pharos
communications limited

pharos whitepaper

PHWP-3001.01_Pharos_Architecture.docx

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01/02/2005

Contents

1 Pharos Architecture

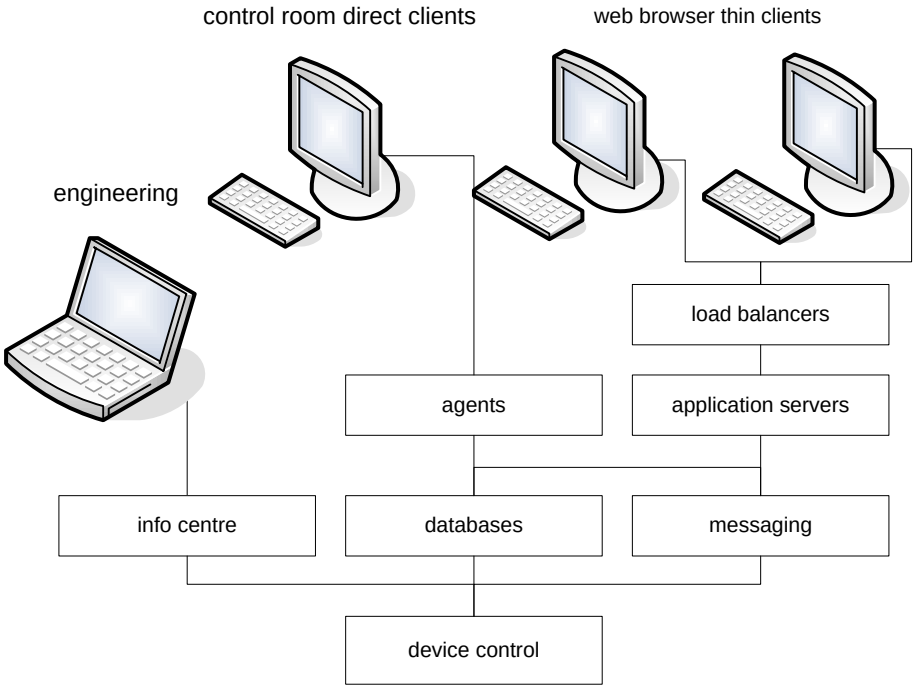
The Pharos Mediator Enterprise Workflow is a modular toolset that uses a layered architecture providing very high reliability, built round standard IT components and protocols. This provides for a very high level of scalability.

Open protocols are used throughout with the exception of the device control layer; which because of necessity must use proprietary protocols for the specific device types.

Refer to the Pharos Whitepaper – Moving out of the control room and onto the enterprise desktop.

1.1 Layered model

The layered model used is shown in the following diagram:



1.2 Web enabled user interface

These are computers running a web browser. If video browse facilities are required they will also need QuickTime installed. They are used for all administrative and workflow processing. The thin client approach enables rapid updating of software and the addition of new workflows and tasks without disruptive and expensive rollout. User management is by the use of usernames and passwords. Usernames are also used to assign roles and manage tasks. It is strongly recommended that a logout / login regime is followed if at all possible. Key fob readers or other security devices may simplify this process.

1.3 Database

The database subsystem consists of at least two database engines. These are Linux based machines running the Firebird database engine. This database engine is ANSI SQL92 compliant and features an advanced multi generational architecture. This prevents the row locking problems which can cause problems in real time databases. The two database engines are usually running in a dual configuration with reads coming from the active database and writes being made to both. The database is used to store all media management information and workflow states. The structure of the database is available to third parties to aid understanding of the system operation. In systems with the Pharos playtime playout the same database structure is used to store the playout schedules.

Low level database administration tools and management reports are included with the system.

1.4 Messaging

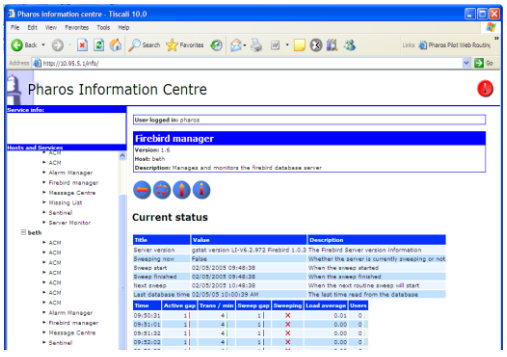
The messaging subsystem consists of a duplicated set of message passing computers. The messaging system uses short text messages sent to a message centre. The connection mechanism is based on TCP/IP sockets connections and provides rapid distribution of control messages. Applications register for message types.

1.5 Agents

Agents are the business logic middleware; they are responsible for handling all material transfers and automated workflow processing, checking schedules, re timing events etc. Agents run on a pool of computers, additional hardware can be added to allow the system to be scaled to any practical size.

1.6 Information centre

The information centre is used to provide a concise engineering overview of all aspects of the system. All device drivers, agents and other system components produce status information as XML data. This provides far more flexibility than the use of SNMP which is restricted to simple alarm and status information. The info centre is accessed using a web browser. It forms the core of the remote access system and allows faults to be diagnosed. It is also possible to restart services and view configuration and version information.



1.7 Alarms

Pharos Exception provides a comprehensive alarm management system allowing monitoring of internal processes as well as bringing in external triggers. All alarms are viewable through the Pharos Information Centre which is a web based application for engineering purposes. The alarms can also be displayed in graphical user interfaces and fed to external systems. Alarms from equipment external to the Pharos processes can be collected in several way, most commonly through GPIs however SNMP based systems have also been implemented including Dell hardware and Omneon video servers. A number of applications within Exception allow intelligent management of the incoming alarms so that response can be correctly targeted.

This is the moving of an object from one state to another. These transitions either happen automatically as a result of some system action or manually as a result of a process being completed. It is only possible to make specific transitions and the correct Role must be used. These workflows are described using state transition diagrams.

2 Workflow

The system supports the embodiment of workflows to be followed. The concepts used are:

2.1 Roles

Each user of the system is assigned one or more roles. A role determines what the user sees on logging into the system and what state transitions they can perform. Typical roles are QC operator, playout operator and playout supervisor.

2.2 States

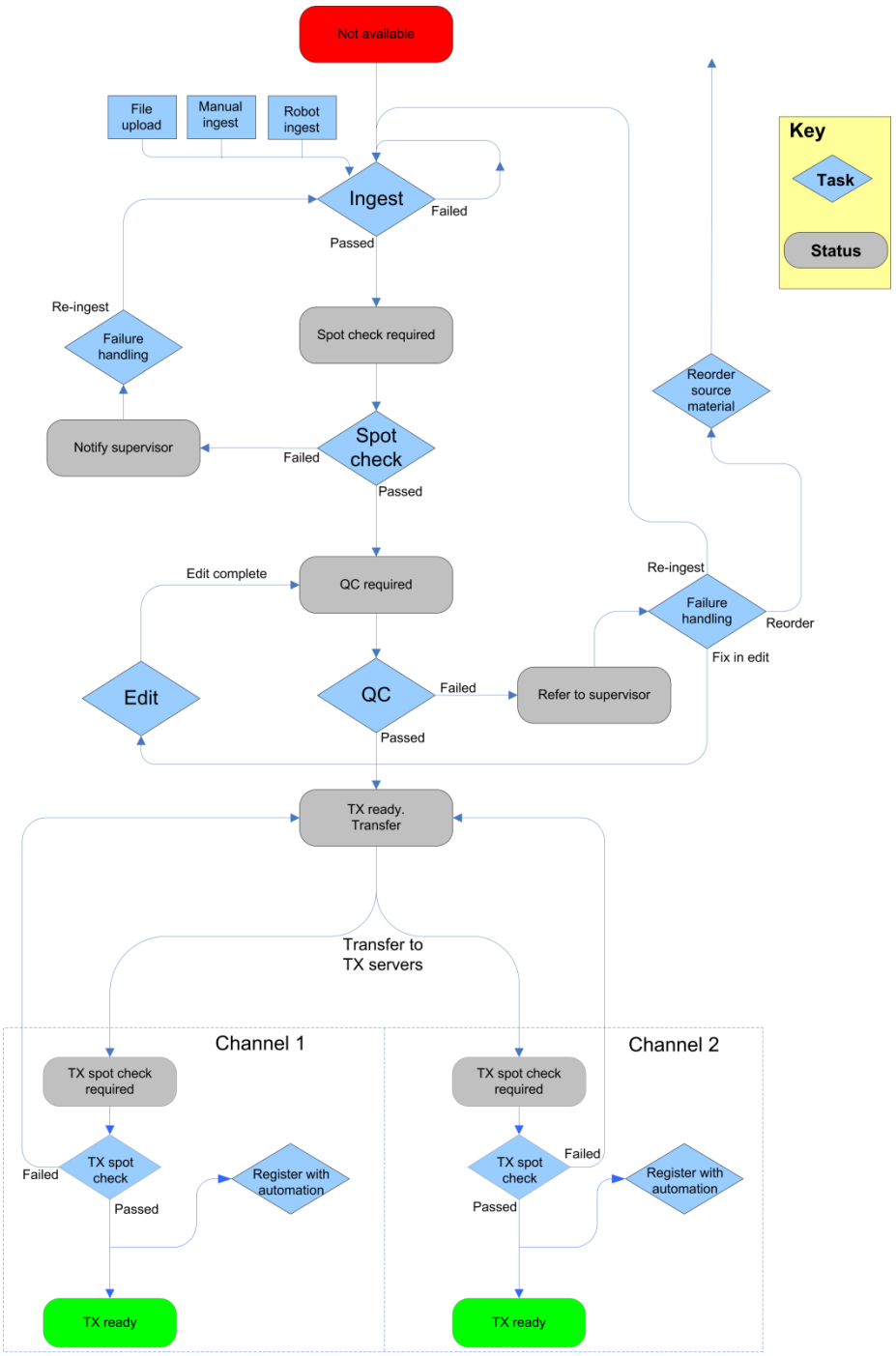
Any object within the database can be assigned a state. States describe the condition of an object in the context of the system. Typical states for a material might be Waiting for ingest, Ingesting, Waiting for QC, In QC etc.

2.3 State transitions

This is the moving of an object from one state to another. These transitions either happen automatically as a result of some system action or manually as a result of a process being completed. It is only possible to make specific transitions and the correct Role must be used. These workflows are described using state transition diagrams.

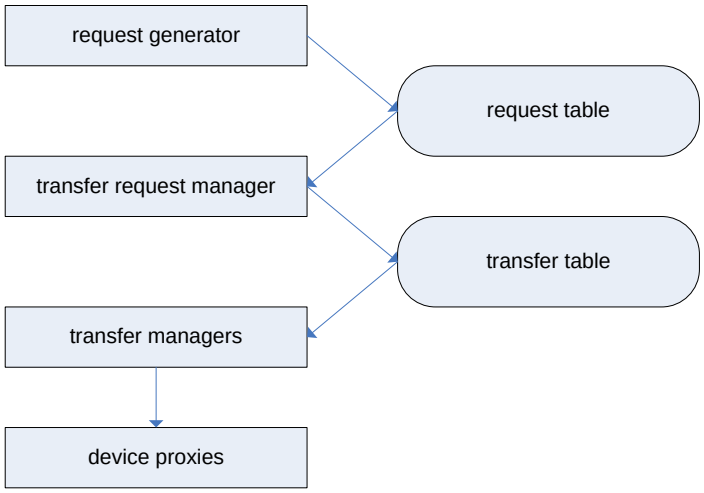
2.4 Workflow Configuration

The configuration of the workflow system can be changed to suit new workflows. As manual processes are automated the state tables can be altered to respond to new triggers.



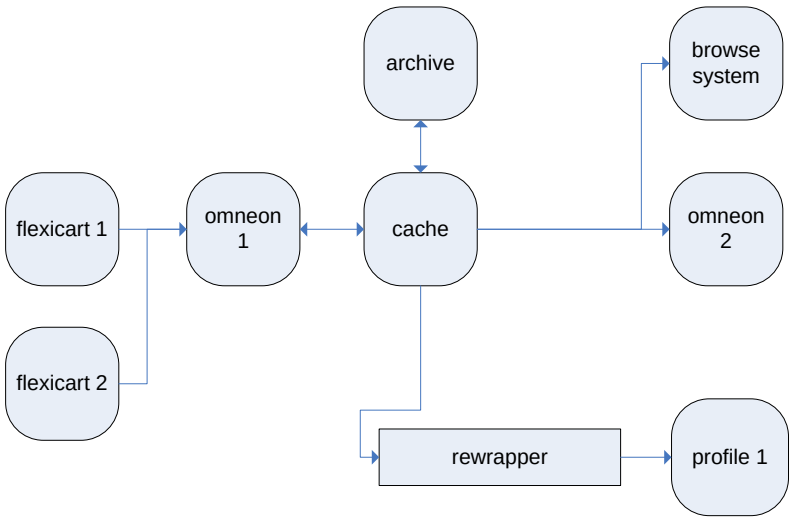
3 Mediator Transfer system

The transfer system provides a uniform structure for all transfers. It is based on a step by step process.



3.1 Nodes and node routes

Any device which can perform transfers is described by a node definition. Routes between nodes are described as a destination node followed by a list of nodes to be used to perform the transfer.



3.2 Transfer routes

A pair of tables is maintained to indicate valid transfer routes. An example of these tables for the diagram above is shown here:

Id	Name	Status
1	Flexicart 1	Online
2	Flexicart 2	Online
3	Omneon 1	Online
4	Cache	Online
5	Archive	Online
6	Browse system	Online
7	Omneon 2	Online
8	Rewrapper	Online
9	Profile 1	Online

Destination	Node route	Comment
3	1	Flexicart 1 to Omneon 1
3	2	Flexicart 2 to Omneon 1
3	4	Omneon 1 to Cache
4	3	Archive to Cache
3	4	Cache to Archive
7	4	Cache to Omneon 2
6	4	Cache to Browse system
9	4,8	Cache to profile1 via rewrapper
7	3,4	Omneon 1 to Omneon 2 via cache

3.3 Transfer Requests

All transfers are triggered by a transfer request. A transfer request is entered into the database request table. It contains the ID of the item required, the destination it is required on and the time it is required by.

3.4 Transfer Request Manager

The transfer request manager takes transfer requests and converts them to a series of transfers. It performs this transformation by referring to the tables described above. The resulting transfers are written to the transfer table with appropriate dependencies. A transfer request is considered complete when all of its dependant transfers are completed.

3.5 Transfer managers

Each type of transfer has a transfer manager to move the material from one device to another. Each transfer manager retrieves the next most urgent request for its routes and performs it. A transfer manager is tailored to the type of transfer so the Sony Flexi-cart transfer manager can perform three simultaneous transfers, an ftp transfer manager can perform one transfer per route.

4 Data migration

Pharos uses open standard XML for the import and export of metadata. So any existing data can be imported from the various business systems and broadcast systems.

4.1 Import from Channel Management

The Channel Management (CM) playlist for material will be used to imports schedules, make lists and for the return of as-run logs. The CM files will be translated to XML files (if required) which will then be imported automatically to the Mediator database. As-run information will be exported from the Mediator database in XML format. This will be translated to the CM format for reconciliation.

4.2 New assets

Our suggestion is that new assets are produced and archived with both a quicktime and an MXF wrapper, the quicktime wrapper achieves greater functionality with the current and projected releases of video server software. The MXF wrapper would reference the same content and allow rapid migration to MXF once this is fully supported elsewhere.

4.3 Rewrapping

Rewrapping services take content essence and rewrap it for playout from a different type of server. The rewrapping does not change the video data in any way, it is therefore transparent in terms of picture quality and further QC is not required. Pharos can offer a re-wrap process and various file formats are available.

4.4 Transcoding

Transcoders take the essence and decode it to a raster based format, this raster is then re-coded to change the format or bitrate. Conversion of bitrate is a significant and lossy process. It is exactly equivalent to playing the file from one video server and re-recording it on anther. Great care must be taken if trancoding is to be employed to ensure the maintenance of quality.

5 Integration with automation system

Pharos can integrate Mediator with any traditional automation system, and has several working examples:

Omnibus

Harris – both Encoda/Drake and Louth ADC-100

Ibis

5.1 Operation

The CMS schedules received will be automatically loaded to the mediator system and will trigger retrieves from the archive. The retrieval requests will have the transmission times from the schedule which will be used by the transfer manager to prioritise the retrieval sequence. The import routine will require a mapping table to indicate the playout server to be used for each channel.

5.2 Audio handling

If the selected automation system does not directly deal with multi language audio then the Pharos Mediator can assemble multi track audios – required for multi language. The Pharos system of profiles used to control the playout of multi language assets under the Pharos Playtime automation will be adapted to control the re-wrapping operation from the archive to the playout servers. This will create temporary assets on the playout servers with the appropriate audio tracks. These will be played out by the automation system as though they had been ingested directly onto the server.

5.3 Workflow tracking

Where it is required to track major workflow states such as the loading of a schedule this will be accomplished by running a mediator form in a web browser. The operator would be required to manually record major workflow items in the web form as they perform them.

6 QC stations

The QC process incorporates both technical checking of material and compliance checking.

6.1 Technical checking

The video can be checked for video quality. This operation requires a decoder of the same type as that which will be used for playout. A dedicated workstation is provided connected to a jog/shuttle control used to enable the logging of QC information into mediator. The technical check is then signed off.

6.2 Compliance checking

Compliance checking can be performed either using the technical QC workstation described above or from the mediator web pages using the browsing functions. The screen used is shown below: