What Are Data Center Tiers and Why Do They Matter?

Data center tiers are used to classify the capacity and quality of a data center facility. They act as a measure for customers to assess the suitability of a data center to their needs.
In order to categorize data center facilities, the Uptime Institute – an authority for global IT standards – designed a four-tier system to benchmark and certify data center facilities based on their infrastructure redundancy and, ultimately, expected uptime.

The Tier Classification System increases in reliability and cost as the levels go higher. Therefore, businesses should assess their colocation needs against costs carefully to avoid over- or underestimating data center tier requirements.

The Uptime Institute's Tier Classification System
Tier I

Tier 1 data centers operate with non-redundant capacity components and a single, non-redundant distribution path. For this reason, Tier 1 providers are considered the least reliable out of the four tiers, as there is no default backup system in place should systems go offline. The cost of Tier 1 data centers are typically lower than other tiers and usually suit small businesses that have minimal data hosting needs or that can withstand downtime.

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Summary:

Single non-redundant distribution path

o Lack of a backup system

o Lowest cost tier o Approximate uptime is 99.671% with an average of

28.8 hours of downtime annually

Tier II

Tier 2 data centers have the same minimum requirements as Tier 1; however, the single distribution path for Tier 2 centers operates with redundant power and cooling capacity components.

These features render Tier 2 data centers more reliable than Tier 1 because they are less susceptible to unexpected outages. For instance, some basic maintenance can be carried out with minimal disruption to the main power supply. Summary:

o Single distribution path

o Limited backup components

Improved reliability

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- Approximate uptime is 99.741% with an average of 22 hours downtime annually

Tier III

Tier 3 data centers are the most common data centers operated by today's colocation providers. A key component of a Tier 3 data center is that its components are concurrently maintainable, meaning that single components, such as a generator, or a UPS, can be taken offline for maintenance purposes without affecting the connected power load of the server racks in the data center. Tier 3 data centers have multiple links and dual-powered distribution paths for power sources and cooling so that one path can take over from another temporarily in the event that it fails; ensuring systems remain online.

In addition, Tier 3 data centers allow for improved management of redundancy and backups during unanticipated downtime. This combined with cost efficiency, make Tier 3 data centers a common choice for most businesses.

Summary:

o Concurrently maintainable mechanical and electrical systems o N+1 backup capability so the system is able to have 1 backup in place should a component fail

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  Multiple links, dual-powered paths, and components

  Uptime rate of 99.982% with around 2 hours downtime annually

  Tier IV
  Tier 4 data centers include all the infrastructure of Tier 3 with an emphasis on fault tolerance in their design.

  Fault tolerance is the ability of a system to continue operating despite the failure of one or more of its components, or put differently, the system's ability to isolate errors where they occur and to resolve interruptions or software related errors.

  The sophisticated structure of Tier 4 data centers features fully redundant components, multiple dual-powered servers, and power cooling equipment – providing for the greatest uptime.

  Summary:

  - Fault tolerant system infrastructure ○ Complex infrastructure with 2N redundant power and cooling capability; a backup for every component in the system

  - Best suited to enterprises with multi-varied data center needs

- Uptime of 99.995% with approximately 26.3 minutes of downtime annually

Why data center tiers matter

A significant aspect for companies to consider while evaluating their colocation needs is that of concurrent maintainability – a term that refers to the ability to manage system maintenance or failures without causing disruption to customers.

Looking at the above tiers in terms of concurrent maintainability, it's evident that Tiers I and II would work for small companies that have minimal to no backup requirements and are using facilities for information or processes that are not mission critical.

On the other hand, the infrastructure of Tiers III and IV make it easier to achieve a higher level of concurrent maintainability, making them a default option for companies' with mission critical system and storage needs that require the maximum uptime.

Taking this into account, it is clear that data center tier classification plays a highly useful role for both customers and providers.

For providers, data center tiers assist in defining and conveying the capacity and capability of a data center facility. Industry standard also assist in aligning development strategies for new facilities.

From the customer's point of view, data center tiers provide a basis to estimate data center needs against projected downtime costs. In this way, lower level tiers are allocated to companies with lower risk investment and higher tiers are designated for ventures or workloads that require consistent uptime.

It is also important to note that obtaining certification for a data center is an expensive process – particularly for Tiers III and IV. Because of this, some providers will build facilities to have the structure of a given tier but not get the official certification. In this case, they usually refer to their facilities as equivalent – for example, "Tier 3 equivalent." Therefore, it is also advisable for businesses to practice due diligence when consulting providers about their facilities to confirm uptime guarantees in SLAs and equipment redundancy standards.

Overall, the data center tier system continues to develop with industry trends, further refining the data tier classification and certification process.