Utah's Data Center Exit

Utah Division of Technology Services

NASCIO Award Category: Enterprise IT Management Initiatives
Project Dates: July 2021-June 2022
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Executive Summary

Following the annual legislative session in 2021, the Utah Division of Technology Services (DTS) was informed that it would need to move its entire data center operations off Capitol Hill. The Legislature had plans to replace the data center and adjoining State Office Building with a new facility. Funding would be available beginning in July and the project had to be completed in less than one year. To make matters more complicated, the move had to take place during COVID-19 supply constraints

This data center facility had been in place since the 1980's and housed over 2500 servers with associated databases, a mainframe, a print center, the network hub for a statewide network, telecommunications center including call centers, and the Network Operations Center. The State Office Building was also home to the State's Cyber Center which would be part of the move. Demolition was to be completed later in the summer of 2022.

From the beginning, DTS leadership was committed to ensuring that the transition from the data center to another location (and to the cloud) would be seamless for state agencies. DTS worked to migrate the systems and applications without any downtime for state agencies. The big initiative was more than just a move, it was an upgrade of the state's system and infrastructure.

On June 16, 2022, Governor Spencer Cox announced the successful completion of the data center exit. He stated that "this is a really big deal for all of us in State Government…. an immense task that required detailed planning, coordination, dedication, creativity, and teamwork…remarkably, all of this happened on time and on budget without anyone noticing at all. There weren't any service disruptions which means that the mission was accomplished, really proud of our team for doing that"

Idea

Utah's massive data center exit demonstrates how careful coordination and resolve across an entire IT enterprise can be successful within a very limited time horizon. When faced with challenging mandates, IT leaders should look beyond the mandate for opportunities to improve and enhance service. Over 350 DTS employees were directly involved in delivering this transformative project successfully. Originally forecast to cost over $30 million, *the project was completed on time at over 50% reduction in cost*.

DTS determined that the process of exiting the state's long term data center should result in service improvements and cost efficiencies for state agencies and citizens. IT leadership created a detailed plan which included a CMDB that identified all components of the technology architecture: servers, networks, applications, and integrations to look for ways to optimize the overall environment as well as individual components. Every agency and IT Director would be involved in determining the eventual destination of applications and services.

Implementation

The 2022 data center exit was implemented as the next logical step demonstrating enterprise-wide collaboration, learning from an earlier consolidation of 38 data centers and machine rooms in 2009. The project required meticulous planning and coordination to ensure that all system dependencies were clearly identified to ensure no service outages to Utah agencies and citizens.

Daily morning stand ups would ensure that any issues were closely coordinated and that impacts were clearly understood. Weekly sprint activities for Enterprise Hosting, Network, Voice, Cloud, Shared Database, GCVE and Data Center Infrastructure were all available on shared planning documents and updated in real time. All aspects of the project were carefully reviewed and monitored by enterprise security.

| PROJECT TITLE | Data Center Exit (DCE) | | | | | | PROJECT SPONSOR | Dan Frei |
| PROJECT MANAGER | Greg Jackson | | | | | | DATE | 5/12/2023 |

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION	PCT OF TASK COMPLETE
1	Hosting Milestones					
1.1	Business Case Approved	Patrick	7/1/21	7/8/21	7	100%
1.1.1	Requirements Gathering	Patrick	7/1/21	8/20/21	49	100%
1.2	On Prem Decision	Patrick	7/1/21	2/1/22	210	100%
1.3	Migration to GCVE	Jonathan	8/15/21	12/30/21	135	83%
1.4	Migration to On Prem	Randy	7/1/22	12/31/22	180	0%
1.5	Decommission Old Hosting Environment	Randy	1/31/22	4/7/22	67	5%
2	Networking Milestones					
2.1	Requirements Gathering	Kevin	5/1/21	8/27/21	116	100%
2.2	TSOB Network Core Design	Mike	2/1/21	10/30/21	269	100%
2.3	Preparation at SL DC	Mike			0	
2.4	Network Circuits	Mike	1/6/22	1/13/22	7	100%
2.5	Equipment Purchase/Receipt	Mike			0	
2.6	Equipment Installation TSOB	Todd	3/4/22	3/17/22	13	100%
2.7	Service Migration from SLDC to TSoB	Mike	11/12/21	1/17/22	65	100%
2.8	Plan Equipment Move from SLDC to RF	Mike	11/16/21	1/18/22	62	100%
3	Data Center Milestones					
3.1	Building Power	DFCM/Todd	7/1/19	1/22/22	921	66%
3.2	Cooling System	DFCM/Todd	7/1/21	1/31/22	210	67%
3.2.1	Print Operations Move to TSOB	Todd	3/1/21	8/30/21	179	66%
3.2.2	Data Center Buildout NCC	Todd/Mobile Techs			0	
3.3	Build Pod A	Todd/Mobile Techs		TBD	#VALUE!	100%
3.3.1	Build Pod for SL County	Todd/Mobile Techs			0	
3.3.2	Data Center Closeout SLDC	Todd			0	
4	Voice Milestones					
4.1	Requirements Gathering	Debbie			0	
4.2	Cisco Call Manager Design	Bryan	6/1/2021	7/1/2021	30	100%
4.3	Genesys Contact Center Design	Rachael	7/1/2021	9/27/2021	86	100%
4.4	Fax System Design	Leon	7/1/2021	8/1/2021	30	100%
4.5	Voice Circuits	Bryan	8/1/2021	2/7/2022	186	100%
4.6	Equipment Purchasing and Receipt	Bryan	10/14/2021	12/30/2021	76	100%
4.7	Salt Lake DC Prework	Leon	7/1/2021	7/31/2022	390	100%
4.8	Installation of Equipment and Circuits	Leon	11/17/2021	12/6/21	19	100%
4.9	Testing	Leon	11/17/2021	2/1/2022	74	100%
4.9.1	System Migration	Leon	3/10/2022	5/19/2022	69	100%
5	Database Milestones					
5.1	Oracle Cloud POC	Adam			0	
5.2	Oracle Standard AWS RDS	Robert			0	
5.3	Oracle Enterprise Oracle Cloud/On Prem	Robert			0	
5.4	MSSQL - GCVE or On Prem or AWS	Robert			0	
6	Financial Considerations					
6.1	Project Funding DFCM	Dan			0	
6.2	Secure ARPA Funding	Dan			0	

Timeline columns: July 2021, August 2021, September 2021, October 2021, November 2021, December 2021, January 2022, February 2022, March 2022, April 2022.

There were many areas where the State plowed new ground in finding solutions to the challenges that were encountered. Some of these involved partnering with private companies such as the Google Cloud VMware Engine (GCVE) migration. Prior to the move, Utah supported a highly virtualized (close to 90%) on-prem environment that ran on VMWare. Understanding that the tight time frame would not allow for re-architecting every application to be converted to a native cloud structure, Utah was one of the earliest clients to leverage this solution to migrate a large portion of the virtual environment to the cloud.

Tasks for the Week	Date		
Infoblox Lift and Shift	5/21/2022	8.9.9	☑
Internet Migration to TSOB	5/21/2022	8.9	☑
FBI - CJIS Circuit turned up	5/25/2022	8.5.6	☑
DABC server migration to TSOB	5/27/2022	8.10	☑
TSOB-RFDC 100GB circuit	5/21/2022	6.2.5	☑
Cloud Circuit connections for TSOB cutover	5/31/2022	8.4.8	☐

Typical Weekly Sprint (Networking)

Procurement

The DTS Finance team tracked 505 separate hardware procurements (13,400 items total) associated with the data center exit for a total of $12,519,337. This included everything from generators and racks to network cards and cables. Sixty-five software purchases were completed including cloud hosting contracts and licensing agreements for a total of $6,272,717. The team also supported telecom, print shop, and other types of procurements.

Preparing the New Data Center

In anticipation of a potential move, the Division of Facilities Construction and Maintenance had purchased an older building owned by American Express prior to the pandemic in 2019. This facility had an existing data center which was significantly smaller than the state data center on Capitol Hill. By 2021, it was determined that the state could leverage this facility but some major upgrades would be required to environmentals such as generators, cooling, wiring, etc. before it could be used by the state. In addition, having a smaller facility forced the State to follow the strategic plan to move many applications to the AWS or GCP cloud.

Communication

A communication plan was enacted during the move. Besides the daily standup and This included a website that kept everyone abreast of the activities and how many of the applications had been moved by agency. There was a weekly status update to DTS leadership and IT Directors, there was a monthly status update sent to cabinet members. A BI dashboard was kept that tracked all of the moves and how many were completed vs how many were left. It also tracked the budget spend down.

Data Center Exit Project
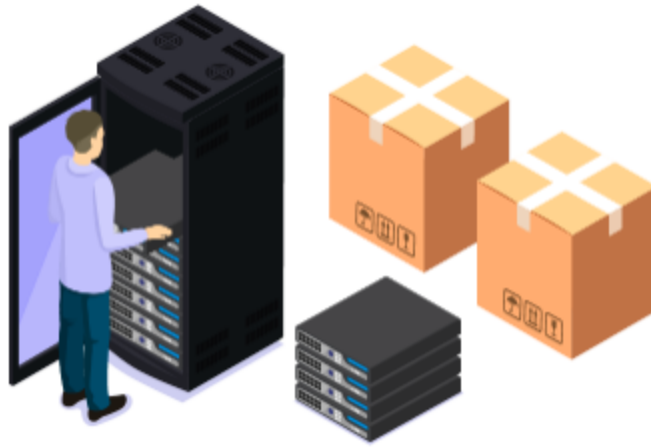
What are we doing:

DTS is currently working on a Salt Lake Data Center Exit (DCE) project. We need to move from the current location at the Capitol complex as the facility is slated to be demolished within the next two years. The data center houses the servers that host state agency IT applications and systems.

Migration progress

Agency	Total to Migrate	Complete	Remaining	% Complete
Capitol Preservation Board	3	3	0	100.00%
CCE	4	4	0	100.00%
DABC	27	27	0	100.00%
DAF	16	16	0	100.00%
DAS	107	107	0	100.00%
DEQ	38	38	0	100.00%
DFI	1	1	0	100.00%
DHRM	23	23	0	100.00%
DHS	94	94	0	100.00%
DNR	43	43	0	100.00%
DOC	57	57	0	100.00%
DOH	263	263	0	100.00%

Coordinating the Complex Multi-Cloud
Although Utah had quite a bit of experience with cloud systems (SaaS, PaaS, and IaaS), it was not fully prepared for the massive transition that occurred in 2021-22. During this short period of time, DTS migrated hundreds of systems to a complex hybrid cloud environment with no disruption in service to agencies or citizens. Over 1600 systems were identified and tracked throughout the process. Utah's cloud team worked closely with multiple cloud providers throughout the process. New billing and financing models were developed to support this major shift in operations.

Week	Agency	Move Type	Server/Context	Server Type/ Database Type	Description	Security Review	Start Date	End Date	Status
Dec 2021	DTS	GCVE	ForescoutGCVE	Prod	Forescout		11/29/2021	12/3/2021	Completed
Dec 2021	DTS	GCVE	ITSS018GP	Prod	Nessus		11/29/2021	12/3/2021	Completed
Dec 2021	DTS	GCVE	ITSS019GP	Prod	Nessus		11/29/2021	12/3/2021	Completed
Dec 2021	DOT	GCVE	SRWCOSP13Dev	Dev	Sharepoint	Security Approve	11/29/2021	5/2/2022	Completed
Dec 2021	DTS	GCVE	itdb001gp	Prod	Shared Sql Conn is building (new)		11/29/2021	1/14/2022	Completed
Dec 2021	DTS	GCVE	itdb002gp	Prod	Shared Sql Conn is building (new)		11/29/2021	1/14/2022	Completed
Dec 2021	DEQ	GCVE	eqlredminesp	test	Redmine		11/29/2021	12/17/2021	Completed
Dec 2021	DEQ	GCVE	eqlairwebtest	test	DEQ Air website and monitoring reports		12/6/2021	12/31/2021	Completed
Dec 2021	DNR	GCVE	NRLASSETSSP	Prod	DNR Asset Management		12/9/2021	1/6/2022	Completed
Dec 2021	DNR	GCVE	NRLASSETSST	Test	DNR Asset Management		12/9/2021	1/6/2022	Completed
Dec 2021	DTS	GCVE	itwentsrvtest	Prod	Microsoft On-Demand Assessments Connection ser		12/15/2021	1/5/2022	Completed
Dec 2021	N/A	Firewall Move	f36-500-Docker	Prod		N/A	12/21/2021	12/21/2021	Completed
Week 1 - Jan 2-8	DEQ	GCVE	EQLPURCHPROD	Prod	DEQ Aestiva Purchasing		1/3/2022	1/31/2022	Completed
Week 1 - Jan 2-8	DEQ	GCVE	EQLAIRWEBPROD	Prod	"DEQ Air website and monitoring reports, Woodburb web app"		1/3/2022	1/31/2022	Completed
Week 1 - Jan 2-8	ABC	GCVE	lqlwebappssp	Prod	abc.utah.gov and abc.dev.utah.gov		1/3/2022	2/18/2022	Completed
Week 1 - Jan 2-8	DNR	GCVE	NRLSHAREDDBP	Prod	Shared MySQL|DB|Prod		1/3/2022	2/14/2022	Completed
Week 1 - Jan 2-8	DNR	GCVE	NRLWEBAPPSSP	Prod	Many DNR Apps		1/3/2022	3/19/2022	Completed
Week 1 - Jan 2-8	DTS	GCVE	NRLWEBAPPSST	Test	Many DNR Apps		1/3/2022	2/16/2022	Completed
Week 1 - Jan 2-8	DNR	GCVE	NRLSHAREDLAMPSP	Prod	DNR Proxies	N/A	1/3/2022	3/19/2022	Completed
Week 1 - Jan 2-8	DTS	Firewall Move	f36-500-CLOUD-STORAGE	Prod	CHG0032373	N/A	1/4/2022	1/4/2022	Completed
Week 1 - Jan 2-8	DTS	Firewall Move	f36-500-DATA-PROTECTION	Prod	CHG0032374	N/A	1/4/2022	1/4/2022	Completed
Week 1 - Jan 2-8	DTS	Firewall Move	f36-500-enterprise-storage	Prod	CHG0032375	N/A	1/4/2022	1/4/2022	Completed
Week 1 - Jan 2-8	ABC	GCVE	LQWAXDEV	dev	AOS 1 (D):AOS 1 (C)|App|Dev:Config		1/4/2022	3/3/2022	Completed
Week 1 - Jan 2-8	DNR	GCVE	NRLUGSWEB3/NRLUGSWEB3SP	Prod	DNR UGS Website		1/5/2022	3/19/2022	Completed

Over 2600 servers were tracked and programmed for transition to new environments

Impact

It was determined early in the data center exit planning that instead of moving the actual servers, blade center, network and telecommunications equipment, a new data center would be built with all new equipment and applications, network, and the such would be virtually moved to the new location. This led to the latest technologies and security in the new environment.

The new data center in Taylorsville has many positive benefits, including:

- Security improvements:
- Enhanced data encryption at rest technology
- New secure Private Cloud
- Updated security management capabilities
- New more robust security features on firewalls
- Installed a new environmental system to protect against physical, environmental or human threats that can cause disruption or downtime to IT infrastructure
- Network improvements:
- Moved and increased the Internet to 100 Gb of bandwidth including new network equipment
- Refreshed hardware and software
- Hosting/Server improvements:
- Refreshed equipment with associated increased processing and security components
- Application improvements:
- Upgraded databases
- Moved 25% of applications to the cloud
- Applications now have backup and redundant features
- Print Center improvements:
- New printers with enhanced features and less downtime

- Phone improvements:
- Additional redundancy and higher throughput for calls

Many of the largest state systems were migrated to the cloud, providing the opportunity to scale indefinitely in the future while leveraging new technologies available through the cloud providers. These include:
- Utah Driver License
- GenTax, the statewide tax system
- FINET, Utah's core financial ERP
- ORSIS (Office of Recovery Services)
- EREP (Enterprise Eligibility System)

Data Center
In July 2022, although the exit was completed, there was still much work to do in getting the data center decommissioned. DTS employees worked to decommission the data center by doing an inventory of assets, taking out 3,000 hard drives, 100 racks, and a lot of network gear. The team also surplused and removed assets in the financial system.

Ultimately, Utah's data center exit prepares the state for a new generation of technology services. The hybrid multi-cloud environment includes new 100GB connectivity to Utah's primary cloud partners, creating an architecture that will be able to scale indefinitely into the future. The simultaneous move of the State's Cyber Center adjacent to the streamlined data center and telecommunications hub ensures that security will continue to be a critical component of the state's computing operations.