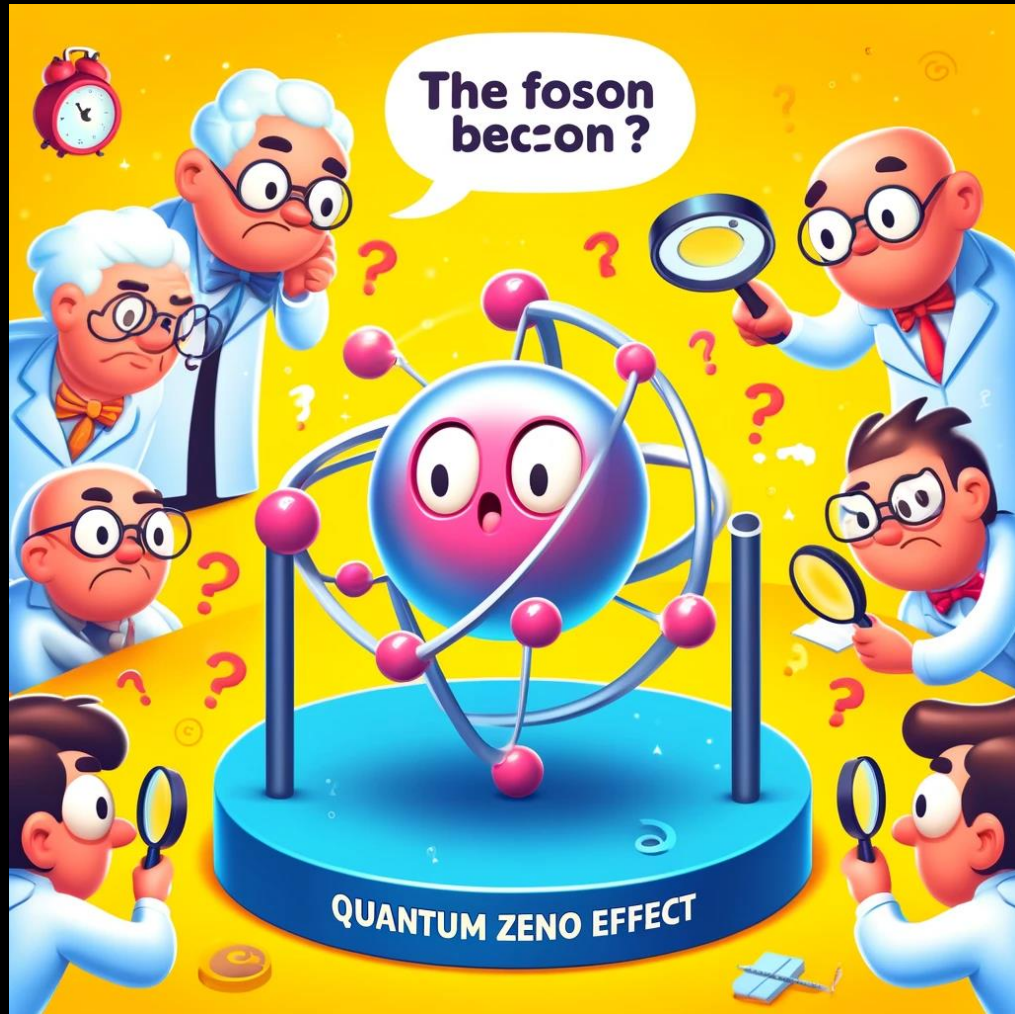
The Quantum Zeno Effect is a phenomenon where frequent observation of a quantum system can prevent it from evolving.

8 - Testing Zeno Effect

In software, overly frequent or intrusive testing might hinder the system's performance, demonstrating the need for balanced testing intervals.

9 - Entropic Time Arrow

The Entropic Time Arrow refers to the concept that time's direction is determined by the increase of entropy, or disorder, in a system.

9 - Entropic Software Arrow

In software world, over time, systems tend to become more complex and harder to maintain, suggesting that proactive testing strategies are necessary to manage growing entropy in software projects.
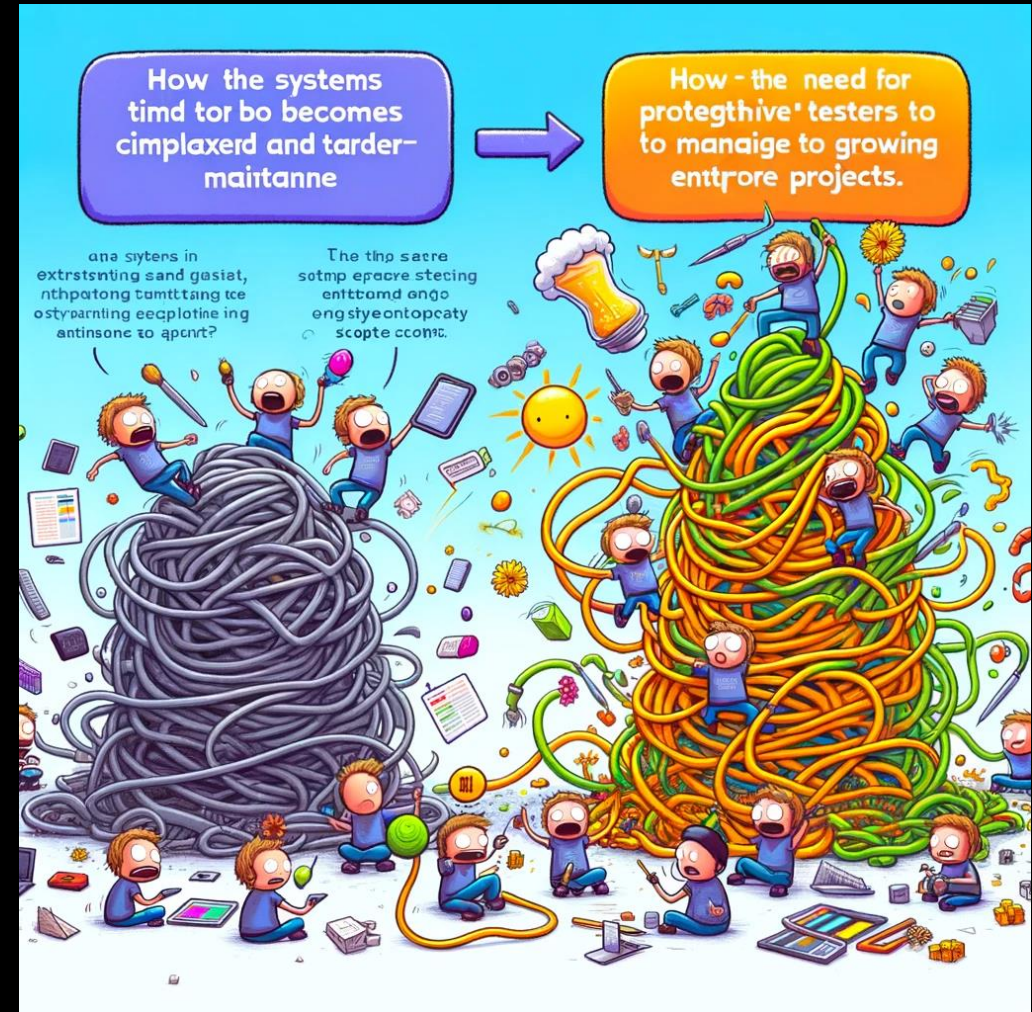
10 - Quantum Teleportation

Quantum teleportation is a process by which the quantum state of a particle is transmitted from one location to another without physically moving the particle itself.

10 - Software Teleportation

In software, the concept can be likened to continuous integration and deployment (CI/CD), where changes are rapidly and automatically tested and deployed, ensuring quick feedback and adaptation.
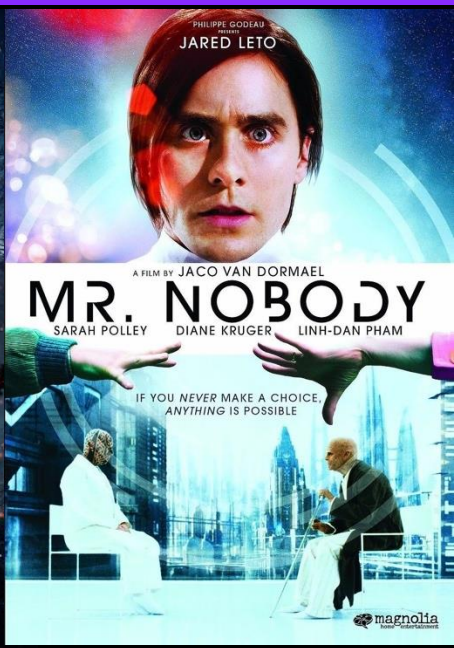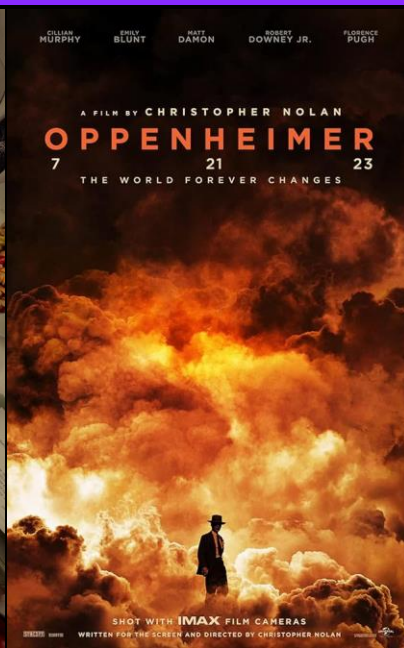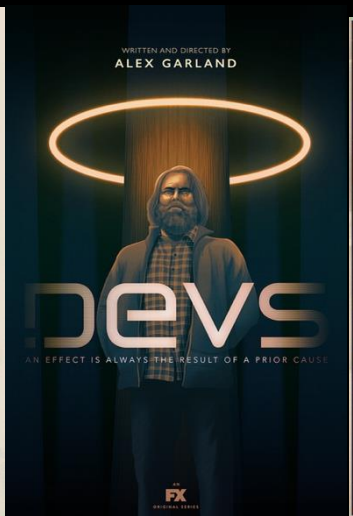
Final Takeaways
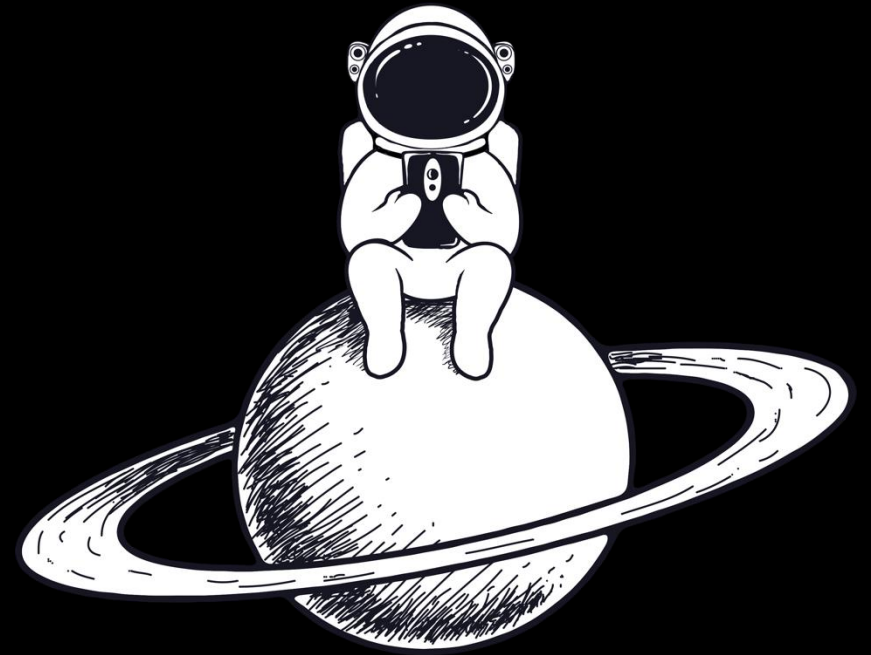
- Embrace Uncertainty, Unpredictability

- Understand the Impact of Observation

- Apply Innovation and Creativity

- Be Future-Oriented

- Avoid Complexity, Welcome Simplicity
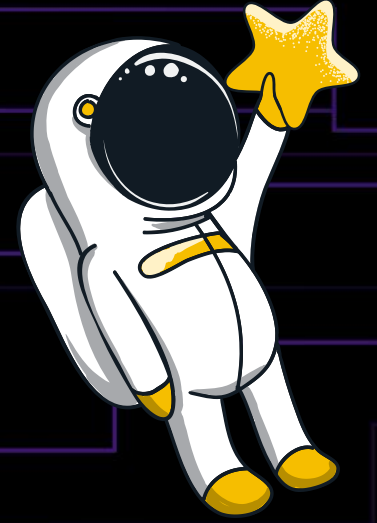
- Leverage on Interconnections and Parallelism
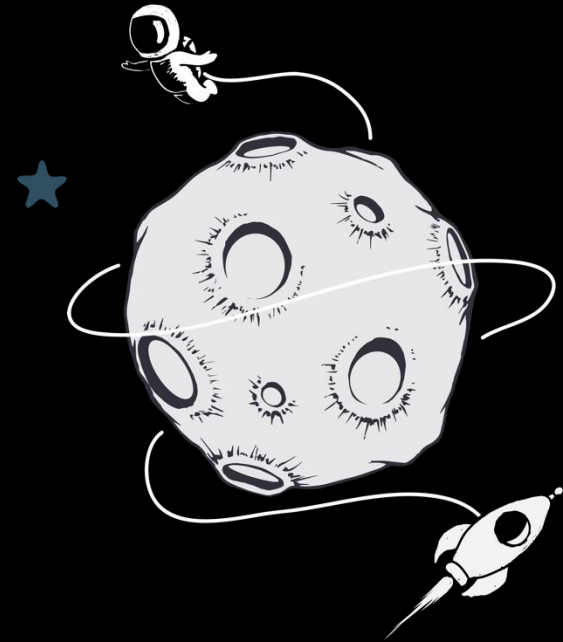
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Some Films to Watch…

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Thank You...

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