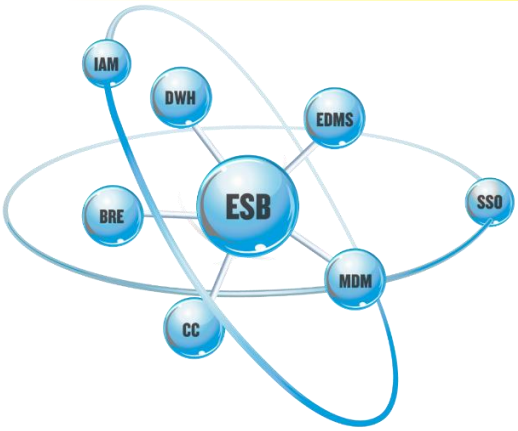
Louisiana Department of Administration

Office of Technology Services (OTS)

Enterprise Architecture and Software Defined Datacenter

Category: Emerging and Innovative Technologies



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Executive Summary

Over the past 10 years, significant advances have been made in the architecture of Health and Human Service (HHS) enterprise IT solutions. The Center for Medicare and Medicaid Services (CMS) has provided architectural direction in the form of their Medicaid Information Technology Architecture (MITA) and their Seven Standards and Conditions. Compliance with these architectural guidelines, including the use of a Service-Oriented Architecture (SOA) based around common COTS components, is a prerequisite to receiving enhanced federal funding for states' Medicaid-related IT initiatives.

Louisiana recently became the first state to contractually and organizationally segregate the establishment of this SOA architecture from the underlying line of business applications that will consume these shared services. The State's Enterprise Architecture (EA) project establishes the foundations of the State's next generation architecture. Louisiana has extended this model for the CMS modularity condition to support motor vehicle, labor, and other departmental programs in addition to HHS.

Louisiana's EA project establishes a statewide SOA architecture that aligns with CMS architectural guidance and includes enterprise-wide governance and cost allocation built into the model. After careful consideration of the investment that both the State and Federal Government made in the architecture, State IT leadership decided that a next-generation datacenter architecture was required to support their goals of security, high availability and cost allocation, beyond the common shared software architecture and SOA design.

Significant research and design resulted in the definition of Louisiana's Software Defined Data Center (SDDC), which will be the platform of choice for the EA project and future line of business applications. This nomination document explains how the State employs software defined storage, networking, and computing to enable this innovative computing platform. The State is releasing their SDDC and EA solution for limited beta testing in the summer of 2016 with a targeted full production release at the end of 2016.

Louisiana's EA and Software Defined Data Center (SDDC) align directly with NASCIO's state CIO top 3 priorities for 2016 as described in the table below.

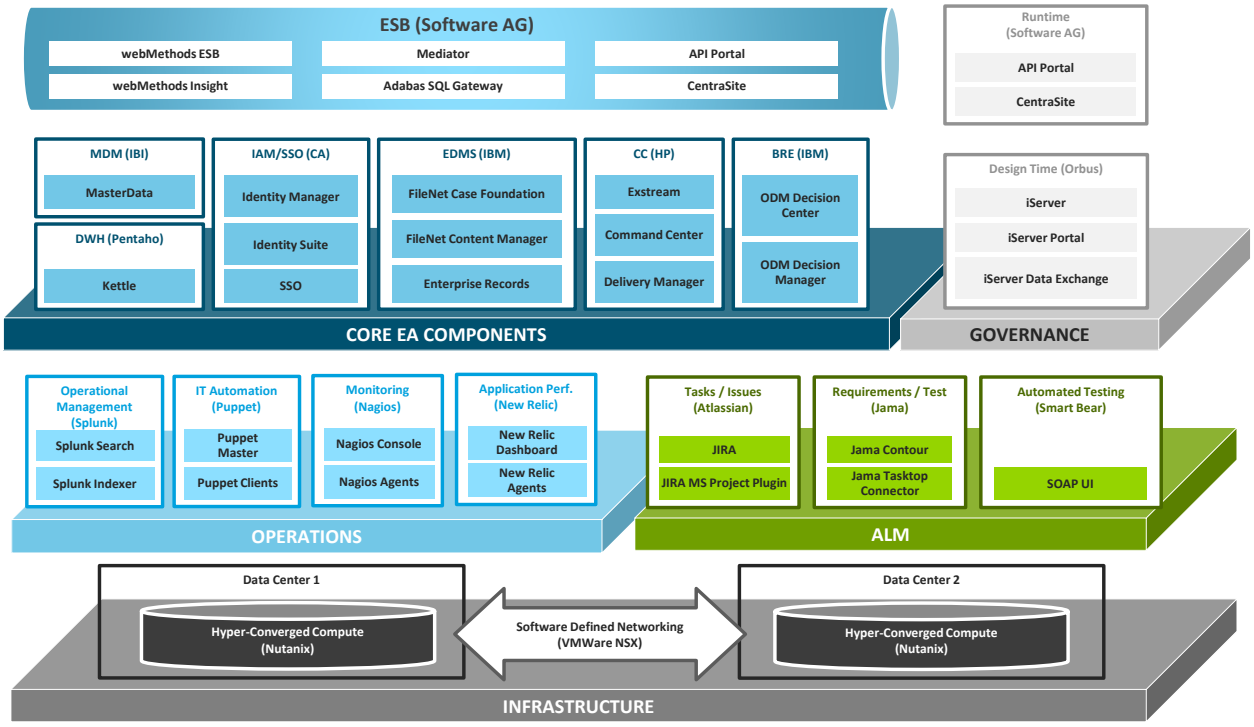
NASCIO CIO 2016 Priority	Louisiana SDDC and EA Alignment
Security and Risk Management	Replacement of network segregation, which is difficult to manage / change, with software-defined data security policies.
Cloud Services	Move towards software-defined networking, storage and compute across multiple active data centers enables the State to integrate with commercial cloud infrastructure offerings.
Consolidation / Optimization	Consolidation and optimization of data center services, a SOA architecture and a governance and cost allocation methodology benefits all the State's IT consumers.

Enterprise Architecture Vision

In 2014, the State of Louisiana arrived at the convergence of several strategically important directions that would define the future of IT in the State:

- First, there was a need to undertake several large system renewal efforts for Health and Human Service (HHS) solutions. These solutions needed to comply with CMS standards and conditions, including the use of a SOA architecture, to receive the federal funding the State needed to fund their construction.
- Second, the State was undergoing an IT organizational transformation and consolidation, centralizing IT resources and administration from over 20 governor controlled Departments into a single new entity, the Office of Technology Services (OTS) under the State's Department of Administration and the new State Chief Information Officer, Dickie Howze.

One of the key outcomes of these two strategic imperatives was the State's Enterprise Architecture (EA) vision and project. The State's vision for EA included the implementation of 7 shared services built out as part of a Service-Oriented Architecture. To manage this architecture, OTS began planning for a set of governance bodies and cost allocation processes to prepare for the eventual rollout of the EA services. The figure below represents the logical architecture of Louisiana's EA solution along with the supporting operational tools to properly govern and cost allocate the solution. Salient highlights from each of the layers are described in the table following the figure.



EA Layer	Architectural Highlight
Core EA Components	7 core components based upon best of breed COTS products exposing secure services to the enterprise through the ESB.
Governance	Design time and runtime governance capabilities to support governance planning activities, runtime policy application and cost allocation functions.
Operations	Significant investment in DevOps approach and tooling including IT build automation, monitoring and deep Application Performance Monitoring (APM).
ALM	Support for software development lifecycle (SDLC) management, planning and tractability for both EA components and line-of-business applications consuming these components.
Infrastructure	Extensive support for HA, security and configurability through a Software Defined Data Center (SDDC) approach covering storage, networking and compute.

Innovative Use of Technology

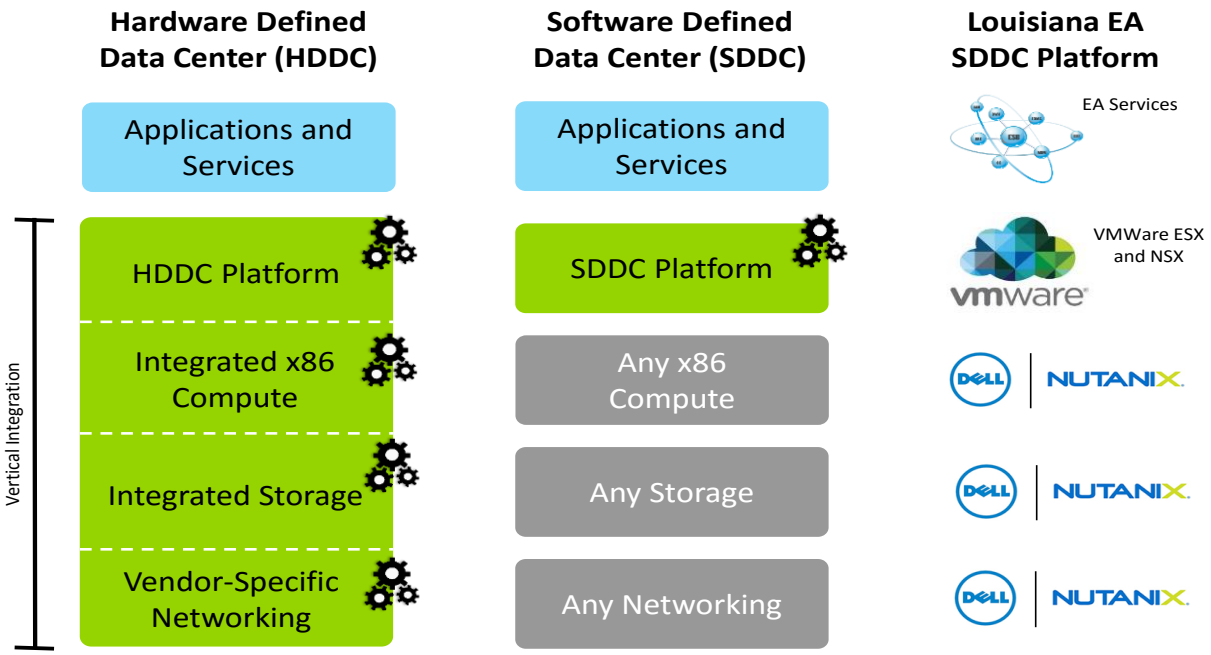
During the evolution of the initial EA vision, it became clear to the experienced technical leadership team at OTS that a secure, highly available, scalable and configurable infrastructure was the key to the successful rollout and adoption of the EA components. The State explored several options, including the use of commercial cloud services and on premise hardware-defined and software-defined datacenter approaches.

The State required an on-premise platform to satisfy existing security and integration requirements. The key criteria for deciding on an SDDC approach are enumerated below with reference to the diagram that follows.

- **Flexibility & Adaptability**. SDDC allowed a maximum amount of flexibility when deciding on what compute, storage and networking to build today, and retaining the option to change these in the future. As represented in the diagram below, a traditional Hardware Defined Data Center (HDDC) requires a significant commitment to a vertically integrated platform with specific commitments to vendor platforms for compute, storage and networking (the green boxes in the diagram). SDDC, on the other hand, uses commodity compute, storage and networking that can be easily interchanged and is managed by the software layer (the SDDC platform).
- **Speed & Agility.** The SDDC platform performs the configuration functions for the compute, networking, and storage layers of the platform. Analogous to the way virtualized computing has made provisioning of servers easier, a completely virtualized datacenter greatly accelerates the provisioning of all elements of the environment –

compute, storage and networking. This enables State departments to address their application requirements and demands in a more agile manner.

- **Availability & Recovery**. In a multi-datacenter environment that requires high availability, the HDDC simply did not have sufficient reach to manage compute, storage and networking across a distributed fabric. The SDDC approach allows for the mobility of compute across datacenters, extension of Layer 2 networking to span datacenters and provides a logical layer of redundant and replicated storage available across both datacenters.



The SDDC platform used for Louisiana's EA project represents an innovative use of technology and a significant leap forward in the way states run their data center operations. As the State rolls out this platform and prepares for initial beta testing of the solution, there are several key requirements and use cases that are of significant interest to the CIO's staff as these capabilities were hard or impossible to achieve with the State's existing platforms. These capabilities are broken out by SDDC layer in the table below

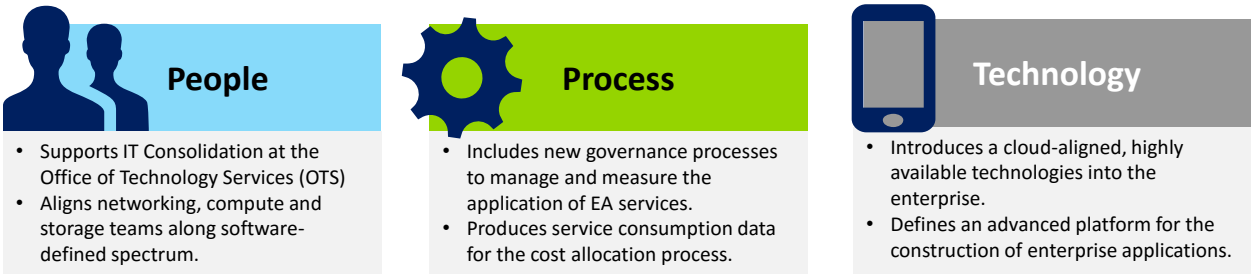
SDDC Layer Goal	Louisiana EA Capability
Maximize Compute Power	• Provide live migration of compute capabilities and virtual machines between the two active data centers, as required. • Allow servers to operate in both local clusters within datacenters and as remote clusters spanning datacenters.
Lower Storage Cost	• Support both local storage redundancy and replication of storage between the datacenters. • Enable inexpensive and commodity storage to be used and easily expanded without requiring commitment to extensive Storage Area Networks (SANs).

SDDC Layer Goal	Louisiana EA Capability
Enable Smart Networking	• Allow security to be managed via software-defined access controls rather than via more complex network hardware. • Route traffic to the most efficient location, ideally on the same backplane and within the same datacenter to optimize performance.

Project Significance

The Enterprise Architecture project and software defined datacenter that supports EA is a significant advance in service-oriented and software-defined computing, not just for Louisiana but for state government at large. The significance of the project is demonstrated in the following ways:

IT Cultural and Organizational Impact. The introduction of the EA and SDDC platform are aligned with the rollout of a new centralized IT organization – the Office of Technology Services (OTS). The introduction of this next-generation platform will result in a transformative shift in the organizational model, the IT service delivery culture and resource alignment that drive much of the expected ROI of this project. There is also a significant and positive impact of the alignment between people, process and technology as illustrated in the following image.

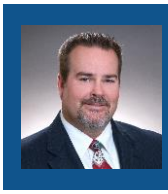


National Model. Louisiana's use of a standardized, service-oriented platform executed independently of the line-of-business applications is recognized as a national model, especially in the Medicaid Management Information System (MMIS) marketplace, where CMS is encouraging states to establish standardized system integration platforms to serve as the basis of their modular platform builds.

Governance. The EA and SDDC platforms are driven by a design time and runtime governance platform responsible for the planning, utilization and measurement of these services. This includes the expansion of the State's cost allocation model to include these enterprise services and the underlying SDDC platform and infrastructure.

Foundational Platform. The EA platform and the underlying SDDC infrastructure is the foundation of the State's system modernization and integration efforts for the future. Most

immediately, it is being targeted for implementation by the several of the largest IT projects being executed by the State, with planned savings of up to $8 million dollars.



"The Enterprise Architecture solution and SDDC is critical to the implementation and success of the Louisiana Medicaid Modernization effort which is responsible for providing medical coverage for more than 1.2 million lives today. With the Medicaid expansion, Healthy Louisiana, we anticipate that we will cover more than 1.6 million lives." -- Bill Perkins, Medicaid Deputy Director, Systems

Project Benefits

As the EA and SDDC initiatives approach beta testing phases, the benefits of adopting these enterprise approaches to service, component, and infrastructure consolidation are clear to key stakeholders statewide. Furthermore, these benefits align directly with NASCIO's 2016 priorities, including:

- **Consolidation / Optimization**. Consolidation and optimization of data center services as the result of improved resource alignment, a SOA architecture and a governance and cost allocation methodology benefit all of the State's IT consumers.
- **Security and Risk Management**. Replacement of network segregation, which is difficult to manage / change, with software-defined data security policies.
- **Cloud Services**. Move towards software-defined networking, storage and compute across multiple active data centers enables the State to integrate with commercial cloud infrastructure offerings.
- **Enterprise Vision and Roadmap for IT**. The consolidation of services and data center services for the EA project aligns directly with OTS's larger consolidation efforts and State IT roadmap.
- **Budget and Cost Control.** The implementation of a cost-allocation approach for the EA component services sets the stage for IT resource utilization optimization, measurement of this utilization and effective cost allocation across participating programs.

Conclusion

Louisiana's Enterprise Architecture and Software Defined Datacenter (SDDC) represent true innovation in the provisioning of next generation software service and compute capacity to State programs. The move to this enterprise platform represents a significant technical and organizational leap forward for Louisiana's Office of Technology Services (OTS) and their constituent programs and promises to streamline enterprise system delivery. EA and SDDC align with federal architecture standards (CMS's MITA) and with NASCIO CIO priorities, establishing best practices for emerging and innovative technologies for other states to emulate.