IBM Highly available Integration and Messaging

Implementation Acceleration and Streamlined Operations

With

IBM Pure Applications Systems

Agenda

- Overview of required componentry
- Overview of Pure Application Platforms
- IBM Pure Application Systems Middleware HA Accelerator Patterns
- Non IBM Software Applications
  - Packaged Engines
  - Other Components

Componentry

From the Private or Public Network

To

Storage replication

The Challenge of 99.99+ availabiity: High technical cost of entry

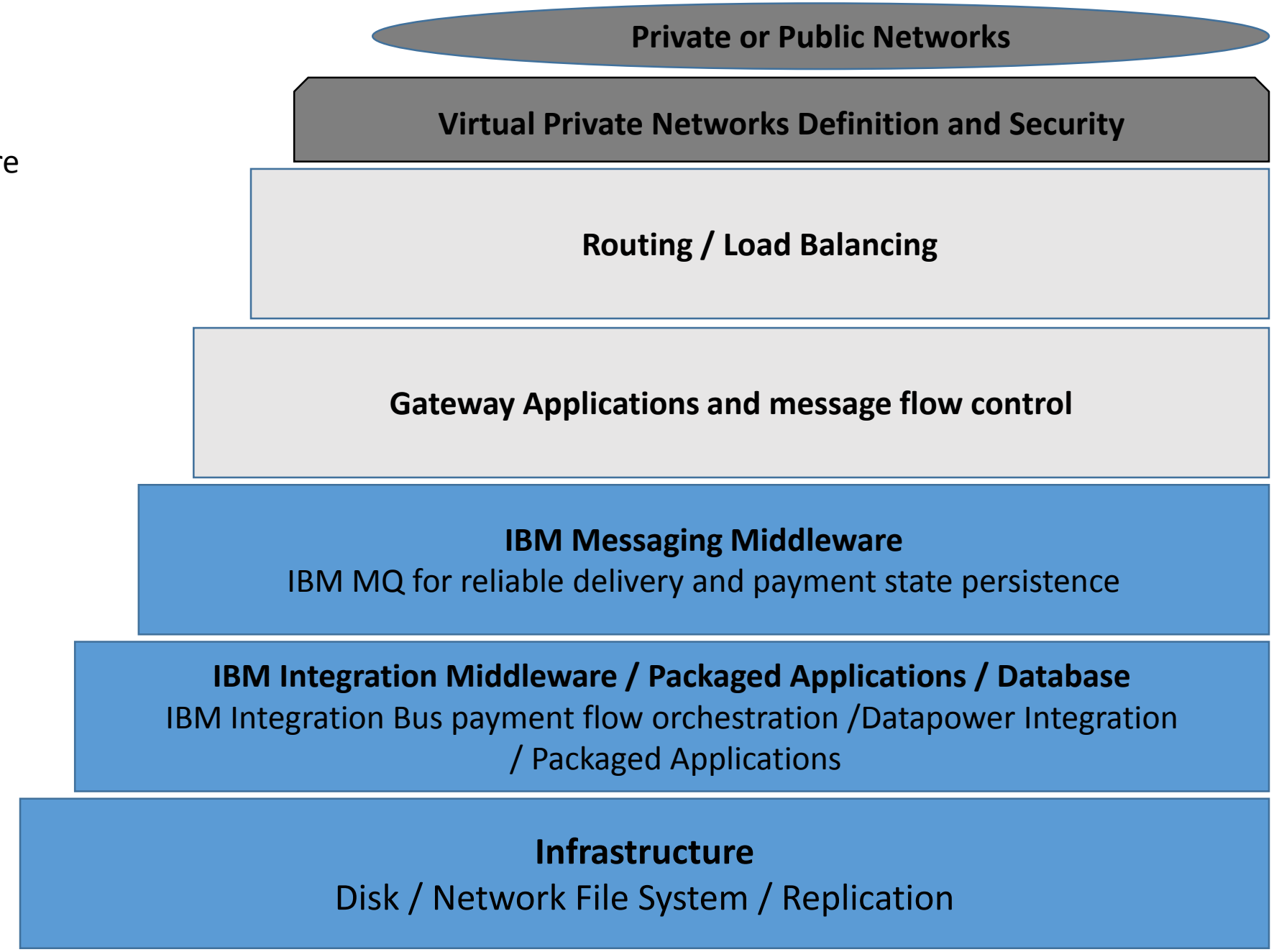
Delivering very highly available middleware presents a number of challenges to organizations large and small.

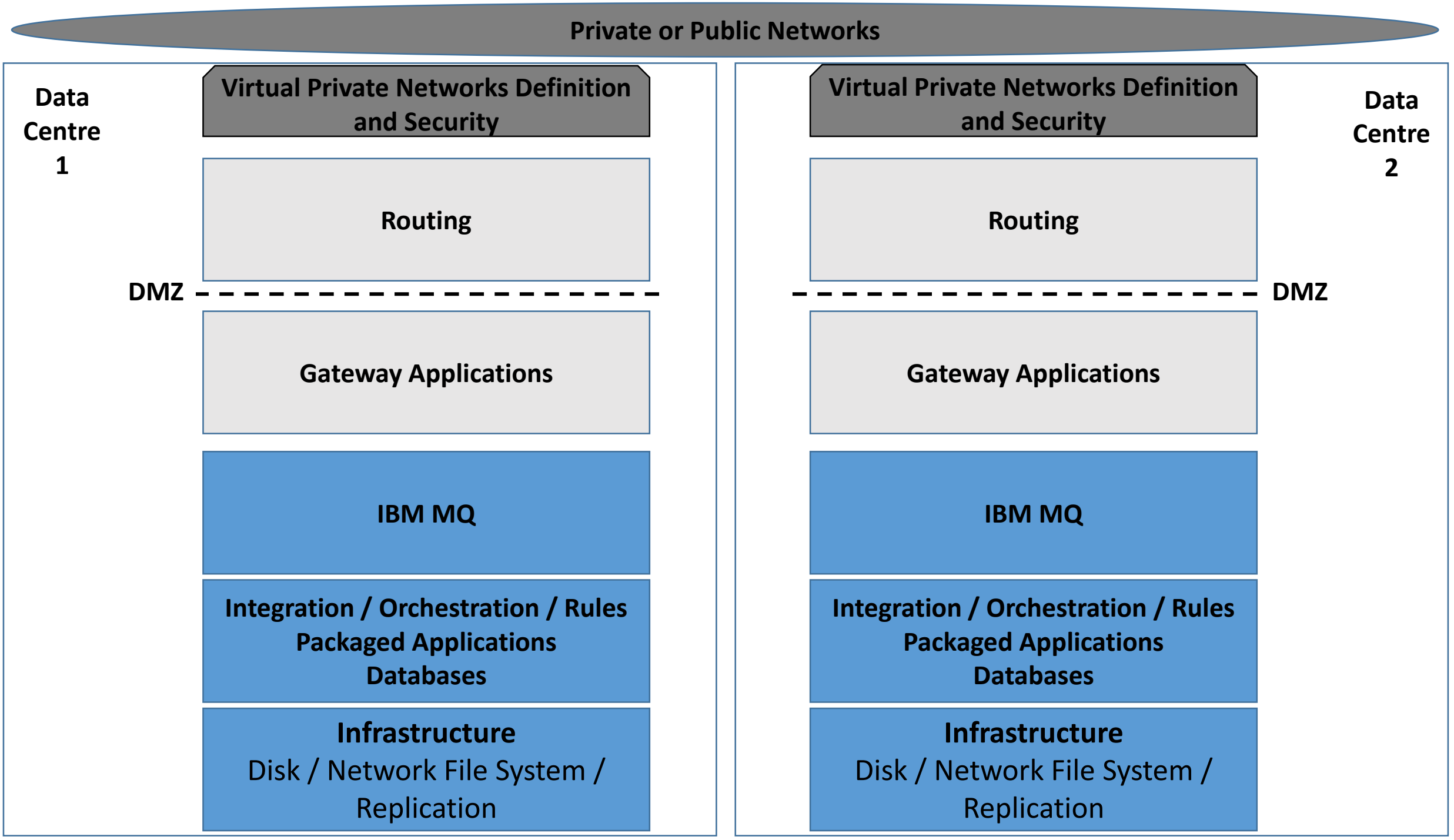
- Complex stack
- Challenging NFRs
- Aggressive delivery schedules

Considerations

- Data Center location
- Infrastructure requirements – compute, disk storage, network
- Adoption of new software technologies
- Deployment to the highest levels of availability and resilience

Layers of connectivity,
Middleware and Infrastructure




Private or Public Networks
Data Centre 1
Virtual Private Networks Definition and Security
Routing
DMZ
Gateway Applications
IBM MQ
Integration / Orchestration / Rules
Packaged Applications
Databases
Infrastructure
Disk / Network File System / Replication
Virtual Private Networks Definition and Security
Routing
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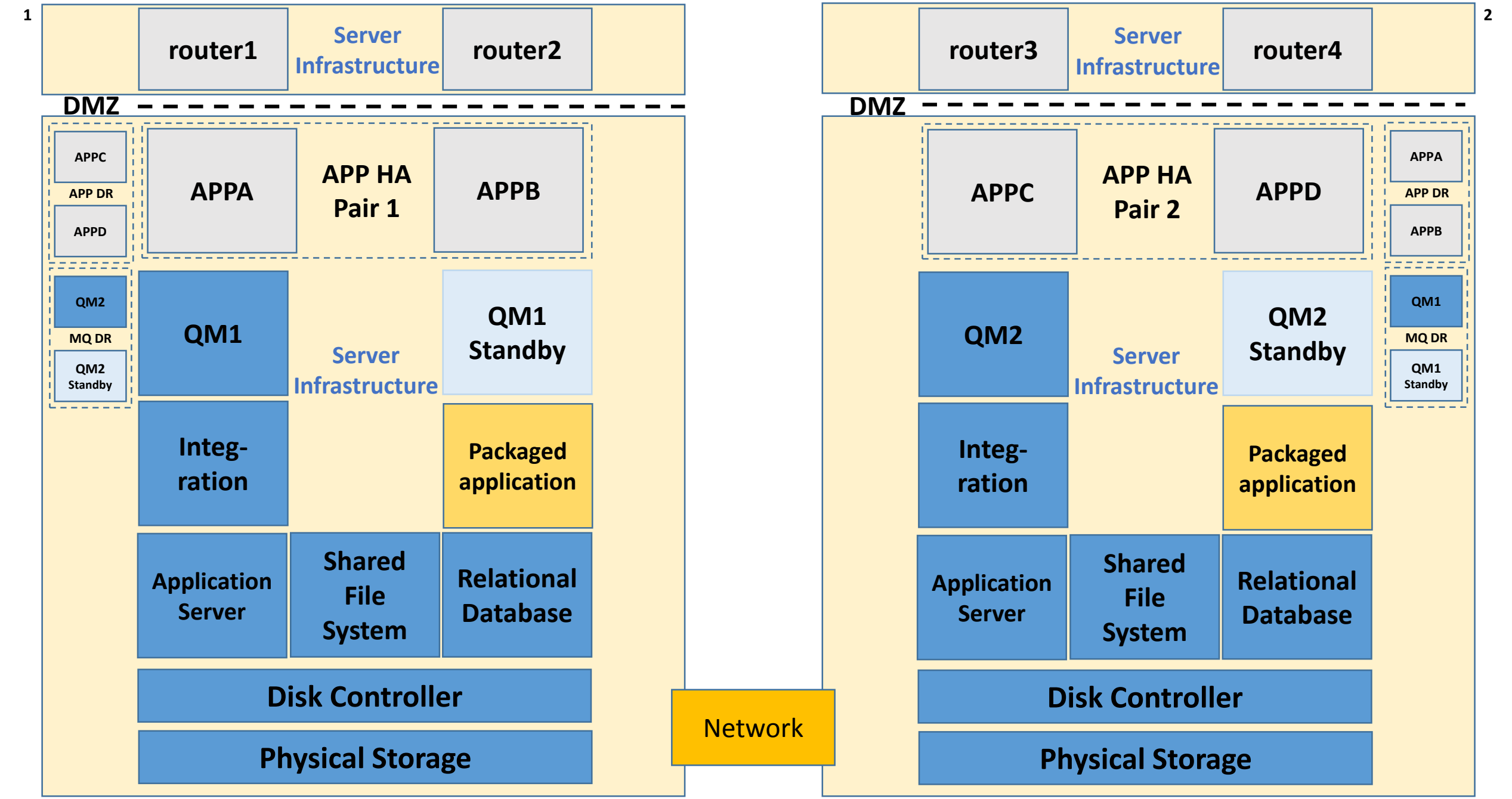
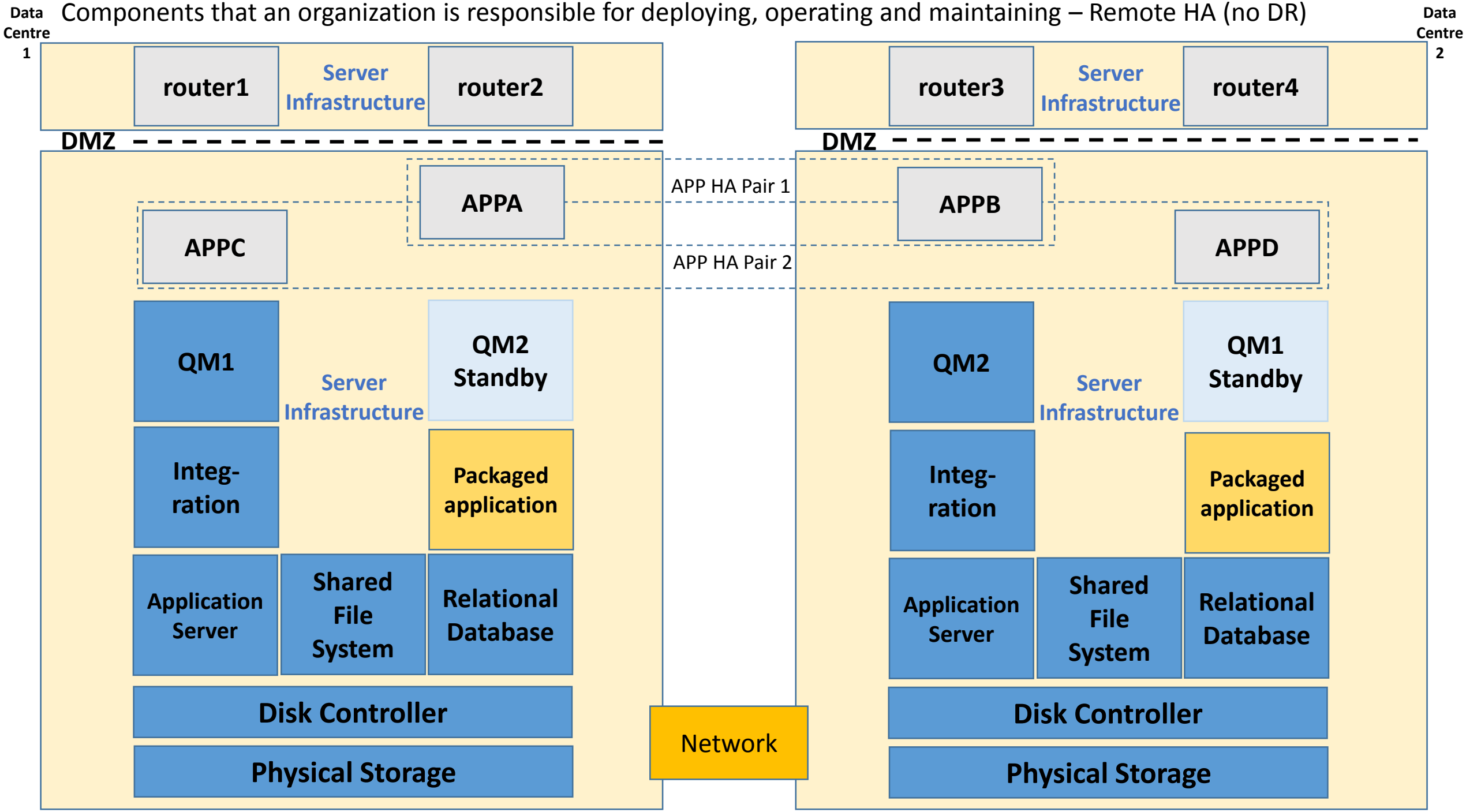
Gateway Applications
IBM MQ
Integration / Orchestration / Rules
Packaged Applications
Databases
Infrastructure
Disk / Network File System / Replication
Data Centre 2

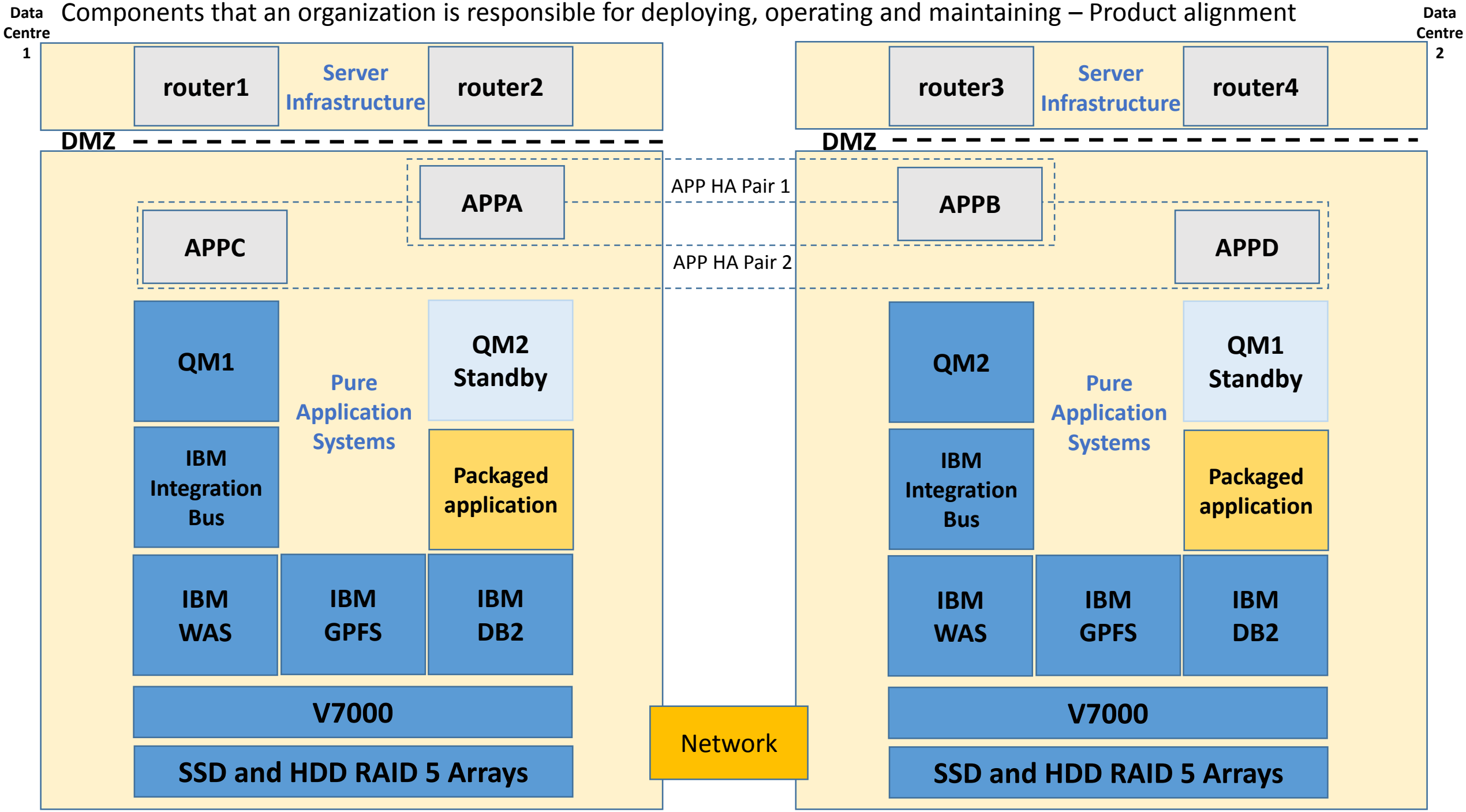
Components that an organization is responsible for deploying, operating and maintaining – Local HA



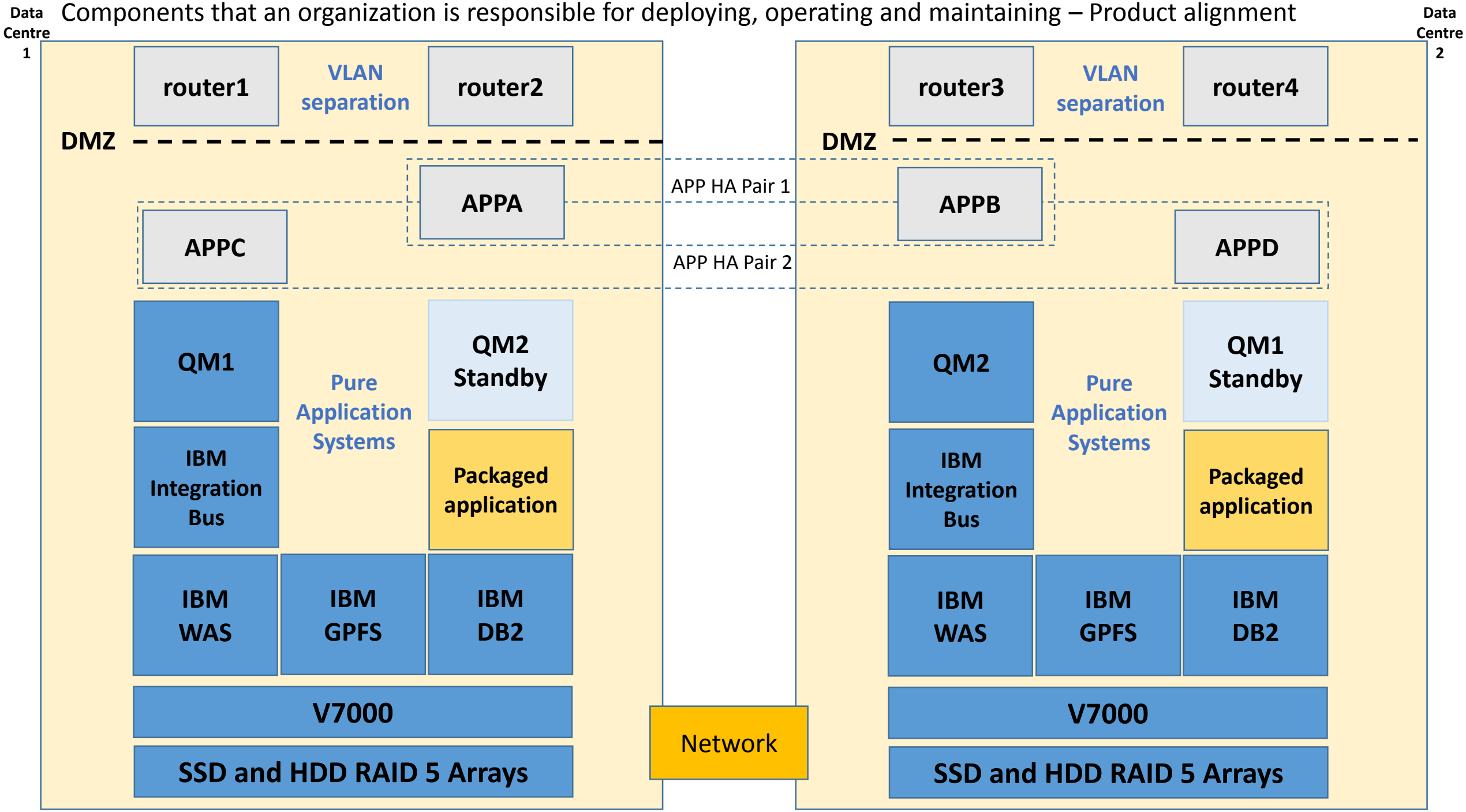
Components that an organization is responsible for deploying, operating and maintaining – Remote HA (no DR)



Components that an organization is responsible for deploying, operating and maintaining – Product alignment



Components that an organization is responsible for deploying, operating and maintaining – Product alignment



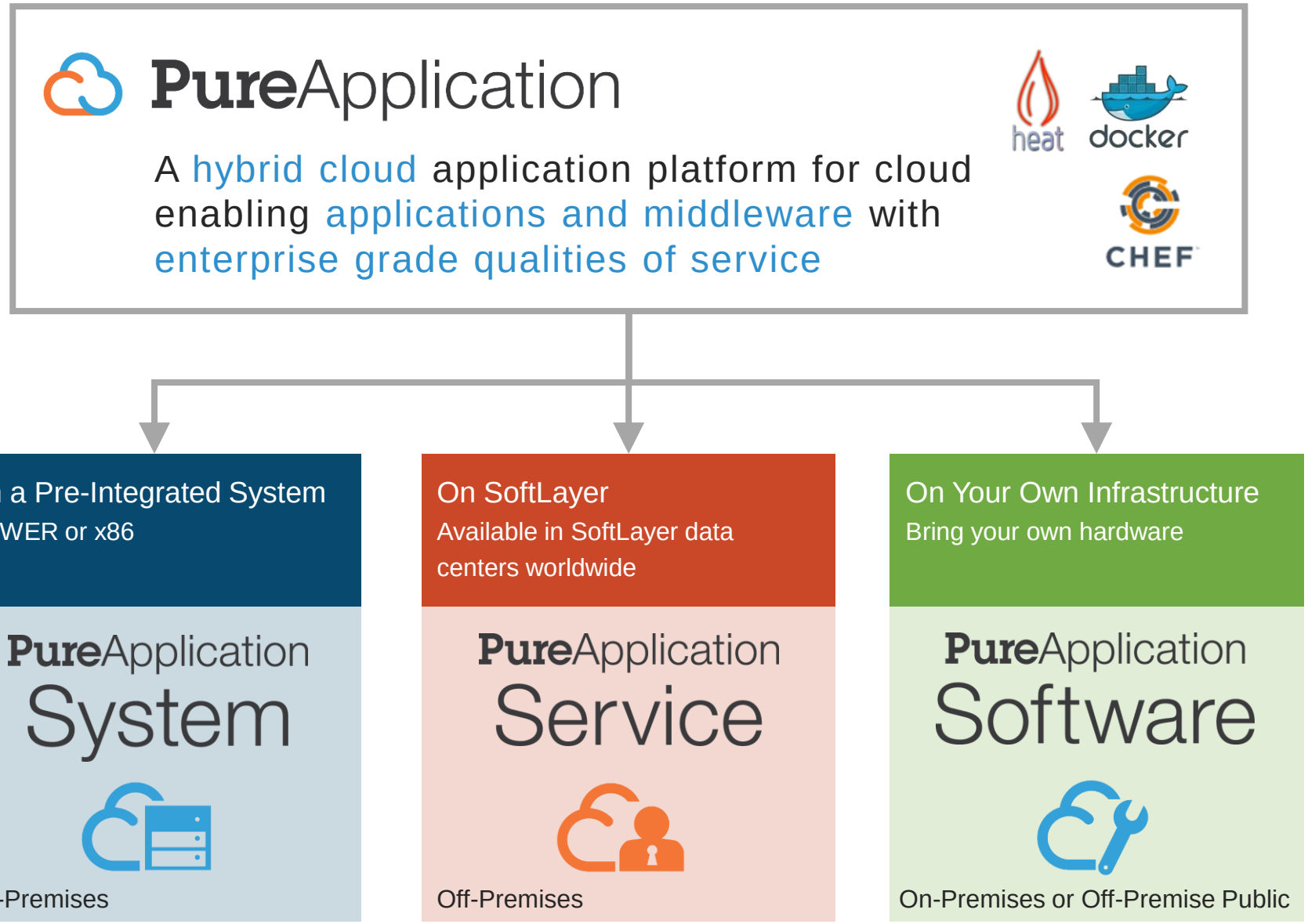
IBM Pure Application Platform Options Detail

Pure Application System

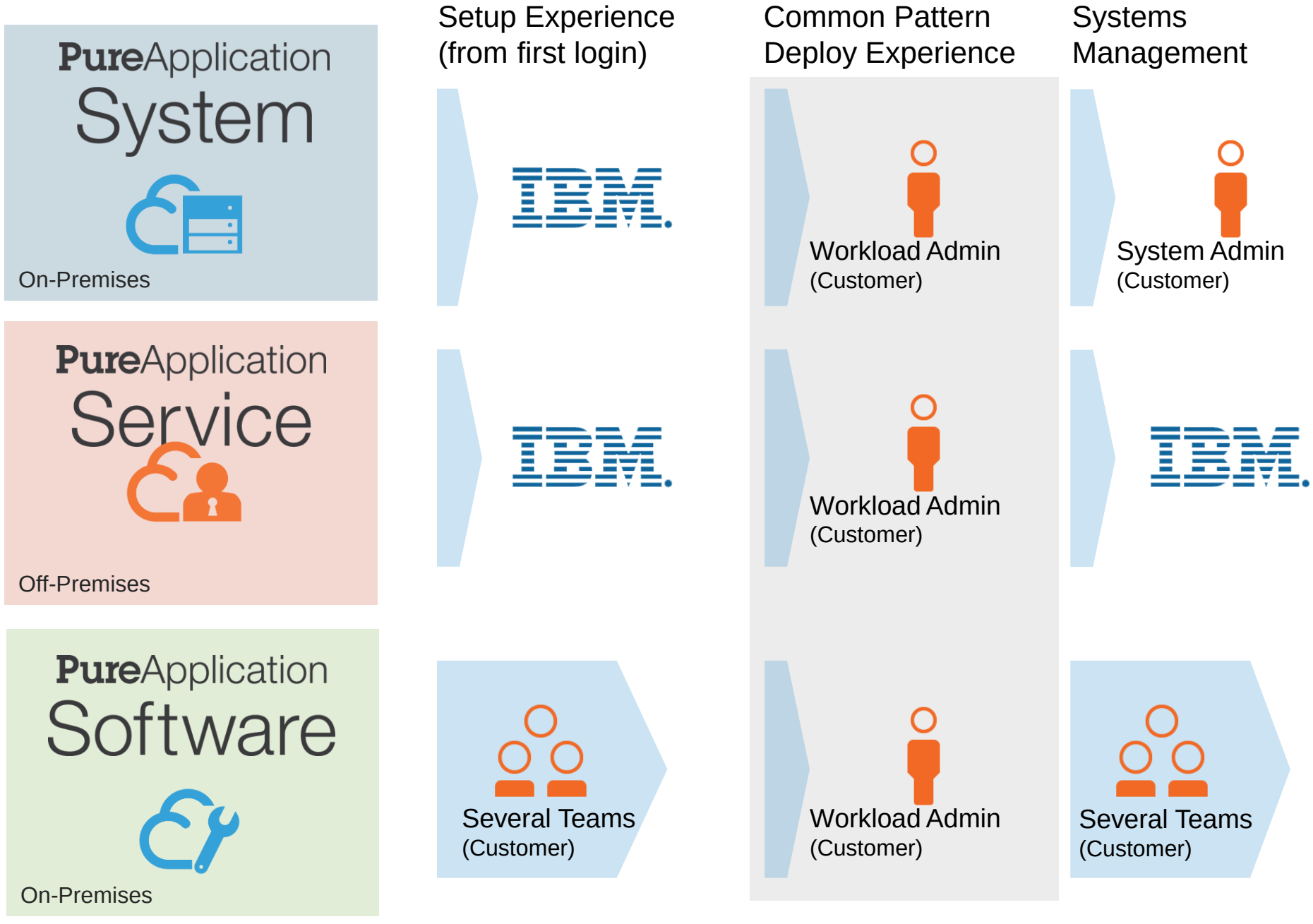
Pure Application Software

Pure Application Service on Softlayer

IBM Pure Application Pattern Platform Options



IBM Pure Application Usage Experience



IBM Pure Application Service on SoftLayer

Run applications ***you have***
with the cloud economics ***you want***
and the isolation ***you need***

PureApplication Service on SOFTLAYER

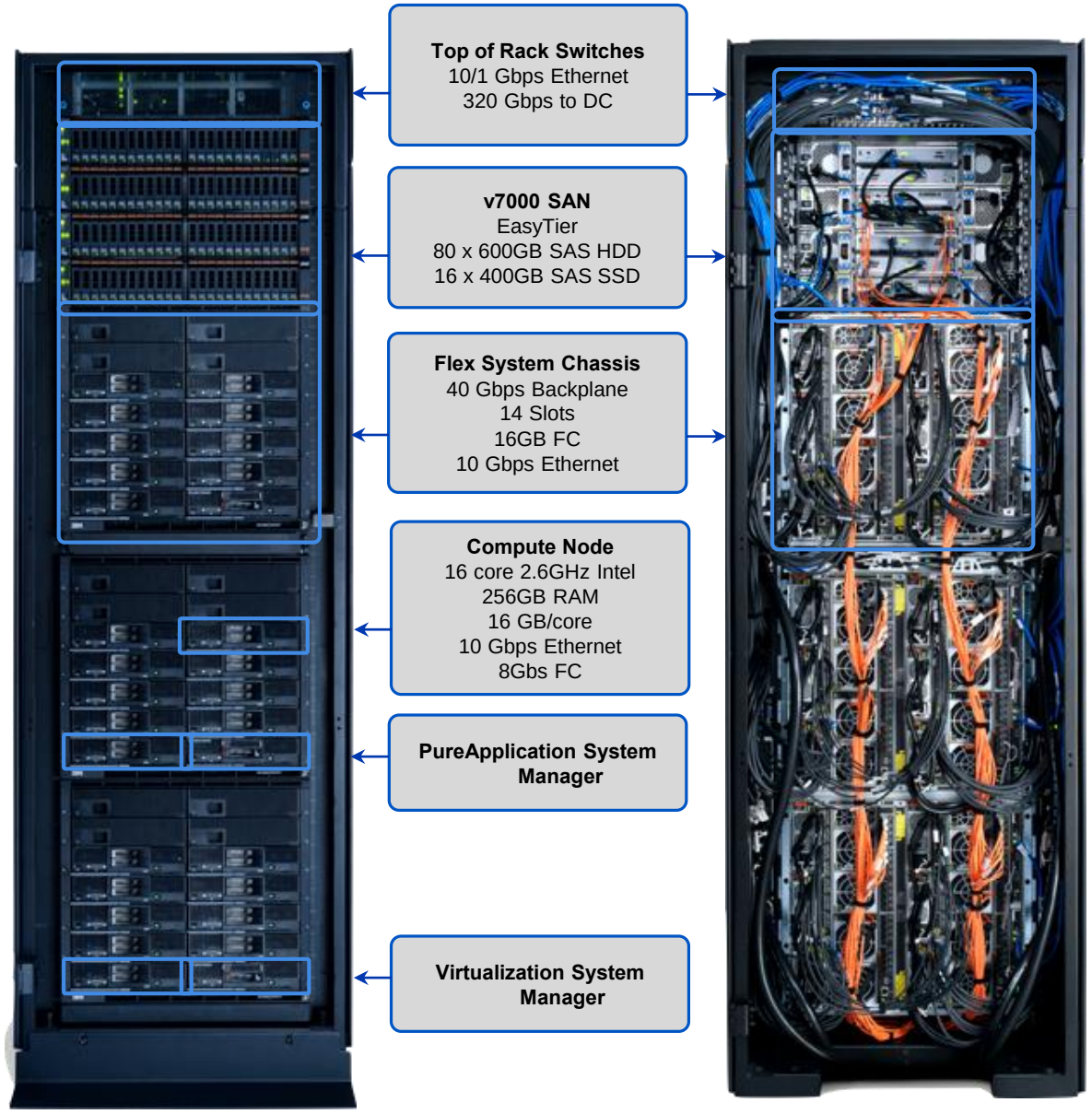
Separate	Built with dedicated SoftLayer hardware to isolate compute, network & storage to keep applications safer off-prem
Simple	Easiest way to run, scale and manage traditional enterprise applications and the underlying infrastructure
Speed	Fastest way to adopt off-prem cloud for traditional enterprise applications via Patterns
Seamless	Portability of traditional enterprise applications across on-prem and off-prem clouds without re-architecting system topology, storage, network designs, etc. via Patterns
Same	Identical interface & experience for developers & operations on-prem & off-prem

PureApplication Software

Offering at a Glance

Values	• Similar speed / simplicity as PureApp System / Service, for deploying and managing workloads: patterns, lifecycle management (scaling, monitoring, caching…) • Flexibility to run on your own HW
Differences from System or Service	• Requires install / config of the environment vs. pre-integrated PureApp System / Service experience • Does not include integration / config / management of storage, network and hypervisors. • Client owns support/maintenance of hardware, firmware, virtualization
Delivery On-premise or Public cloud	• Bring your own on premise hardware • Target public cloud hypervisor environments

Pure Application Systems



Top of Rack Switches
10/1 Gbps Ethernet
320 Gbps to DC

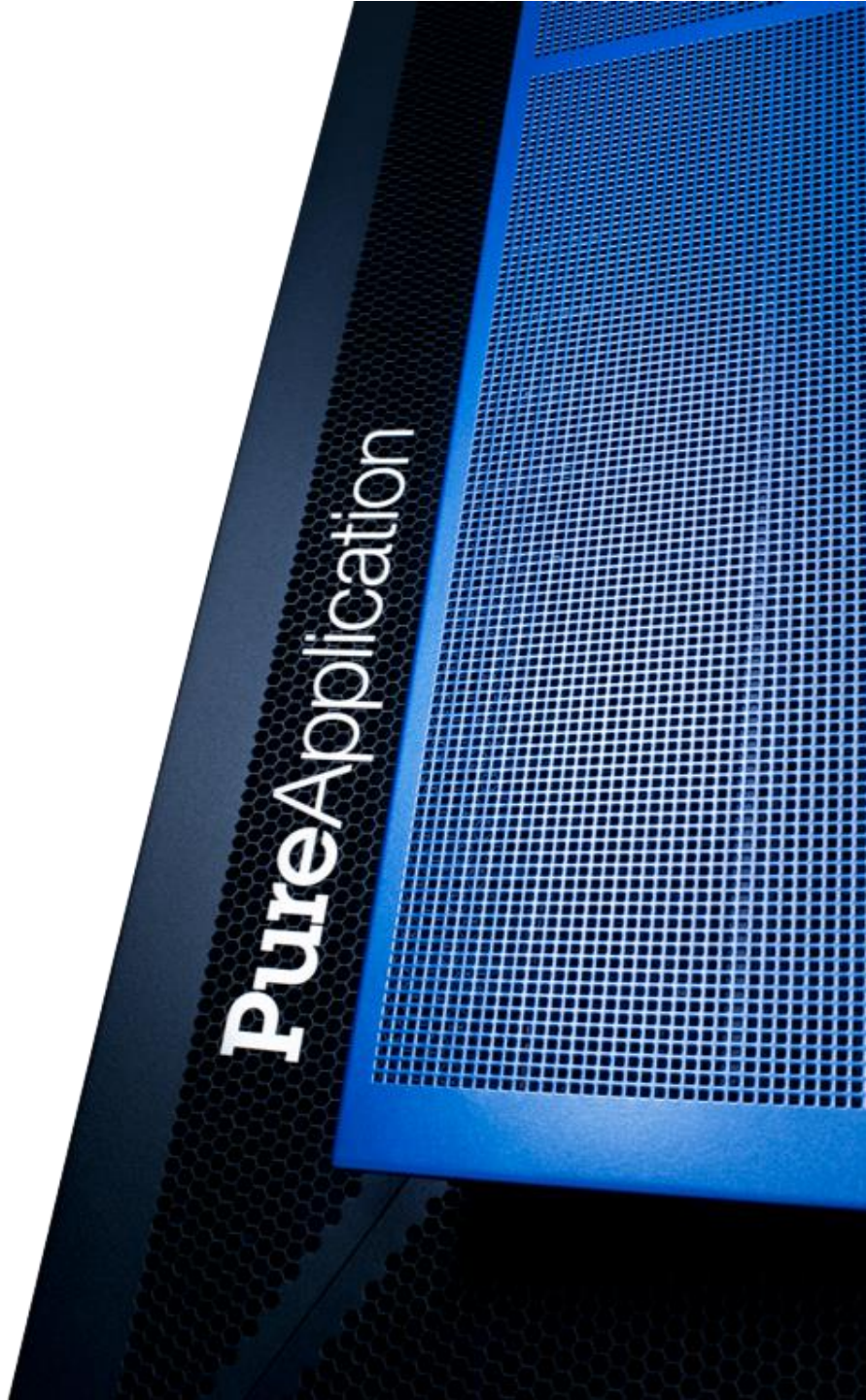
v7000 SAN
EasyTier
80 x 600GB SAS HDD
16 x 400GB SAS SSD

Flex System Chassis
40 Gbps Backplane
14 Slots
16GB FC
10 Gbps Ethernet

Compute Node
16 core 2.6GHz Intel
256GB RAM
16 GB/core
10 Gbps Ethernet
8Gbs FC

PureApplication System Manager

Virtualization System Manager

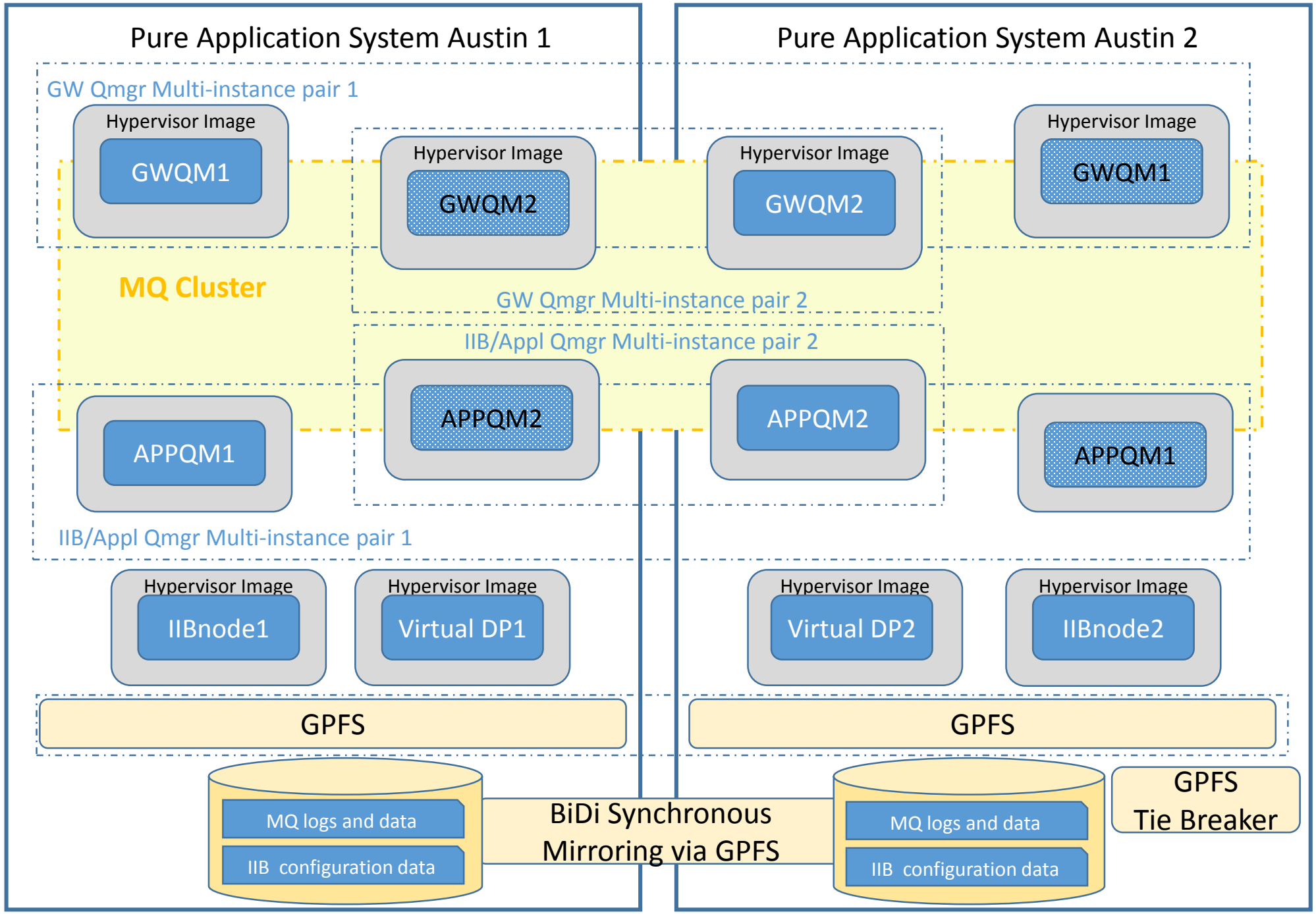


IBM Pure Application Systems Pattern for highly available middleware

Pure Application System

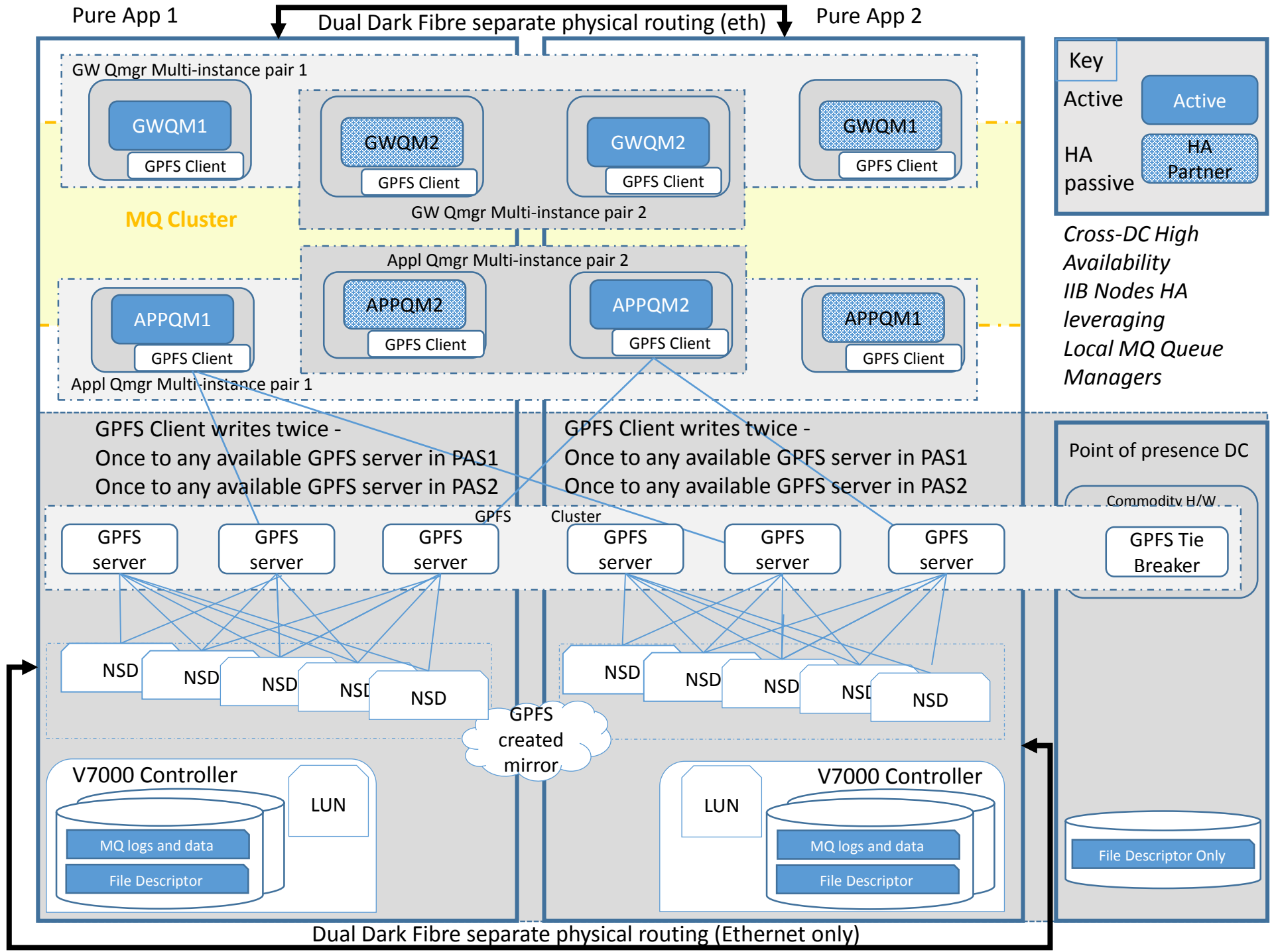
Pure Application Software

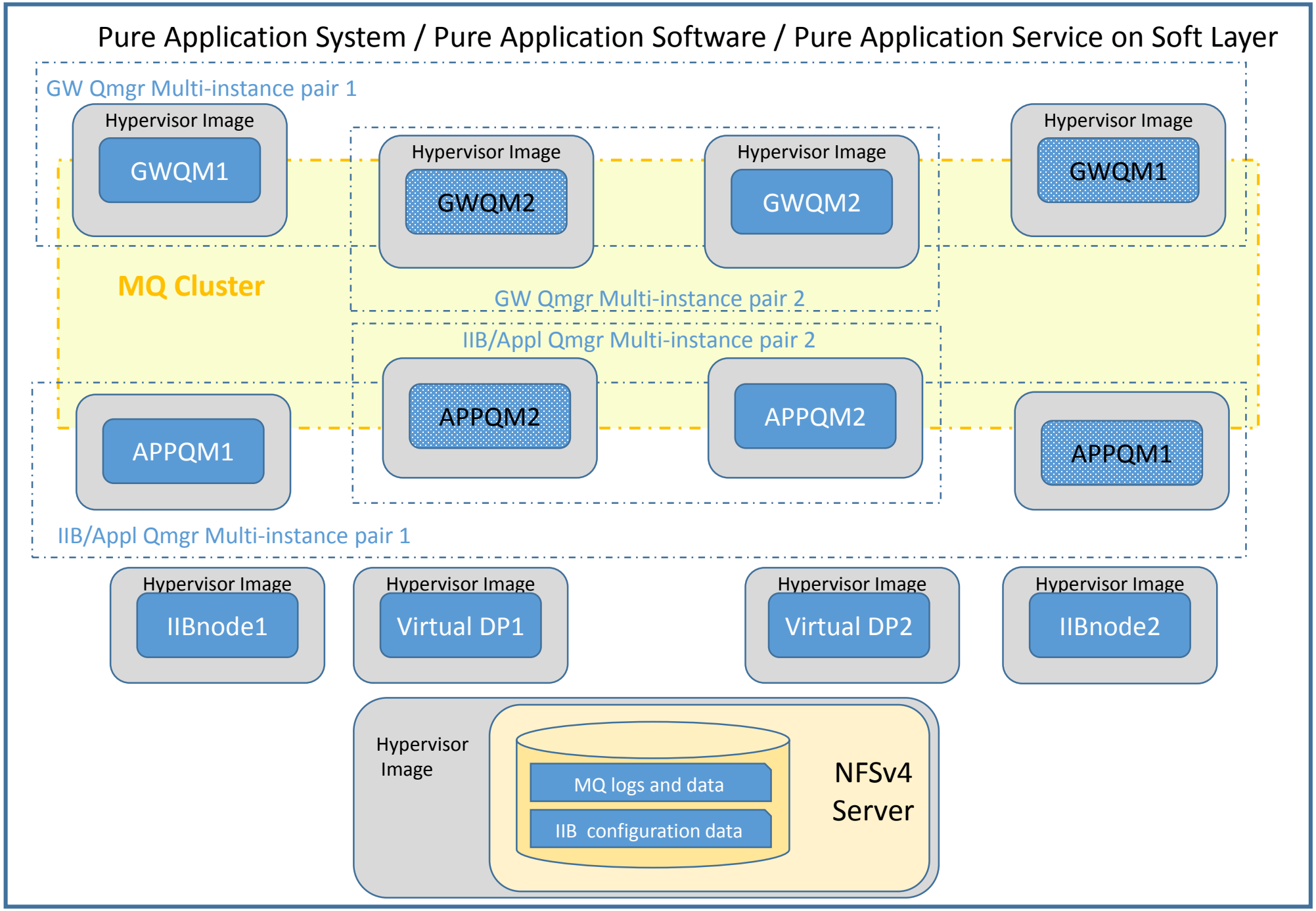
Pure Application Service on Softlayer



Production representative Architecture

- Built across PAS racks in Austin DC
- Remote HA


Pure App 1
Dual Dark Fibre separate physical routing (eth)
Pure App 2
GW Qmgr Multi-instance pair 1
GWQM1
GPFS Client
GWQM2
GPFS Client
GWQM2
GPFS Client
GWQM1
GPFS Client
GW Qmgr Multi-instance pair 2
MQ Cluster
Appl Qmgr Multi-instance pair 2
APPQM1
GPFS Client
APPQM2
GPFS Client
APPQM2
GPFS Client
APPQM1
GPFS Client
Appl Qmgr Multi-instance pair 1
Key
Active
Active
HA passive
HA Partner
Cross-DC High Availability IIB Nodes HA leveraging Local MQ Queue Managers
GPFS Client writes twice -
Once to any available GPFS server in PAS1
Once to any available GPFS server in PAS2
GPFS Client writes twice -
Once to any available GPFS server in PAS1
Once to any available GPFS server in PAS2
Point of presence DC
Commodity H/W
GPFS Cluster
GPFS server
GPFS server
GPFS server
GPFS server
GPFS server
GPFS server
GPFS Tie Breaker
NSD
NSD
NSD
NSD
NSD
NSD
NSD
NSD
NSD
NSD
GPFS created mirror
V7000 Controller
LUN
MQ logs and data
File Descriptor
V7000 Controller
LUN
MQ logs and data
File Descriptor
File Descriptor Only
Dual Dark Fibre separate physical routing (Ethernet only)



Non-Production Representative Architecture

- Single Rack Deployment
- Local HA

Pattern detail

- Time to provision full environment – 30 mins
- Network Address resolution - All nodes resolve IP Addresses at instantiation time
- Middleware is auto started and ready to transact.
- MQ configuration
  - Active/Active MQ Queue Managers Clustered for load balancing
    - 2 full repository and 2 partial repository queue managers configured
    - Gateway (APP) queue managers share EQn queues (defined as persistent) in the cluster
    - Application queue managers share RQn queues (defined as persistent) in the cluster
  - All Active nodes have HA partner via MQ Multi-instance support for auto failover and recovery
  - MQ Queues - All APP queues created
  - MQ Channels - All Cluster, Client and Server Connection channels created
  - MQ Security (on by default) – is disabled for channel connections
- IIB Configuration
  - Both IIB nodes service both Application Qmgrs
    - CCDT created at instantiation time is used to resolve both Application Qmgrs (primaries and standbys).
    - Client auto-reconnect caters for queue manager failover
  - Servicing message flows deployed and started as part of instantiation.
- Datapower Virtual Appliances are created but not configured
  - Pre-configured Datapower Virtual Appliances could be used in the pattern

MQ Explorer and IIB Toolkit view of the pattern

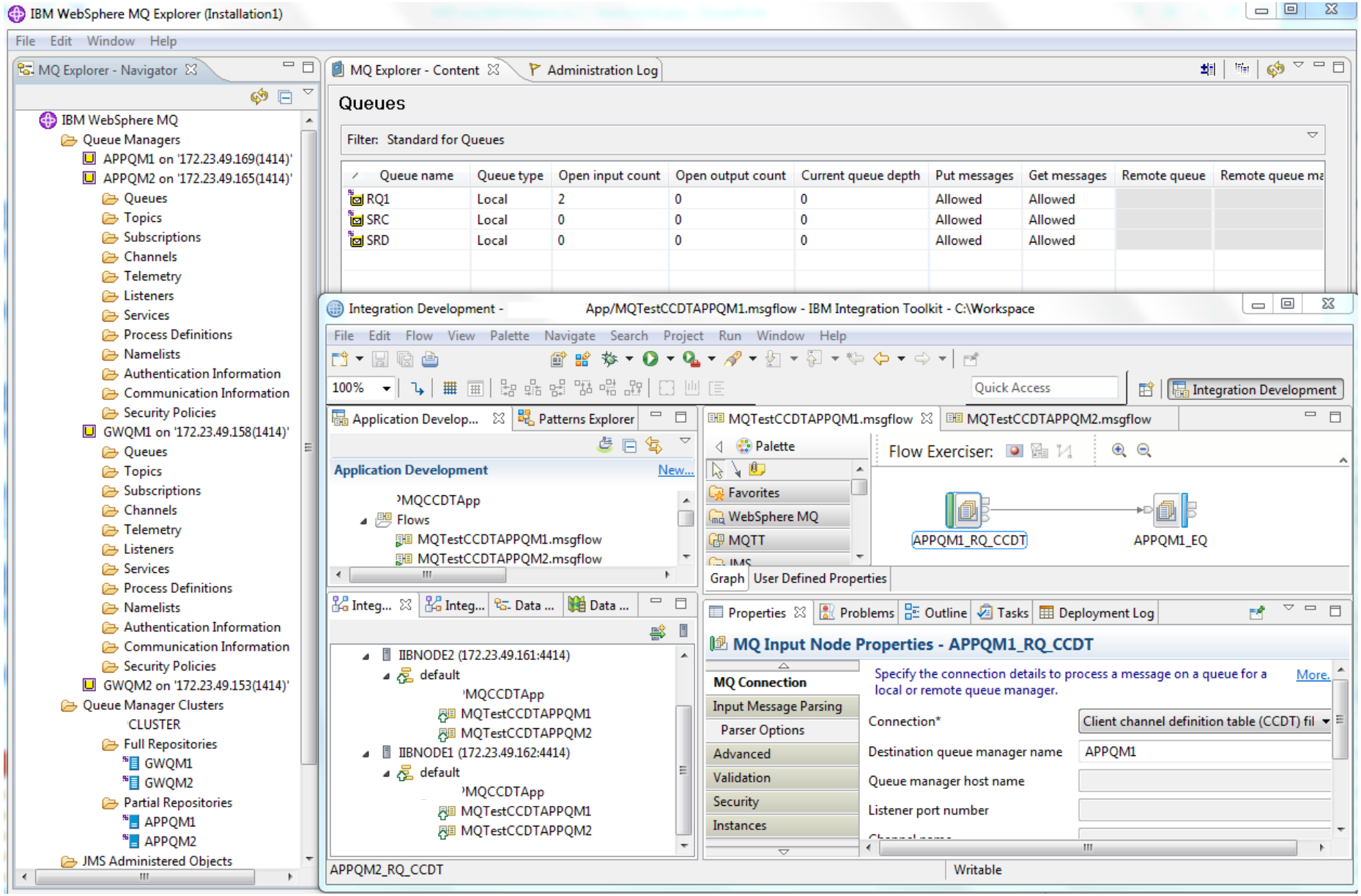
Open input count =2
Indicates the MQInput nodes
In the message flows in each IIB
Node servicing the RQs on the
Application queue managers

Cluster load balances

- Outbound through EQs on GW Qmgrs
- Inbound through RQs on APP Qmgrs

Persistent messages on RQ/EQ
Recovered to standby queue
Manager instances using MQ
Multi-instance Queue Managers

All MQ client and cluster channels
Auto-reconnect on failover



Pure Application view of the middleware nodes

NPP IIB and MQ GW and APP with HA on NFS

Refresh | Start | Stop | Manage | Maintain | Resume

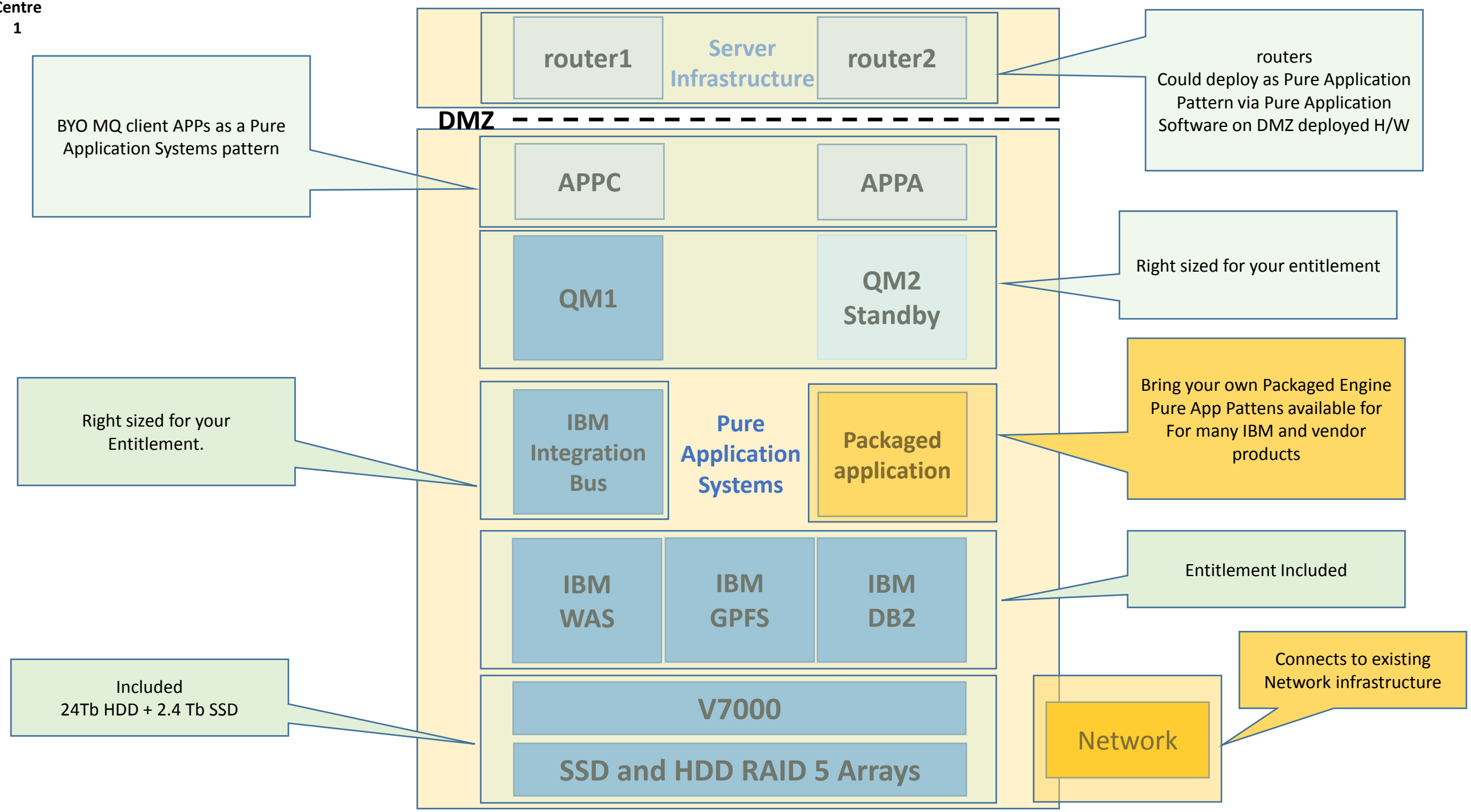
	Name	Public IP	VM Status	CPU	Memory	Action
⊞	APPQM1P. 11442377691602	172.23.49.183	Running	1%	19%	Manage
⊞	APPQM1S. 11442377691601	172.23.49.169	Running	1%	21%	Manage
⊞	APPQM2P. 11442377691596	172.23.49.163	Running	1%	20%	Manage
⊞	APPQM2S. 11442377691597	172.23.49.165	Running	1%	20%	Manage
⊞	GWQM1P. 11442377691592	172.23.49.157	Running	1%	19%	Manage
⊞	GWQM1S. 11442377691593	172.23.49.158	Running	1%	21%	Manage
⊞	GWQM2P. 11442377691590	172.23.49.152	Running	1%	22%	Manage
⊞	GWQM2S. 11442377691591	172.23.49.153	Running	1%	20%	Manage
⊞	IIBNode1. 11442377691595	172.23.49.162	Running	1%	38%	Manage
⊞	IIBNode2. 11442377691594	172.23.49.161	Running	1%	38%	Manage
⊞	NFS_Server_node. 11442377691600	172.23.49.166	Running	1%	30%	Manage
⊞	VirtDP_XG45_ NonProd1. 11442377691599	172.23.49.151	Running	Unknown	Unknown	Manage
⊞	VirtDP_XG45_ NonProd2.	172.23.49.150	Running	Unknown	Unknown	Manage

Summary

- Speed and repeatability of provisioning
  - Production stack approximately 30 nodes
    - Gateway client components – minimum of 4 nodes
    - IBM MQ – minimum of 4 nodes
    - Packaged processing, middleware – 20+ nodes
- Infrastructure
  - Leverage on-board storage and shared file systems – IBM PAS / MQ Appliance
- Operational Efficiency
  - Post go-live
    - Rapidly react to APP v.Next six monthly delivery cycles.
    - Life cycle management
    - Version Control of scripts
    - Patching and upgrade management

Data Centre 1

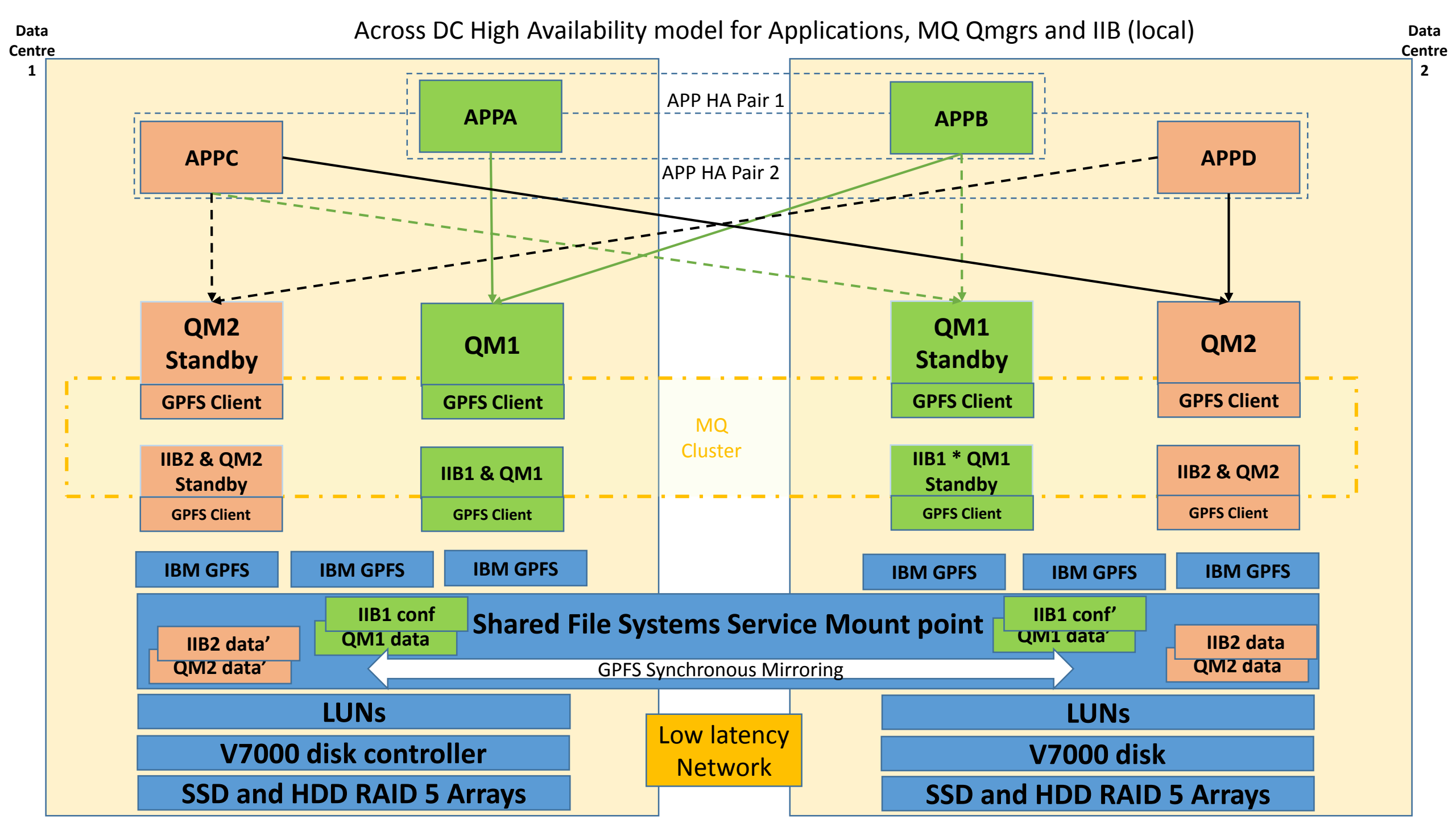
Components that an organization is responsible for deploying, operating and maintaining

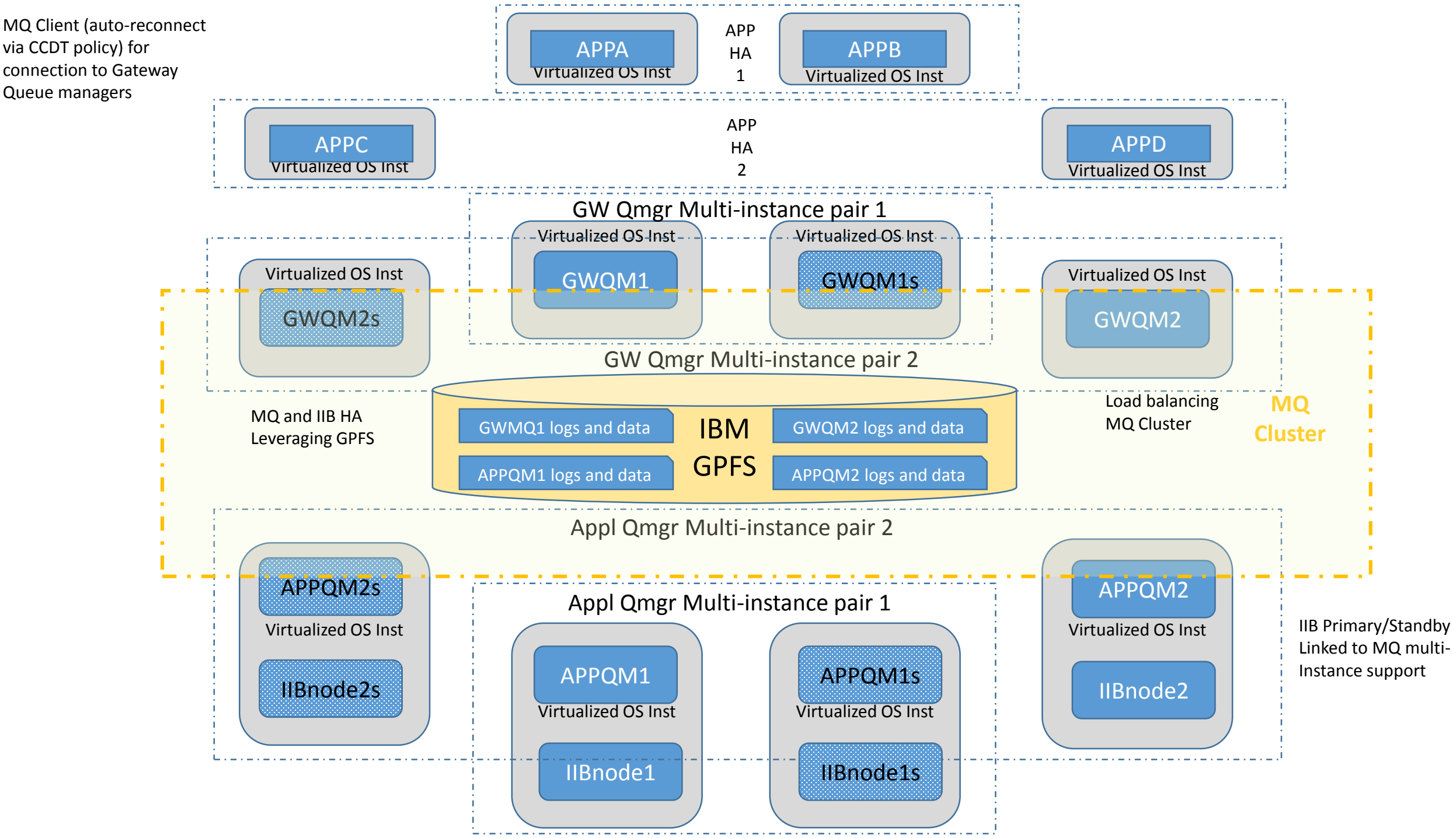


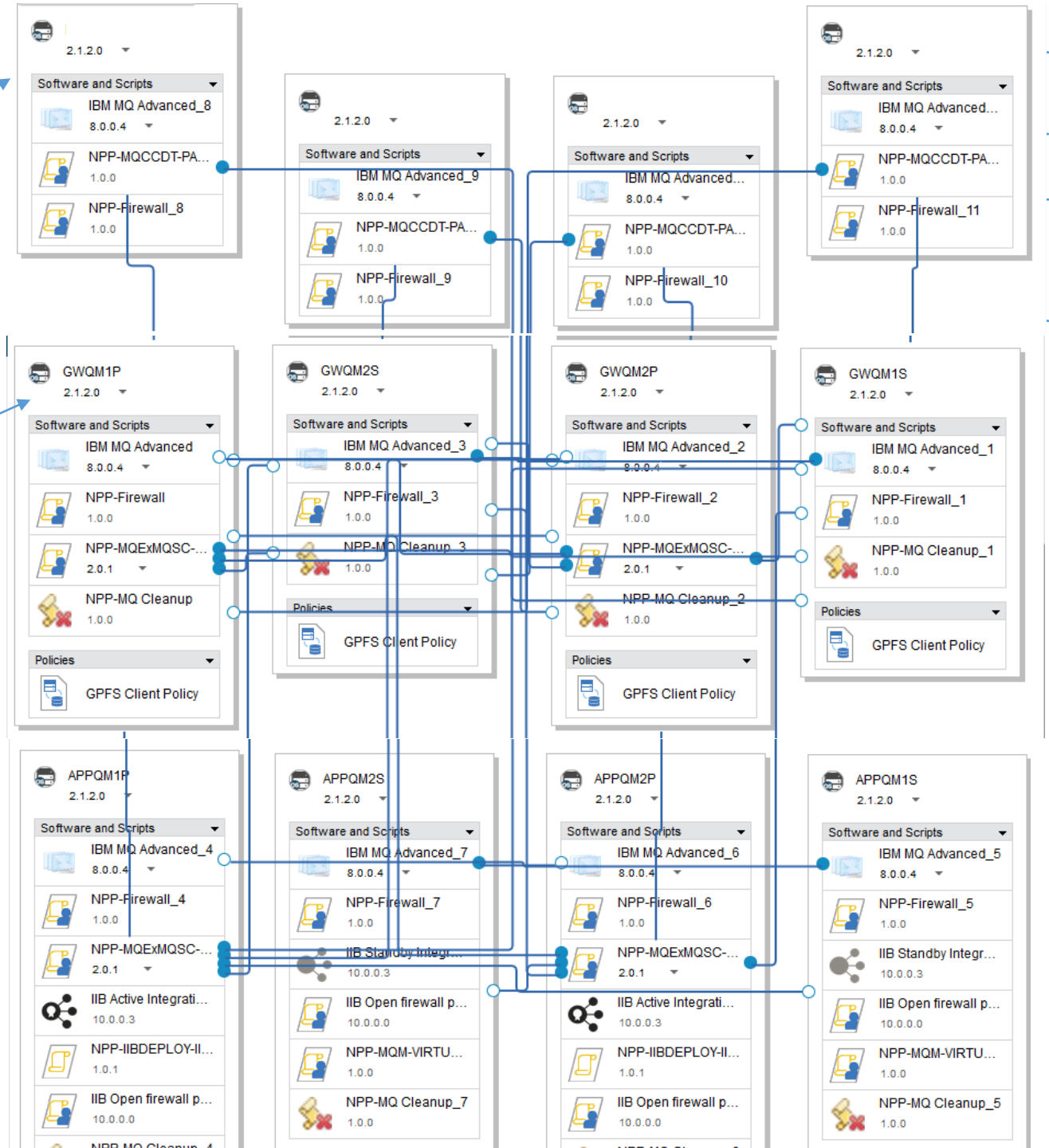
Example Across Data Centre HA Configurations

1) IIB locally bound to Application queue managers leveraging IBM GPFS

Note: the use of IIB multi-instance with MQ for HA is not dependent on IBM GPFS, GPFS was just chosen in this example.


Data Centre 1
Across DC High Availability model for Applications, MQ Qmgrs and IIB (local)
Data Centre 2
APP HA Pair 1
APP HA Pair 2
APPA
APPB
APPC
APPD
QM2 Standby
QM1
QM1 Standby
QM2
GPFS Client
MQ Cluster
IIB2 & QM2 Standby
IIB1 & QM1
IIB1 * QM1 Standby
IIB2 & QM2
IBM GPFS
Shared File Systems Service Mount point
IIB1 conf
QM1 data
IIB2 data'
QM2 data'
IIB1 conf'
QM1 data'
IIB2 data
QM2 data
GPFS Synchronous Mirroring
LUNs
V7000 disk controller
SSD and HDD RAID 5 Arrays
Low latency Network
LUNs
V7000 disk
SSD and HDD RAID 5 Arrays


MQ Client (auto-reconnect via CCDT policy) for connection to Gateway Queue managers
APPA
Virtualized OS Inst
APP HA 1
APPB
Virtualized OS Inst
APPC
Virtualized OS Inst
APP HA 2
APPD
Virtualized OS Inst
GW Qmgr Multi-instance pair 1
Virtualized OS Inst
GWQM1
Virtualized OS Inst
GWQM1s
Virtualized OS Inst
GWQM2s
Virtualized OS Inst
GWQM2
GW Qmgr Multi-instance pair 2
MQ and IIB HA Leveraging GPFS
GWMQ1 logs and data
IBM GPFS
GWQM2 logs and data
APPQM1 logs and data
APPQM2 logs and data
Load balancing MQ Cluster
MQ Cluster
Appl Qmgr Multi-instance pair 2
APPQM2s
Virtualized OS Inst
IIBnode2s
Appl Qmgr Multi-instance pair 1
APPQM1
Virtualized OS Inst
IIBnode1
APPQM1s
Virtualized OS Inst
IIBnode1s
APPQM2
Virtualized OS Inst
IIBnode2
IIB Primary/Standby Linked to MQ multi-Instance support



APP VMs
With MQ Client setup

APP Gateway
Queue Managers
In HA pairs

Application and
Integration Queue
Managers + IIB
In HA Pairs

Clustered with
Gateway Queue
managers

Virtual Machines (VMs)

Installed product

Script applications for
Product configuration

IP address resolution
Between VM nodes

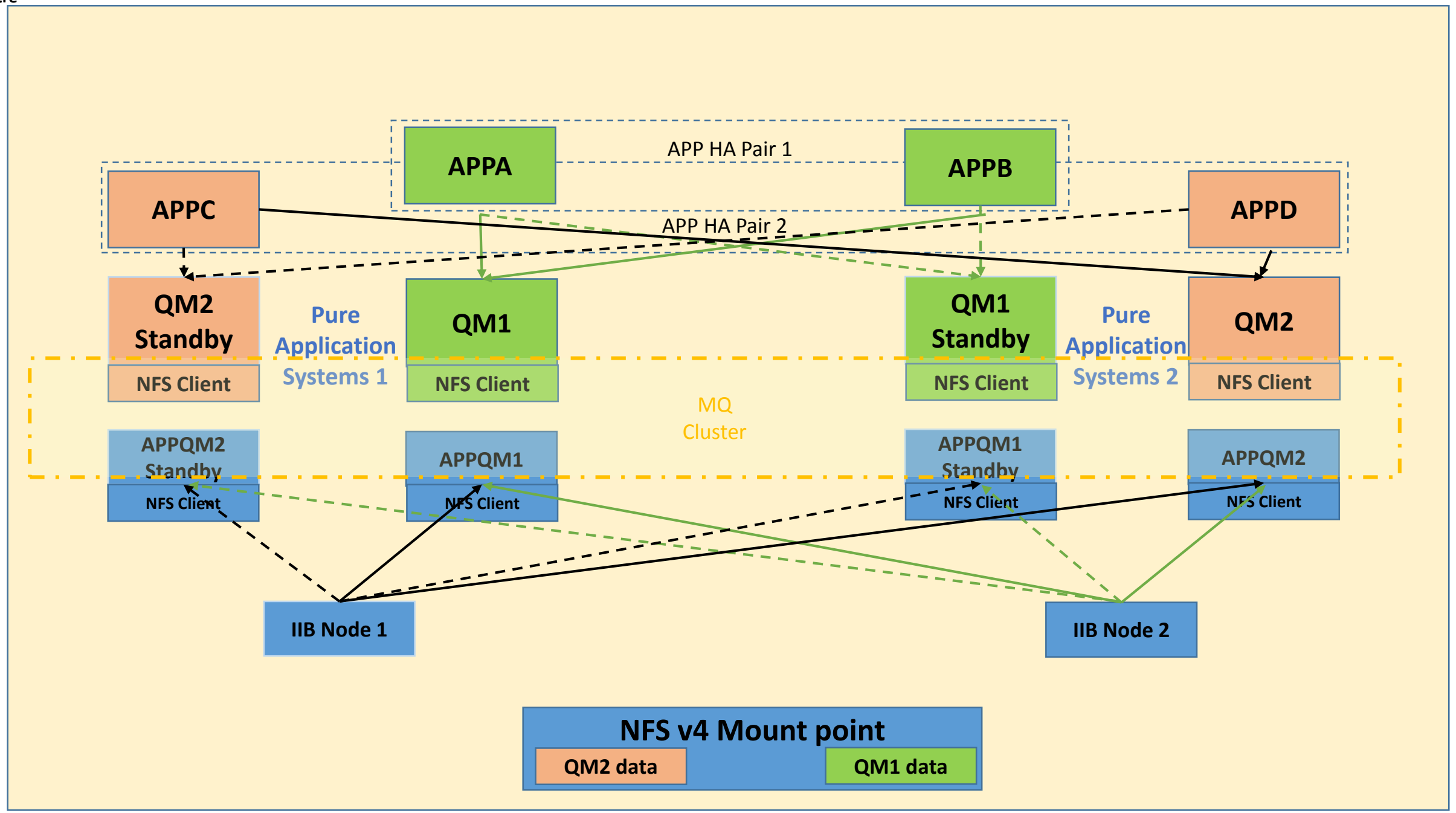
IBM Pure App Pattern
Leveraging IIB Multi-instance

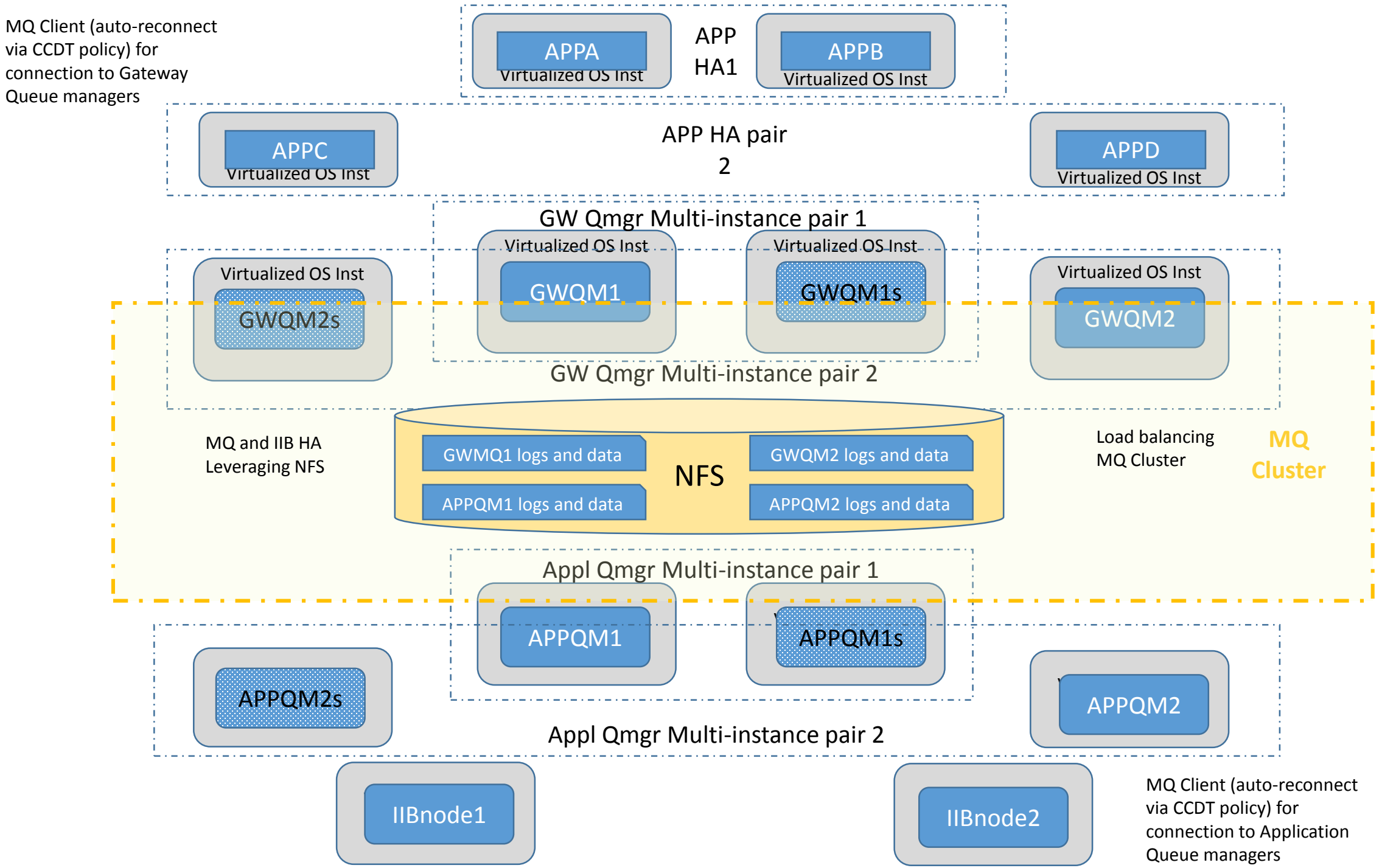
Intra Data Centre HA Configurations

2) IIB Client bound to Application queue managers leveraging NFS

Note: the use of IIB client via CCDT with MQ for HA is not dependent on NFS. NFS was just chosen in this example.

High Availability model for APPs and MQ Queue Managers – NFSv4 Server

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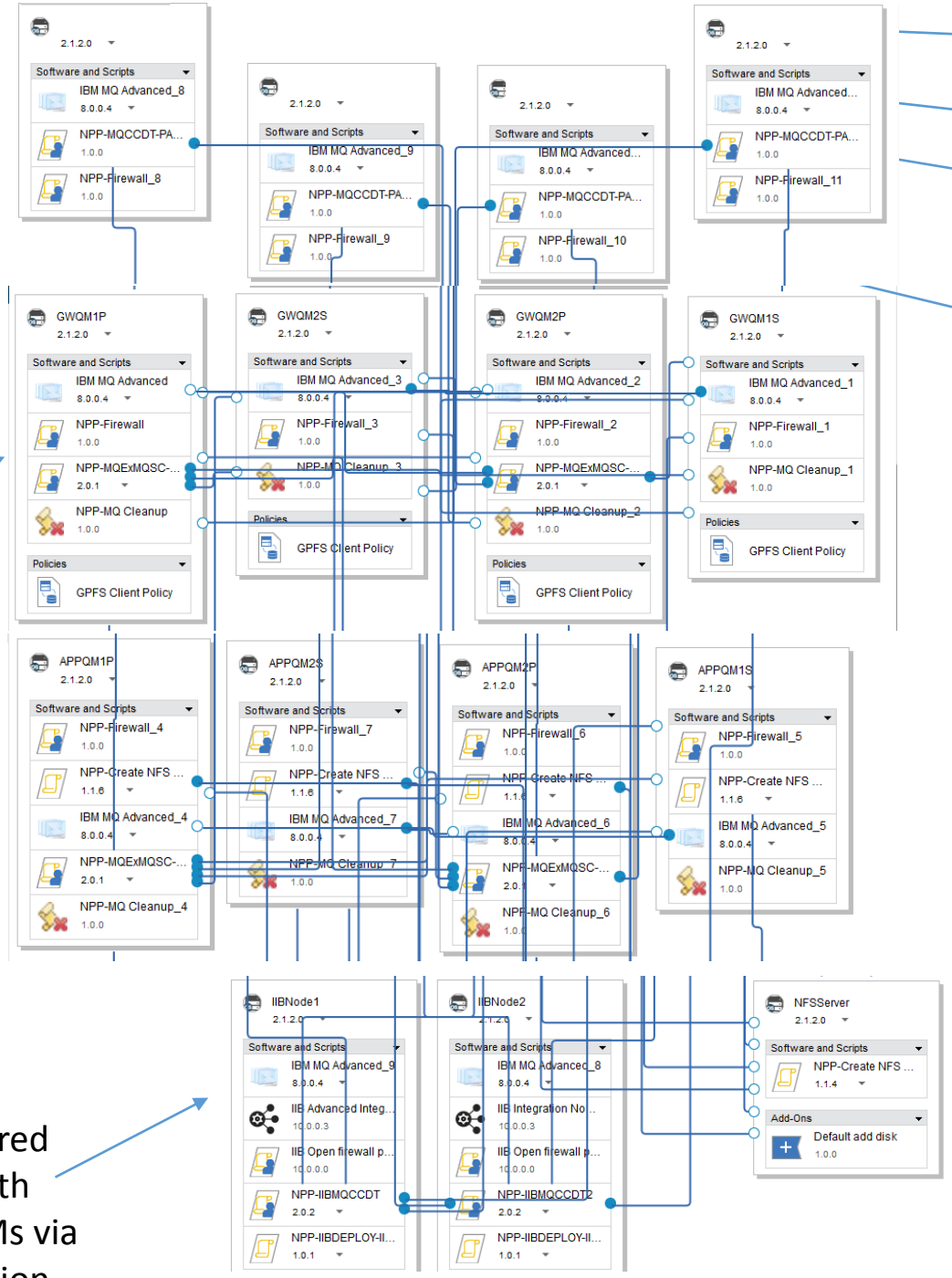
Virtualized OS Inst
APP HA1
APPB
Virtualized OS Inst
APP HA pair 2
APPC
Virtualized OS Inst
APPD
Virtualized OS Inst
GW Qmgr Multi-instance pair 1
Virtualized OS Inst
GWQM1
Virtualized OS Inst
GWQM1s
Virtualized OS Inst
GWQM2s
Virtualized OS Inst
GWQM2
GW Qmgr Multi-instance pair 2
MQ and IIB HA Leveraging NFS
GWMQ1 logs and data
NFS
GWQM2 logs and data
APPQM1 logs and data
APPQM2 logs and data
Load balancing MQ Cluster
MQ Cluster
Appl Qmgr Multi-instance pair 1
APPQM1
APPQM1s
APPQM2s
APPQM2
Appl Qmgr Multi-instance pair 2
IIBnode1
IIBnode2
MQ Client (auto-reconnect via CCDT policy) for connection to Application Queue managers


Virtual Machines (VMs)
Installed product
Script packages for
Product configuration
IP address resolution
Between VM nodes
APP VMs
With MQ Client setup
APP Gateway
Queue Managers
In HA pairs
Application and
Integration Queue
Managers Clustered
With Gateway Queue
managers
2 Identically configured
IIB nodes service both
Service both APPQMs via
CCDT Client connection
IBM Pure App Pattern
Remote IIB with NFS