# Introduction to WebSphere MQ File Transfer Edition

Chris Harris
WMQFTE L3 Team Lead
IBM Hursley
harriscr@uk.ibm.com

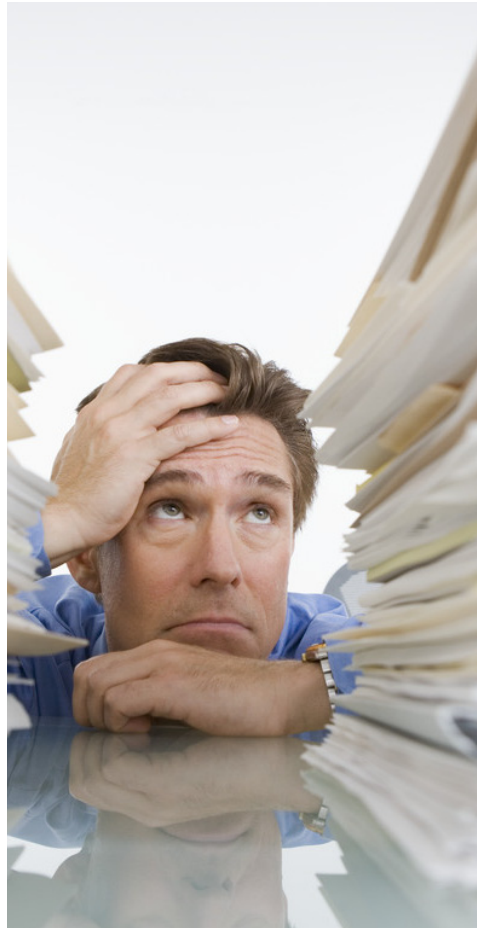
# Agenda

- What is Managed File Transfer?
  - The shortcomings of traditional file transfer solutions
- Introducing WebSphere MQ File Transfer Edition
- Key Components
- How File Transfer Edition uses MQ
  - Different roles for queue managers
  - Key message exchanges
- Walkthrough of Key File Transfer Edition Function
  - Ways to initiate file transfers
  - Integrating with existing systems
- New features in v7.0.2

# How do most organizations move files today?

Most organizations rely on a mix of homegrown code, *several* legacy products and different technologies … and even people!

- **FTP**
  - Typically File Transfer Protocol (FTP) is combined with writing and maintaining homegrown code to address its limitations
- **Why is FTP use so widespread?**
  - FTP is widely available – Lowest common denominator
  - Promises a quick fix – repent at leisure
  - Simple concepts – low technical skills needed to get started
  - FTP products seem “free”, simple, intuitive and ubiquitous
- **Legacy File Transfer products**
  - A combination of products often used to provide silo solutions
  - Often based on proprietary versions of FTP protocol
  - Can’t transport other forms of data besides files
  - Usually well integrated with B2B but rarely able to work with the rest of the IT infrastructure – especially with SOA
- **People**
  - From IT Staff to Business staff and even Security Personnel
  - Using a combination of email, fax, phone, mail, memory keys…



NOTES

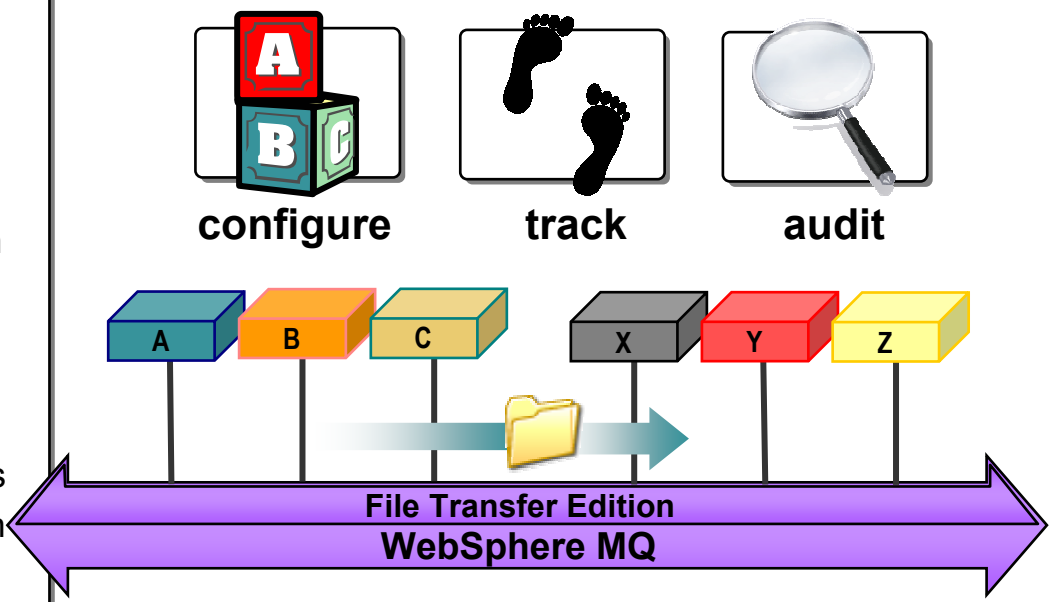
# Moving Files

- Nearly every business today has some need to transfer files
  - A mix of other products, home-grown solutions, FTP and even people
- Shortcomings of basic FTP:
  - Limited Reliability
    - Not every implementation supports “resuming” failed transfers
    - Recipients can mistakenly process partially transferred files
  - Limited Visibility
    - Often no monitoring facilities
    - No facility to centralize control over what gets transferred
  - Limited Traceability
    - Logs often held on the machine performing the transfer
    - Difficult to track a file’s entire journey from start to finish
    - Difficult to audit!
  - 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
- Why is it used?
  - Lowest common denominator
  - Quick fix – repent at leisure
  - Simple concepts – low technical skills to get started
  - FTP products are “free”, simple, intuitive and ubiquitous

# Introducing WebSphere MQ File Transfer Edition V7

- Adds file transfer to WebSphere MQ to enable movement of files – regardless of size – in a managed way (reliable, auditable, secure)
- Multi-purpose infrastructure – for both files and messages

- Flexible backbone for transfers – move files from anywhere to anywhere in your network
- Multi-purpose use – for both files and messages
- Auditable with logging subsystem that tracks transfer at source and at destination for audit purposes
- Centralized control and configuration
- Integration with MQ-enabled apps and ESBs
- No need to program – no need to use APIs
- Automatic file conversion and compression
- Security – of file payload using SSL



NOTES

# Introducing WMQFTE

- WMQFTE is a managed file transfer product that uses a WebSphere MQ infrastructure to transfer files. This means a single infrastructure for application messaging and file transfers.

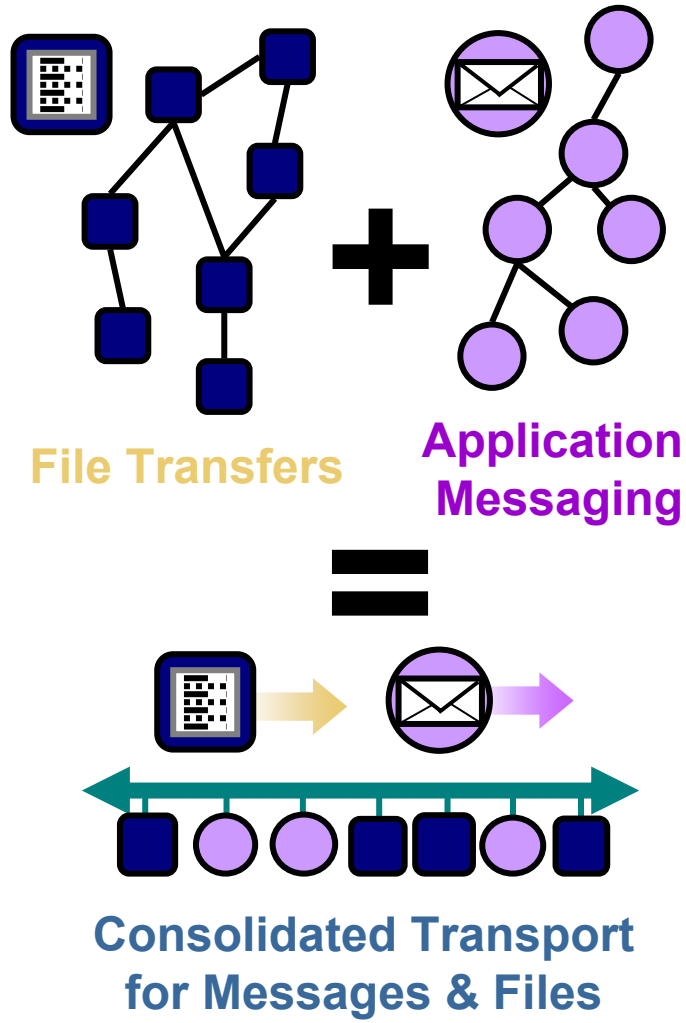
- The file transfers are secure:
  - They can use SSL
  - Allow for security user exits to be run as part of a transfer
  - Can restrict where an agent can write to and read from
  - Restrict which users can perform each action in the system.

- Reliable:
  - Transfers recover from the point where an error occurred
  - Can survive network outages

- Auditable:
  - Each transfer is logged, along with a completion state
  - The progress of a transfer can be monitored
  - All audit logs can be backed up to database to provide long term audit compliance

# A Consolidated Transport for 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 WebSphere MQ, or similar
- High degree of duplication in creating and maintaining the two infrastructures
- Consolidating messaging and file transports yields:
  - Operational savings and simplification
  - Reduced administration effort
  - Reduced skills requirements and maintenance



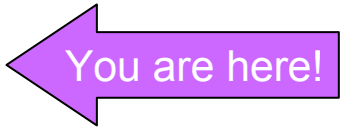
NOTES

# Consolidated Transport

- Traditional approaches tend to lead to parallel infrastructures. In the simplest example this would mean one for messaging and one for transferring files.
- This means a large amount of duplication. For example:
  - Staff costs
  - Infrastructure costs
  - Management costs
  - Administration effort
- It also means a high degree of specialist skill within a single organisation
- Using a single network for both file and application messaging traffic should produce significant savings in the areas mentioned above
- Combining the application messaging and file transport infrastructures could provide savings in the areas mentioned above.

# Agenda

- What is Managed File Transfer?
  - The shortcomings of traditional file transfer solutions
- Introducing WebSphere MQ File Transfer Edition
- Key Components



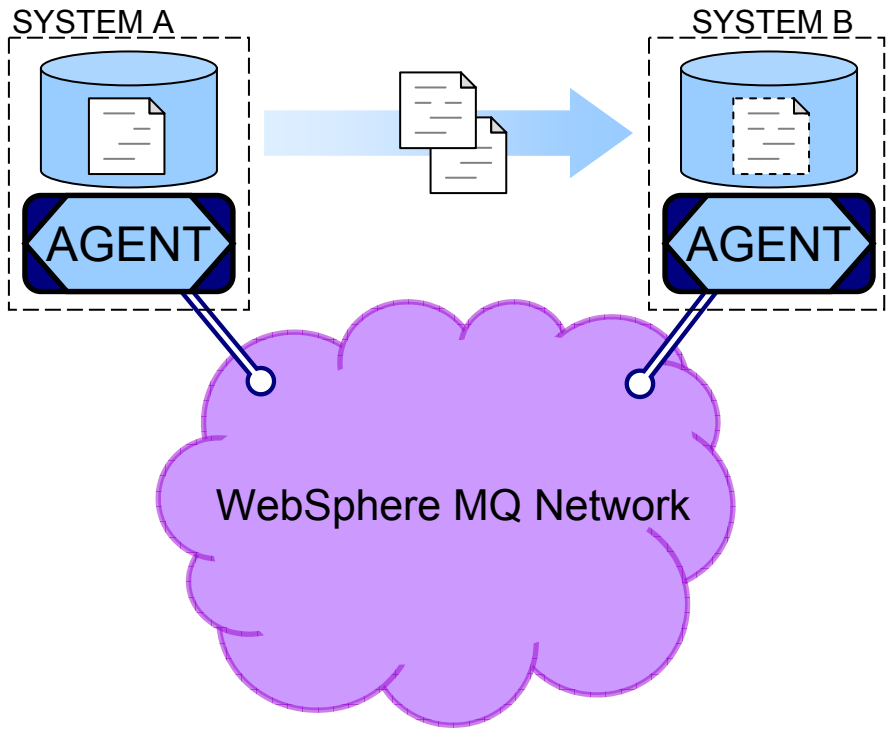

- How File Transfer Edition uses MQ
  - Different roles for queue managers
  - Key message exchanges
- Walkthrough of Key File Transfer Edition Function
  - Ways to initiate file transfers
  - Integrating with existing systems
- New features in v7.0.2

SHARE
Technology · Connections · Results

*The Three Key Components of FTE:*

# 1. Agents

1. **Agents**
   - Long running MQ application
   - Transfers files using MQ
   - Run on system where files are to be transferred from / to
   - Multi-threaded file transfers
     - Can both send and receive multiple files at the same time
   - Agent always associated with exactly one queue manager
     - … but one queue manager can host several agents
     - The queue manager an agent attaches is performing the *agent queue manager* role
   - Each agent monitors its own *command queue* for work



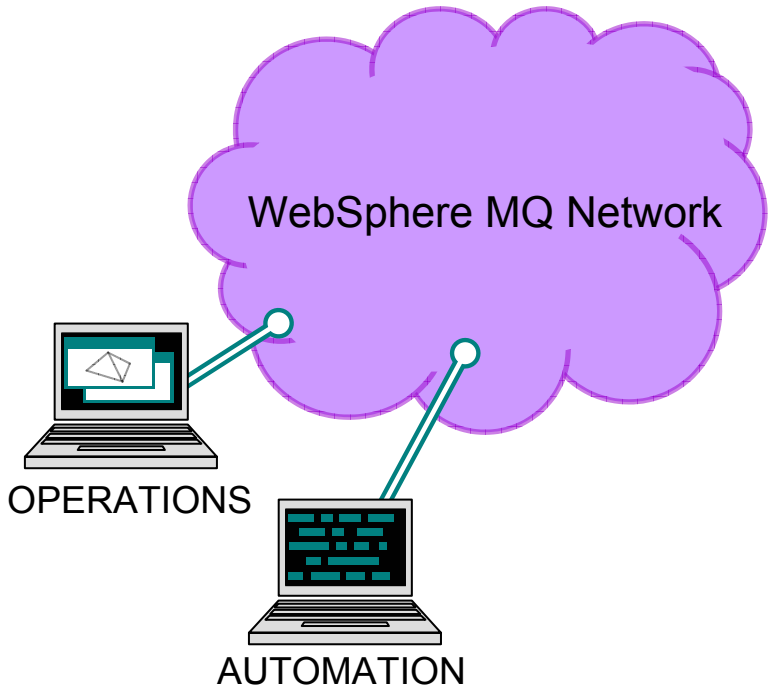
NOTES

- The first of the three key components of File Transfer Edition (FTE) is the 'agent'
- FTE agent processes define the end-points for file transfer. That is to say that if you want to move files off a machine, or onto a machine – that machine would typically need to be running an agent process
- Agent processes are long running MQ applications that oversee the process of moving file data in a managed way. Each agent monitors a 'command' queue waiting for messages which instruct it to carry out work, for example file transfers
- The FTE agent process needs connectivity to an MQ queue manager to do useful work. It can connect either directly to a queue manager running on the same system, or as an MQ client using an embedded version of the MQ client library (which is kept completely separate to any other MQ client libraries that may or may not already have been installed onto the system)
  - Each agent requires its own set of MQ queues – which means that an agent is tied to the queue manager where these queues are defined
  - However – one queue manager can support multiple agents

*The Three Key Components of FTE:*

# 2. Commands

1. Agents
2. **Commands**
   - Instruct agents. For example, to start or cancel a transfer
   - Use MQ messaging to relay the instructions
   - A queue manager that the commands connect to is playing the *command queue manager* role
   - GUI or command line



NOTES

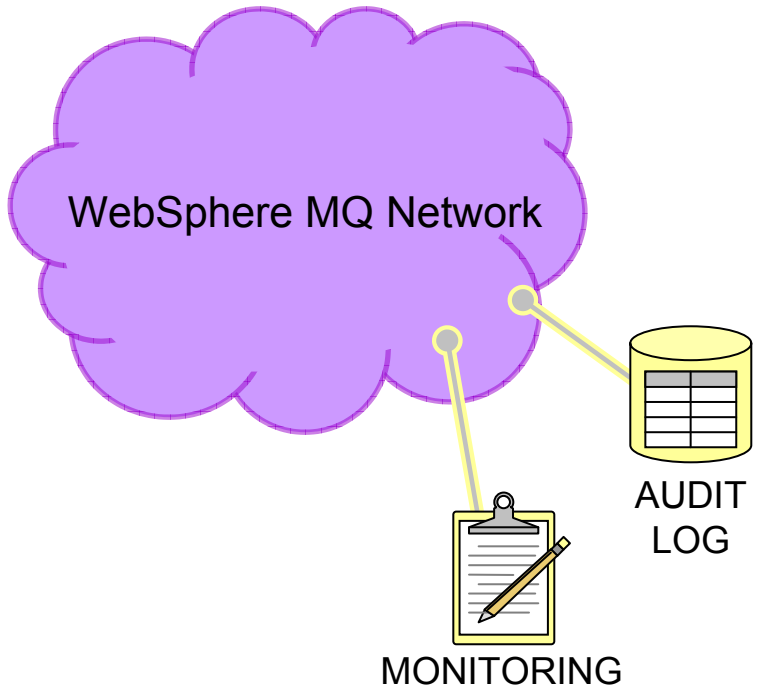
- The second of the three key FTE components are ‘commands’.
- Here we are using the term ‘commands’ to describe anything which issues instructions to an agent process. Examples of ‘commands’ include the command-line, GUI and scripting interfaces that are provided as part of the FTE product.
- The ‘commands’ interact with FTE agents by sending them MQ messages containing instructions to carry out. The ‘commands’ do not need to be directly connected to the same MQ queue manager as the FTE agent as the messages that they send can be routed through the MQ network.

*The Three Key Components of FTE:*

# 3. Logging / Monitoring

1. Agents
2. Commands
3. **Logging / Monitoring**

- Acts as a collection point for monitoring and logging data
  - How are my transfers progressing?
  - What files were transferred?
- The queue manager that the logging / monitoring tools connect to is performing the *coordination queue manager* role
- The coordination queue manager must be MQ V7
  - Uses publish-subscribe capabilities
  - An MQ V7 license comes with distributed File Transfer Edition Server
- File data does not flow through coordination queue manager!



NOTES

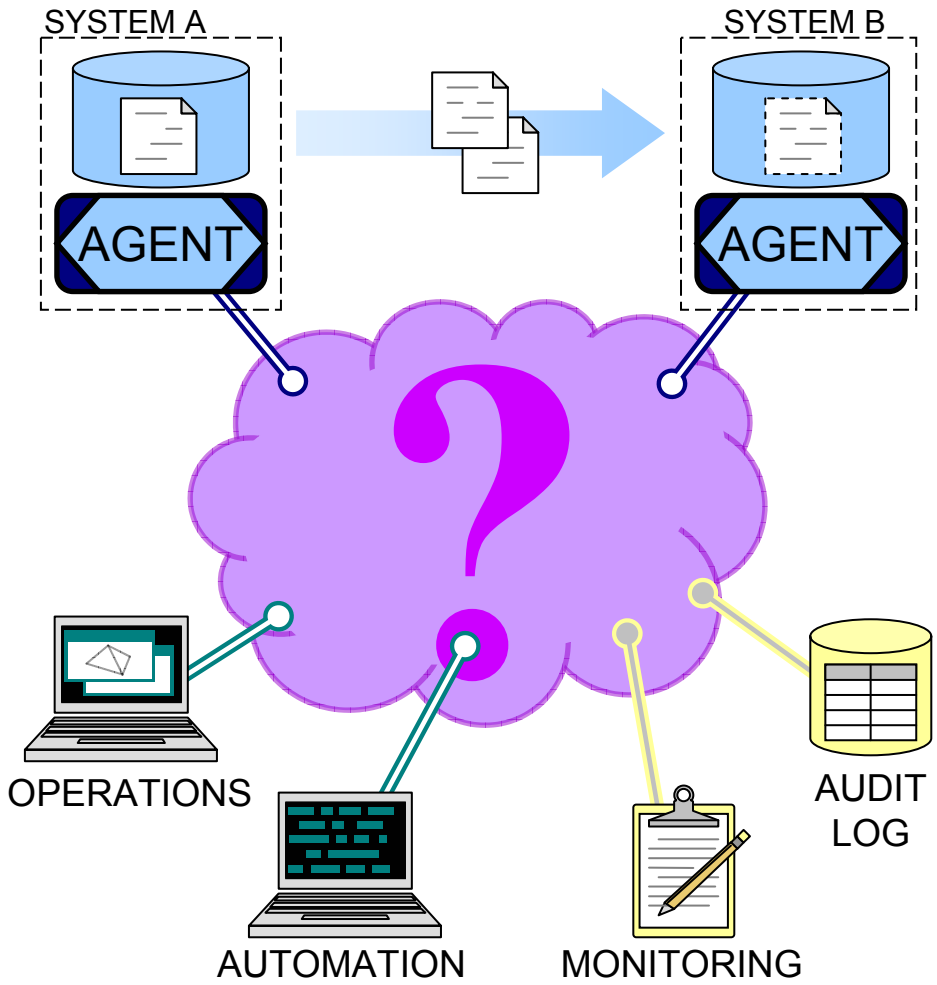
- The third key component of FTE are the tools used for logging and monitoring.

- Examples of the logging and monitoring tools, that form part of the FTE product, include the WebSphere MQ Explorer based GUI and also the database logger which can be used to archive audit information into a database.

- Agents produce audit and monitoring data and forward this as messages to a particular queue manager which is performing the ‘coordination queue manager’ role.  This queue manager then uses MQ publish/subscribe (so it must be an MQ v7 queue manager) to distribute this information to any subscribing monitoring / auditing programs.

# *Integration with MQ Networks*

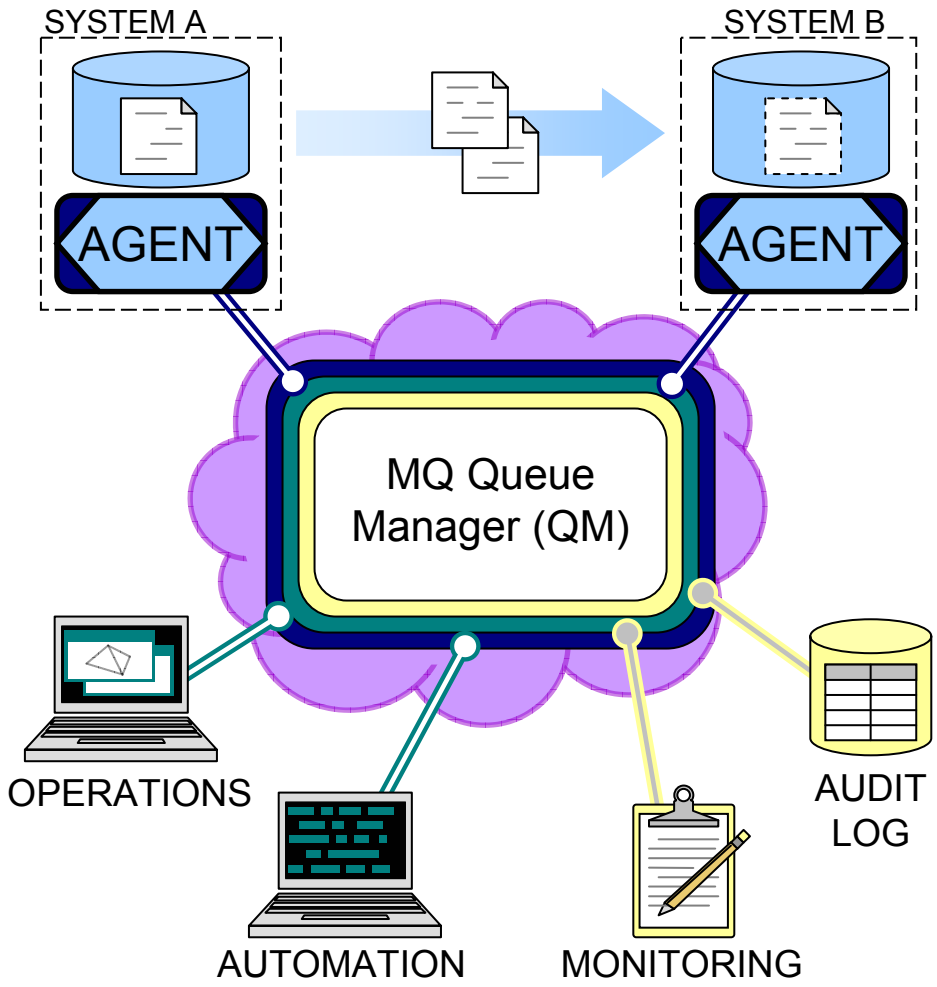
- How do I integrate this with my existing queue manager network?
  - Let's look at some examples…



SHARE
Technology · Connections · Results

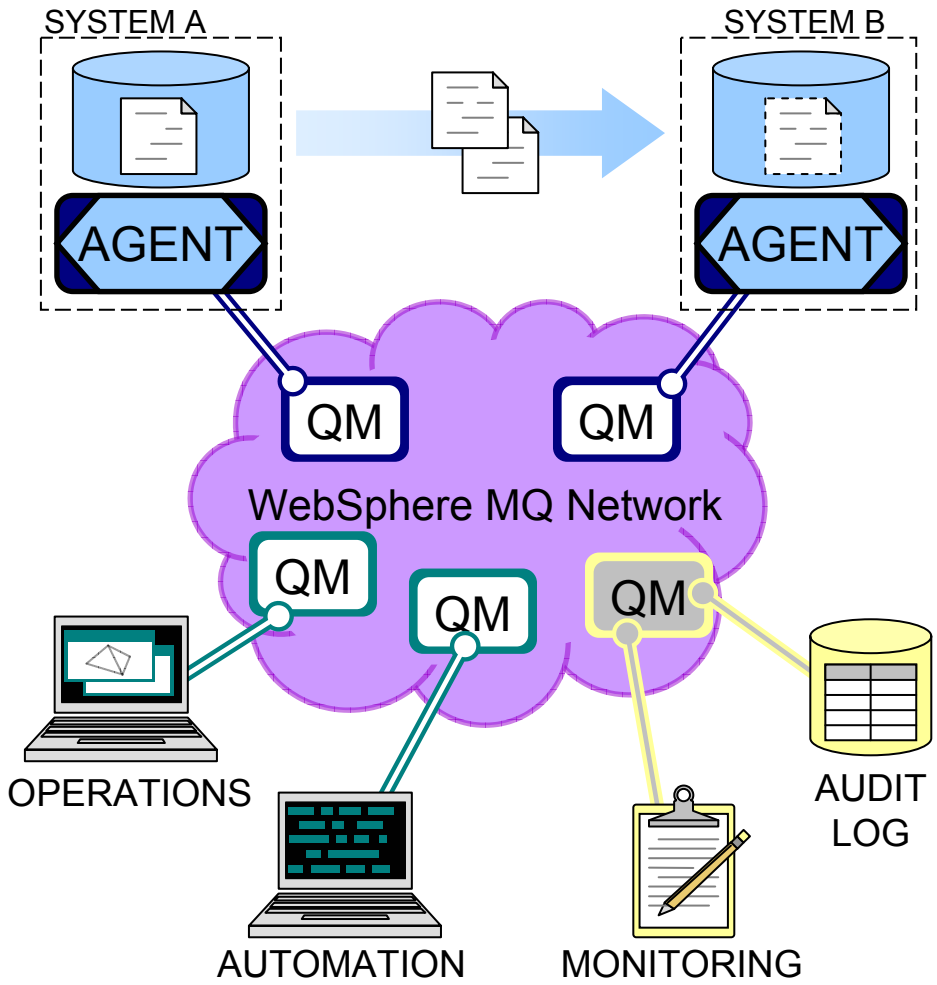
# A Single Queue Manager

- At one extreme, you can connect everything to a single queue manager…
  - Most useful for prototyping or test systems
- Here one queue manager is playing the following roles:
  - Agent queue manager (for the two agents)
  - Command queue manager (for the operation and automation commands)
  - Coordination queue manager (for the audit and monitoring processes)



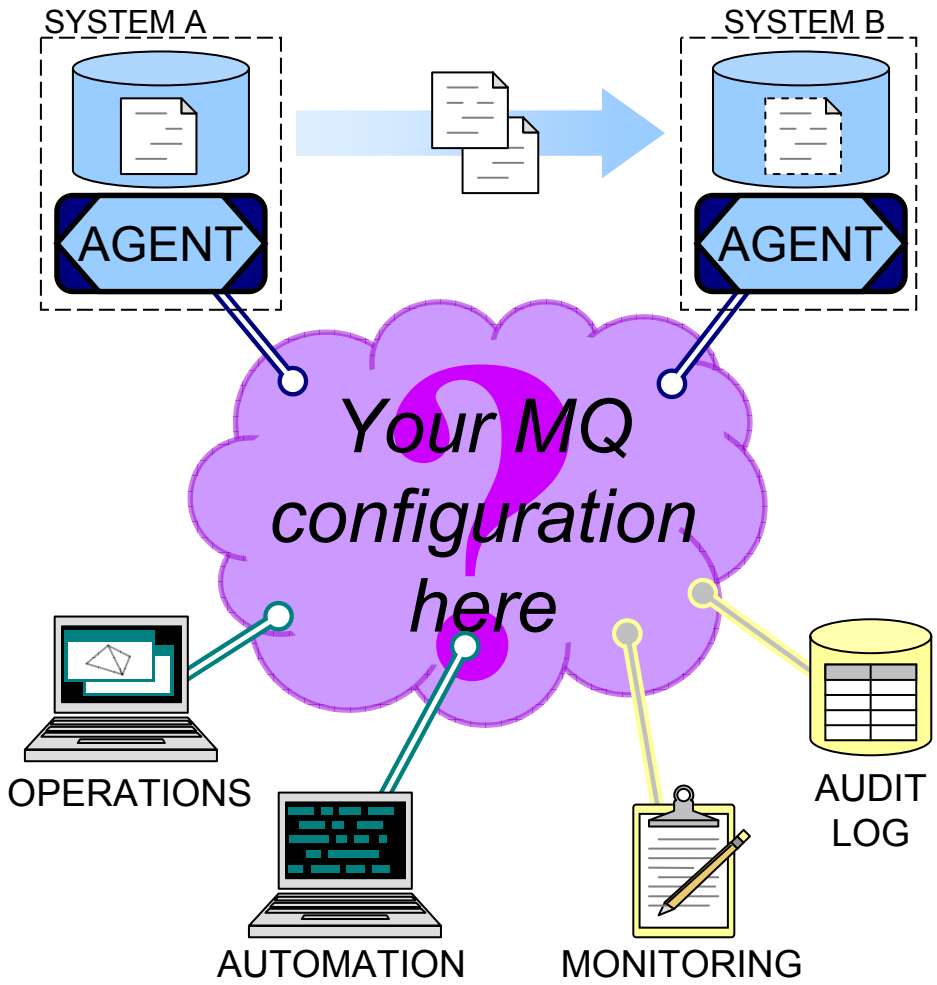
# Complex Configurations

- At the other extreme, you can have one or more queue managers dedicated to each role…
- Many agent queue managers
  - Each agent is associated with exactly one queue manager
  - One queue manager can host many agents
- Many command queue managers
  - Each instance of the commands is associated with exactly one queue manager
  - One queue manager can be used by many instances of the commands
- One coordination queue manager
  - Many monitoring / audit applications can use the coordination queue manager

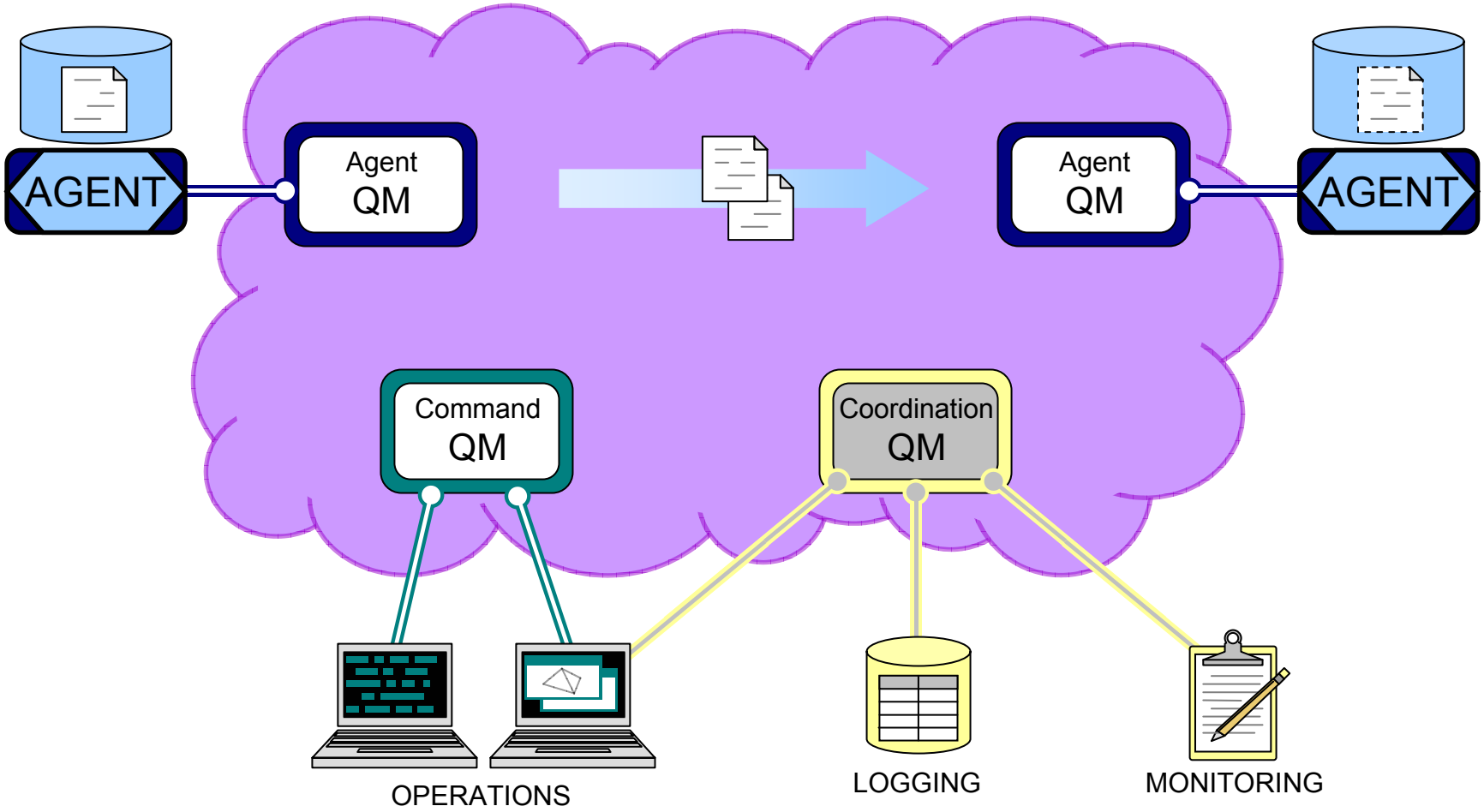


# *And My Current Network?*

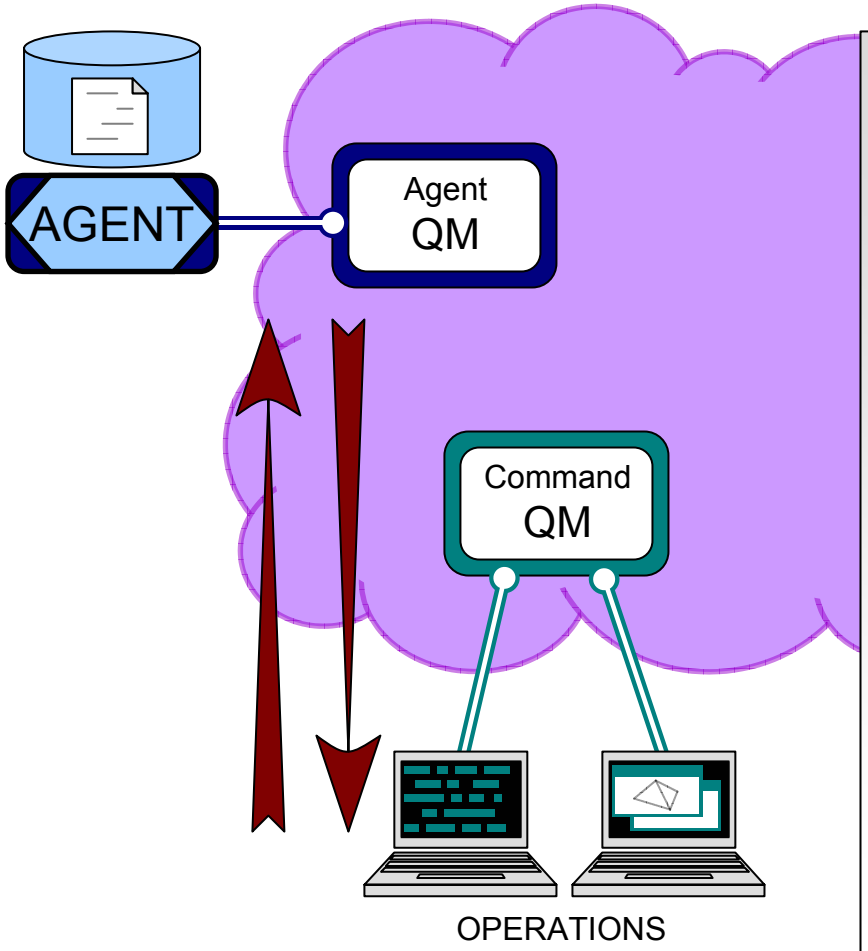
- File Transfer Edition integrates with existing MQ networks
- May need to add a coordination queue manager
  - MQ V7 license comes as part of distributed File Transfer Edition Server product
- Protocols designed to minimize impact on existing messaging networks



# Message Flows

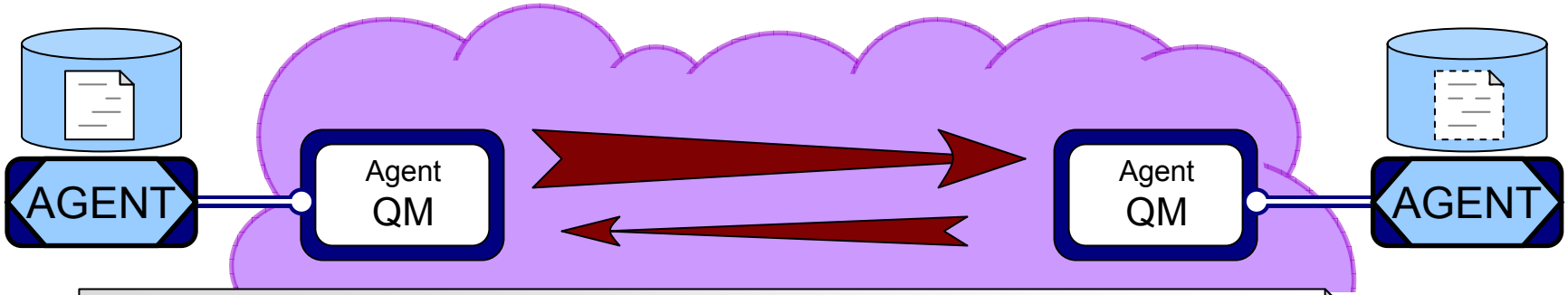


# *Message Flows:* Initiating a Transfer



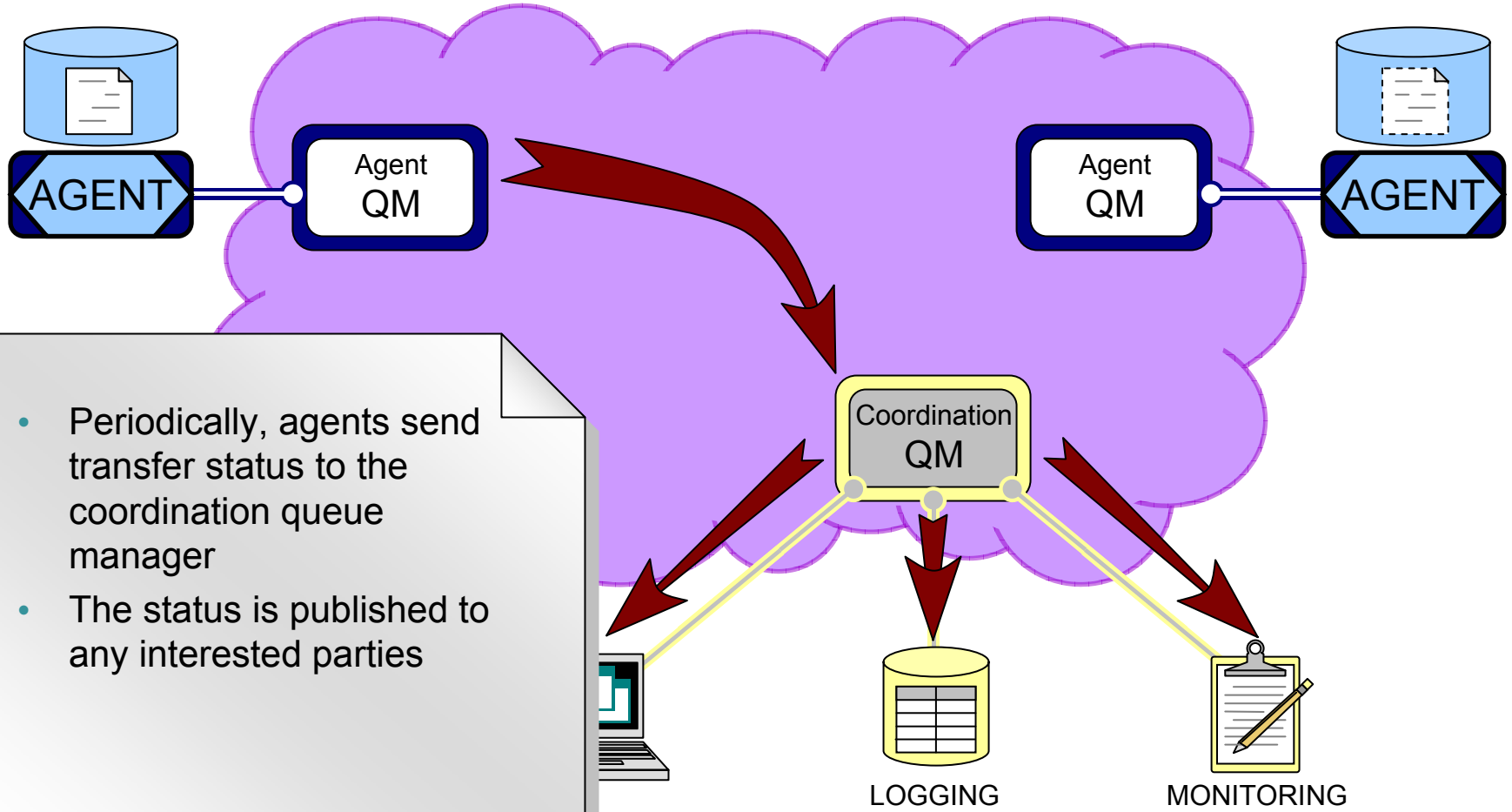

- A new transfer is started by sending an MQ message to an agent
  - The message may be routed via a *command queue manager*
- The MQ message:
  - Describes which files to transfer
  - Specifies the agent to which the files will be transferred
- The agent responds by starting to transfer files, as instructed in the MQ message
- The agent can, optionally, reply

# *Message Flows:* Transferring File Data




- Agents transfer file data as MQ messages
  - File data sent as MQ non-persistent messages
  - Allows prioritization with existing messaging workloads
  - Protocol used accounts for non-delivery and re-ordering
- Transfers are paced
  - This avoids a backlog of messages building up
- Transfers automatically check-point:
  - If any part of the infrastructure suffers an outage, transfers automatically re-start from the last check-point

# *Message Flows:*
# Log and Progress Data



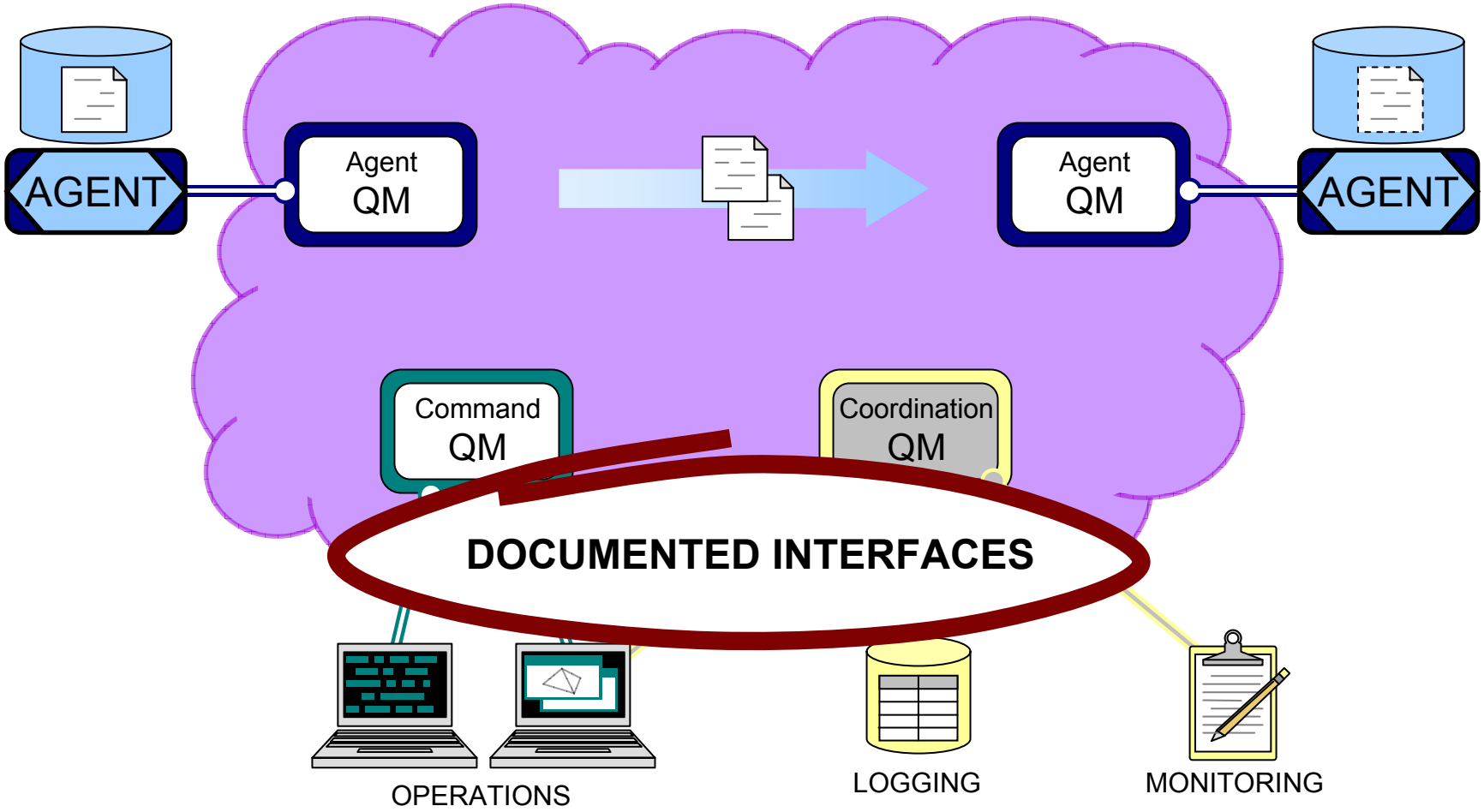

- Periodically, agents send transfer status to the coordination queue manager
- The status is published to any interested parties

NOTES

# Log and Progress data

- When an agent is first started it publishes its presence to the coordination queue manager on the SYSTEM.FTE topic. This publication contains information about the agent such as time zone, operating system, information about the queue manager it connects to, version of the agent and the agent description.
- Periodically the agent will also publish a status message which contains details of the transfers it currently has in progress. The time between these publishes is user definable by the agentStatusPublishRateLimit agent property.
- The information in these published messages is then used for commands such as fteShowAgentDetails and fteListAgents.
- These published messages can be subscribed to by any interested parties.

# *Message Flows:*
# Documented Interfaces



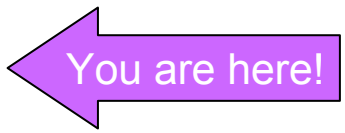
NOTES

# Documented Interfaces

- The following FTE message schemas are fully documented and included as part of the install in the samples/schemas directory:
  - AgentTrace.xsd
  - FileTransfer.xsd
  - fteUtils.xsd
  - Monitor.xsd
  - MonitorList.xsd
  - MonitorLog.xsd
  - PingAgent.xsd
  - ProtocolBridgeCredentials.xsd
  - Reply.xsd
  - ScheduleList.xsd
  - ScheduleLog.xsd
  - TransferLog.xsd
  - TransferStatus.xsd
  - UserSandboxes.xsd

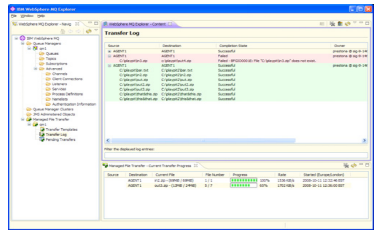
# Agenda

- What is Managed File Transfer?
  - The shortcomings of traditional file transfer solutions
- Introducing WebSphere MQ File Transfer Edition
- Key Components
- How File Transfer Edition uses MQ
  - Different roles for queue managers
  - Key message exchanges
- Walkthrough of Key File Transfer Edition Function
  - Ways to initiate file transfers
  - Integrating with existing systems
- New features in v7.0.2

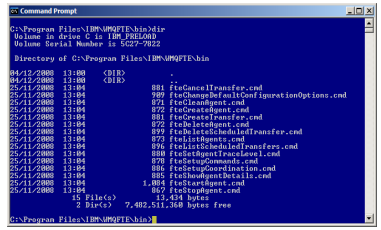


# A choice of alternative ways to configure and control managed file transfers

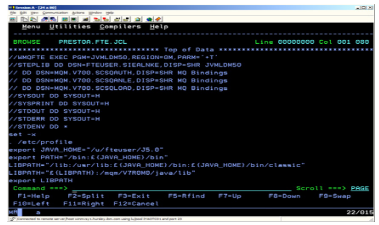
Graphical Eclipse-based MQ Explorer



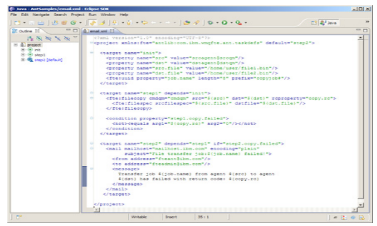
Command Line Interface



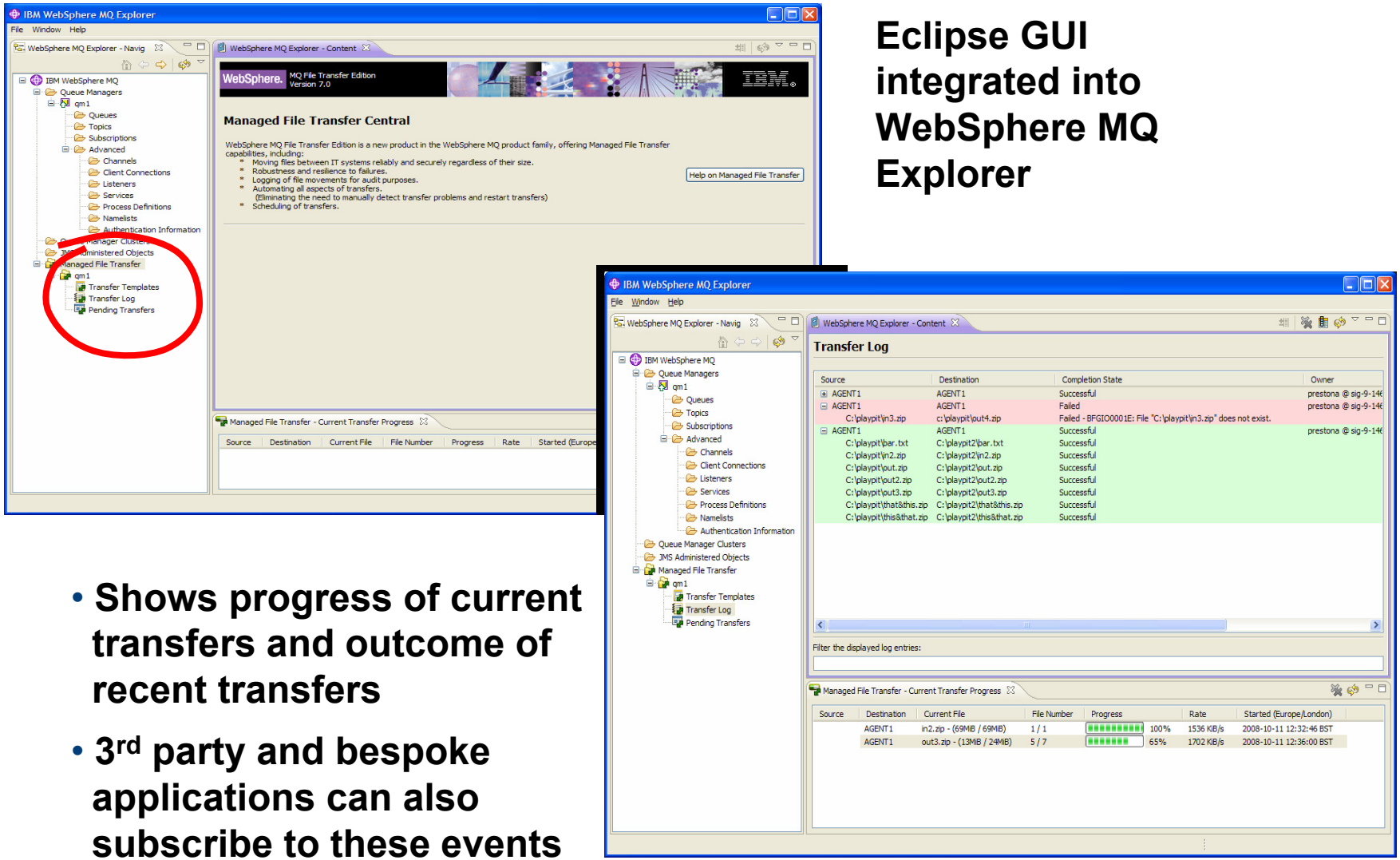

Job Control Language (JCL)




XML Scripts using Apache Ant



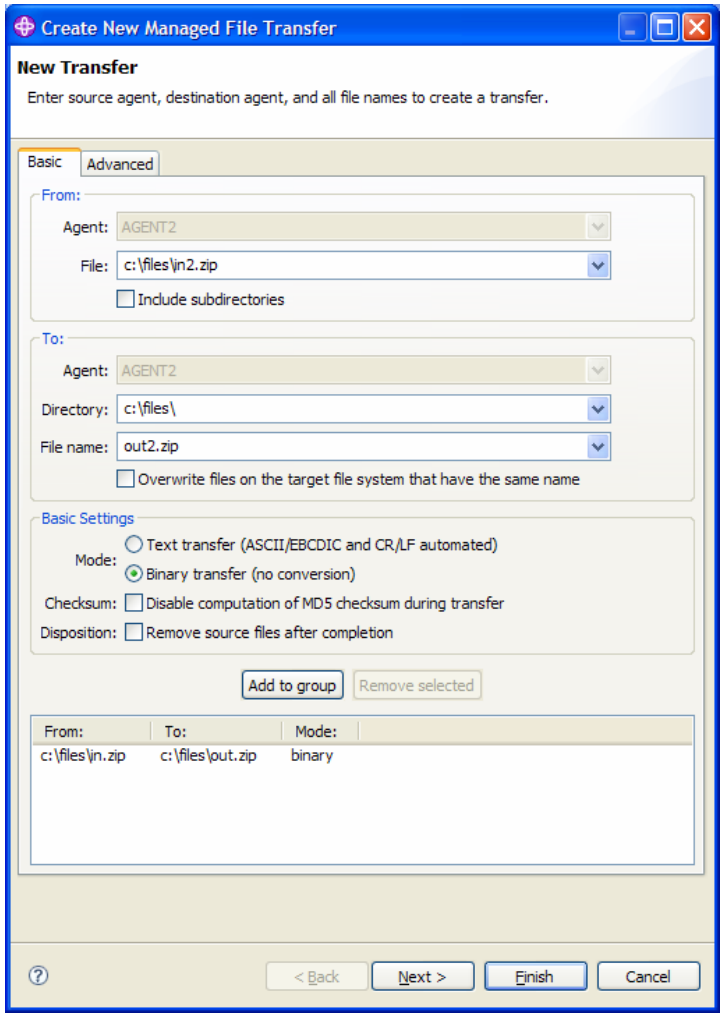
# Centralized monitoring using MQ Explorer




**Eclipse GUI integrated into WebSphere MQ Explorer**

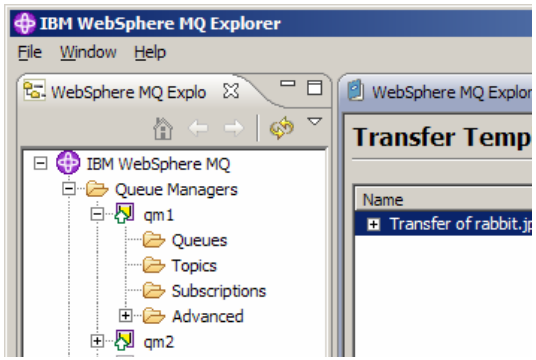
- **Shows progress of current transfers and outcome of recent transfers**
- **3rd party and bespoke applications can also subscribe to these events**

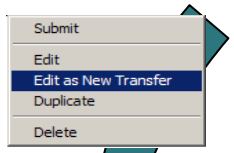
# Managed file transfers using MQ Explorer

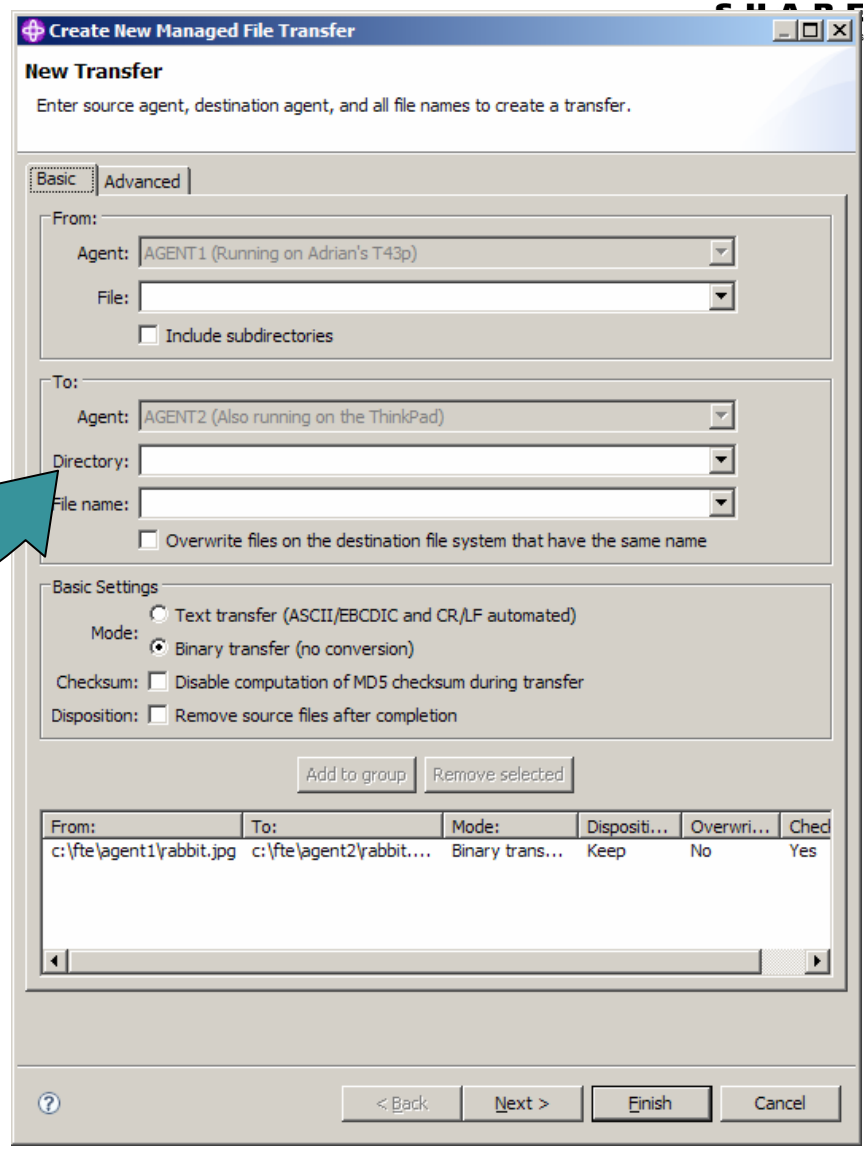



- Graphical user interface that allows:
  - Operators to create ad-hoc file transfers to satisfy a particular business need
- File transfers can:
  - Specify code page conversion
  - Group together multiple files into a single transfer
  - Recursively move directory structures

# File transfers based on templates



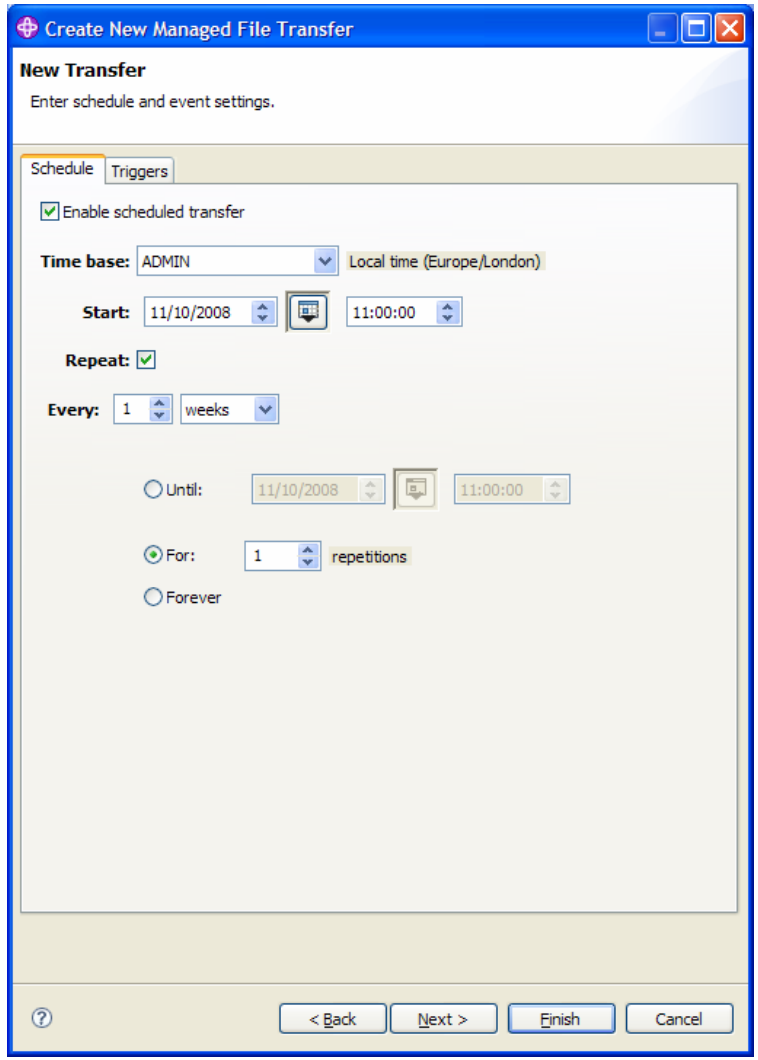




- Store frequently used transfers as templates
- Submit later, either as-is or after modification.

# Scheduled transfers

- Transfers can be scheduled to take place at a specific time
- Scheduled transfers can be used to initiate a managed file transfer during a processing window
- Scheduled transfers can repeat:
  - Every day, week, year etc.
  - For a specified number of repetitions
  - Until an end date/time

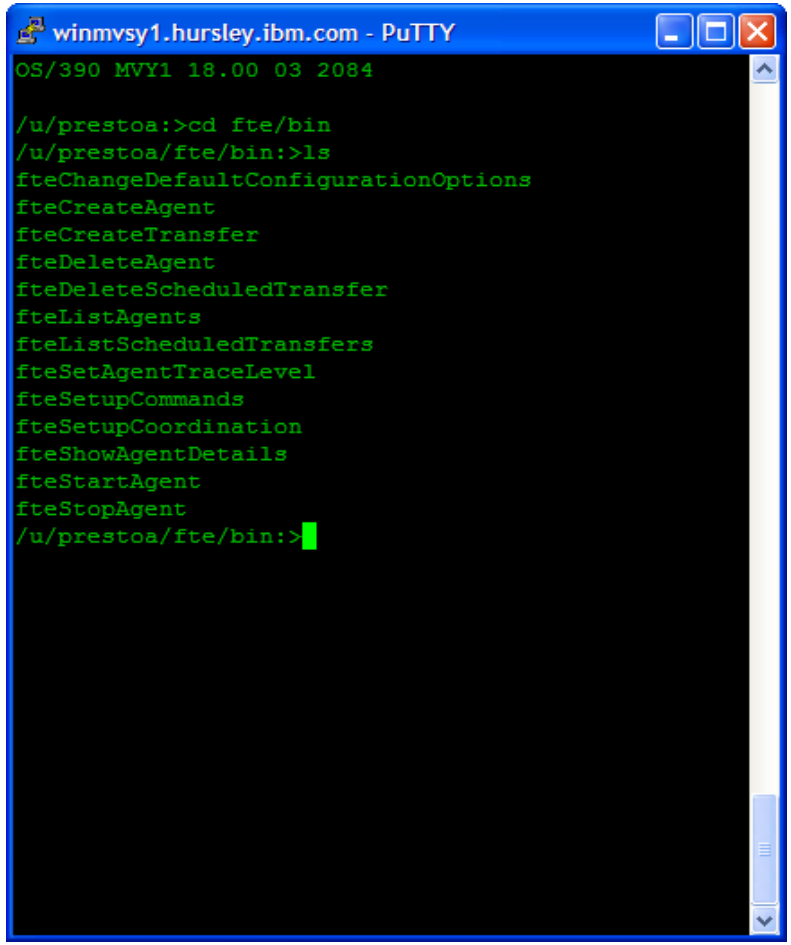


# Directory Monitoring

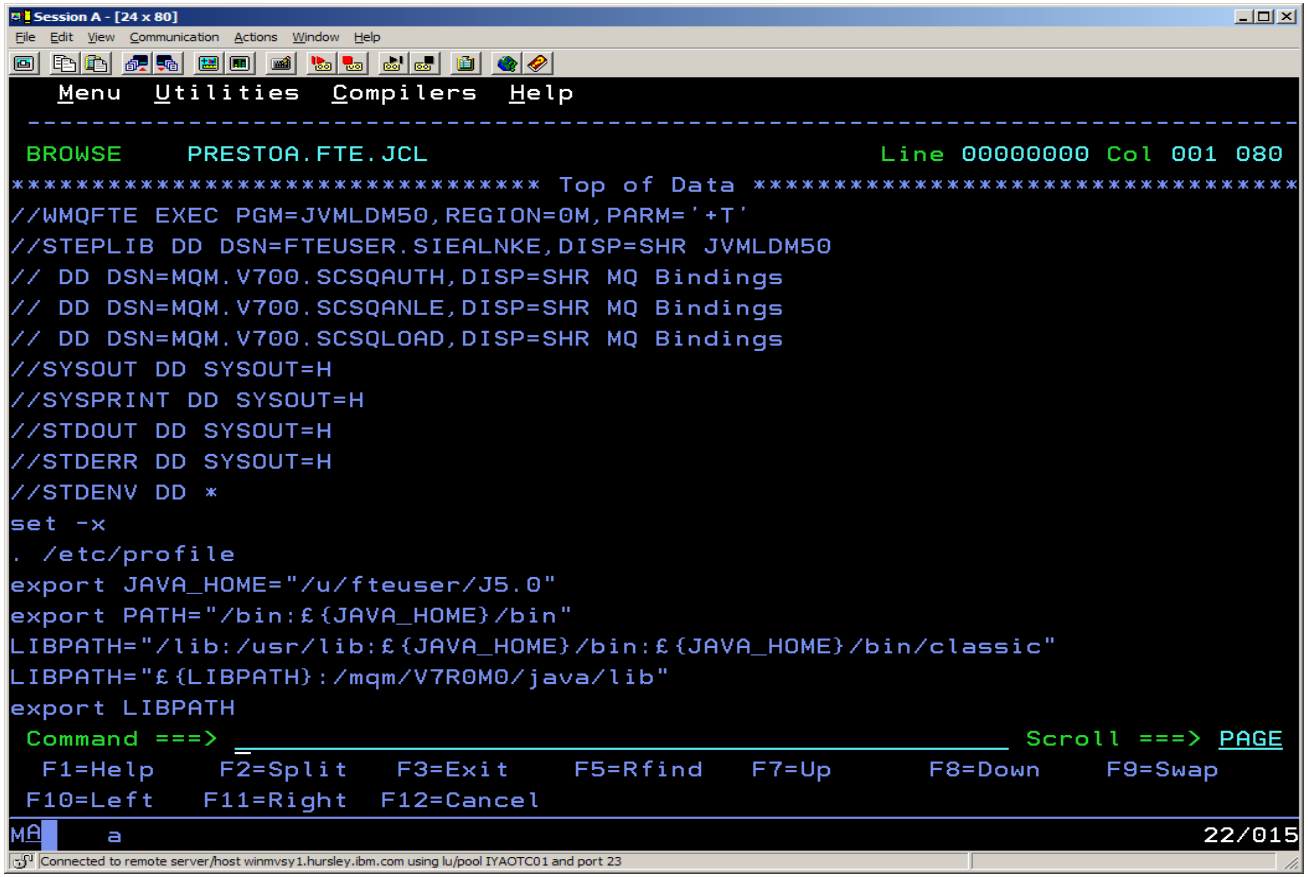
- Monitor file system for presence of “trigger files” and start a file transfer operation
- Directory monitoring can be used to integrate with an application which produce files as its output – without needing changes to the existing application
- “Trigger files” can be:
  - Specified using wildcards
  - Found by recursively searching directory trees
- Attributes of file transfer can be inferred from trigger file, for example:
  - Transfer all files from same directory as trigger file
  - Select destination agent name from parent directory of trigger file
  - Name destination file with timestamp of trigger file
  - Etc.
- Supports extension via user exit routines

# Via the Command Line...

- Equivalent function to the GUI is also scriptable from the command line!
- Administrative commands:
  - Define and delete agents
  - Configure agents
  - List and show details about agents
  - Start and stop agents
  - Create and delete scheduled transfers
  - Create and delete directory monitors
- Operational commands:
  - Start transfers
  - Cancel transfers
  - List in-progress transfers

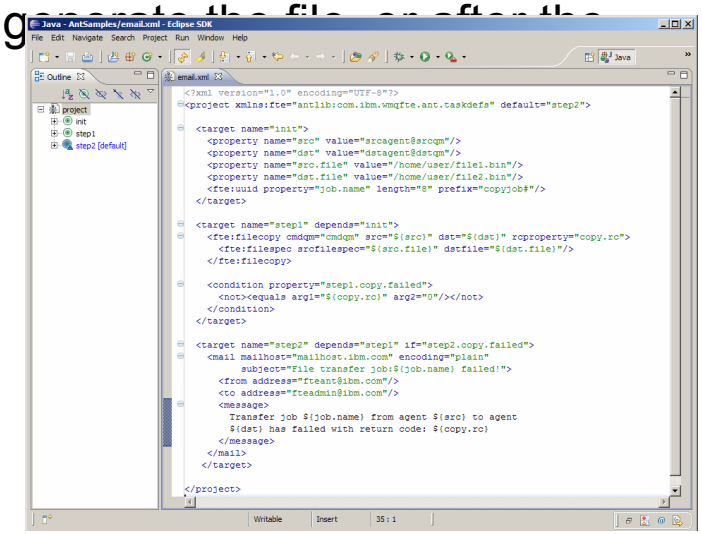


# … and also Job Control Language (JCL)



# Scripting

- Script together complex sequences of transfer operations which execute conditionally
  - E.g. If step1 successful do step2 else email administrator
- Use scripting to call out to other programs to perform pre/post processing of file data
  - E.g. Run a program prior to the transfer to generate the file, or after the transfer to process the file
  - The output from any programs run is captured in the transfer audit information
- Based on the Apache Ant language which is:
  - Open… (so you can get a book on it…)
  - ..and extensible (so you can use Ant tasks developed elsewhere)



# Options for integration with existing systems

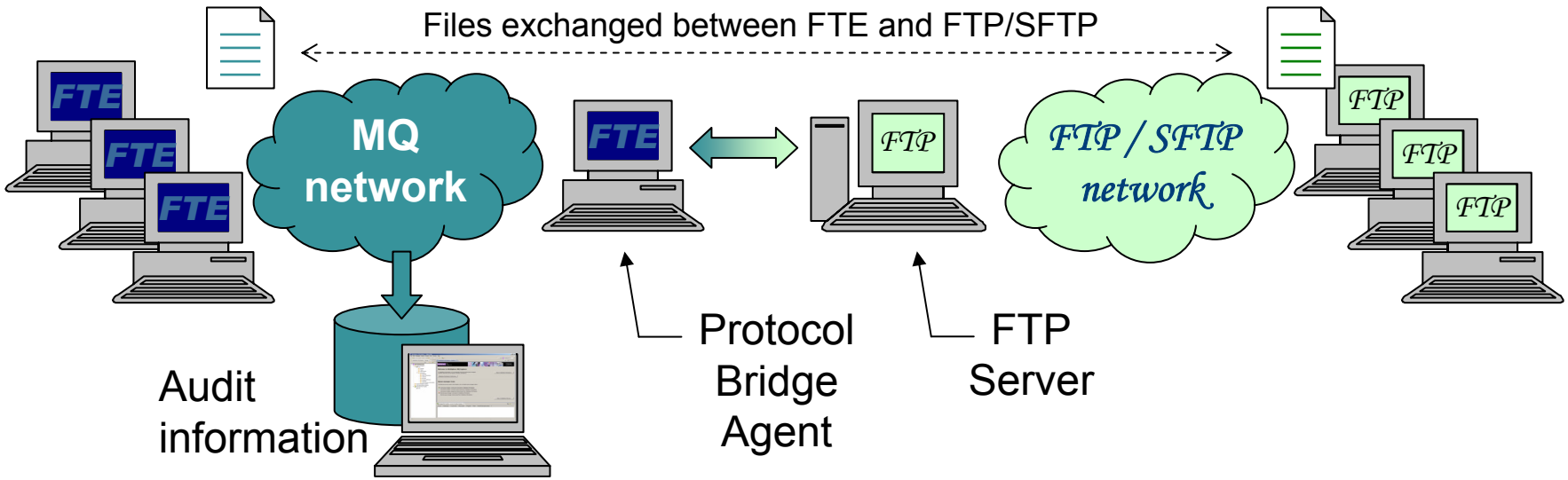
Integrate through the use of directory monitoring and scripting

Connect to existing FTP/SFTP servers using Protocol Bridging

Transfer files outside your enterprise using the DataPower XB60 appliance

# Protocol Bridging Agents

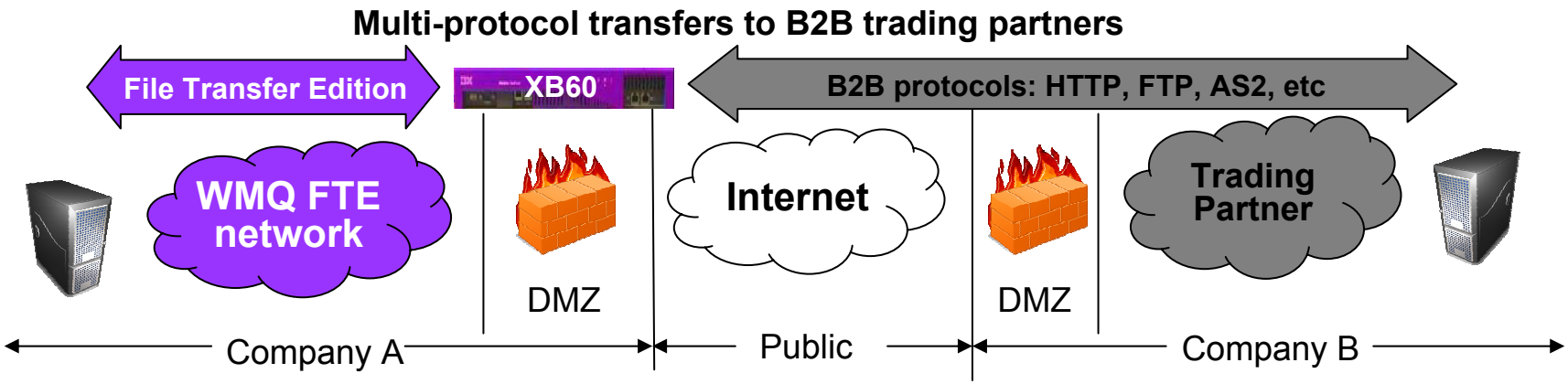
- Support for transferring files located on FTP and SFTP servers
  - The source or destination for a transfer can be an FTP or an SFTP server
- Enables incremental modernization of FTP-based home-grown solutions
  - Provides auditability of transfers across FTP/SFTP to central audit log
  - Ensures reliability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



# Interoperation with Datapower B2B Appliance XB60

- Documented and tested configurations for integrating with DataPower Appliances
  - WebSphere DataPower XB60 B2B Appliance – for B2B connectivity
  - WebSphere DataPower IX50 Integration Appliance – for ESB connectivity

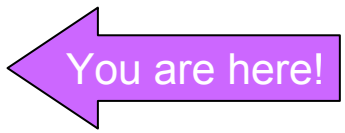
- Enables sending files to trading partners over a range of protocol transports
  - via DataPower Appliances acting as B2B gateways



SHARE
Technology · Connections · Results

# Agenda

- What is Managed File Transfer?
  - The shortcomings of traditional file transfer solutions
- Introducing WebSphere MQ File Transfer Edition
- Key Components
- How File Transfer Edition uses MQ
  - Different roles for queue managers
  - Key message exchanges
- Walkthrough of Key File Transfer Edition Function
  - Ways to initiate file transfers
  - Integrating with existing systems
- New features in v7.0.2



# New features for v7.0.2

- Support for the IBM i platform (iSeries) (V5R4 & V6R1)
- Ability to bridge to FTP and Secure File Transfer Protocol (SFTP) servers
- Enhanced security with more granular access control for users and groups
- Extended Platform Support
  - Extended platform coverage for database archiving of file transfer audit log (z/OS, Solaris & Linux on x86)
- Documentation for configuring transfers through the business-to-business (B2B) gateway provided by WebSphere DataPower B2B Appliance XB60

# Granular Access Control

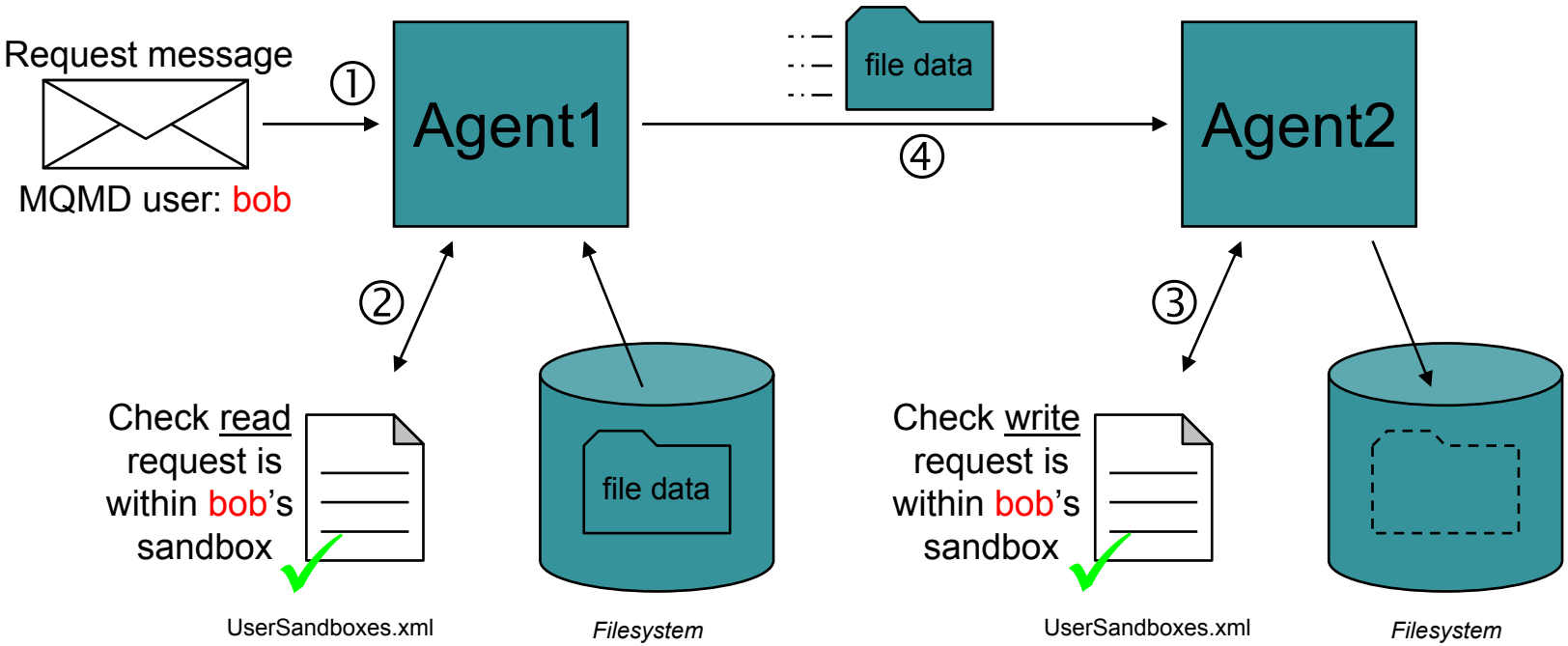
- Pre v7.0.2 a user could be authorised for all agent operations or none.
- Now there are user and agent authorities
  - User authorities pertain to the user ID that submitted the transfer request
  - Agent authorities pertain to the user ID that is running the agent process
- Relies on MQMD user ID
- Very similar to Message Broker V7 security implementation

NOTES

# Granular access control

- Granular access control is implemented by creating authorisation queues for each agent. The authority a user has on a particular queue maps to an authority to do something in the WMQFTE world.
- There are user authorities which relate to the user that submitted the request (as given by the MQMD userID), and agent authorities, which relate to the userID an agent process is running under.
- Security is controlled via the following agent properties:
  - authorityChecking=true|false *(default: false)*
    - Enables granular access control function
  - userIdForClientConnect=none|java *(default: none)*
    - Sets the user ID that gets flowed on MQCONN calls to the user name associated with the process (as returned by the JVM). The default is not to flow a user ID
- Agent process must run under a user with the 'ALT_USER' MQ Authority!
  - A new requirement, that applies when 'authortyChecking=true' is set
- Command line '-ac' switch on *fteCreateAgent*
  - Automatically sets:
    - 'authorityChecking=true'
    - 'userIdForClientConnect=java'

# User Sandboxing




- The checks at steps 2+3 must succeed otherwise the file transfer will not take place!

NOTES

# User Sandboxing

- In V7.0.2 the concept of a per-user sandbox was introduced. This allows the WMQFTE administrator to further restrict where users can transfer files to or from on a particular system.
- The function is enabled by setting the userSandboxes property to true.
- Note that user sandboxing and sandboxing are mutually exclusive, and the agent will not start if properties for both of them are set.
- User sandboxing is configured using the UserSandboxes.xml file. This file is located in the agents configuration directory, and is created when a WMQFTE v702 agent is created.
- The schema for this file is located in the samples directory

# WMQFTE Node in Broker 7.0.0.1

- WebSphere Message Broker 7.0.0.1 contains new WMQFTE nodes that can be added to flows.
  - Input and Output node
  - Based on the existing File Nodes

- This adds a WMQFTE agent to a Broker execution group
  - Can replace any agent in your WMQFTE network
  - Exists on the same physical machine as the Broker queue manager

- For more information see the What's new in WebSphere Message Broker presentation at 6pm on Thursday in the New Content room

# Apply to Join the Early Access Program

- **What is it?**
  - Opportunity to get early access to pre-GA code
  - Influence product directions and features
  - Build product knowledge and skills
- **When does it start?**
  - You can apply to join anytime during 2010
- **What is required to join?**
  - A specific Non-Disclosure Agreement (NDA) must be signed
  - Can be signed electronically via the Betaworks Web site
- **What could I receive?**
  - Download regular code drops of the latest pre-GA iterations
  - Opportunity to provide product feedback direct to labs
  - Product roadmap details and materials
- **Who can I contact with more questions?**
  - Contact your local IBM representative

# Resources

- Information Center:
  - http://publib.boulder.ibm.com/infocenter/wmqfte/v7r0/index.jsp
- Redbooks / Redguides / Redpapers:
  - IBM WebSphere MQ File Transfer Edition Solution Overview
    - http://www.redbooks.ibm.com/abstracts/redp4532.html
  - Managed File Transfer for SOA using IBM WebSphere MQ File Transfer Edition
    - http://www.redbooks.ibm.com/abstracts/redp4533.html
  - B2B Enabled Managed File Transfer using WebSphere DataPower B2B Appliance XB60 and WebSphere MQ File Transfer Edition
    - http://www.redbooks.ibm.com/abstracts/redp4603.html
- Trial Download:
  - http://www.ibm.com/software/integration/wmq/filetransfer/