

Mainframe Migration Case Studies: A Total Cost of Ownership Comparison

Lowering Cost and Improving Flexibility by
Migrating to Open Systems

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EXECUTIVE SUMMARY

As Open Systems grew in scale, reliability and popularity throughout the 1990s IBM and other vendors of proprietary mainframe solutions braced for the assault on their dominance of the corporate datacenter. Mainframe vendors developed innovative partitioning strategies and software and hardware pricing practices to compete with the less expensive RISC and Intel based platforms. The combination of these defensive strategies and the explosive growth in computing requirements in the late 1990s and 2000s were so successful that they actually contributed to a significant growth in mainframe installations during this time. IBM even cheerfully adopted the T-Rex as the mascot for its mainframe business in proud defiance to speculation on the extinction of the mainframe platform.

Despite the best efforts of mainframe vendors, though, the platform remains much less flexible and more expensive than open systems alternatives. Although mainframes have not gone extinct overnight as some anticipated in the early 1990s, organizations are continually reviewing their options, and replacing these platforms one by one. As the scalability and reliability of open systems increases to rival that of mainframe systems the pace of mainframe migrations has started to accelerate in recent years.

There are three major factors driving businesses to consider migrating application workloads off mainframe environments in favor of open systems solutions.

- **Agility** - Although there are many ways to integrate new applications with existing mainframe based applications, organizations struggle with achieving the level of flexibility and time to market they desire in today's rapidly changing business environment.
- **Cost** – As the price performance ratio has steadily decreased in the fiercely competitive open systems market, mainframe vendors have been struggling to reduce prices enough to stay competitive with open systems, while not eroding the huge profit margins of their propriety solutions. This balancing act is not intended to achieve cost parody with open system. Rather, it is designed to maintain mainframe revenue streams and profits for as long as possible.
- **Skills** - The available skill base of mainframe expertise is shrinking. Organizations are having an increasingly difficult time replacing critical mainframe skills, which are rapidly retiring from the work force.

This paper examines two representative case studies to investigate the economic factors for migrating application work loads off of mainframe platforms in favor of open systems alternatives. The first case is based on a manufacturing company which retired its mainframe system by re-hosting an SAP implementation onto an Itanium based HP Integrity solution running Windows Server 2003. The second case examines the advantages of downsizing a mainframe installation by reviewing a financial services company, which moved several computationally intensive applications to a mixed environment of HP Integrity and HP ProLiant servers running Red Hat Linux.

Although both organizations carefully reviewed all costs associated with the alternative platforms, this paper only compares the hard dollar costs for IT operations. In both cases soft costs for availability were viewed as roughly equivalent, while the open systems 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 even while factoring in substantial investments of time and expense in the migration processes. The manufacturing company was able to reduce annual operating expenses by an impressive 71% saving \$7,680,000 per year. The project paid for itself in 18 months with an initial investment of \$6,136,000 and a migration time of 12 months and yielded a return on investment (ROI) of 305% over a four year period. The migration project for the financial services company was more involved, taking 18 months and requiring a total initial investment of \$9,363,552. This case also yielded very strong results by lowering annual operating costs 46.4% and delivering an ROI of 117% over four years with a 30 month payback period.

Results Summary - Manufacturing Case Study

In our first case a large manufacturing company migrated their SAP application suite off an IBM zSeries 2094 Model 720 mainframe to a cluster of two HP Integrity rx8640 and two HP Integrity rx7640 servers running Microsoft Windows Server 2003. The total investment for the new configuration came to \$6,136,000 over four years, including initial acquisition costs, annual support for new equipment and software, and one time migration labor expenses. Over this same four year period, the company was able to reduce operating expenses by \$24,834,042, yielding an impressive 305% return on investment. Table 1 below shows the investment and savings summary for this project.

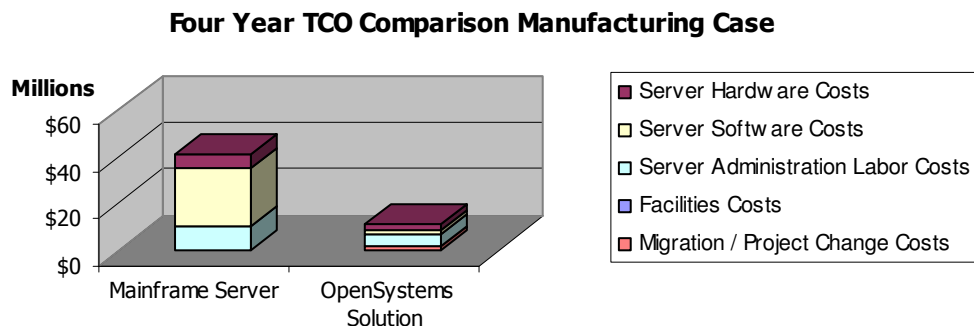
Four Year ROI Analysis	Open Systems Investment	Total Savings Over 4 Years
Server Hardware Costs	\$2,574,000	\$2,630,000
Server Software Costs	\$1,962,000	\$18,600,000
Server Administration Labor Costs		\$3,567,000
Facilities Costs		\$37,042
Migration / Project Change Costs	\$1,600,000	
Total	\$6,136,000	\$24,834,042

Table 1: Four Year Investment and Savings Summary for Manufacturing Case

From a Total Cost of Ownership (TCO) perspective the company was able to reduce annualized operating costs by 70.9%. Table 2 shows the four year comparison of the total costs for maintaining the original mainframe environment versus the acquisition, migration and ongoing operations costs for the open systems alternative.

Four Year TCO Comparison	Mainframe Server	Open Systems Solution	Total Savings	Difference
Server Hardware Costs	\$3,340,000	\$2,574,000	\$766,000	22.9%
Server Software Costs	\$24,800,000	\$1,962,000	\$22,838,000	92.1%
Server Administration and Operations Labor Costs	\$10,000,000	\$5,244,000	\$4,756,000	47.6%
Facilities Costs	\$177,043	\$95,740	\$81,303	45.9%
Migration / Project Change Costs	\$1,120,000	\$1,600,000	(\$480,000)	(42.9%)
Total	\$39,437,043	\$11,475,740	\$27,961,303	70.9%

Table 2: Four Year TCO Comparison for Manufacturing Case



Results Summary – Financial Services Case Study

In our second case a financial services company reengineered their core retail banking applications to run in a distributed environment on a combination of two HP Integrity rx8640 servers, two HP Integrity rx8620 servers and four HP ProLiant DL580 servers, all running Red Hat Linux. The total investment for the new configuration came to \$9,363,552 over four years, including initial acquisition costs, annual support for new equipment and software, and one time migration labor expenses. Over this same four year period, the company was able to reduce operating expenses by \$20,317,500, yielding an ROI of 117%. Table 3 below shows the investment and savings summary for this project.

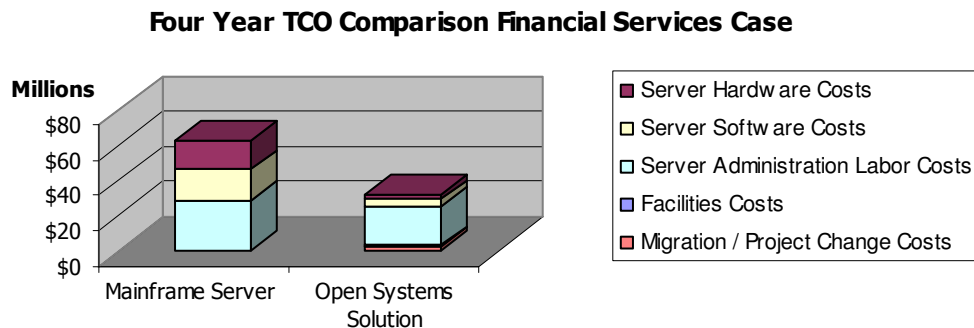
Four Year ROI Analysis	Open Systems Investment	Total Savings Over 4 Years
Server Hardware Costs	\$2,682,000	\$6,125,000
Server Software Costs	\$3,831,552	\$11,287,500
Server Administration and Operations Labor Costs		\$2,900,000
Facilities Costs		\$5,000
Migration / Project Change Costs	\$2,850,000	
Total	\$9,363,552	\$20,317,500

Table 3: Four Year Investment and Savings Summary for Financial Services Case

From a Total Cost of Ownership (TCO) perspective the company was able to reduce annualized operating costs by 46.4%. Table 4 shows the four year comparison of the total costs for maintaining the original mainframe environment versus the acquisition, migration and ongoing operations costs for the open systems alternative.

Four Year TCO Comparison	Mainframe Server	Open Systems Solution	Total Savings	Difference
Server Hardware Costs	\$9,800,000	\$2,682,000	\$7,118,000	72.6%
Server Software Costs	\$18,060,000	\$3,831,552	\$14,228,448	78.8%
Server Administration and Operations Labor Costs	\$21,984,000	\$17,344,000	\$4,640,000	21.1%
Facilities Costs	\$232,000	\$140,000	\$92,000	39.7%
Migration / Project Change Costs	\$0	\$2,850,000	(\$2,850,000)	
Total	\$50,076,000	\$26,847,552	\$23,228,448	46.4%

Table 4: Four Year TCO Comparison for Financial Services Case



MANUFACTURING CASE STUDY

Our first case involved the migration of an SAP application suite from a mainframe environment to a clustered configuration of HP Integrity rx8640 servers running Windows Server 2003. This case involved a \$3.2 billion international manufacturing company, which was running an SAP application suite for supply chain management, manufacturing and financial management systems. The organization adopted the SAP solution in the mid 1990s as an application integration effort and to address application upgrade requirements for the year 2000. Almost all core business processes had been converted to use various SAP application modules.

Although the organization was pleased with the integration of business processes and improved efficiency they achieved with the SAP solution, they found it difficult to deploy new applications quickly to respond to new business opportunities. Since the adoption of SAP the organization had developed several customer facing web applications on Microsoft Windows servers. They were able to achieve some level of integration with their SAP ERP system, but each integration effort was difficult and time consuming. Admittedly their integration problems resulted as much from organizational dynamics as from technical issues. The mainframe SAP team and open systems group were under different management teams. It was as if the two groups spoke entirely different languages.

Since their initial implementation of SAP, the company was reaching a point where they needed to upgrade to the next release of SAP to stay current with supported configurations and take advantage of new features in the application suite. Since all of their business processes were tightly integrated with the SAP solution, they felt that it would be best to upgrade all application modules at once. This upgrade strategy would eliminate the need to run multiple versions of the SAP software, reduce the overall upgrade time, and avoid potential issues of integrating different versions of the software. This Big Bang approach to modernizing their application suite was a formidable undertaking that the organization did not cherish rushing into.

Since the application upgrade was going to require significant planning and resources, the organization thought it would be a good time to reevaluate their options for computing platforms. They had been pleased with the reliability, price performance, and ease of management of their Wintel systems. If they could achieve the scalability and reliability they required for their mission critical SAP applications on a Windows platform, the move could potentially reduce the costs of supporting two diverse architectures and possibly improve their application agility.

In performing the financial analysis for their SAP upgrade the organization found that by migrating to Windows on Itanium based HP Integrity servers they could not only reduce annual operating costs by nearly \$7.7 million per year, but they could quickly recover their investment in the new servers with these significant cost savings.

Server Hardware Comparison

One of the factors which made migration off of the mainframe environment more attractive was the fact that the organization would have needed to upgrade the processing power of their mainframe system to take advantage of the increased capabilities of the SAP version upgrade. In order to leverage new business intelligence features the company was looking at purchasing two additional zIIP processors for additional DB2 workload and two additional general purpose processors. These additional processors would have cost \$500,000 for the hardware upgrade and have increased annual hardware support charges by \$60,000.

The four Itanium based HP Integrity servers and two additional test and development servers the organization had sized for the required workload cost \$1,650,000. So the additional cost of the open systems servers was only \$1,150,000 compared to the potential hardware upgrade for the mainframe environment.

In addition to the open systems servers the migration also required network and storage equipment upgrades. The organization was using an EMC based SAN for the mainframe environment. This storage system was able to be used with only minor updates for the new Windows Integrity servers. The organization was also able to retire some SNA based networking controllers, and they did purchase additional IP switches and routers.

One of the larger areas of savings from the platform replacement came from reducing ongoing hardware support and maintenance costs. By switching platforms the organization was able to save nearly \$500,000 per year in hardware support costs alone. Table 5 shows the capital investment for the new purchase, and the difference in annual operating costs.

Mainframe System Savings		Cost Avoidance	Open Systems Servers Investment		Purchase Price	Annual Support
Z9 2094/720 Annual Support		\$650,000	HP Integrity rx7640 (2 servers) Database servers	\$250,000	\$27,500	
zSeries Upgrade (Avoidance)		\$500,000	HP Integrity rx8640 (2 servers) Transaction servers	\$600,000	\$66,000	
zSeries Upgrade Additional Support		\$60,000	HP Integrity rx7640 (2 servers) Test and Development	\$250,000	\$27,500	
One Savings		\$500,000	Network and Storage Equipment	\$550,000	\$110,000	
Annual Savings		\$710,000	Total Costs	\$1,650,000	\$231,000	

Table 5: Server Hardware Cost Comparison for Manufacturing Case

Software License and Annual Support and Maintenance Costs

By far the greatest advantage in moving off the mainframe environment came from eliminating huge monthly license charges (MLC) for mainframe software packages. Unlike the open systems environment where software has a significant one time license fee and moderate annual support charges, mainframe software vendors lease their software on an annual basis. Table 6 compares the initial software license purchases and annual support fees required for the Windows HP Integrity solution, versus the annual software costs for the mainframe system.

Mainframe Software Savings		Open Systems Software Investment		
Software Package	Annual Savings	Software Package	Initial License	Annual Support
IBM z/OS	\$2,700,000	Microsoft Windows Server 2003	\$290,000	\$58,000
IBM DB2	\$950,000	Microsoft SQL Server 2005	\$800,000	\$160,000
IBM CICS	\$850,000	Total	\$1,090,000	\$218,000
CA 7	\$650,000			
IBM NetView	\$300,000			
Additional Mainframe Utilities	\$750,000			
Total	\$6,200,000			

Table 6: Server Software Cost Comparison for Manufacturing Case

The savings from eliminating the mainframe software charges more than compensated for the initial purchase of the Microsoft software in a single year. On an annual basis, the organization was able to reduce on-going software costs by nearly six million dollars per year.

The additional software license fees and annual support for the SAP application software have not been included in the financial analysis, since these costs were identical for the two platform choices.

Migration / Change Costs

Some of the greatest inhibitors to moving applications off mainframe environments are the risks and costs associated with migrating the functions to other environments. In this case, much of that cost and business exposure had actually been addressed several years earlier during the adoption of the SAP application suite. Although extensive planning and system verification were required for the version upgrade and platform change, the work effort and exposure were much less than would have been needed if the organization were adopting new applications or moving homegrown applications. In fact, a prime motivation for this organization was that they estimated that 70% of the upgrade effort would have been the same, if they stayed on the original mainframe system.

The migration and upgrade process took twelve months including planning, architecture design, and extensive verification. During this time the organization continued to run the production SAP system on the mainframe platform. The company hired three outside consultants to assist with the migration. In addition, the company assigned two project managers and five additional full time staff to assist with the upgrade and system verification process. The external services fees totaled \$750,000, while the internal labor costs came to nearly \$850,000.

Server Administration Labor Savings

In addition to reducing ongoing support costs for the mainframe infrastructure, a major goal of the migration effort was to simplify systems management and application integration by consolidating on a single Windows computing architecture. Since the organization already had strong Windows and SQL Server experience, the new HP Integrity servers were managed primarily by the existing Windows support group with a few additions to handle the increased workload. The SAP basis administrators and application developers shifted to the new environment with little change. Three of the mainframe systems programmers left the organization for other mainframe opportunities. The remaining four mainframe systems programmers were reassigned to other projects. The shift to the open systems environment also enabled the organization to reduce its operations staff by one third from 18 to 12 full time employees.

Overall the organization was able to reduce systems management labor by 11 full time staff, including actual reductions in headcount and reassignment of personnel to other responsibilities. This saved the organization approximately \$1,200,000 per year.

Facilities Expense Reductions

With increased focus on global warming and heightened social consciousness, organizations are aggressively seeking ways to reduce energy and resource consumption in promotion of green practices. Mainframe systems traditionally have required significant power and cooling resources. In this case the organization was able to reduce energy consumption by 46%. Although the financial impact of the energy and space saving were minimal compared to other areas of savings, many IT organizations are reaching either the physical or energy capacity of their data centers. Consolidating systems can free up valuable floor space and power and cooling capacity, which can help postpone very costly data center expansions.

Annual Cost Comparison

Tables 7 and 8 below show the four year annual total cost comparisons for the Mainframe and Open Systems environments. In addition to annual operating costs, the Mainframe scenario includes one time costs for the Mainframe hardware upgrade as well as migration costs for upgrading the SAP application version. The Open Systems scenario includes all upfront costs for the solution as well as on-going operating costs.

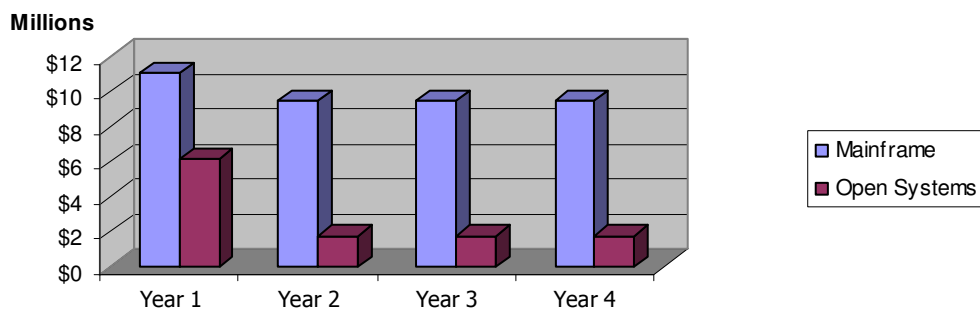
Mainframe Four Year TCO	Year 1	Year 2	Year 3	Year 4	Total
Mainframe Hardware Costs	\$1,210,000	\$710,000	\$710,000	\$710,000	\$3,340,000
Software Costs	\$6,200,000	\$6,200,000	\$6,200,000	\$6,200,000	\$24,800,000
Administration Labor Costs	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000	\$10,000,000
Facilities Costs	\$44,261	\$44,261	\$44,261	\$44,261	\$177,043
Migration Costs	\$1,120,000	\$0	\$0	\$0	\$1,120,000
Total	\$11,074,261	\$9,454,261	\$9,454,261	\$9,454,261	\$39,437,043

Table 7: Mainframe Four Year TCO Summary

Open Systems 4 Year TCO	Year 1	Year 2	Year 3	Year 4	Total
Server Hardware Costs	\$1,881,000	\$231,000	\$231,000	\$231,000	\$2,574,000
Software Costs	\$1,308,000	\$218,000	\$218,000	\$218,000	\$1,962,000
Administration Labor Costs	\$1,311,000	\$1,311,000	\$1,311,000	\$1,311,000	\$5,244,000
Facilities Costs	\$23,935	\$23,935	\$23,935	\$23,935	\$95,740
Migration Costs	\$1,600,000	\$0	\$0	\$0	\$1,600,000
Total	\$6,123,935	\$1,783,935	\$1,783,935	\$1,783,935	\$11,475,740

Table 8: Open Systems Four Year TCO Summary

Four Year TCO Comparison for Manufacturing Case



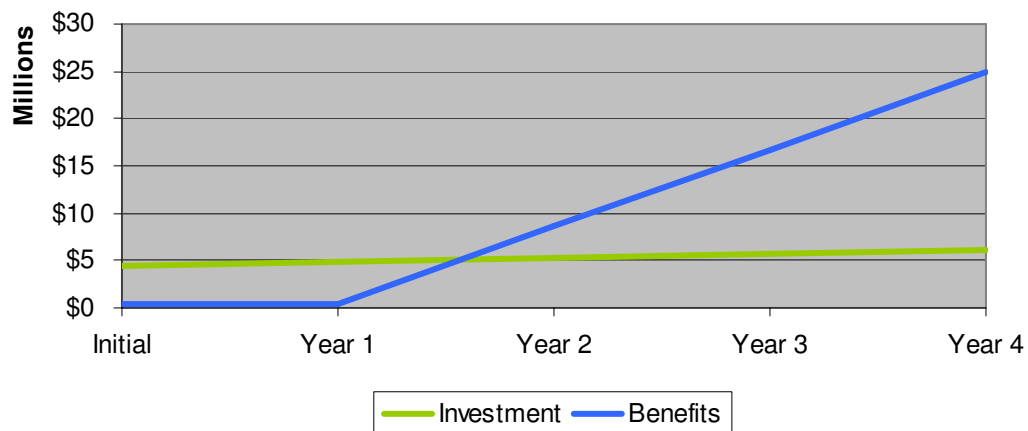
Return on Investment Analysis

Since the migration and validation process took twelve months, the mainframe remained in place during that time. As a result none of the mainframe costs, other than the avoidance of the hardware upgrade, were able to be reduced during this first year. Table 9 below shows the four year investment and savings for this migration project. Comparing the four year total investment of \$6,136,000 with the cumulative benefit of \$18,698,042 yields an impressive 305% ROI.

Four Year ROI Analysis	Year 1	Year 2	Year 3	Year 4	Total
Investment					
Server Hardware Costs	\$1,881,000	\$231,000	\$231,000	\$231,000	\$2,574,000
Software Costs	\$1,308,000	\$218,000	\$218,000	\$218,000	\$1,962,000
Migration Costs	\$1,600,000	\$0	\$0	\$0	\$1,600,000
Total Investment	\$4,789,000	\$449,000	\$449,000	\$449,000	\$6,136,000
Savings					
Mainframe Hardware	\$500,00	\$710,000	\$710,000	\$710,000	\$2,630,000
Software	\$0	\$6,200,000	\$6,200,000	\$6,200,000	\$18,600,000
Administration Labor	\$0	\$1,189,000	\$1,189,000	\$1,189,000	\$3,567,000
Facilities	(\$23,935)	\$20,326	\$20,326	\$20,326	\$37,042
Total Savings	\$476,065	\$8,119,326	\$8,119,326	\$8,119,326	\$24,834,042
Cumulative Benefit	(\$4,312,935)	\$3,357,391	\$11,027,717	\$18,698,042	\$18,698,042

Table 9: Four Year ROI Analysis

Four Year Payback Analysis



FINANCIAL SERVICES CASE STUDY

In our second case study a large financial services company was interested in reengineering their core banking applications to increase application flexibility and quickly offer new customer services by deploying modular applications leveraging Services Oriented Architecture (SOA). After deploying customer facing Java and C++ Web applications for several years, and more recently exploiting SOA integration facilities, the organization thought it could lower ongoing costs for application and systems support by reengineering their legacy Cobol CICS core retail banking applications. Although the primary focus of this effort was on increasing agility to drive competitive advantage, our financial analysis focuses more on the tangible IT cost reductions, than on expected revenue gains of the new application offerings.

Original Mainframe Environment

In this example the company was not able to completely eliminate their mainframe systems. Originally the company was running three large z9 mainframes. The core banking applications were consuming approximately 40% of the processing capacity on a zSeries 2094 model 740. Following the migration, this systems was able to be removed from the data center. The remaining application workload from this zSeries 2094 was transferred to another zSeries 2094, which was subsequently upgraded to accommodate the additional workload.

The annual hardware costs for the zSeries 2094 model 740 totaled just over \$4,200,000, with roughly \$3,200,000 for the annual lease on the equipment and the remaining \$1,000,000 for maintenance and support on the hardware. By migrating the retail banking workload off the mainframe systems, the company was able to reduce their total annual mainframe lease and support costs by \$2,450,000 or 58% of the original \$4,200,000.

Open Systems Solution

The target open systems server environment for the reengineering effort consisted of a combination of HP Integrity servers for the database and transaction processing layers and HP ProLiant servers for the user interface. Two HP Integrity rx8640 servers with 12 dual core Itanium processors were used for the Oracle database servers. Another two HP Integrity rx8620 servers with 8 dual core Itanium processors were used for the backend application servers. Four HP ProLiant DL580s with 4 dual core Xeon processors were used for the front end user interface layer. Additionally, two HP Integrity rx8620s and two HP ProLiant DL580s were purchased for test and development servers.

Mainframe System	Annual Expenses	Open Systems Servers	Purchase Price	Annual Support
Z9 2094/740 Annual Lease	\$3,200,000	HP Integrity rx8640 (2 servers) Database servers	\$800,000	\$88,000
Z9 2094/740 Annual Support	\$1,000,000	HP Integrity rx8620 (2 servers) Transaction servers	\$525,000	\$57,750
Remaining zSeries Upgrades Lease Amount	(\$1,400,000)	HP ProLiant DL580 (4 servers) User Interface Web servers	\$100,000	\$8,000
Remaining zSeries Upgrades Additional Support	(\$350,000)	HP Integrity rx8620 (2 servers) Test and Development	\$400,000	\$44,000
Total Annual Savings	\$2,450,000	HP ProLiant DL580 (4 servers) Test and Development	\$50,000	\$4,000
		Total Costs	\$1,875,000	\$201,750

Table 10: Server Hardware Cost Comparison for Financial Services Case

Software Licensing and Support Costs

The software cost comparison between the two environments is based on the net cost reduction in monthly license charges for the mainframe environment versus the acquisition cost and ongoing support and maintenance costs for the open systems software. In this case the company was able to reduce the total MIPS required by the mainframe systems by nearly 6000, which resulted in lowering the software licensing levels for several packages by a corresponding 750 MSUs. Overall the company lowered their annual software licensing charges for the mainframe by \$4,515,000.

For the new open systems servers the company elected to use open source Red Hat Linux for the operating system and JBoss for the J2EE application server software. Both of these packages are available free of charge for the software license, but require an annual contract for support. The organization purchased Oracle Enterprise Edition for the backend database. Additionally, the company purchased several software packages for application porting, design, source management, and testing for the migration effort. Table 11 below shows a comparison of the initial purchase prices, and annual costs for the software in both the mainframe and open systems environments.

Mainframe Software		Open Systems Software		
Software Package	Annual Savings	Software Package	Initial License	Annual Support
IBM z/OS	\$1,900,000	Red Hat Linux	\$0	\$29,988
IBM DB2	\$665,000	Oracle Enterprise Edition	\$720,000	\$158,400
IBM CICS	\$650,000	JBoss	\$0	\$90,000
CA 7	\$650,000	MicroFocus Cobol	\$350,000	\$70,000
IBM NetView	\$200,000	HP OpenView	\$120,000	\$24,000
Additional Mainframe Utilities	\$450,000	Additional Application Development, Migration and Testing Tools	\$640,000	\$128,000
Total	\$4,515,000	Total	\$1,830,000	\$500,388

Table 11: Server Software Cost Comparison for Financial Services Case

Application Reengineering and Migration Costs

The reengineering effort for this project took eighteen months and required both internal staffing as well as external professional services. The company hired a regional specialist to assist with the high level planning and architecture tasks as well as the detailed application migration and reengineering. Most of the actual new application development was performed by internal staff. Overall the reengineering and migration costs totaled \$2,850,000, with the majority of that expense, \$1,750,000 going for outside professional services.

Systems Administration and Application Development Labor Savings

Reducing application development and integration costs was a major goal of the reengineering effort. Although the company did not reduce any internal headcount as a result of the migration, they were able to increase efficiency of their application development team significantly, and cut spending on external professional services. By training several of their mainframe applications development staff on new technologies and leveraging reusable components the company increased their ability to deliver new application services, and reduced external contractor fees by \$1,300,000 per year.

Since the organization retained most of their mainframe systems, there was little reduction in their mainframe systems management staffing. Only one mainframe systems programmer, who was primarily

responsible for capacity planning and performance management of the retail applications, retired and was not replaced. The new open systems servers on the other hand required two and a half additional staff for systems administration and management. Overall the migration increased systems management staff by one and half FTEs.

Combining the \$1,300,000 savings per year in external contractor fees with the additional cost of 1.5 systems administrators, the organization was able to lower labor costs by \$1,160,000 per year.

Power Consumption and Facilities Expenses

The replacement of the mainframe system not only reduced power and cooling requirements in the data center, but it also freed up valuable capacity needed to extend the life of the current facility. The data center located in a metropolitan high rise was quickly reaching its maximum physical capacity as well as its power and cooling limitations. The new servers consumed 35% less power than the original mainframe, and lowered cooling requirement by a similar percentage.

Annual Cost Comparison

Tables 12 and 13 below show the four year annual total cost comparisons for the Mainframe and Open Systems environments.

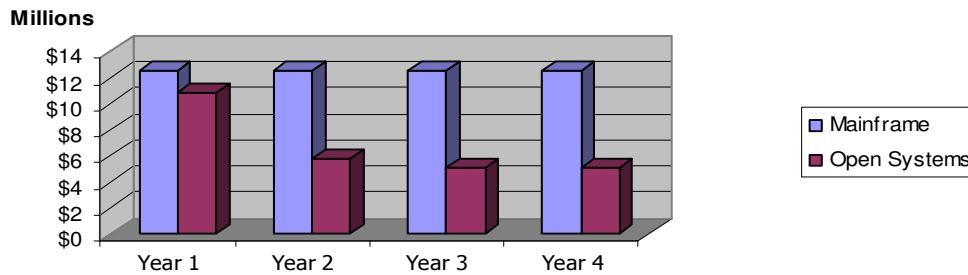
Mainframe Four Year TCO	Year 1	Year 2	Year 3	Year 4	Total
Mainframe Hardware Costs	\$2,450,000	\$2,450,000	\$2,450,000	\$2,450,000	\$9,800,000
Software Costs	\$4,515,000	\$4,515,000	\$4,515,000	\$4,515,000	\$18,060,000
Administration Labor Costs	\$5,496,000	\$5,496,000	\$5,496,000	\$5,496,000	\$21,984,000
Facilities Costs	\$58,000	\$58,000	\$58,000	\$58,000	\$232,000
Total	\$12,519,000	\$12,519,000	\$12,519,000	\$12,519,000	\$57,076,000

Table 12: Mainframe Four Year TCO Summary

Open Systems 4 Year TCO	Year 1	Year 2	Year 3	Year 4	Total
Server Hardware Costs	\$2,076,750	\$201,750	\$201,750	\$201,750	\$2,682,000
Software Costs	\$2,330,388	\$500,388	\$500,388	\$500,388	\$3,831,552
Administration Labor Costs	\$4,336,000	\$4,336,000	\$4,336,000	\$4,336,000	\$17,344,000
Facilities Costs	\$35,000	\$35,000	\$35,000	\$35,000	\$140,000
Migration Costs	\$2,050,000	\$800,000	\$0	\$0	\$2,850,000
Total	\$10,828,138	\$5,873,138	\$5,073,138	\$5,073,138	\$26,847,552

Table 13: Open Systems Four Year TCO Summary

Four Year TCO Comparison for Financial Services Case



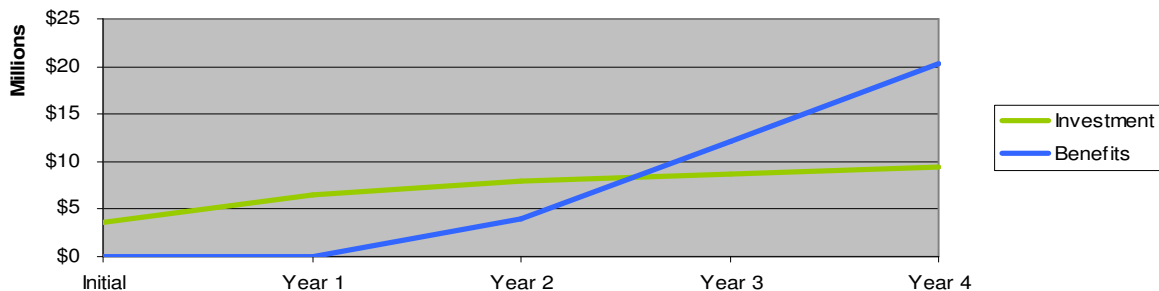
Return on Investment Analysis

Since the reengineering effort took eighteen months to complete, none of the mainframe cost reductions were achieved during this time. Table 9 below shows the four year investment and savings for this migration project. Comparing the four year total investment of \$9,363,552 with the cumulative benefit of \$10,953,948 yields an ROI of 117%.

Four Year ROI Analysis	Year 1	Year 2	Year 3	Year 4	Total
Investment					
Server Hardware Costs	\$2,076,750	\$201,750	\$201,750	\$201,750	\$2,682,000
Software Costs	\$2,330,388	\$500,388	\$500,388	\$500,388	\$3,831,552
Migration Costs	\$2,050,000	\$800,000	\$0	\$0	\$2,850,000
Total Investment	\$6,457,138	\$1,502,138	\$702,138	\$702,138	\$9,363,552
Savings					
Mainframe Hardware	\$0	\$1,225,000	\$2,450,000	\$2,450,000	\$6,125,000
Software	\$0	\$2,257,500	\$4,515,000	\$4,515,000	\$11,287,500
Administration Labor	\$0	\$580,000	\$1,160,000	\$1,160,000	\$2,900,000
Facilities	(\$35,000)	(\$6,000)	\$23,000	\$23,000	\$5,000
Total Savings	(\$35,000)	\$4,056,500	\$8,148,000	\$8,148,000	\$20,317,500
Cumulative Benefit	(\$6,492,138)	(\$3,937,776)	\$3,508,086	\$10,953,948	\$10,953,948

Table 9: Four Year ROI Analysis

Four Year Payback Analysis



CONCLUSION

As the scalability and reliability of open systems continue to increase the motivation for moving off proprietary mainframe platforms is becoming stronger. The decision often can be viewed as a fulcrum with the cost and risk of migration on one side and ongoing operational costs and lack of flexibility on the other. The shift in balance may not be apparent overnight, so organizations should continually monitor the cost differential and improved agility of alternative platforms.

As seen in the case studies examined in this paper, the potential savings in ongoing software and hardware support costs are huge in moving to open systems solutions. These savings can often more than pay for the new open systems infrastructure in a single year.

Moving to an open systems environment can also free up valuable datacenter capacity and improve a company's Green factor by lowering overall power and cooling consumption.

Perhaps one of the biggest advantages of moving to open systems platforms comes from increased application agility. Modern application development approaches such as SOA enable organizations to deliver new capabilities faster and with lower cost than legacy programming environments.

Since the migration costs can be significant, and risk of porting or reengineering legacy applications can be great, organizations need to carefully weigh these business risks against the potential savings for their unique environments. As seen in this paper these savings can be tremendous, freeing up valuable resources for greater innovation leading to competitive advantage. Organizations should look for turning points in their environments, such as impending upgrades, as logical times for making changes. They should also consider evolutionary strategies, which can lower risk by gradually decreasing the dependence on proprietary mainframe systems by moving a few applications at a time.

ABOUT ALINEAN

Since 1994, the Alinean team has been the pioneering builder of tools to help quantify and improve the ROI and TCO of IT investments. Alinean was named for the Spanish word for "Align", matching the Alinean mission as the leading developer of analytical tools to help IT vendors, consultants and IT executives align IT investments with business strategies.

The Alinean team has over a decade of experience in the practical development and application of ROI and TCO methodologies, models and tools to optimizing IT investment decision making. In 1994, the Alinean team formed Interpose, the original pioneers of ROI tools, developing analytical software for over 50 major IT vendors and consulting companies worldwide, and creating the industry standard TCO Manager and TCO Analyst software. Interpose was sold to Gartner in 1998, where the team continued their developments and marketing of ROI and TCO software tools. The original team reunited to form Alinean in 2001, once again becoming the leading pioneers and developers of ROI sales and analytical tools. Current customers include leading IT solution providers such as HP, IBM, Dell, Intel, Symantec, NetIQ, EMC, SAP, Oracle, SBC, and Microsoft, as well as leading consultancies and Global 1000 companies.

Additional information about Alinean and helpful ROI educational resources can be found at <http://www.alinean.com>.