Fundamentals of Cloud Migrations

Todd Gagorik, Senior Manager, Executive Programs
Jamie Duemo, Senior Consultant, Global Media and Entertainment Practice

May 24, 2018
Fundamentals of Cloud Migrations

- Break down the buzz words
  - Relation to cloud-based media applications

- Cloud-based migration strategies
  - Patterns, the process, and means of implementation

- Cloud-based pricing
  - Overview
  - Pricing methods
  - Resources for cost optimization
Breaking Down the Buzz Words
What are Microservices?

• Architectural and organizational approach to software development where software is composed of small independent services that communicate over well-defined APIs
  • Components are developed, deployed, operated and scaled (without affecting other services)
  • Each service focuses on executing one specific task
  • Services are owned by small, self-contained teams

• Benefits
  • Agility
  • Easy deployment
  • Technological freedom
What is Decoupling?

• Building an architecture for complex workloads that allows autonomy
  • Individual components are unaware of each other (loosely coupled)
  • Scale horizontally instead of vertically

• Benefits
  • Minimized blast radius
    • Components do not integrate through direct point-to-point interaction
    • Allows for graceful failures
  • Flexibility to scale
Decoupling Example

Tight coupling (procedural programming)

Controller A → Controller B → Controller C
Call a method in B from A
Call a method in C from B

Loose coupling (independent phases using queues)

Queue A → Controller A
Queue B → Controller B
Queue C → Controller C
Decoupling Example

3 Hr Show Update

Traffic

Automation

Queue

Traffic

Automation

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF

BXF
What is **Serverless Computing**?

- Build and run applications and services **without thinking** about the actual servers
  - Automatic provisioning, scaling and management of required resources

- Benefits
  - No server management (zero administration)
  - No cost if not computing (sub second metering)
  - Continuous horizontal scaling as traffic/jobs increase
  - High Availability automatically included
What is **Serverless Computing**?

![Diagram showing the process of traffic flow from traffic to dedicated resource to playlist translator to final destination.](image-url)
Other Serverless Services Examples

- Message queuing service
  - Amazon SQS

- Run serverless code
  - AWS Lambda

- Broadcast-grade live video encoding
  - AWS Elemental MediaLive

- File-based video transcoding
  - AWS Elemental MediaConvert

- Packaging and DRM
  - AWS Elemental MediaPackage

- Targeted ad insertion
  - AWS Elemental MediaTailor

- AWS storage service optimized for live video
  - AWS Elemental MediaStore
Example Comparisons of On-Prem and AWS Terms

- Playout Server Comparison - Amazon Elastic Compute Cloud (EC2)
- NFS Comparison - Amazon Elastic File System (EFS)
- Archive Comparison - Amazon Glacier
- SNMP Traps/Alarms Comparison - Amazon CloudWatch and Amazon Simple Notification Service (SNS)
- Online and Nearline-ish Comparison - Amazon Simple Storage Service (S3)
Cloud-based Migration Strategies
Cloud-Enabled Media Workloads

Acquisition  →  Media Supply Chain  →  DAM/MAM/Archive  →  Analytics  →  AI/ML

→ Production/Post

→ Playout & Distribution

→ OTT

→ Publishing
Start Experimenting

1. Experiment Continuously
2. Measure Relentlessly
3. Learn

• Change in thought process
  • Focus on services, not servers
  • Treat servers as disposable resources
  • Fail early/fail often
Get Rid of **Time-Consuming, Expensive Tasks**

- Move from risk-laden up-front expense to flexible variable expense
- Stop guessing at capacity planning
- Remove complicated infrastructure management that adds little business value
- Go global in minutes

StarTV drastically reduced both cost and time to market for its over-the-top (OTT) content platform, hotstar.com. Novi Digital is one of India’s largest media companies, providing streaming video for more than 40 channels in seven languages to more than 720 million users.
Focus on Your **Core Mission**

- Lower the time spent on infrastructure
- Concentrate on new business initiatives
- Dedicate more resources to innovation
Migration to the Cloud is a process that takes time and iterations.
Cloud Migration Process

1. Migration Preparation & Business Planning
2. Portfolio Discovery & Planning
3. Application & Design
4. Migration & Validation
5. Operate

Continuously Optimize
Six Common Application Migration Strategies

1. Rehosting (“Lift and Shift”)
2. Replatforming (“Lift, Tinker and Shift”)
3. Repurchasing (“Drop and Shop”)
4. Refactoring/Re-Architecting
5. Retiring (“Get Rid Of”)
6. Retaining
Migration Strategies: **Common Evolution**

**Compute**
- Amazon EC2
- Amazon ECS
- AWS Batch
- AWS Lambda
- AWS Elastic Beanstalk

**Network**
- Amazon VPC
- Elastic Load Balancing
- Amazon CloudFront

**Persistence**
- Amazon EBS
- Amazon EFS
- Amazon S3
- Amazon DynamoDB
- Amazon Redshift

**Application**
- Amazon RDS
- Amazon SQS
- AWS MediaConvert
- Amazon API Gateway
- Amazon Rekognition
- Amazon Polly
Cloud Migrations **Deploy However You Like**

- **Your Datacenter**
  - Fully Featured Compute
  - Common Controls for Security & Access
  - Resource & Deployment Management
  - Integrated Networking
  - Data Integration & Life Cycle Management

**Flexible hybrid options**

Amazon Web Services
Hybrid Strategy: Scripps Networks

Accelerating Time-to-Market

Scripps Network Interactive is the leading developer of lifestyle content across TV, digital, and emerging platforms, engaging more than 190 million consumers each month.

Problem Statement
Difficult to scale and expand infrastructure with demand from heavy seasonal workloads, and on-premises solution was failing.

Use of AWS
- Thinkbox Deadline
- EC2 Spot Instances

Business Benefits
- Faster time-to-market
- Scalability
- Cost savings

https://youtu.be/8axEbbQbQmI
Remote Editing in the Cloud Use Case: Pop TV

**Problem Statement**
Their editing facility reached maximum capacity. PopTV needed the ability to build extra editing bays on demand.

**Use of AWS**
- EC2 G3 instances for high powered workstations and multi monitor needs
- S3 use for finished assets

**Business Benefits**
- Smooth experience for their editing team (became the preferred edit suites)
- Allowed for editing bursting
- Pop TV is now looking to leverage solution to create an overall content hub strategy for business continuity

**Edit Bays on Demand**
Pop TV (joint venture between CBS Corporation and Lionsgate Entertainment) is a general entertainment channel, focusing primarily on programs pertaining to popular culture.

https://www.youtube.com/watch?v=eMKzJnMLS3U
Full Flexibility to Build the Right Media Solutions

AWS core services provide a foundation on which customers can build native, partner, and customized solutions.

- Storage
- Compute
- Database
- Networking
- CDN
- Security
- AI/ML
Build Natively

Source Video (MOV, M4V, MPG, MP4) → S3 Bucket (source) → AWS Step Functions (ingest) → AWS Step Functions (processing) → AWS Elemental MediaConvert → AWS Step Functions (publishing) → S3 Bucket (MP4 output) → Amazon CloudFront

- AWS Lambda functions (workflow functions and error handler)
- Amazon DynamoDB table
- Amazon CloudWatch events
- Amazon SNS topics (publishing and error notifications)

https://aws.amazon.com/answers/media-entertainment/video-on-demand-on-aws/
Build with Partners: Veset (Managed Service SAAS)

VESET NIMBUS ARCHITECTURE

Ingest → MAM
- Quality Check
- Media storage
  - Media assets
  - Broadcast Graphics Templates
  - Archive
- Scheduling
  - Schedule Import Engine
  - Schedule editor
- Primary events
  - Automation
  - Graphics engine
  - Subtitle Engine
- Secondary events
  - As-run Logging
- Live IP input
  - Encoding and Mixing
  - Compliance Recording

Output:
- IP output

Technologies:
- AWS Lambda
- AWS IAM
- AWS VPC
- Application Load Balancer
- Endpoints
- AWS CloudFormation
- Amazon S3
- Amazon EBS
- Auto Scaling
- AWS instances
- Amazon RDS
- Amazon Route 53
- Elastic Load Balancer
- Amazon SNS

Docker Microservices
REST API
Unified web Interface
Self-scaling infrastructure

https://veset.tv
Build with Partners: Evertz (BYOL)

https://youtu.be/kWmpSJXYJgk
Build with Well-Architected In Mind

- Security
- Reliability
- Performance Efficiency
- Cost Optimization
- Operational Excellence

Job #1.
Build for failure
More with less
Margin & Bottom-line
Build, Run, Monitor, Scale
Cloud-based Pricing Overview
AWS Pricing: Overview

- Pay-as-you-go model
- Pay less by using more
- Save when you reserve
- Compute on the spot options
- Resources available to assist with Cost Optimization
AWS Pricing: Pay as You Go

- Pay for the individual services used
- Pay for only as long as used
- Trade upfront capex costs with variable costs
- Easily adapt to changing business needs without overcommitting
AWS Pricing: Pay Less as You Use More

Volume-Based Pricing

- **Up to 50TB Storage**: 0.023 GB/month
- **51-100TB Storage**: 0.022 GB/month
- **500TB+ Storage**: 0.021 GB/month

- Data Transfer In
- No Charge
AWS Pricing: Save When You Reserve

1 Year No Upfront

- ON DEMAND
- vs.
- $650.02/year (NURI)

32% SAVINGS

1 Year Partial Upfront

- ON DEMAND
- vs.
- $552/year (PUIR)

42% SAVINGS

1 Year All Upfront

- ON DEMAND
- vs.
- $541/year (AURI)

43% SAVINGS
AWS Pricing: **Compute on the Spot Options**

- **Spot Instances**
  - Unused EC2 instance
    - Priced less than the EC2 On-Demand price

- **Cost-effective choice**
  - If you can be flexible about when your application runs
  - If your application can be interrupted
    - Batch jobs, background processing (i.e. new content virus scans)
AWS Pricing: Resources

- Cost Optimization
  - Numerous Whitepapers available to assist with the cost management strategy
  - Tips for “Right Sizing” your services
  - Use instructions for using the spot market
  - Tools to monitor, track and analyze your environment

- Free Tier (12 months free offers and always free products)

- TCO Calculator

- Simple Monthly Calculator

https://aws.amazon.com/economics/resources/