DEMYSTIFYING THE CHALLENGES OF APPLICATION MIGRATIONS DURING A DATA CENTRE MOVE

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INTRODUCTION

I am constantly being reminded when I speak to clients who shudder at the prospect of moving their IT estate to a new platform. After all, Application Migrations can be a daunting and a complex process during a Data Centre move. But rest assured, with careful planning and a detailed strategy, the challenges of your Application Migrations can be overcome.

In this guide, I will look at the various aspects of Application Migrations that should be taken into consideration when planning for your next Data Centre move and provide some insights into the best practices and common pitfalls to avoid during your next Application Migration.

The challenge for organisations looking to run an Applications Migration is that they probably only run one on average every 10 years. The tools and processes to run these are evolving on a regular basis and only specialist organisations can bring best practices and tools to the project which minimise risks and expedite the process, saving time and money as a result.

UNDERSTANDING APPLICATION MIGRATIONS

Understanding the complexities of an Application Migration is crucial and is a fundamental element of the Data Centre Move project. It involves the seamless transfer of the organisation's applications from one Data Centre to another (and yes this can involve moves to public and private cloud services) whilst also ensuring minimal downtime and data loss.

Firstly, a comprehensive assessment of the applications is conducted by the Project Team to identify dependencies, performance metrics, and potential risks (key is the impact any outage may have on the business) – the aim should be start at zero impact and aim for this for each move. I am always astounded when finishing a complex Data Centre move (which includes the Applications Move) when a senior stakeholder says he was not aware we had undertaken a Data Centre Move (i.e., the business never complained of an outage).

The comprehensive applications assessment guides the migration strategy, determining whether a lift-and-shift, re-platforming, or re-architecting approach is appropriate for each application suite (sometimes also referred to as an IT service). It is important to allow adequate planning and testing which are essential to mitigate potential issues, which will impact business availability. Additionally, strong communications with stakeholders and end-users' positions for a smooth transition. A well-executed application migration ensures business continuity and optimises the benefits of the Data Centre Move project.

COMMON CHALLENGES FACED DURING APPLICATION MIGRATIONS

A Data Centre move is a complex piece of many thousands of parts that must be broken down and rebuilt in the new location. Just one adaptor in the wrong port will delay the service restoration. Turn the clock back 20 years and the Data Centre move encompassed the physical move of equipment. Turn the clock forward and Application migrations in their virtual environment as part of a Data Centre move can present a different almost hidden number of challenges.

Firstly, ensuring compatibility between the existing infrastructure and the new Data Centre may be a significant hurdle (in a recent move the connection of the two Data Centres was not permitted as the source Data Centre infrastructure did not meet the destinations minimum Security standards, (this includes the Applications which were not patched to a sufficient level either).

Application dependencies and configurations may differ, leading to unexpected issues during the migration. Many times, organisations take the opportunity to change the structure of the new network and increase the challenge by changing the IP address ranges. Data integrity and consistency are critical concerns, as any loss or corruption during the transfer would have severe consequences on the business. Always insist that data doesn't move, always copy the source to the destination. If you must physically move devices (large storage arrays), these have their own challenges which vary from organisation to organisation as the move will need to follow strict Security policies. I had one customer who wanted armed guards in the move vehicle, (I did wonder if the infamous 'A Team' of the 1980s TV were still available for work).

Application downtime poses a major challenge too, particularly for mission-critical systems. Minimising downtime while ensuring a smooth transition requires meticulous planning and coordination. Additionally, managing migration risks, such as security vulnerabilities and performance bottlenecks, demands thorough testing and contingency measures. Always minimise any downtime using copies and testing before the cut over, then if it doesn't work the original is still in situ, untouched and able to support Production workloads again.

The complexity of modern applications, often involving multi-tier architectures and third-party integrations, further complicates migrations. The biggest challenges though are legacy applications which may lack proper documentation, making it challenging to understand their intricacies. It would be nice to say this is an exception in the various migration projects I have run over the past few years but there does appear a lack of governance in ensuring current documentation support for Production and Recovery services.

Moreover, the involvement of various stakeholders, including application owners, IT teams, and end-users, necessitates effective communication and coordination to address concerns and set realistic expectations.

All too often this is exacerbated when the organisation appoints a Project Manager who is not a strong communicator. Utilising an internal Project Manager can also address the time and budget constraints but familiarity within the team may not work in favour of the Project. The Project team's experience of running complex migration programmes can be limited, so engaging with and bringing in the necessary experience and knowledge of undertaking regular migration programmes will assist the team by not just knowing the route to take but the routes not to take to get the best results but will in many cases save the Programme money and time.

PREPARING FOR THE APPLICATION MIGRATIONS

Preparing for the application migration is a critical process to ensure a seamless and successful transition. Let's take a step-by-step walk through to the key points:

Application Inventory	Prioritisation	Compatibility Assessment	The Migration Strategy	Testing and Validation
Data Backup and Integrity	Downtime Mitigation	Communication and Training	Contingency Planning	Post-Migration Support

APPLICATION INVENTORY:

Begin by creating a comprehensive inventory (Applications Catalogue) of all the applications running in the existing Data Centre, including their dependencies and interconnections. Identify those that have or are due to be decommissioned and clearly recording them in the Catalogue. Just because they may not be moving is not an excuse to ignore them, they will continue to be raised in discussion throughout the migration planning process, and don't be surprised if they are not added at the last minute to a move.

PRIORITISATION:

Categorise the applications based on their business criticality and complexity to prioritise the migration sequences. It is important to consider each application's dependencies and potential risks for a transition to a new Data Centre.

COMPATIBILITY ASSESSMENT:

You should evaluate the compatibility of each application with the new Data Centre's infrastructure and identify any necessary modifications or upgrades.

THE MIGRATION STRATEGY:

Choose the most appropriate migration approach for each application - lift-and-shift, re-platforming, or re-architecting - based on compatibility, application suite build and business requirements. The migration strategy will be made up of multiple options for the transition and the decision on which strategy to use will be dependent on many variables such as business availability, time to move, dependency on specialist infrastructure, network configurations etc.

TESTING AND VALIDATION:

Choosing a strategy where the live version is first replicated and tested in the new Data Centre will greatly reduce the risk of issues when finally cut over. Note though this cannot always be undertaken (i.e., the application is based on a specialist piece of hardware which is required to be physically moved) and so the need for multiple strategies for the transition are required.

DATA BACKUP AND INTEGRITY:

Ensure the data integrity by performing robust backups and validation procedures to prevent data loss or corruption during the migration. As I always make clear from the commencement of any migration, data is the organisation's crown jewels and so data integrity is critical.

DOWNTIME MITIGATION:

Plan for minimal application downtime during the migration through careful coordination and load balancing techniques which are key to success. Moving Applications must follow the businesses IT Change Management process. Special attention must be paid to the time to not just transition the application to the new Data Centre but needs to account for testing and in the event of failure the reinstatement of the application in/to its previous location.

COMMUNICATION AND TRAINING:

Keep all stakeholders informed about the migration plan, including end-users, application owners, and IT teams. Provide relevant training if needed. As highlighted earlier effective Communications is key to a successful migration event. IT should be reminded that the Project Team will be moving the organisations business IT systems, so ensuring key stakeholders are briefed at every stage of the Project is important to maintain support. This includes progress and of course any issues encountered. Suitable communication to the business provides support and understanding is important. If there are no surprises, then the businesses confidence in IT will be improved. If there is an unexpected issue (delayed restoration) then the business may be more supportive than if they were not involved.

CONTINGENCY PLANNING:

As per above ensure every move event is prepared with contingency plans to address those unforeseen issues that occur from time to time and establish rollback procedures if required. Make sure the team know the process and maintain robust communications with the business and key stakeholders who can support the decisions the project team make.
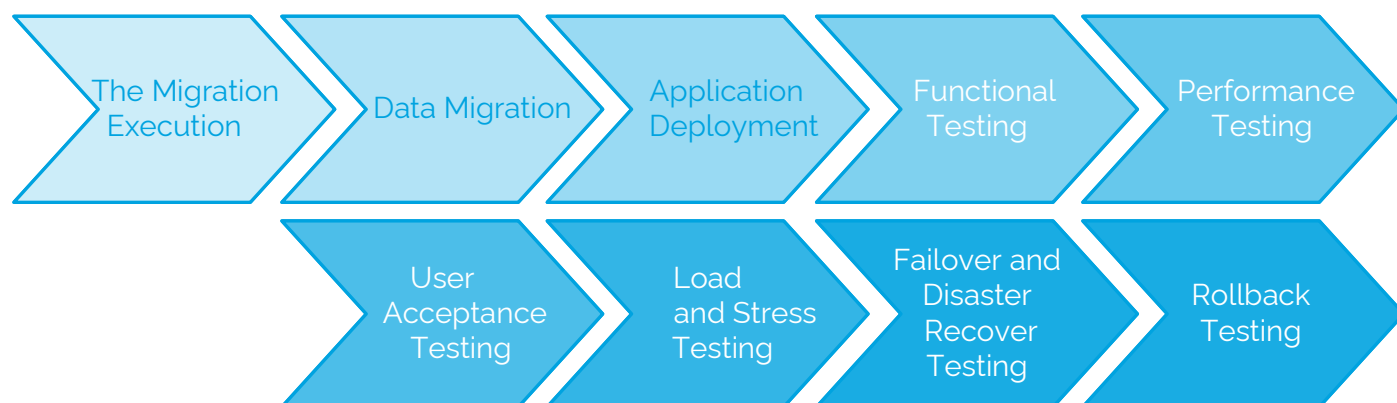
POST-MIGRATION SUPPORT:

Like all new releases of IT Systems, it is important to allocate resources for the post-migration support (as I call them the 'Warranty Period') to resolve any unexpected post-migration issues.

EXECUTION AND TESTING OF APPLICATION MIGRATIONS

As expected, there are critical activities that must be undertaken to ensure a smooth and successful transition, these include:

The Migration Execution	Data Migration	Application Deployment	Functional Testing	Performance Testing

	User Acceptance Testing	Load and Stress Testing	Failover and Disaster Recover Testing	Rollback Testing

THE MIGRATION EXECUTION:

The Project Team will have developed a 'Move Event Runbook' a clear set of tasks with roles and responsibilities and outcomes. The team would have been through the Runbook numerous times till all agree it is the best sequence to be successful. The Runbook will list out a series of pre-requisites that must be met before the Applications can be migrated. Once this checklist has been confirmed successfully, the actual migration process can commence, following the predefined migration strategy documented for each application. The move may involve the physical movement of servers and/or the transfer of data and configurations to the new Data Centre.

DATA MIGRATION:

Transfer the application data to the new Data Centre while verifying data integrity and consistency. Number 1 rule in Data Migrations before any data is moved ensure a full backup is completed prior to any movement. My preference is to have two options for recovery, work with your storage team to identify the available solutions. Ensuring you have several data migration strategies available is key to minimising business risk. Once data has arrived in its destination, perform data validation testing to confirm that all the data has been accurately migrated.

APPLICATION DEPLOYMENT:

Following the Runbook install and configure the application(s) in the new environment, ensuring compatibility and adherence to the target infrastructure's specifications. Ensure network mapping(s) have been implemented and any firewall rules implemented to allow the applications to reach required resources.

FUNCTIONAL TESTING:

Once the systems have been migrated it's time to conduct the functional testing to ensure that the applications perform as expected in the new environment. Functional Testing is the first of three levels of testing which are undertaken to ensure the Application has migrated effectively to its new location. The Functional Testing is the first level of testing and tests the Application in conjunction with the infrastructure to ensure the Application opens without any error.

PERFORMANCE TESTING:

A difficult element to assess will be the evaluation of an application's performance in the new Data Centre. Key will be identifying any bottlenecks or performance issues (Note – this can be exacerbated when a suite of applications is split between two Data Centres when it is not possible to move the whole suite. Choosing the right Applications to move against those which are left behind is difficult and will need a lot of specialist analysis.) Where possible take the advantage to optimise configurations to achieve the desired performance levels. If this is built on new Infrastructure, then there is probably going to be performance improvements from the faster platforms.

USER ACCEPTANCE TESTING (UAT):

This involves the business end-users in testing the applications to gain their feedback and validate that the applications meet their requirements and expectations, they after all will know the applications better than anybody else and will quickly provide feedback. Note there will be a key balance between ensuring tests are done to a level of thoroughness versus taking too long to complete, this is always a fine balance with the testers.

LOAD AND STRESS TESTING:

Always a difficult test to undertake unless the team have access to specialist tools. Assessing the applications' response under pre-defined load conditions to ensure they can handle peak usage without downtime or performance degradation. Most migrations will assess a general performance for load and stress across the network before the migration commences. If there are any issues raised by the testers these are then reviewed on a case-by-case basis.

FAILOVER AND DISASTER RECOVERY TESTING:

Where applicable replications and failovers need to be built into the Migration Runbook with tests undertaken to flip services to the recovery/alternate site (high availability systems). These tests are crucial in restoring the continuity of systems once again in their original location.

ROLLBACK TESTING:

Developing and walking through Rollback Testing as part of the Migrations Teams preparations is essential in case the migration encounters significant issues, providing a fallback option if needed, restoring services once again.

POST-MIGRATION CONSIDERATIONS AND MAINTENANCE

Once the Application Migration has been completed there are several crucial post-migration activities and maintenance requirements to ensure the transition completes successfully:

Issue Resolution → User Support → Documentation → Performance Optimisation

ISSUE RESOLUTION:

In many cases there will be a few issues that are accepted by the business to be resolved post the migration. These are typically to lower priority applications. Managing the team to address and resolve any post-migration problems promptly is important to minimise any downtime and disruptions to the business.

USER SUPPORT:

Providing post-migration 'Warranty Support' to end-users, addressing any queries or difficulties they may encounter is an important element of the end-to-end services from Migration Project Team.

DOCUMENTATION:

Once an application has been migrated, it is time for the application owner to update the application documentation to reflect the changes made during the migration process. There is nothing worse than referencing a Data Centre which was exited many years ago on your documentation, it doesn't provide confidence in the document's content.

PERFORMANCE OPTIMISATION:

Ensure monitoring tools are in place and carefully monitor performance for capacity and latency issues and where appropriate optimise performance in the new setup to ensure efficiency.

ENSURING BUSINESS CONTINUITY DURING APPLICATION MIGRATIONS

If your Application Migration exercise is to remain successful and risks are minimised, ensuring Business Continuity during the Applications Migration will be crucial to minimise any disruptions. To achieve this the Project Team must:

Undertake a Risk Assessment → Phased Migration → Testing And Validation → Communication → Rollback Plan

UNDERTAKE A RISK ASSESSMENT:

It is important to undertake a comprehensive risk assessment of each Migration Event to identify potential points of failure and in conjunction with the Project Team create contingency plans to address them.

PHASED MIGRATION:

Wherever possible avoid the 'Big Bang' Move approach – it is essentially throwing all of your eggs in the basket at once. Unless the move is small and all risks are mitigated then select a phased migration approach, moving less critical applications first, and progressively migrating more critical ones, reducing overall impact. By the time the key applications are moved the project team are well versed in the process being used and the expectations of each of the team members.

TESTING AND VALIDATION:

Thoroughly test the applications in the new environment before the final migration to identify and resolve issues proactively will greatly reduce the risk as the move is simplified to a simple cut over.

COMMUNICATION:

Maintain transparent and constant communication with stakeholders to manage expectations and provide timely updates throughout the migration process. Key will be ensuring the language is kept at the business level, don't confuse your customer.

ROLLBACK PLAN:

Ensure the project has a well-defined rollback plan to revert to the previous state in case of any unexpected complications during migration.

As can be seen above the skills required by the Project Management Team to develop and manage the Applications Migration element of a larger Data Centre move is varied and complex. Many of these skills would only be utilised in specialist Data Centre Move Programmes. Many organisations have started these programmes of work with internal resources only to find that they lack the knowledge and expertise required to drive and lead a technical team through the hurdles of a Data Centre Move, which if left in place will lead to business impacting issues and a programme led by the Technology Team rather than the Project Manager. Select an organisation with the experience and knowledge of having completed these types of complex Programmes of work before. Ask for references from previous projects – engagement will bring its rewards with a sound programme, that can be delivered on-time and within budget.