

AN APPLICATION-CENTRIC APPROACH TO DATA CENTER MIGRATION

Five key success factors

Abstract

IT organizations today are under constant business pressure to transform their infrastructure to reduce costs, increase availability, become more efficient, and remain competitive. Whether the decision to relocate or consolidate a data center is driven by cost pressure or the need for greater IT efficiency, it is important that organizations take into account the opportunity to modernize the infrastructure as part of the initiative. Consolidation and migration undertakings are complex and rare endeavors with little room for error.

Dell Technologies has delivered more than 1000 successful end-to-end data center engagements globally, and has been modernizing, consolidating, and migrating data centers for nearly 20 years. We provide unique value through our combination of expertise, automated tools, and application-centric approach. This paper discusses Dell Technologies' approach, methodology, automated toolset capabilities, and best practices—and how they are applied in data center relocation and modernization programs around the world.

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Business Drivers

Data center migration and modernization projects are complex, and they have significant impact on costs, service levels, applications, and IT operations. However, the desire to improve efficiency, to reduce overall costs, and to deliver greater availability in order to meet business expectations in a cloud era continue to drive enterprises to take on these initiatives. Historically, the drivers propelling these projects were mostly facilities related, such as relocation or consolidation due to a recent merger or acquisition, or reliability and capacity limitations in existing facilities. However in today's digital economy and cloud era, more organizations are looking to utilize data center consolidation or migrations to implement a more holistic, overall modernization of their infrastructure to increase availability, to improve agility, and to better support converged, virtual, or cloud architectures.

Whether the driver is a merger or acquisition, facilities lease expiration, financial pressure from the business, or holistic modernization, it is critical that organizations develop a robust plan and schedule for migration in order to execute seamlessly. These projects involve much more than simply moving infrastructure from one point to another, and should also be planned for as a holistic business transformation.

Challenges

As these are complex and rare events to plan and implement, thorough planning and seamless project management are essential to executing a successful migration with minimal risk. Often, organizations have neither a well-articulated migration strategy nor any migration experience, and they may lack the necessary resources to execute in a specified time frame without risking unplanned downtime. Many organizations also lack effective change management processes or have vaguely defined IT program leadership, which hinders migration success if they take on the initiative alone.

Decisions will have to be made about many aspects of the application and infrastructure environments in the context of the migration program. A critical starting point for any data center engagement lies at the application level, so a comprehensive understanding of the infrastructure and application interdependencies in the environment is necessary prior to determining a strategy for migration. A migration, consolidation, or modernization initiative is an ideal time to consider converged infrastructure, hybrid cloud, shifting toward ITaaS—or simply refreshing the environment by virtualizing servers or upgrading an application. Many organizations are combining these efforts to achieve a more efficient infrastructure at their target data center. In addition, this is an ideal time to analyze applications to determine optimal placement on virtual, private, or public cloud architectures.

There may also be an impending event that either prevents or makes such transformation difficult to incorporate. Key stakeholders need to determine their guiding principles for these transformation activities, and ensure that the proper governance is in place to handle exceptions. Sometimes a “like-for-like” move will be appropriate from a cost or a schedule perspective. However, a hybrid approach of a “like-for-like” move, integrated with upgraded systems that are more efficient, is more often utilized.

Businesses facing these challenges frequently engage external help because they realize that the logistics and risk of migrating hundreds of infrastructure

elements simultaneously is daunting, and they need expert advice on the best approach. Dell Technologies project managers possess a thorough understanding of best practices for program structure, governance and communications, including the development of a migration schedule that is tailored to application needs, business requirements for cost and risk, and the capabilities of the organization's team.

Dell Technologies deploys a proven, application-centric framework for building and executing a migration strategy centered on five key tenets:

- ✓ Adopt a business-focused view
- ✓ Understand application interdependencies
- ✓ Package applications appropriately
- ✓ Optimize the migration schedule
- ✓ Document all pre-migration activities and test plans

Tenet #1 Adopt a Business-focused View

A data center is a complex entity. Its relocation will affect not only business users and customers, but also IT staff, partners, and vendors. A “business-friendly” migration requires a shifting of focus from infrastructure management to the application level, along with early participation and buy-in from all involved stakeholders. Data center engagements are less successful when there is a weak linkage with the business or unclear understanding of business risk tolerance.

Organizations should not underestimate the amount of time, effort, and support their business users require to ensure project success.

Data center migration best practices recognize that business users and IT support need to:

- Understand the current environment—interdependencies between applications, servers, and storage components, and analyze applications for optimal cloud suitability for applications
- Have an accurate picture of the application performance in advance, and time to address new or incremental response-time metrics that meet business requirements
- Be active in the application testing process. Also, scheduling resources to support user acceptance testing requires active forward planning and generally requires a significant user community involvement during migration testing
- Define a migration strategy that reflects the application sourcing strategy, that is, whether the analyzed applications will remain in the data center, migrate to a hosted provider, or be integrated into cloud-based software delivery model

With a lease ending in their maxed-out data center, a **financial services group** called upon Dell Technologies to help them:

- Minimize migration risks, costs, and timeline
- Improve their ROI with a ~30% savings in power cost + additional savings with tech refresh
- Evolve DC strategy for transformation and future growth
- Improve DR capability to meet regulatory requirements

Dell Technologies employs a patented migration methodology (see Figure 1) to deliver an agile approach that maximizes flexibility and reduces the time before the first package of applications is migrated. As the first package moves through the migration process to migration execution, the next package can be simultaneously developed.

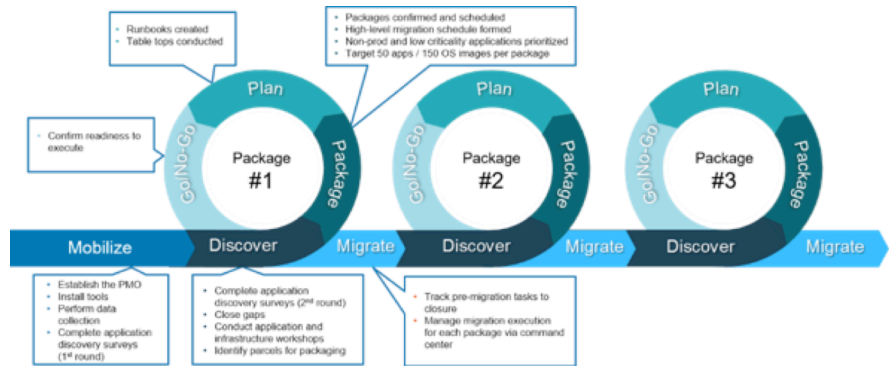


Figure 1. Dell Technologies's Proven Migration Methodology

In its consulting engagements, Dell Technologies collaborates with business liaisons, application owners, and application support groups to perform a detailed discovery and analysis of the current-state environment.

Balancing financial impact and risk is a key element in the success of any migration project. Applications have different levels of importance and criticality to the business. These varying business requirements drive different migration strategies. Dell Technologies's flexible approach ensures that budget, schedule and business requirements are met, and our advanced toolset ensures elimination of nearly 98% of human error, virtually eradicating sequencing and dependency errors.

The team engages representatives from the functional business areas, as well as the respective application owners, in order to assess business and application release plans and upcoming business events, such as new product launches. Then they evaluate the potential complexity and risk of the migration. Critical components warranting an in-depth analysis include:

- Business criticality of the application
- Business impact of downtime
- Service-level objectives and underpinning service contracts
- Application downtime thresholds and risk tolerance
- Application roadmaps, release plans, and "Forward Schedule of Changes"
- Application complexity and system dependencies, including technical information and configurations

Tenet #2 Understand Application Interdependencies

Once a clear picture of the business environment and its supporting applications and systems is established, the team drills down to further understand and analyze the interdependencies between the applications. Because many applications have external inputs and outputs, developing

After extensive M&A activities, this **specialty insurance firm** needed help from Dell Technologies to help them:

- Achieve a 7:2 data center consolidation
- Reduce risk through automated orchestration and operating model efficiency
- Shift IT spend from fix/maintain/operate to innovation
- Position IT as broker of private/public cloud services

a sound migration plan requires a complete picture of application feeds and flows, as well as the timing of critical data transfers. This is important for two reasons.

First, since data center migrations routinely require splitting applications from their data flows and feeds, care must be taken to package the migration of the applications and systems into complementary “move packages”—that is, components that must move together to ensure that operating in separate data centers won’t cause any breakage or performance delays. Second, most companies have built their IT infrastructures over time, incorporating various best-in-class components. The result is that today’s multitier IT infrastructures are highly complex and fragmented, with multiple vendors, platforms, applications, and standards.

Dell Technologies believes automation is critical to accurately discover and map these complex relationships that exist across business processes, applications, and the IT infrastructure. We use an advanced automation tool called Dell Technologies DTM Assist (formerly Dell Transformation Manager) to rapidly document and analyze interdependencies between applications, servers, and storage in real-time.

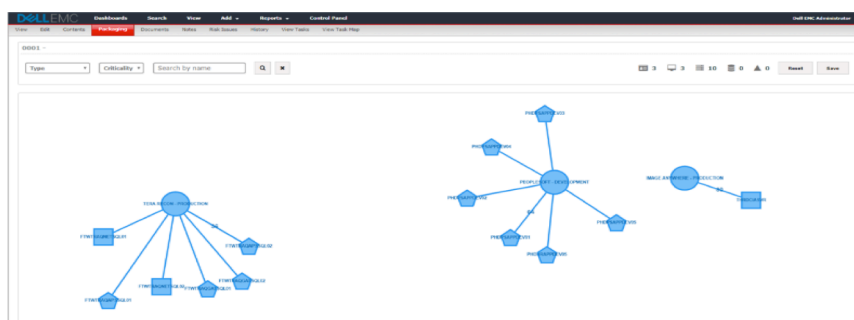


Figure 2. Packaging Based on Interdependencies

Coupled with our patented application-centric approach, we can utilize these discovered interdependencies to package applications, set migration schedules, and determine optimal migration strategy options. For example, in figure 1, Dell Transformation Manager forms the three move packages shown based on the interdependencies among the corresponding applications and associated infrastructure. By analyzing the data in real-time using Dell Transformation Manager, we are able to deliver data center initiatives in the shortest amount of time and with the lowest amount of associated risk. The discovery phase is shortened from four to six months to four to six weeks in many cases. The time to complete discovery is based on the size of the server and application environment and may take longer in some cases.

In addition to Dell Transformation Manager, we also utilize decision support and analysis platforms such as Dell Technologies Adaptivity to augment migration decisions. The Dell Technologies platform supplements Dell Transformation Manager by assessing the suitability of application workloads for public, private or hybrid cloud environments. As shown below, Dell Technologies Adaptivity can help identify the applications that are most suitable for migration to cloud environments as part of a data center migration, and which cloud delivery model is the best fit for each application.

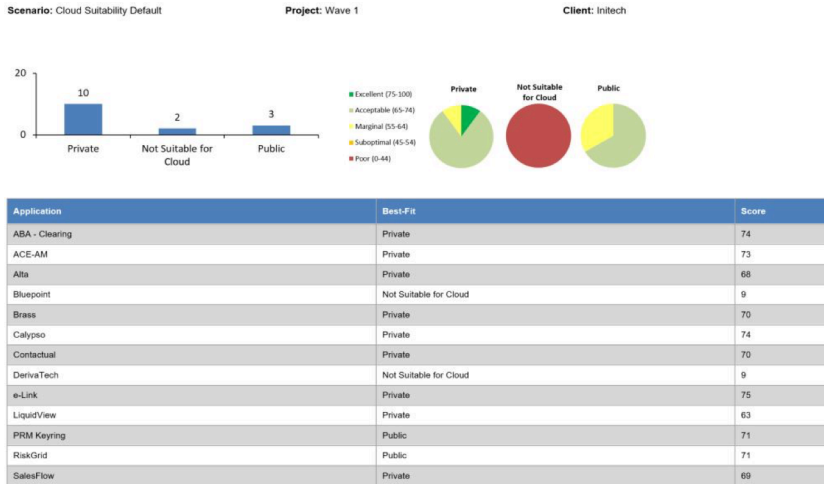


Figure 3. Cloud Suitability Assessment

Tenet #3 Package Applications Appropriately

After completing the identification of cloud migration candidates as well as the critical application interdependencies and determining which servers must be moved with other servers, applications must be grouped into move packages to allow for an optimal sequencing during migration. These packages depict which applications (and their associated server and storage infrastructure) need to move together during the migration, and serve as the foundation for the migration events to follow.

Dell Technologies has developed a comprehensive framework to package applications for migration. See Figure 3 for a summary of migration factors and considerations, encompassing business factors such as the degree of business impact and events that may include end of month processing; technical considerations related to package size constraints due to outage windows or environmental requirements; and operational factors such as insurance risk and personnel availability.

With a need to relocate data centers away from a high-risk area, this **large worldwide bank** called upon Dell Technologies to help them:

- Complete the migration without business disruption
- Migrate server and storage infrastructure from existing data centers to 3 more resilient production data centers
- Conduct a multiphase migration of 1500 servers at a rate of 150/weekend
- Achieve robust DR capability

MIGRATION FACTOR	CONSIDERATIONS
Business impact	Applications that have high business impact should normally be spread over multiple packages to reduce risk
Business events	Some business functions may be data-related (e.g. end-of-month processing); packaging may need to be adjusted
Package size constraint	Depending on the size of the outage window and the number of resources available, size and composition of a package may be limited
Physical environment	If the source data center has environmental issues (e.g. overheating), components that provide the quickest relief should be a priority in early packages
Insurance and risk	The value of the components being moved may be a consideration for insurance coverage and/or risk
Personnel	Consideration must be given to avoid overtaxing resources (e.g. administrators, networking, security, DBAs)

Figure 4. Migration Packaging Considerations

Dell Technologies leverages migration tools and a comprehensive repository of the source and target environment that can be used throughout discovery and analysis, migration planning, and execution activities to:

- Query and report on the relationship between the application and infrastructure layers and their interdependencies
- Analyze the complexity of risk points
- Provide a dynamic picture of the data center's alignment with business demands
-

Tenet #4 Optimize the Migration Schedule

Typical data center relocation requires multiple move events to relocate systems from the source to the target data center. Each event defines the infrastructure and applications that will be moved. They are typically a blend of production and non-production environments or low and high criticality systems.

Each event also articulates how the migration of the servers, applications and related databases is performed. The decisions about the size and frequency of move events depends upon multiple factors, such as data criticality, cost, resource availability, and the risk associated with having multiple applications migrating at the same time.

Dell Technologies works with the project team and the business stakeholders to develop a consensus for the recommended application move packages and optimal migration schedule after evaluating:

- Business criticality to ensure that vital applications would be distributed over different move events to reduce risk
- Migration complexity (a measure calculated from the number of applications hosted and their interdependencies) to appropriately distribute the applications
- The application's availability requirements and its tolerance for any extended downtime

A major U.S. hospital corporation saved \$123.9 million after Dell EMC was called upon to help them:

- Consolidate 8 data centers down to 5
- Virtualize and consolidate the infrastructure
- Achieve early exit from 3 data centers, saving \$1 million in facilities costs
- Avoid \$1 million in costs by eliminating the need for a network latency remediation solution

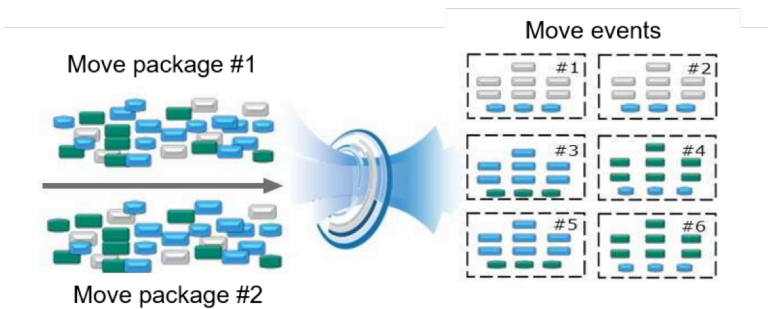


Figure 5. Grouping Packages into Move Events

Figure 5 depicts how move packages of interdependent applications (on the left) are grouped together in move events (shown on the right). Typically, move events are scheduled to execute every other weekend to avoid overtaxing resources. That allows application teams the time needed to ensure that production applications are running smoothly before attention shifts to the execution of the next move event. Many times client will allow a trickle process which is the movement of a few non critical applications during the week. This activity blends in with normal work day activity and does not impose a burst of time consumption on support personnel.

While today’s virtualization technologies support larger move events, the gating factor is more dependent upon how many application migrations the business can tolerate simultaneously. Our approach also allows dependent resources to be identified and moved in a sequence that ensures that the application functions properly in its new location.

Tenet #5 Document All Pre-Migration Activities and Test Plans

Typically, several different migration strategies are employed throughout the program, and even within a single migration event. With different events in various stages of planning, it is important to have a thoroughly documented plan. Two critical components of that plan include: (1) the weeks of pre-migration activities that lead to a successful migration and (2) the detailed test plan for both infrastructure and applications after they are brought up at the target data center. See Figure 5 for an example of a pre-migration plan.

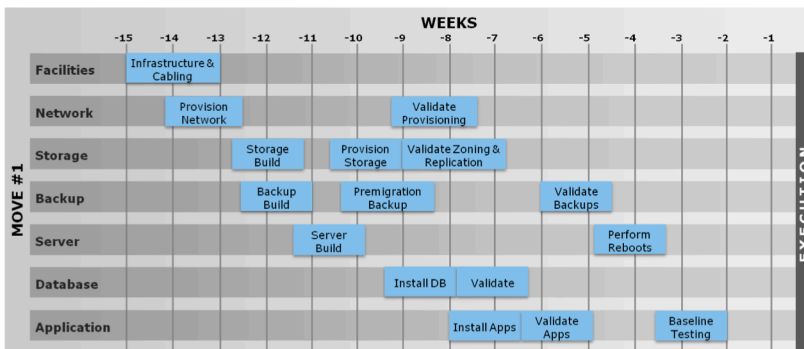


Figure 6. Pre-migration Planning

Pre-migration activities generally take place at least 6-8 weeks in advance of the migration event. They include such items as adding new capacity at the target data center, installing applications, beginning data replication, installation of new network circuits and so forth. These should be coordinated by an event lead, who is typically the same person who will be managing the migration.

Organizations often have existing test plans for their most critical applications, either for release management or for disaster recovery. However, many of the less critical applications or IT services do not have documented test plans. Many organizations have to determine an

appropriate level of testing based on the application criticality and complexity. This can range from something as simple as opening a web page or performing a simple query to something much more complicated.

Dell Technologies works with customers to document all required pre-migration tasks and related test plans, and coordinates the implementation of those tests during the migration.

Conclusion

Data center migration projects may seem daunting, but with an experienced partner and automated tools that greatly reduce human errors and outage windows, much of the risk can be mitigated. Dell Technologies's services for data center consolidation, migration, and modernization are built upon a foundation of extensive expertise, combined with pre-engineered cloud solutions, leading automation tools, and a patented methodology. Dell Technologies is the leading provider of converged infrastructure and has a breadth of knowledge in implementing hybrid cloud architectures as part of a data center consolidation or modernization initiative. In addition, Dell Technologies's advanced cloud suitability platform determines the optimal placement of application.

The automated tools utilized throughout Dell Technologies' application-centric approach both accelerate overall project time, shortening it by as much as 50 percent, and eliminate nearly 98 percent of human error. Through the combination of seasoned expertise, robust methodology, and rapid discovery tools, Dell Technologies executes data center consolidation, modernization, and migration initiatives in the shortest amount of time, with the lowest risk.

After M&A activity at this global pharmaceutical, they called upon Dell Technologies to help them:

- Consolidate 19 data centers down to 4
- Migrate 6,500 servers to a converged infrastructure
- Reduce data center floor space requirement by 50%
- Lower operational costs, while increasing efficiency



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