Software Defined Storage (SDS) Solution Proposal

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Revision History

Date	Revision	Description	Author
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1 Organizational Need

TechFite's organizational need is a technology solution that will store activity related to network maintenance and analysis (log correlation and monitoring files) in highly regulated medical and government sectors, while being sufficiently automated as to allow its small IT team to continue to perform essential routine network tasks. The selected solution should also be able to flexibly and economically expand to meet future requirements, which will be based on a strategy of diversifying types of opportunities and partners across international boundaries.

Due to the resource limitations on TechFite as a small company with a small IT team, the solution should prioritize IT efficiency (more than innovation and/or out of the box thinking), while allowing for future changes to the infrastructure based on the company's top-down vision, as well as allowing it to meet new industry requirements that will be introduced (according to observations made of industry competitors).

Working in the highly regulated sectors of medical devices and government, the company's approach to risk-taking is conservative. The adopted solution must be uncomplicated due to the inevitability of increasing demands made on the small IT team, combined with an industry-wide forecast of shrinking opportunities and budgets.

Technical requirements to be met include:

- provide cost-effective storage (currently in order to be FISMA compliant with record-storage requirements of event logs)
- support the potential of expanding diversity of industry partners
- cost-effectively support current infrastructure of a 2 firewall, 3-ring network
- flexibly meet a changed infrastructure of added company locations
- meet potential of increased complexity of data handling requirements across international boundaries

Because log correlation products are inexpensive and mature, at this juncture the most significant technical challenge for TechFite seems to be "how might it most effectively meet the current and future challenges of data storage?". In the present, the amount of storage required for retaining log-files for at least one year presents a challenge to the company. Added to that, going forward, data-storage requirements will inevitably be much more complex. Most likely, the storage solution for the company's medical device product will expand if it pursues international partnerships and clients due to: the establishment of new company locations; necessary increases and changes to its processes; and change management for product development, testing, documentation, and data-handling across international boundaries.

2 Emerging Technology Solution

On-site implementation of a Software Defined Storage (SDS) solution will meet TechFite's present needs for long-term log-file storage, as well as allow for cost-effective expansion to meet anticipated data-storage requirements accompanying its top-down vision for diversification.

SDS is an emerging technology with the main benefit of consolidating dissimilar hardware components into a single virtual storage container and software defined storage management portal into the virtual storage network. Although still so new as to

be understood differently even by informed member of industry, SDS is currently defined by the SNIA (Storage Networking Industry Association) as follows:
“virtualized storage with a service management interface, which includes pools of storage with data service characteristics that may be applied to meet the requirements specified through a service management interface. The benefits of SDS include automation, interface standardization, virtual data paths, improved scalability and transparency. “ (Storage Networking Industry Association, 2019)
Industry excitement about SDS was initially signaled in 2012 with the purchase of Nicira by VMWare, around the time the acquired company made breakthroughs in OpenFlow (a transformative communications protocol allowing conflicts between proprietary softwares to be bypassed, and upon which Networking (SDN) is based). (Mind Commerce Staff (2013), 2019).
Universal standards have not yet been implemented across SDS technology, so that capabilities can vary greatly from vendor to vendor as major industry competitors (Citrix Systems Inc., Dell Inc., Hewlett Packard Enterprise Development LP, IBM Corporation, Microsoft Corporation, and VMWare Inc.) jockey for marketing control and deployment of still evolving product capabilities. Innovation and interest is widely expected to continue its steep rise, having accounted for $4.18 billion in 2016 with forecasts projected as high as $42.1 billion by 2023. (MarketersMedia via COMTEX, 2019)

3 Adoption Process

The Gartner Group espouses a methodology called STREET (Scope, Track, Rank, Evaluate, Evangelize, and Transfer) for the successful adoption of emerging technology solutions. (Fenn, 2010)
In addition to adequate general scoping of the need, successful adoption of the SDS solution depends on IT research to track current capabilities in SDS solutions and understand the disparities across major vendors. Effort should be put into assigning value to those differences in order to rank the vendors and ideally select multiple products for trial-period evaluations.
A better understanding of actual capabilities will allow the IT Team to better understand, document, and ultimately assign monetization metrics against which products can be tested and compared to each for clarity in test reporting phase. Final evaluations should consider key areas of performance, benefits, risks, and costs.

3.1 Evaluation of (Requirements and Cost/Benefits Analysis)

The STREET methodology provides the following guidance for a sufficiently systematic evaluation of the solution:

3.1.1 Benefits

A thorough analysis of implementation benefits should investigate the degree to which adoption of the solution could benefit TechFite’s people, processes, business and infrastructure. In TechFite’s case, the primary benefit to be weighed is investment into expertise in a transformative technology, as well as the opportunity to retain control over its own data and data storage processes and infrastructure.

3.1.2 Risks

A thorough risk analysis should be conducted, to assess the potential organizational costs if problems in performance, integration, penetration, and/or monetization. Since TechFite is a small organization, the impact of miscalculations could have potentially damaging consequences, so special attention should be paid in communications between the IT team and upper management.

Because the success of the SDS solution will not be dependent on acceptance or cooperation by the rest of the company, if the IT team is effective at its technical tasking, the implementation has a very high likelihood of success that is not based on non-technical issues, such as politics, training, and communication with non-IT people in the organization.

3.1.3 Monetization Costs

For the same reason, the success of the solution to meet the organization's needs is a reasonably accurate understanding of associated costs for computer hardware, operation, and long-term expenses. If the solution can do the job, however the actual cost is double or triple the original estimates, the effect on TechFite could be catastrophic. Because the technology is emerging, special attention should be put into researching requirements definition and the capabilities of competing products in a market where terminology is still understood differently by informed members, and then conducting careful product trials to ensure verification of the above factors.

3.2 Well Documented Requirements, Test Plans, and Test Reports

The risk of work-disruption due to disorganized implementation and outages can be offset by detailed test plan documents that are conducted on simulated equipment prior to implementation in the production environment. Also, preparing a bare-bones fail-over production LAN as part of the implementation plan could allow the IT team some cushion to a rigid schedule that will otherwise be confined to strict weekend and after-hours activity.

3.3 Evangelization

The IT team should ensure especially detailed, clear, and well documented communications with management prior to making decisions, to avoid disparities in expectations. Because the SDS solution will not ever be visible to TechFite employees (outside of the IT team), the sole accountability for success and or failure of the implementation rests entirely on the technical expertise, planning, decision-making, and execution within the control of the IT department. The IT team should be vigilant in protecting its interests through especially detailed, clear, and well documented communications with management to ensure a successful transfer of this solution into the organization.

3.4 Transfer

Thorough test planning and execution are the keys to implementing the solution in the production environment.

4 Technology Impact

Listed below are the potential negative impacts to TechFite due to unanticipated problems arising from the adoption of this solution:

- ***Significant erosion of confidence/trust in the IT team in the event of disarray related to over-capacity strain on the small IT team during implementation***
- ***Lack of expertise in sustaining the solution***
- ***Financial risk of unplanned expenditure temporary employees must be hired in due to strain on small IT team***
- ***Financial losses resulting from work disruption due to disorganized implementation***
- ***Financial losses due to work disruption due to solution failure***

All of the above consequences of a poorly executed implementation can be best mitigated by a methodical approach to requirements definition, product research, test plan development and execution, and also development of back-up plan options and cost estimates for those back-up plans, in order to avoid loss of trust in even worst-case scenarios. In the event that a technical problem emerges in the late phases of implementation, having prepared and approved in advance cost estimates for back up plans (temporary IT workers, short-term cloud contracts, and/or a failover network) would help retain confidence in the IT team so it remains empowered to do its job.
If the solution delivers as expected, and implementation is well-planned and successful, there is no real negative consequence to the adoption of this solution. Downsizing is unlikely to occur because the IT team is so small. Adopting an SDS solution should have only a temporary impact on the workload of the IT team and the observable impact on the work-force outside IT will be negligible because there will be no acceptance or cooperation required of the rest of the company, with the solution running invisibly in the background without the need for the employees to embrace it, adopt it, understand it, etc.
Because a key feature of the SDS solution is liberation from proprietary hardware, this solution will likely increase organizational agility by lowering the cost of investments into future IT purchases and decisions ranging from small to significant. If IT is thorough in its research into and evangelization with management on this topic, a reduced segregation between IT and the rest of the organization could be expected, as that range of discussions is increasingly understood to be less disruptive to the entire workforce, and greater organizational independence from external solutions, and increased flexibility and reduced risk for the entire company in areas of IT purchasing. By allowing integration of diverse hardware into a single storage fabric, purchases can be customized to performance need, such that an inexpensive hardware solution can be purchased and integrated into the storage solution. Compared to the impractical on-site alternative on-site of a SAN/WAN solution, in which the hardware components are typically expensive and proprietary, and constrained to a single functional role. This feature should result in greater operational efficiency going forward, as the organizational storage needs change.

5 Technology Comparison

The most obvious alternative solution to adopting an on-site SDS solution would be to adopt cloud-based storage. Based on the potential for highly diverse storage requirements in the future, on-site storage using and SDS solution is a prudent investment, compared to having the IT team invest its research into cloud vendors, while trying to keep pace with changing capabilities and requirements from a distance, and relative frequency due to the gradual changes to the company's requirements as well as changing capabilities in SDS.

An onsite storage solution will allow the company to retain control over sensitive and proprietary development data that is FISMA compliant. It will also allow TechFite to cost-effectively deploy its expertise in software defined storage as TechFite expands it development activity across international borders, and with the exponential increases in storage requirements that will result from new activity in product development, test, and configuration management activity for multiple customers, locations, and data handling laws.

Control, security, price, manpower, scalability will allow the small IT team to acquire expertise in SDN technology, retain full control over the organizations data, and scale appropriately as the organizational focus diversifies.

5.1 Cloud Advantages

The advantages to the company by selecting a cloud storage solution are the same benefits to any company, regardless of whether working in a highly regulated industry: Cost-effective scalability, increased IT resources due to reduced routine maintenance tasks

5.2 Cloud Disadvantages

The disadvantages of the cloud solution are the loss of control over the company's core business functions of security and data-control/ownership of its data and intellectual property, which would be transferred to a third-party vendor. Also lost would be the investment in the IT team in what is expected to be a major technical innovation relating to IT data security and storage. Because TechFite's core business activity are regulated by medical and government guidelines, the price-tag for expertise in those areas would reasonably be expected to increase. Outsourcing the technical expertise not only introduces significant risk due to loss of control over the intellectual property and the data but also would most likely result in much higher IT costs for the company in the long run, while at the same time draining resources of the small IT team with increased accounting and contract-based functionality needed to select qualified cloud vendors. Every time the organization changes its IT infrastructure (by adding a new location, developing a new product line for a foreign customer, and/or exchanging data across international boundaries), the IT team and the cloud vendor selection process would have to be revisited by IT, and from a position of reduced expertise. As the SDS technology becomes more stable, cloud vendor offerings will change, so that the IT team will have to investigate changing vendor offerings for every potential company change and contract review period.

5.3 SDS Disadvantages

The disadvantages of investing in the IT team as SMEs in SDS is a potential lack of experience and/or resources in establishing necessary clarity of boundaries that allow them to manage a temporary surge in their activity in a way that ultimately diminishes demands on the team (versus a lack of clear boundaries that result in increases in maintenance, research, and/or upgrades). Additionally, because the consequences of selecting an inappropriate product are clearly traceable to the IT team's technical expertise, the implementation applies negative pressure on the team directly, versus transferring that risk to a cloud vendor. If the solution succeeds, it is unlikely to receive the same amount of attention compared to a failed implementation.

Also, the IT team is exposed to a slight technical risk due to unforeseen events unfolding marketplace, however because SDS is being fielded by major influencers in the technical market, the risk to product stability seems minimal. By thoroughly capturing requirements, conducting a prototype tests that simulate as many envisioned requirements as possible (an added branch location, for example), the risk can be significantly minimized. Once it has been established that the product can meet current storage requirements and with relative simplicity, and in a manner that does not increase the demands on the IT team.

5.4 SDS Advantages

The SDS solution has multiple cost-effective benefits in key areas: investments in the IT team, data control by the organization, and reduced storage expense going forward. The solution is considered low-risk, low-maintenance, scalable, and FISMA compliant. Although implementation would result in a surge of demands on the small IT team, SDS is based on automated provisioning, so that the surge in demand should be short-term and temporary, while investing valuable expertise in the team so that costs can be controlled going forward, compared to paying for that expertise in cloud vendor solutions.

Keeping the storage solution on-site avoids the complexity of security, contractual constraints, and data control related to relying on a vendor-based cloud solution when those issues remain vulnerable in the cloud solution at large (putting aside the higher standards associated with regulated domains). It also invests into on-site technical expertise, (versus tasking the small IT team with more administrative tasks related to vendor selection).

6 Adoption Success

Since SDS is an established technology that is currently being fielded, the risk introduced due to technical immaturity of SDS is modest. The greater risk is due to the lack of standards in the technology so far, which could potentially impact longer-term sustainment and technical support.

The factor that will more likely determine success or failure of the SDS solution to meet organizational needs is requirements definition, and robust test planning and test execution. A process for communicating on requirements definition should be implemented to ensure clarity between IT and upper management.

Providing IT with visibility into potential organizational changes to be met by this product is essential to the development of a thorough test plan, including prototypes of virtual architectures to allow complete testing. Emphasis on the requirements discussion can also help IT describe and monetize to management areas of significant uncertainty or expense.

Equally important to a clear understanding of the company's IT vision is the ability of IT to adequately test, assess, and communicate on the degree of financial risk associated with significant IT decisions, as the product capability may or may not be able to perform.

Aside from outright technical failure, success can be measured in degrees of accuracy when comparing forecasted expenditures in time and money with actual costs.

7 Sources

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