Do-It-Yourself Content Delivery Network Orchestrator

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Content delivery networks (CDNs) [1] provide fast and reliable content access to the end-users. CDN providers (e.g., Akamai [2]), either own the entire infrastructure or it is outsourced to a single Cloud provider. Content owners (e.g., clients and end-users) need to establish expensive contracts with third party ISPs or CDN providers. Hence, existing CDN services are out of reach for all but large enterprises. Current CDNs do not provide services that allow an end-user to create dynamic content such as combining music videos from an existing content source on the Internet. Finally, the content owners do not have low-level control over the orchestration operations such as, multiple Cloud provider selection and resource management for hosting content. Hence, the content owners are dependent on their CDN providers to perform these operations behind the scene.

In this paper, we present MediaWise Cloud Content Orchestrator (MCCO) — a novel system that facilitates do-it-yourself CDN orchestration for simplifying the management of media content (e.g., video) using Cloud services. Unlike existing commercial CDN providers such as Limelight Networks [3] and Akamai [2], MCCO eliminates the need to own and manage expensive infrastructure while facilitating content owner requirements pertaining to price, SLA, privacy and QoS. It offers enhanced flexibility and elasticity as it supports pay-as-you-go model. MCCO content orchestration operations include: (i) production: create and edit; (ii) storage: uploading and scaling of storage space; (iii) keyword-based content tagging and searching and (iv) distribution: streaming and downloading. MCCO capabilities span across a range of operations such as selection, assembly, deployment of services and monitoring their run-time performance (e.g., load, availability, throughput, etc.). MCCO is developed using Java, Cloud services, and open-source Cloud APIs. It supports deployment, configuration and monitoring of content and Cloud services using Web-based widgets. These widgets hide the underlying complexity related to Cloud services and provide *an easy do-it-yourself* interface for content management.

The MCCO architecture shown in Fig. 1(a), consists of two layers. Widget Layer encapsulates user interface components in the form of six principle widgets including Appliance, Instance, Storage, Monitor, Content, and Security. Programming Layer implements the logic for the interface exposed by these widgets. For example, the Media Appliance Manager implements Cloud service API that allows Appliance Widget to list the set of media appliances (e.g., streaming, indexing and editing servers) associated with owner's account. Programming Layer is also designed to

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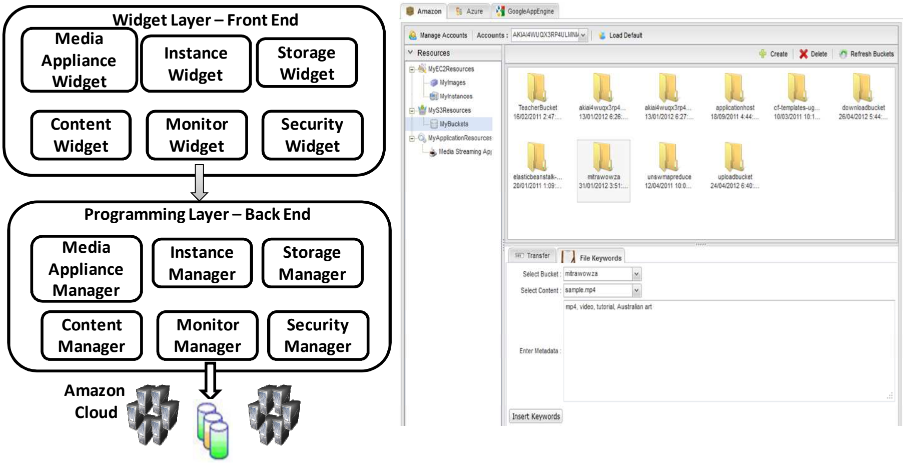

Accounts : AKIAI4WUQX3RP4ULMNI

Select Bucket : mitrawowza

Select Content : sample.mp4

Enter Metadata : mp4, video, tutorial, Australian art

(a) MCCO Architecture.

(b) A screenshot of Content Widget.

Fig. 1.

allow engineers to plug-in different Cloud service APIs. Currently, our implementation works with Amazon Web Service (AWS) [4] and is being extended to support other Cloud providers. The Security Widget manages the authentication and authorization for content orchestration. The basic configuration of media appliances including their architecture, image id, state and virtualization platform is managed via Appliance Widget. The Storage Widget allows owners to upload content and media appliances to Amazon S3. Instance Widget enables the control for deployment (e.g. start, stop and termination) of media appliances. It is also used to select the media appliance deployment configuration parameters including number of instances, their types and SSH key pairs. Content Widget as shown in Fig. 1(b) enables the functionality for tagging content with metadata and its deployment to a media appliance (e.g., streaming server). Monitor Widget is used to monitor the status of media appliance instances, network and storage services for example, CPU load and memory utilization on per media appliance basis.

To the best of our knowledge, no existing CDN providers support: (i) do-it-yourself content and Cloud service orchestration; (ii) drag and drop based deployment of content to media appliance; and (iii) controlling lifecycle activities of both content (upload, edit, delete, stream, etc.) and cloud services (e.g. start, stop, refresh, and undeploy) via shared widgets. This demonstration highlights the effectiveness of MCCO in simplifying the process of end-to-end CDN orchestration operations. We also demonstrate that prior knowledge of existing Cloud service orchestration tools and concepts is not mandatory for content owners. The demonstration will utilize multi-tier streaming consisting of content streaming, indexing, and editing appliance hosted over AWS EC2 and S3 services. A detailed screenshot of the MCCO can be found at: http://rranjans.wordpress.com/MCCO-tool.

References

[1] Buyya, R., Pathan, M., Vakali, A.: Content Delivery Networks. LNEE, vol. 9. Springer, Germany (2008) ISBN: 978-3-540-77886-8

[2] Akamai, http://www.akamai.com/html/solutions/sola-solutions.html (access date: June 07, 2012)

[3] Limelight Networks, http://www.limelight.com/ (access date: June 07, 2012)

[4] Amazon Web Services, http://aws.amazon.com/ (access date: June 07, 2012)