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Reduce operational and environmental costs with the IBM MQ Appliance

IBM **IT Economics Consulting & Research**

The challenge of rising costs

Businesses, large and small, seek ways to reduce costs. This can be especially challenging when there is also a need to grow. While some hastily look at reducing investment in resources and people, much can be achieved by evaluating the current infrastructure to make it more efficient. The same workload organized in a different way can mean savings on licenses, floor space, hosting, energy, and time. If implemented correctly, IT organizations can free up resources and explore new areas with little or no extra investment. A consolidated solution can help to make the existing setup more efficient, and offer options for growth.

For most organizations, workload growth is inevitable, and with this comes increasing administrative overhead, particularly in complex environments. As distributed server environments expand to meet new business demands, floor space can become a significant expense, and internal hosting costs can soon add up.

An alternative to offset the cost of growth is to consolidate existing and new workloads onto IBM MQ® Appliances. MQ Appliances can provide savings for your current investment, and offer room to expand.

Sustainability

Environmental impact is a growing consideration, and more and more businesses are assessing their strategies. Shrinking the physical footprint in parts of your datacenter can offset growth in other parts, reducing energy and Green House Gas (GHG) emissions. Selecting options where the hardware lifecycles are greater than those of existing solutions is another way to reduce impact, by sending less waste to landfill. Consolidating workloads onto MQ Appliances can be a core part of this strategy.

The MQ Appliance

The MQ Appliance is a hardware appliance designed to optimize IBM MQ usage. It is a dedicated MQ resource that is configured to consolidate and simplify the management of messaging workloads. The appliance runs IBM MQ, but due to its protocol support can also connect with other messaging applications.[1] The MQ Appliance delivers the following attributes:

- Optimization: The hardware components, including 40 GB network cards and solid-state drives, have been selected, configured, and tuned by IBM MQ specialists to maximize MQ performance and provide an attractive lifecycle.

Figure 1: Front view of the IBM MQ Appliance

- Consolidation: The optimization and design of the appliance enables use of up to four times fewer appliance cores required for MQ workloads compared to a traditional distributed software installation.[2] This results in fewer MQ Appliances being able to do the

[1] Refer to https://developer.ibm.com/articles/mq-fundamentals/#ibm-mq-language-support-and-capabilities for protocol support
[2] IBM MQ Appliance Performance Report, http://ibm-messaging.github.io/mqperf/MPA3.pdf

work of a greater number of servers running equivalent software, thus minimizing underutilized core and memory resources found in a traditional x86 server landscape, and reducing the physical footprint and energy consumption within the datacenter.

- **Standardization:** A pre-configured solution enables MQ users to rapidly deploy and benefit from consistent performance and setup. With a standardized configuration, workloads running on different versions of MQ can be combined to run at a consistent level. Each appliance is uniform, so users can save time troubleshooting setup issues and reduce maintenance efforts.
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- **Performance:** The MQ M2002A appliance can achieve over half a million messages per second with a 2KB message size and the MQ M2002B appliance can achieve over 180,000 messages per second with a 2KB message size, resulting in fewer resources required to handle the demands of enterprise level workloads.[3]

- **Security:** The MQ Appliance is locked to impede installation of additional software that could introduce security vulnerabilities. Additionally, security patches are provided as firmware upgrades in the form of single, signed packages that facilitate security maintenance.

The MQ Appliance is available in two models, the M2002A with 24 x86 cores and the M2002B with six x86 cores. Learn more about the IBM MQ appliance.

MQ Appliance consolidation scenarios

In this paper we examine the cost implications of two commonly considered scenarios for MQ customers:

- **Scenario 1: Existing MQ licenses versus MQ Appliance -** This scenario examines the cost of continuing with existing MQ licenses on x86 servers versus the use of MQ Appliances

- **Scenario 2: New MQ licenses versus MQ Appliance -** This scenario examines the cost of purchasing new MQ software licenses versus the use of MQ Appliances

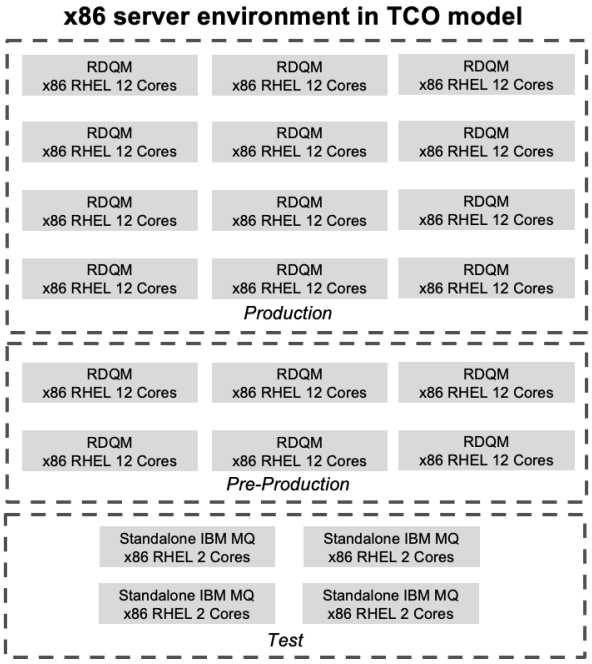


Figure 2: IBM MQ setup on x86 server cases in TCO cost models

[3] https://ibm-messaging.github.io/mqperf/MPA4.pdf

In both scenarios we considered IBM MQ software on x86 servers with separate test, pre-production, and production environments (figure 2). Both scenarios included high availability environments in production and in pre-production, with 3-way replicated data queue manager (RDQM) configured in the x86 server cases and 2-way replication for the MQ Appliances.[4]

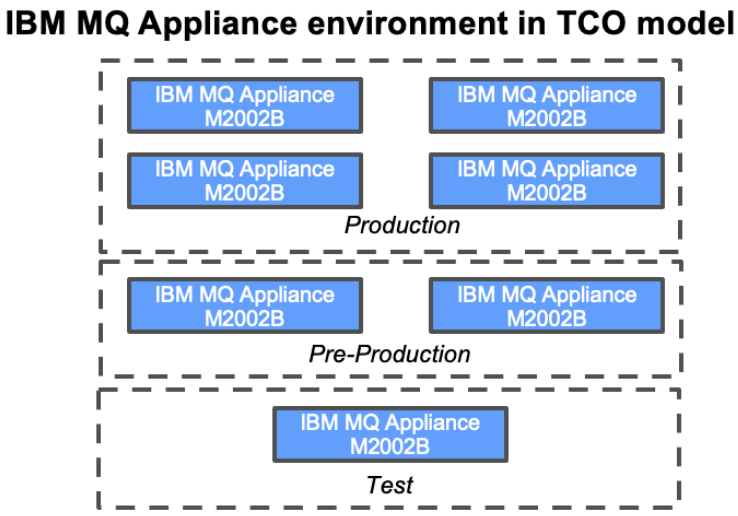


Figure 3: IBM MQ Appliance setup in TCO cost models

Due to the MQ Appliance's support of 2-way replication, and its core consolidation ratio of up to 4:1 compared to the x86 server environment, the MQ Appliance cases required just seven 6-core M2002B appliances (see figure 3), in place of the 22 x86 servers in the MQ license cases.

Scenario 1: Existing MQ licenses versus MQ Appliance

This scenario examined the cost of continuing to run an existing MQ solution on x86 servers, versus replacing the existing MQ software estate with MQ Appliances. In this scenario, new MQ Appliances would need to be purchased, and the previous software licenses would be retired. The cost of using MQ Appliances was evaluated against using an existing MQ-licensed software estate, which required no new licenses, but which continued to have annual operating expenses and support charges. Regarding hardware costs for the existing software estate, only annual hardware maintenance costs were considered for the existing x86 servers.

In a five-year cost comparison model, MQ Appliances delivered a 33% lower total cost of ownership (TCO) versus x86 servers using existing MQ licenses.[5] Figure 4 shows a breakout of the individual costs in the model for an existing MQ estate on 22 x86 servers, versus replacing that estate with seven MQ Appliances.

[4] The MQ Appliance provides 2-way replication. Learn more about its high availability capabilities in the MQ Appliance Datasheet

[5] An IBM IT Economics total cost of ownership five-year model examined MQ Appliances versus MQ software and x86 hardware, with floor space, energy, networking, people, and disaster recovery costs comparing seven 6-core MQ Appliances (total of 42 Skylake cores and 448 GB of memory) and 18 12-core and four 2-core x86 servers (total of 224 Broadwell cores and 1,408 GB of memory) using MQ performance reports (http://ibm-messaging.github.io/mqperf/). Both environments included production and non-production (DevTest, QA) environments with RHEL and IBM MQ Advanced software. IBM software and appliance pricing is based on standard U.S. list prices with discounting as of July 2021. Annual x86 hardware maintenance is a percentage of hardware pricing based on IBM analysis of U.S. prices as of July 2021 from IDC. Floor space, networking, energy, labor and other x86 software costs are based on data from IBM IT Economics assessments for clients. For additional information on the TCO model, contact the IBM IT Economics Team at IT.Economics@us.ibm.com.

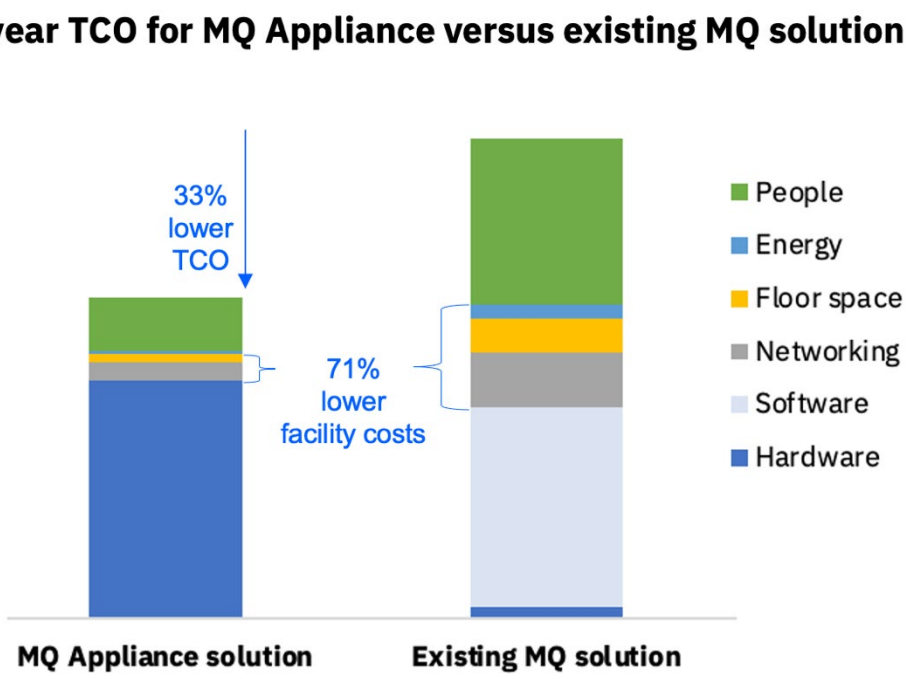


Figure 4: TCO comparison of a new MQ Appliance solution versus an existing MQ estate on x86 servers

In the MQ Appliance case the largest expense was found to be hardware, which also included the preconfigured and preloaded MQ software. Since both hardware and software are included in the MQ Appliance purchase, the model shows no separate software cost for the appliance. Support and service for both the hardware and software was also part of the hardware category.

In the existing MQ licenses case, the existing x86 servers were assumed to be three or more years old. Thus, no initial hardware purchase cost was considered but only the ongoing hardware maintenance expense. The software category included the cost of support and service for the existing MQ licenses.

By the end of five years, the combined hardware and software costs for the MQ Appliance case were 11% higher than the existing MQ licenses case due to the upfront purchase of the appliance. However, its overall TCO was lower due to operations efficiencies.

In terms of infrastructure the MQ Appliance case required significantly less expense. MQ deployment across x86 servers in the existing MQ estate case required three times more servers with 80% more cores than the consolidated MQ Appliance solution.[2] With more servers consuming a larger footprint in the data center, the energy, floor space and network costs increased by 71%. The larger number of servers also resulted in greater IT administration efforts to manage the physical servers, to perform software maintenance, and to troubleshoot issues. More servers and greater complexity drove both higher people and facility costs.

From a financial perspective, the MQ Appliance was a better option than continuing with x86 servers. Even with the initial purchase of the MQ Appliances at the onset of five years, the savings in ongoing infrastructure and people costs resulted in an investment breakeven point in year 2. Opting for the MQ Appliance enabled a much lower run rate in operating expenses in years 2 to 5 compared to the existing MQ estate case, as shown in figure 5.

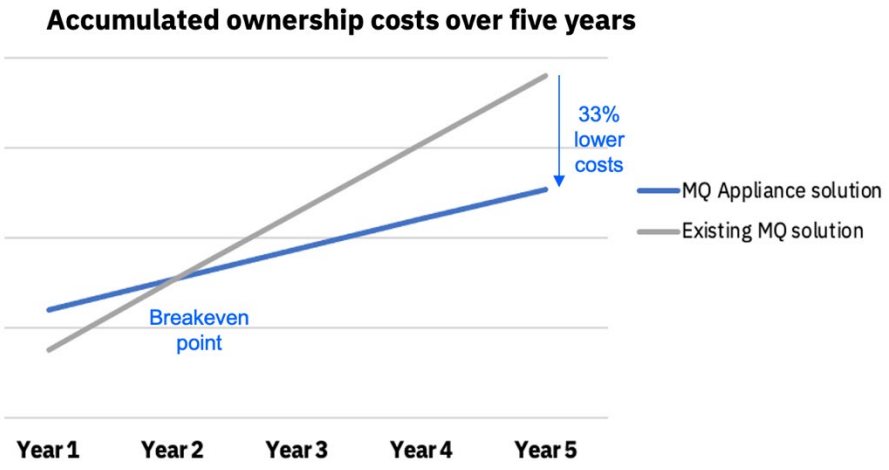
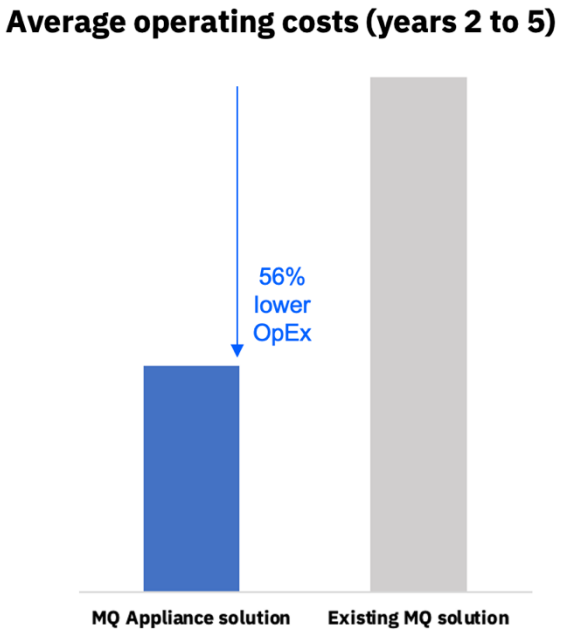


Figure 5: Accumulated ownership costs per year for existing MQ estate case versus MQ Appliance case show the breakeven will happen within one year

In terms of average operating expense (OpEx), the MQ Appliance case was 56% less than the x86 server case. Figure 6 shows the difference in average operations costs, comprised of infrastructure, hardware and software maintenance, and people costs, from years 2 to 5 between the two cases.



For customers who own MQ Appliances for longer than five years, further savings can be achieved. While x86 server refresh cycles may occur every three to four years,[6] the expected MQ appliance lifecycle can be seven or more years with the M2001 model and beyond.[7] Less frequent hardware refreshes can reduce administration effort, extend the value of the initial hardware investment, and reduce landfill contributions.

[6] Client data from 22 IBM IT Economics assessments collected from a range of industries and geographies from 2015 to 2020 indicates x86 servers undergo a technology refresh on average every 3.5 years. Initial purchase costs, hardware maintenance and technology refresh data, software and data center costs were provided by clients to quantify the cost of servers for workload consolidation and/or new technology adoption TCO analysis. Each client engaged the IT Economics team to evaluate their current x86 IT environment and assess a proposed environment for workload placement on POWER technology. Client data showed that POWER servers were refreshed once every four to six years with an average of 5.14 years and x86 servers were refreshed once every three to four years with an average of 3.69 years. For additional information on TCO analysis contact the IBM IT Economics team, IT.Economics@us.ibm.com.

[7] Refer to https://www.ibm.com/support/pages/node/6426983 for MQ Appliance support lifecycle planning

Figure 6: Average operating costs from year 2 to year 5 for the MQ Appliance and existing ME estate cases

Scenario 2: New MQ licenses versus MQ Appliance

This scenario examined deploying a new project by purchasing additional MQ software and x86 hardware versus purchasing MQ Appliances. In contrast to scenario 1, in which existing MQ software entitlement was used, scenario 2 required the purchase of new licenses to deploy a new MQ environment. Unlike scenario 1, this scenario included the cost of purchasing x86 servers for the deployment, as well as subsequent server maintenance costs.

Scenario 2 (new MQ licenses versus MQ Appliance) assumed the same environment requirements as scenario 1 with seven MQ appliances versus 22 x86 servers. Thus, all infrastructure and people costs remained the same.

In a five-year cost comparison model, MQ Appliances delivered a 42% lower total cost of ownership (TCO) versus x86 servers with new MQ licenses.[8] Figure 7 shows a breakout of the individual costs in the model for new MQ licenses on 22 x86 servers versus architecting a new solution with MQ Appliances.

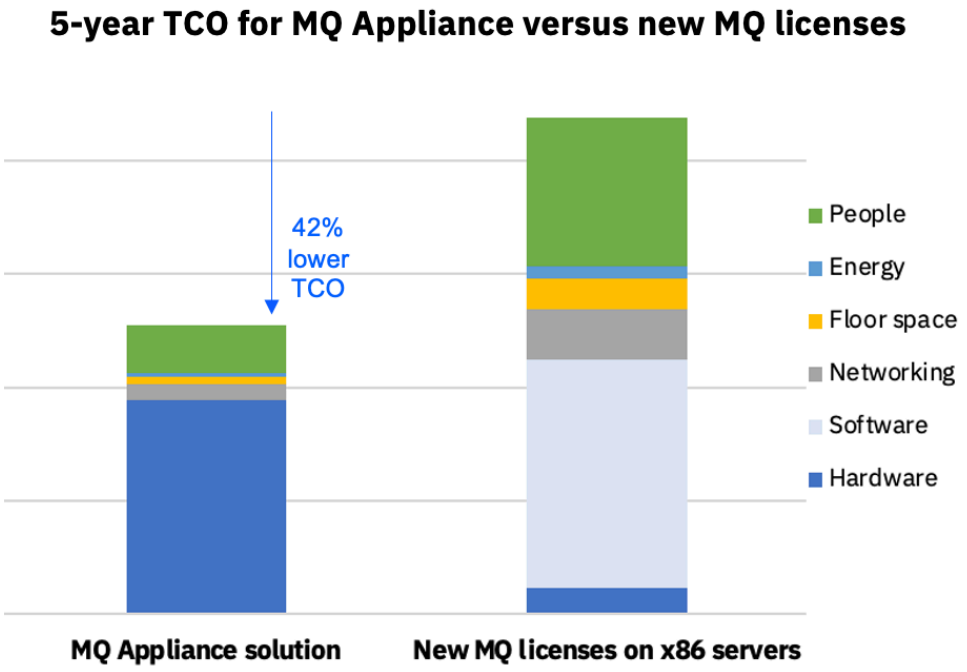


Figure 7: TCO comparison of a new MQ Appliance solution versus purchasing new MQ licenses

[8] An IBM IT Economics total cost of ownership five-year model examined MQ Appliances versus MQ software and x86 hardware, with floor space, energy, networking, people, and disaster recovery costs comparing seven 6-core MQ Appliances (total of 42 Skylake cores and 448 GB of memory) and 18 12-core and four 2-core x86 servers (total of 224 Broadwell cores and 1,408 GB of memory) using MQ performance reports (http://ibm-messaging.github.io/mqperf/). Both environments included production and non-production (DevTest, QA) environments with RHEL and IBM MQ Advanced software. IBM software and appliance pricing is based on standard U.S. list prices with discounting as of July 2021. x86 hardware pricing is based on IBM analysis of U.S. prices as of July 2021 from IDC. Floor space, networking, energy, labor and other x86 software costs are based on data from IBM IT Economics assessments for clients. For additional information on the TCO model, contact the IBM IT Economics Team at IT.Economics@us.ibm.com.

In terms of initial spend, from Day 1 the MQ Appliance case showed a better return on investment than the new MQ licenses scenario. Due to the sizeable investment in new licenses for the new MQ licenses case, its cost run rate was higher than the MQ Appliance case with no breakeven point, as shown in figure 8.

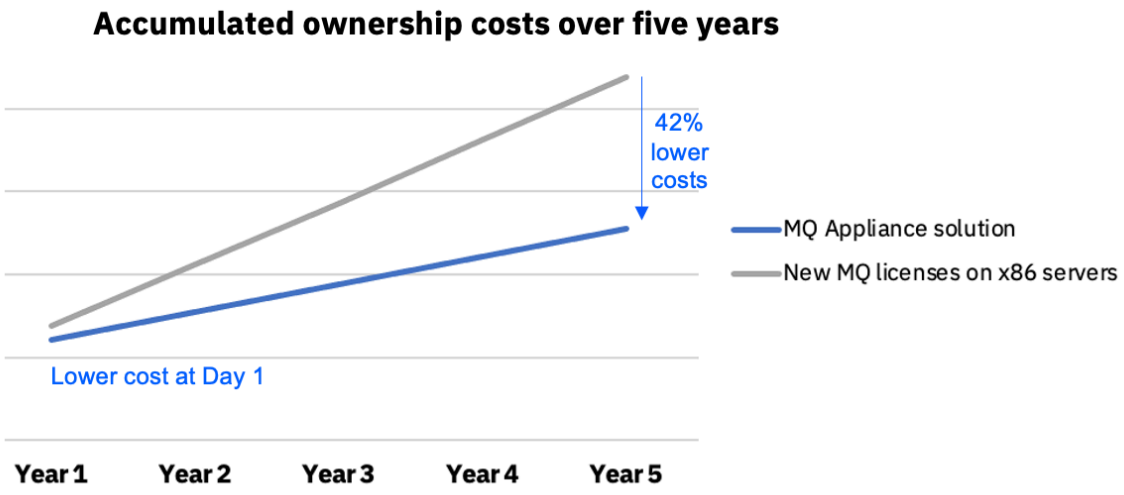


Figure 8: Accumulated ownership costs per year with lower implementation cost from onset of five years with MQ Appliance case

Datacenter efficiencies and sustainability

Energy, networking, and space requirements are all factors that can drive up costs when running software on servers in your datacenter. A reduction in the number of servers reduces these costs, and makes areas of your datacenter available for new projects. In Scenarios 1 and 2, the MQ Appliances displaced x86 servers, creating savings of around 71% across networking, power, and space. Specifically, the energy usage is 74% lower. This has direct consequences also on reducing the Green House Gas (GHG) emissions by 74%, making the MQ Appliance a much greener choice. Because fewer MQ Appliances were used (seven compared to 22 servers), more space was created in the datacenter. In a datacenter that struggles for capacity, the prospect of freeing up floor space can be a great advantage.

Administration productivity

The reduction in servers drives savings in the number of server administrators, or full-time equivalents (FTEs), required for the solution. With about a third of the number of MQ Appliances required compared to servers, these extra FTE resources can be utilized for other solutions, increasing administration productivity across your datacenter.

People savings can be even greater when we consider the configuration benefits of the MQ Appliance. Since the appliance is pre-configured and optimized for MQ, less effort is required for the initial setup compared to software used in a non-appliance environment. There is also likely to be less disparity between the deployed software versions since the appliance enables MQ workloads to be standardized and consolidated. After setup, maintenance can be achieved

through single, signed packages resulting in less time to configure and maintain the MQ Appliance compared to MQ software on custom servers. These efficiencies can enable fewer FTEs to manage a greater number of MQ Appliances than disparate servers.

Ready to consolidate?

The MQ Appliance can generate savings and simplification whether consolidating existing workloads (scenario 1) or deploying new projects (scenario 2). If your organization is looking for operational efficiencies and cost savings, ask your IBM representative to connect you with an MQ specialist. They can help you evaluate your current MQ setup to leverage the advantages of consolidation and help you determine how to achieve a solution that offers simpler administration, less infrastructure and lower cost.

MQ Resources

- IBM MQ Appliance overview
- IBM MQ Appliance comparison details
- IBM MQ Appliance datasheet
- IBM MQ performance documentation
- IBM MQ Appliance Performance Report
- IBM MQ RDQM HA Performance Report

About the authors

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