

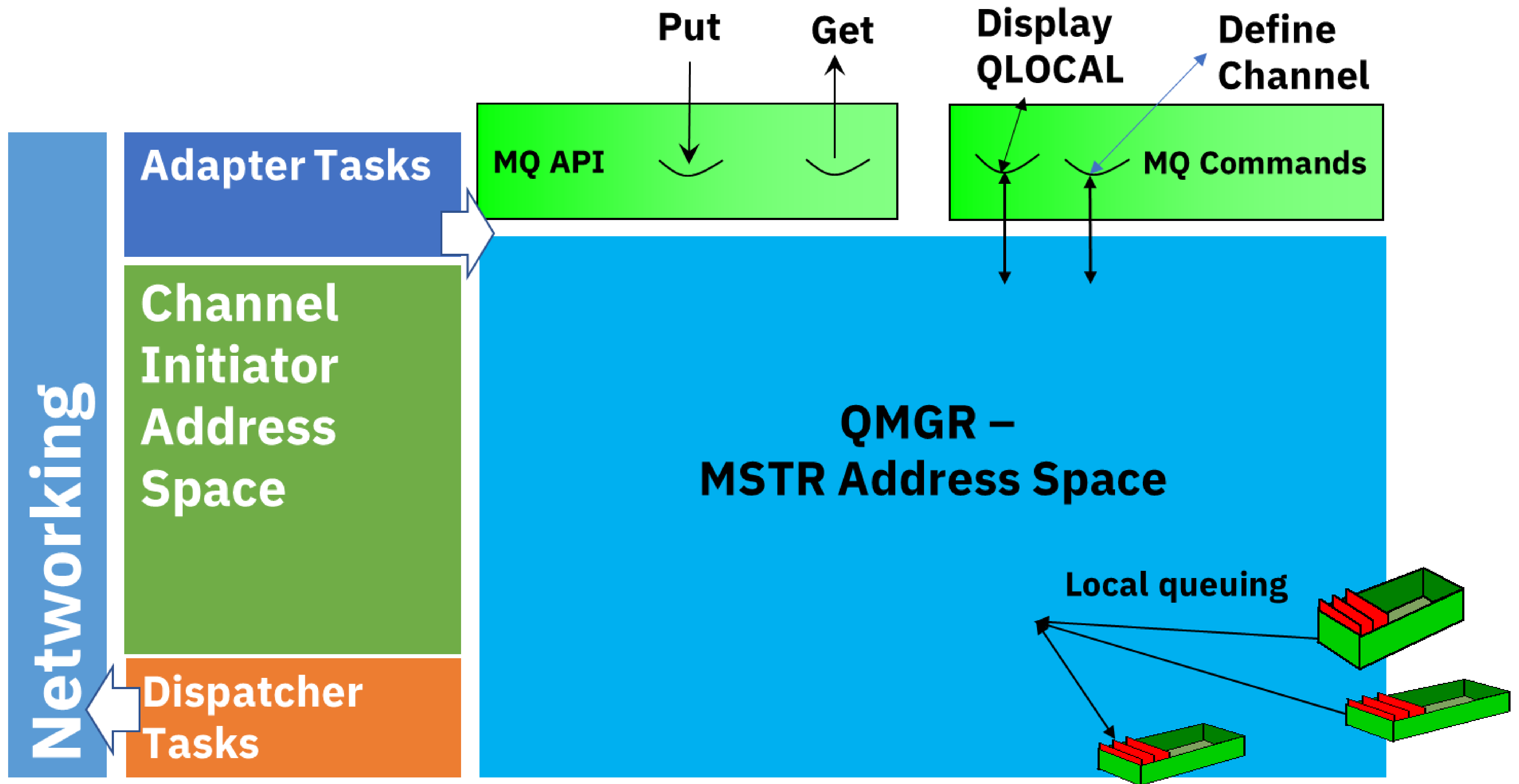
Queue Manager Internals



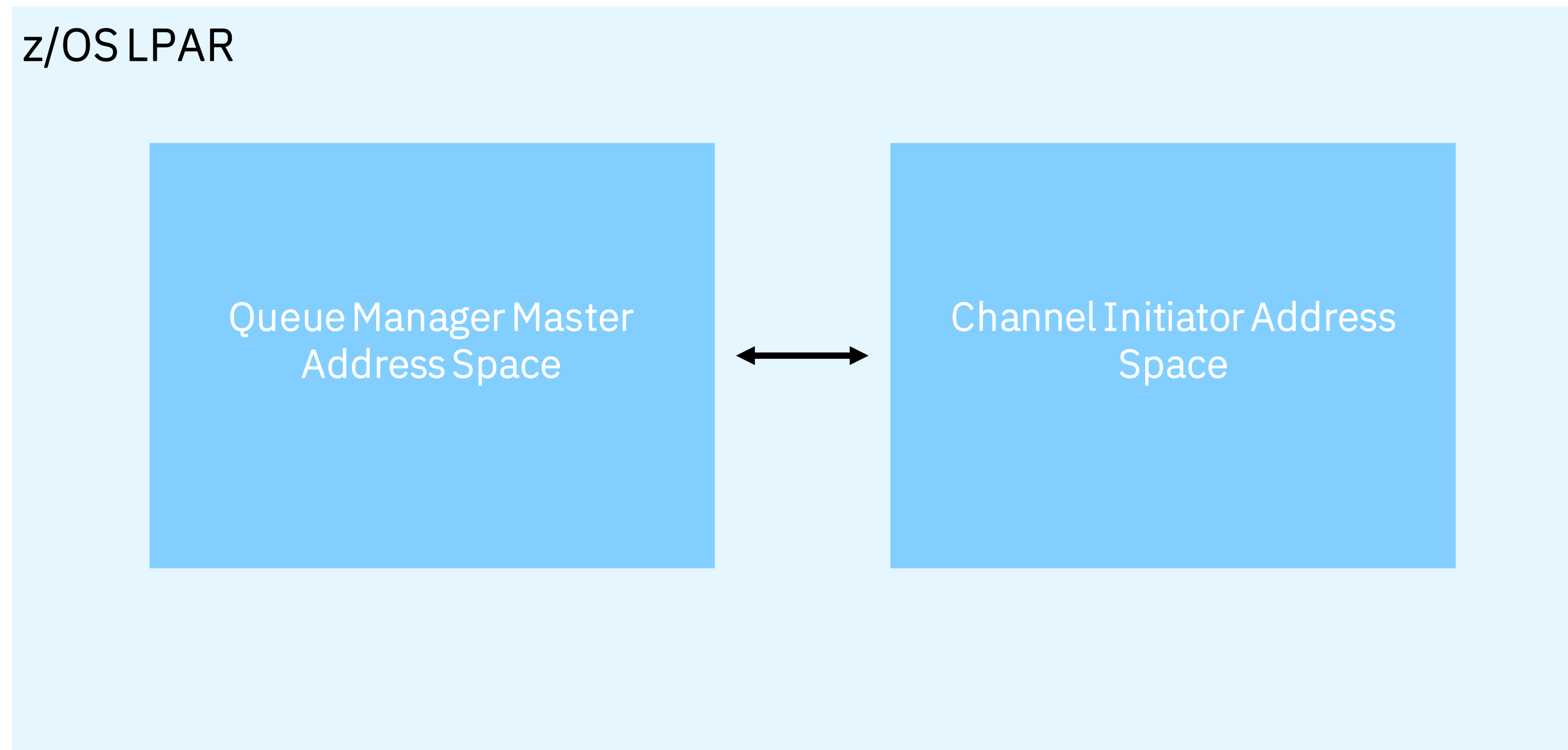
Wildfire Workshop

Washington Systems Center
Technical Hands-On Workshops

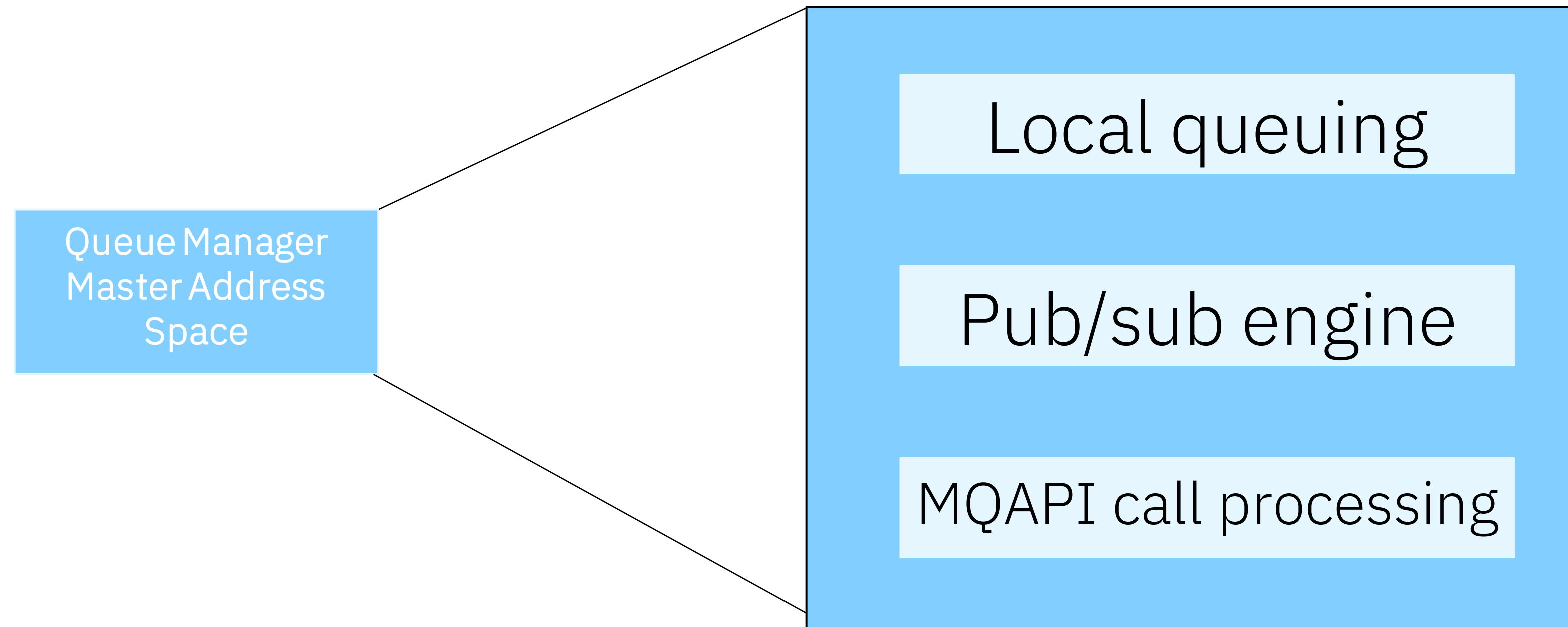




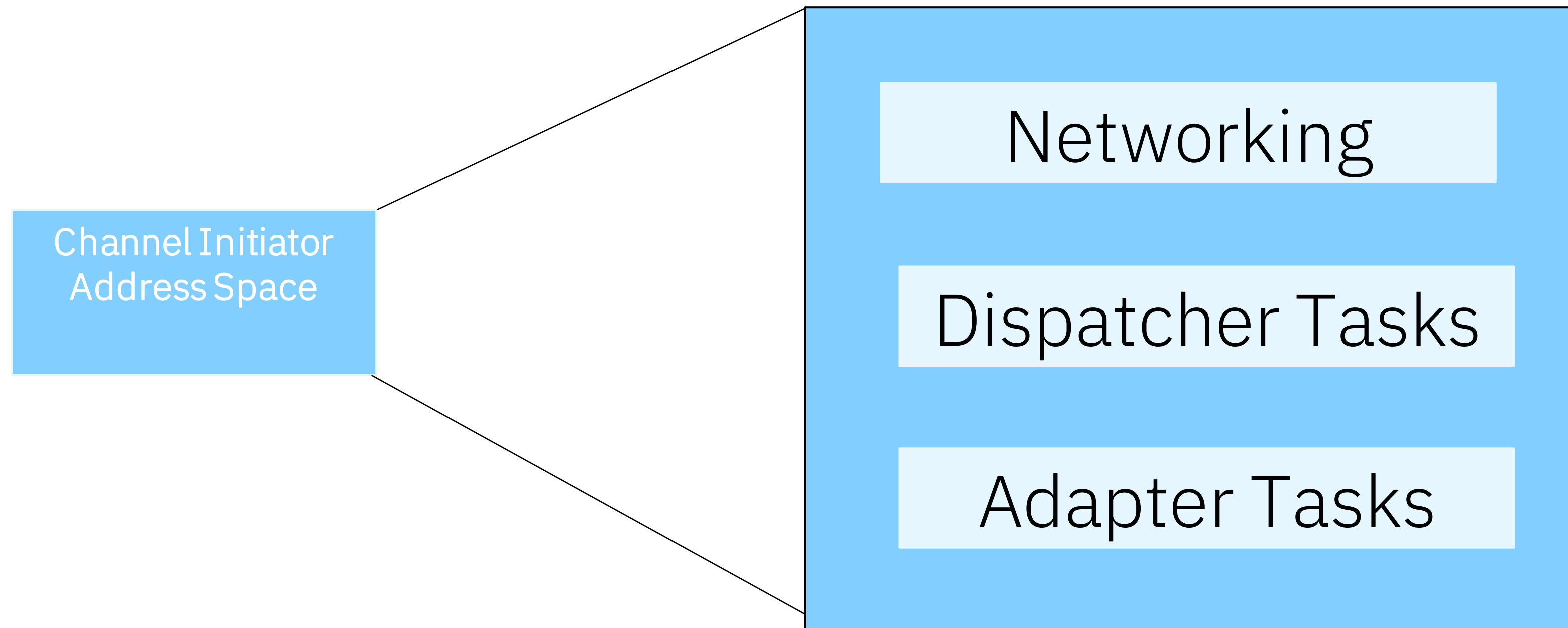
At a glance



Diving deeper: Private queues



Diving deeper: Private queues



Digging into local queuing

Message A

```
Sent message:

JMSMessage class: jms_text
JMSType:          null
JMSDeliveryMode:  2
JMSDeliveryDelay: 0
JMSDeliveryTime:  1585562399950
JMSExpiration:    0
JMSPriority:       4
JMSMessageID:     ID:414d5120514d3120202020202020200ac2815e024ce120
JMSTimestamp:     1585562399950
JMSCorrelationID: null
JMSDestination:   queue:///DEV.QUEUE.1
JMSReplyTo:       null
JMSRedelivered:   false
  JMSXAppID: JmsPutGet (JMS)
  JMSXDeliveryCount: 0
  JMSXUserID: app
  JMS_IBM_PutApplType: 28
  JMS_IBM_PutDate: 20200330
  JMS_IBM_PutTime: 09595997
Your lucky number today is 926
```

Message details ×

Messages properties

Message ID	ID:414d5120514d3120202020202020200ac2815e024ce120
Timestamp	2022-2-18 16:37:23
Character set	UTF-8
Delivery mode	Persistent
Application ID	JmsPutGet (JMS)
Format	MQSTR
Expiration	0
Priority	4
Encoding	273
User ID	app

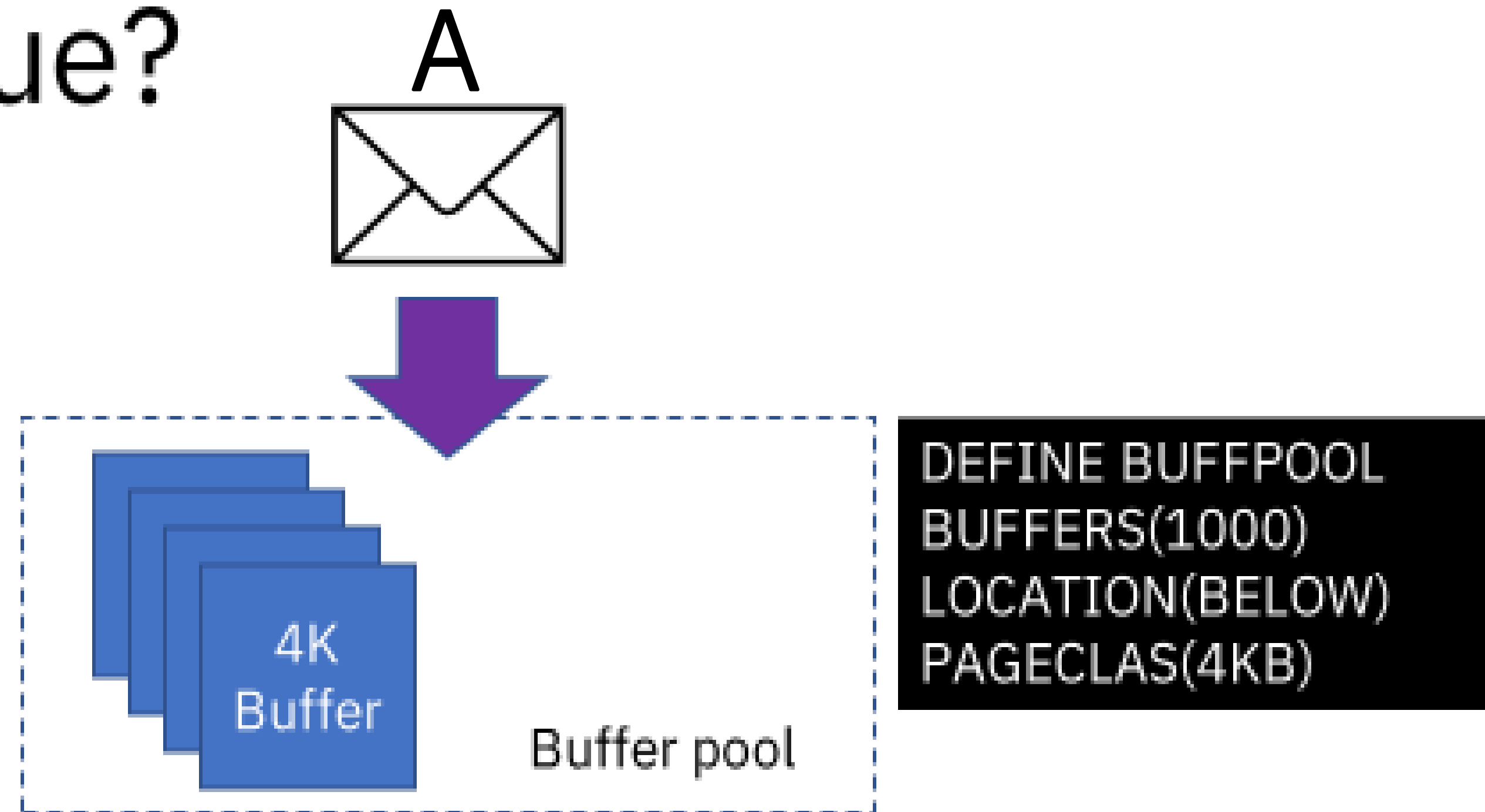
Application data

Your lucky number today is 369

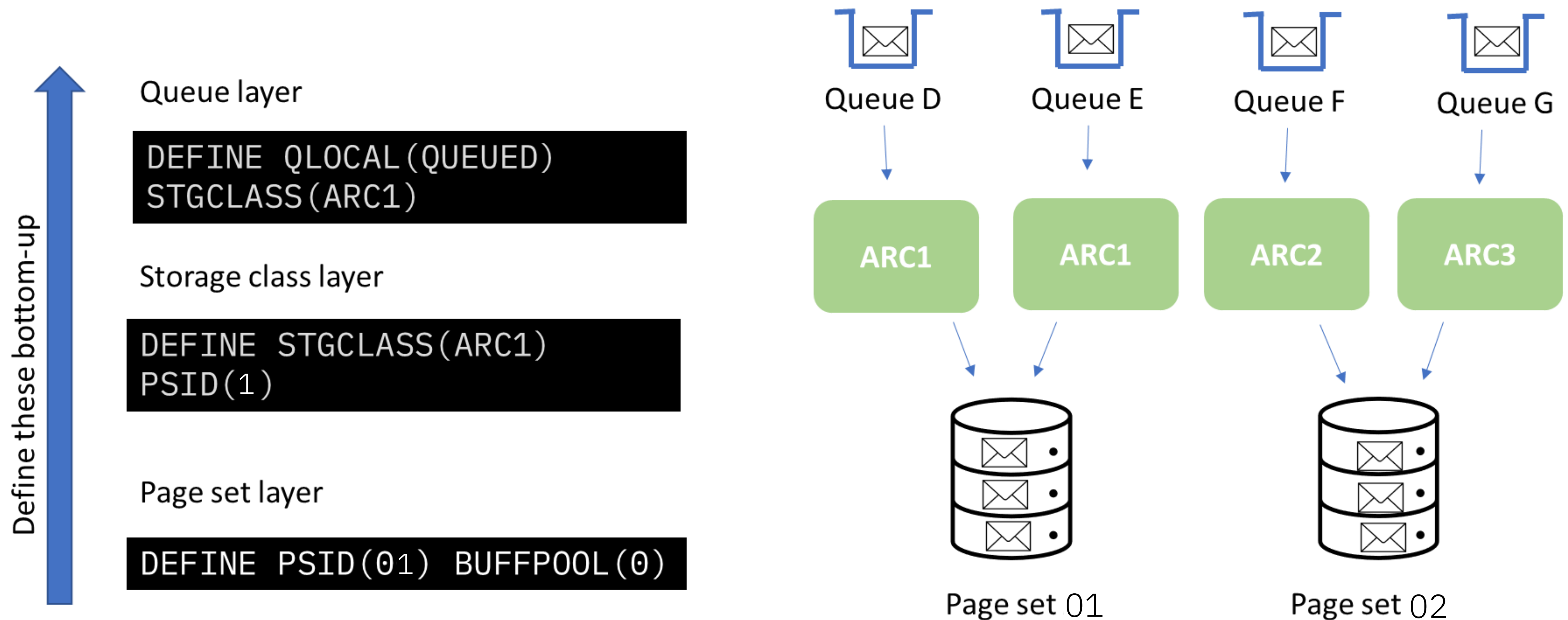
How does physical storage work on a private queue?

When messages are written to page sets...

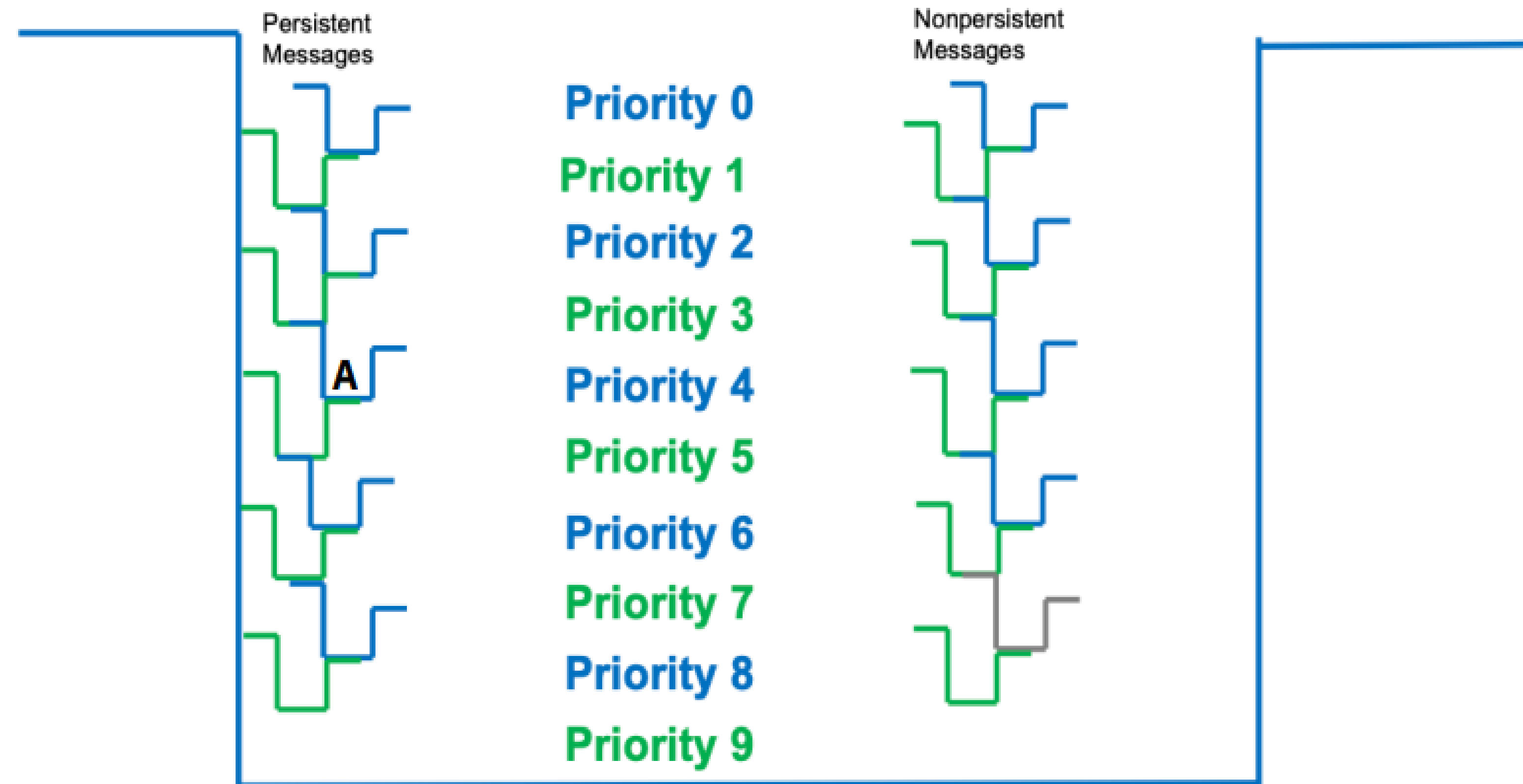
- When messages have been in the buffer pool for 2 log checkpoints
- When buffer pool usage exceeds the deferred write threshold
- When buffer pool usage exceeds the buffer pool threshold



How are private queues associated with physical storage?

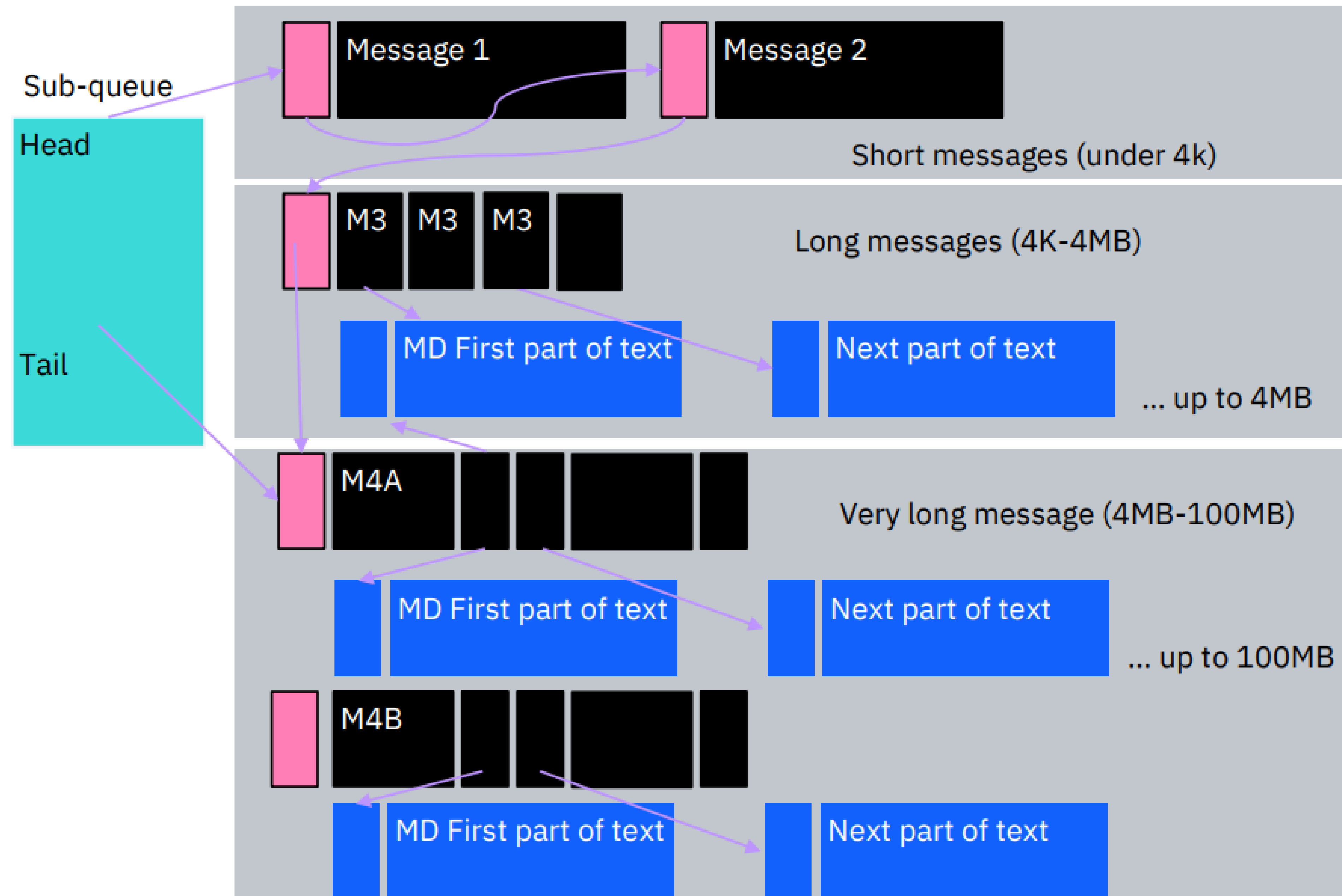


Internal Representation of a Private Queue

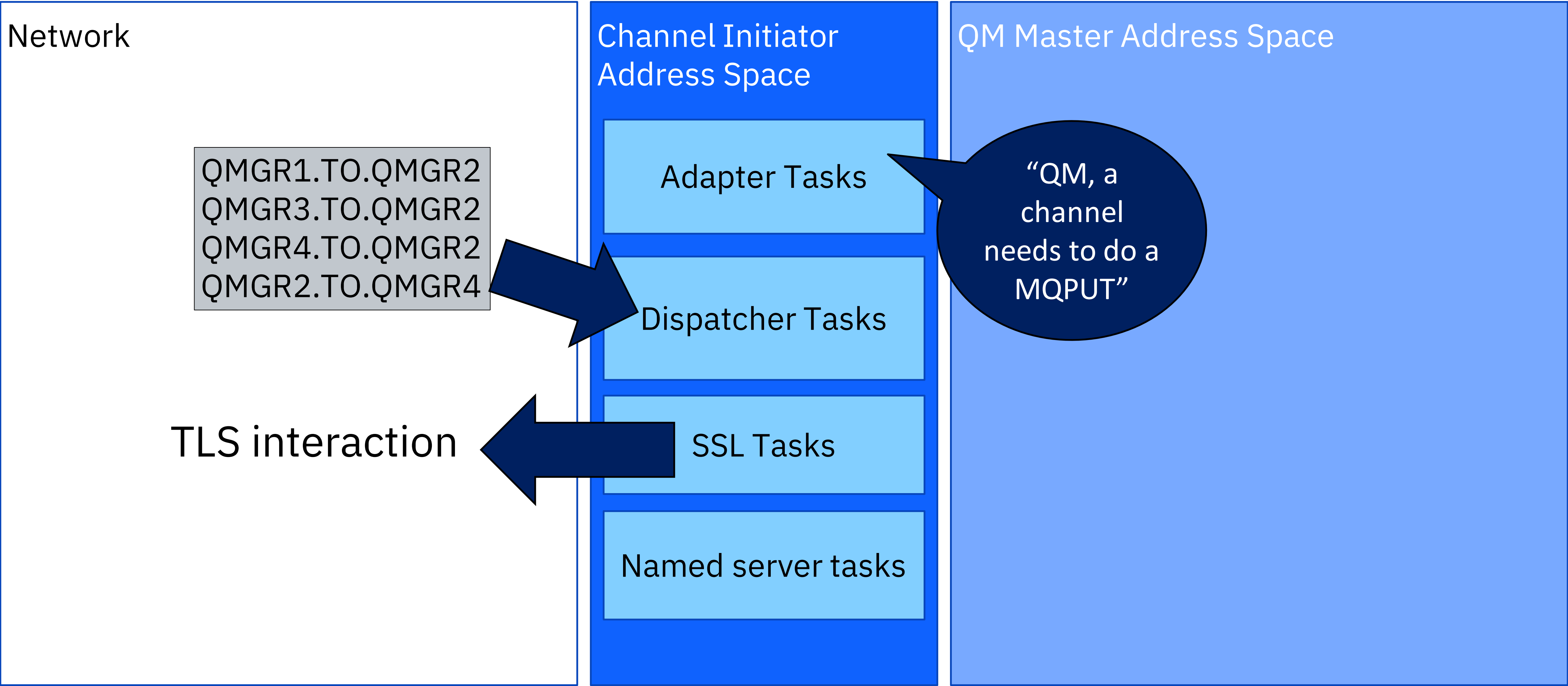


Sub-queue Internal View

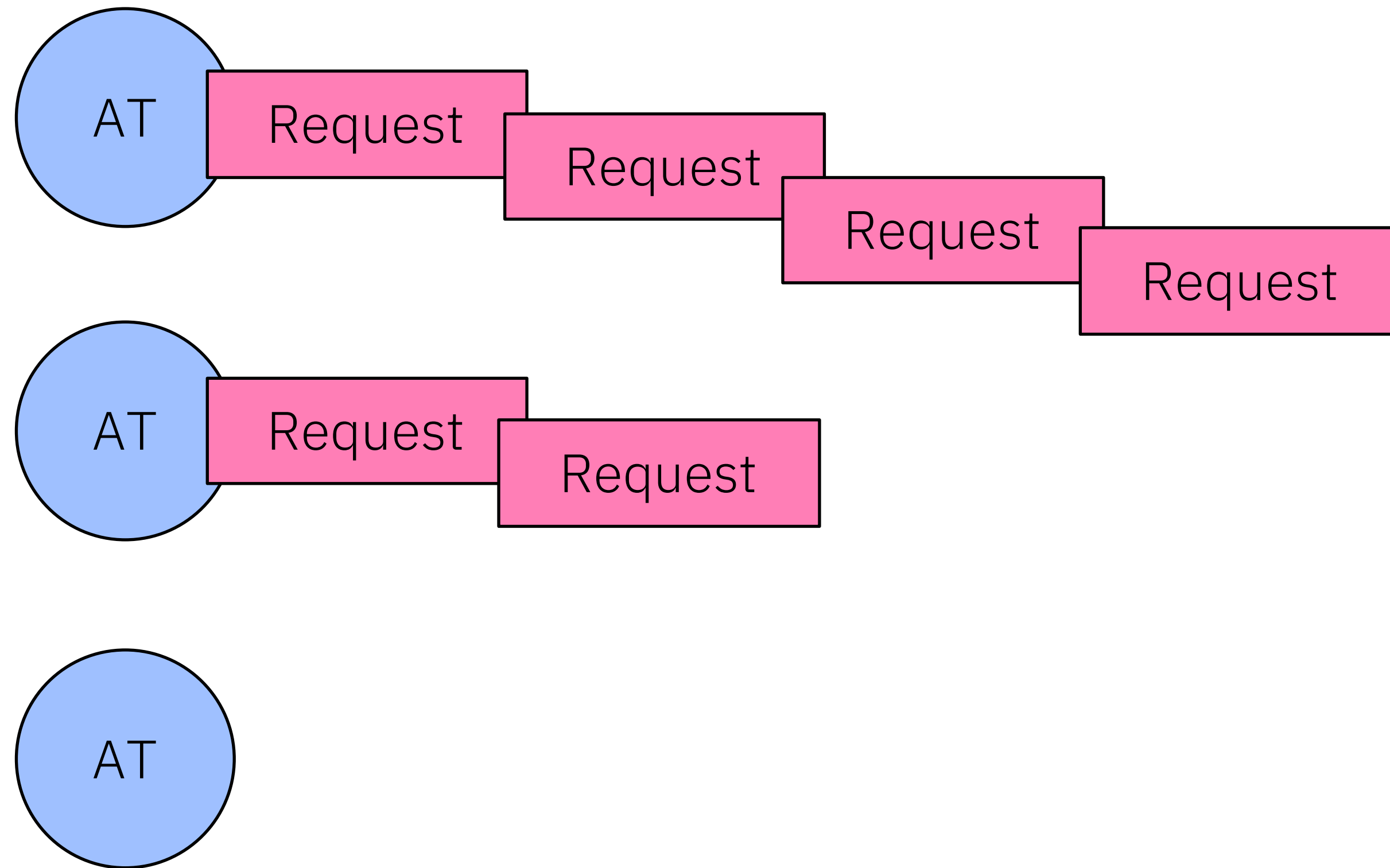
in



CHINIT Address Space Structure



How adapter tasks are assigned

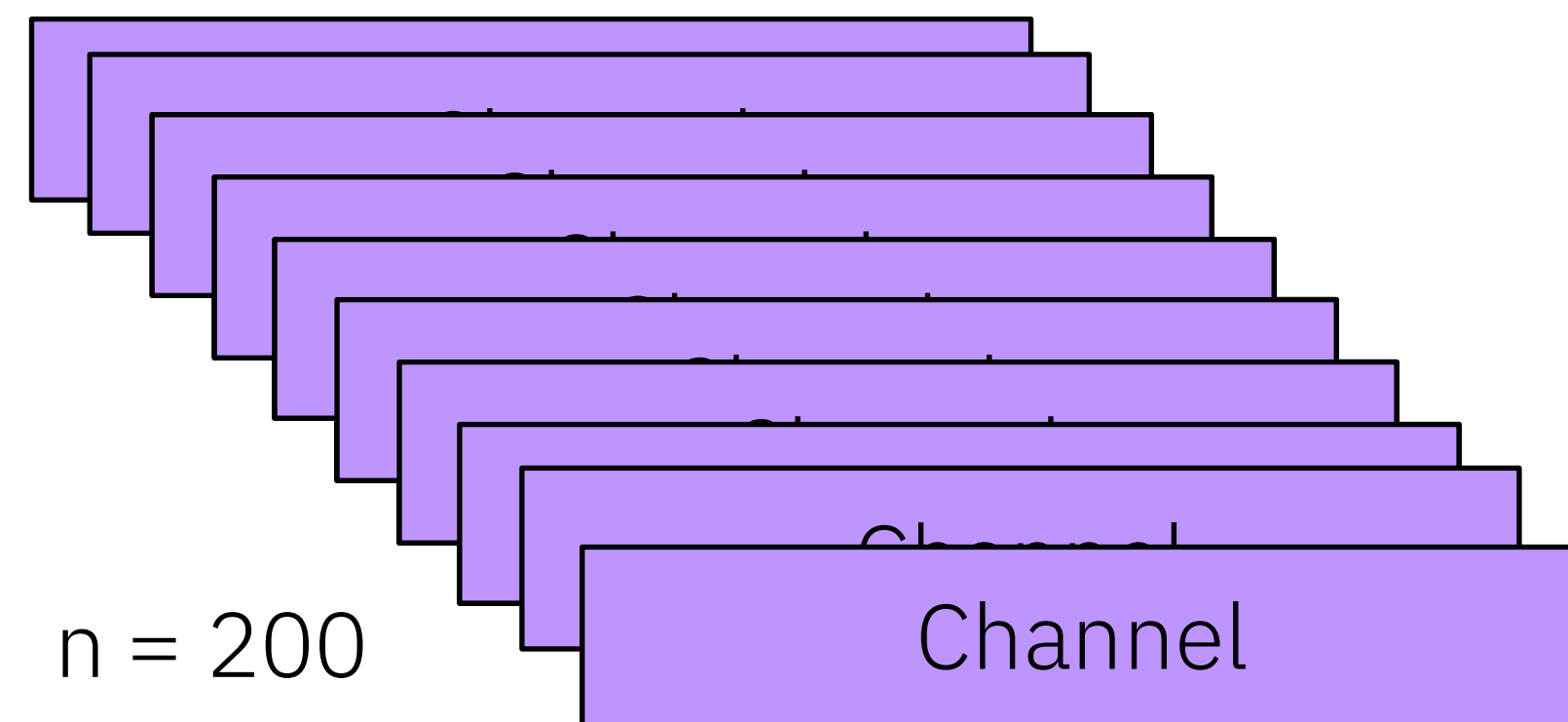


How dispatcher tasks are assigned to channels

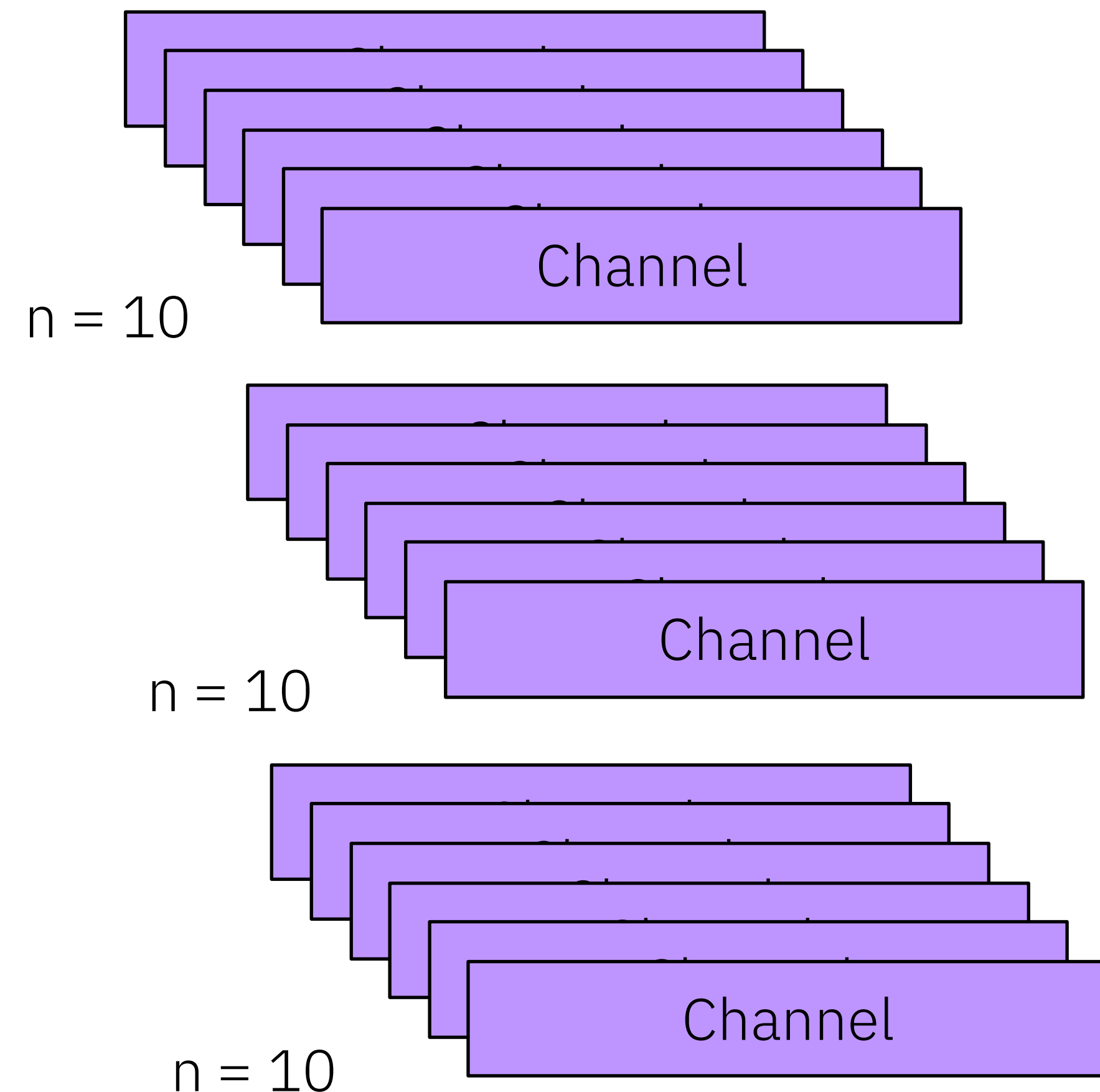
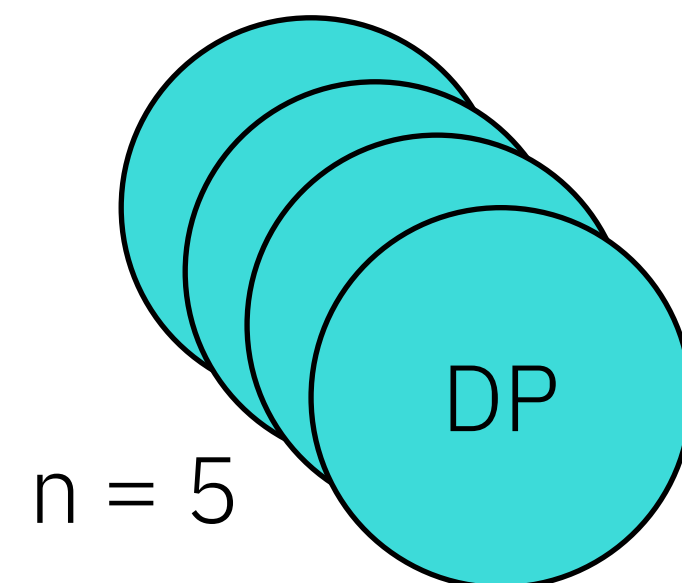
Scenario 1:

$200 / 5 = 40 \mid 40 > 10$ (from the rule of 10) \mid SO, 10 channels will be assigned to each dispatcher task

Active Channel Max of 200



Dispatcher Tasks allocated

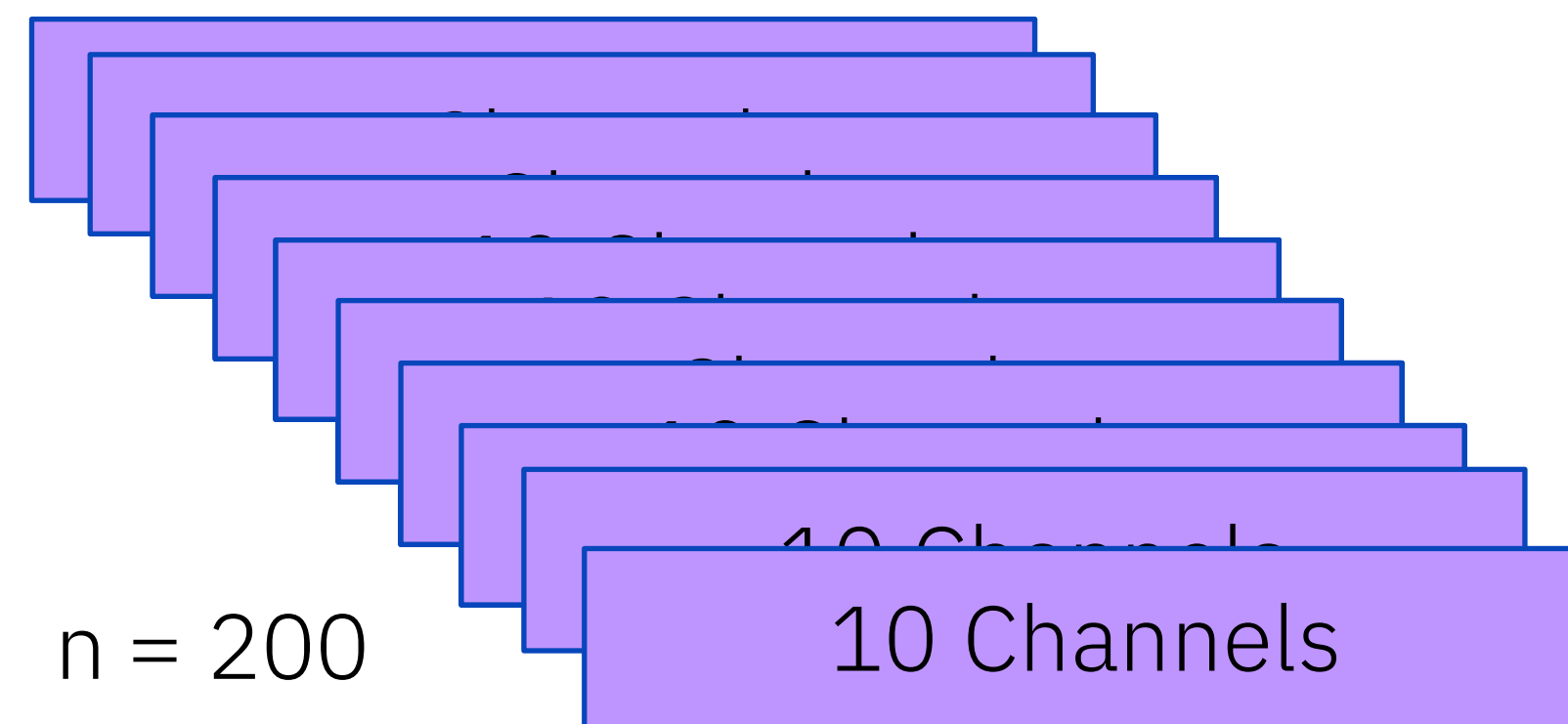


How dispatcher tasks are assigned to channels

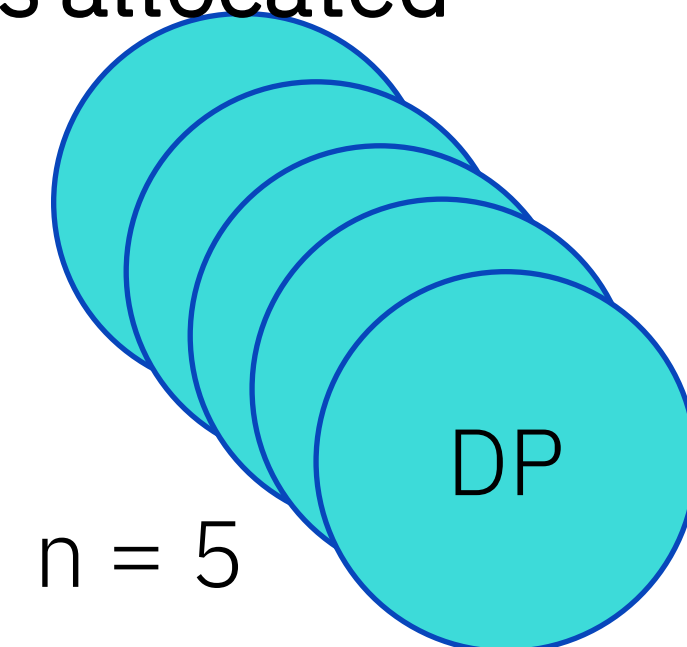
Scenario 1:

$200 / 5 = 40$ | $40 > 10$ (from the rule of 10) | SO, 10 channels will be assigned to each dispatcher task

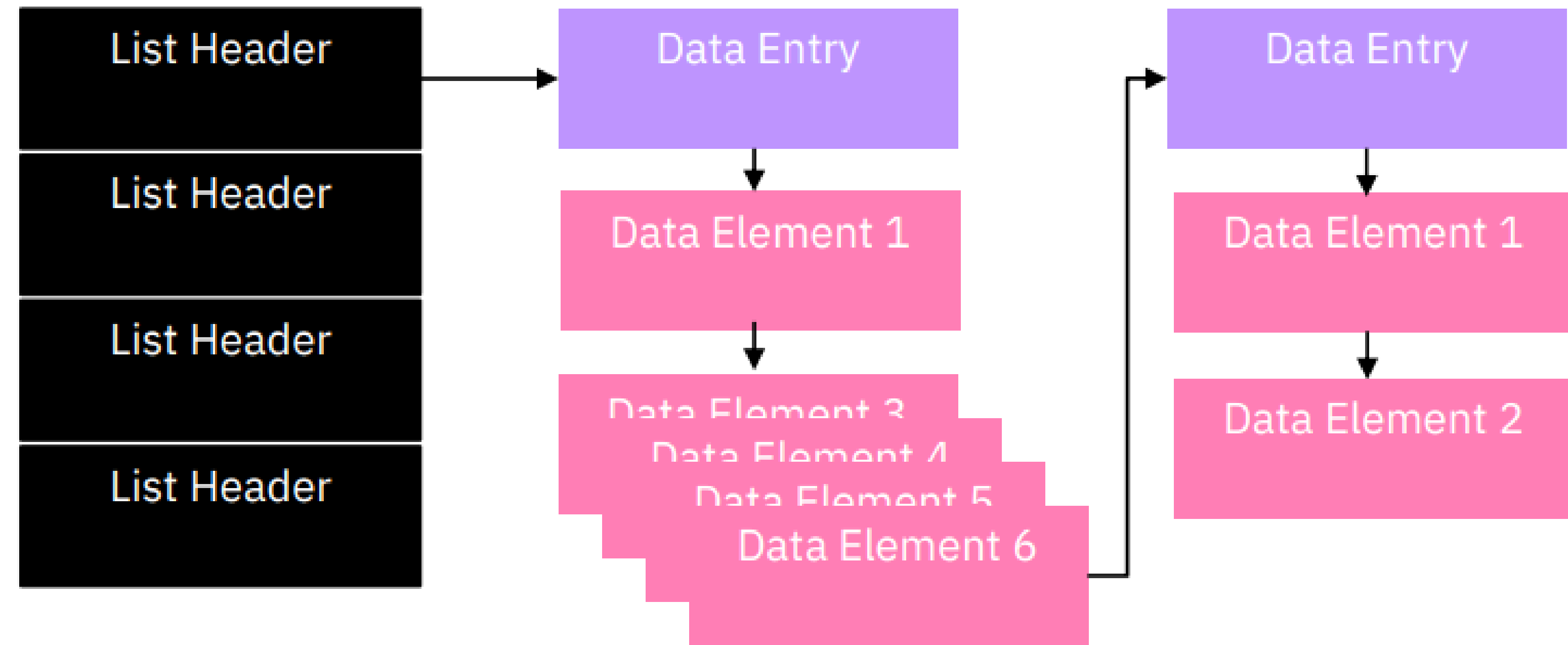
Active Channel Max of 200



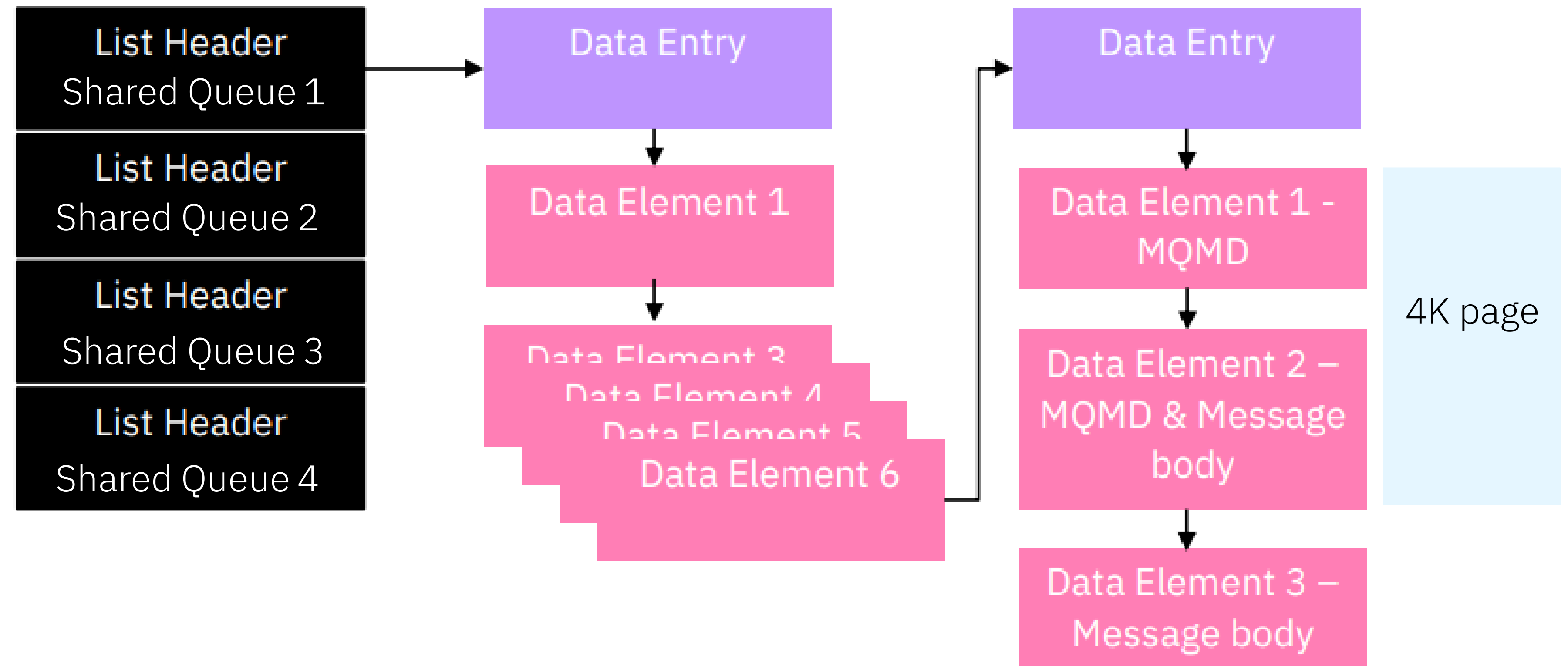
Dispatcher Tasks allocated



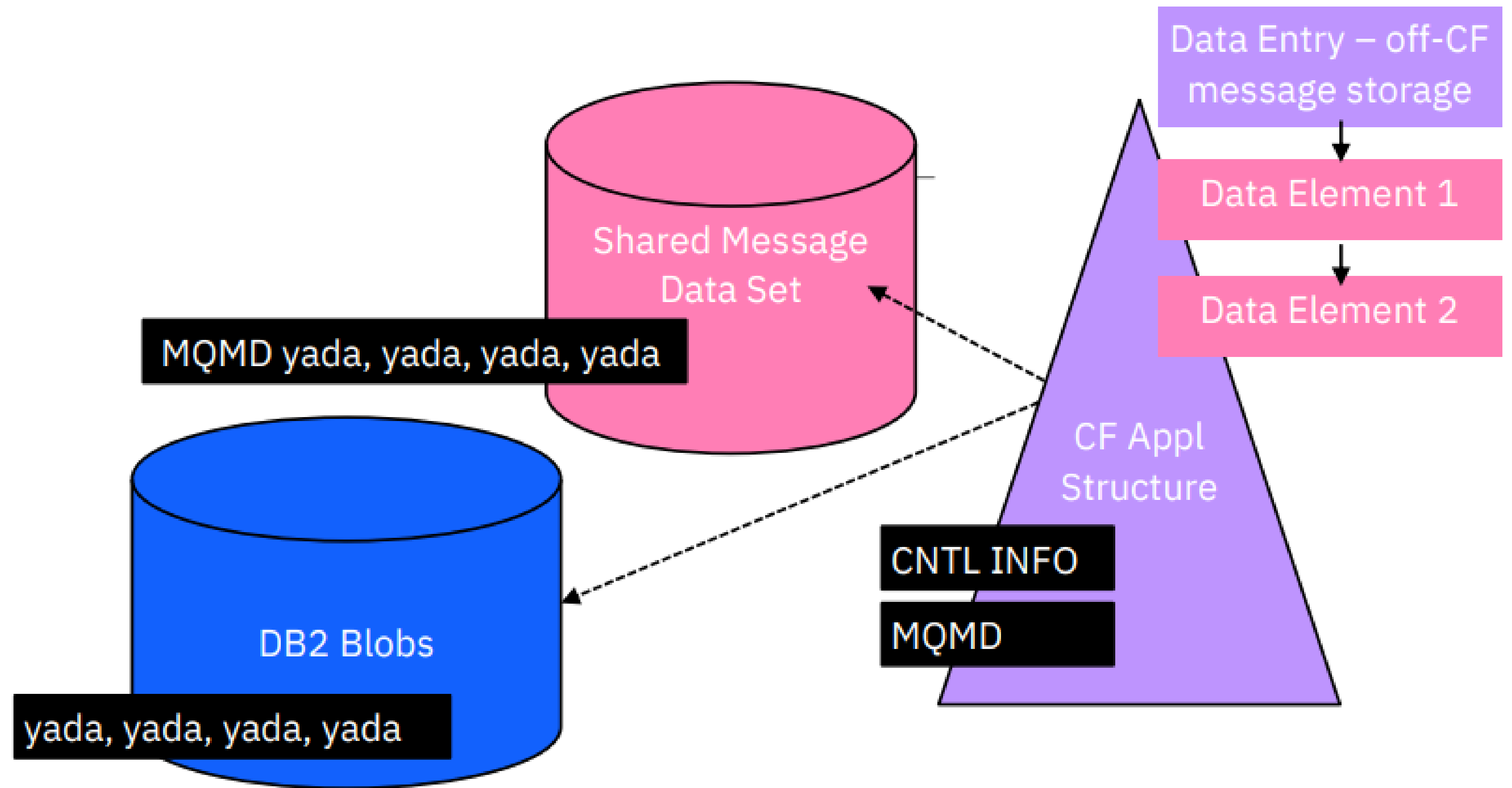
Internal Representation of a Coupling facility list structure

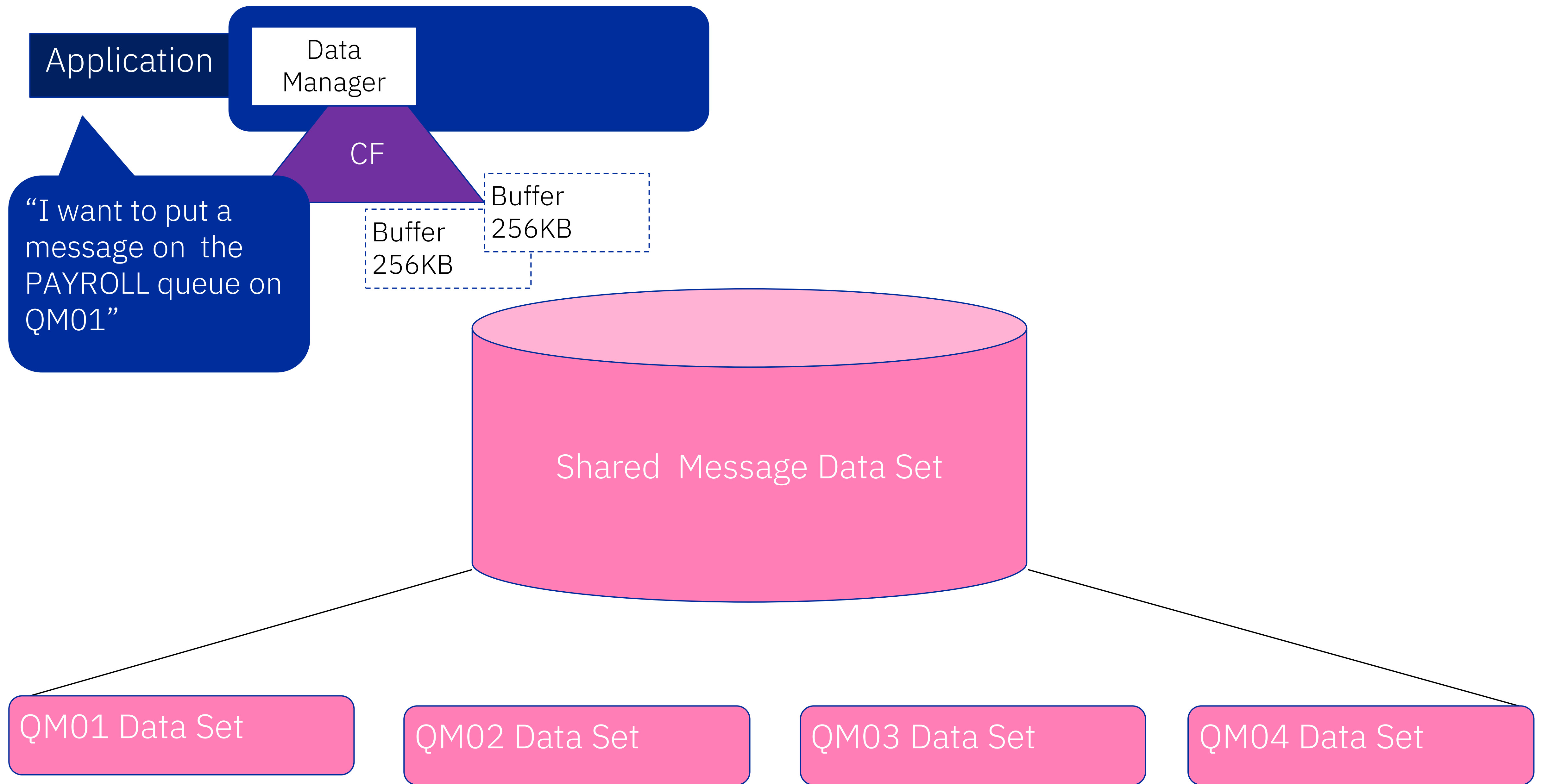


Internal Representation of a Shared Queue



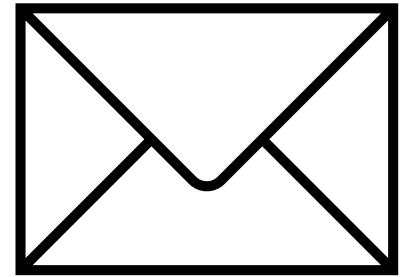
Shared Queue Message Storage





Where does logging come in?

1) Persistent

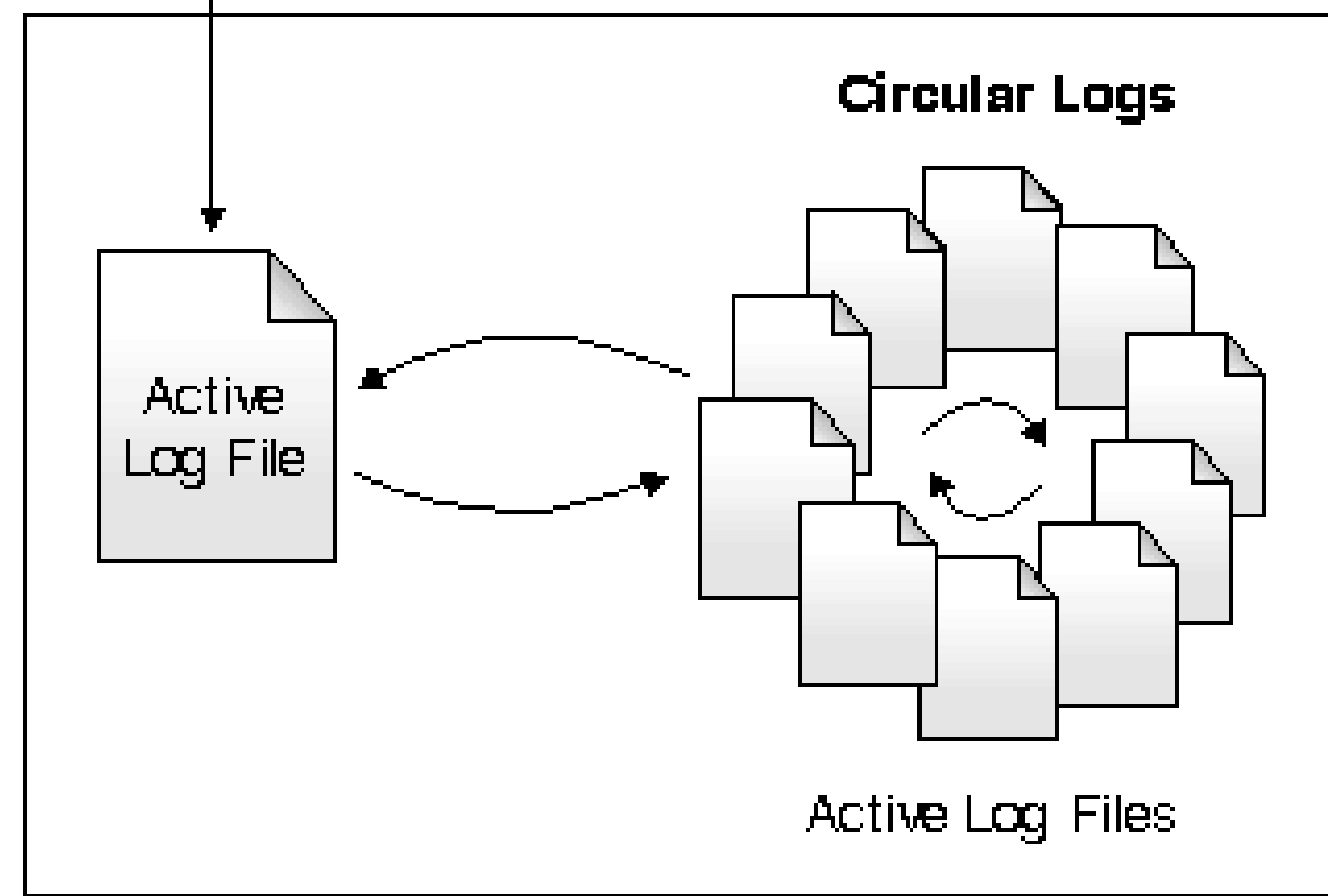


2) MQ Object

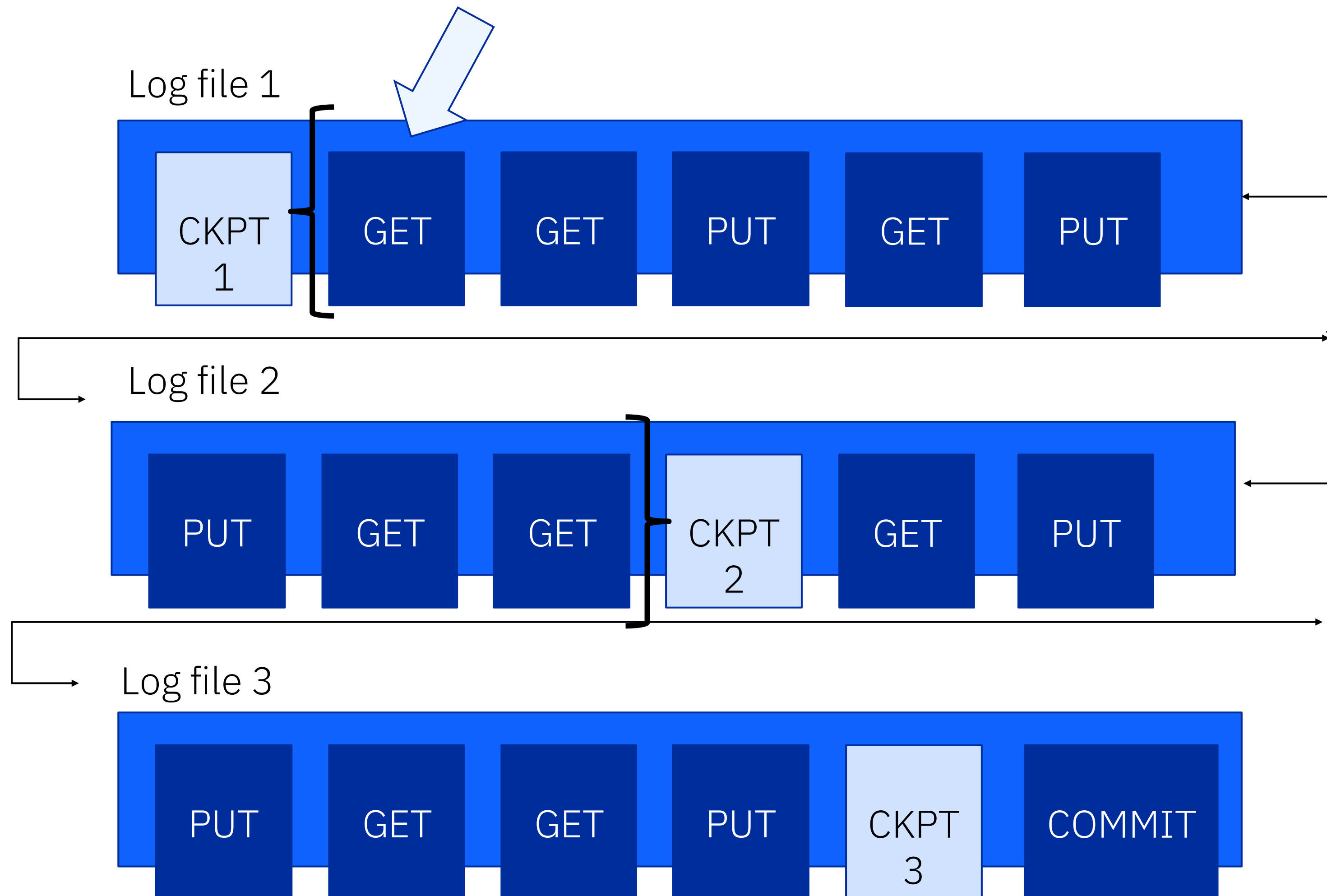
3) Queue Manager



1. Unit of recovery log records
2. Checkpoint records
3. Page set control records
4. CF structure backup records



What does a log file look like?



Concept check

When I want to offload messages from my list structure, I should use...

(a) DB2 Blobs

(b) Shared Message Data sets

(c) Page sets

Why might a short message be classified as a 4k or less?

Which address space is the Pub/Sub engine associated with?

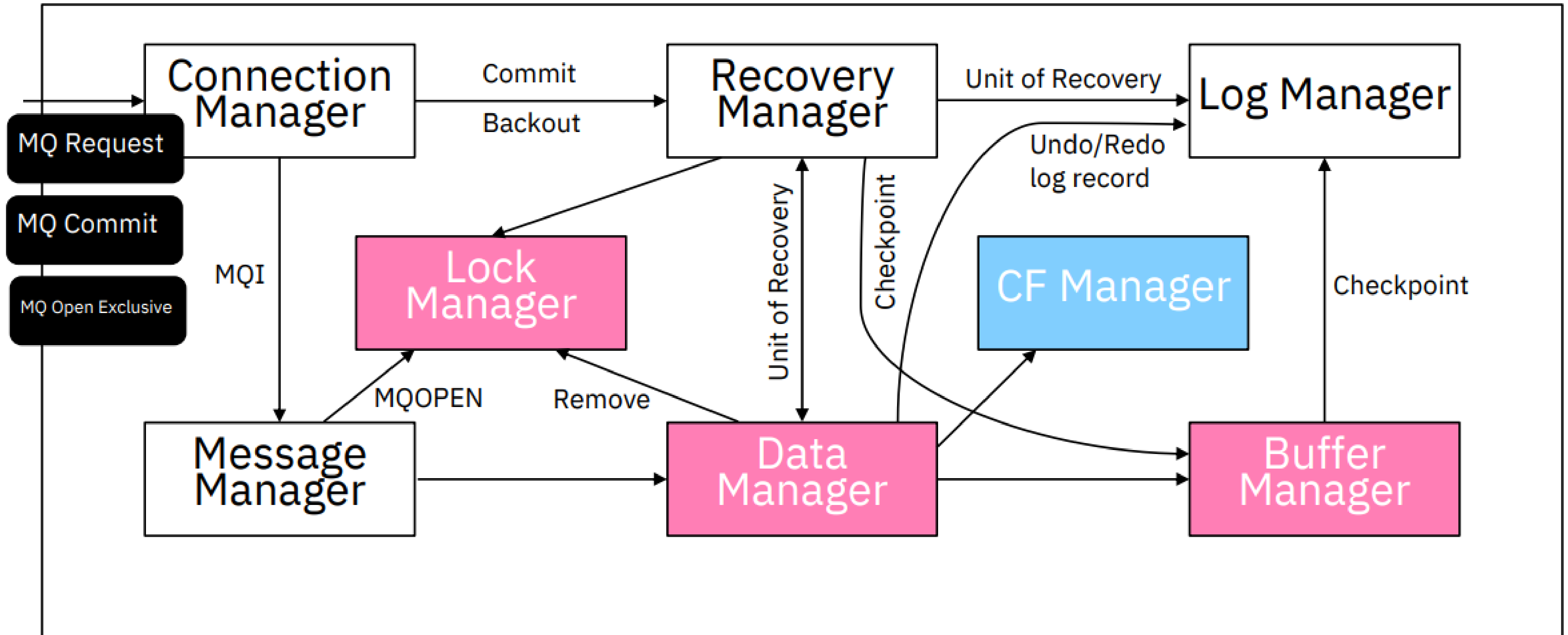
(a) QMGR master address space

(b) CHIN address space

What is the size of an element in a list structure?

Building Blocks

Resource Managers



First Line Managers

The threads within the QMMSTR address space who do the real work within each queue manager by interacting with applications and the underlying z/OS resource managers

They include:

Connection Manager – not the channel initiator, but local connections

Recovery Manager

Log Manager

Message Manager

Topic Manager

Data Manager

Buffer Manager

Lock Manager

Storage Manager

CF Manager

Security Manager

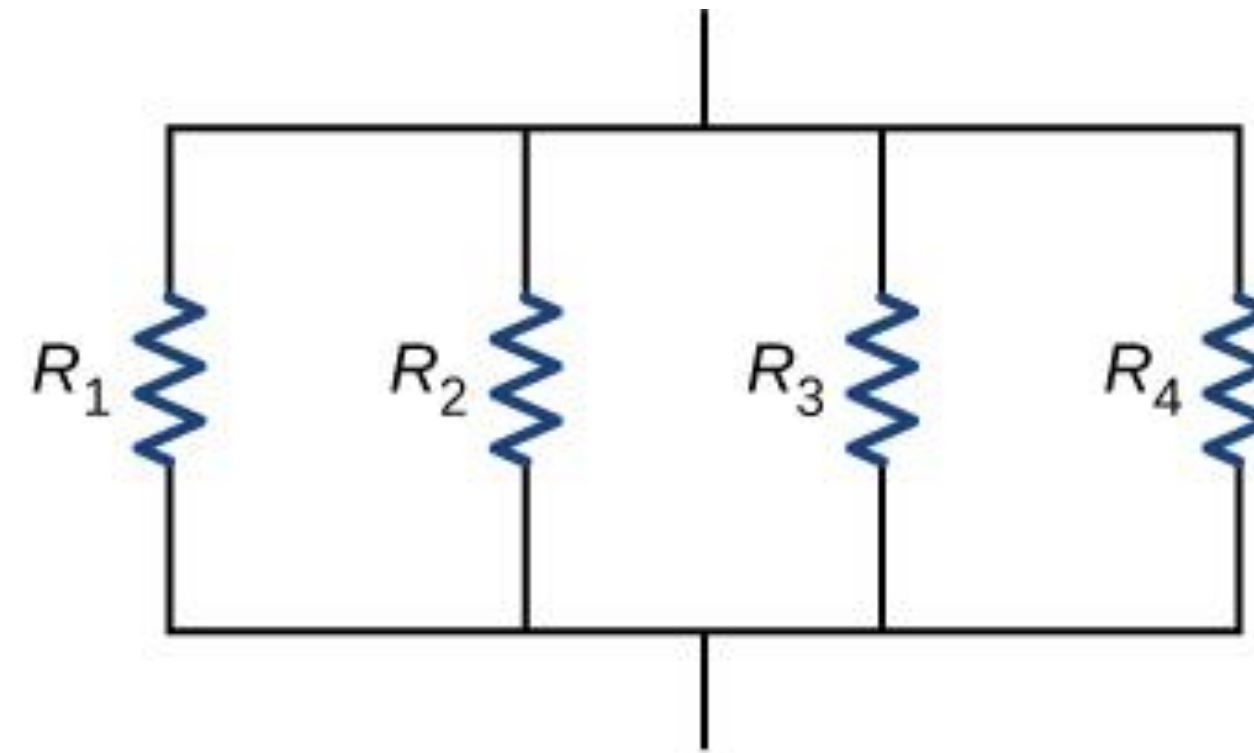
Lock Manager

Input Exclusive



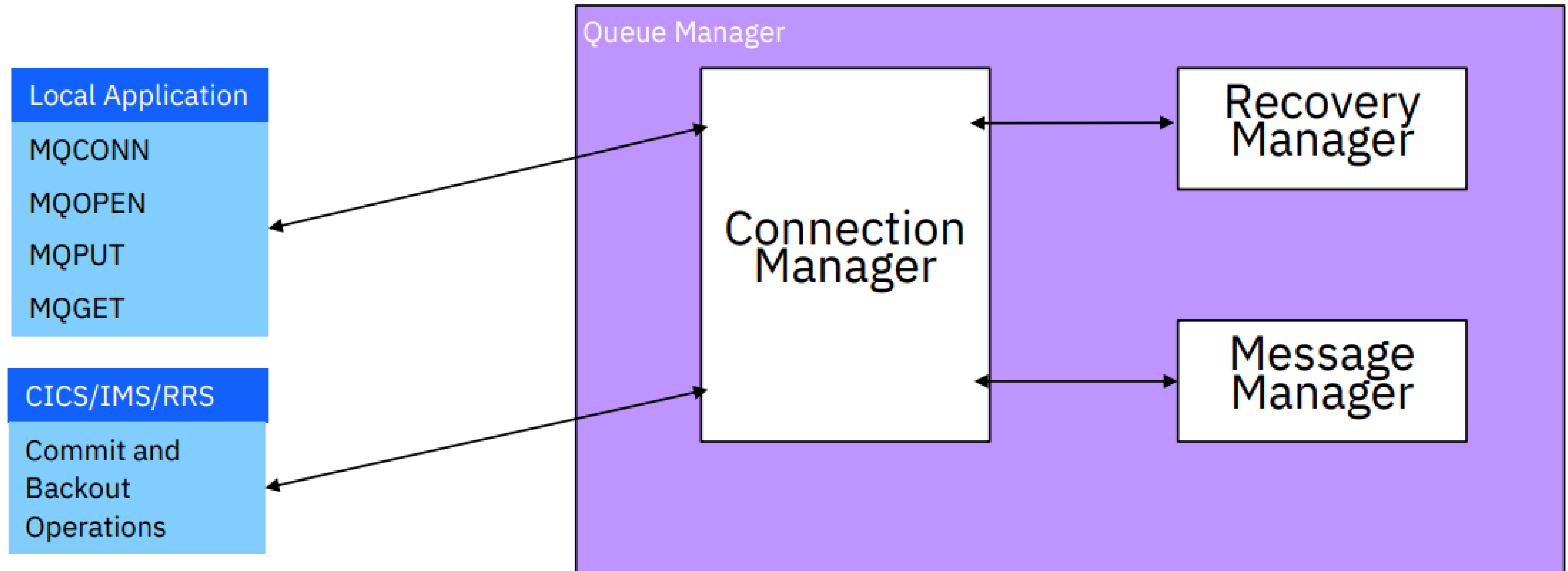
(a) Resistors connected in series

Input Shared



(b) Resistors connected in parallel

Connection Manager



Buffer Manager

How big in this
buffer pool?

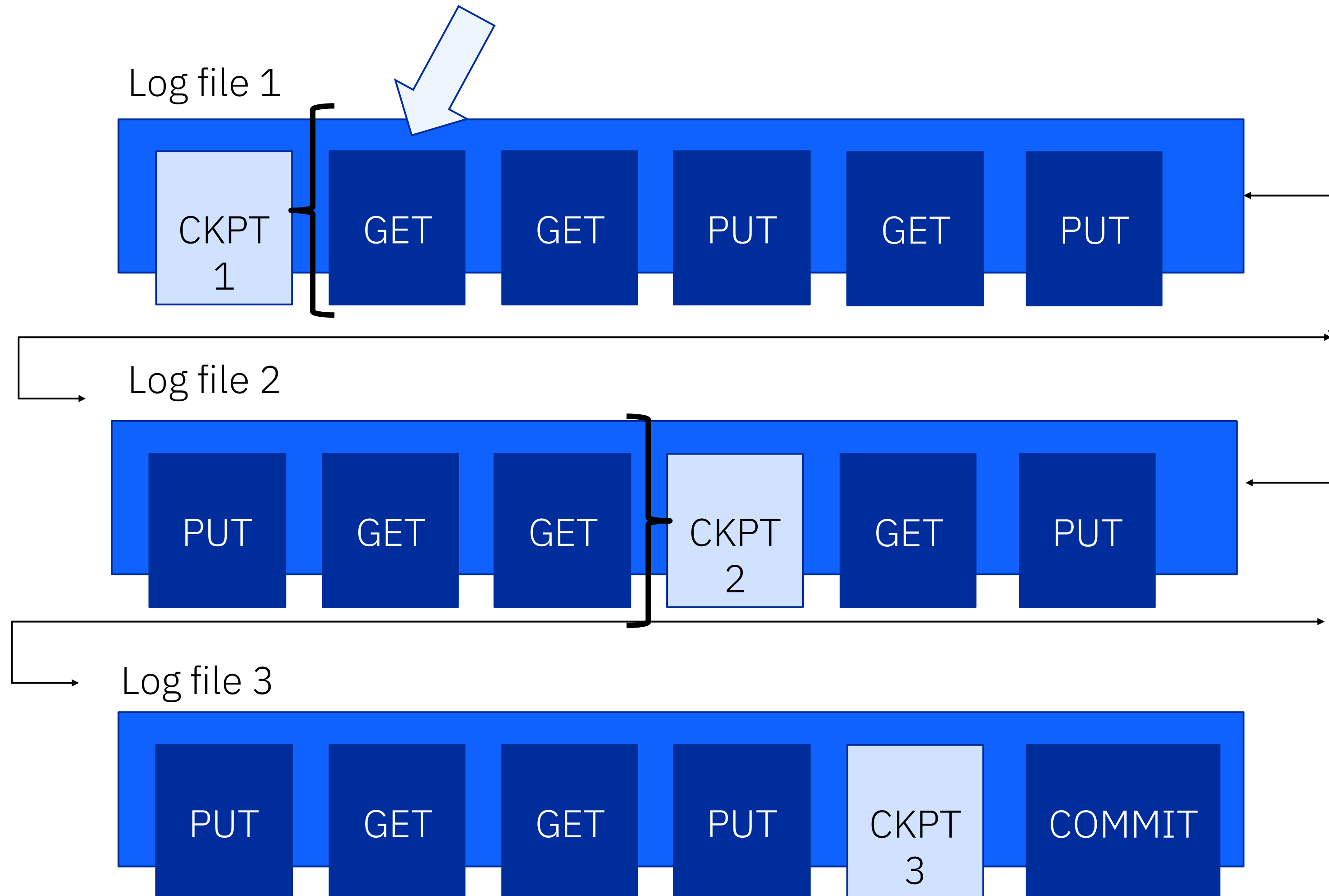
Which buffer pool
is operating close
to capacity?

Buffer pool

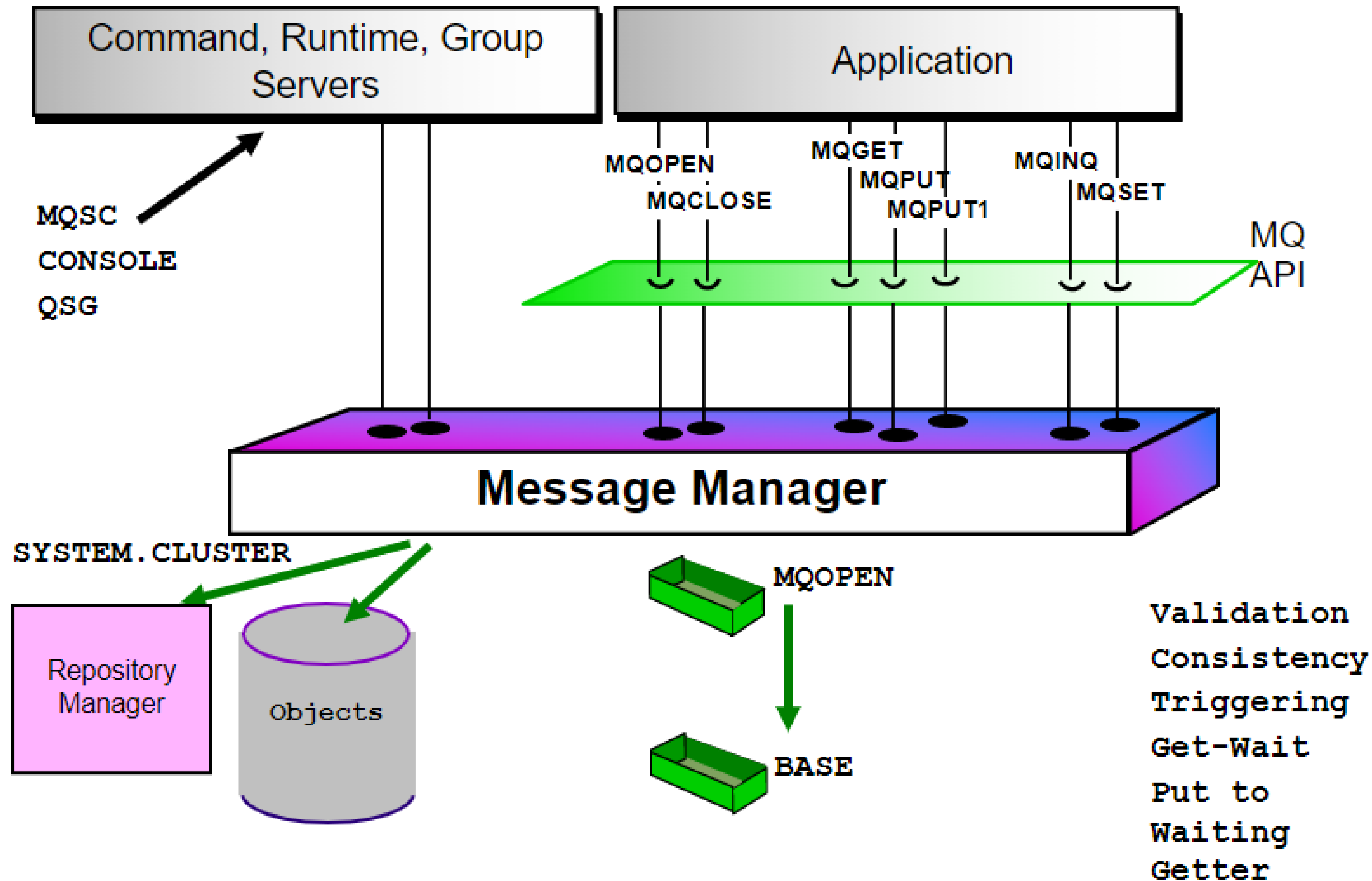
- 95 %

- 85 %

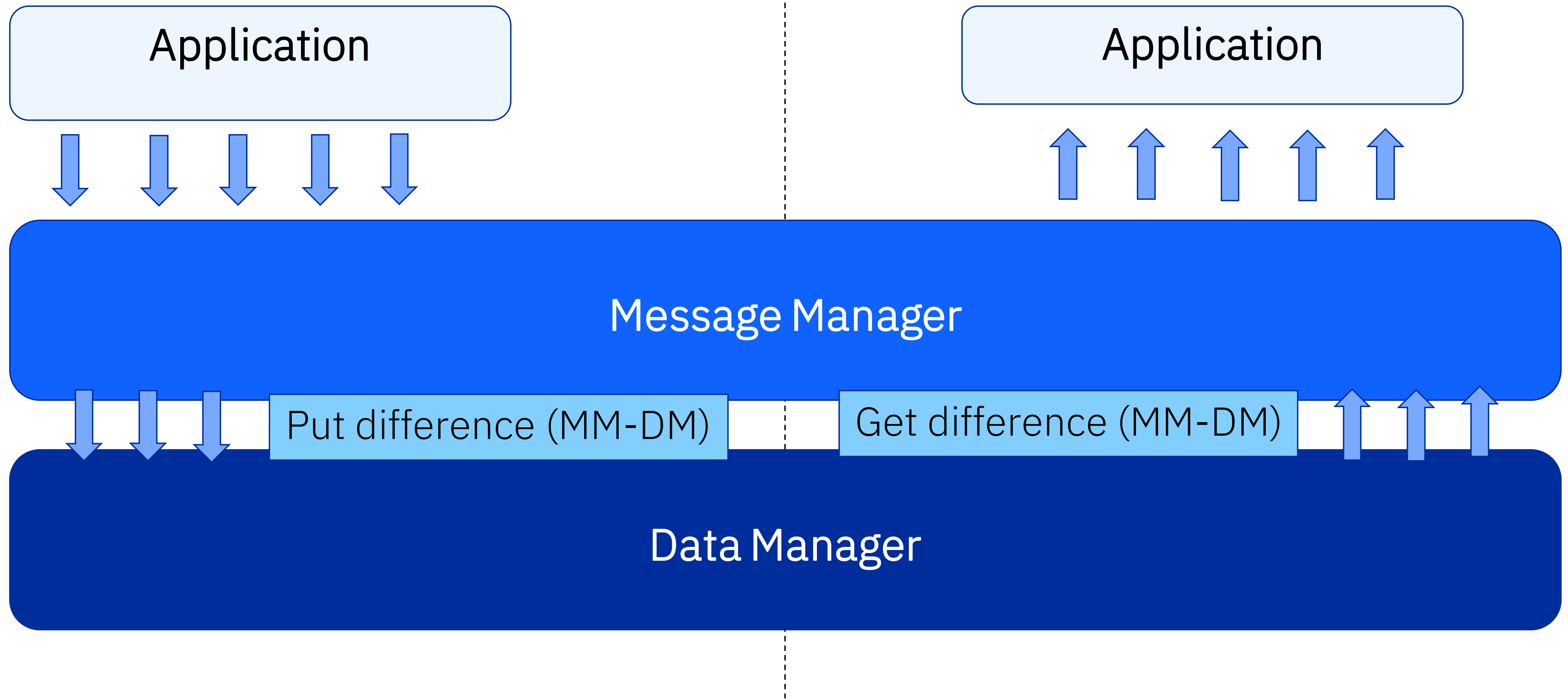
Log Manager



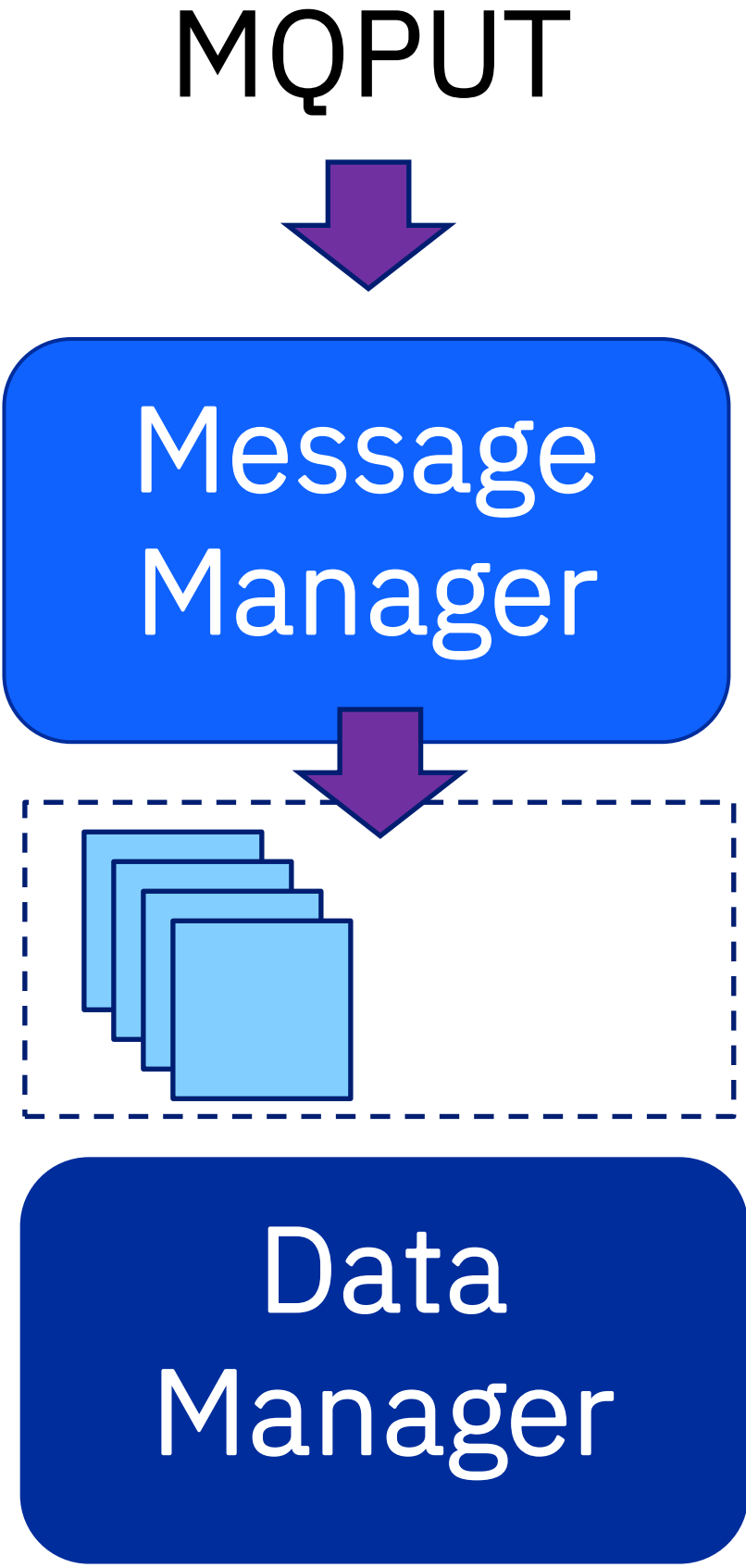
Controlling the MQI and MQSC - Message Manager



Data and Message Managers

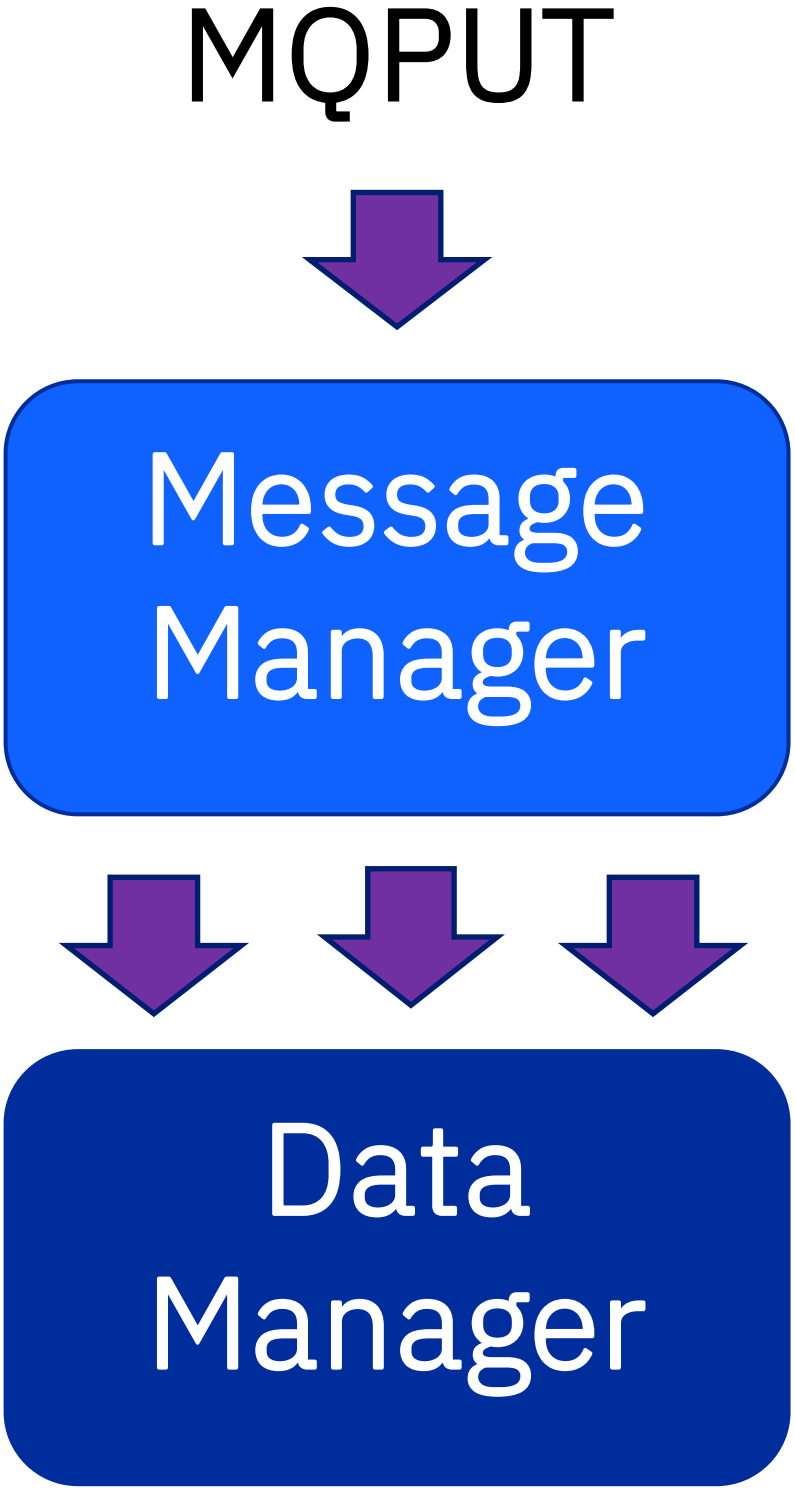


Positive put difference
MM puts > DM puts



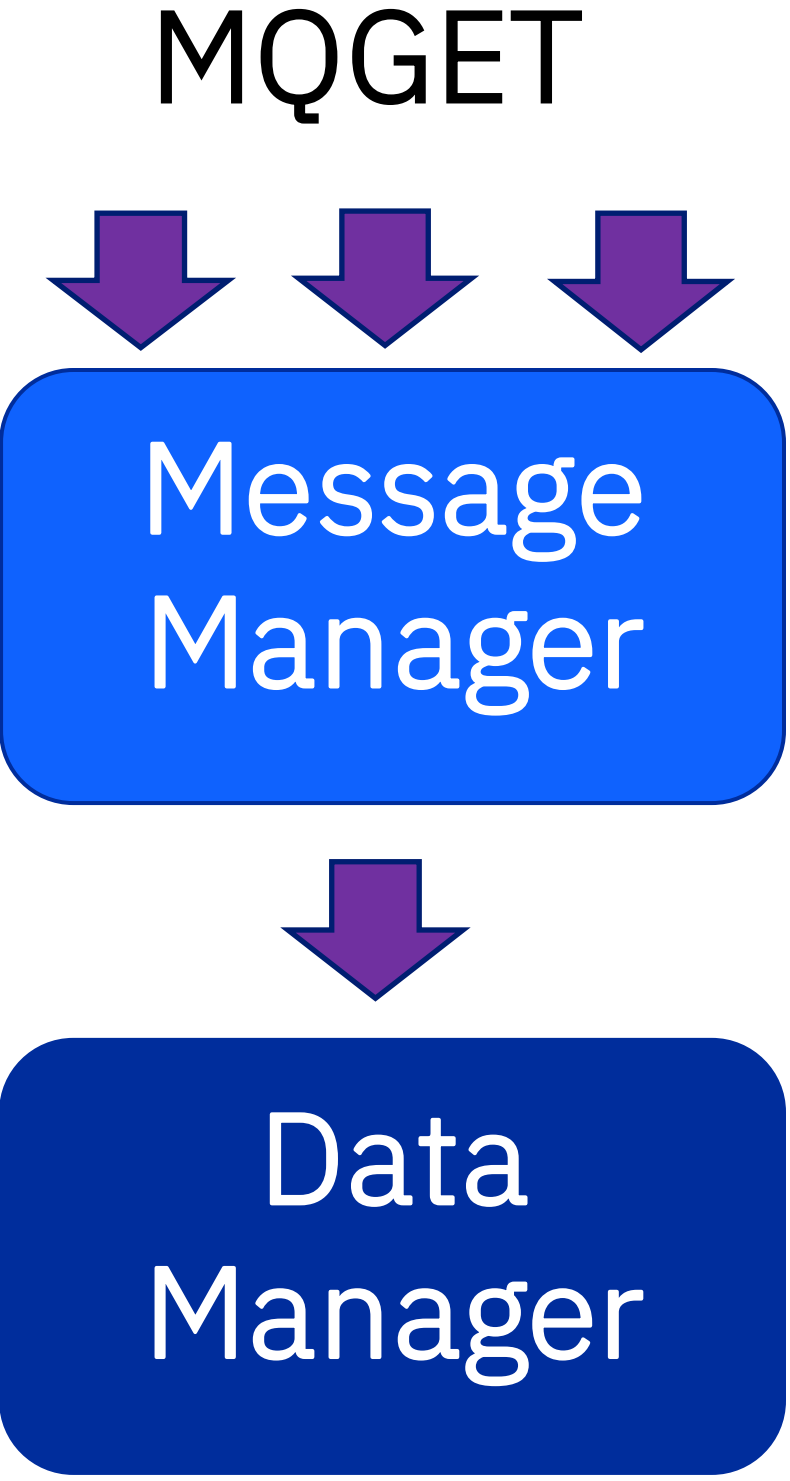
Put to waiting getter
advantage

Negative put difference
DM puts > MM puts



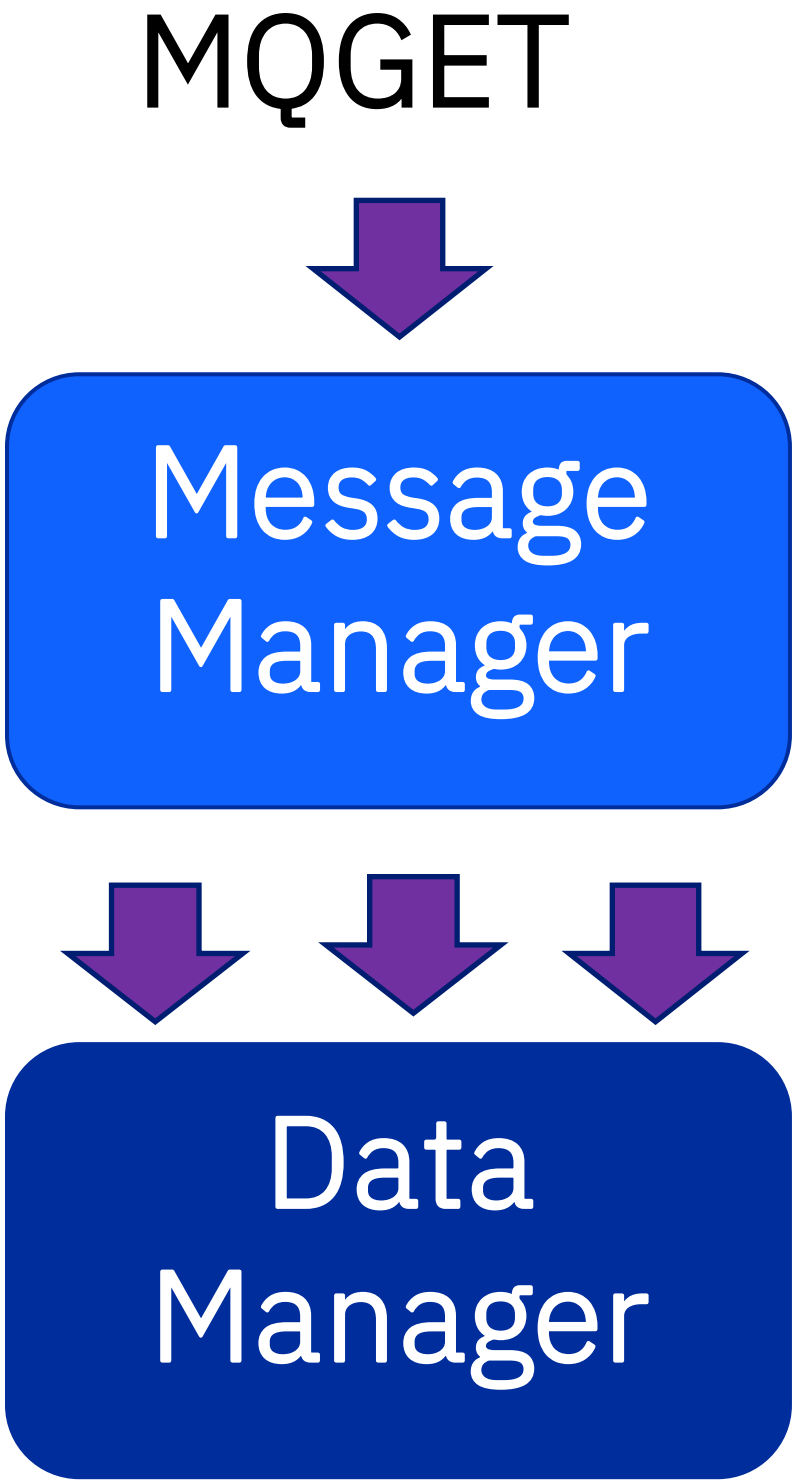
Publications or generated
messages from triggering

Positive get difference
MM gets > DM gets



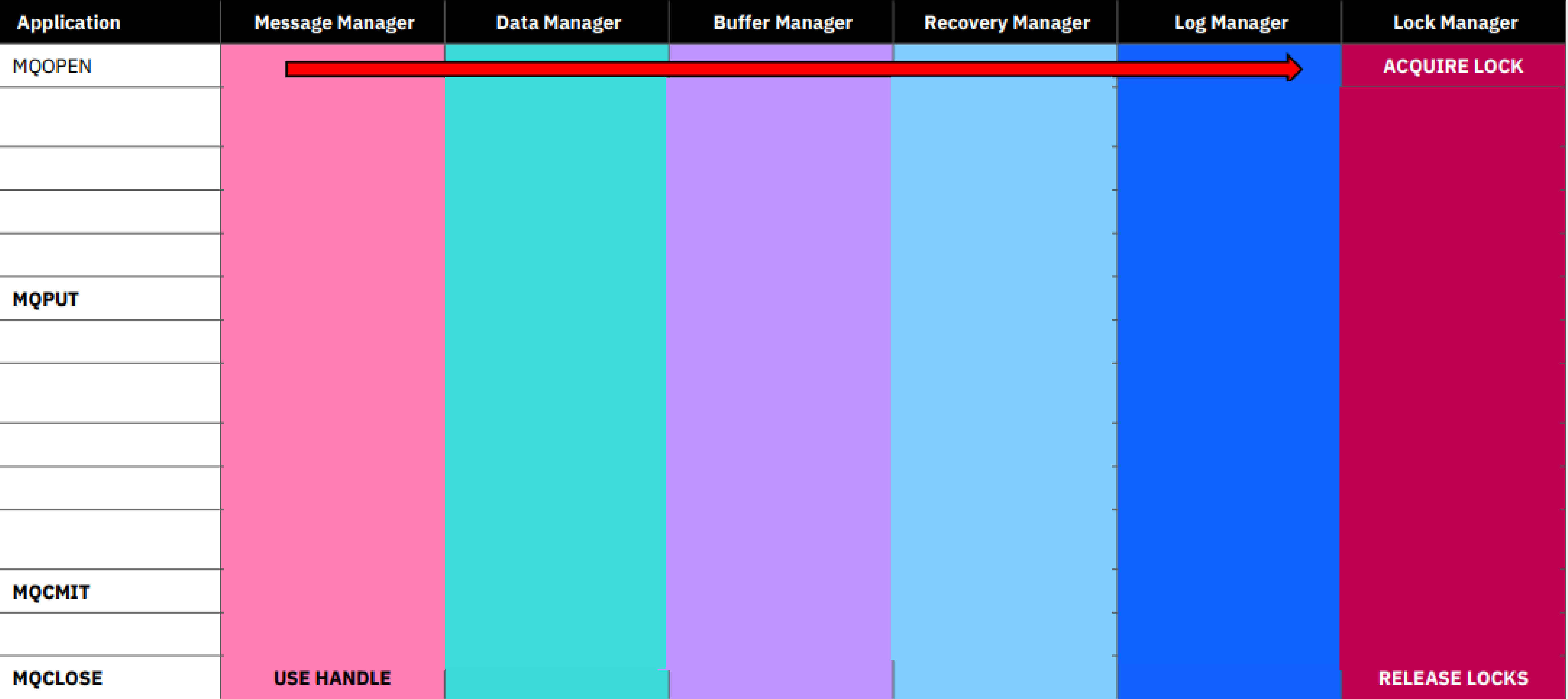
Target queue is empty
Not a problem

Negative get difference
DM gets > MM gets

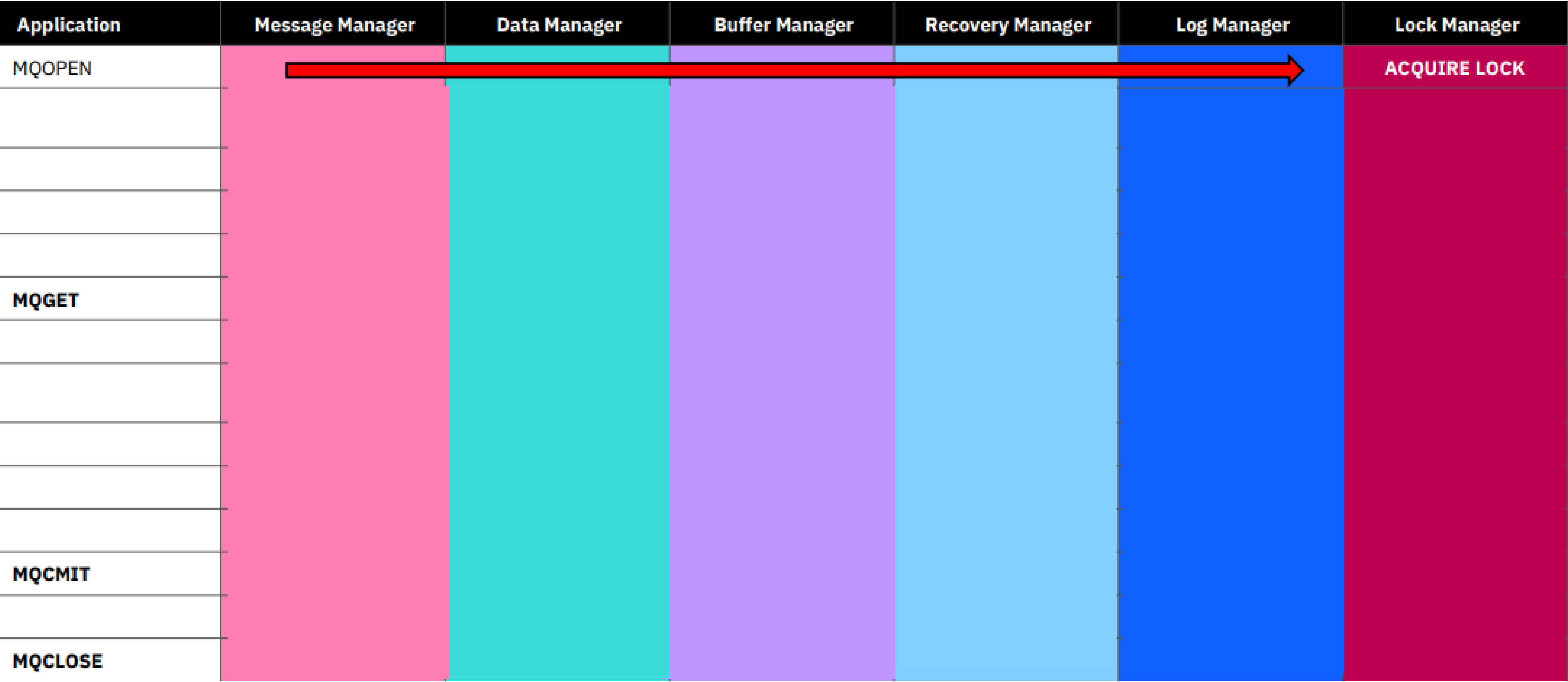


May indicate scrolling
Look for skipped
messages

Scenario: Persistent MQPut on a Triggered Queue



Scenario: MQGet from a Queue



Concept check

I want to ensure my messages are put to a queue in a serial fashion....

I want to place an MQI request to put a message....

I want to find the specific physical storage associated with a queue I am looking for....

I want to keep track of the unit of work in the event of an outage...

To recap...

Private queues use buffer pools, storage classes, and page sets to underpin queuing

Shared queues use CF list structures, shared message data sets, and BLOBs to underpin queuing

Both private and shared queues use **logging** for recovery

Resource threads run through MQ, handling requests to the queue manager