

The Nines of Availability

What each nine costs in real time — and where downtime actually begins

What each “nine” allows per year

Availability	Name	Allowed downtime / year
99.9%	Three nines	~8.8 hours
99.99%	Four nines	~52 minutes
99.999%	Five nines	~5 minutes
99.9999%	Six nines	~32 seconds

Each additional nine cuts allowed downtime roughly tenfold — moving from three nines to five is far harder than the numbers suggest.

The math

Uptime %

$$= (\text{total time} - \text{downtime}) \div \text{total time} \times 100$$

MTBF

mean time between failures — how often things break

MTTR

mean time to repair — how fast you recover

Most downtime starts in the physical layer

- A failed power supply
- A degraded RAID array
- An overheating rack
- A flapping optical link
- A configuration change no one recorded

Monitoring that only sees the operating system detects these late — often at the moment of failure, exactly when MTTR climbs. Reducing downtime is largely earlier detection and faster recovery at the hardware layer: component-level early warning, an out-of-band rescue path, accurate asset data, and a clear line from component fault to the business service it threatens.