Building a Broadcast Grade System in the Cloud

Stephen Godwin - Senior Technical Architect
Online Video from the BBC
Online Video from the BBC
Online Video from the BBC
• The UK’s biggest Video & Audio On-Demand service
  – And it’s free!

• Over 7 million requests every day
  – ~2% of overall consumption of BBC output

• Over 500 unique hours of content every week
  – Available immediately after broadcast, for at least 7 days

• Available on over 1000 devices including
  – PC, iOS, Android, Windows Phone, Smart TVs, Cable Boxes…
    • Both streaming and download (iOS, Android, PC)

• 20 Million app downloads to date
… the best online TV service in the world – and the front door to many people to the whole BBC.

Tony Hall, BBC Director-General
Video Factory

- Complete in-house rebuild of Ingest, Transcode & Delivery workflows for BBC iPlayer
- Scalable, Cloud based architecture for delivering Video to the BBC iPlayer platform
- The result of 1 year of development by ~18 engineers
Why the Cloud?

- Highly scalable architecture
- Improved reliability
- Handle spikes in load
Video Factory - Mezzanine Capture

SDI Broadcast Video Feed x 24

Broadcast Encoder

RTP Chunker

Time Addressable Media Store

Transcoding

Distribution

Mezzanine Video Capture

SMPTE Timecode

Mezzanine Video Capture

Playout Data Feed

Live Ingest Logic

File Based Ingest

Mezzanine

Playout Video

Transcoded Video

Metadata
Broadcast Feeds

The world's first regular high definition television service was inaugurated here by the BBC on 2 November 1936.
Video Factory - Mezzanine Capture

- SDI Broadcast Video Feed x 24
- 3Gb HD/1Gb SD
- SMPTE Timecode

Broadcast Grade Encoder

- MPEG2 Transport Stream (H.264) on RTP Multicast 30Mb HD/10Mb SD

RTP Chunker

- MPEG2 Transport Stream (H.264) Chunks

Chunk Uploader

- Amazon S3 Mezzanine Chunks
Video Factory - Mezzanine Capture

SDI Broadcast Video Feed x 24 → Broadcast Grade Encoder

SDI Broadcast Video Feed x 24 → SMPTE Timecode

Broadcast Grade Encoder → RTP Chunker

RTP Chunker → 2 per location

Chunk Uploader → resilient network to cloud

resilient network to cloud
Video Factory - Mezzanine Capture

SDI Broadcast Video Feed x 24

3Gb HD/1Gb SD

SMPTE Timecode

Broadcast Grade Encoder

RTP Chunker

Chunk Uploader

2 per location

multiple locations

resilient network to cloud
Video Factory - Time Addressable Media

SDI Broadcast Video Feed x 24

Broadcast Encoder

RTP Chunker

Time Addressable Media Store

Transcoding

Distribution

SMPTE Timecode

Mezzanine

Playout Video

Transcoded Video

Metadata

Playout Data Feed

Live Ingest Logic

File Based Ingest
Video Factory - Time Addressable Media

Request for transcode source

Chunk Concatenator

Control Messages

Mezzanine Chunks

S3

Mezzanine

Video Factory - Time Addressable Media

- Video Factory: Time Addressable Media
- Request for transcode source
- Chunk Concatenator
- Control Messages
- Mezzanine Chunks
- S3
- Mezzanine
Video Factory - Transcoding

SDI Broadcast Video Feed x 24

SDI Broadcast Video Feed

SMPTE Timecode

Broadcast Encoder

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Time Addressable Media Store

Transcoding

Live Ingest Logic

File Based Ingest

Distribution

Mezzanine

Live Ingest Data Feed

Playout Video

Transcoded Video

Metadata
Video Factory - Transcoding

- File Based Ingest
- Live Ingest Logic
- Transcode Abstraction Layer
- Elemental Cloud
- Other Transcoders
- Distribution
Video Factory - Transcoding

- Background of 6 channels, spikes up to 24 channels 6 days a week
- A perfect pattern for an Elastic Architecture

Off-Air Transcode Requests for 1 week
Software

• Lots of small components
  – 20 components in total
  – do one thing and do it well
  – easier to test

• Entirely message driven
  – Amazon Simple Queuing Service (SQS)
  – Uses standard message orientated middleware patterns
  – Ideal for scaling and resiliency
Deployment

• Fixed end date

• Deployed in several small steps
  – Clip publishing
  – Mezzanine capture
  – File Based Delivery

• Continuously delivery
  – Re-deployment became second nature
  – Only small amounts of code going live at once - reduces risk
  – Easy to roll back
What does Video Factory enable?

• More Video Content available online
• Faster delivery of live programmes
• Premieres - Watch it first online
• Exclusives - Online only content
Future

• More content, higher bitrates, more devices
• Integrate with simulcast chain
• Even faster delivery of live programmes
Questions?
Links

• iPlayer Performance Pack
  http://www.bbc.co.uk/blogs/bbcinternet/bbc_iplayer_press_pack/

• BBC Director-General’s Speech
  http://www.bbc.co.uk/mediacentre/speeches/2013/tony-hall-vision.html

• Video Factory on the BBC Internet Blog
  http://www.bbc.co.uk/blogs/internet/posts/Video-Factory