

Secure Data Center Design and Supporting Controls



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Overview



Consider basic standards for data center design

Review design resilience levels for availability classes

Enumerate design resilience levels related to protection classes



Data Center Design Standards



Reviewing Logical Design for a Data Center



Cloud consumers generally not building data centers

Knowing standards is helpful

May assist with compliance issues

Tenants of Logical Design

Measures to limit access

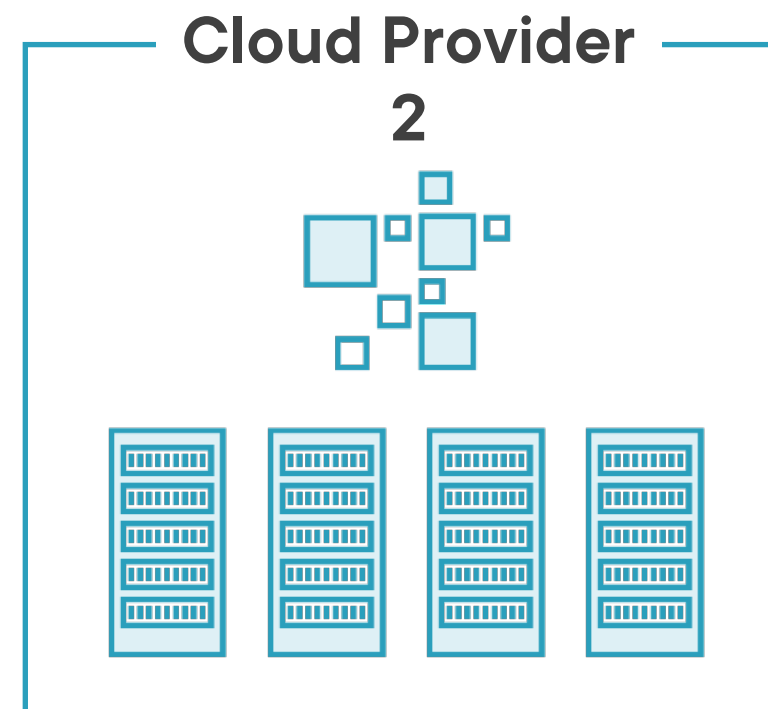
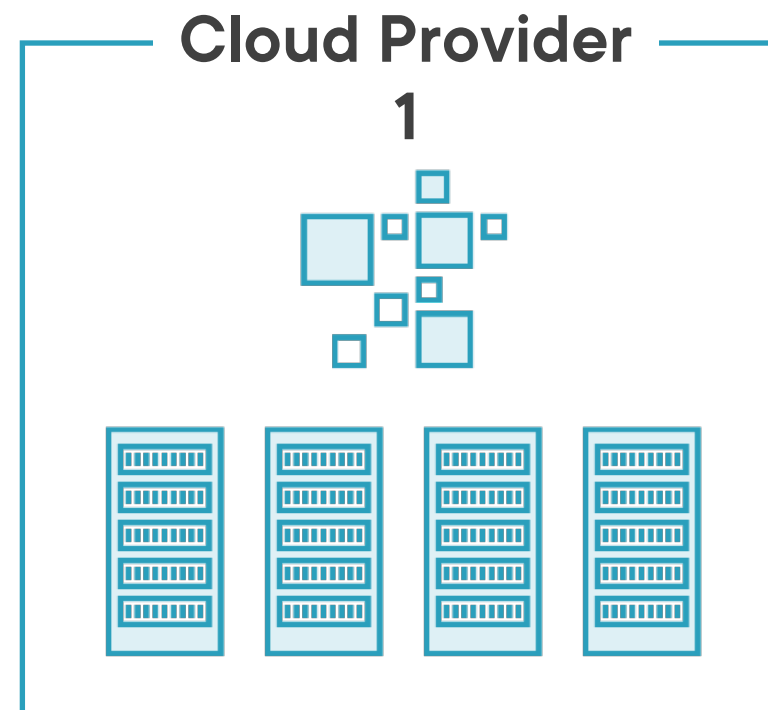
Expressed in business terms

Included business requirements

Precedes physical design



Functional Security Requirements



Two or more CSPs may be needed

Data formats and techniques often proprietary

Consider portability and interoperability

ISO/IEC 22237 Data Center Facilities and Infrastructures

**Location
recommendation**

Power distribution

Control systems

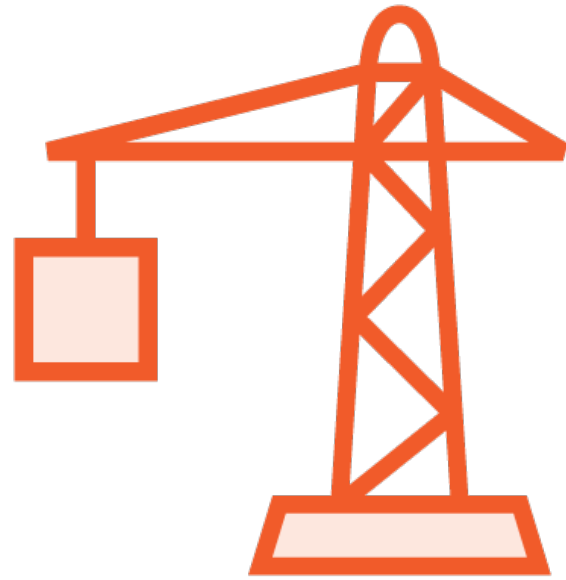
**Monitoring and
security**

**Security for
protection class**

**Operational and
management**



Location and Site Selection



Building construction

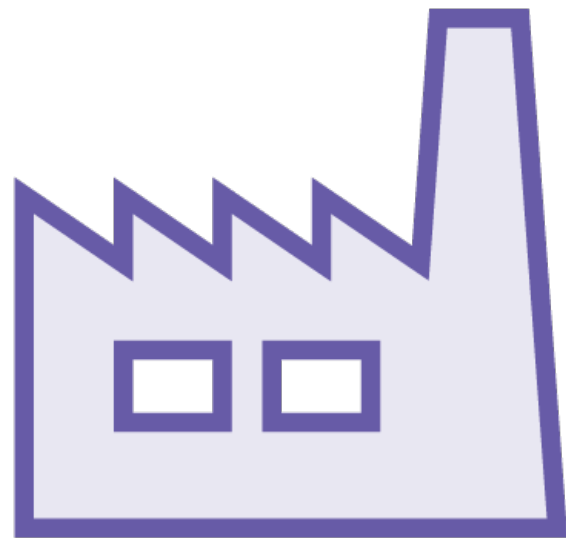
Building configuration

Fire protection

Quality construction measures



Environmental Impact



Brownfield/Greenfield impact

Understanding carbon footprint

Renewable energy



Major Cloud Providers Climate Sensitivity

Amazon

Became the world's
largest corporate
purchaser of
renewable energy

Google

100 percent of global
electricity is
renewable energy.

Microsoft

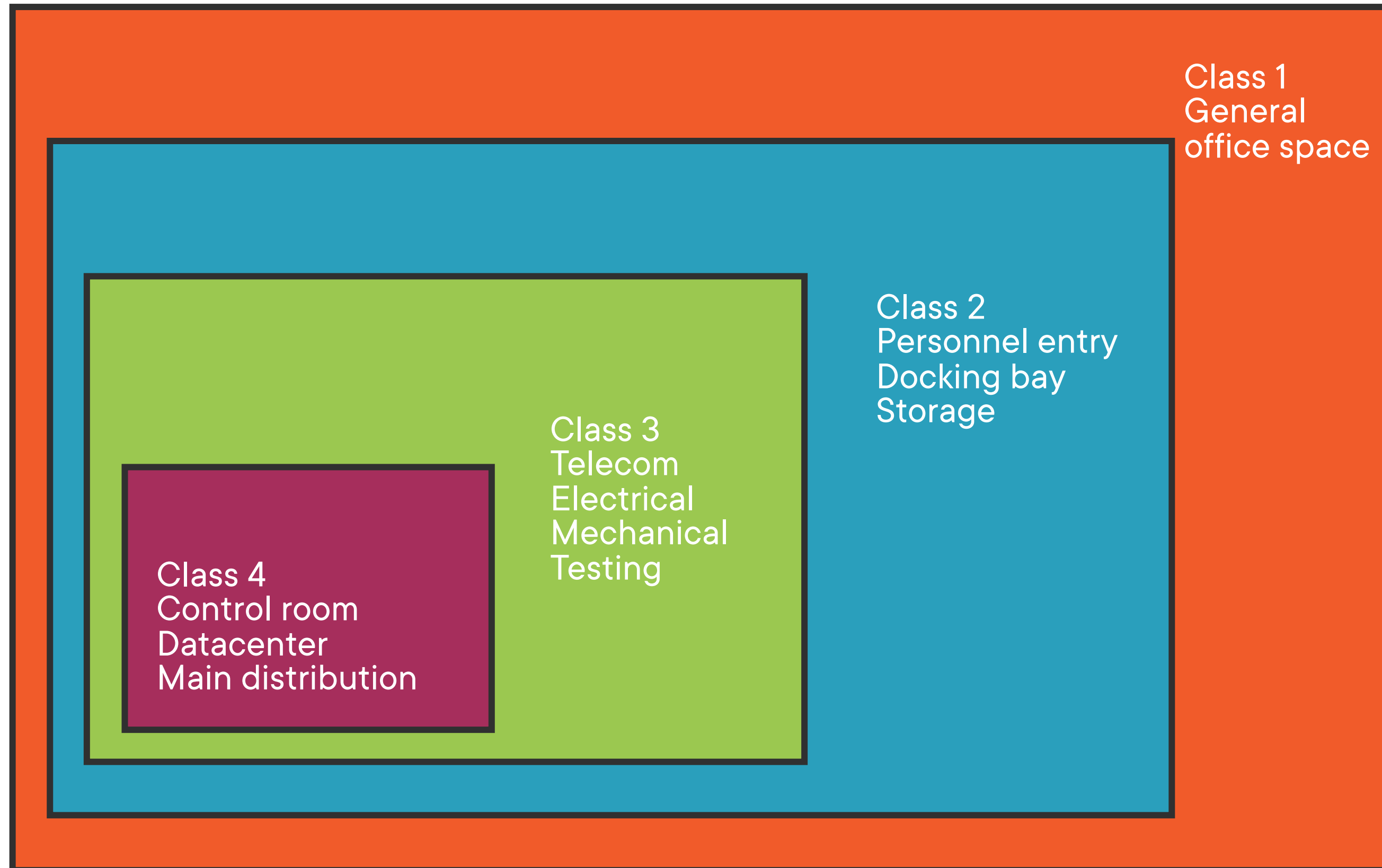
Multifaceted 2030 plan
of firsts aimed at
reducing



Design Resilience – Protection Classes



Four Classes of Protection



Design Resilience - Fire Suppression



Fire Suppression

To Survive a Fire Needs



Oxygen



Fuel



Heat



Fire Detection



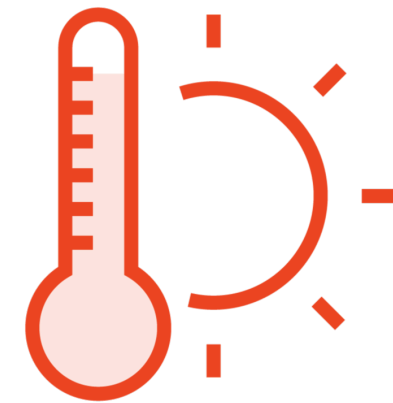
Flame Detection

Flame detectors use photoelectric: infrared, visible light, and ultraviolet



Smoke Detection

Smoke detectors use ionization and photoelectric



Heat Detection

Heat detectors rate-of-rise and fixed-temperature



Gas
FM-200
Argonite
Aero-K
Foam
Water



Water-based Suppression in Data Centers

Dry-Pipe

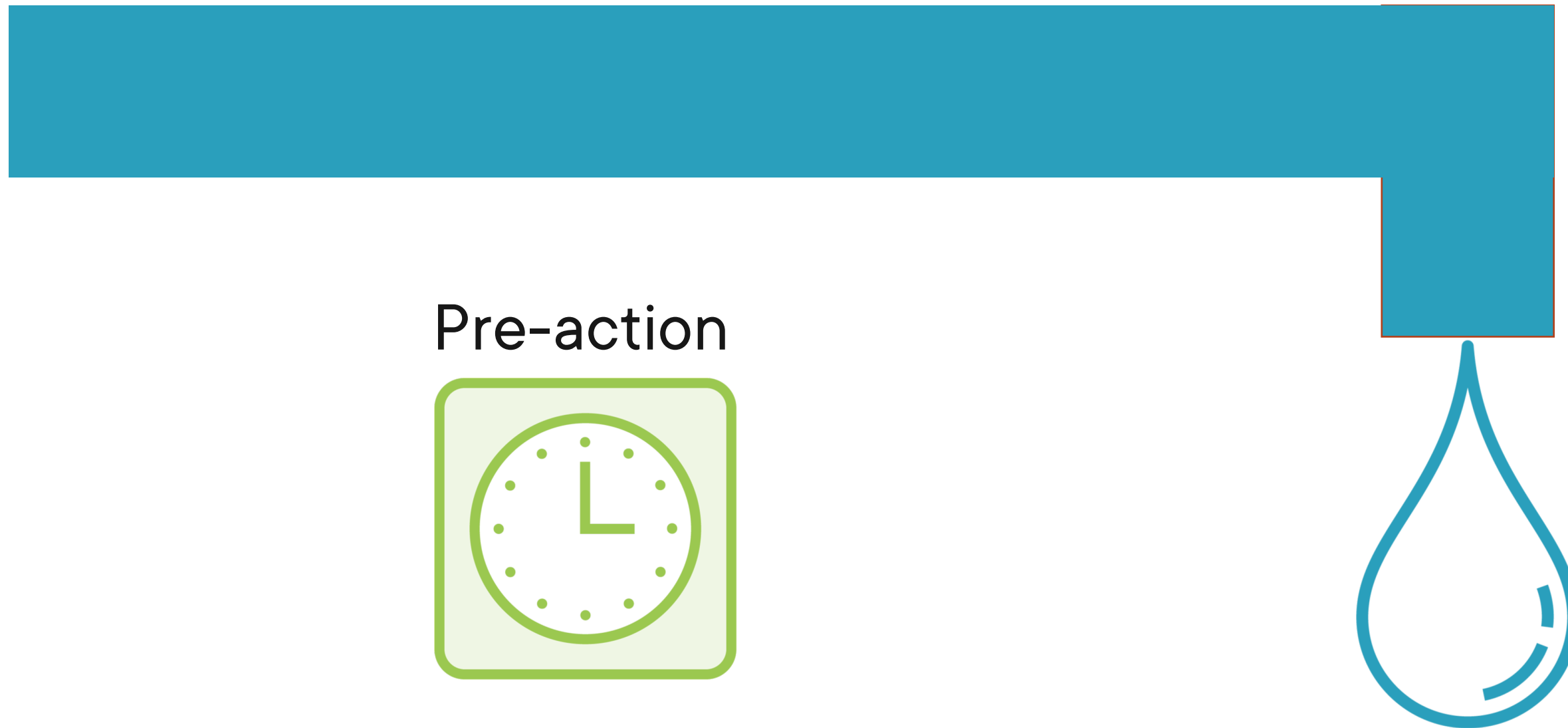


Pre-action

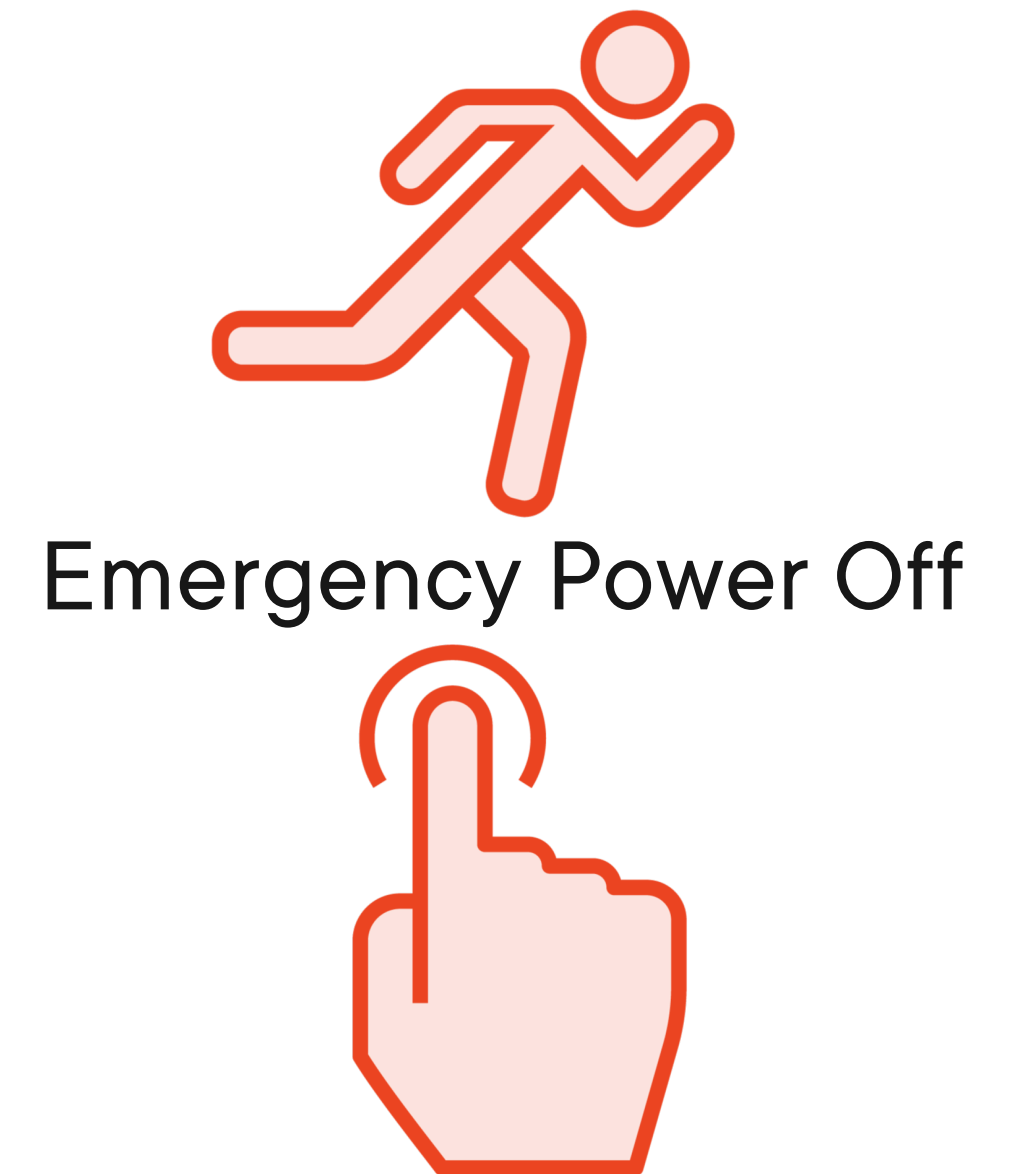


Water-based Suppression in Data Centers

Dry-pipe



Pre-action



Emergency Power Off



Design Resilience - Heating Ventilation and Air Conditioning



Heating, Ventilation, and Air Conditioning (HVAC)



Data centers have high electricity consumption

Have heavy carbon footprint

Most of the cost is cooling

Leaders in industry run systems at higher temperature



ASHRAE guides

18–27° C

5–15° C DP

60% RH

Standards/Recommendations



Types of Cooling

Latent cooling

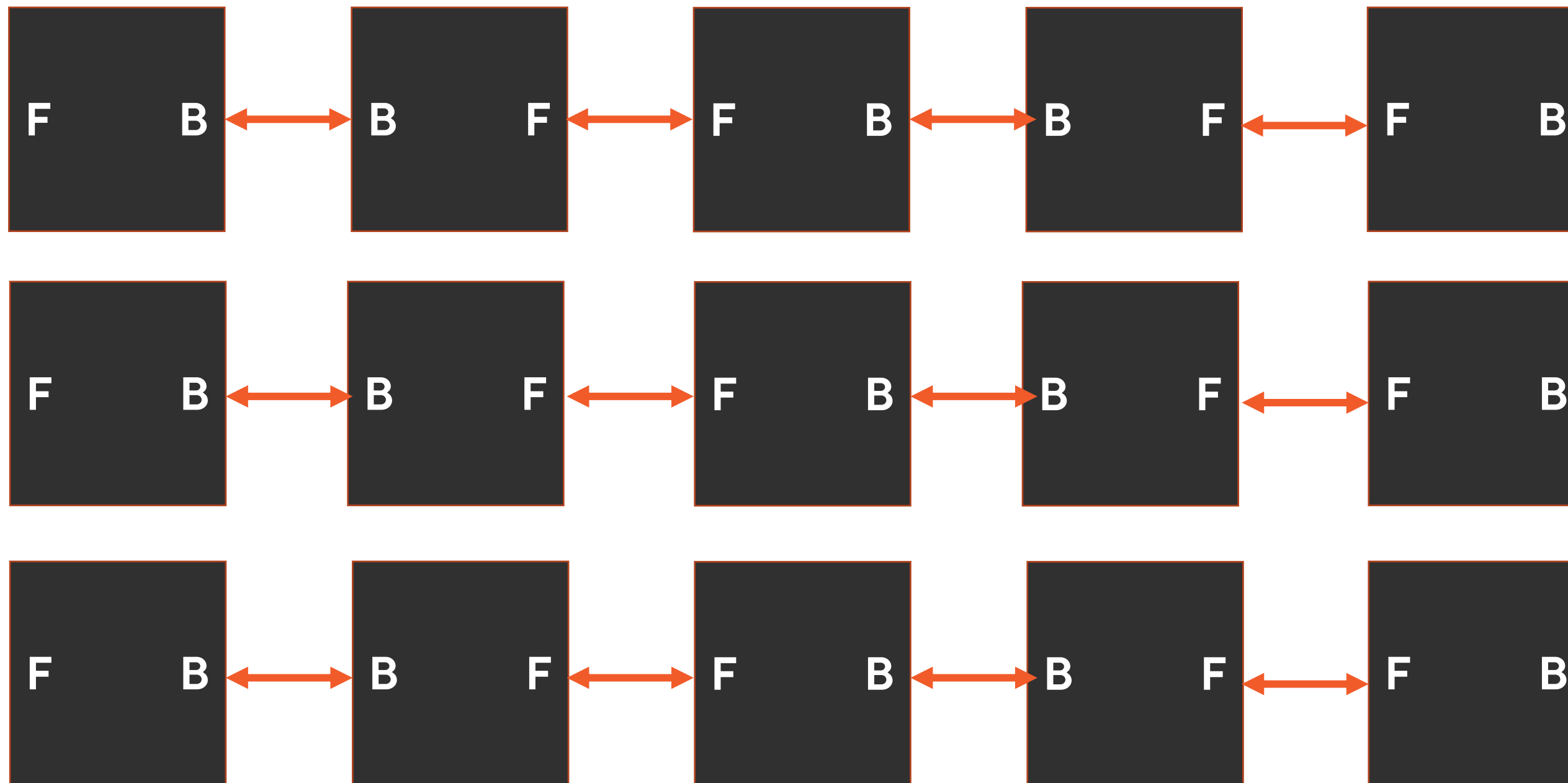
Removes moisture

Sensible cooling

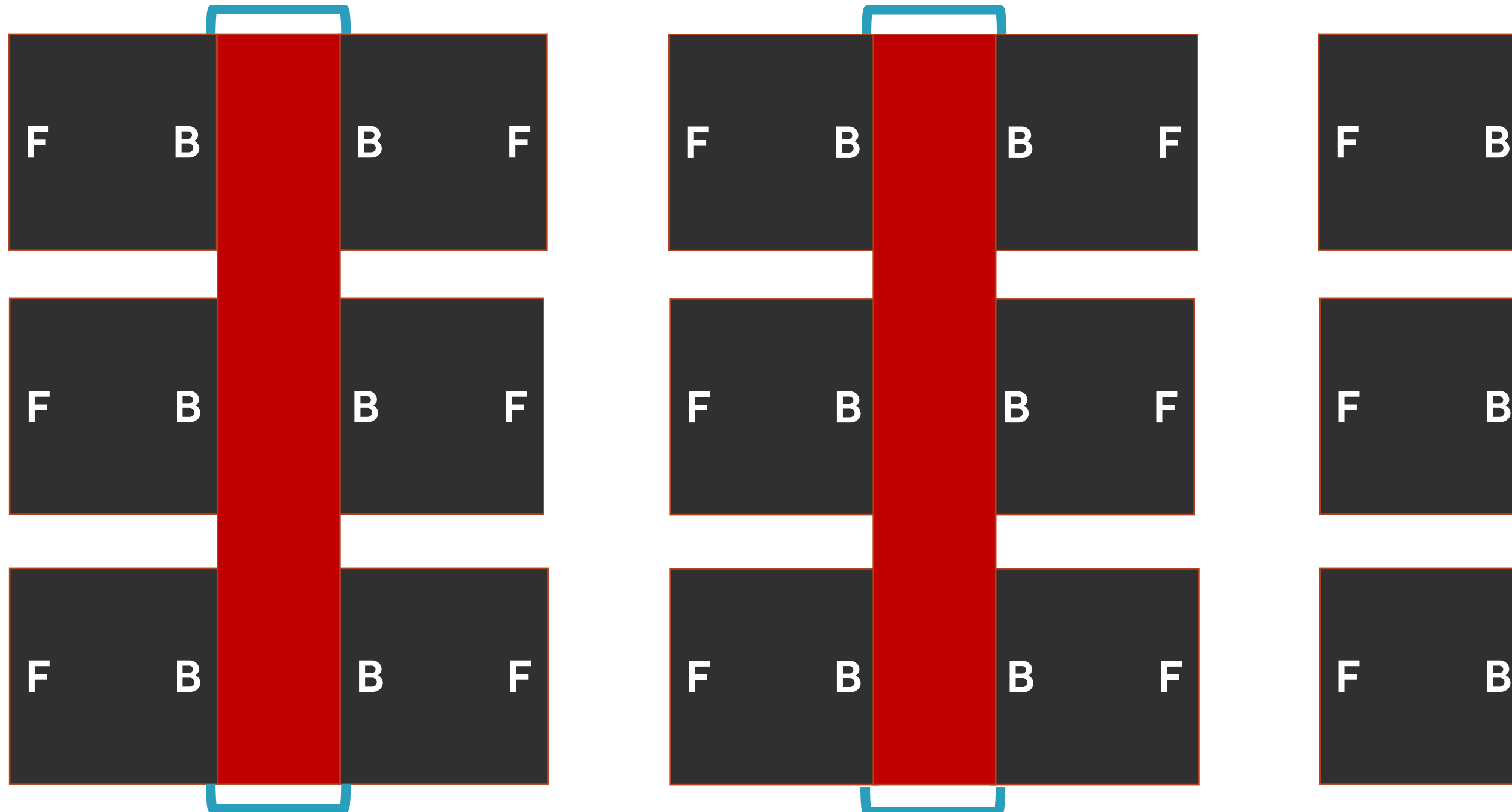
Removes heat



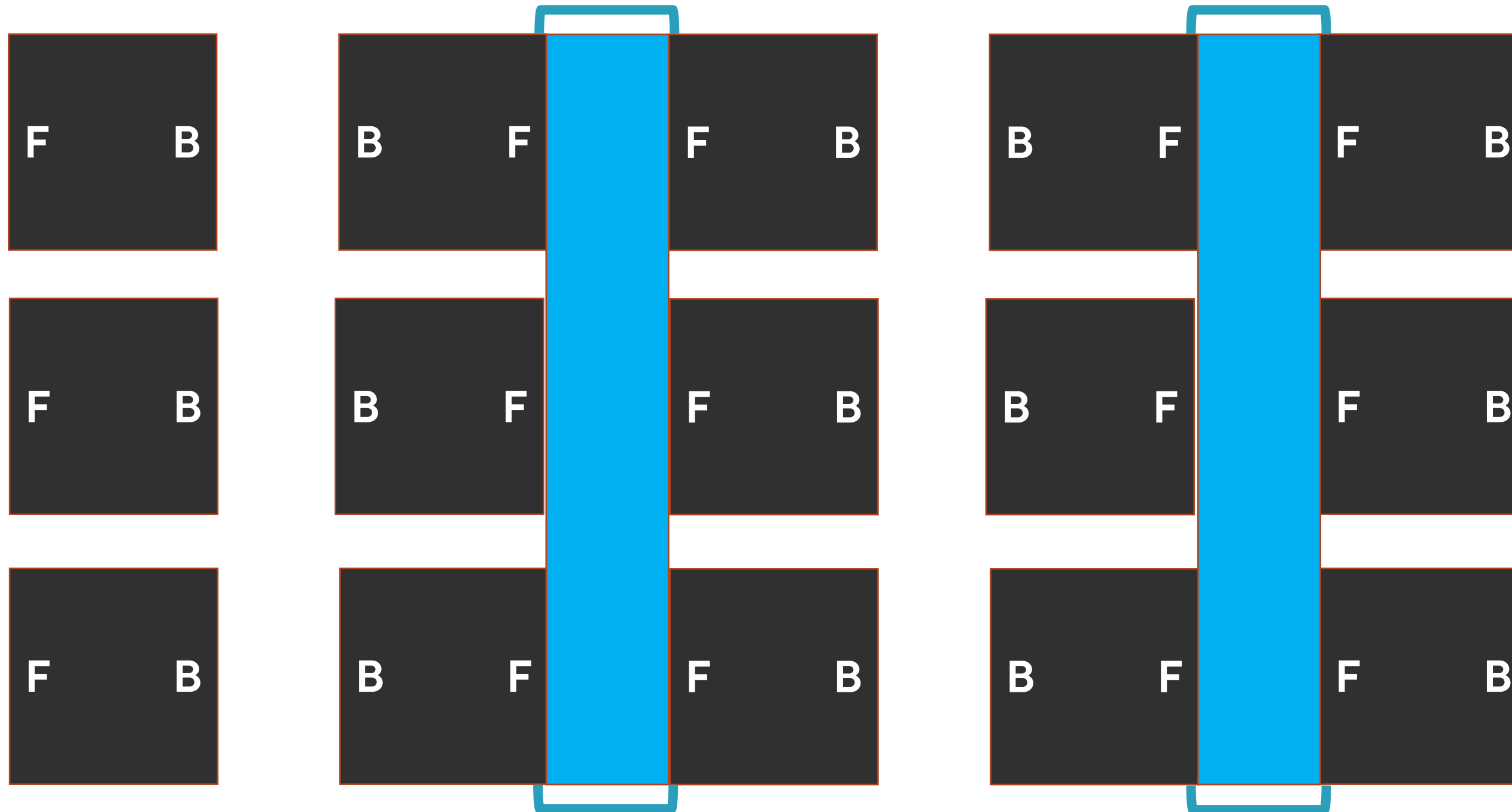
Hot and Cold Aisle Containment



Hot Aisle Containment



Cold Aisle Containment



Design Resilience – Availability Classes



Availability Classes

Class 1

Single-path
(no resilience)

Class 2

Single-path
(resilience)

Class 3

Multipath
(redundancy)

Class 4

Multipath
(fault tolerant)



Data Center Site Infrastructure Tier Standard

Tier IV

Tier III

Tier II

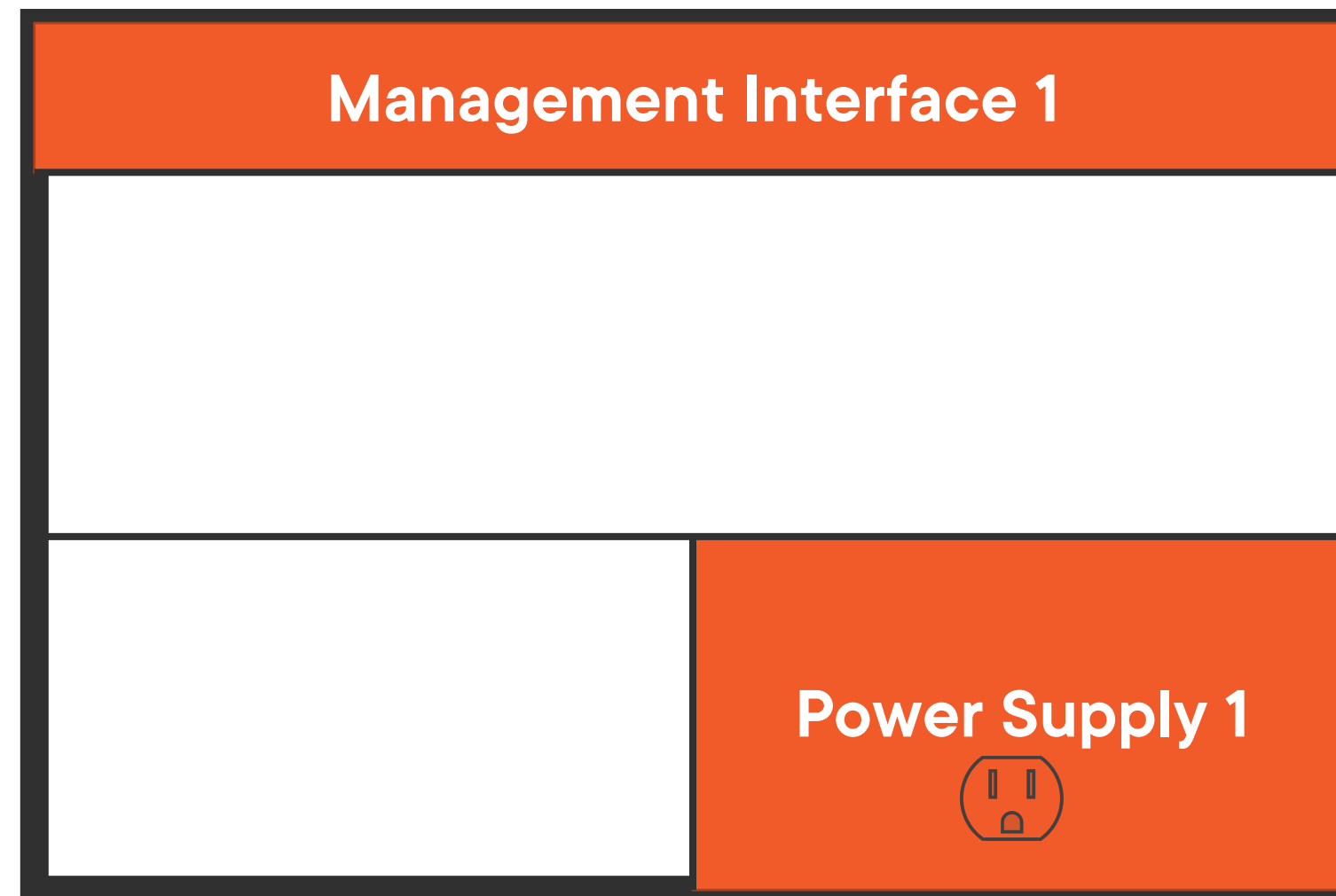
Tier I



Data Center Site Infrastructure Tier Standard

Tier I

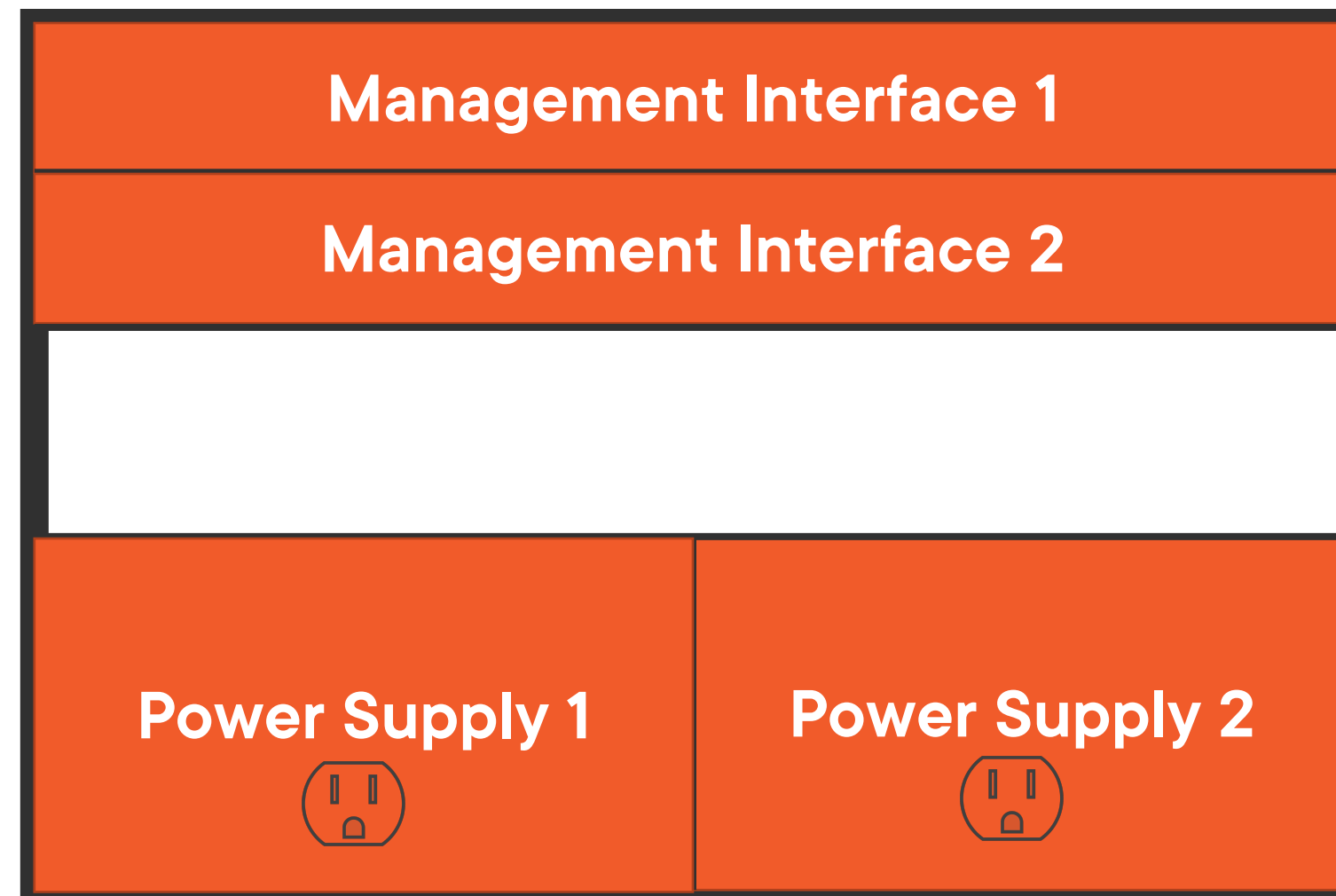
Data Switch 1



Data Center Site Infrastructure Tier Standard

Tier II

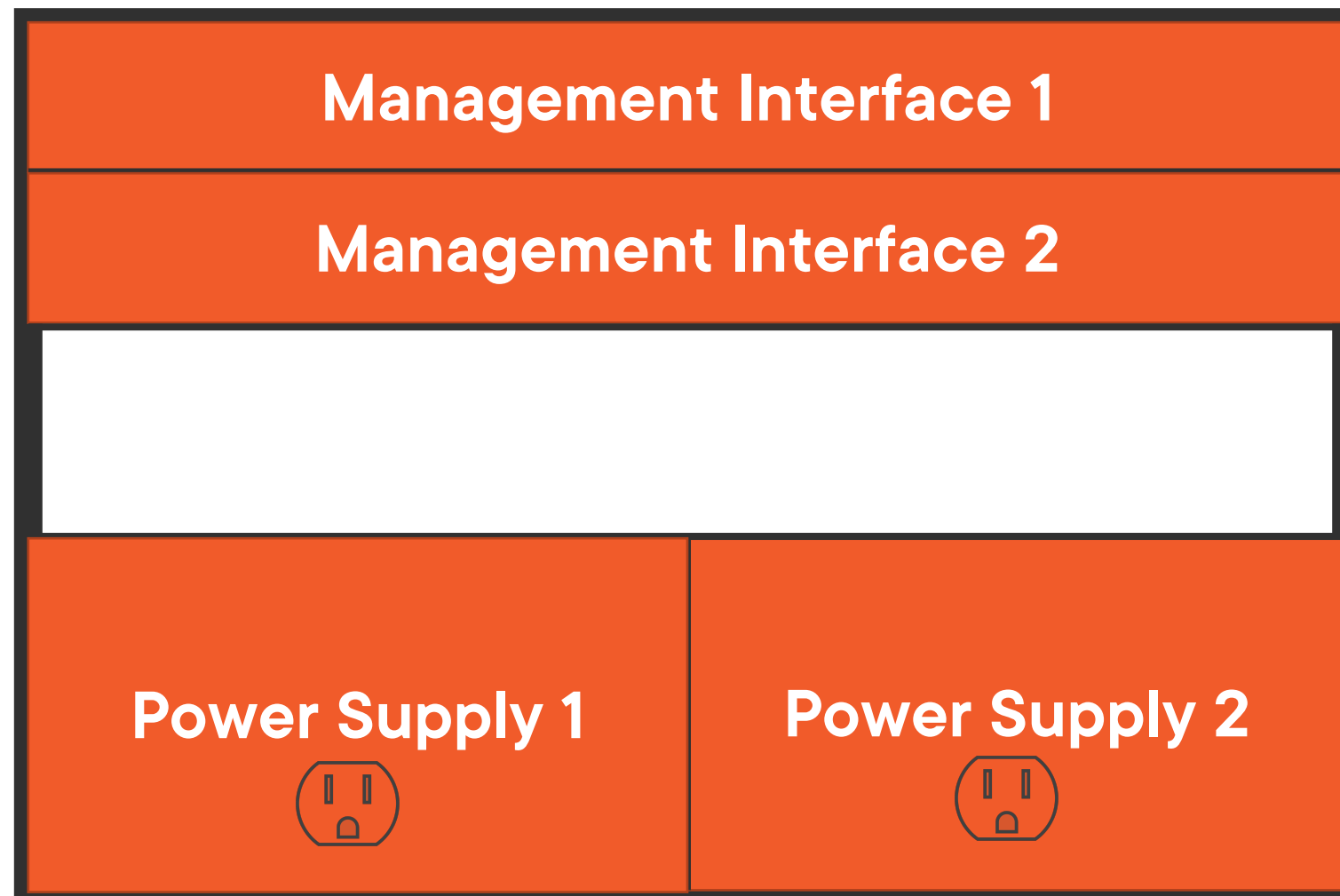
Data Switch1



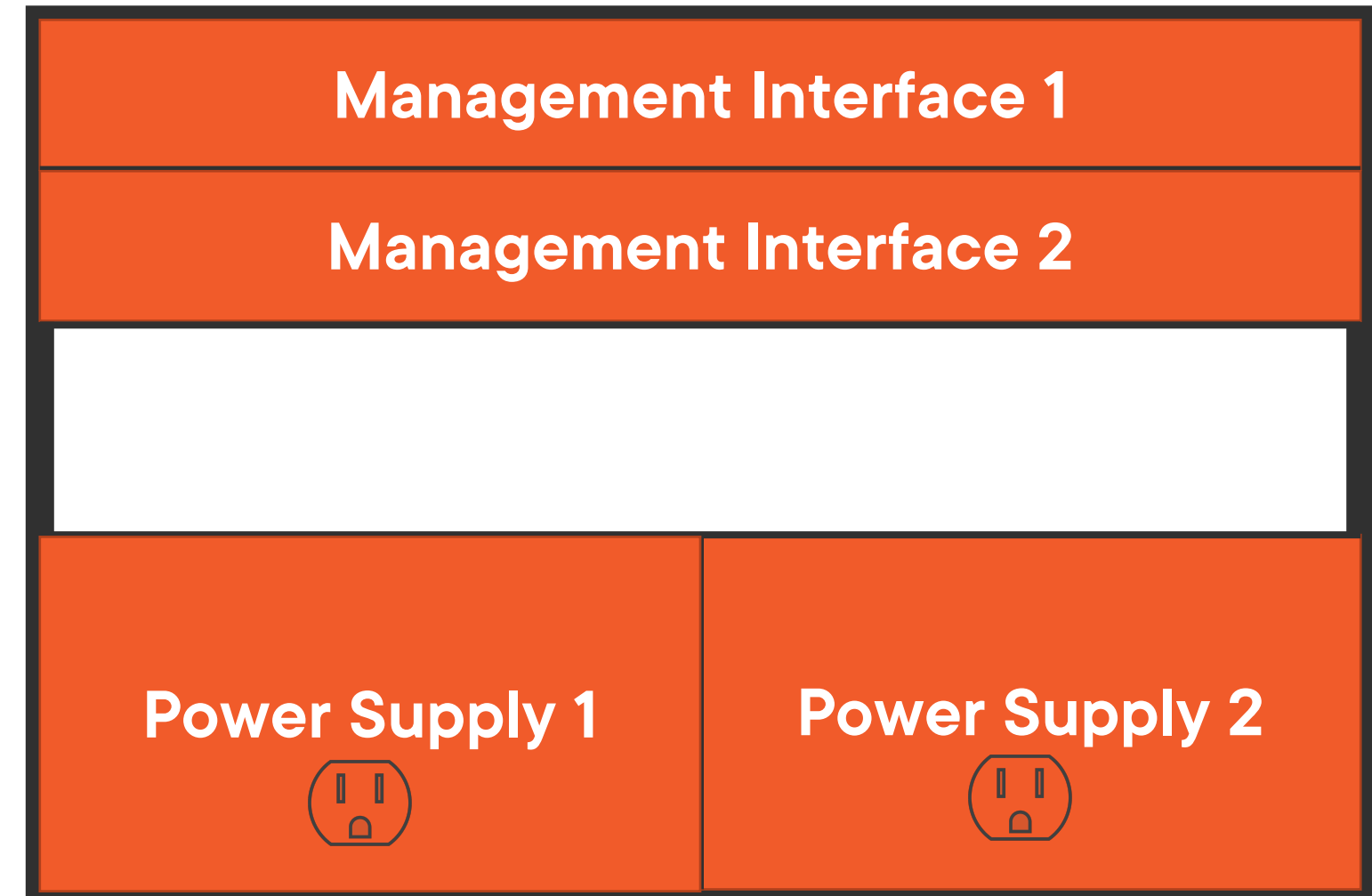
Data Center Site Infrastructure Tier Standard

Tier III

Data Switch 1 - Active



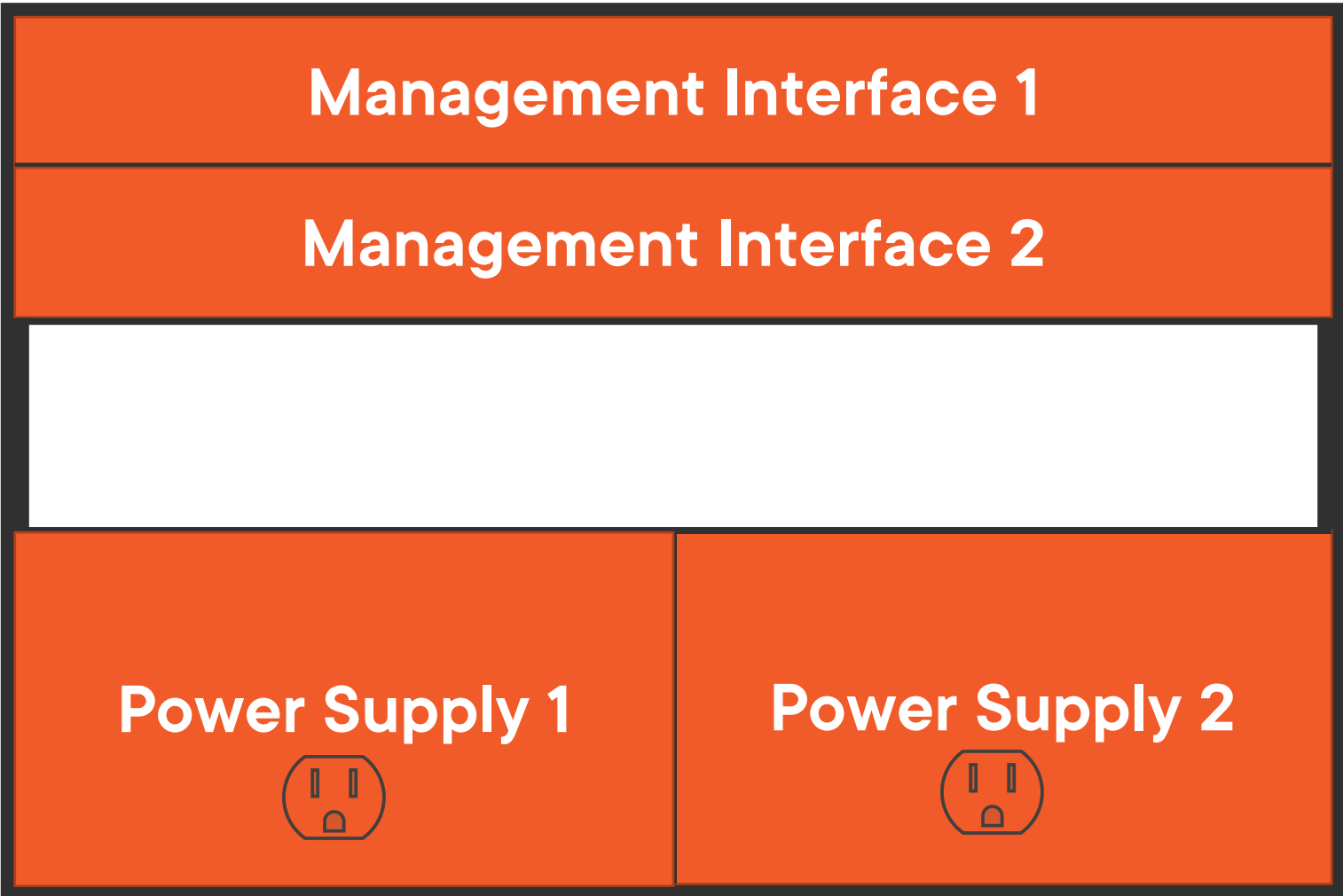
Data Switch 2 - Passive



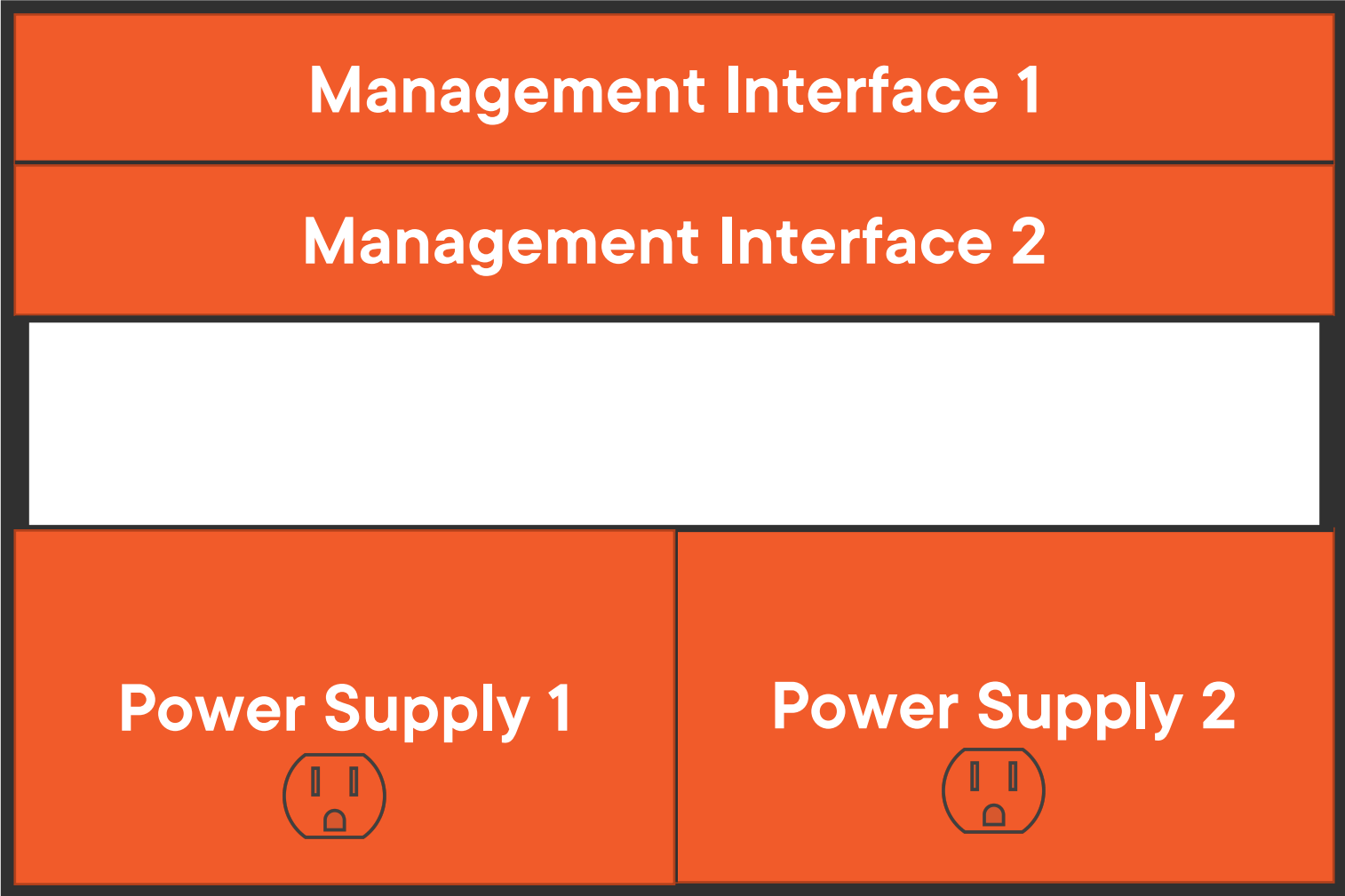
Data Center Site Infrastructure Tier Standard

Tier IV

Data Switch 1 - Active



Data Switch 2 - Active



Summary



How may the provider's renewable energy initiatives affect your patronage?

Consider how the modification of the threat environment affects availability

Understand how notions of protection classes can be used in your environment



Up Next:
Cloud-based BCDR

