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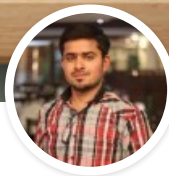
Continuous Optimization:

**The Next Evolution
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DevOps Blog

Availability: What's the Difference?



May 13, 2020

4 minute read



Muhammad Raza

When you pay for a [service](#) or invest in the underlying technology infrastructure, you expect the service to be delivered and accessible at all times, ideally. In the real world of enterprise IT however, ideal

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is used in this evaluation are **Reliability** and
takenly used interchangeably, both terms have
ve different purposes, and can incur different
d standards of service levels.

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Availability

The percentage of
time that the
infrastructure, system,
or solution is
operational under
normal circumstances.

Reliability

The probability that
the system will meet
certain performance
standards and yield
correct output for a
specific time.

Both reliability and availability serve as key decision factors in your IT strategy. Make sure you understand these concepts before planning and implementing IT infrastructure solutions.

Let's take a look.

Availability refers to the percentage of time that the Infrastructure,

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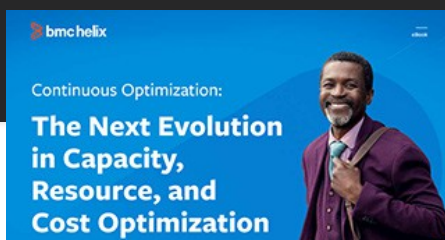
remains operational under normal circumstances in a defined purpose. For [cloud infrastructure solutions](#), the time that the data center is accessible or service as a proportion of the duration for which it is used.

Formula for Availability is :

$$\text{Availability} = (\text{total elapsed time} - \text{sum of downtime}) / \text{total elapsed time}$$

If a service is purchased at a 90 percent [service level agreement](#) for its availability, the yearly service downtime could be as much as 36.5 days. For an SLA of 99.999 percent availability ([the famous five nines](#)), the yearly service downtime could be as much as 5.256 minutes.

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The 9s of Availability

Availability percentages vs service downtime

Availability %	Downtime per year	Downtime per month	Downtime per week
90% (1 nine)	36.5 days	72 hours	16.8 hours
99% (2 nines)	3.65 days	7.20 hours	1.68 hours
99.5%	1.83 days	3.60 hours	50.4 minutes
99.9% (3 nines)	8.76 hours	43.8 minutes	10.1 minutes
99.95%	4.38 hours	21.56 minutes	5.04 minutes
99.99% (4 nines)	52.56 minutes	4.32 minutes	1.01 minutes
99.999% (5 nines)	5.26 minutes	25.9 seconds	6.05 seconds
99.9999% (6 nines)	31.5 seconds	2.59 seconds	0.605 seconds
99.99999% (7 nines)	3.15 seconds	0.259 seconds	0.0605 seconds

(Source)

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Organizations may want to invest in [different SLA agreements](#) for different types of workloads:

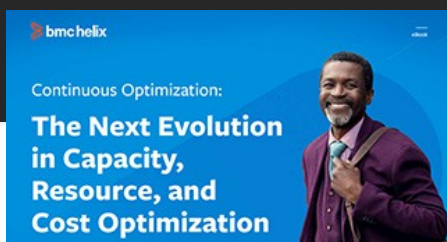
- A mission-critical cloud infrastructure service may require 'six 9s' of availability to ensure the core app functionality is always up and running.
- Low-priority workloads may run reasonably well at low SLA performance in terms of service availability.

Merely having a service available isn't sufficient. When an IT service is available, it should actually serve the intended purpose under varying and unexpected conditions. One way to measure this performance is to evaluate the reliability of the service that is available to consume. Organizations depend on different functionality and features of the IT service to perform business operations. As a result, they need to measure how well the service fulfils the necessary business performance needs.

What is reliability?

Reliability refers to the probability that the system will meet certain performance standards in yielding correct output for a desired time duration.

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Reliability can be used to understand how well the service will be available in context of different real-world conditions. For instance, a cloud solution may be available with an SLA commitment of 99.999

ties to sophisticated cyber-attacks may cause IT control of the vendor. As a result, the service may be down for several days, thereby reducing the effective service.

The Reliability of a system is equally challenging. There may be several ways to measure the probability of components that impact the availability of the system. To calculate the [Mean Time Between Failures](#)

$$\text{MTBF} = (\text{total time} - \text{sum of downtime}) / \text{number of failures}$$

MTBF represents the time duration between a component failure of the system. Similarly, organizations may also evaluate the [Mean Time To Repair \(MTTR\)](#), a metric that represents the time duration to repair a failed system component such that the overall system is available as per the agreed SLA commitment.

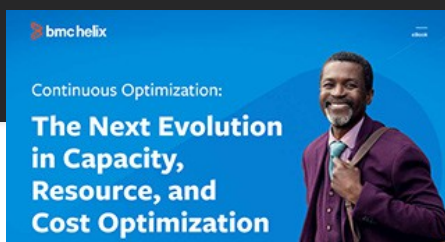
Other ways to measure reliability may include metrics such as fault tolerance levels of the system. Greater the fault tolerance of a given system component, lower is the susceptibility of the overall system to be disrupted under changing real-world conditions.

Using availability & reliability

The measurement of Availability is driven by **time loss** whereas the measurement of Reliability is driven by the **frequency** and **impact** of failures. Mathematically, the Availability of a system can be treated as a function of its Reliability. In other words, Reliability can be considered a subset of Availability.

For either metric, organizations need to make decisions on how much time loss and frequency of failures they can bear without disrupting the overall system performance for end-users. Similarly, they need to decide how much they can afford to spend on the service,

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- Infrastructure management
- Monitoring, troubleshooting and repair

- Security
- Other associated operations that make the service adequately reliable and available

While vendors work to promise and deliver upon SLA commitments, certain real-world circumstances may prevent them from doing so. In that case, vendors typically don't compensate for the business losses, but only reimburses credits for the extra downtime incurred to the customer. Additionally, vendors only promise "commercially reasonable" efforts to meet certain SLA objectives. As such, customers are expected to leverage adequately redundant and failover systems to guarantee availability and reliability of the service in response to disruptions caused by impactful natural disasters such as [Hurricane Sandy](#).

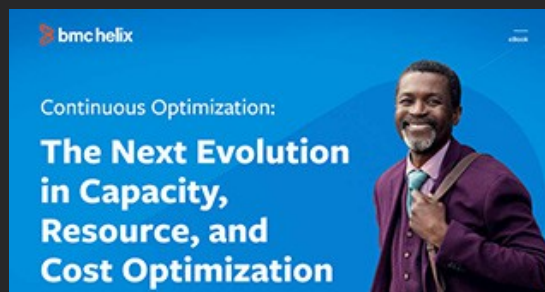
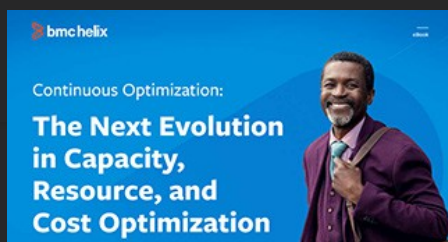
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- [BMC Service Management Blog](#)
- [BMC IT Operations Blog](#)
- [System Reliability & Availability Calculations](#)
- [Impact of Redundancy on Availability](#)
- [What Is High Availability? Concepts & Best Practices](#)

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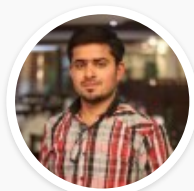


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About the author



Muhammad Raza

Muhammad Raza is a Stockholm-based technology consultant working with leading startups and Fortune 500 firms on thought leadership branding projects across DevOps, Cloud, Security and IoT.

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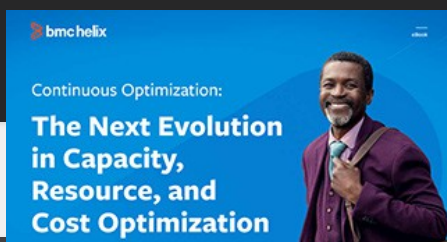
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