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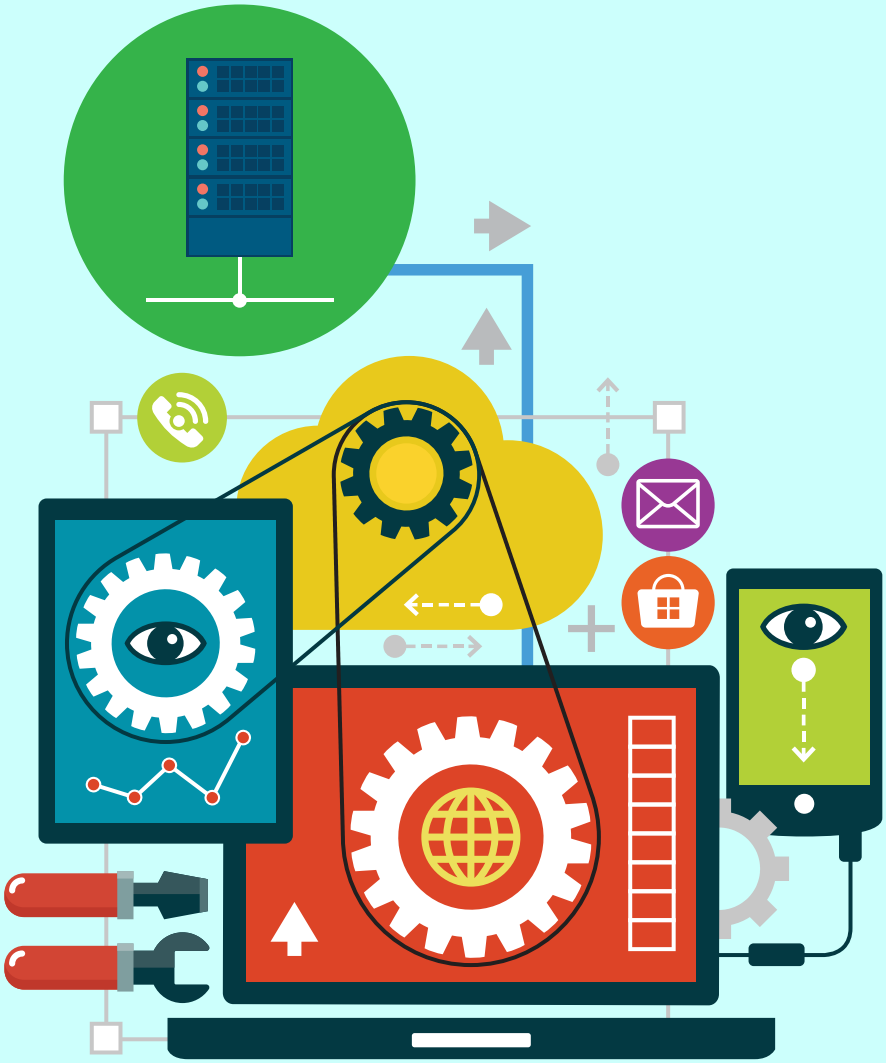
The Mindful IT Company
Born **Digital** . Born **Agile**

Evolution of the Software Defined Data Center



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Abstract

SDDC – a term that still dwells in the futuristic sense of things, is perhaps the next major milestone in a cloud-centric world that can entirely change the way data is stored and managed. A fully software defined and software led data center can radically change the way IT infrastructure works today.

Software-Defined Data Center (SDDC) is one of the newest, yet most talked about term among enterprises today. Coined in 2012, the idea may have seemed far-fetched initially placing software at the forefront of the data center against hardware, However, it has become 'the reality' and from what we have learned from other apparently bizarre technological ideas of the past, this new reality is going to decide the future of data centers.

While programmatically automating resource allocation and consumption based on business requirements is futuristic, this evolution of IT infrastructure and architecture represents a complete paradigm shift from today's standard operating procedures for architecting and provisioning IT services. This future of the data center is still in the debate stages.

But enterprises in their pursuit to be future-ready can be seen gradually treading towards adopting SDDC. For them it is absolutely necessary to understand its impact, potential risks and expected benefits before they embark on their journey of implementing it. This paper gives an oversight of future scenarios and probable implications on today's legacy infrastructure, tools, and facilities.

The big promise of SDDC

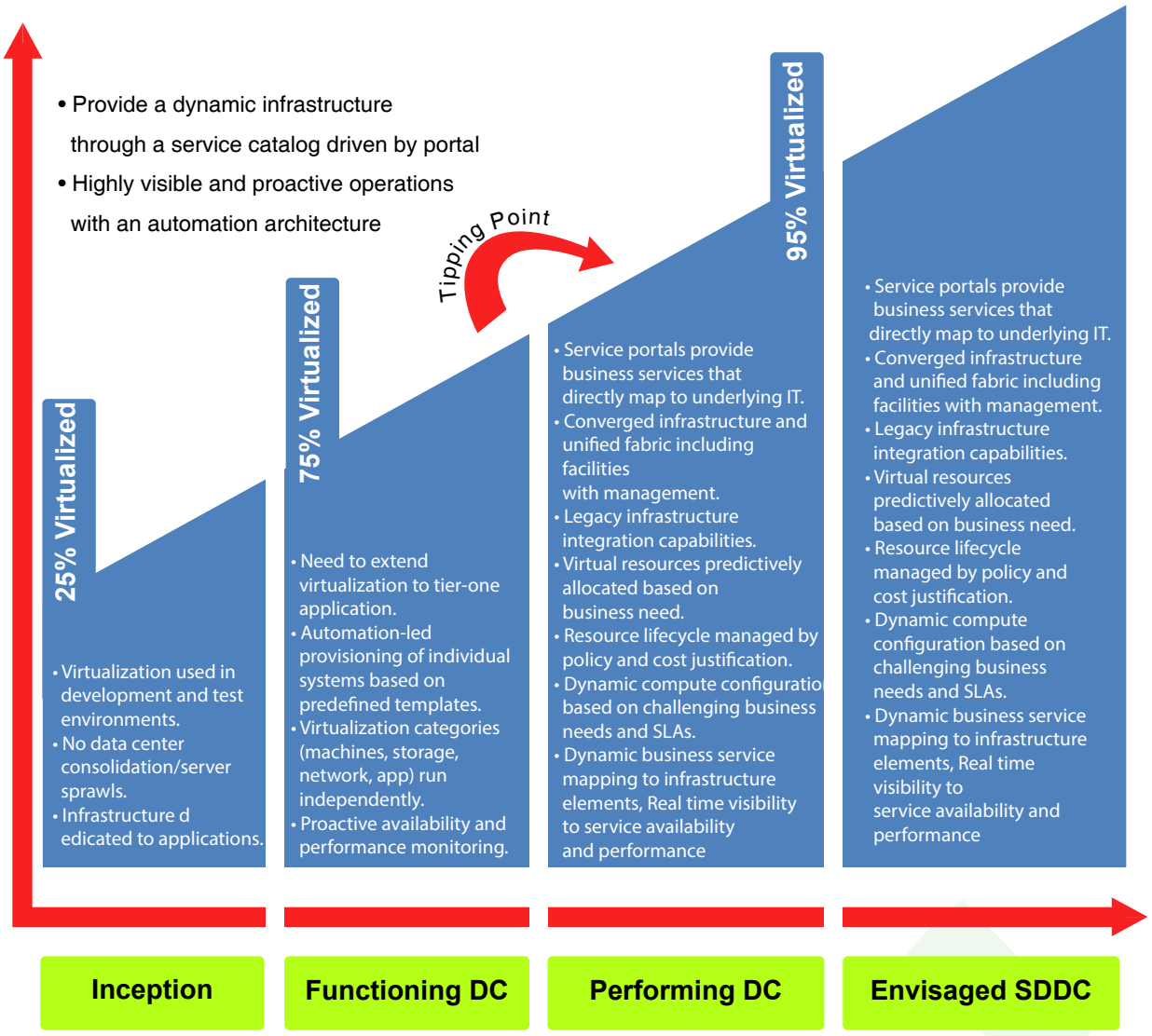
The concept of SDDC paves the way for better efficiency and effectiveness for IT in meeting business demands. The hypothesis of a software-defined network implementation, a company can access a virtual port that can be programmatically controlled to work as a router or firewall or load balancer. This eliminates the need for physical devices for each IT function. That being said, hardware cannot be eliminated in an SDDC. The hardware restrictions and storage IOPS capabilities will depend on the physical hardware deployed.
With SDDC, virtualized data can be separated from physical locations for efficient data retrieval and updates. There are more such benefits that we can look forward to from an SDDC:

- Single view of skills can administer the entire IT existence, instead of managing and administering individual IT functions
- Standardization across processes and systems will be easy with increased utilization of resources within a data center
- Scope for more just-in-time environments instead of infrastructure procurement process for every business application
- Enterprises can become more fungible and agile to meet business demands in a challenging and dynamic business environment
- Potential to achieve self-service IT in enterprises in place of multiple touch points for resolving issues or request fulfillments

Moving towards SDDC – the adoption roadmap

Enterprises need to draw the adoption path for SDDC based on the level of infrastructure maturity. SDDC is still evolving; enterprises therefore need to be very proactive and consider the futuristic angle of this data center. It involves them to be agile and nimble enough to adapt to change quickly.

The following illustration shows the maturity curve for enterprises taking the initial steps towards SDDC.



Points to keep in mind

To move into an SDDC environment, enterprises need to:

- Have a sustained and long term vision for SDDC and overcome all resistance to change
- Get formal and proper training on the technology and concept
- Refine and validate functionality, licensing policies and support from OEM partners for business applications and commercial-off-the-shelf (COTS) products to be used
- Run impact assessment and implementation plan to align SDDC with server build architects, network and security architects and storage architects
- Hire a data center facilities operator for converged infrastructure implementation and an IT security officer to revisit standards and align as per security-based goals for the organization
- Hold a pilot run before roll out

Challenges

There are several challenges in mainstream adoption of SDDC that the industry needs to overcome. Some of the primary ones include:

- The SDDC stack needs a mechanism to identify legacy infrastructure, physical infrastructure and intuitively create a controlled environ ment to integrate them. Usually, an enterprise data center has different infrastructure maturity standards which makes it all the more difficult.
- Common open standards-based framework for software defined networking (SDN) and software defined storage (SDS) is needed to leverage and implement SDDC and interoperability among OEM partners.
- There is a possibility of vendor lock-in due to converged infrastructure and products from OEM vendors.
- SDDC needs an all-inclusive management and monitoring tools as well as building management systems, a tightly-coupled automation and orchestration solution.

Above all this, enterprises need to overcome inertia and be completely agile to operate in SDDC environment.

The Vision of Future-State Data Centers – development of the SDDC

Software-defined data center can be defined as using software to control hardware that brings infinite scalability of resources and services to meet a defined level of service assurance. This is achieved by abstracting the hardware layer to provide compute services as virtual resources to applications demanding them. This abstraction is achieved through:

- Server virtualization
- Storage virtualization or software-defined storage
- Network virtualization or software-defined networking

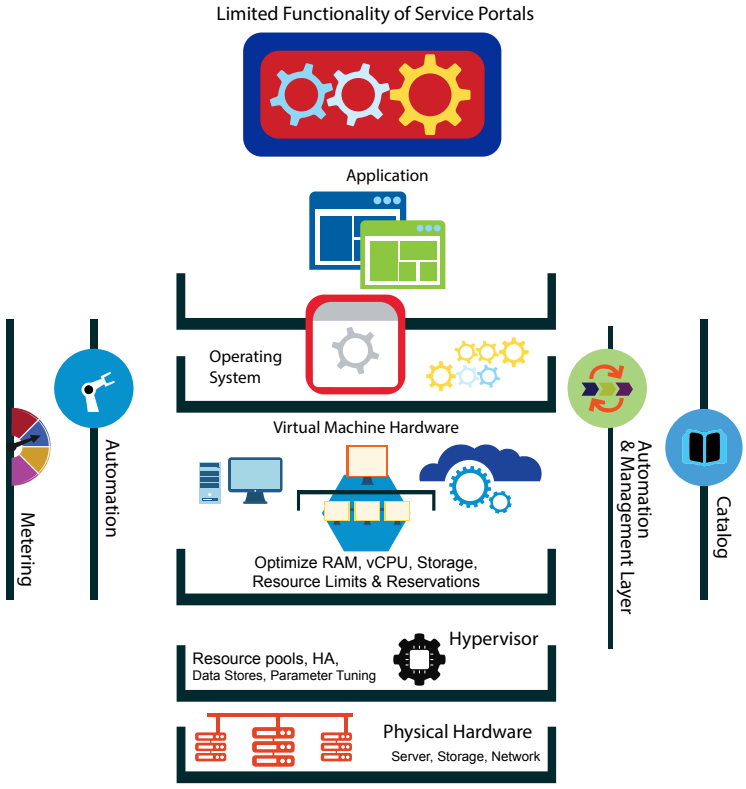
Server virtualization enabled by hypervisors has attained popular adoption. R&D to bring storage and network virtualization to the same state is also in place. A multitude of niche products exists in this domain. This, coupled with the numerous acquisitions by large Original Equipment Manufacturers (OEMs) add SDDC capabilities to their hardware products.

A promising development in this space is the Open Daylight Project where a set of companies have defined a common goal of establishing an open-source framework for software-defined networking (SDN).

Conceptual View of the Solution

SDDCs are an extension to the cloud delivery model of Infrastructure as a Service (IaaS) and the basic principles of cloud delivery model will continue to be the building blocks. The other key factors of SDDC are the additional integration layers between data center facilities, its legacy hardware and the monitoring and management stack.

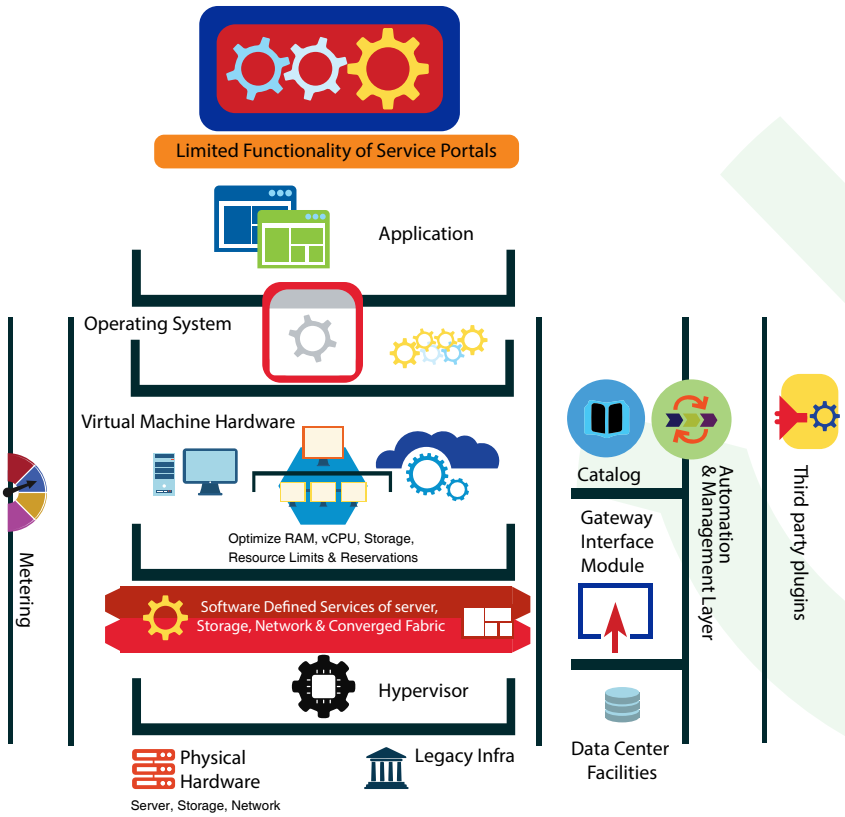
Typical Data Center Infrastructure Architecture



As illustrated, components such as data center facilities and legacy infrastructure continue to exist in as individual components in the data center. In SDDC infrastructure architecture, the software programmatically controls and matches dynamic workload requirements of critical business applications.

SDDC blocks need to be holistically integrated with everything in the infrastructure including physical, legacy facilities. Such level of integration requires third-party vendors and plug-ins to provide the interfaces.

Infrastructure Architecture in SDDC:

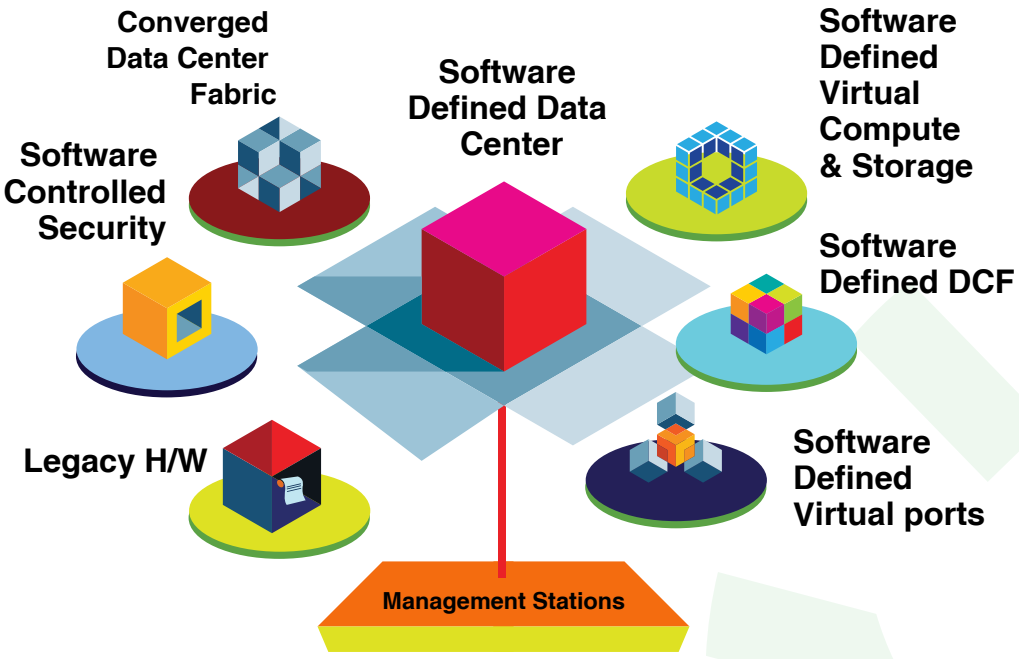


- **Physical hardware and legacy infrastructure:** Bare metal hardware and data centers form this layer that can be virtualized across physical or legacy systems. The evolution of technology or business needs determine the ability of these to be programmatically controlled by software. It depends on the abstraction of server, storage, network compo nents and legacy integration requirements. The key influencers here are OEMs and converged infrastructure vendors as they design, fabricate and integrate to make this happen
- **Management layer:** This comprises a suite of management and monitoring solutions that are integrate for the data center estate, with operations and performance engineering capabilities
- **Gateway interface module:** SDDCs have to be integrated with existing data center components. The gateway module consists of multi-vendor OEM plug-ins connecting with the existing data center, along with OEM partners and service system integrators
- **Data center facilities:** In case of an increase in dynamic resource shifts, enhanced power and cooling components are needed to control and meet the scale and demands effectively. Plug-ins and application programming interfaces (APIs) also need to be scaled up and coupled tightly with converged infrastructure
- **Consumption and service design:** A customized service partner portal, along with integrated solutions from OEM players are need to build the ability to consume hardware controlled by software

A very strong integration across multi-vendor components is absolutely important as concluded from the above. However, SDDC reference architecture will continue to evolve over next ten years

SDDC in the Future

A logical depiction of SDDC as we foresee in mainstream adoption is illustrated in the figure here:



Power and Cooling:

Power and cooling play a crucial role in converting the SDDC vision into reality. As per the current state of enterprise architecture, a unified fabric with power, cooling, SAN fabric, IP for LAN and storage block level data through fiber is still a distant reality.

Facilities play an important role in ensuring SLAs are aligned and met in a datacenter. With the current the mix of data center categories, data center providers need to develop integrated and adaptable power and cooling solutions aligned to the infrastructure capacity planned and provisioned.

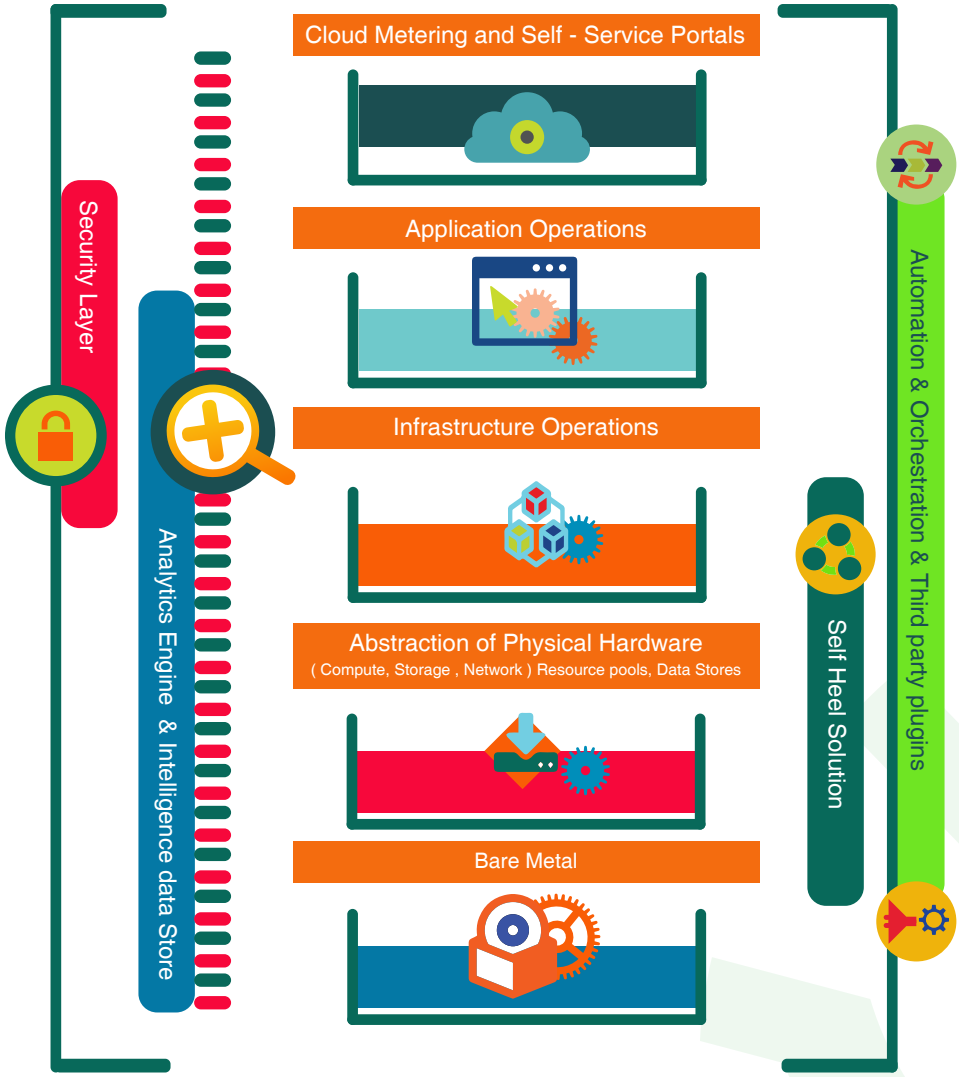
Management and Monitoring

SDDC implies the entire controlling of the data center through software. Therefore, a holistic and upper view is of utmost importance for proper management and monitoring of the data center, along with the ability to quickly identify, diagnose, correlate, isolate and resolve issues. Current management and monitoring stack for siloed components is not effective or responsive enough and can result in excessive lead times for problem resolution.

Management of the stack has to happen from abstraction layer within server, storage, network and fabric. This means commoditizing of infrastructure across server, storage and network components and a centralized software module to determine functionality and features deployed for the bare metal.

The management and monitoring ecosystem of the SDDC will need to be comprehensive multi-vendor, cohesive and integrated to be able to abstract bare metal hardware with intelligent software, as illustrated below.

SDDC Management Stack Blocks



About the Author

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Strategic, focused, and business oriented enterprise, Solution architect, Pre-sales, Post-sales and Practitioner with 15 years of experience in information technologies. Master of establishing productive relationships with partners and customers. Data Center Enterprise Technology Roadmaps, Transformation Strategies, Private Cloud Implementation, Public, Private Cloud Integration, Cloud Computing adoption Roadmap for Enterprises, ROI models, Performance Engineering, Infrastructure Consolidation and Optimization, Enterprise Social Collaboration, Vendor Management, Evangelism.

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Headquartered in Bangalore, India; Happiest Minds has operations in USA, UK, The Netherlands, Australia and Middle East.

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