

Seven Tactics to Lower the Risk and Optimize the ROI of Data Center Modernization

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Transitioning a data center from a mainframe environment to an open, industry-standard architecture may appear at first glance to be dauntingly complex. Part of the challenge is the misconception that moving off the mainframe must be an all-or-nothing endeavor. On the contrary, an organization is likely to experience cost savings and improve flexibility for each application it moves to an open-system architecture. Because of this, organizations can achieve financial and operational goals by transitioning data and applications in multiple phases, with gains comparable to those achieved in a total migration. An iterative approach may not only lower the perceived risk of modernizing a data center infrastructure, but also provides opportunities for optimizing ROI along the way.

For organizations ready to deploy the flexibility and cost savings of an open, industry-standard architecture, this paper offers seven tactics to lower the risk and optimize the returns from mainframe modernization. For a detailed discussion of the technical and financial tradeoffs of mainframe modernization, please refer to “Modernizing Mainframe Environments: High Value Alternatives To The Excessive Costs And Inflexibility Of Mainframe Technologies.”¹

Seven Tactics to Lower the Risk and Optimize the ROI of Data Center Modernization

Planning – shoot for near-term successes.

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2. Explore Options for Moving Applications
3. Target Applications Ripe for Migration

Preparation – put in place the skills and tools to proceed.

4. Find Vendors With Experience Relevant to Your Goals
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Execution – solidify and communicate your gains.

6. Test and Refine Vigorously
7. Document, Report and Build on Your Gains

Planning – shoot for near-term successes.

1. Start with Short-Term Projects for Near-Term ROI

Establish short-term goals that deliver meaningful business value. Long migration projects with no intermediate returns can become bogged down and lose the support of business decision makers.

No matter which approach is chosen, mainframe modernization is a significant undertaking. Fortunately, a large community of vendors, tools and methods are now available, proven by companies that began migrating off their mainframes years ago as growing business pressures became too much for aging systems and applications. Multiple options are available for managing cost and risk based on goals and requirements, and they can be combined as needed for various applications.

When CIOs and IT managers look out across the IT infrastructure, the sheer scope of the challenge can become an obstacle to progress. By focusing on short-term projects, you can get past this initial “analysis paralysis,” start making a financial impact, and gain experience that will help with the more difficult parts of the transition.

As a good rule of thumb, look for projects that can be completed in six to 12 months. In our experience, you may expect an ROI in as few as 18 months.

A recent TCO study² for example, reviewed the hard dollar costs for IT operations pursuing a mainframe modernization (“Mainframe Migration Case Studies: A Total Cost of Ownership Comparison” by Alinean). Soft costs were viewed as roughly equivalent, while the open-architecture solutions offered significantly improved time to market for new services. From an IT cost perspective, the organizations were able to greatly reduce ongoing operating costs and achieve very rapid paybacks. In particular, one manufacturing company pursued a migration project with a 12-month project timeline. The company was able to reduce annual operating expenses by an impressive 71% saving, or \$7,680,000 per year. The project paid for itself in 18 months with an initial investment of \$6,136,000. Longer term, the migration yielded a return on investment (ROI) of 305% over a four-year period.

2. Explore Options for Moving Applications

There are many options for transitioning your applications and services to a more cost-effective open-architecture platform. Depending on the goals of modernization, you can:

- **Rehost** existing mainframe applications on open-architecture servers using existing rehosting tools available for several operating systems.
- **Replace** aging code with packaged applications that provide a more flexible and cost-effective hardware and software platform for supporting business evolution.
- **Rewrite** existing applications, using code scanning and business rule extraction tools to automate much of the effort and reduce risk.

Each of these strategies can deliver substantial savings and help to improve the flexibility and agility of core computing systems. You can also combine these approaches, using the optimal strategy for different components of the mainframe environment. In this way, hardware and software can be modernized incrementally and progressively to achieve faster ROI with less risk.

A rehosting strategy is often the best choice in terms of fast return and low risk. With this approach, legacy code can be run with little or no change in a UNIX* Linux* or Windows* environment. Though it does not deliver the additional application optimization inherent in replacing or rewriting, rehosting can be put more cost-effective hardware to work immediately and free up expensive mainframe MIPS that much sooner.

Replacing mainframe code with packaged applications may be a good alternative if you can find a direct replacement with very similar or superior functionality. This choice is becoming easier as more systems vendors and independent software vendors (ISVs) port their applications to

mainframe alternatives. The Itanium® architecture, for example, now supports over 14,000 applications from vendors in every market and geography. Choosing a packaged application gives you access to the continuing development efforts of the vendor as well as the combined support of the application's user community.

For some mainframe applications, the preferred approach may be to rewrite a dedicated application with code tailored to the target hardware environment. In such a case, consider gradual replacement of legacy core systems using a services-oriented architecture (SOA) approach. The goal is to migrate applications one "service" at a time, and you may get higher long-term value by reevaluating and optimizing the code. Depending on which operating system environment you choose, you can find mature development environments available for componentizing legacy code into reusable services that are more easily integrated into modern business environments. Be aware, however, that the monolithic nature of legacy mainframe code may complicate this strategy, potentially pushing the financial returns much farther into the future.

3. Target Applications Ripe for Migration

One of the quickest paths to ROI in an iterative migration is to target and prioritize individual applications that are ripe for migration. Look for those applications that deliver high business value with relatively low cost and risk – for example, moving SAP or small-to-mid-sized COBOL and DB2 applications.

It isn't hard to identify the ancillary applications that are not as tightly woven into the monolithic mainframe code. Consider peeling back the stand-alone applications like these:

- Application development tools
- Print servers
- Report-writing applications

Moving these stand-alone applications to a less-expensive server can free up mainframe MIPS – the standard measure of mainframe performance – for core applications without noticeable performance changes for users – and in many cases will achieve performance improvements.

The key to this step is to do a thorough assessment of your application portfolio to identify discrete modules and functions as well as the relationships among them. Opportunities for quick migration are then more obvious. In addition, simply by reducing the unknown, you lower your risk when moving forward. Server vendors and modernization consultants often bundle this assessment into their services; these services can offload the assessment task from your staff and apply the lessons of many previous migrations to your plan.

Open-system architectures provide a key advantage for organizations assessing applications for migration. By running a variety of operating systems, open systems remove the question of "which OS we must settle on for this application." One Itanium-based server, for example, can run multiple instances of UNIX, Linux, OpenVMS* and Windows, concurrently. Compared with mainframes, organizations can consolidate a more diverse set of applications on industry-standard servers, with less need to replace or modify their software. This gives organizations more options for selective replacement of mainframe functionality.

Preparation – put in place the skills and tools to proceed.

4. Find Vendors with Experience Relevant to Your Goals

There are countless vendors and service organizations with experience helping IT organizations modernize their data center software and hardware infrastructure. When evaluating vendors for your project, consider qualifying those with a proven track record of similar modernization and migration projects.

Once you have your target list of near-term applications and business objectives, look to work with vendors whose experience will augment your own. Ideally, your vendors will have completed many migrations of the same scale and functionality as yours. Here is a short list of the main questions to ask:

- **What size of migrations you have done?** Ask for the average and maximum sizes of migrations they have successfully completed. Not in total, but what is the average size of migration they have successfully executed. The skills and tools to move a 20 MIPS installation are substantially different than those needed for a 2,000 MIPS modernization.
- **What industry do you primarily service?** If you are an insurance company, find a vendor who has migrated other insurance companies. They will have greater understanding of your applications, business objectives, and end-users. Ask for explicit examples and customer references you can call.
- **What in-house expertise do you have?** Smaller vendors may need to sub-contract or partner with other companies to support your migration. That may be fine, if the partners are very specialized towards your IT environment. On the other hand, many government organizations can't employ off-shore contractors or subcontractors. A large, fully integrated vendor is more likely to have all the experts under one roof, but it may also be more expensive.

- **What is your experience with mission-critical applications like ours?** Not all vendors have experience with the demanding levels of availability and performance necessary to deliver mission-critical systems.

Credible vendors and consultants will come with many years of experience in the mainframe world. As a result, you should expect considerable understanding of the hardware, networking and applications that form your mainframe installation. Do not hesitate to ask pointed questions.

5. Leverage and Extend Technical Staff

Develop a tactical plan for your technical staff to make new skills and responsibilities as clear as possible and to leverage their understanding of your business and user base.

A mainframe migration program may be mysterious and even threatening to your mainframe IT staff. Does this mean their skills will no longer be needed? Will their budgets or staffs be cut to make room for new equipment and personnel? It is very important to plan ahead for communicating with – and harnessing the skills of – your IT staff. It's also a great opportunity for some of them to extend into career-enhancing skills such as mentoring and technical management of projects.

The people who have run your data center for years (if not decades) understand the role that IT plays in the running and success of your business. They've been executing the backup restores and the change management. They've been testing and rolling out applications and services to every user in your organization. Leverage this experience by giving them responsibilities for defining, testing and rolling out the migrated services.

Open Systems Can Match Mainframe Performance

Most vendors of mainframe alternatives have experience in the mainframe market, so they understand the key technical parameters that your environment requires. For example, many of today's Itanium-based systems provide levels of scalability, availability and security that rival, and in some cases exceed, the legacy mainframe. A number of leading server vendors offer large, multi-processor Itanium-based systems designed for high-end scalability and availability with unprecedented flexibility. These systems scale up to 64 processor cores and 2TB of memory in a Windows environment. Many vendors support capacity-on-demand options, and these systems tend to scale linearly to deliver excellent performance on a wide range of demanding workloads.

Incorporating their skills in the process will also make them feel more secure of their positions and value to the organization. They can see that they won't necessarily be replaced by someone with more open-architecture experience; instead, they will gain new skills and responsibilities that can further their careers.

While your organization will make investments in new equipment and software, your staff should understand the near-term ROI you are aiming to achieve. A positive return improves the odds for existing programs and staff to be continued, and for available budget for new, interesting initiatives.

As a manager, it is doubly important for you to maintain the confidence of your staff. With the projected shortage of mainframe professionals (Gartner, Impact of Generational IT Skill Shift on Legacy Applications) you do not want to lose any critical personnel to fear of mainframe migration. Plus "modernizing" your IT staff is the best way to keep valuable business knowledge in your organization.

Execution – solidify and communicate your gains.

6. Test and Refine Vigorously

To streamline (and ensure optimal outcomes for) each step of a migration, build in a fast but rigorous testing and refinement process for each application as it deploys on the new systems. Remember, more testing is not the same as better testing. Designing appropriate tests for scalability as well as functionality is a difficult, but well designed testing adds value to your migration project.

While most of the critical decisions in mainframe modernization revolve around new systems and application migration, your staff must continue what it does well – in particular, testing and rolling out functionality to users. Don't let the migration effort distract from the planning and preparation for testing and deploying the rehosted, replaced or rewritten application. Again, your first objective should be short-term projects with fast ROI. Any glitches in putting the new environment to use will delay the payback and may potentially reduce returns.

At the same time, the new application and the infrastructure that supports it must be at least as available and robust as the application platform it replaces. Here are three guidelines specific to the task of testing and deploying migrated applications.

1. Characterize and document the current functionality, behavior and known issues with the old system. Make sure your team fully understands all the quirks and obscure corners of the old application platform. That

way, if someone reports a problem during the migration, you know that it is a real problem with the new application or platform instead of being a long-standing problem that people have taken the opportunity to raise as a new problem.

2. Perform load testing to at least the same load level as the legacy system. You must stress-test the ability of the new application platform to scale up without performance-related issues. Mission-critical testing needs to match the mission-critical scale of the legacy mainframe system. Make sure you are validating availability and performance across three criteria:
 - Throughput of the system, which is limited by the available bandwidth of the system and infrastructure. Understand where the pinch points are and how you can optimize them.
 - Response time behavior of the system for a user's perspective. Response times are usually determined by the latency within the system and within the infrastructure. Moving from direct-connect terminals in a mainframe environment to a network connected infrastructure introduces far more components in the path from the user to the system, as well as far more software. This new complexity can have a big effect on the overall latency, scalability and reliability.
 - Predictability of the response time as the load on the systems changes. This is characterized by what network designers call "jitter," otherwise known as the variation of latency with respect to time (which mathematically is "div latency"). Ideally, this remains constant and close to zero as the workload increases. If the predictability or consistency of the response varies widely over time, the system is susceptible to performance induced transient failures during spikes in workload.
3. You'll need to run continuous performance monitoring during testing and live production to be able to track down the cause of problems. Don't forget to ensure that all your performance data collection throughout the infrastructure is time-synchronized. Remember that performance monitoring software may affect the test results because it is utilizing resources in parallel with your application. To help alleviate that effect, the Itanium architecture is equipped with chip-level performance counters. You can make use of microprocessor instruction-level profiling without affecting the on-chip cache, which is important for accurate performance measurements when testing high-performance applications that make extensive use of in-memory data. After all, you don't want monitoring software constantly hitting the cache to update its performance counters when you run your application – you want your application to have as much use of the caches as it can get.

7. Document, Report and Build on Your Gains

Start small, build experience and validate gains. The knowledge and skill sets you develop on early projects will deliver value many times over as you move forward.

By this point you have targeted specific stand-alone applications, engaged outside experts, migrated the applications and deployed them to users. As you proceed, track and validate that the migrated applications are operating as expected, and that you are on track to meet your intended returns. Use this information to build momentum with your senior executives for continuing to invest in mainframe modernization. This is especially important because, as you remove each application from the mainframe onto a more cost-efficient open-architecture server, the remaining applications on the mainframe must justify the machine's high cost. In other words, each mainframe application becomes more expensive to the organization. This fact will help support subsequent modernization plans. Eventually, you can achieve a point of maximum efficiency between those applications that may be simply too expensive or difficult to migrate and those that can run more efficiently on the open-architecture platform.

Similarly, employ a process to feed the learnings from each project back into your IT staff and migration team. Your growing in-house knowledge base will become your best asset for tackling the larger, harder migrations to come.

Conclusion

For organizations ready to pursue mainframe modernization, an iterative approach may not only lower perceived risk but also provide opportunities for optimizing ROI throughout the process. By targeting short-term projects with faster ROI, an organization can more quickly build the process, skills and momentum to extract all of the benefits of an open-system architecture. Select the applications most amenable to migration, and consider rehosting for lowest risk. Bring in vendors with appropriate, specific experience and leverage the legacy skills and knowledge base of your IT staff. As your individual applications migrate to the open system, use a rapid test cycle with continual refinement, then document your successes for continuous validation and improvement. With these tactics, an organization can start enjoying the flexibility and cost savings of mainframe modernization sooner than if it followed an "all-or-nothing" approach.

For more information, please visit www.itaniumsolutions.org.

¹www.itaniumsolutions.org/attachment/resource_media/0A3E9392-B9E3-BD8F-282969C1D0EB6FF5.pdf.

²www.alinean.com/PDFs/Intel-Mainframe_Migration-TCOStudy.pdf.

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