IBM MQFT
An Overview and Usage

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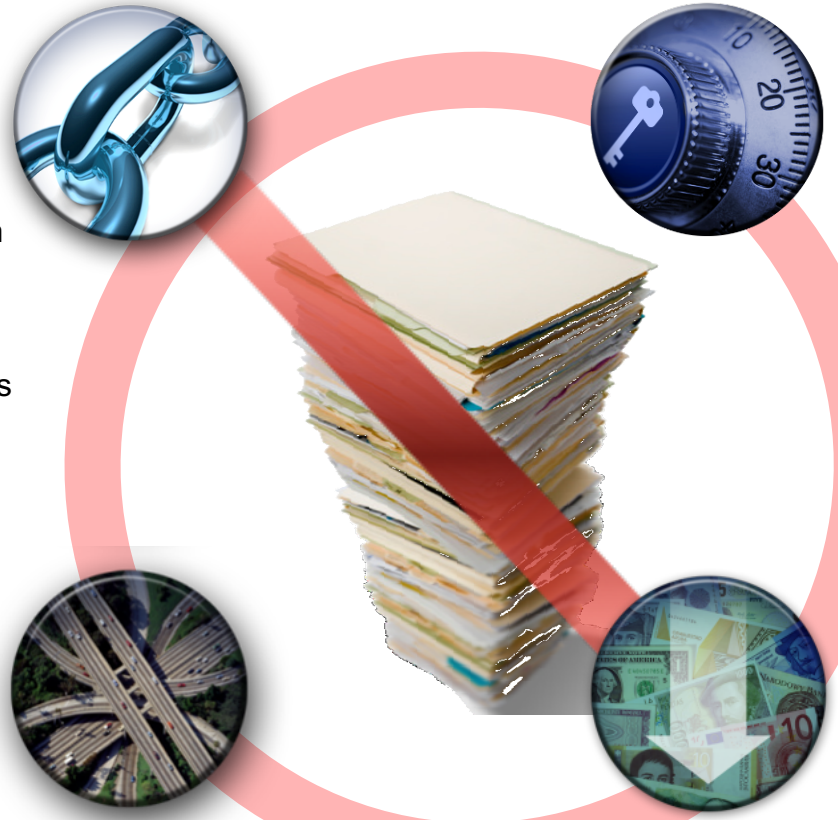
Who Am I?

- Barry Lamkin
- Army Helicopter Pilot 1967 – 1971
- Air Traffic Controller 1973 - 1981
- MVS (aka z/OS) Systems Programmer 1981 – 1994
- Candle Systems Engineer 1994 – 2004
- IBM Executive IT Specialist 2004 – whenever

Agenda

- Common problems transferring file data
- Introduction to MQ Managed File Transfer
- Key MQ Managed File Transfer concepts
- Usage scenarios for MQ Managed File Transfer

Shortcomings of Basic FTP



Limited Reliability

- Unreliable delivery – Lacking checkpoint restart – Files can be lost
- Transfers can terminate without notification or any record – corrupt or partial files can be accidentally used
- File data can be unusable after transfer – lack of Character Set conversion

Limited Security

- Often usernames and passwords are sent with file – as plain text!
- Privacy, authentication and encryption often not be available
- Non-repudiation often lacking

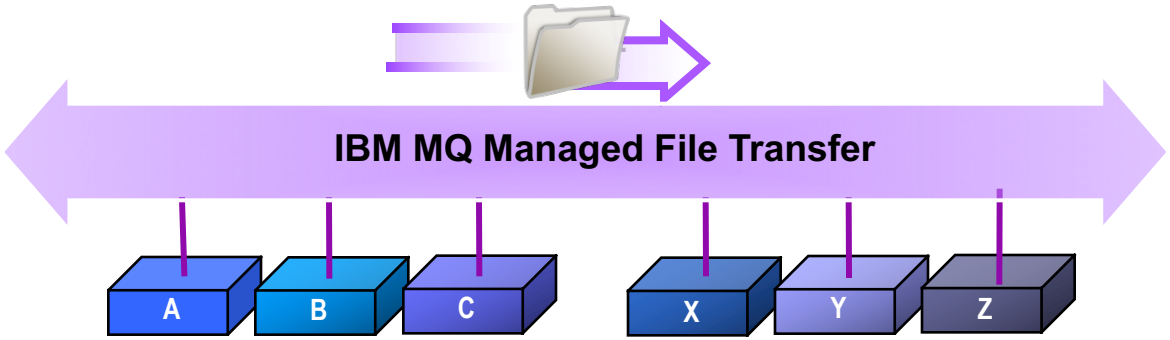
Limited Flexibility

- Changes to file transfers often require updates to many ftp scripts that are typically scattered across machines and require platform-specific skills to alter
- All resources usually have to be available concurrently
- Often only one ftp transfer can run at a time
- Typically transfers cannot be prioritized

Limited visibility and traceability

- Transfers cannot be monitored and managed centrally or remotely
- Logging capabilities may be limited and may only record transfers between directly connected systems
- Cannot track the entire journey of files – not just from one machine to the next but from the start of its journey to its final destination

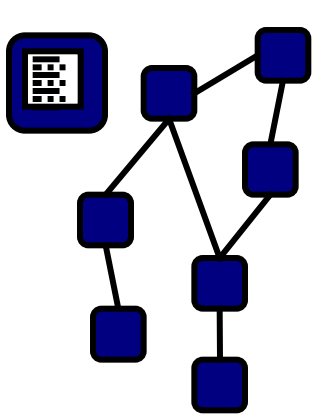
What is IBM MQ Managed File Transfer?



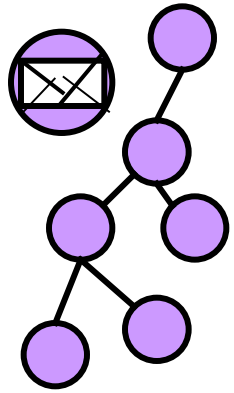
☑ **Auditable**	Full logging and auditing of file transfers + archive audit data to a database
☑ **Reliable**	Checkpoint restart. Exploits solid reliability of IBM MQ
☑ **Secure**	Protects file data in transit using SSL. Provides end-to-end encryption using AMS
☑ **Automated**	Providing scheduling and file watching capabilities for event-driven transfers
☑ **Centralized**	Provides centralized monitoring and deployment of file transfer activities
☑ **Any file size**	Efficiently handles anything from bytes to terabytes
☑ **Integrated**	Integrates with IIB, WSRR, ITCAMs for Apps, DataPower + Connect:Direct
☑ **Cost Effective**	Reuses investment in IBM MQ. Wide range of support (inc. z/OS and IBM i)

A consolidated transport for both files and messages

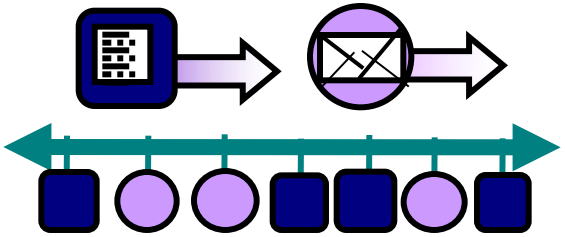
- **Traditional approaches to file transfer result in parallel infrastructures**
  - One for files – typically built on FTP
  - One for application messaging – based on IBM MQ, or similar
- **High degree of duplication in creating and maintaining the two infrastructures**
- **Managed File Transfer reuses the MQ network for managed file transfer and yields:**
  - Operational savings and simplification
  - Reduced administration effort
  - Reduced skills requirements and maintenance



File Transfers



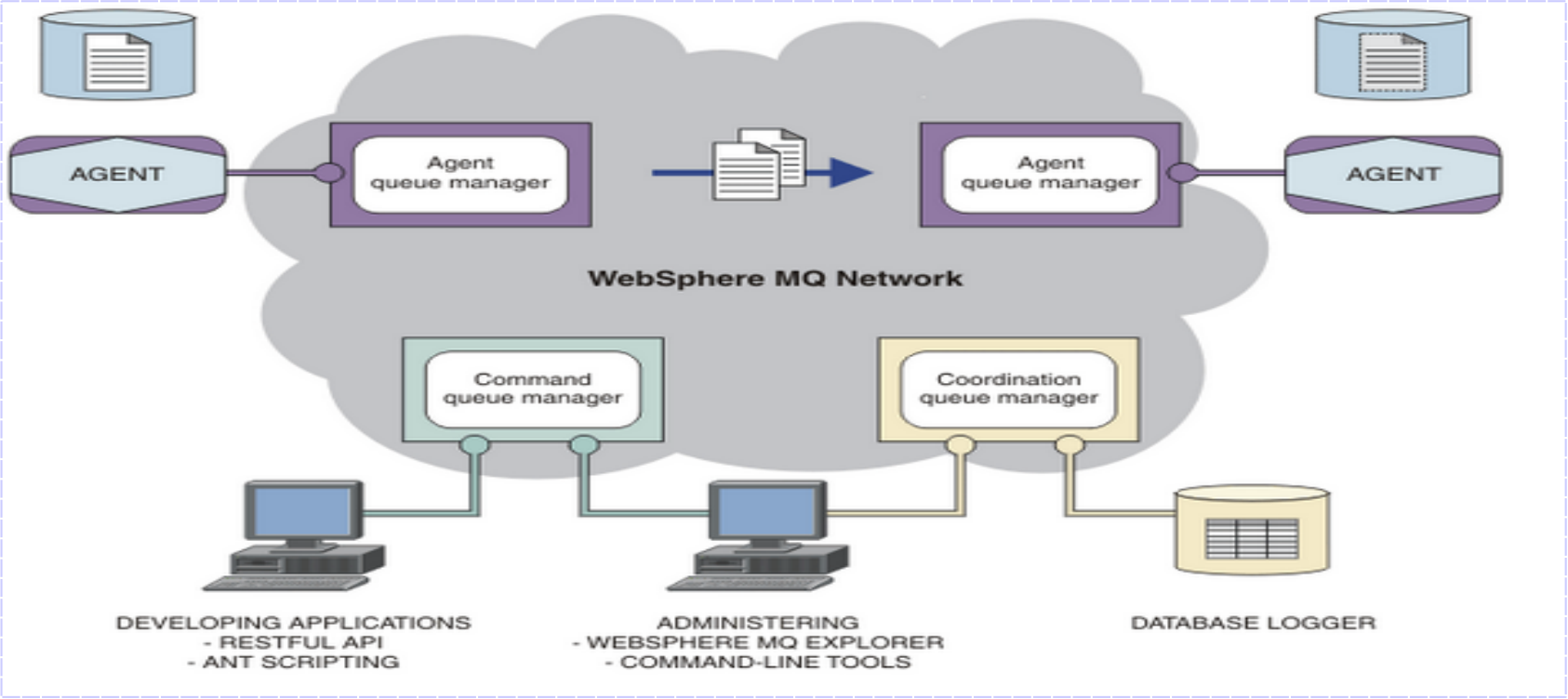
Application Messaging



Consolidated Transport for Messages & Files

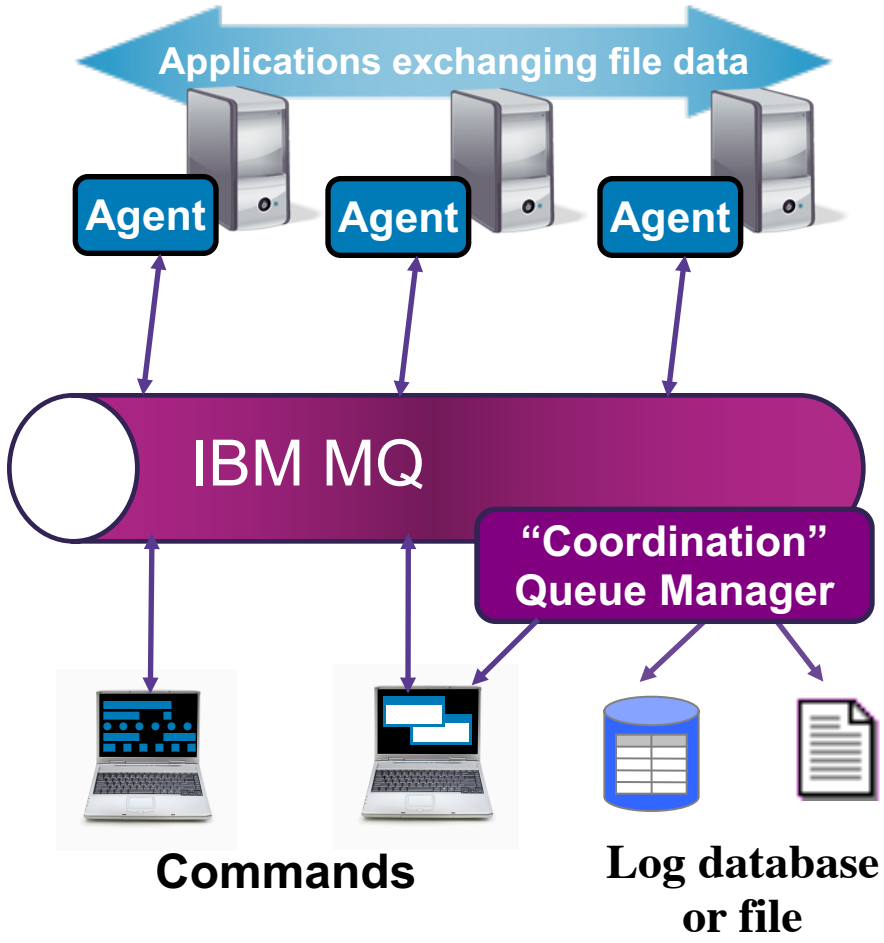
What is MQMFT

- WebSphere MQ Managed File Transfer (MQMFT) transfers files between systems in a managed and auditable way, regardless of file size or the operating systems used.



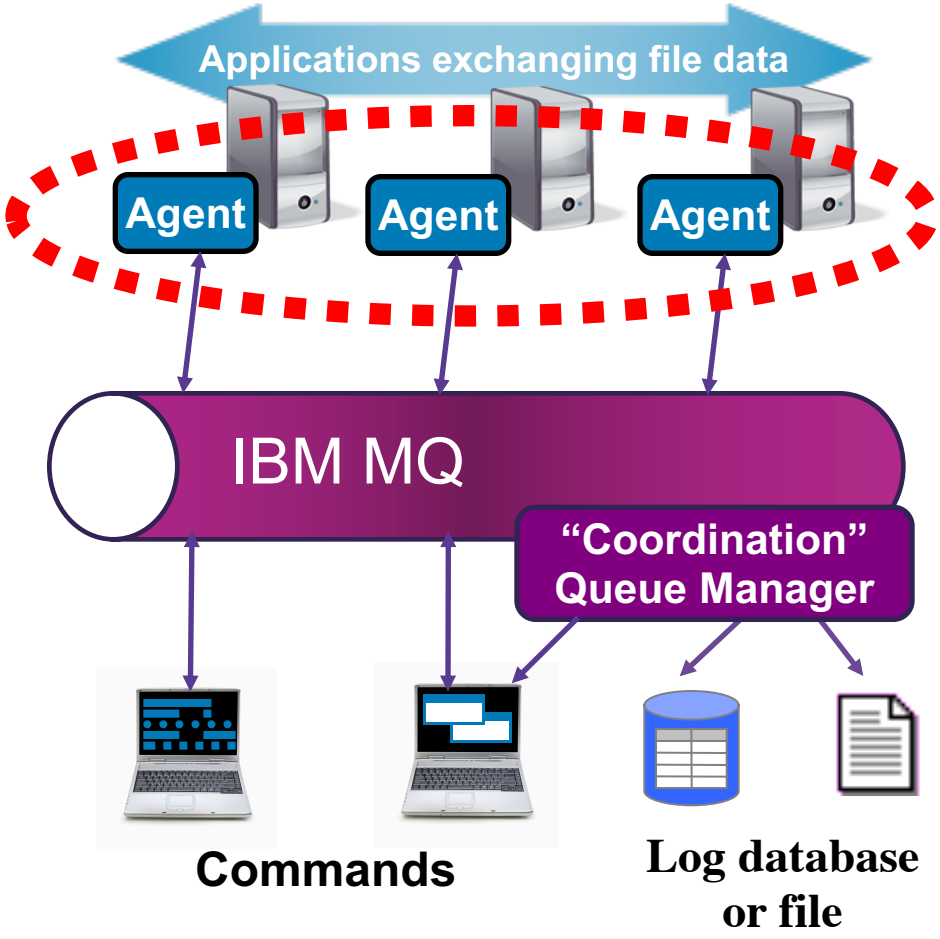
Components of a typical WMQ MFT network

- **Agents**
  - The endpoints for managed file transfer operations
- **Commands**
  - Send instructions to agents
- **Log database or file**
  - A historical record of file transfers
- **Coordination queue manager**
  - Gathers together file transfer events



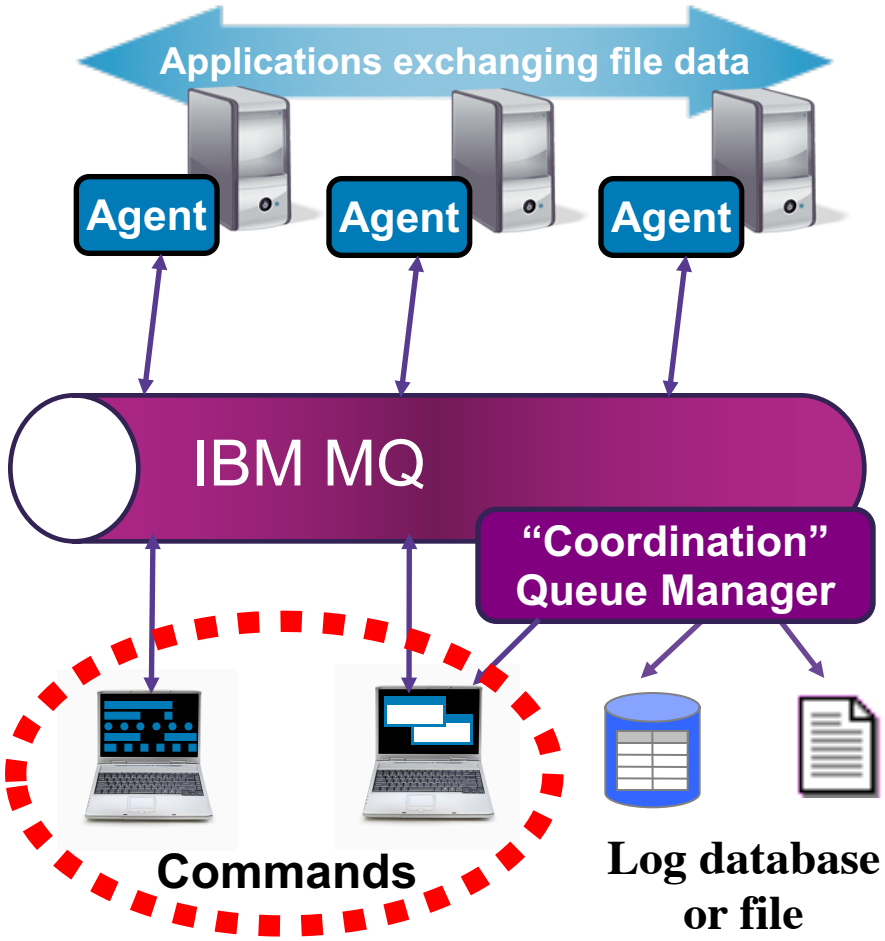
Agents

- **Act as the end points for file transfers**
- **Long running MQ applications that transfer files by splitting them into MQ messages**
  - Efficient transfer protocol avoids excessive use of MQ log space or messages building up on queues
- **Multi-threaded file transfers**
  - Can both send and receive multiple files at the same time
- **Generate a log of file transfer activities which is sent to the "coordination queue manager"**
  - This can be used for audit purposes
- **Associated with one particular queue manager**
  - Agent state on queues



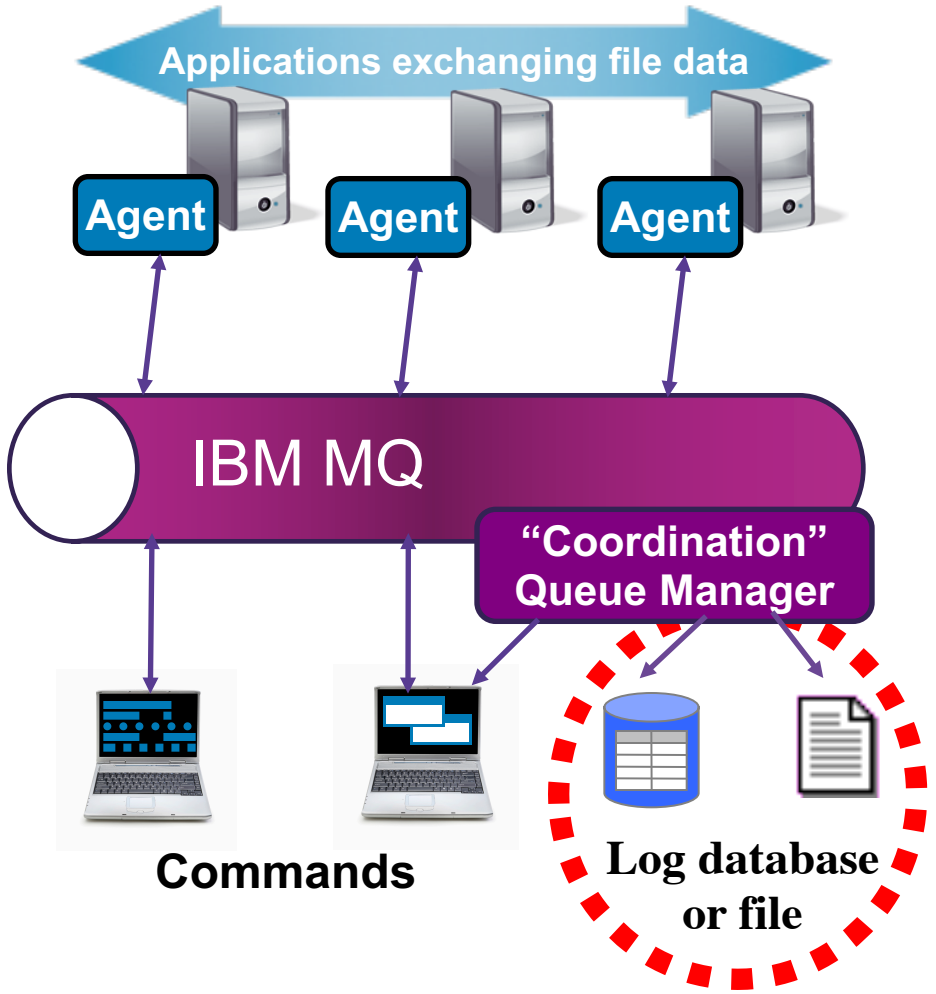
Commands

- **Send instructions to agents and display information about agent configuration**
  - Via MQ messages
- **Many implementations of commands:**
  - MQ Explorer plug-in
  - Command line programs
  - Open scripting language
  - JCL
  - Documented interface to program to



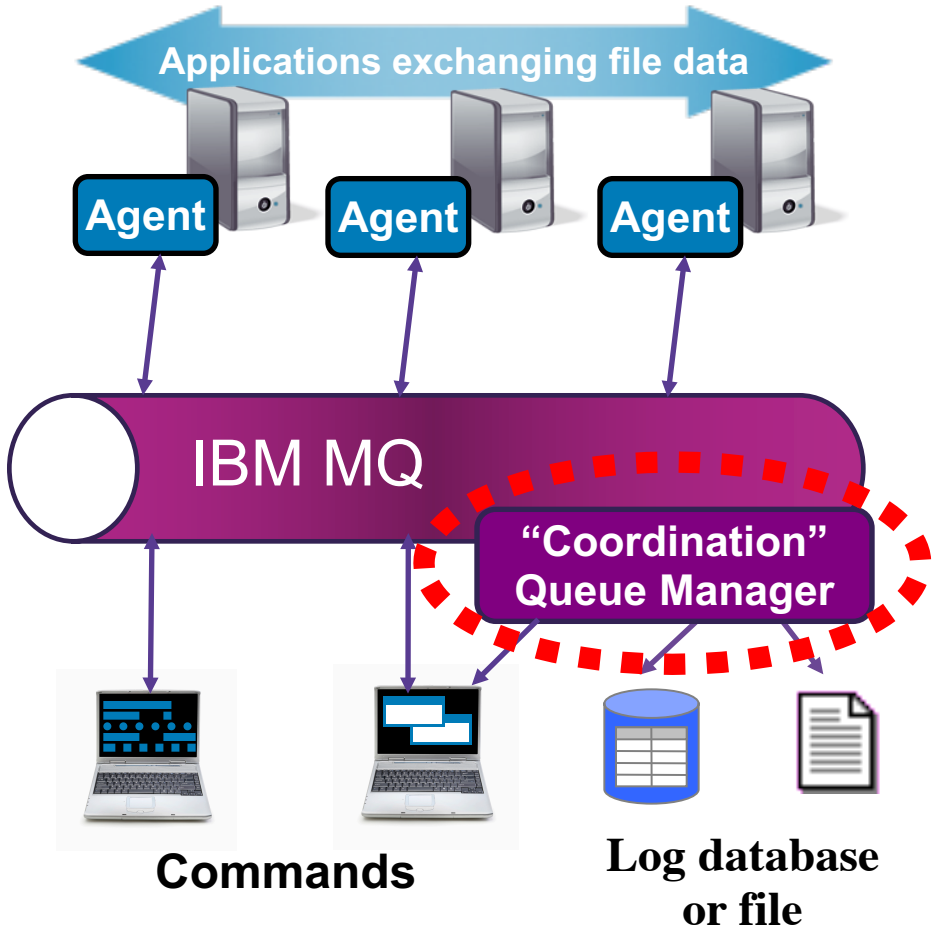
Log Database & File

- **Keeps a historical account of transfers that have taken place**
  - Who, where, when… etc.
- **Implemented by the 'logger' component which connects to the coordination queue manager**
  - Stand alone application
  - Can log to database or file
  - Or JEE application
  - Can log to database only
- **Queryable via Web Gateway**
  - Also a documented interface



Coordination Queue Manager

- **Gathers together information about events in the file transfer network**
- **Not a single point of failure**
  - Can be made highly available
  - Messages stored + forwarded
- **MQ publish / subscribe**
  - Allows multiple log databases, command installs
  - Documented interface



Granular Access Control

Access control to agent capabilities can be broken down into steps:

Determine a user's identity

- (MQMD user ID of request message)

Work out what action is being taken

- (Parse payload of request message)

Map what they are trying to do to one (or more) MFT authorities

- (Simple 'look-up' table in the code)

Determine the agent's identity

- (MQMD user ID of messages sent by the agent)

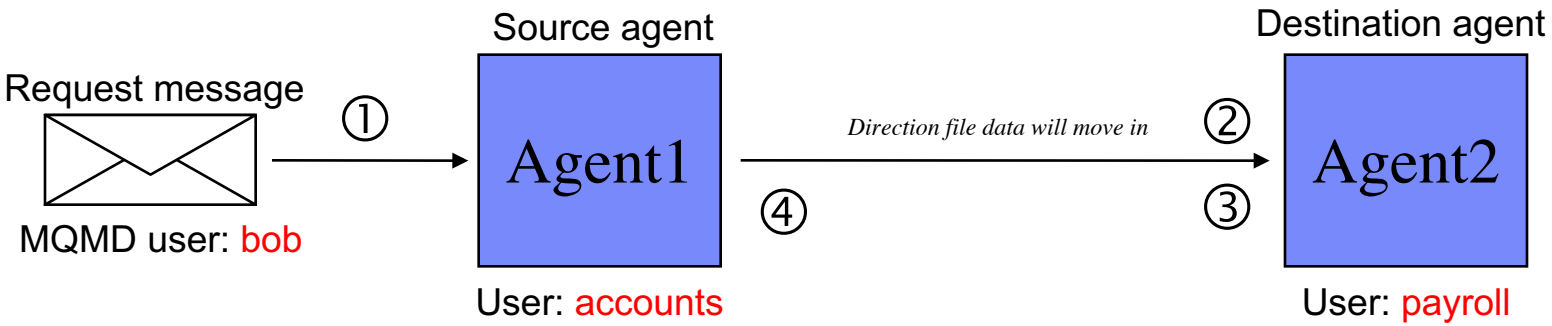
Check to see if the identities have the appropriate authorities

- (Map MFT authority to MQ authority and see if the user is authorized)

Permit or deny the action

- (Either carry on as normal, or fail the request)

Example authority checks before transfer occurs



Checks that occur before the transfer starts:

- Does ‘bob’ have ‘transfer source’ authority?
  - (i.e. can bob move files off agent1?)
- Does ‘accounts’ have ‘agent source’ authority?
  - (i.e. is ‘agent2’ going to allow ‘agent1’ to transfer files to it?)
- Does ‘bob’ have ‘transfer destination’ authority?
  - (i.e. can bob move files onto agent2?)
- Does ‘payroll’ have ‘agent destination’ authority?
  - (i.e. is ‘agent1’ going to allow ‘agent2’ to receive files from it?)

Checks 1+4 happen at the source agent, and 2+3 at destination agent

Mapping MFT Authorities to MQ Authorities

We have talked about MFT authorities (like ‘transfer source’ or ‘schedule’)

- But how does an administrator configure these?

MFT authorities are mapped to MQ authorities on specific MQ objects

- E.g. the MFT ‘administration’ authority maps to the MQ ‘browse’ authority on queue ‘SYSTEM.FTE.AUTHADM1.agentname’.

The same model used for Distributed platforms (via the OAM) and for z/OS (via SAF)

Queue names:

SYSTEM.FTE.AUTHADM1.agent_name

SYSTEM.FTE.AUTHAGT1.agent_name

SYSTEM.FTE.AUTHMON1.agent_name

SYSTEM.FTE.AUTHOPS1.agent_name

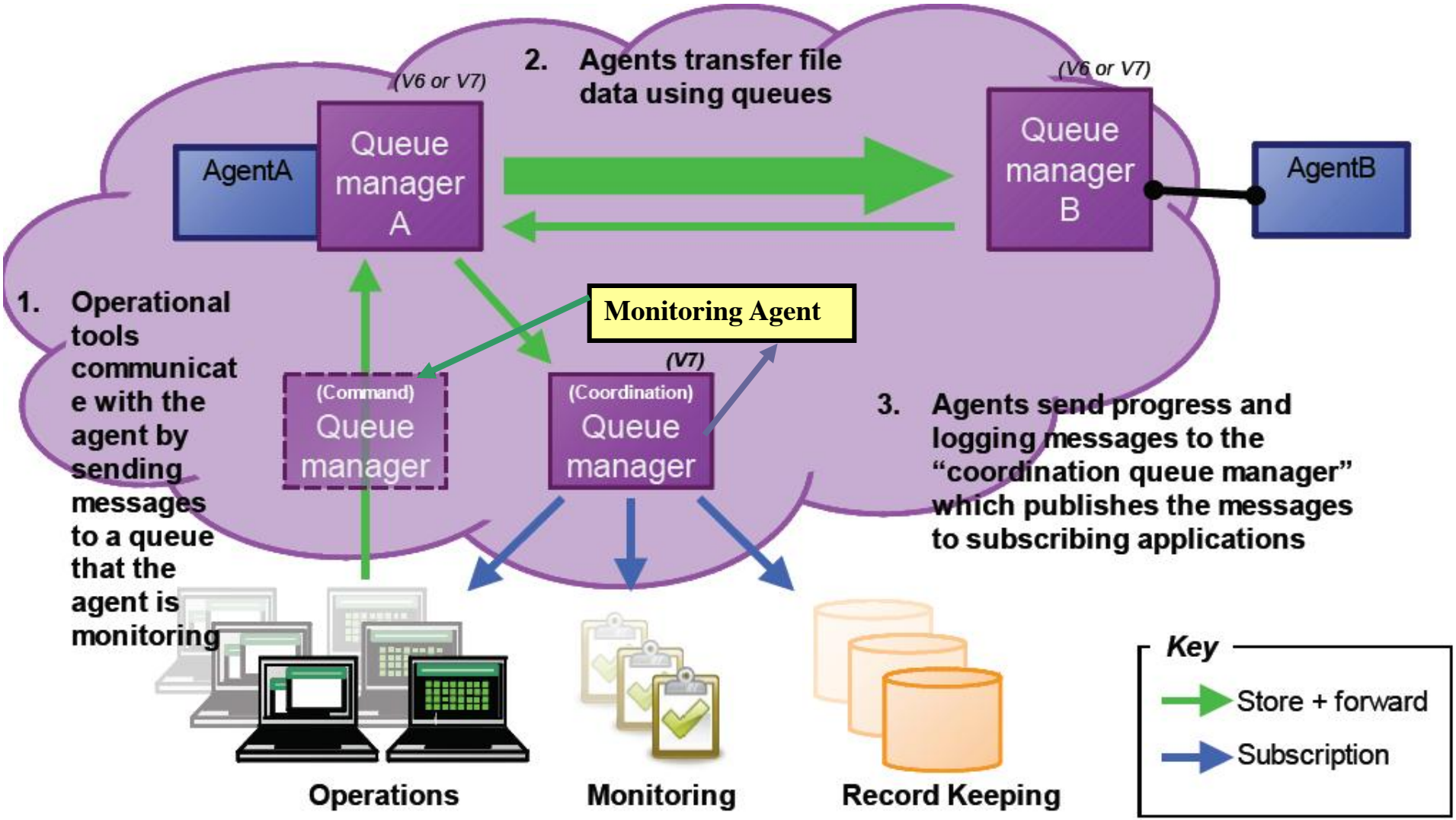
SYSTEM.FTE.AUTHSCH1.agent_name

SYSTEM.FTE.AUTHTRN1.agent_name

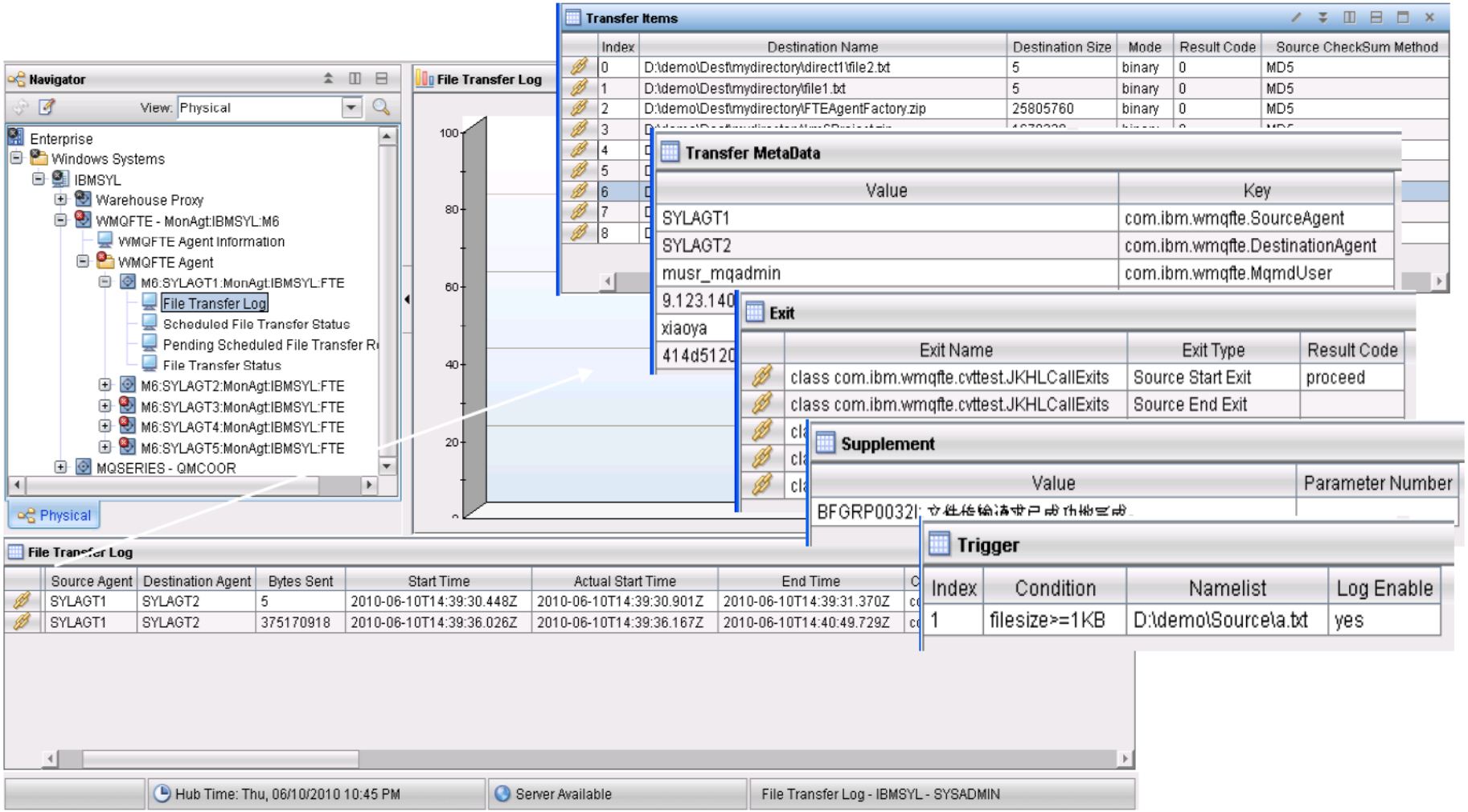
IBM MFT Monitoring Agent

- **Keeps a historical account of transfers that have taken place**
  - Who, where, when… etc.
- **Implemented subscribing to the MFT Topics that are published by the Coordination Queue Manager.**
- **Integrated into IBM Monitoring**
  - Dashboard - Tivoli Enterprise Portal
  - Can view all events within MFT
  - Custom Event monitoring
  - Process Implementation

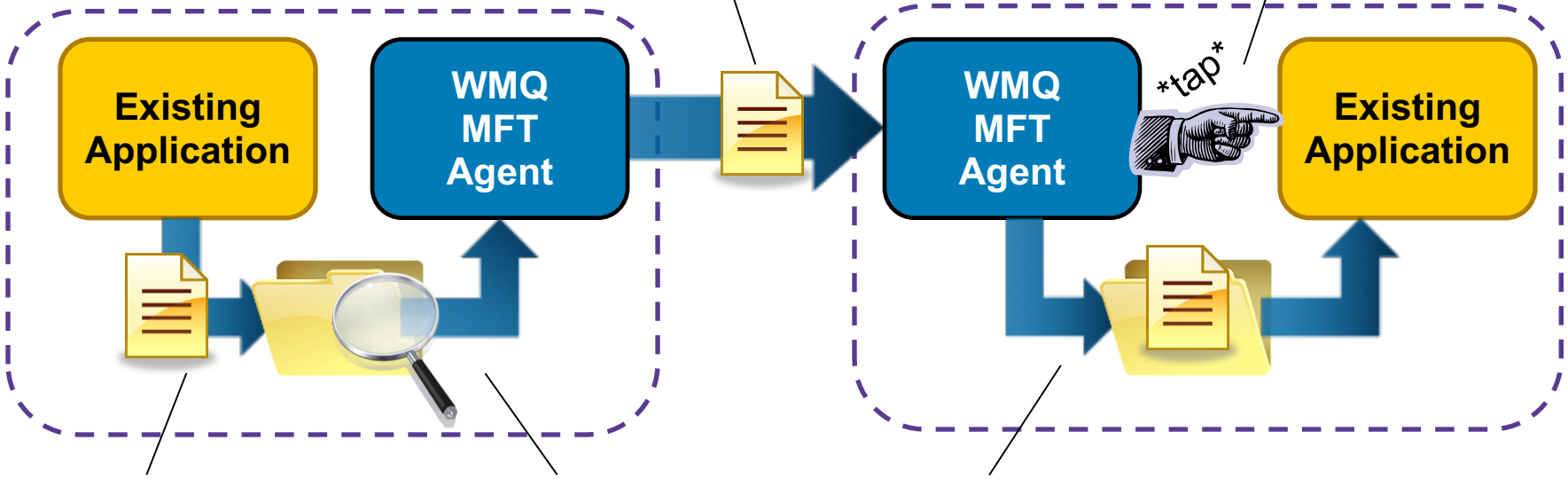
Overview


2. Agents transfer file data using queues
(V6 or V7)
AgentA
Queue manager A
Queue manager B
(V6 or V7)
AgentB
1. Operational tools communicate with the agent by sending messages to a queue that the agent is monitoring
Monitoring Agent
(Command) Queue manager
(V7)
(Coordination) Queue manager
3. Agents send progress and logging messages to the "coordination queue manager" which publishes the messages to subscribing applications
Operations
Monitoring
Record Keeping
Key
Store + forward
Subscription

IBM MFT Monitoring Agent



Example usage of monitoring + program execution



3. MFT transports file to destination

5. MFT can also start another application to process the file

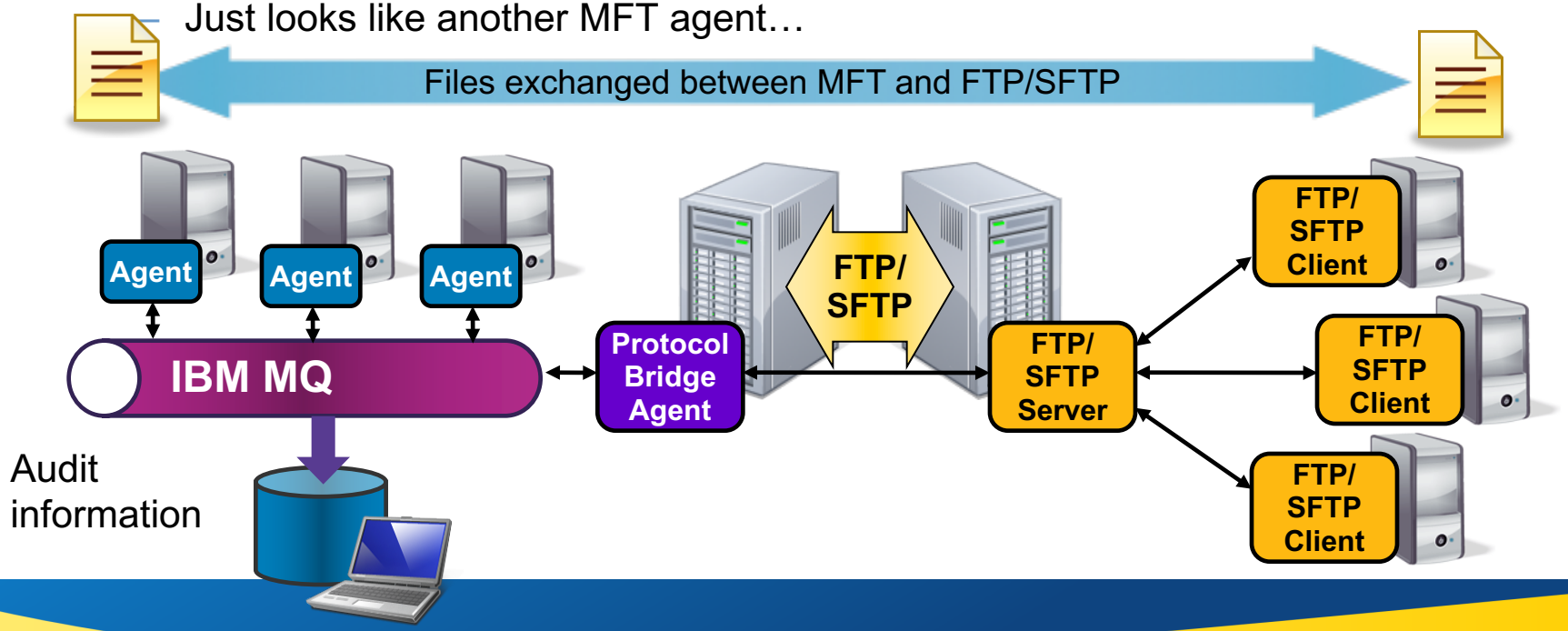
1. Application writes file to file system

2. Agent monitors file system, spots arrival of file and based on rules, transfers the file

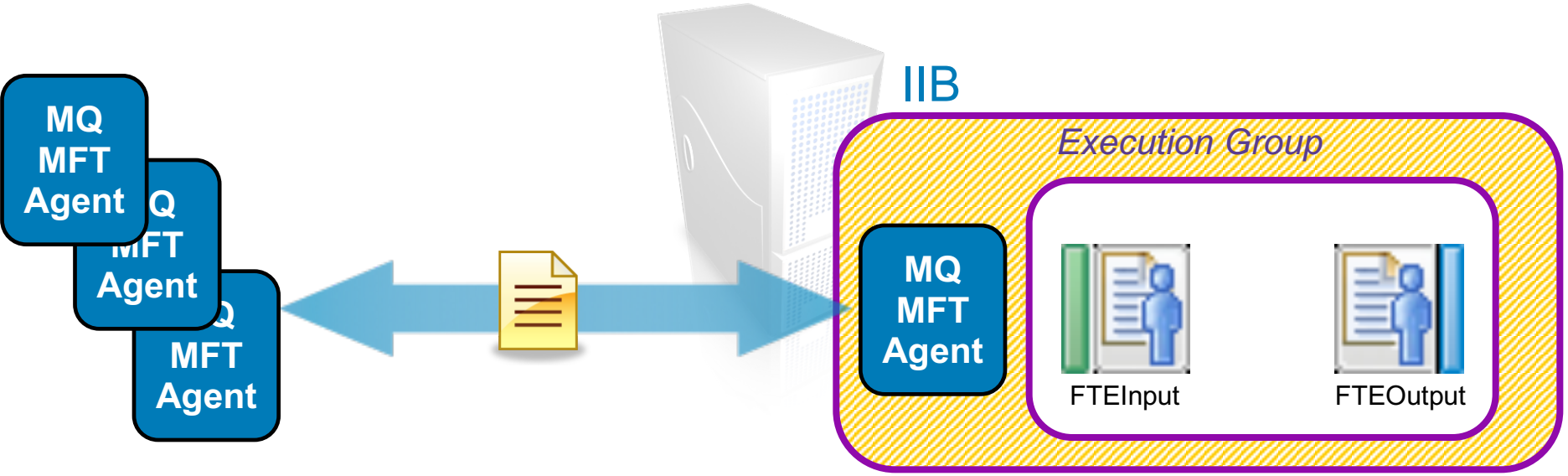
4. At destination MQ MFT writes file to file system

Protocol Bridging Agents

- **Support for transferring files located on FTP and SFTP servers**
  - The source or destination for a transfer can be an FTP or an SFTP server
- **Enables incremental modernization of FTP-based home-grown solutions**
  - Provides auditability of transfers across FTP/SFTP to central audit log
  - Ensures reliability of transfers across FTP/SFTP with checkpoint restart
- **Fully integrated into graphical, command line and XML scripting interfaces**
  - Just looks like another MFT agent…



IIB Nodes



- **FTEInput node**
  - Build flows that accepts file transfers from the MQ MFT network
- **FTEOutput node**
  - Build flows that are designed to send a file across a MQ MFT network
- **When MQ MFT nodes are used in a flow an MFT agent is automatically started in the IIB Integration Server Group**

Options for converting data between files and messages

One file to one message

- One file becomes one message

One file to a group of messages

- **The file can be split based on:**
  - Size
  - Binary delimiter
  - Regular expression

One message to one file

- One message becomes one file

A group of messages (or all messages on the queue) to one file

- Optionally, a delimiter can be inserted between each message used to compose the file

New features in MQ MFT V8

- **Inlining file data with transfer handshake**
  - Improved performance for small file transfers
- **More options on resource monitors**
  - Include meta-data in transfers
  - Specify file list in trigger file
  - Other related features – see InfoCenter for complete set of new options
- **Support for z/OS and IBM i**
  - MQ MFT 7.5 didn't support these platforms

Enhanced Protocol Bridge Agent Diagnostics

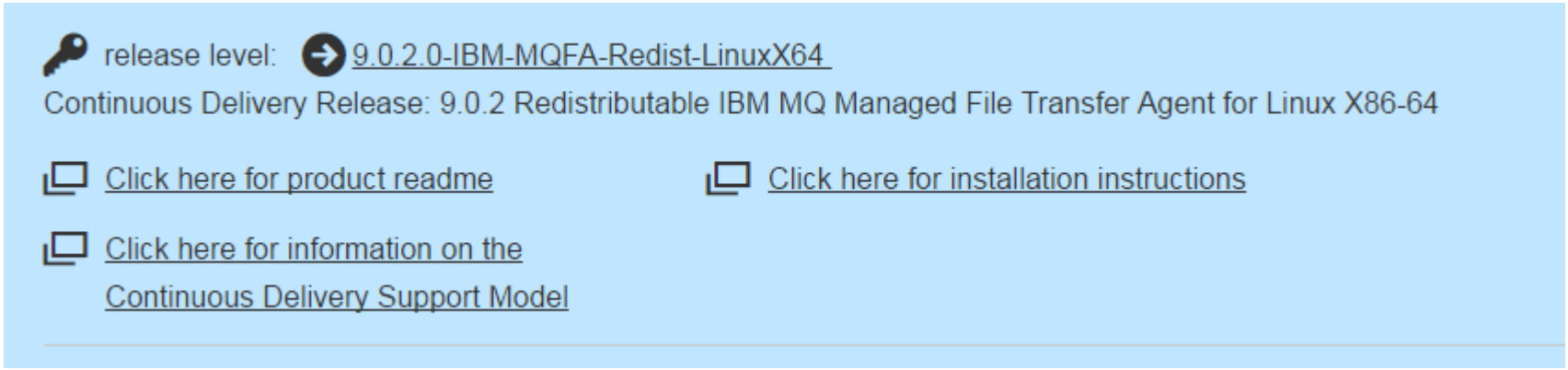
MQ 9.0.0

- **Enhanced logging of communication**
  - FTP, SFTP and FTP servers
  - Aids in post diagnosis of communication issues with file servers
  - Fine grained controlled, new command *fteSetAgentLogLevel* provided
    - Filter diagnostic logs
      - On per server
      - Transfer metadata
- **Comprehensive fine grain coverage of FTP errors**
  - More return codes from FTP server handled
  - Increased stability of bridge agent
- **Web Gateway support discontinued**
  - Pre-MQ v9 versions still supported

Redistributable MFT Agent

MQ 9.0.1

- **Redistributable MFT Agent**
  - Download from IBM Fix Central
  - No installation required, simply unzip and use
  - Requires MQ Advanced license
  - Simple command to setup environment
  - Supported on Windows, Linux OS



- **MFT Logger still requires MQ installation**
  - File and Database
- **Bundle and redistribute with your application**

Configurable transfer recovery timeout

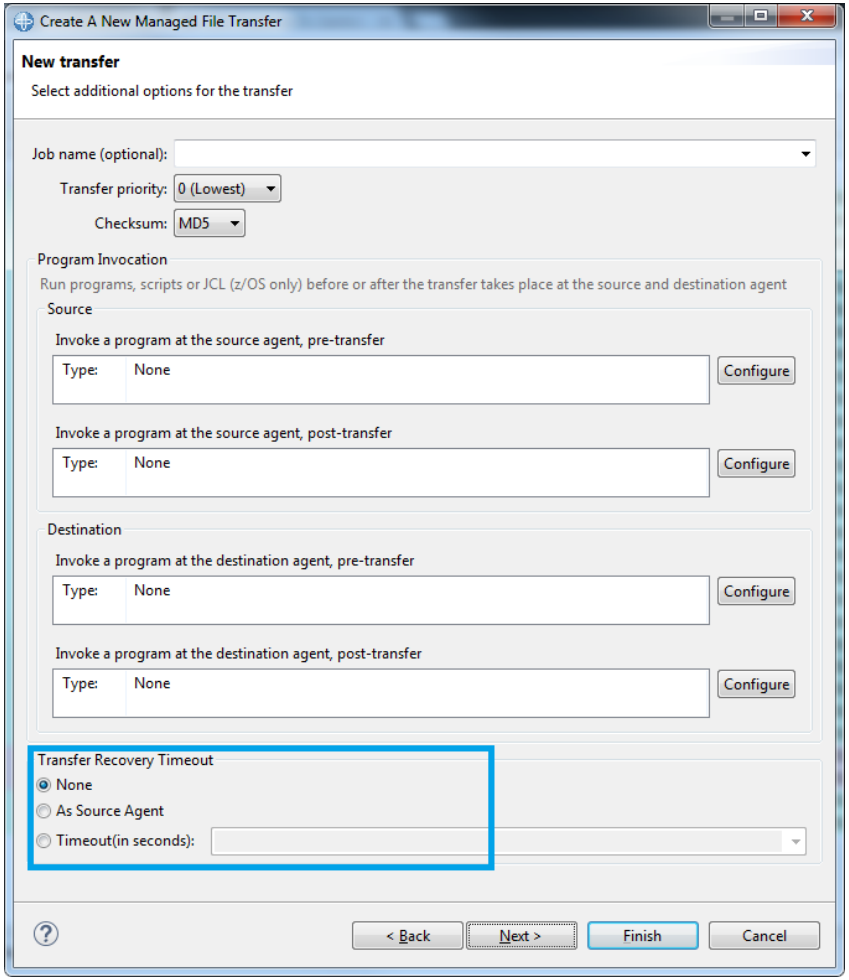
MQ 9.0.1

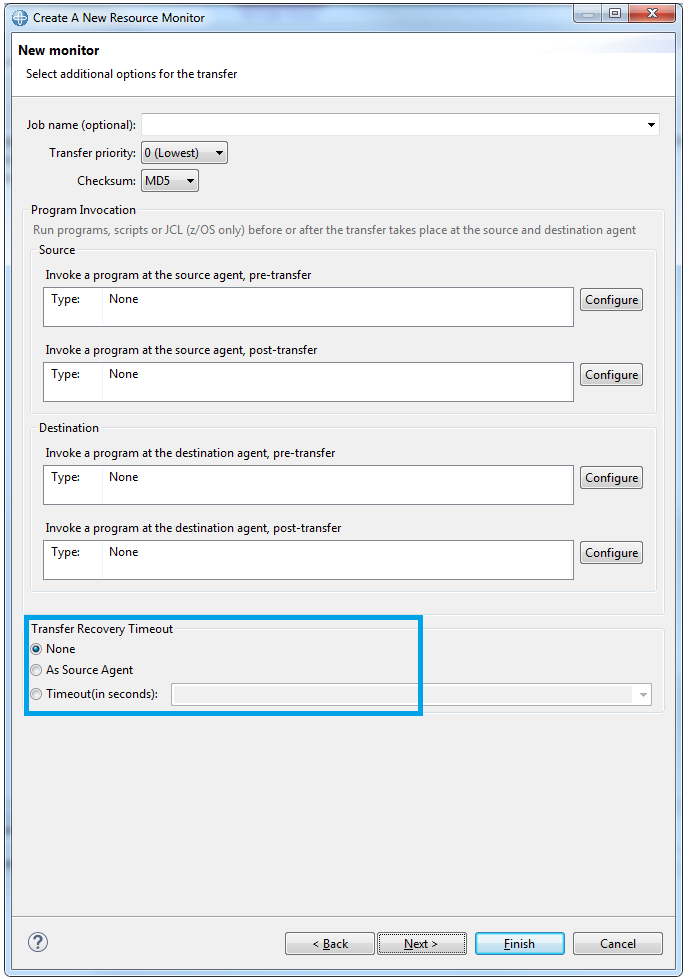
- **Transfers go into recovery due to**
  - Destination agent failure
  - Network issues
- **Transfer recovery attempts for ever,**
  - Unless completed or canceled by user
- **New option to automatically cancel failing transfers**
  - Specify transfer recovery timeout using *rt* option on *fteCreateTransfer* command
  - Transfer terminated if not recovered in specified time
  - Configurable through templates, Ant Script and Resource monitor
  - Audit log published indicating transfer timeout

Configurable transfer recovery timeout

MQ 9.0.1

- **Configure via MQExplorer**





- Via command

Other updates

MQ 9.0.1

- **Easily identify Agent connections at queue manager**

Applications connected to "MFTDEMO":

App name	App type	App description	Process	Thread	User ID	Options	Channel name	Conn name	Cli
es\IBM\MQ\bin64\runmqchi.exe	Channel initiator	IBM MQ Channel Initiator	2504	1	MUSR_MQADMIN	Shared			
MFT Agent DEST	User	IBM MQ Channel	8992	10	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent DEST	User	IBM MQ Channel	8992	10	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent DEST	User	IBM MQ Channel	8992	11	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent DEST	User	IBM MQ Channel	8992	10	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent SRC	User	IBM MQ Channel	8992	4	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent SRC	User	IBM MQ Channel	8992	4	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent SRC	User	IBM MQ Channel	8992	4	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	
MFT Agent SRC	User	IBM MQ Channel	8992	4	samantha	Shared, Share block	MFT_CHANNEL	127.0.0.1	

Scheme: Standard for Application Connections - Distributed

```
dis chstatus(MFT_CHANNEL) ALL
     6 : dis chstatus(MFT_CHANNEL) ALL
AMQ8417: Display Channel Status details.
   CHANNEL(MFT_CHANNEL)                    CHLTYPE(SVRCONN)
   BUFSRCVD(2370)                          BUFSSENT(2002)
   BYTSRCVD(352224)                        BYTSSENT(348380)
   CHSTADA(2017-04-18)                     CHSTATI(11.58.29)
   COMPHDR(NONE,NONE)                      COMPMSG(NONE,NONE)
   COMPRATE(0,0)                           COMPTIME(0,0)
   CONNAME(127.0.0.1)                      CURRENT
   EXITTIME(0,0)                           HBINT(300)
   JOBNAME(00002320000002370)              LOCLADDR(127.0.0.1(1414))
   LSTMSGDA(2017-04-18)                    LSTMSGTI(12.33.20)
   MCASTAT(RUNNING)                        MCAUSER(samantha)
   MONCHL(OFF)                             MSGS(1663)
   RAPPLTAG(MFT Agent SRC)                 SECPROT(NONE)
   SSLCERTI( )                             SSLKEYDA( )
   SSLKEYTI( )                             SSLPEER( )
   SSLRKEYS(0)                             STATUS(RUNNING)
   STOPREQ(NO)                             SUBSTATE(RECEIVE)
   CURSHCNV(4)                             MAXSHCNV(10)
   RVERSION(09000200)                      RPRODUCT(MQJF)
AMQ8417: Display Channel Status details.
```

Other updates

MQ 9.0.1

- **Easily identify subscriptions created by MFT**
  - All subscriptions created by MQExplorer are prefixed with MQExplorer_MFT_Plugin followed by machine name and user name
  - Helps administrators in cleaning up subscriptions

Subscriptions

Filter: Standard for Subscriptions

Subscription name	Topic name	Topic string
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_09f341ee-cfeb-4c5c-8573-a434ff2ebcb7	SYSTEM.FTE	SYSTEM.FTE/Scheduler/#
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_4293a770-6b7a-4cd1-b80b-c591c2f2d84b	SYSTEM.FTE	SYSTEM.FTE/Templates/#
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_47cf2ab7-a3ca-4dc9-bb80-c2ca03b16f0e	SYSTEM.FTE	SYSTEM.FTE/Log/#
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_77581b2a-6f12-4dbe-93fd-c79c170993fb	SYSTEM.FTE	SYSTEM.FTE/Agents/#
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_80436858-0b7d-428a-8316-eea784f62f65	SYSTEM.FTE	SYSTEM.FTE/EVENT_HANDLER
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_be1fe9b2-eee2-40fd-83fd-84742d64d0ae	SYSTEM.FTE	SYSTEM.FTE/monitors/#
MQExplorer_MFT_Plugin_IBM216-PC0BTCBL_samantha_cf204c20-6d97-46ef-90b3-1b041ac478df	SYSTEM.FTE	SYSTEM.FTE/Transfers/#

Enhanced agent status reporting

MQ 9.0.2

- **Agent status reported unknown**
  - Cause concern to customers
- **Additional column, *StatusAge*, in the *fteListAgents* command output**
  - Displays the age of an agent's status publication
  - Age is the difference between system time of coordination queue manager and time when agent last published it's status.
  - Helps customer to understand possible reasons for UNKNOWN status
    - Like network issues
  - Possible reasons for UNKNOWN status displayed in output
  - Option provided hide Status Age column

Enhanced agent status reporting

MQ 9.0.2

fteListAgents command output

```
C:\Users\IBM_ADMIN>fteListAgents
5724-H72 Copyright IBM Corp.  2008, 2017.  ALL RIGHTS RESERVED

Command executed at 2017-04-09 18:34:35 IDT

Coordination queue manager time 2017-04-09 13:04:35 UTC

Agent Name:      Queue Manager Name:      Status:      Status Age:
DEST             MFTDEMO                  READY           0:00:06
FDC              MFTDEMO                  STOPPED        97:30:45
SRC              MFTDEMO                  READY           0:00:19

Command executed at 2017-04-09 18:41:19 IDT

Coordination queue manager time 2017-04-09 13:11:20 UTC

Agent Name:      Queue Manager Name:      Status:      Status Age:
DEST             MFTDEMO                  UNKNOWN         0:06:51
FDC              MFTDEMO                  READY           0:03:59
SRC              MFTDEMO                  READY           0:02:04

The UNKNOWN status can be reported against an agent for a variety of reasons,
including:
1. A significant difference in the system time between the agent queue manager
   host and the coordination queue manager host.
2. Stopped channels between the agent queue manager and the coordination queue
   manager, which prevent the status messages reaching the coordination queue
   manager.
3. An authorization issue which prevents the agent from publishing its status
   to the SYSTEM.FTE topic on the coordination queue manager.
4. An agent failure.

Use the ftePingAgent command to determine if these agents can be contacted and
are running.

For more information about why an agent can report an UNKNOWN status, and how
to resolve it, please see the topic "Agent Status" in IBM Knowledge Center
```

Enhanced diagnostics for Resource Monitor

- **Resource monitor event publications don't reach consumers**
  - Network issues
  - No consumer or Logger present
- **If enabled, publications for all resource monitor enabled**
  - Per resource monitor publishing not possible
- **Customers and MFT Service require more information**
  - Understand what resource monitor is doing
  - Resolve issues related to triggering
    - For e.g: Why a transfer was not initiated
  - Simple and easy to understand messages

Enhanced diagnostics for Resource Monitor

MQ 9.0.3

- **Resource monitor actions written to a local log file**
  - Time when a scan was initiated and ended
  - Reasons for triggering or not triggering
  - List of files scanned by resource monitor
  - Number of items matching trigger condition
  - ID of transfer initiated by resource monitor
  - More….
- **Enable logging on a per resource monitor basis**
- **Support both directory and queue resource monitors**
- ***fteSetAgentLogLevel* to enable/disable resource monitor logging**
  - New option `-logMonitor <resource monitor name> = info/moderate/verbose/off`
- **Or via agent.properties file.**
- **Wildcards supported for resource monitor names**

Thank you! Questions?

Legal Disclaimer

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Questions & Answers