



Hewlett Packard
Enterprise

Business white paper

Applications Re-host

Shift to more modern, agile, cost-effective platforms





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Examine the rationale and requirements related to re-hosting legacy applications to distributed or midrange computing systems.

Move to re-hosting

A groundswell has arrived—toward more open, flexible, and economic computing platforms.

For a generation or more, large IT organizations built their data center strategies around proprietary, legacy mainframe systems. Even today, many companies continue to run mission-critical functions on mainframes due to the reliability, availability, serviceability, and security traditionally delivered by them.

In a 2011 commissioned study conducted by Forrester Consulting of 200-plus CIOs and IT professionals in multiple nations and industries, 62 percent of respondents indicated at least some of their organization's applications portfolio runs on a mainframe-class platform. Additionally, 47 percent report that more than 10 percent of their applications run in the mainframe environment.¹

In many situations, those legacy mainframes provide a stable environment hosting the core business logic for the organization. The resources needed to support those systems are familiar. Because mainframes represent substantial investments, the retention rates for those systems tend to be based on business criticality and core versus context issues.

Whereas some organizations may have interest in migrating away from the proprietary platform longer term, they simply have not had the bandwidth to make that happen. In either case, there are certain aspects of managing a legacy-oriented IT environment that affect the ability for most organizations to achieve desired levels of agility, to innovate, and cut costs.

In this paper, we examine one possible option for dealing with issues commonly voiced by mainframe operations—re-hosting. We explore the current-state architecture and realities of many mainframe environments, along with potential future-state distributed computing options, and offer guidance to help identify which applications might be good re-hosting candidates, and which are not.

Review modernization options

As legacy systems grew and expanded over the years, they contributed to the growth of portfolios that were often filled with brittle, redundant applications. Infrastructure grew older and less flexible. Architectures became more heterogeneous—leading to greater complexity, reduced agility, and higher costs.

IT professionals skilled in CICS, COBOL, and mainframe platform are at or nearing retirement, while those entering the workforce are far more likely to be skilled in Java, .NET, Windows, Linux, and open systems environments. This shifting talent pool poses a very real risk to legacy-oriented businesses.

¹ Application Modernization: Procrastinate At Your Peril!—December, 2011, Commissioned Study conducted by Forrester Consulting on behalf of HPE.

Industry standard platforms offer technical and strategic flexibility. Most legacy applications use very specific tools and software, but today some of those tools are no longer available, their licensing costs are high, and if they are supported they may no longer be improved or upgraded. In some cases, these special tools providers have been acquired by nonsoftware companies, leaving users dependent on less-than-reliable third-party sources.

Dual infrastructure requirements of running a mixed mainframe-and-distributed environment are another issue. These organizations are likely to require the creation and maintenance of two sets of job schedulers, source code control systems, performance management tools, processes, skill sets, and licensing agreements. This increased complexity often forces a requirement for duplicate operations functions.

Data center operational activities also are often duplicated within organizations running mainframe systems—these include systems management, storage management, batch management, disaster recovery (DR), and test and development environments provisioning. With most IT organizations looking for ways to streamline and optimize their operations to cut costs, eliminating duplicate functions within the data center has become a real priority.

Not surprisingly, one of the most powerful reasons for moving away from the mainframe platform is the ability to reduce, and eventually consolidate and replace twin stacks with a single, converged, and unified infrastructure platform. This enables the consolidation of operations management functions and service management tools.

Cost, of course, is a major concern, and in many organizations, mainframe spending is simply getting out of control. Gartner research estimates the average in-house cost of managing a mainframe infrastructure environment is 8.1 percent of average annual enterprise IT spend.² These numbers do not include associated mainframe costs such as storage, tape, and print management, or application and code management and maintenance expenses.

Total mainframe IT spend

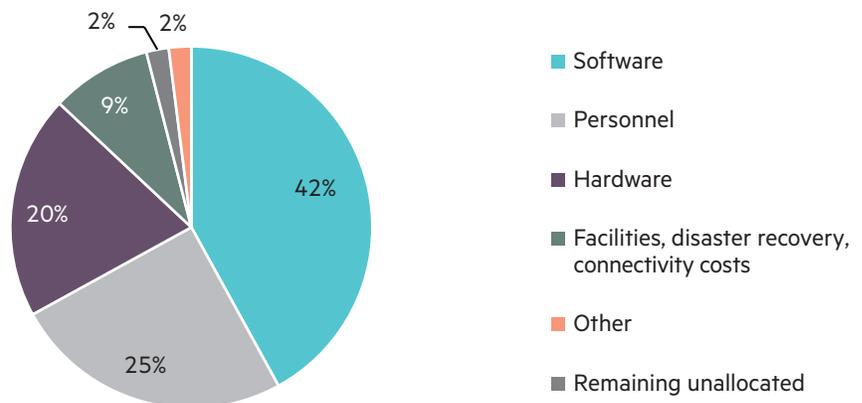


Figure 1. Total mainframe IT spend

Organizations with mainframe environments allocate an average of 42 percent of their total mainframe IT spend on software; 25 percent on personnel; 20 percent on hardware; and 9 percent on facilities, disaster recovery, and connectivity costs; 2 percent on other, and with 2 percent remaining unallocated.³

² Gartner Benchmark Analytics: IT Key Metrics Data 2012: Key Infrastructure Measures: Mainframe Analysis: Multiyear. 15 December 2011.

³ Ibid, Graphic created by HPE based on Gartner research.

So the question becomes:

How can companies leverage more open, standards-based computing platforms, while also maximizing the positive attributes of their existing application and infrastructure environments?

HPE defines re-hosting as:

Re-hosting is the process of moving an application from its current operating environment (typically a mainframe setting) to a more open, contemporary platform (Windows, UNIX, Linux, or NonStop) without significantly changing the business features and functions or the user look and feel of the application. An example of a re-host might be moving a COBOL application running on a mainframe to an HPE midrange server.

Seek new platform strategies

Challenges of a rapidly changing world include cloud-enabled capital expenditure (CapEx) reductions and more cost-effective use of resources. Considering this, it is not surprising that many organizations are rethinking their platform strategies, and seeking dynamic infrastructures that deliver greater computing power while more effectively using resources.

Companies have a number of options. Some may work internally to optimize their current mainframe or mixed computing environment, or work to negotiate more favorable software pricing with independent mainframe software vendors. Modernization strategies can help optimize mainframe assets, improving business value and return on investment (ROI).

In many situations, a company may prefer to outsource some, or all, of its mainframe management. This may include anything from infrastructure and systems management, to output and print management, business continuity and recovery, and user applications management. Other organizations are taking a longer-term approach. They are reviewing their legacy environments and support staff, and given the severe issues catalogued here, are re-evaluating whether some or all of their crucial enterprise applications belong on a mainframe platform at all.

Proven and workable modernization strategies are available that enable organizations to move selected application assets and processing off of the mainframe. Re-host is one of those modernization strategies and can be employed to address many challenges.

When applied correctly, modernization can provide improved architectural and operational agility, enhanced application interoperability, and reduced software license and maintenance costs. It also can measurably reduce hardware costs when organizations are able to eliminate mainframe platforms altogether.

Understand re-host

When an application is re-hosted, the hardware, operating system, and database move to a contemporary, lower-cost platform. Advanced software is used to emulate application layers on this new platform, but the application code and transaction processing remain largely unaffected. In some cases, the presentation layer may be replaced with a web-based interface to improve the user experience.

When selecting the re-host alternative, organizations migrate legacy applications to lower-cost modern platforms without significantly changing business features or functions. Sometimes called "lift and shift," re-hosting assumes minimal changes to the application source code and logic, underlying data, and user experience. By establishing robust integration frameworks, organizations can realize the benefits of re-hosting, while promoting interoperability between existing mainframe applications and more modern, open environments.

Re-hosting serves to simplify the computing infrastructure and preserve business knowledge associated with legacy applications, while leveraging modern integration standards such as Web Services, XML, and HTML user interfaces. This approach enables organizations to accelerate the move away from aging legacy platforms, mitigating business and technology risks associated with those infrastructures.

By fully documenting the as-is state, re-host enables organizations to retain intellectual capital and preserve the business value of legacy assets. Re-host should require minimal user retraining.

By shifting applications to lower-cost platforms, re-host tends to reduce maintenance and license costs, and can measurably reduce the time required for development projects. HPE experience has applied the re-host process to achieve application operating cost savings of up to 65 percent savings that can be applied to extending the reach and value of an enterprise application portfolio.

The re-host approach enables continuous operations without disruptions. When implemented correctly, re-hosting can deliver cost savings and a cleaner, well-managed infrastructure.

Review your options

A number of variables affect whether a particular application is well suited for re-hosting. When evaluating the re-host strategy, organizations should examine the business and technical rationale for the proposed shift.

To fully understand the requirements and implications of any proposed re-host, we recommend organizations first undertake a robust and detailed assessment of the application. That assessment should review service-level requirements and examine source code, system integration, and interface requirements. The assessment also should evaluate JCL (batch jobs, process, and schedules), data types, management systems, utilities, and libraries. User security and file access also should be addressed, along with output management, reporting requirements, and the presence of any third-party software.

The organization should recognize the time, cost, and resources needed to complete a successful re-host.

Question the rationale for re-host

Ask yourself these questions. If you answer “yes” to the majority of them, your application may be a logical candidate for a re-host.

- Does the mainframe application run COBOL workloads that execute in CICS or IMS, or in batch mode?
- Do you use applications with compute-intensive workloads such as homogeneous, predictable online transaction processing?
- Do you have single, stand-alone workloads with a single application function?
- Do you leverage systems that use standard IBM file structures or data types, such as IBM VSAM, sequential, DB2, and DL/1?

Question the rationale against re-host

On the other hand, if you answer “yes” to any of these questions, the application may not be an ideal candidate for re-hosting.

- Does the application require support for exceptionally high transaction rates?
- Do you run applications for which source code has been lost?
- Do you depend on third-party applications that do not have suitable versions or replacements in the distributed environment?
- Is the application connected in convoluted ways to a wide variety of other systems?

Review next steps

Once an organization has identified an application that is well suited to run in a midrange environment, the next steps are crucial. Re-hosting an application is not as simple as just moving the current application and data to a more cost-effective server. Each application has links into other applications, including a storage and tape solution tied to the environment, a disaster recovery solution, and possibly related output management systems. All of those IT elements will be impacted by a re-host effort. The implication may be that a re-host requires not only new servers, support, and training, but also new storage, DR, and output.

For organizations currently outsourcing mainframe environment support, they would simply begin acquiring server and storage management, DR, and output management services to support the newly re-hosted environment. A reliable supplier can scale a mainframe solution

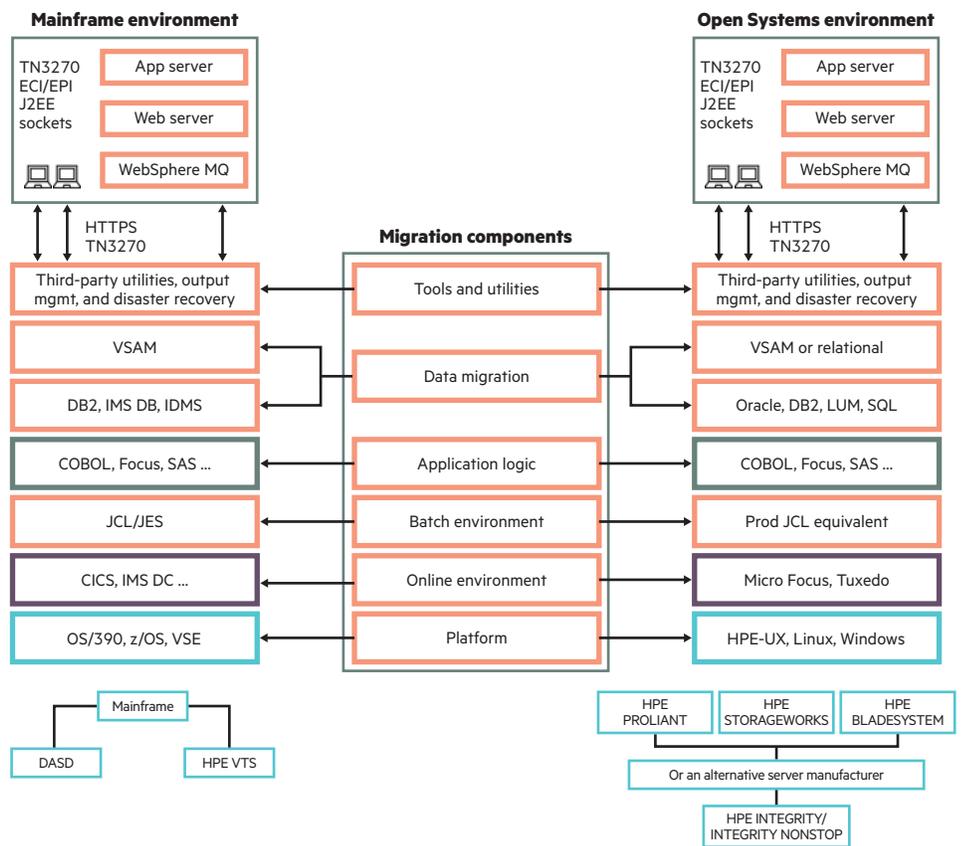


Figure 2. Elements of a re-host migration

down, while spinning open solutions up to meet those requirements, and facilitating holistic changes in the overall mainframe environment.

Most organizations that manage their own mainframe environment also are running open system server and storage environments. They provide DR, output management, and other support for those open systems, and can leverage those investments, operational support processes, and staff to support the re-hosted environment. Internal teams would simply dial down mainframe support, and dial up open systems support.

Figure 2 depicts various elements of a typical re-hosting effort. The mainframe environment on the left includes relevant hardware, storage, tape infrastructure, operating system, and client applications. The re-hosted environment depicted on the right illustrates potential server and storage infrastructure devices, future state operating platform, system software, and client applications. Various required re-host migration components are shown in the middle.

It may be helpful to highlight key changes that would be required in any re-host effort. From an infrastructure and infrastructure management perspective:

Hardware

- At its base, a typical legacy mainframe hardware platform consists of the central processing unit(s), memory, control units, and channels to enable communication between the main unit and controller devices. In the re-hosted environment, this hardware is replaced by midrange servers.
- Hardware migrations typically involve the installation of new servers into a data center, or the provisioning of available shared servers.

Software

For many organizations, this aspect of re-hosting promises the greatest cost savings. Figure 2 shows an example of mapping software stack components from the mainframe environment to the re-host environments.

- The Micro Focus software stack provides the core COBOL services and the mainframe equivalent operational services.
- The database is moved to a relational database like Microsoft SQL Server or Oracle.
- The applications servers can run under a variety of midrange solutions including Windows or UNIX-based applications servers.

Mainframe reference stack migrated to Micro Focus and HPE

Security	RACF, CA ACF2, CA top secret	Micro Focus Server EE	Microsoft Active Directory
Collaboration	TSO ISPF	Micro Focus Studio EE	
Development tools	JMS, Eclipse	Micro Focus Studio EE	HPE-UX 11i Ecosystem
System management	Tivoli (Netview), CA Sysview	Micro Focus Server EE	HPE OpenView, HPE OpenMCM, HPE Caliper
Transaction management	CICS	Micro Focus Server EE	
Database	DB2, VSAM, ISAM	Oracle, IBM UDB	SQL Server, Micro Focus Server EE
Application server	Web Sphere App Server	Windows IIS	Oracle Application Server
Batch	JCL	Micro Focus Server EE	
EAI/integration	MQSeries Integrator	IBM MQSeries, TIBCO	
Business process integration	MQSeries Workflow	IBM MQSeries, TIBCO	
Syndication/communication	SNA	HPE Hostlink	
High availability	Parallel Sysplex	Micro Focus Enterprise Link	HPE Serviceguard, HPE Global Workload Manager, HPE Capacity Advisor, HPE Process Resource Manager
Output management	JES	HPE Output Server	ASG-Cypress
Operating system	Zvm, os390-zos, Linux	Windows	HPE-UX
Hardware architecture	32-bit and 64-bit CMOS	ProLiant	Integrity

Figure 3. Re-hosting produces a number of changes in the software stack

Re-host process

Figure 3 shows a general approach used for re-hosting applications. The first Input step includes collecting source code. This can be a major challenge for some companies, but is a critical element. The extracted source code is not just the main programming language (that is, COBOL code), it also should include the job scheduling element, screens, transactions, and JCL. Data, data files, offline storage elements, and system documentation must be collected.

The Analysis/Validation step evaluates the collected information, and ensures that all language elements are supported by the re-hosted software stack or that appropriate remediation actions can be taken. Advanced tools and experience may be needed to handle exceptions.

Now, the re-host process begins and can include component testing, movement of data and operational processes, performance testing, user testing, validation, and remediation of outstanding issues. A final step may include the development and remediation of interfaces to other systems.

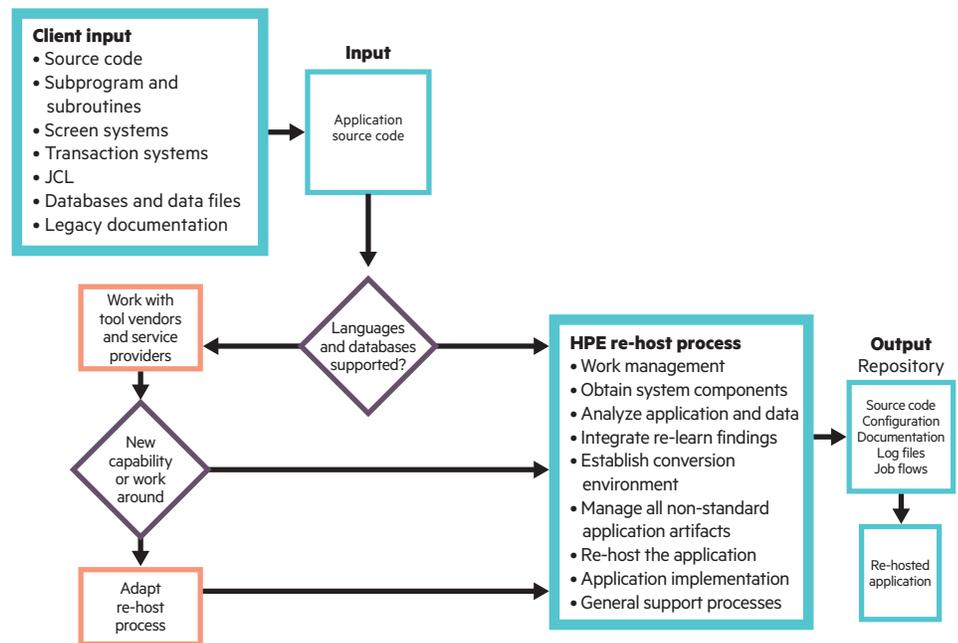


Figure 4. Application re-hosting approach

Storage, tape, backup

- Typical legacy environments for storage usually include direct access storage devices (DASD), suited for quick or on-line access, and various versions of tape storage used for batch processing and data archival.
- The standard re-host solution is used to move all data to disk in the target architecture. Retention periods should be re-evaluated with the business organizations to understand rules that will be incorporated into the new platforms. Datasets are managed in storage classes, and generation data groups (GDGs) are used to manage the retention/deletion process. Tape solutions are available in the distributed arena, but the software for administering the datasets is in an emulated mainframe catalogue not available out of the box. Data storage solutions can be created based on overall storage architecture requirements. Some organizations may seek assistance in the design of future state architecture and processes.
- If the organization wants access to the mainframe tape environment, an archive solution can be created for that purpose using fiber connectivity to storage and tape.

Disaster recovery

- DR solutions for mainframes can vary greatly and consist of anything from completely redundant systems implementation to simple off-site tape storage.
- In the midrange environment, DR solutions are provided in a similar fashion based on system requirements.
- While the underlying DR hardware might change, the recovery point and time objectives for the re-hosted application would be unchanged. Some adjustments would be needed to actual DR recovery plans and procedures.

- A DR solution is based on the organization’s current distributed enterprise application DR design. Server and storage solutions may be implemented to meet specific DR and continuity of operations requirements. Because of much lower hardware, software, and facility costs in the re-host solution compared to one where mainframes have to be replicated, there is much greater flexibility and lower costs for providing like-system failover support.

Maximize re-host ROI

Re-hosting represents a significant investment in time, resources, and funding. For that reason, we recommend any organization considering this modernization strategy undertake the diligent analysis described in this document. The following additional guidance is based on hands-on field experience with enterprise-class re-hosting projects.

Review lessons learned

Certain variables make specific applications more or less conducive to re-hosting. We typically recommend focusing effort on systems that can be “lifted and shifted” cleanly to an alternative platform with minimal code and data changes. Re-hosting is not free; it takes time and requires testing, transitioning, and personnel training. For applications that do not fit this profile, organizations might consider re-architecting, replacing, or another modernization strategy.

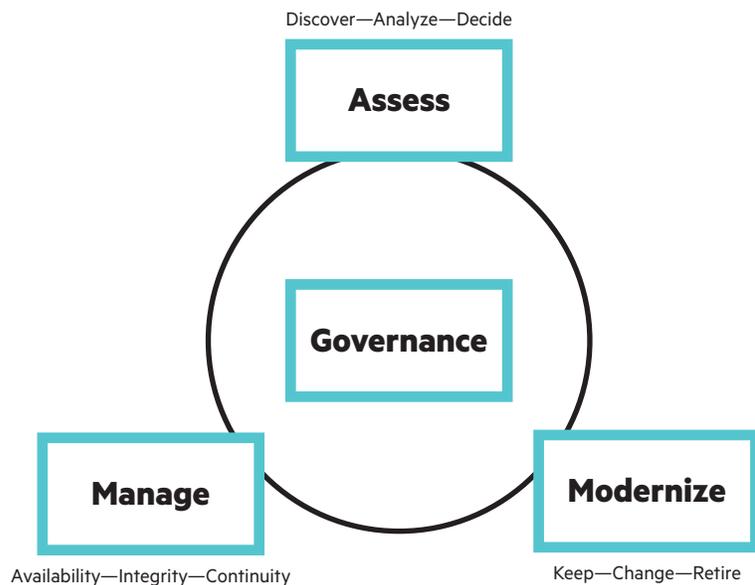


Figure 5. The Modernize approach enables organizations to keep, change, or retire an enterprise application

Consider costs and staff

Take time to understand the time and cost of a re-host effort. Analyze the implied aspect of total cost of ownership on your existing mainframe and the proposed distributed platform, including your backup, recovery, security, and availability requirements. If reducing spend is your primary objective, consider whether you have fully optimized the hardware and software cost opportunities in the current environment.

Many organizations simply prefer to retain the familiarity and comfort of the mainframe environment. Funding for modernization can be a challenge. The effect on the overall environment needs to be taken into account as well. If moving one application does not

permit an organization to turn off or reduce the MIPS requirement of its mainframe, it needs to consider a program that includes the larger set of applications running in its mainframe environment. In some modernization assessments, the “no” decision is the correct decision.

If a proposed re-hosting project seems viable, continue to ask the tough questions. How will a migration effort affect staffing, skill levels, and skills availability when COBOL applications are shifted to another platform? Will the re-host yield an acceptable quality of service? What are the implications for record retention, audits, and long-term intellectual property value?

Consider partners

Few organizations have, or want to acquire, the internal staff or resources needed to plan and execute a complex re-host initiative. When evaluating a potential modernization partner, companies may wish to consider the following qualities.

Seek out an objective advisor, one whose primary interest is in finding ways to enhance agility and reduce costs and risk in your IT environment. The best may be a partner who can provide mainframe support, outsourcing, re-hosting, and other modernization solutions. These powerful capabilities give organizations the flexibility to choose the strategies and tactics to best meet their requirements.

Many software-only suppliers and other vendors simply cannot address the full range of issues related to a complex re-host effort, such as data management, operations, and training. If handled poorly, those elements add cost and time, and can seriously endanger the ultimate success of a re-host project. When managed by an experienced modernization partner, those elements can support a faster, more efficient and successful transformation.

Few software vendors can conduct the rigorous assessment needed to inform and guide any transformation effort. A reliable partner should insist on a detailed evaluation before any re-hosting effort is undertaken. The goal should be to identify modernization opportunities for applications that you need or want to retain on the mainframe platform, and for applications that may be re-hosting candidates.

When insufficiently planned or poorly managed, a re-host project can take longer and cost more than companies originally expect. So it is smart to work with a partner that can objectively evaluate the true feasibility of a re-host, and has successfully completed similar projects. When evaluating a potential re-host partner, look for specific skills and experience in the legacy IT environment, future state settings, the cloud, and other emerging technologies, and in enterprise-scale applications transformation and management efforts.

Get started

When determining if re-hosting and/or other modernization strategies, or executing the transformation of an enterprise applications portfolio can benefit your organization, turn to a third-party service provider for help.

This provider can help you assess your environment and determine if re-host—or another modernization strategy—is best for your environment, and then help you plan and execute a full transformation journey. This can include assisting in the migration of mission-critical applications from legacy hardware platforms to new infrastructures, including re-hosted systems running in enterprise-standard environments and finding appropriate funding solutions to implement a sound migration path.

Learn more at
[**hpe.com/services/applications**](https://hpe.com/services/applications)

About the authors

Larry Acklin

Larry Acklin, manager, Application Services, has more than 26 years of experience in the application business including consulting, management, development, and leadership. Acklin is currently a member of the HPE Product Marketing organization, where he is responsible for several global HPE Application Services offerings.

Acklin drives innovation for HPE clients by helping them grow business and innovation through their IT and applications environments. Acklin has provided consulting covering all aspects of IT management, business process, applications development, and applications management spanning clients in all industries globally.

Acklin earned his degree in electrical engineering, specializing in computer software. In 2012, he received an HPE Most Valuable Performer award.

Shawna Rudd

Shawna Rudd is a global product marketing manager with 14 years supporting various areas within HPE Enterprise Services' IT Outsourcing business. Rudd spent the past five years supporting Managed Mainframe and Data Center Modernization Services where she provided in-depth sales support, training, growth planning, and vendor relationship management. Her previous experience in delivery, sales enablement, service line and product marketing spanned our Web Hosting, Enterprise Service Management, and Storage Management offerings. Rudd recently became the product marketing manager for Server Management Services and Enterprise Cloud Services–Private Cloud. Her current marketing responsibilities include strategy, planning, communications, and execution of marketing plans.



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