A distributed programme making environment using IT-based technology

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IBC Amsterdam, 11 September 2000
Mass-market IT infrastructure

- IT market much larger than broadcast market
  - global PC sales now exceed 100 million / year
- Lower infrastructure costs
  - IDE storage now €6 / GB (& CD-RW storage now €2 / GB)
  - Fast Ethernet switches now €25 / port
- DV cameras & PC editing increasingly used for production
- Re-authoring for Internet simplified
- Reuse of material aided by easy metadata handling
A distributed programme making environment using IT-based technology

- Infrastructure re-engineering
- The ORBIT project
- Architectures
- Distributed components & services
  - Example of content access
- Content formats
- Technologies
- Standards
Infrastructure re-engineering

Metadata

Essence

Research & Development
Infrastructure re-engineering

Metadata

- database
- database
- IT infrastructure

Essence

- metadata interface
- process
- process

VHS, SP, DI, D3, DigiBeta, DVC, DVC Pro, DVCAM...
PAL, Rec. 656, SMPTE 270M, AES/EBU...

Research & Development
Infrastructure re-engineering

Metadata

- Database
- Database
- IT Infrastructure
- Metadata Interface

Essence

- Encoder
- High Performance Network
- High Performance Server
- High Performance Server
- High Performance Server
Infrastructure re-engineering

Metadata & essence combined
ORBIT - Object Reconfigurable Broadcast Infrastructure Trial

- Identify best practice for distributed IT-based programme-making infrastructure
  - content handling & desktop access to material
  - linkage of media asset management and content handling
  - suitability for use on corporate-wide scale
  - reconfigurability
    - for different types of production process
    - for different content formats
  - recommendations on suitable content formats

- Develop set of interconnected networks
  - production, playout & archiving
  - enable controlled access between areas while allowing users ownership of their own material
ORBIT architecture - production area

- team 1 facilities
- team 2 facilities
- team 3 facilities
- online editor
- quality viewing
- workstations
- local area network
- shared storage
- intake
- processors for transcoding, edit conforming & mastering
- area facilities

Research & Development
DISTRIBUTION & TECHNOLOGY
Distributed components and services

- Functionality distributed across co-operating software components
- Client components on workstations
  - Intake Control, Essence Viewer, Metadata Viewer, Clip List...
- Service components on servers
  - Intake Service, Metadata Service, Content Service, Transcoder, RS-422 Control...
Search application

Query Entry

Essence Viewer

Clip List

Metadata Viewer

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Distributed components and services

- Technological approaches include:
  - Web-based client/server technology
    - HTTP
    - XML ...
  - Remote procedure calls
  - Object middleware
Object middleware

- Interconnects object-oriented components which may be running on different machines
  - clients see “proxies” to server objects
- Major offerings are D-COM, EJB/RMI and CORBA
- ORBIT uses a CORBA middleware layer
  - open
  - multi-platform & multi-language
  - choice of vendors
  - standard services: Naming, Trading, Event, Notification
  - DSM-CC
- Developed by INESC, Portugal
Content access

Metadata Service

SQL

Database

Search Workstation

Content Locator

lookup (unique label)

query()

unique label

resolve data service

(resolve "Metadata Service"
(resolve "Content Locator")

lookup (unique label)

reference to content

request_player()

Content Service

Content Player

reference

stop()

TCP socket connection

Content Server

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Content access

- Metadata Service
- Content Locator
- Naming Service
- Search Workstation
- TCP socket connection
- Content Server
- Content Service
- Content Player
Content access

- Metadata Service
- Naming Service
- Search Workstation
- Content Locator
- Content Service

Content Server

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DISTRIBUTION & TECHNOLOGY
Content access - multiple tiers

Database

Metadata Service

SQL

query()

unique label
Content formats

• Focus is on MPEG for video essence
  – MPEG-1 for browse, MPEG-2 422P@ML for full quality
  – Long-GOP and I-frame-only MPEG as appropriate
  – ATLANTIC processing techniques preserve quality with long-GOP MPEG

• System extensible to support DV, M-JPEG, etc.

• Wrapper information identifies essence format and synchronises audio, video and metadata
  – Currently ORBIT implements its own wrapper
  – AAF for interchange with online editor
  – MXF for delivery of finished programme to playout
Storage requirements for production area

- Six teams each working on a 40-minute episode
- 40:1 shooting ratio
- No material destroyed
- 15 days shooting per episode
- 30 days post production per episode
- 20 Mbit/s full quality
- 3 Mbit/s browse quality

![Storage Requirements Chart]
Technologies and platforms

- Pentium-III and Athlon CPUs
- Fast Ethernet and ATM switched networking
- RAIDed and non-RAIDed IDE & SCSI disks
- PCI cards for essence I/O
  - MPEG-1 video & audio capture
  - MPEG-2 video & PCM audio capture
  - MPEG-2 video & PCM audio output
- Software MPEG-2 encoder & decoder in development
- NT & Linux versions of CORBA service components
- NT-based client applications
Standards

Standards needed for the building blocks, allowing innovation at the application level:

- **IT world**
  - OMG, IEEE, IETF, etc.

- **System control**
  - SMPTE WG on Advanced System Control Architecture
  - Pro-MPEG Networking and Control group

- **Content formats**
  - Advanced Authoring Format
  - Material eXchange Format

- **Metadata**
  - SMPTE UMID, Dictionary, etc.
  - EBU P/Meta
ORBIT activities

• Initial production demonstrator
  – Intake, search and browse edit applications

• Enhanced software in development
  – Applications
  – Metadata model
  – Middleware layer
  – FTP
  – Essence Cacheing

• Integration with commercial systems
  – BBC desktop applications
  – AAF-based online editor
  – Asset management system
  – Play-to-air servers
Conclusions

• Use commodity IT hardware for essence
  – Same IT system for essence and metadata
  – Efficient management of media assets
  – Access to programme content at desktop

• ORBIT is developing set of inter-connected networks

• Enabling technologies
  – Object middleware
  – Long-GOP compression
  – Wrappers

• Working with manufacturers and standards bodies

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