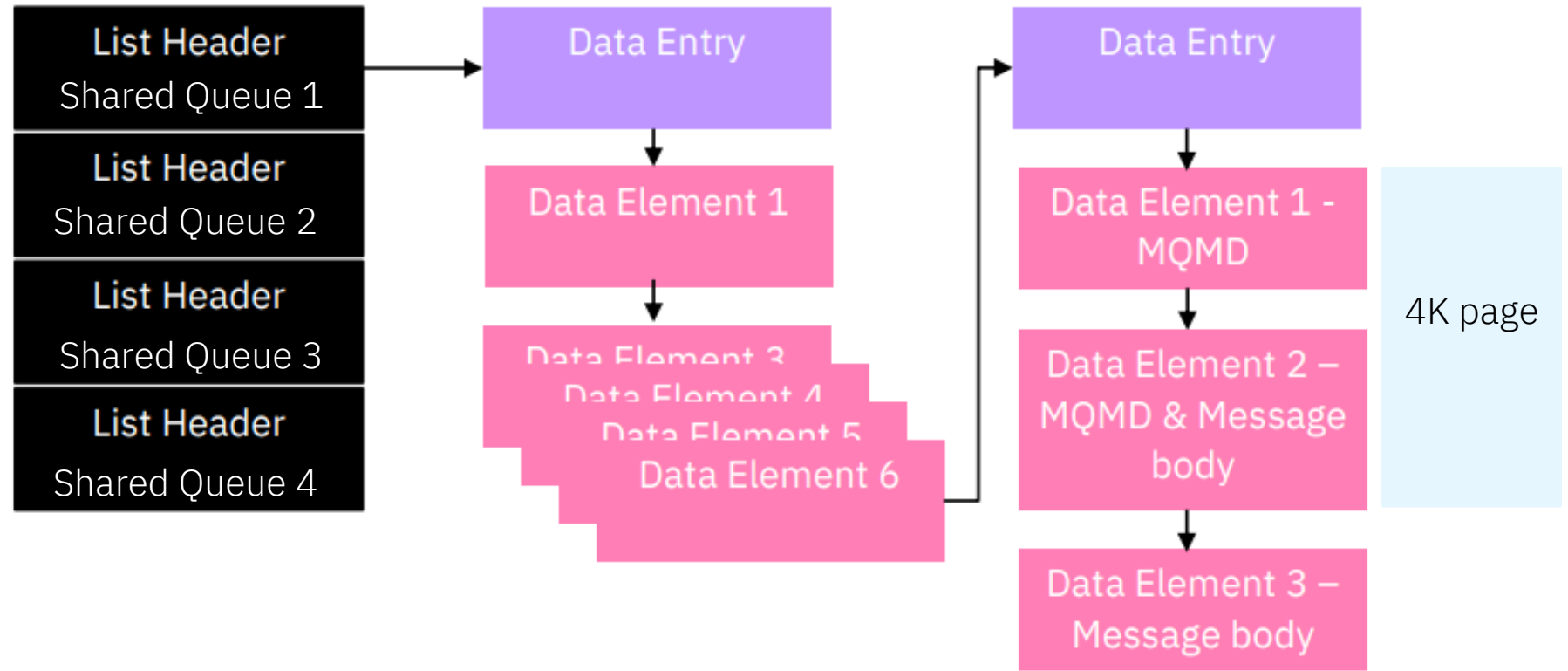




Building a queue-sharing group from scratch



Internal Representation of a Shared Queue



Planning Storage

Application structures – how to size them?

- How many queues?
- Characteristics of those queues:
 - How big are the messages?
 - How deep do they normally get?
 - How deep do they abnormally get?
 - Are there requirements to hold X messages for Y time?
 - Are there any messages greater than 63K?
 - External storage plans for Shared Message Data Sets
 - Characteristics of the CF List structure
 - How much storage will the z/OS admin let me have?
 - Do I need a failover structure (yes, yes you do)?
 - Where will that be?

Basic queue sharing group configuration

CSQ Admin

- Holds information about the Queues and messages within a UoR
- Sizing is based on the number of queue managers in the QSG and the version of the CF you are using
- Use the CF Sizer tool to establish the size

CSQSYSAPPL

- Hold Group UoR information – used by WAS and CICS
- Sizing has never really been an issue

App Structure

App Structure 2

- This holds the queues and messages (or pointers to the messages)

Background and parameters

Subsystem name: D3A1

Structure tying them together: DB3AG_SCA

QSG name: QSGA

CF names: CF01, CF02

Structures we want to define: CSQ_ADMIN, CSQSYSAPPL, TEST

CFRM policy name: CFRM003

```

  .  _Display_  _Filter_  _View_  _Print_  _Options_  _Search_  _Help_
  -----
SDSF OUTPUT DISPLAY D3A1MSTR STC07835  DSID      2 LINE  CHARS 'GROUP' FOUND
COMMAND INPUT ==>                                SCROLL ==> CSR
*** BEGIN DISPLAY OF GROUP(DB3AG  ) CATALOG LEVEL(V13R1M501)
                                CURRENT FUNCTION LEVEL(V13R1M502)
                                HIGHEST ACTIVATED FUNCTION LEVEL(V13R1M502)
                                HIGHEST POSSIBLE FUNCTION LEVEL(V13R1M503)
                                PROTOCOL LEVEL(2)
                                GROUP ATTACH NAME(D3AG)

-----
DB2      SUB      DB2      SYSTEM      IRLM
MEMBER   ID  SYS  CMDPREF  STATUS    LVL     NAME      SUBSYS  IRLMPROC
-----
D3A1      1 D3A1  -D3A1    ACTIVE    131503 MQS1      I3A1    D3A1IRLM
D3A2      2 D3A2  -D3A2    ACTIVE    131503 MQS2      I3A2    D3A2IRLM
-----

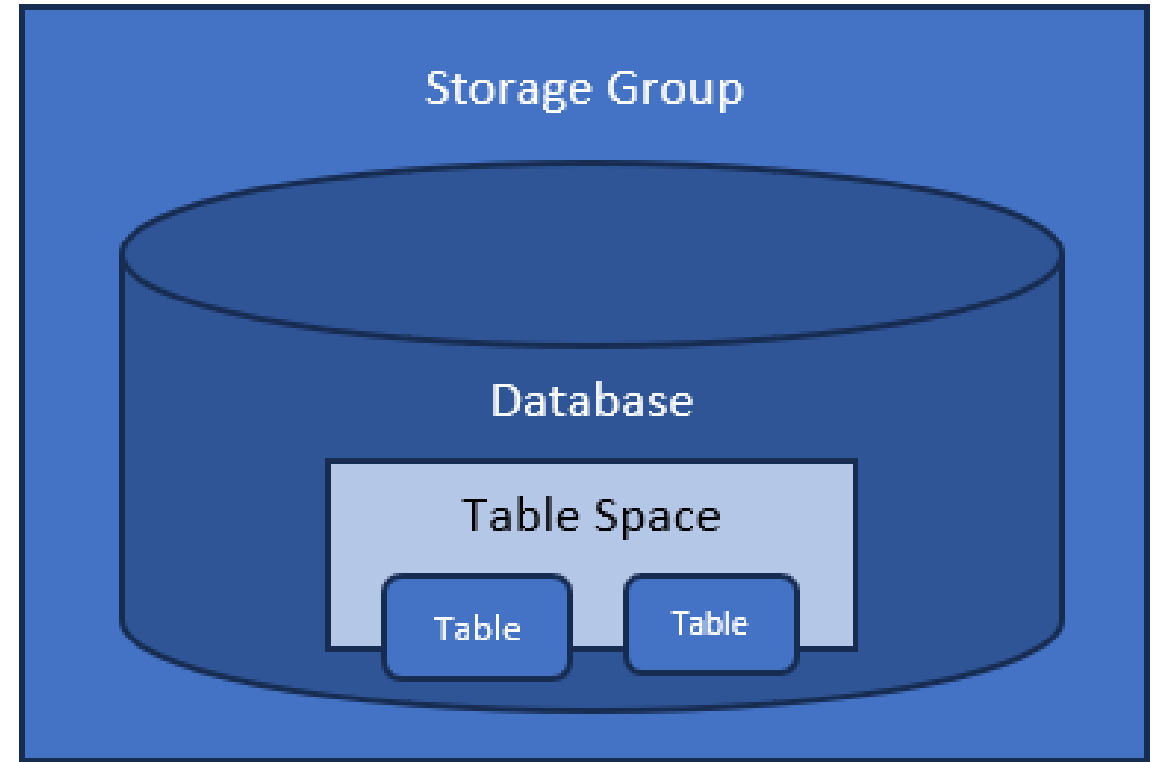
DB2      PARALLEL  PARALLEL
MEMBER   COORDINATOR ASSISTANT
-----
D3A1      NO      NO
F1=HELP   F2=SPLIT  F3=END    F4=RETURN  F5=RFIND  F6=RCHANG
F7=UP     F8=DOWN   F9=SWAP   F10=LEFT   F11=RIGHT  F12=RETRIE

```

Members we will need

CSQ4CFRM	
CSQ4XCSG	Create the storage group
CSQ45CDB	Create the DB2 database used by IBM MQ
CSQ45CTS	Create the table spaces used by IBM MQ
CSQ4CTB	Create the tables and indices used by IBM MQ
CSQz45BPL	Bind the DB2 plans used by IBM MQ using DB2 TSO batch interface
CSQ45AQS	Add a QSG record into the DB2 admin table CSQ.ADMIN_B_QSG
CSQ45AQM	Add a queue manager record into the DB2 admin table CSQ.ADMIN_B_QSG

Some basic DB2 architecture



CSQ4CFRM

An administrative structure called qsg-name CSQ_ADMIN. This structure is used by MQ itself and does not contain any user data.

A system application structure called qsg-name CSQSYSAPPL. This structure is used by MQ system queues to store state information.

One or more structures used to hold messages for shared queues

```
STRUCTURE NAME(QSGACSQ_ADMIN)  
  SIZE(60000)  
  INITSIZE(30000)  
  PREFLIST(CF01,CF02)  
  FULLTHRESHOLD(85)
```

```
STRUCTURE NAME(QSGATEST2)  
  SIZE(524288)  
  INITSIZE(272144)  
  PREFLIST(CF01,CF02)  
  FULLTHRESHOLD(25)  
  ALLOWAUTOALT(YES)
```


Activating the new CFRM policy
with our changes

```
SETXCF START,POLICY,TYPE=CFRM,POLNAME=  
policy-name
```

```
BROWSE    SYS1.MQPLEX1.CFRM.POLICY.JCL(CFRM004)  
          FULLTHRESHOLD(85)  
  
          STRUCTURE NAME(QSGACSYSAPPL)  
            SIZE(100000)  
            INITSIZE(50000)  
            PREFLIST(CF02,CF01)  
            FULLTHRESHOLD(85)  
  
          STRUCTURE NAME(QSGATEST1)  
            SIZE(524288)  
            INITSIZE(272144)  
            PREFLIST(CF01,CF02)  
            FULLTHRESHOLD(25)  
            ALLOWAUTOALT(YES)  
          STRUCTURE NAME(QSGATEST2)  
            SIZE(524288)  
            INITSIZE(272144)  
            PREFLIST(CF01,CF02)
```

CSQ4XCSG

Sample job to create the DB2 storage group used by IBM MQ using the DB2 TSO batch interface.

```
CREATE STOGROUP
MQSTGG VOLUMES('*')
VCAT DB3AD;
```

```
/** YOU MUST DO GLOBAL CHANGES ON THESE PARAMETERS USING YOUR EDITOR
/**
/**      Replace   DB2V13
/**              with the high level qualifier of the
/**              DB2 target library data sets.
/**
/**      Replace   D3AG
/**              with the DB2 subsystem ID or
/**              batch group attach name through which access
/**              is gained to the DB2 data-sharing group.
/**
/**      Replace   DB2V13
/**              with the version number of DB2 you
/**              are currently using, for example
/**              71 = DB2 for OS/390 V7.1
/**
/**      Replace   USER1
/**              with the name of the user id with sufficient
```

```
/**      Replace   MQSTGG
/**              with the name of the DB2 storage group
/**              associated with the IBM MQ database.
/**
/**      Replace   ++DB2VCAT++
/**              with the short identifier of the ICF
/**              catalog for the storage group.
/**
```

CSQ4XCDB

Sample job to create the DB2 database used by IBM MQ using the DB2 TSO batch interface.

```
CREATE DATABASE "MQDB"
```

```
STOGROUP MQSTGG
```

```
BUFFERPOOL BP32K
```

```
INDEXBP BP4
```

```
CCSID EBCDIC;
```

Replace DB2V13

with the high level qualifier of the DB2 target library data sets.

Replace D3AG

with the DB2 subsystem ID or batch group attach name through which access is gained to the DB2 data-sharing group.

Replace DB2V13

with the version number of DB2 you are currently using, for example
51 = DB2 for OS/390 V5.1

Replace SYSPROG

with the name of the user id with sufficient authority to define the MQ DB2 resources.

Replace MQSTGG

with the name of the DB2 storage group associated with the database.

Replace BP32K

with the name of a DB2 32K buffer pool associated with the database.

Replace BP4

with the name of a DB2 4K buffer pool to be used for all indexes on IBM MQ tables

CSQ4XCTS

Sample job to create the DB2 tablespaces used by IBM MQ using the DB2 TSO batch interface.

Replace	DB2V13	with the high level qualifier of the DB2 target library data sets.
Replace	D3AG	with the DB2 subsystem ID or batch group attach name through which access is gained to the DB2 data-sharing group.
Replace	DB2V13	with the version number of DB2 you are currently using, for example 10 = DB2 for z/390 V10.0
Replace	SYSPR0G	with the name of the user id with sufficient authority to define the MQ DB2 resources.

Replace MQDB with the name of the DB2 database used for the IBM MQ tables.

Replace MQSTGG with the name of the DB2 storage group associated with the database.

CSQ4XCTB

Create the 15 Db2 tables and associated indexes.

```
CREATE TABLE CSQ.ADMIN_B_QSG
(
  QSGNAME          CHAR(4)   NOT NULL,
  ARRAY_QMGR       CHAR(32),
  ARRAY_STRUC      CHAR(64),
  PRODLVL          CHAR(3)   NOT NULL,
  VERSIONCOUNT    INT,
  UPDT_QMGR        CHAR(48),
  UPDT_QMGRNUM     SMALLINT,
  UPDT_STAMP       CHAR(8),
  CREATE_QMGR      CHAR(48),
  CREATE_QMGRNUM   SMALLINT,
  CREATE_STAMP     CHAR(8),
  RECON_STAMP      CHAR(8)   WITH DEFAULT X'00',
  RECON_QMGRNUM    SMALLINT WITH DEFAULT 0,
  PRIMARY KEY (QSGNAME)
)
IN MQDB.ADMQSG;
```

Replace DB2V13

with the high level qualifier of the DB2 target library data sets.

Replace D3AG

with the DB2 subsystem ID or batch group attach name through which access is gained to the DB2 data-sharing group.

Replace DB2V13

with the version number of DB2 you are currently using, for example
71 = DB2 for OS/390 V7.1

Replace MQDB

with the name of the DB2 database used for the IBM MQ tables.

```
CREATE UNIQUE INDEX CSQ.ADMIN_QSG
ON CSQ.ADMIN_B_QSG (QSGNAME ASC)
CLUSTER
USING STOGROUP MQSTGG
PRIQTY -1
SECQTY -1
CLOSE NO;
```

```
PRIMARY KEY (NLNAME, QSGNAME),
FOREIGN KEY (QSGNAME) REFERENCES CSQ.ADMIN_B_QSG
ON DELETE CASCADE
)
IN MQDB.OBJNL;
```

CSQ45GEX

GRANT EXECUTE ON PLAN
CSQ5A9X0 TO SYSPROG;
GRANT EXECUTE ON PLAN
CSQ5C9X0 TO SYSPROG;
GRANT EXECUTE ON PLAN
CSQ5D9X0 TO SYSPROG;
GRANT EXECUTE ON PLAN
CSQ5L9X0 TO SYSPROG;
GRANT EXECUTE ON PLAN
CSQ5M9X0 TO SYSPROG;
GRANT EXECUTE ON PLAN
CSQ5P9X0 TO SYSPROG;

```
Replace  _DB2V13      with the high level qualifier of the
                        DB2 target library data sets.

Replace  D3AG         with the DB2 subsystem ID or
                        batch group attach name through which access
                        is gained to the DB2 data-sharing group.

Replace  DB2V13       with the version number of DB2 you
                        are currently using, for example
                        71 = DB2 for OS/390 V7.1

Replace  SYSPROG      with the user ID that will be used for
                        the queue manager started task.
```

```
_ Replace  SYSPROG      with the user ID that will be used for
                        the CSQ5PQSG utility.

Replace  SYSPROG      with the user ID that will be used for
                        the CSQUTIL utility.

Replace  SYSPROG      with the user ID that will be used for
                        the CSQUZAP utility.
```


CSQ45BPL

CSQ45BPL binds the Db2 plans for the queue manager, utilities, and channel initiator.

```
BIND PLAN(CSQ5A9X0) -  
PKLIST(CSQ5A9X0.CSQ5A9X0) -  
ACQUIRE(USE) RELEASE(COMMIT) -  
CURRENTDATA(NO) -  
ENCODING(EBCDIC) -  
ACT(REP) RETAIN ISOLATION(CS)
```

```
Replace    DB2V13  
           with the high level qualifier of the  
           DB2 target library data sets.  
  
Replace    D3AG  
           with the DB2 subsystem ID or  
           batch group attach name through which access  
           is gained to the DB2 data-sharing group.  
  
Replace    MQ933CD  
           with the high level qualifier of the  
           IBM MQ target library data sets.
```

CSQ45AQS

Sample job to add a queue-sharing group record into the DB2 administration table CSQ.ADMIN_B_QSG used by IBM MQ using the CSQ5PQSG utility.

```
Replace  ++DB2QUAL++  
          with the high level qualifier of the  
          DB2 target library data sets.  
  
Replace  MQ933CD  
          with the high level qualifier of the  
          IBM MQ target library data sets.  
  
Replace  ++LANGLETTER++  
          with the letter for the language that  
          you want messages shown in.  
  
Replace  ++QSGNAME++  
          with the name of the queue-sharing group  
          to be defined.  
  
Replace  ++DSGNAME++  
          with the name of the DB2 data-sharing group
```


CSQ45AQM

Defines the queue managers to the DB2 data sharing group tables for IBM MQ. This may be run multiple times as queue managers are added

```
Replace    ++DB2QUAL++  
           with the high level qualifier of the  
           DB2 target library data sets.  
  
Replace    MQ933CD  
           with the high level qualifier of the  
           IBM MQ target library data sets.  
  
Replace    E  
           with the letter for the language that  
           you want messages shown in.  
  
Replace    ZQS1  
           with the name of the queue manager that is  
           to be added to the queue-sharing group.  
  
Replace    QSGA  
           with the name of the queue-sharing group.
```

```
Replace    ++DSGNAME++  
           with the name of the DB2 data-sharing group  
           used by the IBM MQ queue-sharing group.  
  
Replace    ++DB2SSID++  
           with the DB2 subsystem ID or  
           batch group attach name through which access  
           is gained to the DB2 data-sharing group.
```

CSQZPRM

Must be customized for each queue manager

Update the QSGDATA parm

QSGDATA=(QSGA,DB3AG,D3AG,4,4)

QSGA is QSG name

DB3AG is the Db2 data sharing group

D3AG is the DB2 connection name

4 is the number of server tasks used for accessing DB2

4 is the number of tasks used for accessing the BLOBS

Replace MQ933CD

with the high level qualifier of the SCSQMACS and SCSQAUTH target libraries.

Replace ZQS1.USERAUTH

with the data set name of the authorized load library in which to store your system parameter module.

Replace CSQ4ZPRM

with the name of your system parameter module.

Note - do NOT use the default version name of CSQZPARM if you are using the IBM library SCSQAUTH to store your system parameter module.

Allocating USERAUTH

Allocate New Data Set

Request failed
More: +

Data Set Name . . . : ZQS1.USERAUTH

Management class . . . : DEFAULT

Storage class . . . : STORAGE

Volume serial . . . :

Multiple Volumes . . . :

Device type . . . :

Data class . . . : DEFAULT

Space units . . . : TRACK

Average record unit . . . :

Primary quantity . . : 100

Secondary quantity . . : 10

Directory blocks . . : 20


Record format . . . : U

Record length . . . : 0

Command ==>

F1=Help F2=Split F3=Exit F7=Backward F8=Forward F9=Swap

Speaking:

Lyn

APF authorizing USERAUTH

```
DISPLAY PROG,APF
```

```
SETPROG APF,ADD,DSNAME=ZQS1.USERAUTH, VOLUME=SMS
```

Lessons learned

Display commands are your best friends

- display usage
- display qlocal
- -D3A1 DISPLAY
BUFFERPOOL(BP4)
- DISPLAY PROG,APF
- display XCF,POLICY,TYPE=CFRM
- -D3A1 DISPLAY group(*)
- -DIS GROUP
- -D3A1 DISPLAY BPOOL(*)

Lessons learned

SQL ERROR DURING EXECUTE IMMEDIATE
DSNT408I SQLCODE = -647, ERROR: **BUFFERPOOL
MQDB.EXTQMGR HAS NOT
BEEN ACTIVATED**

DSNT418I SQLSTATE = 57003 SQLSTATE R
DSNT415I SQLERRP = DSNXIC01 SQL PRO
DSNT416I SQLERRD = 40 0 0 -1 0 0 SQL
DSNT416I SQLERRD = X'00000028' X'00000000'
activation of MQDB.OBJSTGC, MQDB.OBJ

```
//$$BP4      JOB (999,POK),'DB3A INSTALL',CLASS=A,  
// MSGCLASS=T,NOTIFY=SYSADM,TIME=NOLIMIT,REGION=0M  
/*JOBPARM SYSAFF=*,L=9999  
// JCLLIB ORDER=(DB3AM.PROCLIB)  
//JOBLIB DD DISP=SHR,  
//          DSN=DB2V13.SDSNLOAD  
//*  
//DSNTIAB EXEC PGM=IKJEFT01,DYNAMNBR=20  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
//SYSTSIN DD *  
          DSN SYSTEM(D3A1)  
          -ALTER BUFFERPOOL (BP4) VPSIZE(20000)  
//*  
//DSNTICR EXEC PGM=IKJEFT01,DYNAMNBR=20,COND=(4,LT)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
//SYSTSIN DD *  
          DSN SYSTEM(D3A1)  
          RUN PROGRAM(DSNTIAD) PLAN(DSNTIA13) -  
            LIB('DB3AM.RUNLIB.LOAD')  
          END  
//SYSIN DD *  
          SET CURRENT SQLID = 'SYSADM';  
          GRANT USE OF BUFFERPOOL BP4  
            TO PUBLIC;  
//*
```

Lessons learned

```
CREA 000072 //SYSIN DD *
ID as 000073 SET CURRENT SQLID = 'USER1';
//SYS 000074 CREATE STOGROUP MQSTGG VOLUMES(*);
SET 000075 /*
000076 //
```















CREATE STOGROUP MOSTGG VOLUMES('*') VCAT DB3AD:

```
CREATE STOGROUP MQSTGG VOLUMES(*)
SQL ERROR DURING EXECUTE IMMEDIATE
DSNT408I SQLCODE = -104, ERROR: ILLEGAL SYMBOL "*". SOME SYMBOLS THAT MIGHT BE
DSNT418I SQLSTATE = 42601 SQLSTATE RETURN CODE
DSNT415I SQLERRP = DSNHPARS SQL PROCEDURE DETECTING ERROR
DSNT416I SQLERRD = 3 0 0 -1 32 502 SQL DIAGNOSTIC INFORMATION
DSNT416I SQLERRD = X'00000003' X'00000000' X'00000000' X'FFFFFFFF' X'000
INFORMATION
READY
DSN SYSTEM(D3AG)
```

What's next? Shared message data sets

```
File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      ZQS1.SCSQPROC(CSQ4SMDS) - 01.00      Columns 00001 00072
***** Top of Data *****
==MSG> -Warning- The UNDO command is not available until you change
==MSG>          your edit profile using the command RECOVERY ON.
==MSG> -CAUTION- Profile is set to STATS ON. Statistics did not exist for
==MSG>          this member, but will be generated if data is saved.
000001 //CSQ4SMDS JOB
000002 //*****
000003 //*
000004 //* <copyright
000005 //* notice="lm-source"
000006 //* pids="5655-MQ9"
000007 //* years="2011,2016"
000008 //* crc="1163847555" >
000009 //* Licensed Materials - Property of IBM
000010 //*
000011 //* 5655-MQ9
000012 //*
Command ==>
F1=Help      F2=Split      F3=Exit      F4=Expand      F5=Rfind      F6=Rchange
F7=Up        F8=Down      F9=Swap      F10=Left      F11=Right     F12=Cancel
*DSLIST
```


Success!

- ▼  ZQS1 on '129.40.114.132(1424)'
 -  Queues
 -  Topics
 -  Subscriptions
 - >  Channels
 -  Listeners
 -  Process Definitions
 -  Namelists
 -  Authentication Information
 -  Storage Classes
-  ZQS2 on '129.40.114.134(1424)'
-  ZSHR on '9.82.31.241(1423)'
- ▼  Queue-sharing Groups
 - >  QSGA



Queue-sharing Group QSGA

Queue-sharing group information source:

Queue manager name	ZQS1
Description	IBM MQ for z/OS - V9.3.3
Command level	933
QMID	ZQS1.DE7D142F0856B581
Coded character set ID	500

Last updated: 20:07:06

Members of queue-sharing group:

Queue manager name	Queue manager number	DB2 name	Queue manager status	DB2 connection status	Command level	Queue manager CPF
 ZQS1	1	D3A1	Active	Active	933	ZQS1
 ZQS2	2	D3A2	Active	Active	933	ZQS2

CFLEVEL = 3

Persistent and non-persistent messages less than 63KB.

CFLEVEL = 4

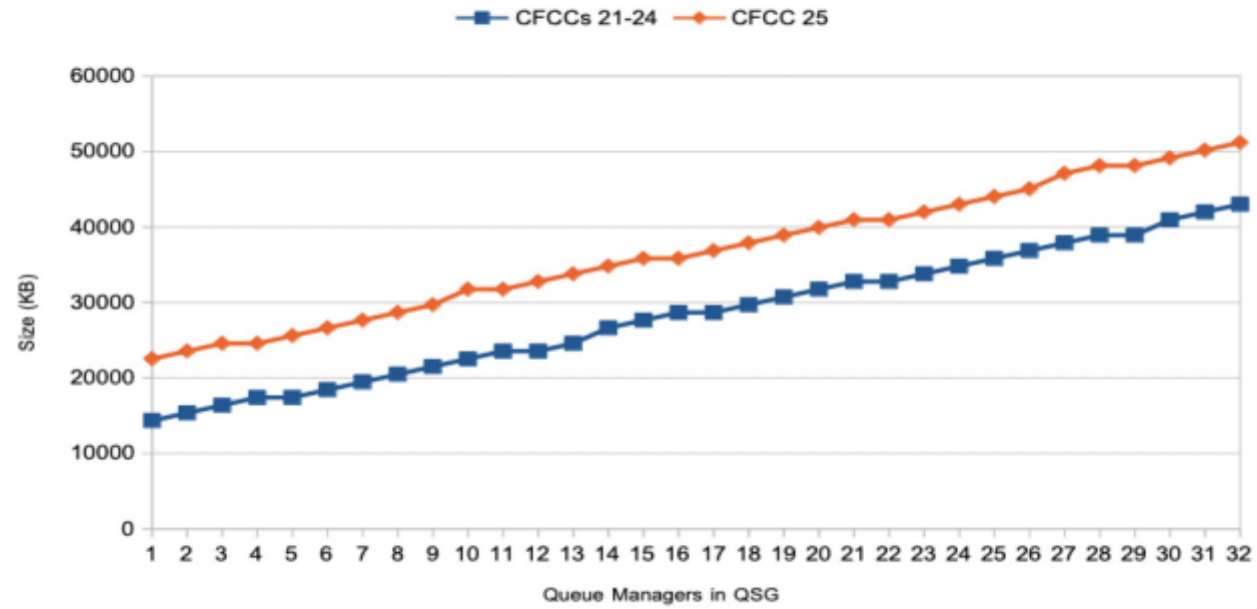
Persistent and non-persistent messages up to 100MB

CFLEVEL = 5

As CFLEVEL(4) but allows tiered offloading when coupling facility fills and offload choice of DB2 or SMDS

IBM MQ for z/OS: CF Admin Structure Size

CFCC 25 requires an additional 8MB over CFCC 24



CF Sizer tool

Link: [MQSeries \(ibm.com\)](https://ibm.com)

☒ **MQSeries Administration structure**

[MQSeries Administration structure help](#)

Number of members in the queue sharing group

Entry ratio

Element ratio

☒ **MQSeries Application structure**

[MQSeries Application structure help](#)

Average arrival rate of MQ messages with average size < 63KB (messages / minute)

Average size of those messages

Average arrival rate of MQ messages with average size >= 63KB (messages / minute)

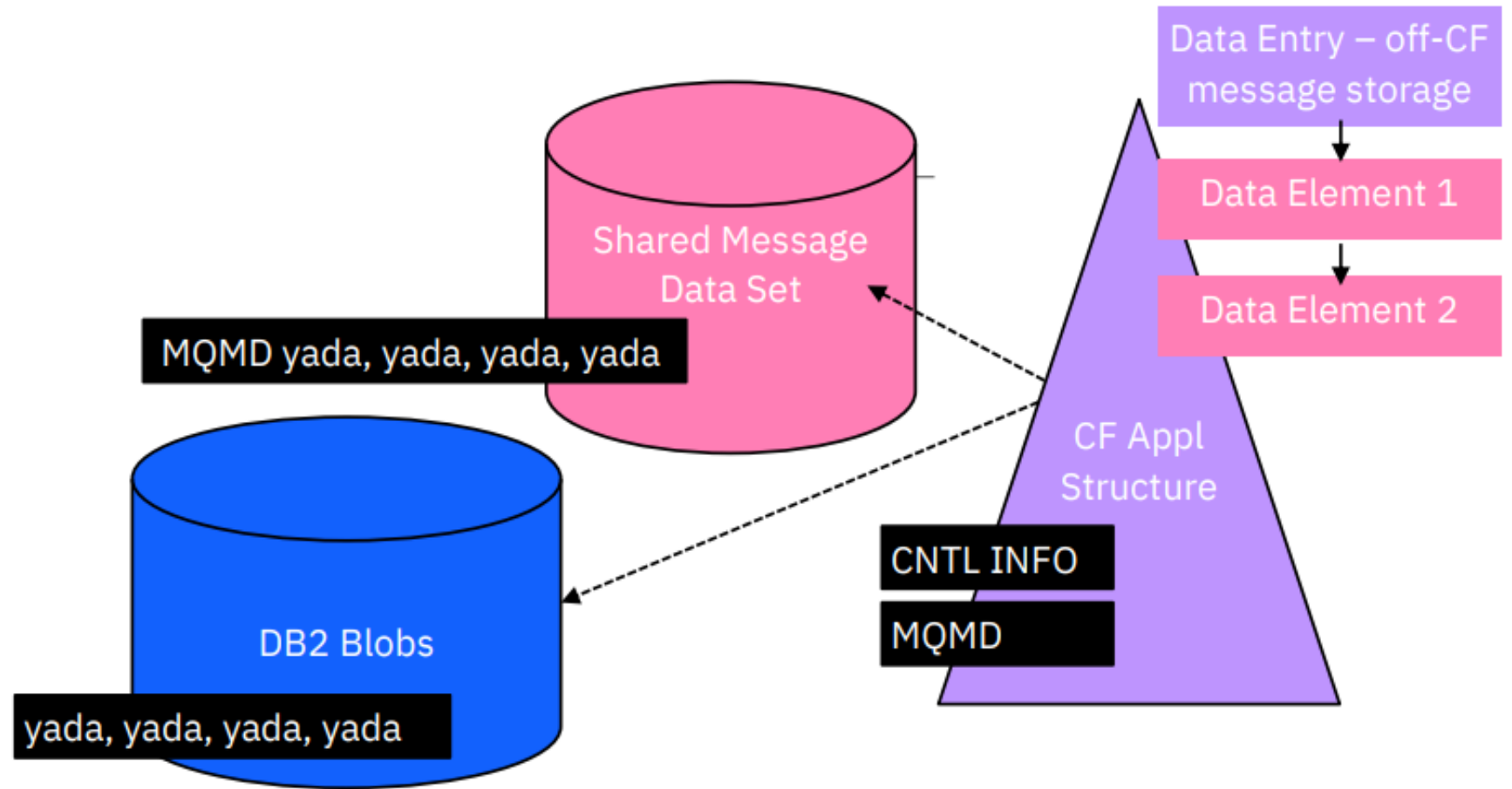
CF real storage message capacity (minutes)

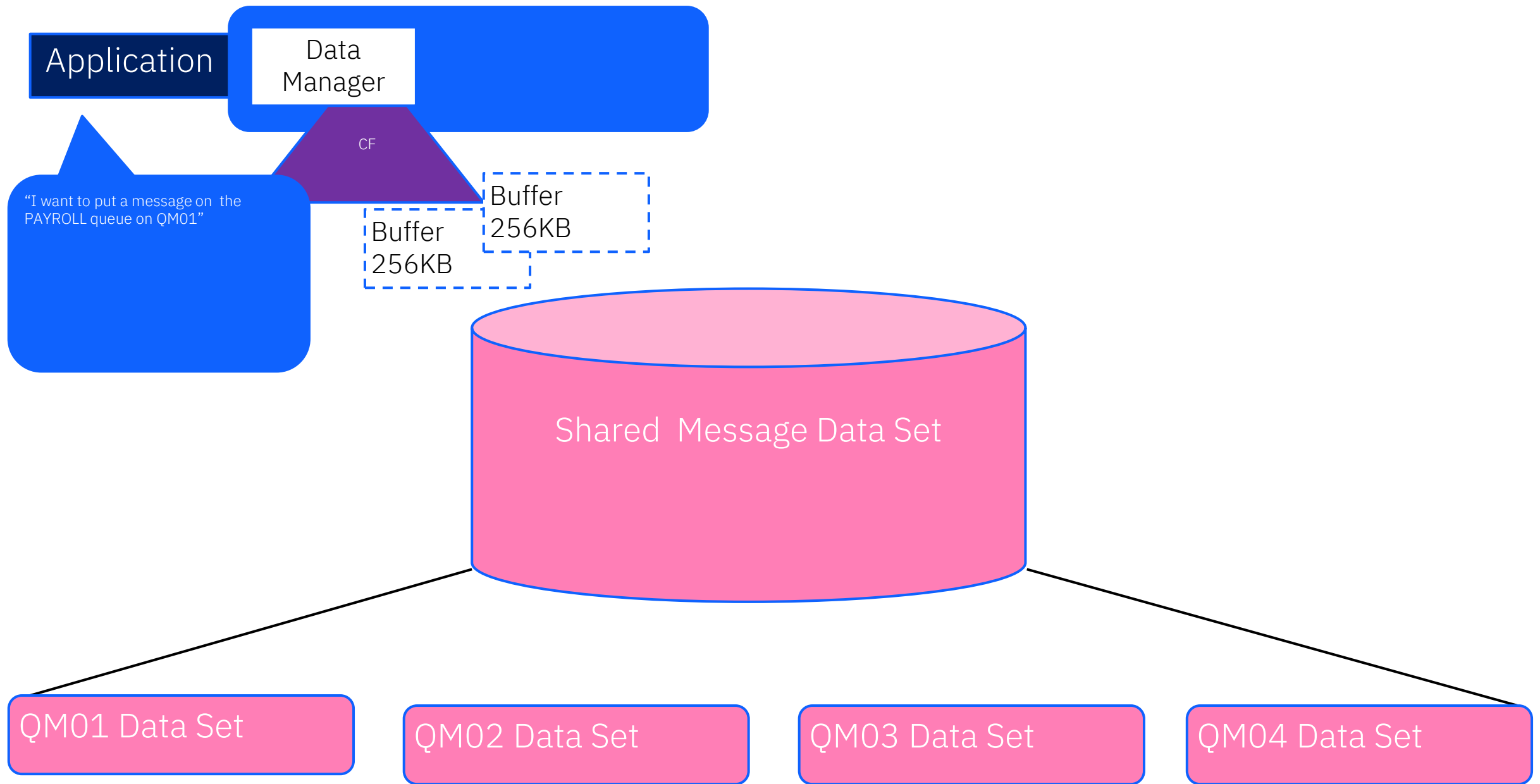
Overflow (SCM) message capacity (minutes)

Entry ratio

Element ratio

Shared Queue Message Storage





Resources:

[Managing queue sharing groups - IBM Documentation](#)

[Set up the Db2 environment - IBM Documentation](#)

[MP16](#) performance manual