Foundry: A Cloud-Based Web Application for Transforming User-Generated Content

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Introduction

The goal of this project was to create a large-scale web application to transform user-generated content on a cloud computing platform.

The result of this project was Foundry, which is written in PHP, runs entirely on Amazon Web Services and transforms content using ImageMagick.

Software Model

Cal Henderson describes a five-layered software model for designing large-scale web applications. This model is good as it ensures that developers keep a strict interface between each of the layers.

- **Storage**: The bottom-most layer connects the web application to whatever it is using to store and retrieve data.
- **Business Logic**: The business logic layer is where the code that drives the application lives. If a web application allows users to edit their profile data, then the business logic is where the function to perform the actual editing is located.
- **Page Logic**: The page logic specifies what goes on every page of the application and how those pages are connected together.
- **Mark-up**: The Mark-up layer specifies how the content of a page is laid out.
- **Presentation**: The top-most layer is presentation, which dictates how the content of a page will look when it’s laid out.

Cloud Computing

So what exactly is cloud computing? The quote below is a definition of cloud computing based on the definitions of many different experts. It describes what cloud computing is pretty well, even if it is somewhat verbose.

- "Clouds are a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically reconfigurable to adjust to a variable load (scale), allowing for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider by means of customized SLAs.”
  - Vaquero et al. (2009)

Cloud Computing Diagram

Amazon Web Services

Amazon Web Services is an Infrastructure-as-a-Service cloud-computing platform provided by Amazon.

- **Elastic Computer Cloud**: EC2 is Amazon’s processing service. Using EC2 developers can deploy their own OS, configured how they want, onto dozens of machines (known as instances).
- **Simple Queue Service**: SQS is Amazon’s distributed queue service. Users can read and write messages to their own queues.
- **Simple Storage Service**: S3 is Amazon’s storage service. Users store data as objects, which are contained in buckets.
- **Simple DB**: SimpleDB is Amazon’s databasing service. It differs from relational DBs in that the schema for a domain (table) does not have to be decided in advance.
- **Load Balancing**: The Web Servers have traffic directed to them by an Elastic Load Balancer, which is the point of entry into Foundry.
- **Storage & Communication**: Content & config file for Foundry are stored in S3, with metadata such as their location on S3 stored in SimpleDB.

Evaluation

The scalability of Foundry has been analyzed based on 3 criteria: that it can handle usage increases, that it can handle data increases and that it is maintainable.

- **Usage Increases**: Foundry’s ability to handle increases in its usage relies on the infrastructure and services Amazon have in place for use with their cloud computing services. One of the useful features of Amazon’s Auto Scaling is that triggers can be updated on the fly without disrupting the application. This means that the triggers could be altered to account for any massive and unexpected usage increases, such as if the application were to become linked to from Slashdot or Digg.
- **Data Increases**: Foundry uses S3 and SimpleDB to store all of its data. These services ensure that storage capacity is not an issue as the application grows. Costs associated with data storage will increase linearly with the increase in data being stored.
- **Maintainability**: The software model used in the design of Foundry made the code for the application far more maintainable and allows it to be functionally scalable in some regards.

Further Information

**Contact Information**

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