

# IT Infrastructure Architecture

Infrastructure Building Blocks  
and Concepts

Datacenters  
(chapter 7)

Datacenter availability

# Availability tiers

Tier	Measures	Expected downtime
<b>Tier 1</b> <u>Availability</u> 99.671% <u>Type</u> Basic	Single path for power and cooling distribution No redundant components	Downtime very likely for planned and unplanned maintenance
<b>Tier 2</b> <u>Availability</u> 99.741% <u>Type</u> Redundant components	Fulfills all Tier 1 requirements Single path for power and cooling distribution Redundant components	Downtime likely for planned and unplanned maintenance

# Availability tiers

<b>Tier 3</b> <u>Availability</u> 99.982% <u>Type</u> Concurrently maintainable	Fulfills all Tier 1 and Tier 2 requirements Multiple active power and cooling distribution paths Only one path active Redundant components All IT equipment must be dual-powered	No downtime due to planned maintenance Downtime unlikely for unplanned maintenance
<b>Tier 4</b> <u>Availability</u> 99.995% <u>Type</u> Fault tolerant	Fulfills all Tier 1, Tier 2, and Tier 3 requirements Multiple active power and cooling distribution paths Redundant components All cooling equipment is independently dual-powered, including chillers and Heating, Ventilating and Air Conditioning (HVAC) systems	No downtime due to planned or unplanned maintenance

# Availability tiers

- The tier classification only describes the availability of the datacenter facilities
  - Not the availability of the IT infrastructure components
- A tier 3 datacenter running an IT infrastructure with an availability of 99.990% will have a total availability of
$$0.99982 \times 0.9990 = 0.99972 = 99.972\%$$

# Redundant datacenters

- Multiple redundant datacenters can be used to increase availability
- Multiple datacenters are a must when higher availability than 99.995% is needed
  - If a datacenter with all its equipment has an availability lower than tier 1, two datacenters can reach an availability of the same level as one tier 4 datacenter
- Redundant datacenters should be at least 5 km apart
  - Based on the effect of incidents like the 9/11 terrorist attacks in the USA and reports of explosions in factory plants and fireworks storage

# Datacenter performance

# Datacenter performance

- The datacenter itself does not provide performance to IT Infrastructures, except for the bandwidth of the internet connectivity and the scalability of the location



# Datacenter security

# Physical security

- Ensure that equipment is physically safe behind the datacenter doors
- Physical access to the datacenter must be restricted to selected and qualified staff
- An entry registration system should be used
- A log should be maintained containing all staff entering and leaving the datacenter
- Doors must be secured using conventional locks (for instance for dock loading doors) or electronic locks
  - Electronic locks should open only after proper authentication

# Physical security

- Entry points can be implemented as:
  - Regular doors
    - Staff is routed through a set of double doors that may be monitored by a guard
  - Mantraps
    - Only one person at a time can enter the datacenter's restricted area
  - Revolving doors
    - Only one person at a time can enter the datacenter's restricted area
- Entries can be equipped with weighing scales to ensure only one person enters the restricted area

