

tutorial: cf
 quite review: Tuesday (relates with previous)

Plan:

- Reliability
- Approach
- Metrics
- Ex: disk

Examples

- DNS: epidemic NS
- BGP: ~~redundant~~ alternative path
- tcp: retransmit

aggr: increased rate of failure.
 (show slide) aggr is an emergent property of a redundant system

MTTF

1,000 disks
 3,000 hours

1 failure per 300,000 hrs.

PC failure (not a dot)

Operational Lifetime

L15: Reliability (4/5/06)

1 Threats:

- Software fault → blue screen
- Hardware → hard disk failed
- design → didn't consider when for disk
- operation: dist. typing corrupt code
- environment: natural disasters

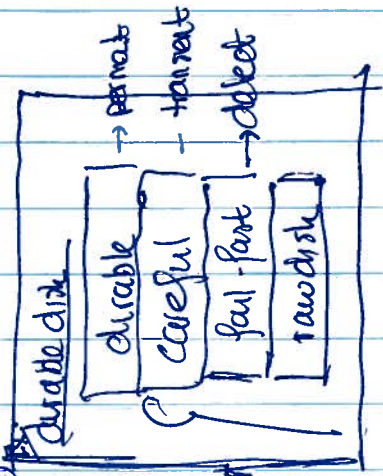
(tough: many things can go wrong)

2 Approach

1. Identify possible faults
2. Detect or contain
3. Options

nothing → fail-fast → fail-safe

fail-sept → mask → redundancy in space



make connection to client/server - self-sufficient users

3 Fault tolerant systems

Reliable systems from unreliable modules

M1 → M2 → M3 (redundancy)

latent ⇒ active ⇒ error ⇒ failure (fault)

Module doesn't meet spec.

4 Metric

availability = $\frac{MTTF}{MTTR + MTTF}$

unavailable = 1 - avail.

number of q.s.

