Designing for Failure: Building Resilient Systems

Designing for Failure: Building Resilient Systems

Presenter: Sai Sahiti Nemalikanti

Agenda

- Why Design for Failure? The Reality
- Core Principles & Techniques
- It's a Mindset Shift
- Conclusion: Key Takeaways

Why Design for Failure? The Reality

Systems Will Fail

Hardware, Networks, Software Bugs, Dependencies, Human Error

Preventing All Failure is Impossible / Costly

Total prevention of failures incurs high costs and is often impractical in dynamic environments.

Unplanned Failures Impact

Unplanned failures lead to cascading outages, poor user experience, and significant business impact.

Goal: Resilience

Design systems to withstand failures, degrade gracefully, and recover quickly.

Techniques

Core Principles & Techniques

Redundancy

No Single Points of Failure (Instances, Zones)

Isolation (Bulkheading)

Contain Failures, Prevent Spreading

Circuit Breakers

Protect from Failing Dependencies (Fail Fast)

Timeouts & Retries

Don't Wait Forever (Use Backoff)

Graceful Degradation

Partial Functionality > Total Failure

Monitoring & Observability

See Failures (Logs, Metrics, Traces)

Mindset

It's a Mindset Shift

Cultural Shift

Emphasize the importance of cultivating a culture that embraces resilience and adaptability in the face of failure.

Continuous Questioning

Encourage teams to ask, "What happens if this fails?" to proactively identify potential weaknesses in designs.

Planning for Worst-Case Scenarios

Develop strategies for worst-case scenarios to ensure systems are robust and can handle unexpected issues effectively.

Testing Resilience

Implement practices such as Chaos Engineering to validate the resilience of systems under stress and failure conditions.

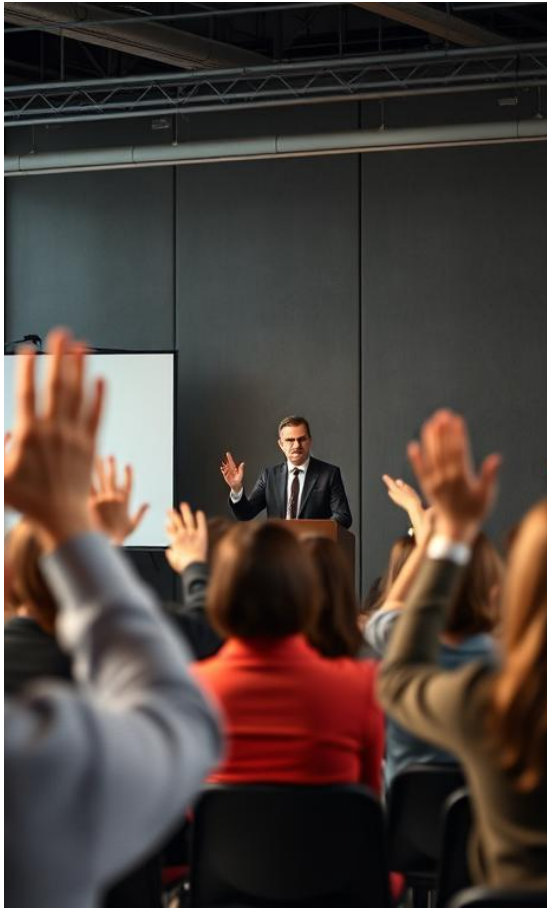
Conclusion: Key Takeaways

Core Message Expect Failure. Design for It. Build Resilience.

Benefits Higher Availability & Reliability. Better User Experience (even during incidents). More Robust Systems.

Call to Action Start small: Ask 'what if?'. Implement resilience patterns. Monitor everything!

Final Thoughts Building resilient systems is essential for long-term success and sustainability in today’s complex environments.



Conclusion

Thank You

Thank you for your attention!