Week 1 . Lesson 4 Availability, Reliability & Fault Tolerance

1 Availability

Availability = How often the system is up

example
- System work 99% of the time
- Down 1% of the time

That's availability
99% vs 99.9%
- 99 % → ~ 3.6 days downtime / year
- 99.9% → ~8.7 hours / year
- 99.99% → ~ 52 minutes / year

Small numbers matter a lot at scale

2 Reliability

Reliability = System does the correct thing

A system can be available and incorrect
eg: - Like count shows wrong numbers
- messages delivered out of order

System is up but not Reliable

3 Fault Tolerance

Fault Tolerance = System continues working even when parts fail

Key idea :
Failures are expected not rare.

Examples of failures:
- Server crashes
- Network timeout
- DB replica goes down

Fault-tolerant systems degrade gracefully, not crash.

4 Real-world analogy
Airplane systems
- One sensor fails → backup takes over
- Plane doesn't fall

That's fault tolerance.

5 System example (like Counter)
Non-fault-tolerant
- One DB
- DB goes down → likes stop.

Fault-tolerant
- Multiple DB replicas
- One fails → others serve traffic

System remains available and reliable.

6. Important tradeoff
Available and consistency often conflict.

Sometimes:
- You choose to show slightly stale data
- Instead of showing nothing.

most big system prefer some data over no data

mini task 4

You are designing a system where:
- Users can "like" posts
- A database can sometimes go down

Answer:
1. Should users still be able to see like counts?
2. Should users still be able to like posts?
3. What happens to likes during DB downtime?