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Office of Citizen Services and Innovative Technologies

Migration Planning and Execution

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WHITE PAPER

1. Introduction

Infrastructure managers face a variety of challenges when planning for and migrating data centers. This paper describes those challenges and introduces the IBM tools available to help lessen the business risk and the services that IBM offers to plan and execute the move of applications, data, and IT equipment from one data center to another data center, locally or across geographies.

2. Description of Problem and Goals

Data center migration requires special skills for planning, managing, and executing the migration while maintaining current day-to-day operations. Agencies should consider whether their IT staff has any significant experience in application and data migration and their currency in planning and implementation techniques. Tasks such as provisioning new servers or managing tape drives are part of day-to-day data center operations. However, data center consolidations or relocations are major events that require specialized knowledge to perform smoothly, achieve desired benefits, and minimize operational risk and impact.

3. Description of Approach, Rationale, Results, and Timeline

IBM offers a service that helps clients to migrate applications, data, and IT equipment between data centers while reducing risk and providing a seamless transition for end users. Our services enable clients to achieve the following goals:

- Move dependent applications and equipment together
- Meet critical application availability requirements using specialized data migration techniques
- Reduce cost and improve operational efficiencies by centralizing the IT environment
- Limit risk by leveraging the skills of the agency, experienced IBM relocation practitioners, and third parties
- Allow IT operations to focus efforts and resources on more critical operational areas

Our data center migration service supports planning and execution of moves for applications, data, IT equipment (such as servers and storage arrays) and the data center infrastructure (such as racks, power systems, and cooling systems). These services can help you move within a data center or from one data center to another data center, locally or across geographies.

Help ensure a seamless, low-risk migration for end users

Consolidations and relocations can contribute to significant cost savings but can also be disruptive to end users if not done correctly.

A data center move is more complex than simply physically relocating a few servers from one location to the next. During a move, data and applications availability are at risk. The cost of a single mission-critical application outage could be sizeable, both financially and strategically. A successful migration plan should anticipate and avoid these crippling unplanned outages.

Users have decreasing tolerance for downtime in accessing essential applications, even for planned events such as migrations. Acceptable application outage windows—the amount of time and frequency an application may be unavailable—are getting shorter and shorter. Long outages to migrate data center equipment are simply unacceptable.

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A three-phase methodology for successful migrations

IBM has a three-phase approach for migrating data, applications, and equipment, as depicted in Figure 1.

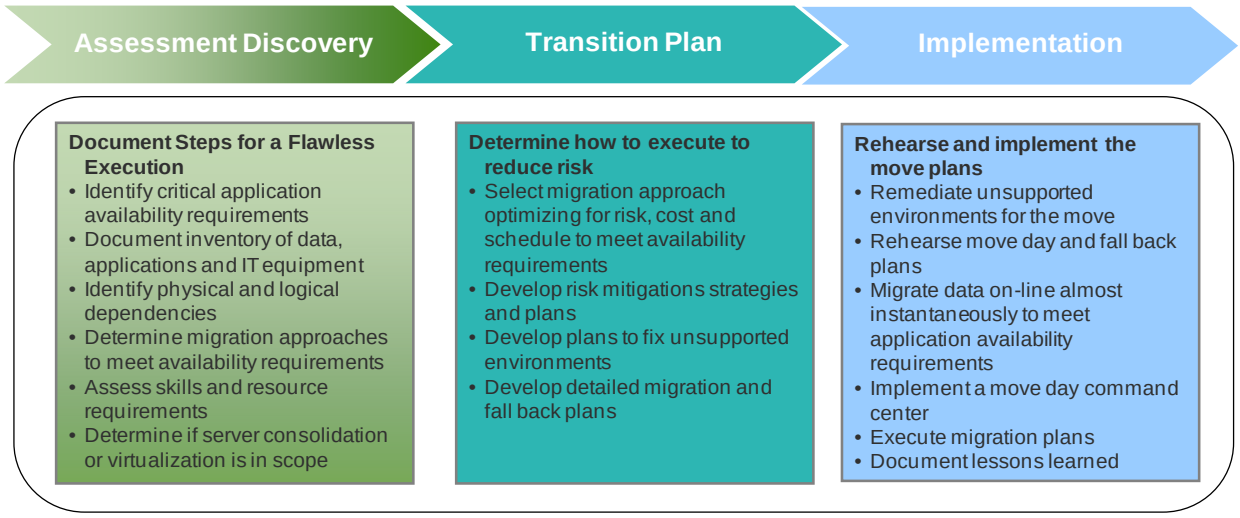

Figure 1: A three-phased migration methodology helps ensure that details are covered.

Assessment discovery

In the assessment discovery phase, you and IBM jointly document steps for a successful execution. Together, we determine critical application availability requirements and inventory the data, applications, and IT equipment. Physical and logical dependencies are identified to allow those applications and their equipment to move together.

Affinity groups – applications, data, and equipment with similar characteristics and business requirements – are identified in this phase. Multiple affinity groups will be moved together, reducing project cost, time, and business impact.

With the dependencies revealed, the IBM team will develop possible migration approaches that satisfy budget requirements and time constraints outlined by the client. The IBM team will also develop a top-level expense estimate and skill and resource requirements.

The output of the assessment discovery phase is a project review and recommendation about how and whether to proceed with the migration.

Transition plan

During the transition plan phase, IBM makes recommendations on migration approaches to reduce risk and optimize both cost and schedule.

IBM will build an experienced team with the right platform architecture and relocation project management skills to reduce business and technical risk and achieve a successful application move within predefined outage windows.

After an approach is selected, IBM finalizes detailed migration plans and updates expense estimates, if necessary. The output of the transition plan is a detailed planning, budget, and timeline document ready for implementation.

Implementation

In the implementation phase, IBM rehearses and then implements the move plans. This phase can last from a few weeks to several months, depending on the scope and nature of the project.

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Before the move, IBM develops plans to remediate unsupported environments and rehearses move and fallback plans to identify and resolve potential problems. We establish a move day command center to address unforeseen issues. These activities are key elements of a comprehensive plan. IBM can staff the project management and implementation teams with skilled professionals and resources necessary to meet an agency's objectives while simultaneously managing expenditures to financial projections.

After the implementation is complete, IBM conducts a post-project review to document the lessons learned to help plan future data center projects and support daily operations.

Case Study #1: Safely migrate to a new data center in only four months

A waste disposal company that serves more than 600,000 residential and 60,000 commercial customers in more than 50 communities needed to implement a new data center and then migrate IT equipment quickly and safely. IBM helped the company build an energy-efficient, scalable, and resilient data center and relocated its equipment from the old location in only four months. As part of the project, IBM helped define requirements, scout locations, design and implement the new data center, and then safely migrate data and applications without any unplanned service interruptions.

Upon completion, the company had a future-ready data center scoped, designed and delivered by IBM. It provided the client with improved availability through enhanced redundancy. The expanded data center capacity supported a doubling of the client's business and reduced operating costs up to 20% through improved efficiency. The client reported that "after the move, a number of users came back and said this project seemed like it was flawless and went just like we told the users it would go."

Leverage IBM research innovation to identify critical dependencies

In our experience, manual client inventories are generally 70-90% accurate, which is not accurate enough to use in planning a major relocation. Furthermore, performing manual inventories is time-consuming and expensive, and the information obtained has a limited useful life. To combat these challenges, IBM has created an automated discovery tool that improves the equipment and application discovery process to produce the highly accurate inventory needed to help ensure a seamless relocation with reduced risk.[1]

Applied mathematics can help ensure a seamless migration

A product of IBM Research, our logical dependency mapping tool applies advanced mathematical modeling to map application and server dependencies. This tool can help to identify the server, storage, and application assets to be moved. Figure 2 illustrates the multiple associations with an IT environment as small as 27 servers.

Case Study #2: Leverage the IBM discovery tools to better understand the IT infrastructure before relocation

A large financial services institution was planning a move and needed to better understand the environment—especially the 700 Wintel servers and over 400 critical applications deployed on all the platforms.

They were able to reduce the time to understand the dependencies between applications and servers by 50% (compared to their manual methods) using IBM's discovery tool, which uses

[1] This tool discussion reflects just one of the IBM discovery tools. For more information on other discovery mapping tools, refer to the white paper "Tools for Mapping Applications."

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analytics for logical dependency mapping. The tool helped them to reduce risk and cost by identifying areas of the IT environment that needed to be remediated before the move, such as unsupported environments or operating systems. Through more insightful understanding of the logical dependencies, planners were able to move equipment and applications without disruption, and to identify and fix a key single point of failure in a critical application.

This discovery tool is a set of server side scripts that automatically discover equipment connections over networks, systems software, middleware, and applications. It is a simple and transparent shell/VBE script that runs on a client's servers without requiring IBM-specific skills or IBM access to the systems. The script creates a data file for each server, which is then combined with other server data files, creating a graphical depiction of the entire IT environment that identifies logical dependencies. This automated process using the tools helps reduce the time required to inventory the equipment typically by up to 10-15%, is less costly than manual efforts, and avoids the risk of missing up to 10% of the physical assets.

After the environment has been identified, IBM algorithms can identify the dependencies and recommend affinities. This dependency mapping is shown in Figure 2, where the algorithms look for relationships between what was discovered in the inventory. Minimum-cut graph algorithms are then applied to recommend what must move together to meet application availability requirements—thereby reducing the risk of not moving the right servers and applications together. Having an electronic model of the inventory allows us to work with a client to quickly evaluate affinity grouping scenarios and provide a plan for a cost-effective move.

Applications with high availability needs are identified and the move recommendation factors in time, distance, and cost trade-off to accomplish the move within the availability window. Noncritical data can be migrated online almost instantaneously to the new data center.

Dependency Mapping and Logic

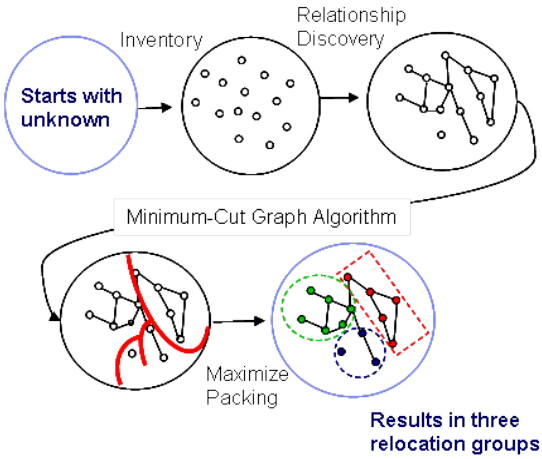

Figure 2: Dependency group mapping supplies valuable insights into the relationships of the assets to be moved.

Case Study #3: Helping avoid service interruptions while migrating to a new data center

A commodities and securities dealer needed to transition to a new office location without service interruptions. IBM helped the organization implement and migrate to a new, state-of-the-art data center to support more than 1,000 traders and 500 back-office users without incurring downtime that would negatively affect business processes.

Throughout, IBM provided expertise in data center construction and IT relocation processes. We brought together a diverse group of internal resources to deliver project management services, consultancy services and physical relocation of IT systems and network components. We helped the company quickly design and build a new large-scale data center and network infrastructure, relocate critical IT components and sensitive data, and move the existing applications and IT

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systems. The applications and systems were fully operational by the next business day with no downtime, and no business processes were affected.

Next steps to begin a consolidation and relocation project

Consolidation and relocation projects are significant undertakings that can span 6 to 18 months, yet have far-reaching influence on an agency's mission. Given this importance, it is essential to develop a strategy for initiating a project and seeing it through to conclusion.

- **Identify the executive who will be responsible for the relocation project.** CIOs are often the best choice for a champion, but CFOs can be allies to help demonstrate business value.
- **Determine the scope of the project and the migration objectives.** Understand the data center priorities—supporting growth, reducing costs, improving application availability, increasing resiliency—and understand how a migration will affect those priorities. Assemble information from experts to document the inventory of assets to be moved, to define critical application availability requirements and dependencies, and to develop risk mitigation strategies for unsupported platforms.
- **Identify skill and resource requirements.** Decide if any of the existing data center staff can be reassigned to help plan and execute the project. Determine if any equipment will need to be acquired to execute the move.
- **Identify business and technical requirements.** Understand which applications are to be given priority.
- **Begin developing the project plan.** Plan the migration after objectives and requirements are clearly understood.

Conclusion

Data center consolidation and relocation services from IBM can help you migrate applications, data, IT, and infrastructure within your data centers or from one data center to another while maintaining your application availability, reducing project risk, and meeting project budgets and timelines. In the past three years, IBM has successfully migrated hundreds of thousands of servers and thousands of applications, including our own. All of this experience offers you the confidence that you can achieve growth while limiting your risk to support innovations that increase the competitiveness of your business.

4. POC and Vendor Information

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