WHAT IS SDI? HOW SOFTWARE-DEFINED INFRASTRUCTURE WORKS

Several decades ago, virtualization was introduced to transform the way IT infrastructure resources were consumed. The logical abstraction between the physical hardware and the software resources allows organizations to improve IT service performance and delivery.

Since then, the industry has evolved and now experiences unprecedented demands on modern IT infrastructure, like:

- Service availability
- Flexibility
- Security

Increasing dependence on technology to reach end-users and customers has forced vendors to find new and effective ways to meet high standards of Service Level Agreements (SLAs). One popular was is software-defined infrastructure (SDI).

Let's take a look.

What is software-defined infrastructure?

SDI is the operation and control of IT infrastructure entirely using software technologies and without involvement of the human element.

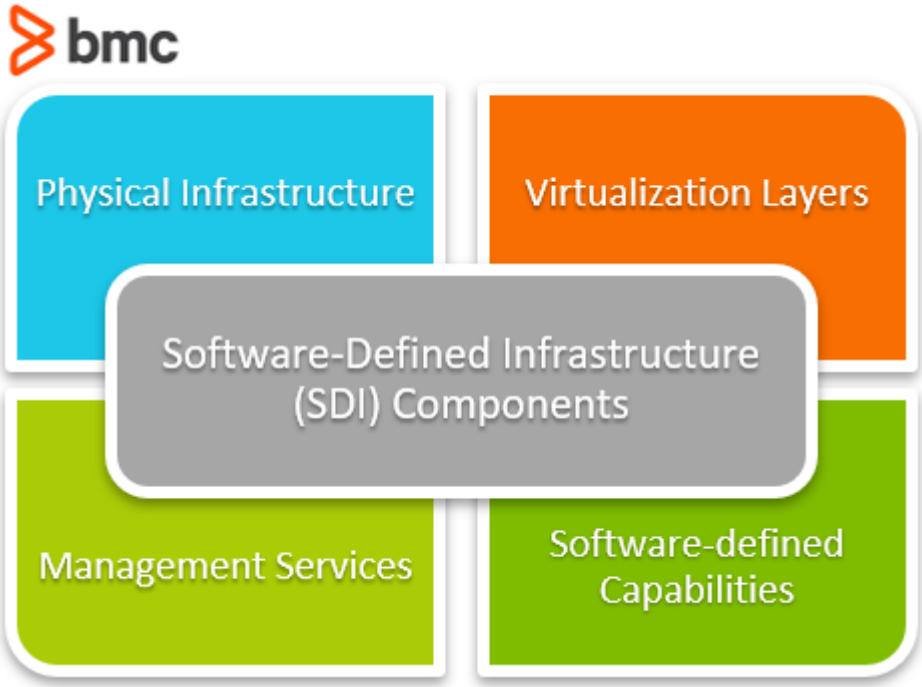
SDI has emerged as a promising approach to address the extensive demands on maximizing the value potential of infrastructure deployments.

Processes in SDI including infrastructure control, management, provisioning, configuration and other architectural operations are performed automatically via software as per application requirements and the defined operational policies. Since the changes are not dependent or limited to the human involvement, SDI enables intelligent infrastructure processes based on the changing IT operation requirements in real-time.

The IT infrastructure therefore becomes intelligent, taking smart decisions on its own in order to meet the defined goals on:

- SLAs
- Performance
- Security
- Other considerations

SDI allows the infrastructure to operate as a self-aware, self-healing, self-scaling and self-optimizing IT environment to enable truly agile business processes.



How software-defined infrastructure works

The Software-Defined Infrastructure stack typically comprises of the following components:

- **Physical infrastructure.** At the machine level, SDI comprises the hardware resources such as servers and networking devices, as well as firmware, hypervisors, and other endpoint terminals. The infrastructure components may be scaled on an ongoing basis to address changing IT needs, while the SDI functionality can encompass the expanding infrastructure.
- **Virtualization layers.** Virtualization is applied to the infrastructure resources such as storage and network components. A heterogeneous architecture of computing resources is maintained. This component sits directly above the physical infrastructure level within an SDI architecture.

- **Software-defined capabilities.** Capabilities such as Software-Defined Networking (SDN), Software-Defined Compute, and Software-Defined Storage are applied to the virtualized layer of computing resources. Intelligent monitoring and control systems are deployed to automatically transform the network, compute, and storage resources per the architecture policies. End-users may define their requirements pertaining to resource provisioning and server deployment, while the intelligent control systems will take on the responsibility of configuring the underlying infrastructure and managing the virtualized resources.
- **Management services.** At the infrastructure management level, SDI may involve the user-interface to define parameters such as SLA performance, availability, scalability, and elasticity. IT admins or internal IT users may also request provisioning of resources. The management services layer will take care of all infrastructure operations necessary to ensure that desired standards of SLA and performance are maintained.

Attributes of a successful SDI

The SDI approach goes beyond the deployment of core SDI components and should be designed to realize the key attributes of a successful SDI strategy. These attributes may vary based on organizational requirements regarding the infrastructure scalability, agility, security, performance, reliability, and compliance.

Common attributes may include the following:

Intelligent virtualization

SDI should aim to:

- Enhance the portability of IT workloads
- Remove dependencies from the underlying infrastructure

While virtualization and layers of abstraction are necessary, an effective SDI infrastructure is composed of strong intelligence capabilities to orchestrate the infrastructure resources and architecture for maximum performance and reliability.

Software-driven innovation

Software-centric SDI strategy focuses on using commercial off the shelf hardware instead of investing in proprietary and customized hardware solutions. Software is used to fill the gap in transforming commercial hardware platforms into a flexible and scalable infrastructure backend.

Open source hardware designs can further help remove the barriers in scaling the infrastructure to meet the desired standards of an SDI architecture.

Modular design

Adaptability, a key attribute of an effective SDI strategy, is enabled by introducing modularity in the design of the software architecture. The roles of different infrastructure resources are distributed across different technical functionality as defined by the software. To achieve modularity, look at techniques such as:

- Software Oriented Architecture (SOA) design

- Microservices

Context awareness

Legacy infrastructure architecture may not be designed to collect information on context such as incidents, triggers, warning, events or other parameters from related infrastructure components.

An effective SDI strategy should involve selective identification, access, and analysis of relevant metrics to accurately determine and manage performance, security, and compliance of the IT infrastructure.

Performance focused

Organizations may assess the performance in terms of the availability, security, and compliance posture of the wider infrastructure. The SDI approach should be designed to achieve high standards of performance by introducing capabilities such as:

- Strong encryption and access controls
- Redundancy in architecture
- Monitoring
- Visibility
- Control over the infrastructure

Policy-based systems

The SDI should be designed to meet the purpose and goals of the organization's infrastructure operations. Establish a policy-driven approach to:

- Continuously monitor infrastructure performance
- Enforce the changes necessary to comply with IT, operational, and business policies

Instead of introducing manual automation scripts every time a change is needed, SDI can automatically identify the requirements and issues appropriate commands to infrastructure components.

Open-source driven

Open source technologies remove the barriers that prevent elastic and flexible operations of the infrastructure. An SDI architecture requires multiple interfaces and components to operate as integrated, interoperable, elastic and flexible pool of infrastructure resources.

By following open standards, organizations can build an open and agile IT environment that allows the software to manage, configure, provision and operate the infrastructure autonomously while meeting intended SLA performance standards.

Benefits of SDI for the enterprise

Software Defined Infrastructure allows organizations to control how IT workloads are distributed and optimized to maximize the value potential of infrastructure deployments. Early movers in the SDI journey can take advantage of the technology and deliver optimum levels of service delivery for

customers in terms of low latency and high performance of apps as their key competitive differentiation.

The ability to realize the true potential of infrastructure deployments and operate agile software-driven architecture empowers organizations to test new business models and offer improved customer experiences in response to changing market trends.

For progressive organizations, SDI continues to prevail as a key business enabler with its expanding scope of automation, intelligence and virtualization applied to cloud-based data center technologies.

Related reading

- BMC IT Operations Blog
- What Is SDITO? Software-Defined IT Operations Explained
- What Is a Software-Defined Data Center? SDDCs Explained
- Converged vs Hyperconverged Infrastructure: The Differences Between CI & HCI
- What Is a Virtual Network?
- IT Infrastructure Management: An Introduction