

Supporting IBM MQ on a \$hoestring Budget



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Supporting IBM MQ on a Shoestring Budget

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Supporting IBM MQ on a Shoestring Budget

Definition/Qualification

- Shoestring Budget – is making the optimal use of limited financial resources by prudent planning and allocation of those resources in support of your business requirements and your companies bottom line.
- Federal/State/Local laws, Security, Audit, quality of service and other requirements are oxy morons to a shoestring budget. These ongoing requirements should always be a part of your core budget.
- Shoestring aside, IT (and MQ) cost containment benefits your companies bottom line and profitability.
- CAVEAT: Cutting your budget too much introduces more risk and can impact the ability of your business and systems to grow and meet their objectives. Small companies may go out of business due to cuts.

Supporting IBM MQ on a Shoestring Budget

Business 101

- One purpose of a business is to make a profit
- Non-profit organization's cannot operate for profit and use their assets/revenues to achieve their stated mission.
- GAAP: $\text{Assets} = \text{Liabilities} + \text{Owner's Equity}$ (Balance Sheet)
- Liability = costs or expenses of doing business
- IT generally considered a Cost Center, although most Profit Centers can't operate without technology
 - Power/Equipment/Hardware/Software/Leases/FTEs
 - Related Expenses (Security, Audit, Monitoring)
 - Ri\$k avoidance
 - Regulatory or Compliance requirements
 - Balancing the Budget and Cost Containment
 - Build what we need; Not what we want

Supporting IBM MQ on a Shoestring Budget

What are your MQ goals to support the business?

Mission Statement

Using SOA principles and industry best practices, the Middleware Services Team's mission is to provide a dependable, scalable and cost-effective service channel, based on messaging and application server technology, supporting the various delivery channels within *companyname* and enabling internal and external customers of *companyname* to interact over diverse platforms and applications.

Vision Statement

Provide timely middleware integration solutions to meet the requirements of our business units and increase *companyname* competitive advantage. Promote component reusability/plug-and-play to lower development and support costs as well as facilitate rapid application development (RAD).

Supporting IBM MQ on a Shoestring Budget

Cost of Doing (MQ) Business

- How much does it cost your Institution to process each MQ message (TCO)
 - MQ Licensing cost
 - MQ Monitoring cost
 - Security Software, SSL/TLS Certificates
 - O/S licensing cost
 - Hardware/Leasing cost
 - People cost (support, maintenance, patches, etc.)
 - Other costs (Audit, DR, Installation, Training, etc.)
 - One time costs versus ongoing costs

Supporting IBM MQ on a Shoestring Budget

Total Cost of Ownership and Cost per Message

TCO (abbreviated definition):

the purchase price of an asset plus the direct and indirect cost of its operation over the life span of the asset.

Cost per Message = Total Cost of providing the MQ Service¹ /
Total Number of MQ Messages Processed

Example: Annual Cost of MQ Services = \$800k

Annual MQ Message Count = 3.2 billion round trips

Costs .00025/msg or \$1 to process 4000 round trips

Cost per Message tells you how cost-efficient your service is.

References: [Wikipedia: Total cost of ownership](#)

[Marty Schmidt@business-case-analysis.com](mailto:Marty_Schmidt@business-case-analysis.com): Total Cost of Ownership TCO Explained

[Gov.UK Service Manual: Measuring cost per transaction](#)

¹ Derived from your TCO analysis

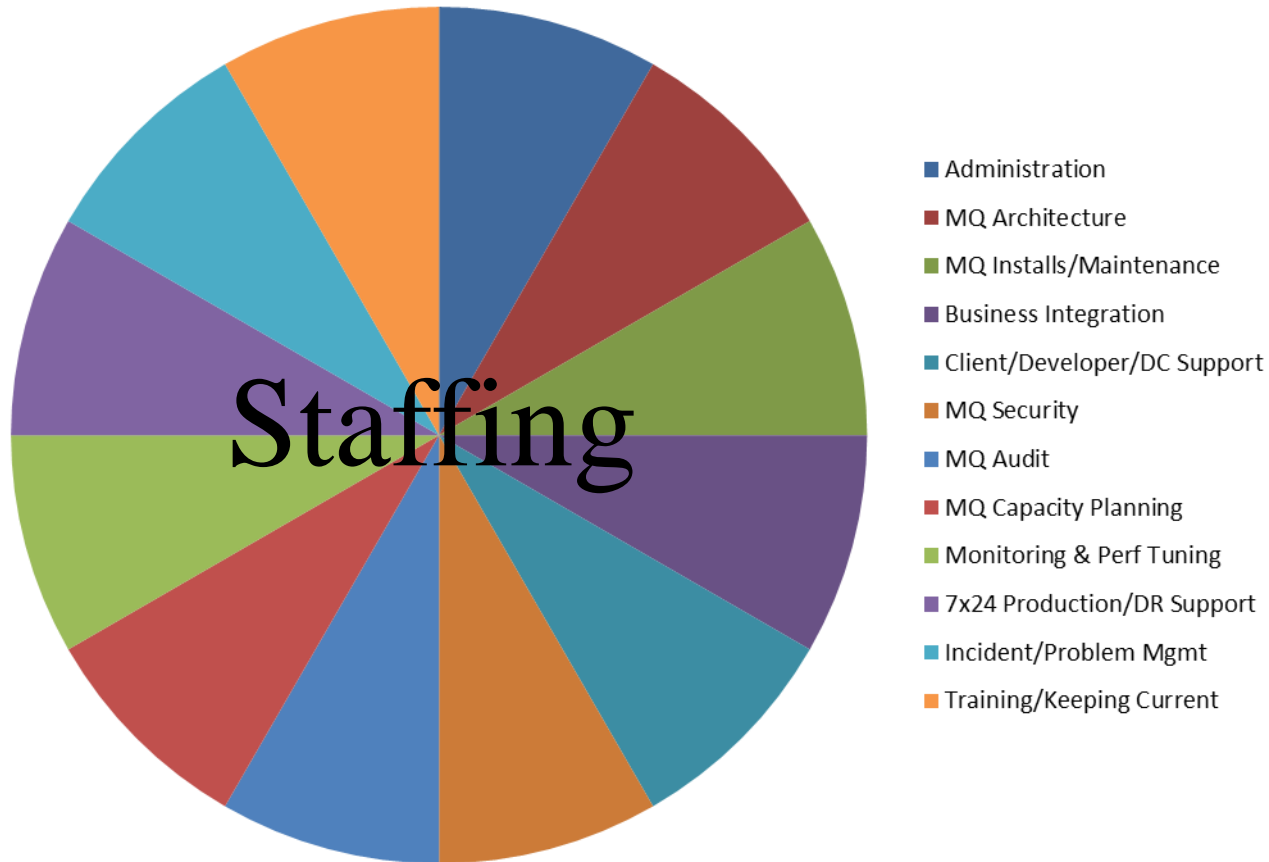
Supporting IBM MQ on a Shoestring Budget

Reducing the Cost per Message

The following slides contain ideas on how to reduce your Total Cost of Ownership, and by extension, the cost per message.

Note that increasing the number of MQ messages processed without increasing your TCO costs will also reduce the cost per message.

MQ Administrator Roles & Responsibilities



MQ Administrator Roles & Responsibilities

- Administration (Budget, Purchasing, Licensing, Project Management, Hiring FTE's/Consultants, Managing Personnel)
- MQ Architecture Planning, Design and Roadmap (plus EA Integration)
- MQ Installation, upgrades and maintenance on multiple platforms and MQ recertification against OS and/or other upgrades (e.g. z/OS, CICS, ESB)
- Business Integration Support (Solutions, compatibility and interoperability)
- Client, Developer, Project, Data Center and Other Support
- MQ Security
- MQ Audit
- MQ Capacity Planning
- Monitoring and Performance/Tuning
- 7x24 Production & DR Support as well as Incident/Problem Management
- Debugging
- Training/Upgrade Skillsets/Keep Current
- Other Responsibilities not listed

MQ Administrator Roles & Responsibilities

Staffing to support MQ Admin Roles & Responsibilities

- **Are you adequately staffed to support your areas of responsibility?**
 - As your MQ infrastructure grows and more applications are added to your portfolio each year, can you still meet your obligations or do you need more staff? How do you justify adding more staff?
 - Can current staffing level accommodate these situations? In combinations?
 - ✓ One or more FTEs sick/emergency
 - ✓ 2 or more concurrent Sev 1/2 calls
 - ✓ One or more FTEs on vacation
 - ✓ Overworked FTEs are not machines
 - ✓ FTEs leave your company
 - ✓ Surge in BAU and new project work
 - ✓ Weekend, 2nd or 3rd Shift support
 - ✓ NOTE-FTEs are not plug 'n play
 - Inadequate staffing injects risk & costs (eg extended outages) to a company
 - What can I do to help improve my staff coverage and exposures?
 - 1) Leverage your TCO & other analysis (next slide) to justify new hires
 - 2) Utilize consulting/other solutions as needed
 - 3) Leverage technology to make your team more productive

References: managershandbook.com: Strategy to Hire More People

[The Workplace@stackexchange.com: How to build a Business Case for New People](http://TheWorkplace@stackexchange.com: How to build a Business Case for New People)

Capitalware's MQ Technical Conference v2.0.1.6

MQ Administrator Roles & Responsibilities

Staffing to support MQ Admin Roles & Responsibilities

Justifying New Hires by building a Business Case

- **Cost per MQ message**

A before/after analysis of the FTE Add on the cost per MQ message is one supporting item to supplement other items.

- **FTE Histogram and Additions to the Infrastructure/Portfolio over time**

A histogram showing the number of FTEs annually and the annual additions to the MQ infrastructure/portfolio/other in support of the business (and expressed in business terms) is a way to identify/justify staffing gaps. You can also include the situations noted previously and variances in team skills.

- **List Histogram, Current and Projected Statistics on Your MQ Workload**

- ✓ Data mine your team's timesheets
- ✓ Overtime stats & Chargeback to Apps
- ✓ MQ System Uptime vs Outage Durations
- ✓ Total inbound/outbound phone calls
- ✓ Total inbound/outbound business emails
- ✓ Factor in reduced staff for vacation/training
- ✓ #Changes supported & duration
- ✓ #Problems supported & duration
- ✓ #Projects supported & duration
- ✓ #Adhoc/Unplanned Requests
- ✓ #MQ platform/Qmgrs supported
- ✓ PCI/SDLC separation of duties

MQ Administrator Roles & Responsibilities

Staffing to support MQ Admin Roles & Responsibilities

Using Consulting/Other solutions as needed (1)

- Hire a part-time employee instead of an FTE
- Cross-train your team to support MQ on multiple operating platforms as well as the applications in your portfolio
- Hire a MQ consultant for BAU or overflow work (to free your team up)
- Engage a College Intern for the summer (Future Junior MQA?)
- Negotiate scheduling/availability of MQ team resources with project leaders. Give priority to funded projects and align MQ resources to the business assigned priorities.

MQ Administrator Roles & Responsibilities

Staffing to support MQ Admin Roles & Responsibilities

Using Consulting/Other solutions as needed (2)

- Develop MQ DR procedures/scripts for unattended recovery of the MQ Infrastructure to minimize need for DR MQ resources. If needed, train a member of the Data Center (at a contingency site) to perform MQ DR recovery and verification procedures or contract MQ DR support.
- Promote MQ in-house via presentations/seminars. Be an entrepreneur.
- Reduce MQ incidents and eliminate them by using MQ best practices, standard builds, unit testing, documentation and attention to detail. Achieving high uptime and a low incident rate frees your team's time up for other work and avoids customer impact, financial penalties and/or loss of business revenue.
- For MQ deployments that are off-support, MQ support may be obtained via IBM's extended support agreement or 3rd party vendors.
Reference: [IBM: Software Extended Support Agreements...Did you know?](#)

MQ Administrator Roles & Responsibilities

Staffing to support MQ Admin Roles & Responsibilities

Leverage Technology to increase Team Productivity

- **Use MQ Explorer (secured connection) for centralized administration**
Also see [MQGEM: MO71 Admin and Config Tool](#)
For change management, RUNMQSC may be better choice (more later)
Reference: [IBM: RUNMQSC Command Syntax](#)
[IBM: Preparing Chls & XmitQs for Remote Administration](#)
- **Use MQ monitoring software in lieu of an FTE** to monitor the health of your MQ infrastructure and alert you when something is amiss. In addition, some monitors can (semi)automate corrective actions via MQ or scripts.
- **Review IBM MQ SupportPacs for applicability to your environment**
Reference: [IBM: Business Integration - WebSphere MQ SupportPacs](#)

MQ Administrator Roles & Responsibilities


Staffing to support MQ Admin Roles & Responsibilities

Leverage Technology to increase Team Productivity

- **Use in-house developed automation to help offset staffing deficiencies**
 - See Appendix A for a sample script which shuts down your Queue Manager and reboots your Windows server. The Windows Local Group Policy can also assign your script to the shutdown event. Unix has a shutdown script where you can include commands to bring down your Queue Manager.
 - Windows has a task scheduler, Unix has the Cron scheduler and the mainframe has batch jobs which can run your admin scripts at a specific TOD
 - Consider having developers define MQ objects in Test via MQA developed software panels which apply edits for naming and other MQ standards
 - Develop MQ PCF scripts to centralize and automate administration tasks.
Reference: [IBM: PCF Commands](#)
 - Basic MQ Health Check loop
Setup on Hub Qmgr one Qlocal and Qremotes for each spoke Qmgr. Spoke Qmgrs setup Qremote back to Hub Qmgr Qlocal. Put messages on Hub Qremotes, with the Qmgr name in message, and see which messages come back to the Hub Qlocal. Other variations?

Leverage Technology to increase Team Productivity

I view our MQ Monitor as another FTE solely dedicated to monitoring the health of our MQ infrastructure and alerting us when something is amiss. Some Monitoring tools can automate corrective actions via MQ or scripts.

 M&T Bank MiddleWare Services

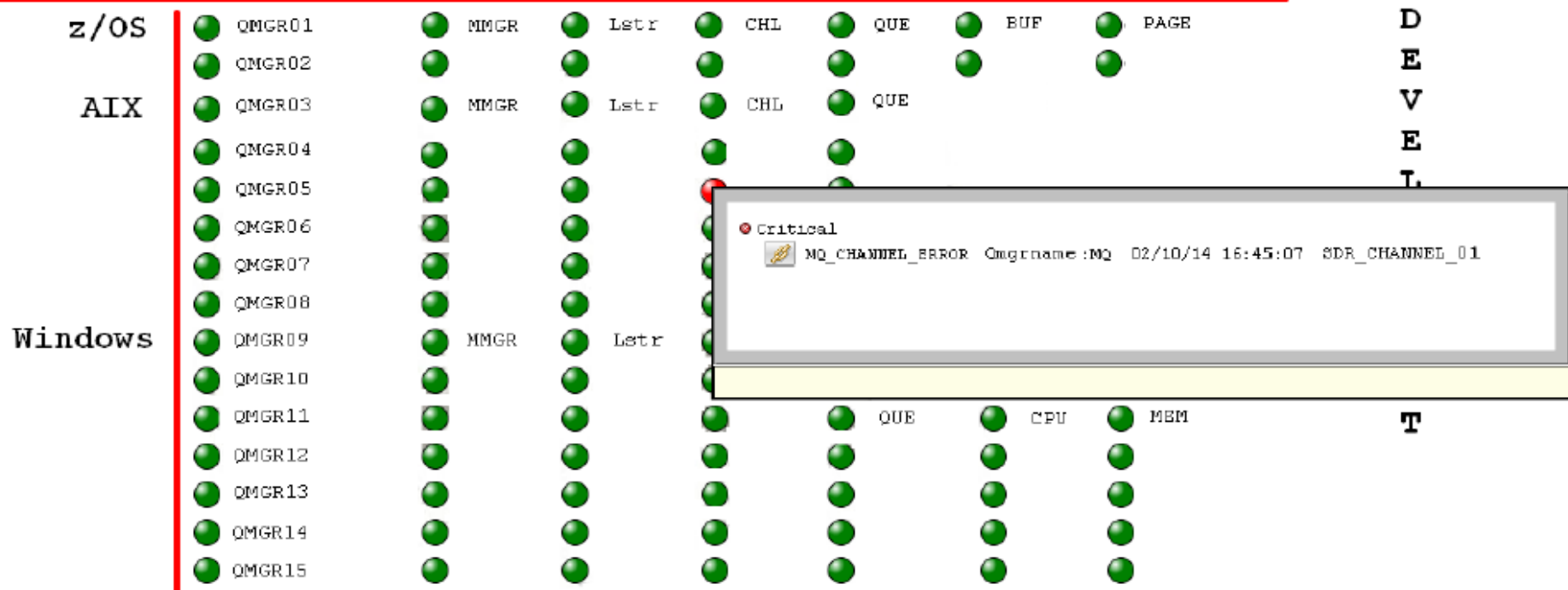


Figure: Early M&T prototype of MQ Monitoring Dashboard

MQ Administrator Roles & Responsibilities

Staffing to support MQ Admin Roles & Responsibilities

Leverage Technology to increase Team Productivity

- Go to Vendor websites and download free/low cost MQ related software

Example: [Capitalware: Capitalware Products Licensed As Free](#)
[Capitalware: Capitalware Open Source Projects](#)

Capitalware's Home for IBM MQ products on AIX, HP-UX, IBM i (OS/400), Linux, Solaris, Windows, - Internet Explorer

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[Products](#)

[Products for z/OS](#)

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NEW MQ Technical Conference v2.0.1.6 **NEW**

MQ Technical Conference v2.0.1.6 (MQTC), brought to you by Capitalware Inc., is an event that will educate attendees on current practices, methodologies, administration, problem determination, security best practices and technology trends for IBM MQ. MQTC will offer 70 technical sessions and 15 vendor sessions that are designed to enhance the skills of IT professionals who are using IBM MQ on AIX, HP-UX, IBM i (OS/400), Linux, Solaris, Windows and z/OS. Since we have 5 session rooms at MQTC, there will be 5 concurrent MQ sessions at any given time.

Date:	September 26 to September 28, 2016
Location:	Kalahari Resorts in Sandusky, Ohio
Duration:	3 Days

Regular Price:	\$399.00 from June 27th to September 11th, 2016
Group Price (5+ people):	\$299.00 until August 26th, 2016

Go to [MQTC's About](#) page to learn more about MQTC.

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MQ Administrator Roles & Responsibilities

Leverage Service-Oriented Architecture (SOA) to increase Team Productivity

▪ From Banking Industry Architecture Network (BIAN) study on SOA benefits:

- 100% of banks agree that the adoption of SOA standards will increase their institutions' ability to compete
- 77.7% of banks expect SOA standards to reduce IT costs by at least 25%, with 44.4% expecting to experience a reduction of 50% in IT costs.

Source: [BIAN: SOA Study](#)

- Subscribe to SOA principles and it will benefit your companies bottom line and your teams productivity.
- Leverage previously successful messaging patterns for new business solutions and avoid reinventing the wheel (which results in redundant solutions, more costs and longer project delivery timelines).
- Re-use existing services/solutions which will facilitate Rapid Application Development (RAD) and lower development costs. Avoid 1-off solutions.
- Early on, find/create a callable and reusable client adapter interface as a gateway into your MQ infrastructure. It should reduce your production and developer calls. Such an interface also helps keep MQ code out of the business logic layer.

Capacity Planning

MQ Administrator Roles & Responsibilities

MQ Capacity Planning (1)

▪ Definitions

- **Capacity Management** is responsible for ensuring that adequate capacity is available at all times to meet the agreed needs of the business in a cost-effective manner. Source: ITIL
- **Capacity Management** is a process used to ensure that IT resources are right-sized to meet current and future business requirements in a cost-effective manner. Source: Google search-Author Unknown
- **Capacity Planning** collects the computing capacity of the current environment and employs statistical and analytical tools to measure it against future requirements. The primary objective of capacity planning is to ensure that the planned IT resources are added to the system not earlier or later than actual demand. (Also see parallels to Demand Forecasting).
- Commercial MQ Capacity Planning Solutions are available
Assure they capture the metrics you need and have the reporting you need
- MQ Monitors that can capture and export the metrics you need to a histogram database can be an alternative solution. SQL can be used for custom trend analysis and reporting/graphs can be generated with other tools. Requires more work on your part than a commercial solution.

MQ Administrator Roles & Responsibilities

MQ Capacity Planning (2)

- Initial Action items (short version):
 - Establish your official definition of Capacity Management
 - Establish your official definition of Capacity Planning
 - Define the resources needed to support the MQ infrastructure
 - Define the capacity requirements and metrics for these resources
 - Implement the software or process to capture the desired metrics at regular time intervals (i.e. compare apples to apples)
 - Create a (relational) histogram repository to host the metrics and retain them long enough to establish reliable baselines, and facilitate trend analysis to identify future capacity requirements/gaps.
 - Define the trigger thresholds for when action is needed to add capacity
 - Utilize Analytical, Data Mining and reporting tools to schedule action
 - Ideally, your metrics can be associated with cost for a complete picture

MQ Administrator Roles & Responsibilities

MQ Capacity Planning (3)

Supplementary Information

- [IBM: WebSphere MQ Family - Performance Reports](#)
- Client End-to-End response times and histogram
 - #Messages in the DLQ may allow you to infer performance & capacity
 - Backups or buildups in Qdepth can infer performance & capacity issues
- Microsoft Perfmon (CPU, Memory, Disk, ASP Request Execution Time)
RFE to put back MQ performance counters on 64 bit Windows
See [IBM Support: Perfmon counters do not show up on Windows 64 bit OS](#)
- [Nigel Griffiths@IBM developerWorks: AIX Performance Commands](#)
- MQ z/OS SMF 115, 116
- Having your MQ team monitor application load/stress tests provides invaluable information about the capacity of your MQ infrastructure (without learning the hard way in production)

Distributed MQ & Licensing

MQ Distributed Servers and Licensing (\$)

Full Capacity Licensing
Standard MQ vs. MQ AMS



Sub-capacity Licensing w/ ILMT
[IBM: Sub-capacity licensing FAQs](#)

Free 90-Day Trial Licensing
w/ update option for support

IBM MQ Advanced
(MQ bundle w/ AMS, FTM, Telemetry)



Please check with your IBM account rep and/or IBM authorized licensing agent to confirm the best licensing option for you.



NOTE-Distributed MQ licensing costs are based on the number of PVUs (core processors \times) on your server times the unit cost NOT utilization of MQ services. However, sub-cap licensing has other considerations as noted on the next slide.

MQ Distributed Servers and Licensing (\$)

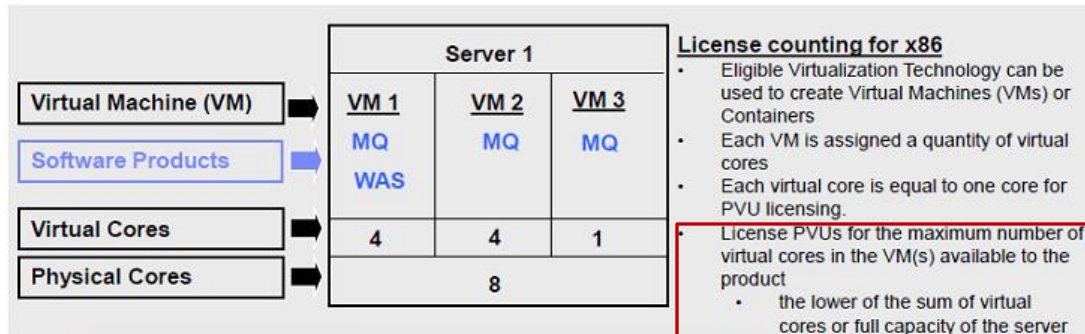
Sub-cap Licensing Considerations

- Source: [IBM: Virtualization Capacity License Counting Rules](#)

IBM Passport Advantage Software – Virtualization Capacity Licensing for x86 Virtualization

License counting in a Server

1 Server	9 Virtual Cores	8 Physical Cores
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For above example, the PVU Virtualization Capacity licensing requirement is based on the maximum number of virtual cores in the VM(s) available to a product

License Rule: lower of the Virtualization Capacity or Full (Physical) Capacity available in the Server

**Example of Sub-cap
Lowering licensing costs**

**Example of Sub-Cap
MQ benefitting
from Full-Cap**

Cores to License	VM 1	VM 2	VM3	Virtualization Capacity	Full capacity
MQ software	4	4	1	9	8
WAS software	4	-		4	8

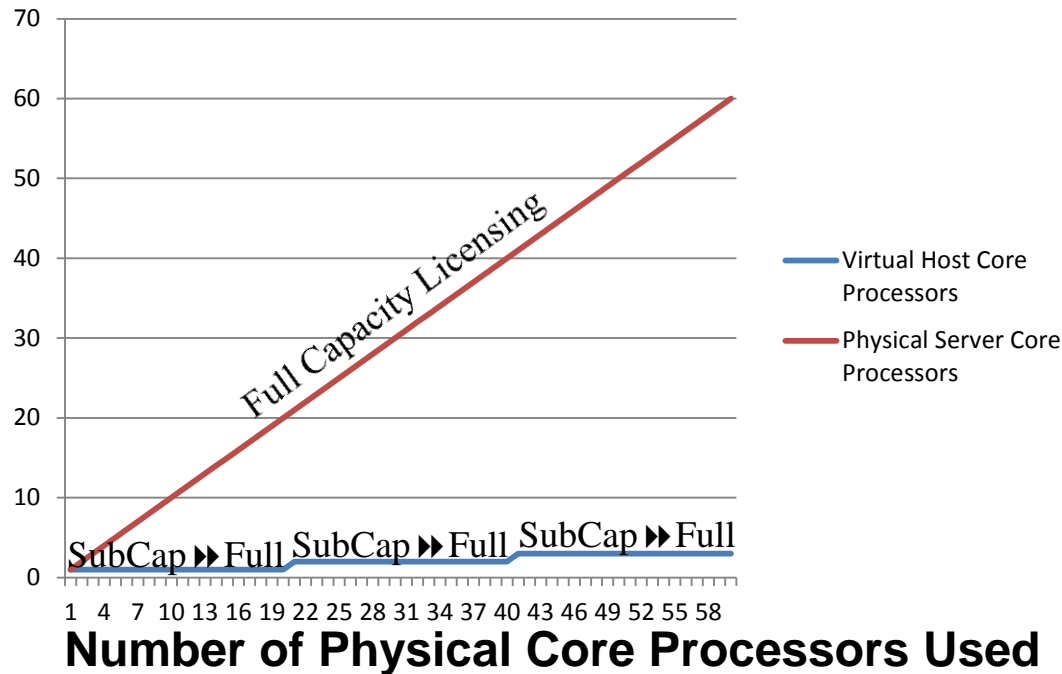
6 March 30, 2016

IBM Corporation

MQ Servers & Licensing (\$) on Virtual versus Physical Servers

Figure:
Hardware
Cost Savings

#Servers/Hosts
Required



- Assumptions:**
- 1) Distributed MQ licensing cost based on unit cost & #PVUs
 - 2) One core equals 100 PVUs (see [IBM PVU Calculator](#))
 - 3) Each physical server or Virtual Guest assigned 1 core
 - 4) Each Virtual Host has 20 cores to support 20 Guest servers

- Observations:** (VMotion)
- 1) Example shows 3 virtual host or 60 physical servers required
 - 2) The MQ licensing requirements for Virtual equals Physical
 - 3) FullCap-each Virtual Guest can be assigned 1 or more VCPUs
 - 4) If each core for Virtual Host rated at 50 PVUs, MQ licensing cost is 1/2 of Physical Servers

MQ Distributed Servers and Licensing (\$)

Other Options (1)

- Centralize all of your IBM software purchases under the same Passport Advantage agreement in order to maximize RSVP volume discounts.
Reference: [IBM: How Passport Advantage works](#)
- Check with your IBM licensing agent. Under certain conditions, you may not need to purchase MQ licensing for passive DR servers that correspond to licensed production servers. Some 3rd party providers of MQ related software may also have a similar DR policy.
- Consolidate your Queues into fewer queue managers and reduce your PVUs.
Reference: [Morag Hughson & Dave Gorman@SHARE Boston 2013: Can I consolidate my Qmgrs & Brokers?](#)
- Consider incorporating the IBM MQ Appliance into your Infrastructure. Compare the TCO for the appliance versus a physical server with MQ (AMS) installed as well as the features and capabilities of each solution.
Reference: [IBM: IBM MQ Appliance](#)
- Consider consolidating distributed queue managers under MQ on z/Linux

MQ Distributed Servers and Licensing (\$)

Other Options (2)

- Have applications leverage the MQ client (whenever tight coupling with the queue manager is not needed) to reduce MQ licensing, enable application portability and better utilize your existing Queue Managers.
- Consider placing two or more low volume test queue managers on the same server instance or a group of server instances.
 - Add a processor/VCPU or two and memory, if necessary, and still be ahead cost-wise on hardware and licensing.
- Spread your costs over multiple years, where feasible, to achieve your final end goal. i.e. a divide and conquer approach
- Like any consumer, shop around for the best price especially on MQ accessory software (e.g. monitors, productivity tools).
 - Create documents beforehand that list your requirements & features to objectively compare products you are reviewing or doing a POC on. Leverage your findings/research in negotiations with the vendor.

MQ z/OS Costs

MQ z/OS Costs (1)

- MQ z/OS licensing costs are charged on a monthly basis (MLC), on a sub-capacity basis or a value unit pricing basis (IPLA). Note that Sysplex has other pricing considerations. (See [IBM z Systems Software Pricing](#)).
Reference: [IBM: Websphere MQ for z/OS Value Unit Edition](#)
- **Please check with your IBM account rep and/or IBM authorized licensing agent to confirm the best licensing option for you.**
- *MQ z/OS sub-cap costs are based on the processor time used NOT PVUs.*
- **To locate your MQ z/OS Measured Usage License Charge (MULC) info and the contributors to the MULC, run the following SMF reports:**
 - ▶ SMF Type 89 Lists usage totals by product . Also see [SCRT89 report](#).
 - ▶ SMF Type 30 Lists CPU usage for each job step
 - ▶ SMF Type 115 Statistics records for MQ z/OS Queue Manager Resource Usage
 - ▶ SMF Type 116 Statistics records for MQ z/OS Task/Queue Level Usage
- **Do performance tuning and MQI optimization of your heavy hitters using SMF reports, MQ monitors and other tools to reduce your usage on z/OS. z/OS & MQ benefits and your wallet will too.**

MQ z/OS Costs (2)

- **In MQ V8, the MULCCAPT parameter in CSQ6SYSP determines the algorithm to be used for MULC as follows:**
 - ▶ STANDARD-MULC is based on the time from the IBM MQ API MQCONN call to the time of the IBM MQ API MQDISC call. STANDARD is the default setting.
 - ▶ REFINED-MULC is based on the time from the start of an IBM MQ API call to the end of the IBM MQ API call.
 - ▶ See which setting works best for you. Also see [PK73461](#)
- **Consider changing Trigger on Every to Trigger on First (or None)**
 - ▶ Trigger on Every puts one trigger message on the InitQ for each message that is put to a local (or transmit) queue, and CICS CKTI starts a CICS task for each trigger message it gets off the InitQ. Trigger None eliminates trigger messages but requires dedicated and right sized MQ connections to service messages arriving on their assigned queue. Trigger on First can serve as basis for just in time processing & elastic [Reactive System](#)
- **Consider moving MQ client connection\$ to Distributed queue managers**
 - ▶ Especially volatile/runaway MQ connections or connections not using Fail_If_Quiescing
 - ▶ Keep in mind Distributed MQ charged by PVUs and not by utilization
 - ▶ Frees up mainframe queue managers to focus on more important 'bread & butter' work
- See [Lyn Elkins & Mitch Johnson@SHARE San Antonio 2016: MQ & CICS-Integration Options & Costs](#)

MQ Security

MQ Security (1)

- **Never Compromise on MQ Security; You can't afford to**
 - **According to a 2014 study by the Insurance Institute of America:**
 - For U.S. companies, average total cost of a data breach was \$5.9MM
 - 42% of data breaches were deliberate due to insiders and outsiders
 - 30% of data breaches were due to human error or negligence
 - **Consider using MQ AMS instead of standard MQ**
 - **Consider “Loose Lips Sink Ships”** and worse-case security scenarios
Keep your MQ topology, object names and IP/ports on a ‘Need to Know’ basis. Once published, you can't get it back. (Another security layer).
 - **Consider IPsec in conjunction with OAM channel/Other security**
 - IPsec supports network-level peer authentication, data origin authentication, data integrity, data confidentiality (encryption), and replay protection. Intercepts unauthorized access before it hits MQ listeners. (Another security layer). IPsec is usually part of the OS.
 - Still keep MQ to MQ encryption/certificates. Use CHLAUTH to refine.

MQ Security (2)

■ Never Compromise on MQ Security; You can't afford to

- IBM has provided a number of security features in MQ. Authenticating access to MQ resources, instead of Identification (e.g. userid only), is a top priority and vital for auditing and non-repudiation. Example:
 - MQCONNX userid and password (encrypted)
 - Signed TLS certificates for Client and Queue Manager
 - LDAP and mqccred (MQ V8+)
Reference: [Morag Hughson@IBM developerWorks: IBM MQ V8 Connection Authentication](#)
 - SSPI security exit-NTLM (one way) and Kerberos (two way) options
 - Create custom Security exits in MQ on client and server side
Reference: [IBM: Channel-exit programs for messaging channels](#)
 - Other/3rd party authentication solutions (e.g. Capitalware MQAUSX)
 - EXEC CICS VERIFY PASSWORD
- Don't forget to apply timely security patches/maintenance to your MQ related software (e.g. Monitors, 3rd party) in addition to your OS & MQ.

MQ Audit

MQ Audit (1)

Consider the Following Situations:

- Customer says he/she never made that withdrawal or purchase
- Client/Developer says they lost messages from yesterday or before
- Outside service bureau suddenly double bills you based on what they say is an increase in your MQ traffic volume to them.
- Front-end and/or back-end application has no ability to log updates or there is a need for a MQ checks & balances presence
 - Corrupted data requires roll back to previous point in time using the transaction/audit log
- Insider/Outsider Hack/Fraud has been committed and audit data is needed to facilitate the investigation and determine the extent of the intrusion.
- Auditors require tracking of all MQ Admin changes to the infrastructure

Conclusion: You're SOL without a solid audit strategy

MQ Audit (2)

Audit Categories

- See [IBM Knowledge Center: IBM MQ V8 Planning Auditing](#)
- Tracking application based messages passing through your Queue Managers where non-repudiation, checks and balances and/or other audit requirements are needed.
- Tracking changes made to the MQ infrastructure by MQ Administrators and other personnel (e.g. Data Center, Developers)
- Tracking MQ Health/Operational/Run-time events
- Other
- *Logging can add performance overhead and opens up concerns as to who owns and can see the logged data, securing the data and pruning/retention/maintenance of audit logs.*

MQ Audit (3)

Options for your consideration:

- It may be sufficient to have the front-end and/or back-end application create/maintain an audit log. Do Inquiry transactions need to be logged?
- Consider MQ replication, via QAlias/Topic, to make a copy of the received message and route it to a MQ audit queue or out to a DB2 database via MQ-USS-DB2 z/OS listener.
 - Can also write a program or use utility to dump messages in the MQ audit queue to a file as well as produce an audit report. (MQ not a DB)
 - This option does not show when the message was picked up or sent
- MQ provides message exits for message channels allowing you to create a custom Audit solution.
Reference: [IBM Knowledge Center: Message Exits](#)
- MQ provides sender/receiver exits for MQI channels allowing you to create a custom Audit solution.
Reference: [IBM Knowledge Center: Channel-exit programs for MQI channels](#)
- Also see [IBM Knowledge Center: Writing and compiling API exits](#)
- Be aware that MQ exit formats could change in future MQ releases

MQ Audit (4)

Options for your consideration:

- IBM MQ Audit Features for tracking changes to MQ Infrastructure
Reference: [MayurRaja@SHARE 2016: Monitoring and Auditing MQ](#)
- [MH05: WebSphere MQ - Events Display Tool](#)
- Your MQ Monitor may have the capabilities to perform health checks of your MQ infrastructure as well as help with event msgs
- [IBM Support: Where's My Message? Tool to extract persistent messages](#)
- IBM MQ AMS on z/OS can generate SMF type 180 MQI operations
- Use Vendor software to audit MQ (Usually preferred by Auditors)
Assure solution works on all your MQ platforms for complete view.
- [The ITAM Review: Beginner's guide to IBM software audits](#)
[softwareONE: Understanding the IBM Compliance Audit Process](#)
Consider deploying Software Asset Management (SAM) software

MQ Audit (5)

Change Management

Besides putting up change tickets to promote your MQ infrastructure changes to cert and production, a procedure and/or vendor solution should be in place to consistently apply the MQ object changes that were validated in test to your cert and production environments.

Reference: [IBM Knowledge Center: Working with IBM MQ objects](#)

- If available, leverage your company's ITIL configuration manager repository to store your MQ object definitions and changes and to promote them to cert and production.
- If just starting out with MQ or you have a shoestring budget, a manual procedure may be acceptable to your Audit department:
 - In Test, create new MQ objects/definitions using DEFINE LIKE where feasible. MQ Admins and End-users validate these changes.
 - Run *dmpmqcfg* or *makedef* and save to file. Edit out everything except your particular object changes. Save this to a change repository/file.
 - Use CM jobs/scripts to RUNMQSC/CSQUTIL changes into cert & prod
- Purchase/Use Vendor change management solution

Training: Free or Low Cost

■ Convention/Training

- ❑ [MQ Technical Conference - World's largest conference on IBM MQ](#)
- ❑ Virtual MQ Training Class, IBM MQ Webinars, [IBM Wildfire Workshops](#)

■ Attend IBM MQ or Websphere User Groups

- ❑ [NY/NJ IBM MQ User](#), [IBM Middleware User Community](#)

■ IBM MQ on the Web

- ❑ [IBM Tech Xchange](#), [MQ on facebook](#), [#IBMMQ on Twitter](#)

■ MQ List Servers/Blogs

- ❑ [IBM MQ "Vienna" List server](#)
- ❑ [MQSeries .NET Technical Forum](#)
- ❑ [IBM MQ Blogosphere via GEM Software](#)
- ❑ [Roger's Info](#) , [MQGem Monthly Newsletter](#)

■ MQ Articles/Resources

- ❑ [IBM developerWorks](#)
- ❑ [IBM MQ Manuals](#)
- ❑ [IBM Redbooks and Papers](#)
- ❑ [IBM MQ Support Portal](#)
- ❑ Google and/or Bing searches
- ❑ R&D Blow up your MQ test environ

Other Sources: IBM Online Help

- Go to www.ibm.com to have your questions answered online or contact your IBM Account rep for definitive answers.

The screenshot displays the IBM MQ website in a browser window. The main content area features the IBM logo, the text "Marketplace", and a large blue banner for "Secure messaging IBM MQ". Below the banner, it states "IBM MQ, formerly WebSphere MQ software that rapidly transports applications, systems and services". A "Contact us for pricing" button is visible, along with a "Free 9" offer. A navigation bar at the bottom includes "Overview", "Details", "Purchase", and "Resource".

An "IBM Live Advisor" chat window is overlaid on the page. It shows a conversation with an agent named Ashley M. The chat history includes:
- Ashley M: [10:44:11] Hi, I got your chat transferred to me from Karen.
- Ashley M: [10:44:28] Let me see - we have a public list available.
- User: [10:44:50] Thank you!
- Ashley M: [10:45:50] No problem - still looking.

To the right of the chat window, there is a "Considering a purchase?" banner and a "Text chat now" button. Below this, there are three contact options:
- "Text chat now: Start a text chat session with an expert."
- "Call IBM: 1-877-426-8774 Priority Code: Middleware."
- "Email an expert: An expert will respond to your email."

The browser's taskbar at the bottom shows several open applications, including "MQ Learning on Yam...", "JILM MQ - United Sta...", "Engagement Win...", "C:\ Drive (MFC 2015)", "Supporting JILM MQ...", "Unlabeled - Notepad", and "Unlabeled - Fant". The system clock shows 1:28:49 PM.

Summary

In this session, we covered the following areas:

- Shoestring budget terminology and Budget 101 concepts
- Aligning your MQ goals to support the Business
- Total Cost of Ownership and Cost per MQ message
- MQ Administrator Roles & Responsibilities and Staffing
- Leveraging Technology and SOA to increase productivity
- Capacity Planning
- Server consolidation, licensing and reducing costs
- MQ Security and MQ Audit
- Training

Questions & Answers



Audience Participation

- Any contributions or ideas on how you deal with a \$hoestring Budget? Any War stories?



Supporting IBM MQ on a \$hoestring Budget

Thank you for attending this session!



Appendix A

The following Windows .bat file is a sample script for ending a queue manager and then doing a Windows server reboot after the MQ processes are down. When coupled with Windows task scheduler, it can suffice to allow for unattended maintenance in some cases. Customize this script to meet your needs.

```
@ECHO %date% %time% START MQ Server Recycle:
@ECHO OFF
title Recyle MQ Server for Maintenance Patch
set "qmgrname=myqmgrname" REM supply name
set "mqsvcacct=mqdomainacctname" REM supply name
set MQ_Wait_Time=20 REM Number of times to check for MQ up
set counter=0
@ECHO %date% %time% Stopping MQ queue manager
endmqm -i %qmgrname%
:: Give queue manager time to come down
timeout /t 30 /nobreak
@ECHO %date% %time% Stopping MQ listeners
endmqslr -m %qmgrname%
timeout /t 30 /nobreak
tasklist /FI "USERNAME eq %mqsvcacct%"
@ECHO =====
@ECHO %date% %time% Stopping MQ service
:: =====> Stop MQ service and related services if any exist
net stop "IBM MQSeries"
REM net stop "IBM WebSphere MQ (Installation1)"
:START_LOOP
timeout /t 60 /nobreak
set /a counter=counter + 1
@ECHO %date% %time% Status Check # %counter%
```

```
:: List AMQ and RUNMQ processes that are still running
tasklist /FI "USERNAME eq %mqsvcacct%"
:: Check to see if AMQ and RUNMQ processes are down
tasklist /FI "USERNAME eq %mqsvcacct%" | find "Image Name" >nul
@ECHO =====
:: @ECHO err %errorlevel% <=== use only for debugging
if %errorlevel% NEQ 0 goto STOP_LOOP
::
:: With counter set at 20 and checking MQ services are down every
minute, then after 20 minutes of waiting we shutdown server
if %counter% GEQ %MQ_Wait_Time% goto STOP_LOOP
goto :START_LOOP
::
:STOP_LOOP
::
@ECHO %date% %time% MQ services may be down if Status Check# <
20. Check event log. Proceeding to shutdown phase.
REM see http://technet.microsoft.com/en-us/library/cc780360\(v=ws.10\).aspx for shutdown syntax
::
shutdown /r /d u:4:12 /c "Apply maintenance patches and recycle MQ
server"
::
@ECHO %date% %time% END of MQ Server Recycle
```


Appendix B

IBM MQ Request for Enhancement (RFE)

**Please help make MQ a better place by submitting an RFE to IBM.
See:**

<http://www.ibm.com/developerworks/rfe/>