MQ in containers

Rob Parker, IBM

parrobe@uk.ibm.com

Please note

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion.

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.

The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Agenda

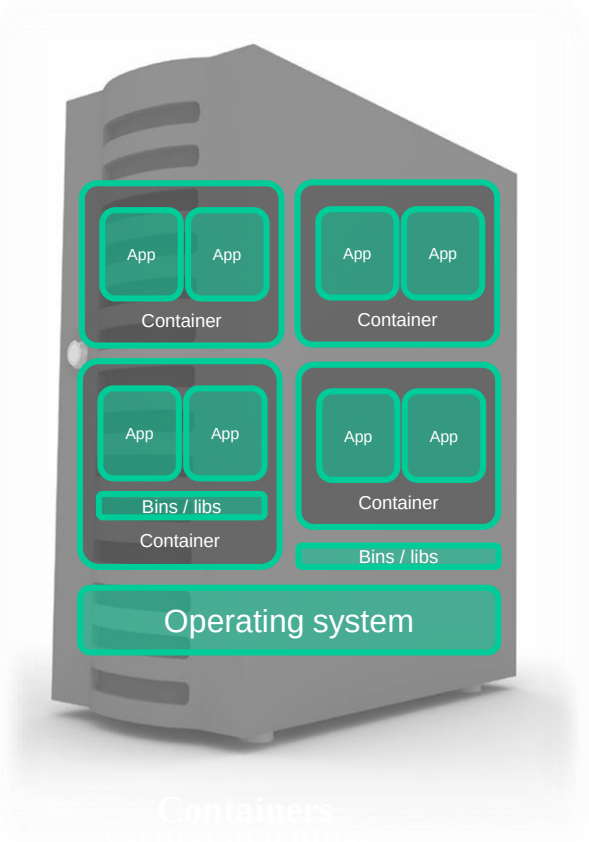
- Containers
- MQ in containers
- Examples of using MQ in containers
- Demos (Hopefully)

CONTAINERS

Containers

- **Containers provide a similar environment to a VM but lighter in weight**
  - A **virtual machine** provides an abstraction of the physical hardware
  - A **container** abstracts the OS level, typically at the user level

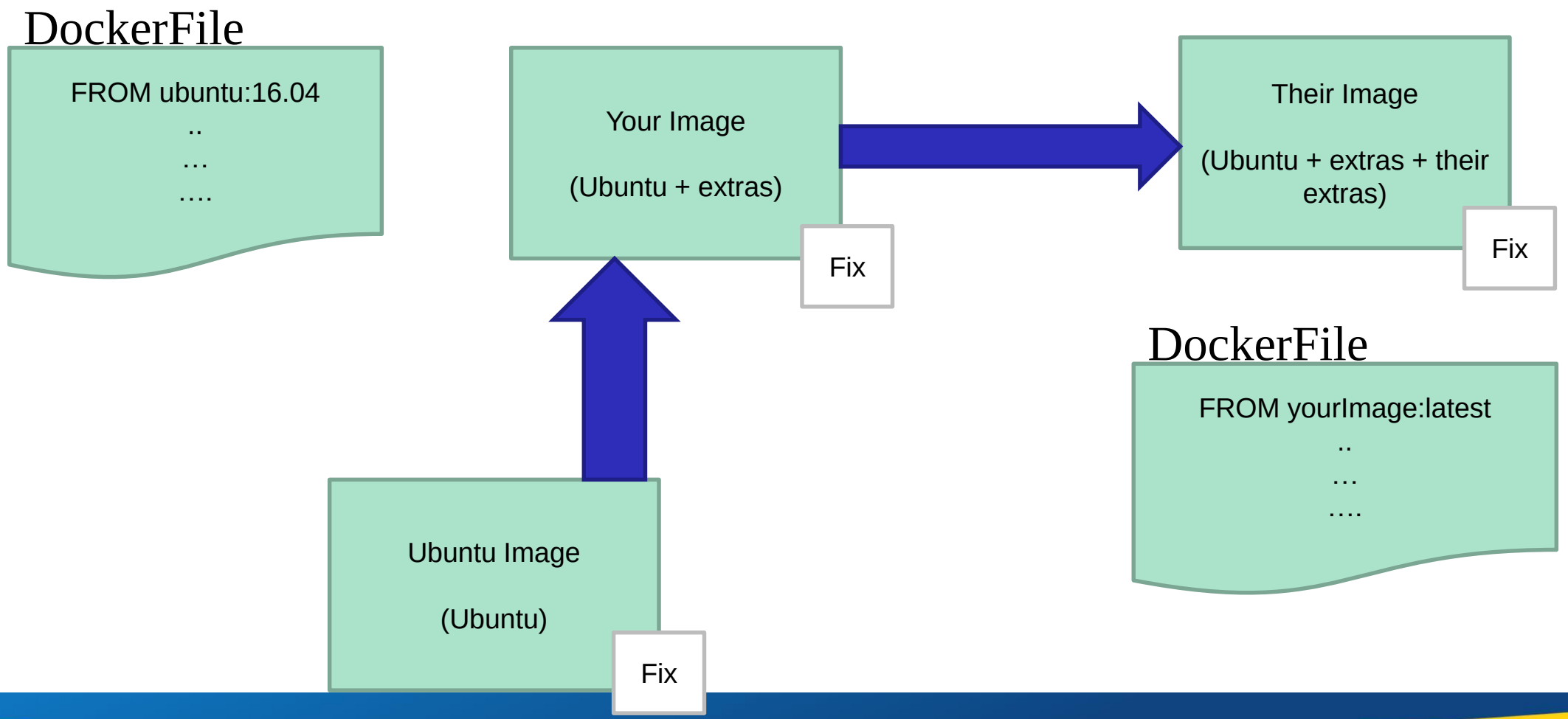
- **Linux containers**
  - Containers all share the same OS kernel
  - Images are constructed from layered filesystems
  - Containers isolate applications from each other and the underlying infrastructure



Benefits of Containers

- Each container/process only sees its own process(es)
- Each container/process only sees its own filesystem
- Fast startup time – just the time to start a process, setup networks, etc
- Better resource utilization – can fit far more containers than VMs into a host

Expanding on existing images



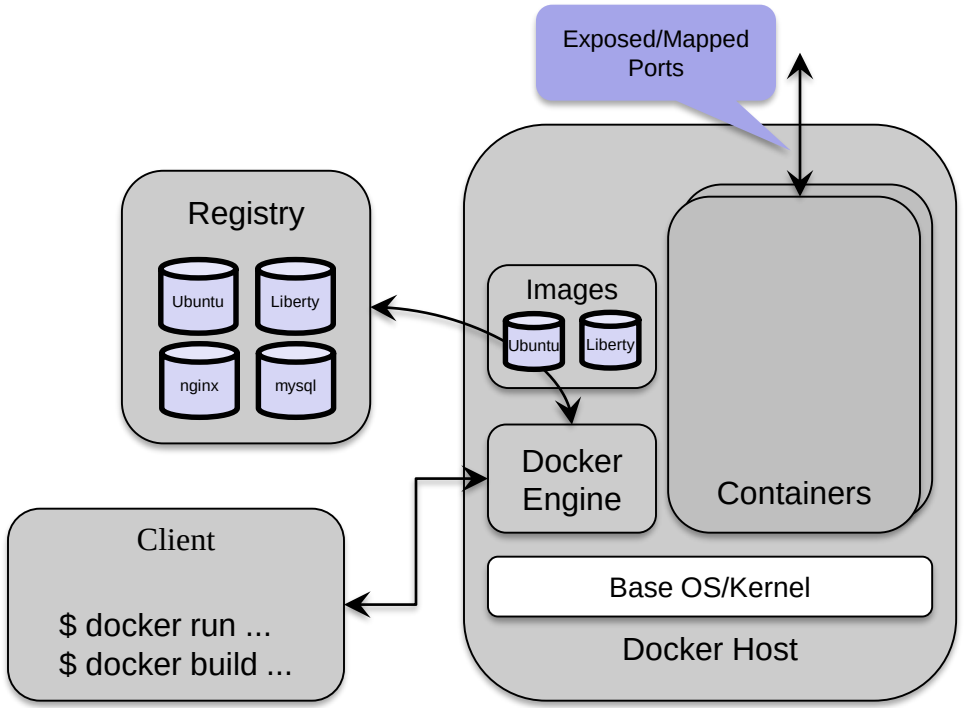
What is Docker?

- **Tooling to manage containers**
  - Containers are older than Docker
  - Docker just made them easy to use

- **Docker creates and manages the lifecycle of containers**
  - Setup filesystem
  - Setup networks
  - Setup volumes
  - CRUD container
    - Create: start new process telling OS to run it in isolation (unique namespaces, cgroups)

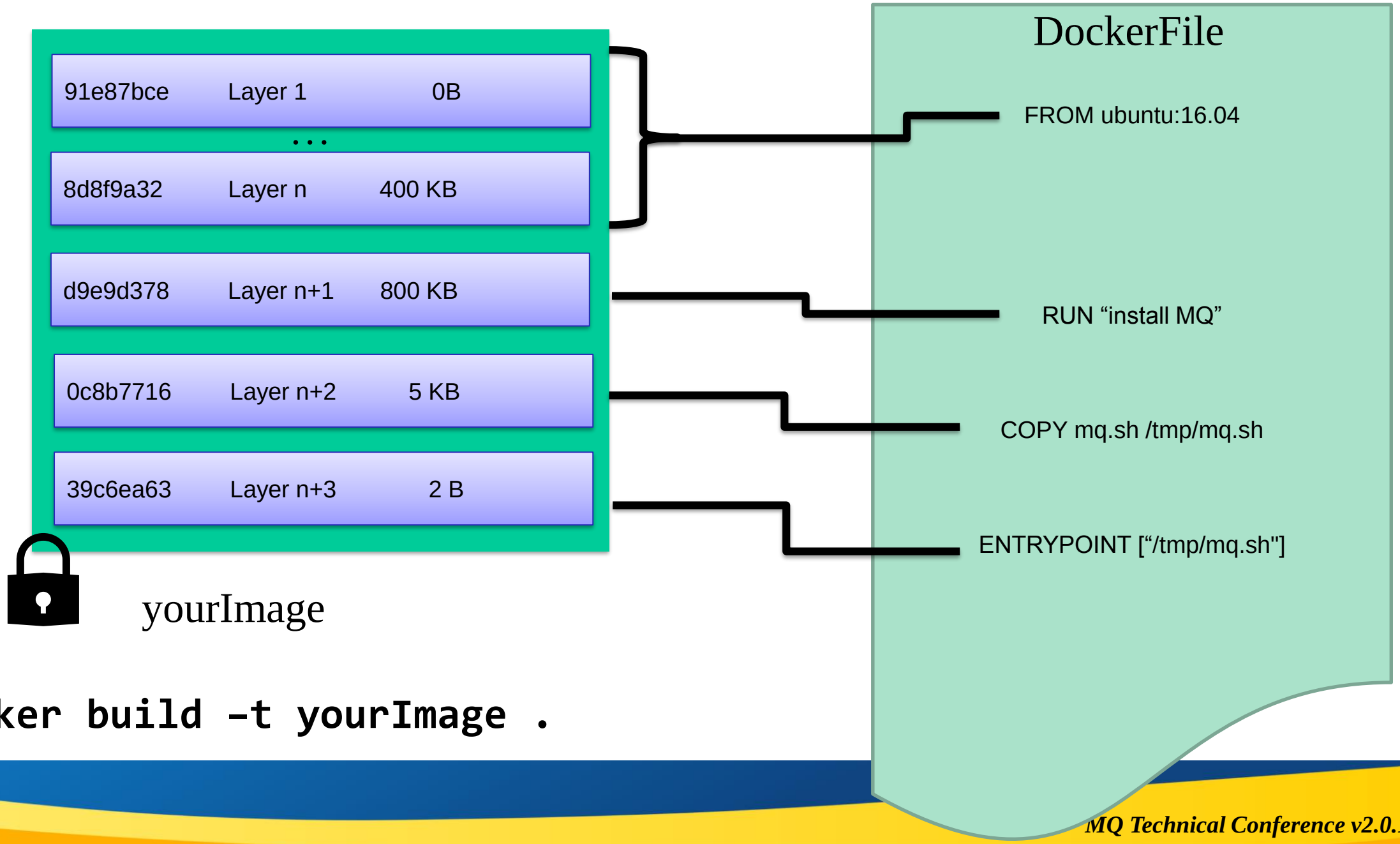
Docker Component Overview

- **Docker Engine**
  - Manages containers on a host
  - Accepts requests from clients
    - REST API
  - Maps container ports to host ports
    - E.g. 80 → 3582
- **Docker Client**
  - Drives daemon
- **Docker Registry**
  - Image DB



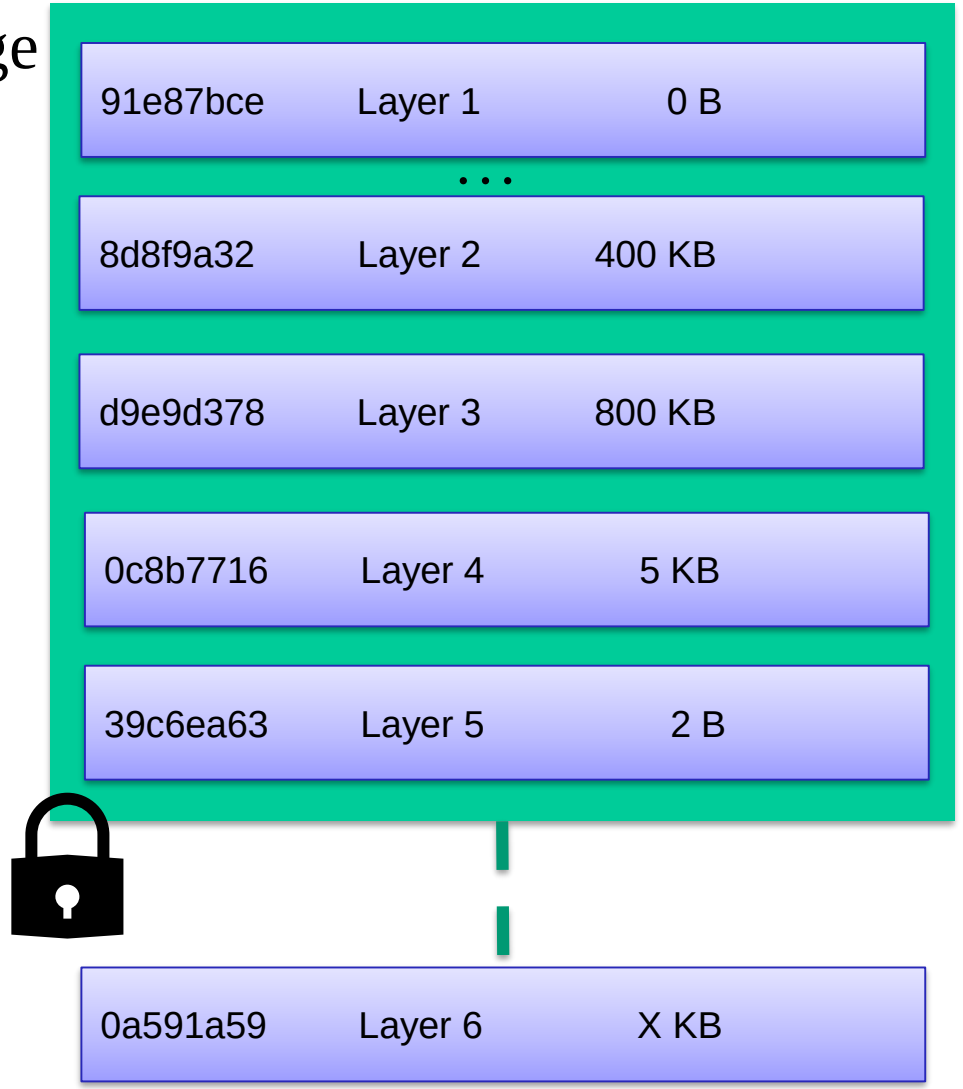
What are container layers

- **Container images are made of multiple layers**
- **In a Dockerfile, each command you execute creates a new layer**
  - A layer details a change from the previous layer
- **If you update a layer then only that layer and the subsequent layers will be built.**
- **If you have too many layers you could see performance drops.**



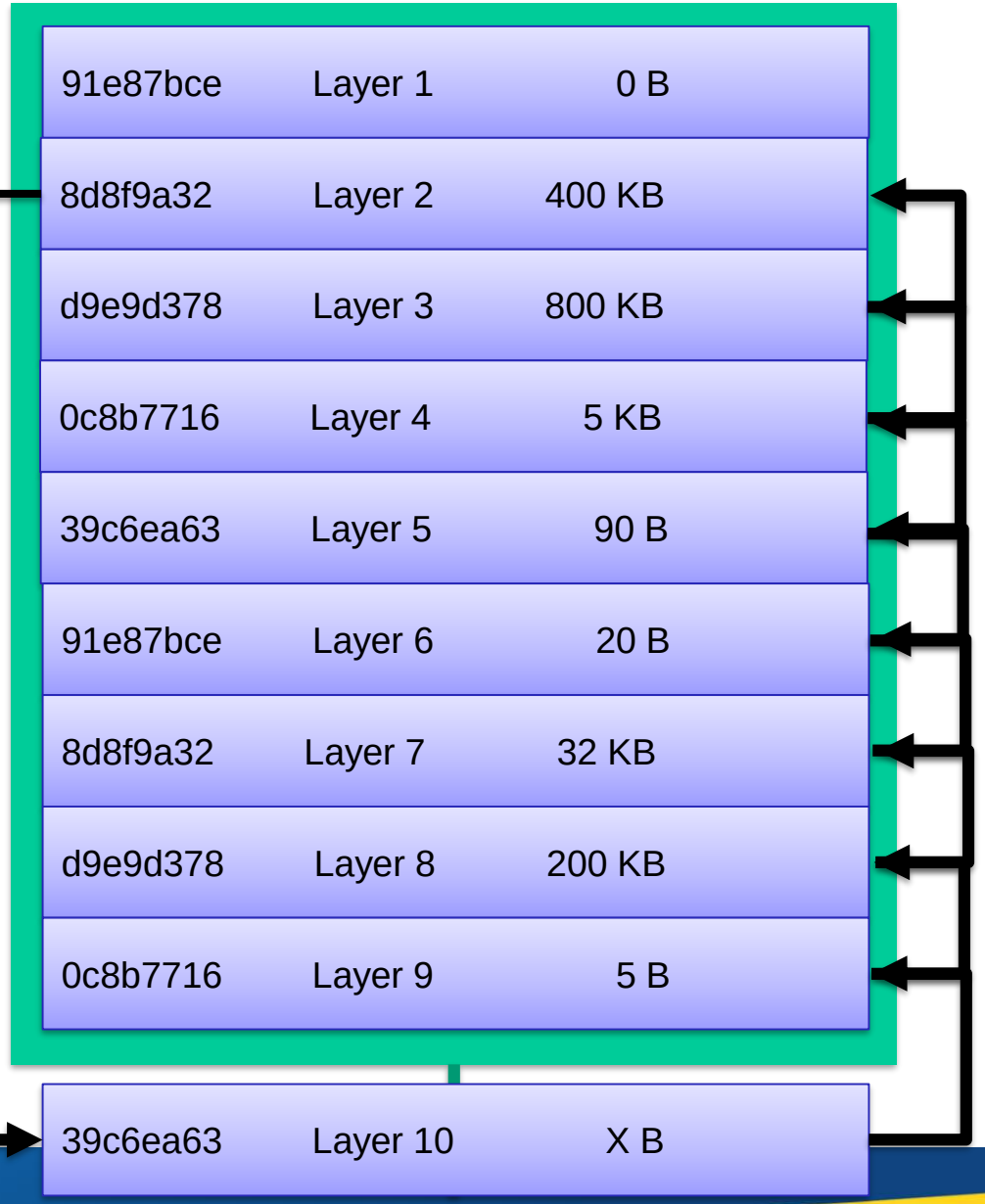

```
docker build -t yourImage .
```

yourImage




```
docker run …… yourImage
```

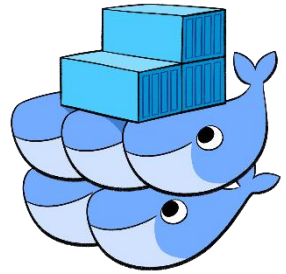
Create file “xyz.file”



`vi xyz.file`

Orchestration of containers

Orchestration tools



Docker Swarm

Public cloud container services

IBM MQ IN CONTAINERS

Why MQ in Docker?

- **Lightweight containers for running MQ**
- **Predictable and standardized units for deploying MQ**
  - Can use the same image to make multiple Queue Managers
    - Each setup with the same configuration script
  - Can assist in rolling out a new fix/version of MQ
- **Process, resource and dependency isolation**

What is supported?

- https://www.ibm.com/support/knowledgecenter/SSFKSJ_9.0.0/com.ibm.mq.con.doc/q114484_.htm
  - Docker Support on Linux Knowledge center page
- **IBM MQ v 8.0.0.4 +**
- **Docker must be running on a Linux Kernel of 3.16 or above**
  - Host platform must be a supported platform
- **Then the usual things you'd expect for anything**
  - You need to use persistent volumes
  - You need to be able to run the MQM commands
  - You need to be able to gather diagnostics
- **So what IBM MQ packages are supported?**
- **… we'll revisit this.**

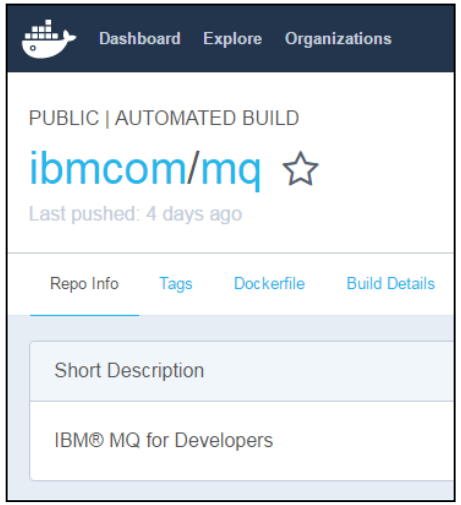
Sample MQ Docker Container

- MQ 8.0.0.4+ supported to run inside a Docker image
  - Details: https://ibm.biz/mqdocker
- Brings the benefits of Docker to MQ
  - Lightweight containers for running MQ
  - Predictable and standardized units for deploying MQ
  - Process, resource and dependency isolation

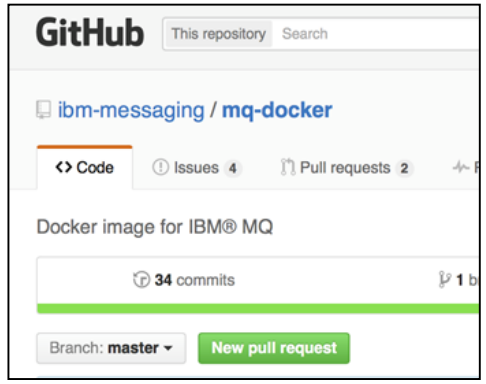
```
mwhitehead@mrw-ubuntu-1604: ~
mwhitehead@mrw-ubuntu-1604:~$ docker pull ibmcom/mq
Using default tag: latest
latest: Pulling from ibmcom/mq

71a21fdea81d: Downloading 13.52 MB/65.7 MB
cf68a3ea6e1d: Download complete
31cb2a4d344a: Download complete
0341b6fcb0fe: Download complete
```

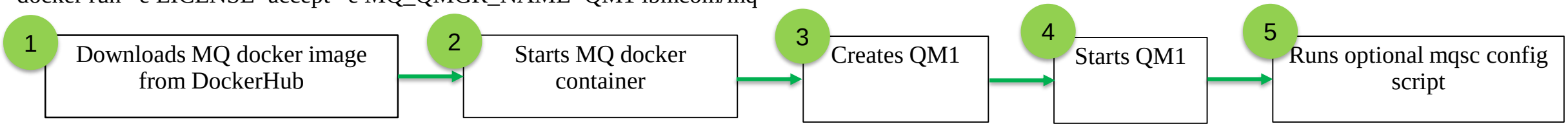
Binary image in Docker Hub



Source in GitHub

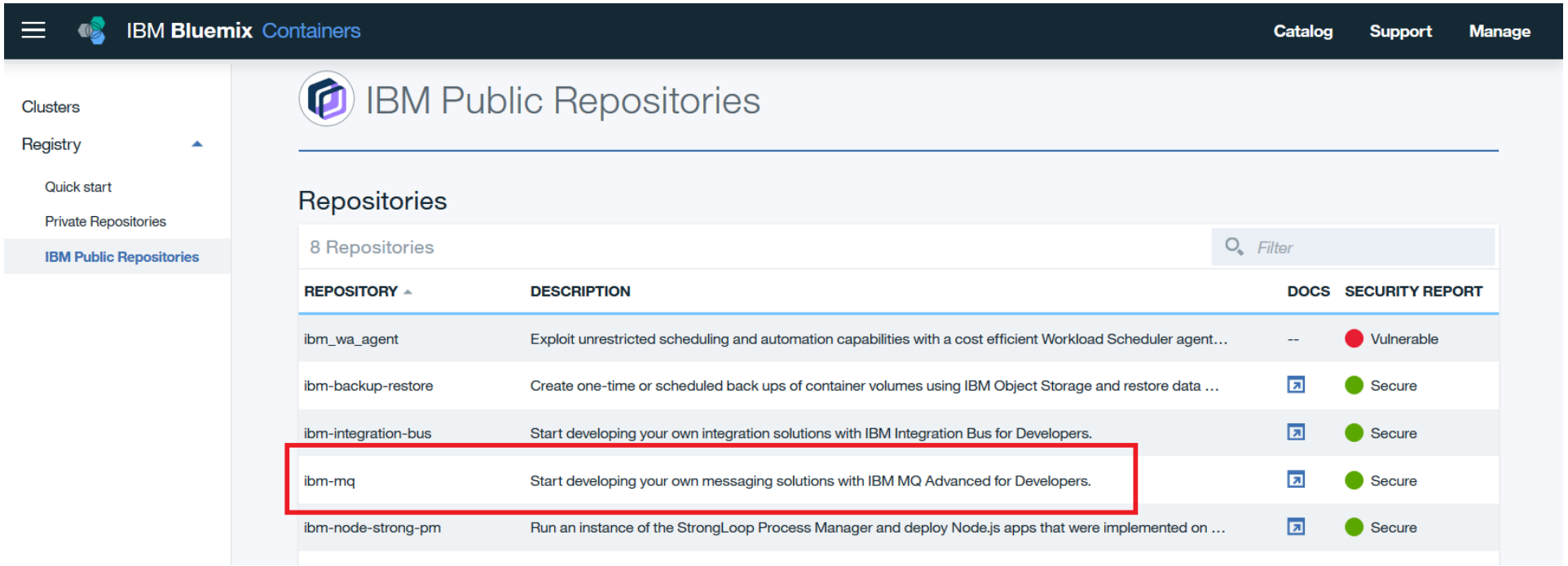


"docker run –e LICENSE=accept –e MQ_QMGR_NAME=QM1 ibmcom/mq"



MQ Sample in the Bluemix Container Registry

- **The MQ Sample is available in the Bluemix Container Registry**
  - Called ibm-mq and available in all regions the Container registry is available in. (Under IBM Public Repositories)

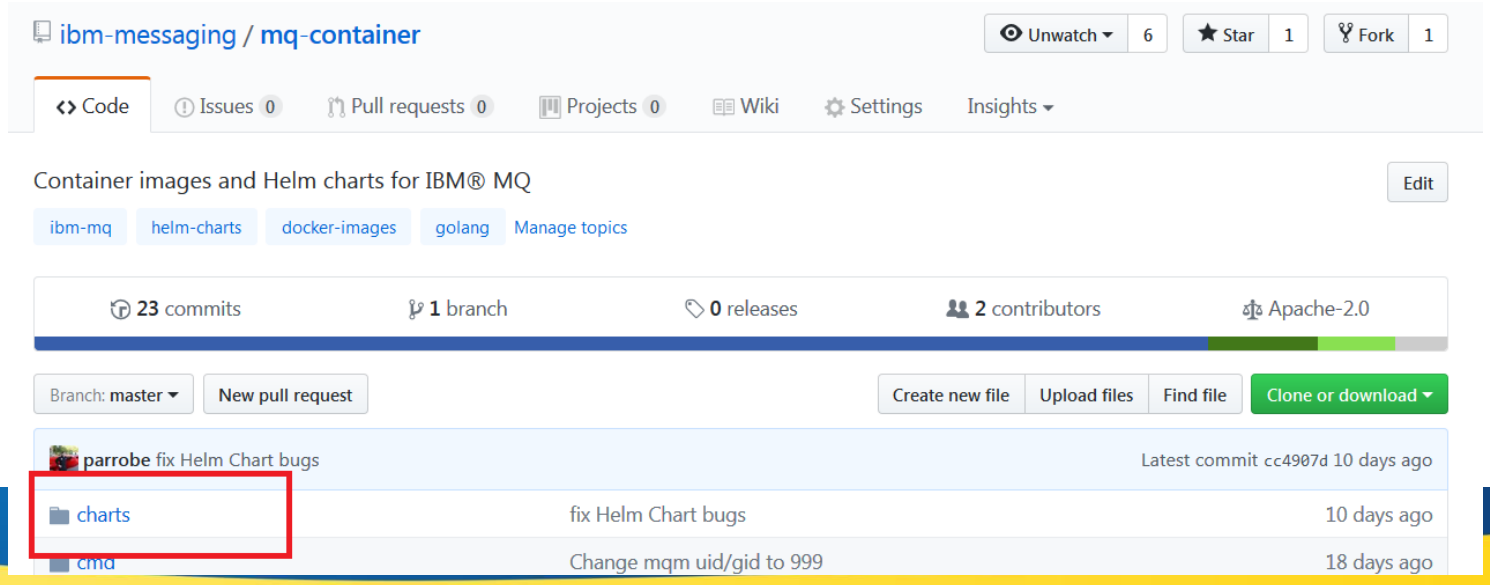


- **This can be used in your Bluemix Kubernetes Cluster for free.**

MQ in IBM Cloud Private

- **We have shipped a Helm Chart for IBM MQ developer in Icp.**
  - It is available in 1.2 and 2.1 Beta.
  - Uses Developer editon

- **The helm chart is available as open source on Github.**
  - https://github.com/ibm-messaging/mq-container
  - This is currently an “In-Development” sample
  - Will likely replace the mq-container sample in the future.



Hot off the press! Updated support statement

- **Two new things that have changed in the last week!**

- **We now support all current MQ 9.0.3 packages in docker containers**
  - MFT
  - MQTT
  - Explorer!

- **We now allow you to use PID/IPC Namespacing to link containers namespaces!**
  - You can run local binding applications in different containers to the Queue Manager!
  - Has limitations/restrictions.

Containers with shared Namespaces

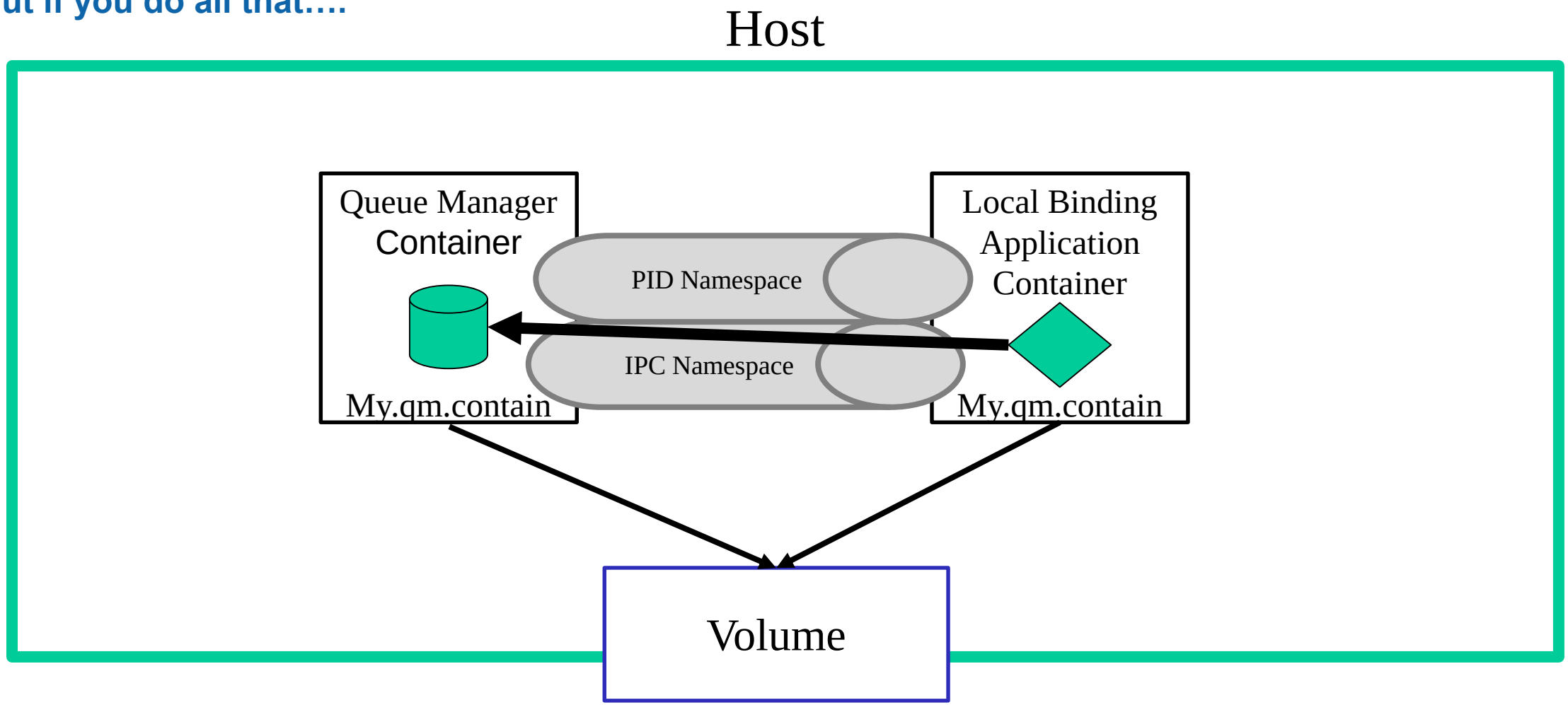
- **Docker allows you to share different namespaces between containers:**
  - IPC Namespace
  - PID Namespace
  - User Namespace
  - UTS Namespace

- **Using this we can share the MQ spaces across multiple containers so local applications can access Queue Managers running on different containers.**

- **There are some (5) requirements:**
  - Docker version 1.12 and above must be used.
  - You must share the containers PID namespace using the --pid argument.
  - You must share the containers IPC namespace using the --ipc argument.
  - Either:
    - You must share the containers UTS namespace with the host using the --uts argument
    - You must ensure the containers have the same hostname using the -h or --hostname argument
  - You must mount the MQ data directory in a volume that is available to the all containers under /var/mqm.

Containers with shared Namespaces

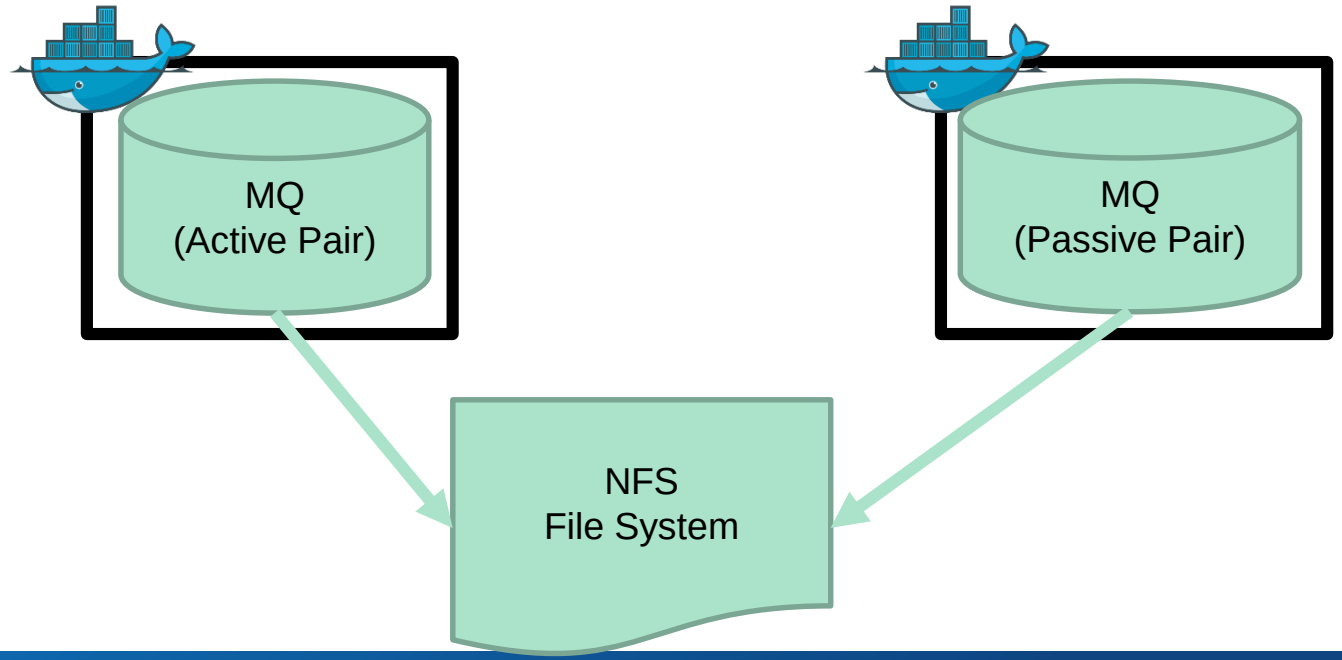
- But if you do all that….



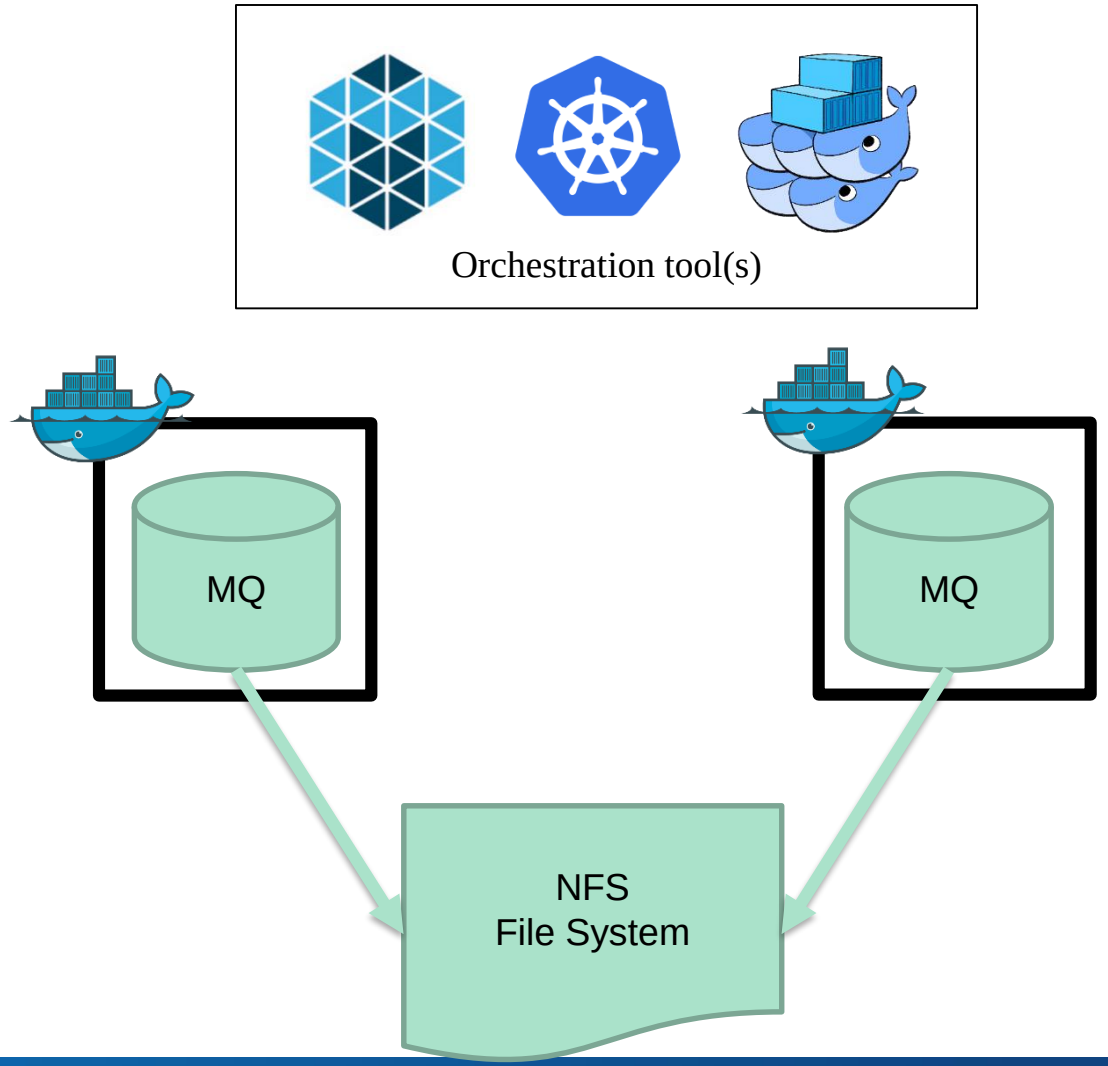
EXAMPLES OF USING MQ IN A CONTAINER

MQ + Docker + HA example

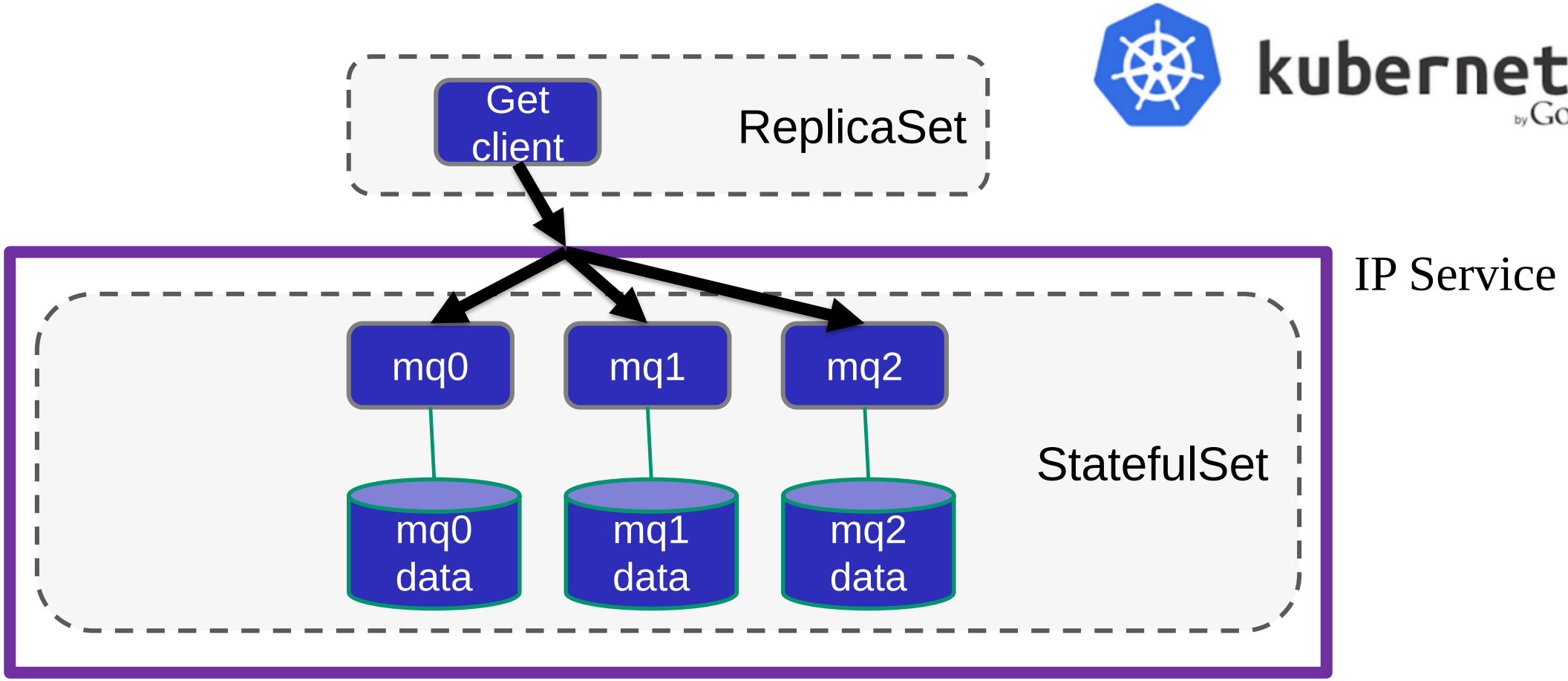
- **Docker also supports shared file systems**
  - Can be used for HA/DR of containers



MQ + Docker + HA example



Kubernetes – Create clusters of MQ Containers



LIVE DEMOS!
(WHAT COULD POSSIBLY GO WRONG?)

Where can I get more information?

IBM Messaging developerWorks
developer.ibm.com/messaging

IBM Messaging Youtube
https://www.youtube.com/IBMmessagingMedia

LinkedIn
Ibm.biz/ibmmessaging

~~Twitter~~
~~@IBMMessaging~~

~~IBM MQ Facebook~~
~~Facebook.com/IBM-MQ-8304628654/~~

Would you like to take part in IBM MQ Design Research?

- **The IBM MQ team is currently conducting some long term research with our MQ customer base.**
- **With this survey we would like to understand:**
  - Who is interreacting with MQ and what are their responsibilities?
  - Which customers are interested in moving IBM MQ into the cloud?
  - Which customers would like to take part in future research?
- **We estimate the survey should take 4 minutes to complete.**
- **Please note: This survey is for distributed users only.**
- **If you're interested, go to ibm.biz/MQ-Customer-Survey**

Other Cloud sessions from the IBM MQ team.

- **Planning for MQ in the cloud – Rob Parker**
  - Monday 15:50 – Leopardwood Room
  - Wednesday 8:30 – Leopardwood Room
- **MQ Automation: Config Managenment using Amazon S3 – T.Rob Wyatt**
  - Monday 15:50 – Aloeswoood Room
  - Wednesday 8:30 – Aloeswood Room
- **MQ Hybrid Cloud Architectures – Matt Whitehead**
  - Tuesday 8:30 – Sagewood Room
  - Wednesday 9:50 – Sagewood Room
- **MQ Automation: Config Management using Baselines, Patterns and Apps – T.Rob Wyatt**
  - ~~Monday 9:50 – Aloeswood~~
  - Tuesday 13:00 – Aloeswood Room
- **What's up DOCker – Rob Sordillo**
  - Monday 11:15 – Zebrawood Room
  - Wednesday 11:15 – Sagewood Room

Other Cloud sessions from the IBM MQ team.

- **Introduction to Kafka (and why you care) – Richard Nikula**
  - Monday 14:40 – Zebrawood Room
  - Wednesday 14:30 – Aloeswood Room
- **MQ Console & REST API – Matt Leming**
  - Wednesday 15:50 – Rosewood Room
- **Deploying MQ to the Cloud – Matt Whitehead**
  - ~~Monday 9:50 - Sagewood~~
  - Wednesday 15:50 – Sagewood
- **Meet the experts! – Various**
  - Tuesday 15:50 – Zebrawood Room

Questions & Answers

Notices and disclaimers

U.S. Government Users Restricted Rights — use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM.

Information in these presentations (including information relating to products that have not yet been announced by IBM) has been reviewed for accuracy as of the date of initial publication and could include unintentional technical or typographical errors. IBM shall have no responsibility to update this information. This document is distributed “as is” without any warranty, either express or implied. In no event shall IBM be liable for any damage arising from the use of this information, including but not limited to, loss of data, business interruption, loss of profit or loss of opportunity. IBM products and services are warranted according to the terms and conditions of the agreements under which they are provided.

IBM products are manufactured from new parts or new and used parts.
In some cases, a product may not be new and may have been previously installed. Regardless, our warranty terms apply.”

Any statements regarding IBM's future direction, intent or product plans are subject to change or withdrawal without notice.

Performance data contained herein was generally obtained in a controlled, isolated environments. Customer examples are presented
as illustrations of how those customers have used
IBM products and

the results they may have achieved. Actual performance, cost, savings or other results in other operating environments may vary.

References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business.

Workshops, sessions and associated materials may have been prepared by independent session speakers, and do not necessarily reflect the
views of IBM. All materials and discussions are provided for informational purposes only, and are neither intended to, nor shall constitute legal or other guidance or advice to any individual participant or their specific situation.

It is the customer’s responsibility to insure its own compliance with legal requirements and to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer’s business and any actions
the customer may need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer is in compliance with any law.

Notices and disclaimers continued

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. IBM does not warrant the quality of any third-party products, or the ability of any such third-party products to interoperate with IBM's products. IBM expressly disclaims all warranties, expressed or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular, purpose.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents, copyrights, trademarks or other intellectual property right.

IBM, the IBM logo, ibm.com, Aspera®, Bluemix, Blueworks Live, CICS, Clearcase, Cognos®, DOORS®, Emptoris®, Enterprise Document Management System™, FASP®, FileNet®, Global Business Services®, Global Technology Services®, IBM ExperienceOne™, IBM SmartCloud®, IBM Social Business®, Information on Demand, ILOG, Maximo®, MQIntegrator®, MQSeries®, Netcool®, OMEGAMON, OpenPower, PureAnalytics™, PureApplication®, pureCluster™, PureCoverage®, PureData®, PureExperience®, PureFlex®, pureQuery®, pureScale®, PureSystems®, QRadar®, Rational®, Rhapsody®, Smarter Commerce®, SoDA, SPSS, Sterling Commerce®, StoredIQ, Tealeaf®, Tivoli® Trusteer®, Unica®, urban{code}®, Watson, WebSphere®, Worklight®, X-Force® and System z® Z/OS, are trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at: www.ibm.com/legal/copytrade.shtml.