K. J. SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH

Program: PGDM (Exec) Fourth Trimester (Batch 2018-2019)

Subject: Cloud computing_
(End Term examination)

Maximum Marks: 50   **Duration : 3 Hours**   **Date: 18/09/2019**

Notes:
1. Concepts -20 marks
2. Case study analysis and interpretation - 30 marks
3. Please answer the questions in the order given below.

Section 1: Concept.

Question 1: Answer any FOUR of the following (5 marks)   [20]

I)   What is virtualization in terms of cloud? Give the benefits and pitfalls of virtualization

II)   Write 2 points on IAAS, PAAS and SAAS and give one example for each.

III)   Calculate downtime per year (consisting of **365 days**) and per month in tabular format for the below availability figures for any generic IT resource.

Availability	Downtime per year(days,hours, minutes)	Downtime per month(hours, minutes, seconds)
90%		
99.50%		
99.80%		
99.99%		

IV)   List/Define and give real life examples for some of the '**impediments to outsourcing**' while evaluating whether or not to go in for a cloud solution.

V)   Define in your own words and give examples of public clouds, private clouds, hybrid clouds and community clouds.

VI)   Draw and illustrate the Capex/Opex cost graph in a public cloud v/s the private cloud (X-Axis has the cost graph and Y axis is the time since inception of the cloud). Write

few points explaining the same with your interpretations.

Section 2: Please go through the below 2 case studies and answer the questions that follow.

About Unilever

Unilever was formed in 1930 by the merger of Dutch margarine producer, Margarine Unie and British soap maker, Lever Brothers. Today, the consumer goods giant sells food, home care, refreshments, and personal care products in over 190 countries. Unilever has headquarters in London, United Kingdom and Rotterdam, the Netherlands, and subsidiaries in over 90 countries. The company employs more than 170,000 people. In 2012, Unilever reported more than €51 billion in revenue.

The Challenge

Unilever North America in Englewood Cliffs, New Jersey needed to re-design its infrastructure to support Unilever's digital marketing approach. Unilever previously used on-premises data centers to host its web properties, all of which had different technologies and processes. "We needed to standardize our environment to support a faster time-to-market," says Sreenivas Yalamanchili, Digital Marketing Services (DMS) Global Technical Manager. Unilever optimizes its business model by testing a marketing campaign in a pilot country. If the campaign is successful, the company deploys it to other countries and regions. The IT organization wanted to use the cloud to implement the same process.

Why Amazon Web Services

After a comprehensive RFP and review process involving more than 16 companies, Unilever chose Amazon Web Services (AWS). Unilever's priorities in choosing a digital marketing platform included flexibility, a global infrastructure, technology, as well as a rich ecosystem of members. "With AWS, we have the same hosting provider for all regions, which means we don't have to customize and tweak hosting solutions per region," says Yalamanchili. "Unilever is focused on delivering great brands to consumers; it's not an IT shop. We're able to spend less and get more innovation by working with AWS and members of the AWS Partner Network."

The Unilever IT team had two goals for the AWS migration: deliver a common technology platform for websites with regional content delivery architecture, and migrate existing web properties to the cloud.

To develop the platform, Unilever attended an AWS workshop to design the architecture. Then the DMS team built a pilot platform (a disaster recovery site for third-party hosting in Miami) for stakeholder review. After obtaining business approval, Unilever chose CSS Corporation, an

Advanced Consulting Partner member of the Amazon Partner Network (APN), for system integration and application development. The DMS team worked with CSS to develop a global content management system (CMS) . The CMS platform lets agencies build brand web sites globally and publish them across several AWS regions. Unilever uses a HAProxy load balancer to improve performance of its web sites and runs its databases on Microsoft SQL Server and MySQL.

For disaster recovery, Unilever stores backup data, snapshots, product and recipe media files in Amazon Simple Storage Service (Amazon S3), and uses EBS Snapshot Copy to copy Amazon Elastic Block Store (Amazon EBS) snapshots from the US East (Northern Virginia) Region to the US West (Northern California) Region. "We designed a disaster recovery solution to protect our content management system, content deployment architecture, and many GOLD-classified web properties—and to give the business confidence in the AWS Cloud," says Yalamanchili. Figure 1 demonstrates Unilever's architecture on AWS.
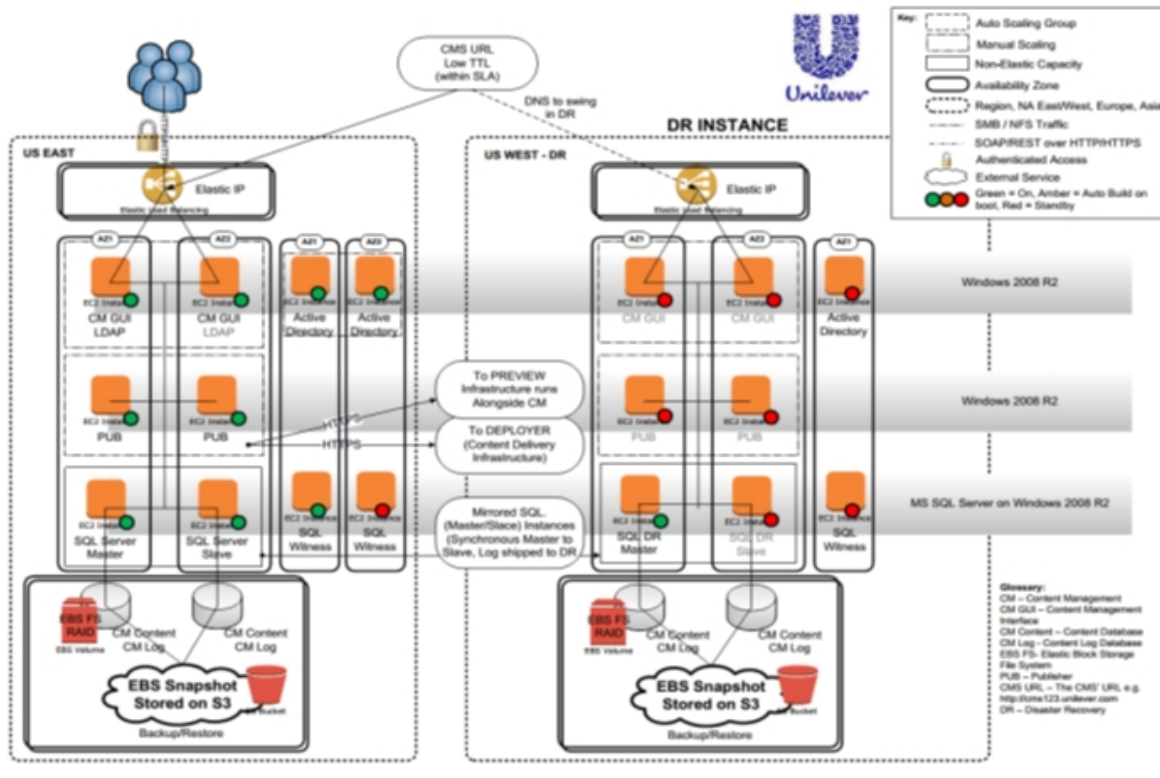

Figure 1. Unilever Architecture on AWS

Unilever and CSS created Amazon Machine Images (AMIs) running Windows and Linux for use on approximately 400 Amazon Elastic Compute Cloud (Amazon EC2) instances. Amazon Virtual Private Cloud (Amazon VPC) provides flexibility for deployments and access to the Internet. Nick Morgan, Enterprise Architect for Digital Marketing comments, "What's nice about using AWS is how easily we're able to scale the instances based on the nature of a campaign's popularity. We used Auto Scaling as well as manual scaling for sites such as Recipedia.com and Axeapollo.com. We can deploy instances across different AWS Regions and Availability Zones and use Amazon EBS snapshots to bring services back."

To migrate its web properties to the cloud, Unilever built pre-production and production environments on AWS for several existing websites. Once Unilever's creative and production agencies certified the website in the pre-production environment, Unilever switched the DNS address for production environment to go live on AWS.

After a successful pilot launch, Unilever migrated more than 500 web properties from its data centers to AWS in less than five months. Since then, Unilever has more than 1,700 web properties running on AWS worldwide. "Throughout our business globally, we strive to create repeatable models and it's easy to standardize our hosting environment with AWS," says Yalamanchili. "If a marketing campaign that we deploy in the US East (Northern Virginia) Region is successful, we can easily replicate it to Asia Pacific (Singapore) Region for the APAC countries."

CSS supplied Unilever with machine images of different operating systems, APIs and tools to automate the process of launching a new project. "The way CSS automated launching instances reduced the time to launch a project by about 75 percent," says Morgan. "What used to take four days now only takes one day. We're not rebuilding web and database servers from the ground up all the time. We can just clone and re-use images."

The Benefits

For Unilever, moving to the AWS Cloud improved business agility and operational efficiency. "Previously, requesting a website for a marketing campaign was a lengthy process," says Yalamanchili. "By using AWS, we improved time to launch for a digital marketing campaign from two weeks to an average of two days. That's more than seven times faster than our traditional environment. If a brand manager has an idea, he or she can implement it before the competition,"

"Using AWS saves us time," he continues. "I can simply go to the AWS website and plug in numbers to calculate costs. That makes it easy for me to set up a standard billing model for websites. It takes our partner, CSS, less than 12 hours to calculate pricing for a campaign website. I can comfortably say to my marketing folks that we have the capacity for anything we want to do. We can focus on innovation rather than infrastructure."

"The other advantage is the responsiveness of the AWS Cloud," says Yalamanchili. "By using AWS, one of the brand managers was able to completely alter a campaign within 24 hours,

which wouldn't happen with the physical infrastructure."

"AWS listens to us and helps come up with ideas to do things differently that are beneficial," says Morgan. "I really enjoy the rapid rate of innovation from AWS." Yalamanchili adds, "With AWS, it's the customer's way, always. AWS has proved to us that it's the customer that matters by listening to us and innovating products and services."

Question 2: Answer the below questions based on the case study above.

A. Explain the challenges faced by Unilever **[5]**
B. Why did Unilever choose AWS? Highlight the salient points. **[5]**
C. What could have been some of the impediments to adopting AWS at Unilever? **[5]**

AccuWeather

Global Weather Center Increases Global Scalability and Speeds Time-to-Market with Cloud Platform

AccuWeather, a leading provider of weather forecasts worldwide, needed a better solution for handling more than 4 billion daily data requests. To increase scalability, the company is delivering content from the cloud on the Windows Azure platform. As a result, the company has accelerated times for development and proofs of concept without worrying about provisioning infrastructure. It has also gained on-demand scalability, improved access to real-time weather data, and cut IT costs by up to 40 percent.

"With Windows Azure, we gain velocity because we can be innovative without worrying about complex infrastructure. A proof of concept that might have taken three months to execute now takes three days."

Chris Patti

Vice President of Technology, AccuWeather

Business Needs

Established in 1962 in State College, Pennsylvania, AccuWeather provides weather forecasts for nearly 3 million locations worldwide through multiple channels including smartphones, websites, and broadcast media. With an ever-increasing array of mobile devices on the market combined with more people going online globally, the company looked for new ways to satisfy demand for its services.

AccuWeather served most of its content from its main data center in Pennsylvania. As digital traffic increased, the company supplied an increasing volume of multimedia content, including forecasts, current conditions, alerts, and images.

At first, most forecast requests came from the United States, but over the years, nearly half of all requests were international in origin. "As more connected devices came on the market worldwide, we went from 2 million to more than 4 billion requests a day within five years," says Chris Patti, Vice President of Technology at AccuWeather. "Scale became a challenge."

The company wanted to ensure a rapid response to users in any location, but hesitated to build out its on-premises infrastructure. "We were already spending too much money on servers," says Patti. "Also, we wanted to put data closer to users and move away from having a single point of failure."

Solution

AccuWeather considered several cloud-based options, including Amazon Web Services, before choosing a platform-as-a-service (PaaS) offering on the Windows Azure platform—including Windows Azure Cache Service and Windows Azure Cloud Services—a flexible framework built to handle billions of requests each day. The company believed that Windows Azure would provide a more comprehensive, easily managed set of services. "We've used other content distribution networks to cache content," says Patti. "However, what we gained with the Windows Azure tier is geo-diversified distribution along with business logic."

Within six months, the company migrated its application programming interface (API) to Windows Azure and went live in the cloud on April 2012. "Our API, which is hosted on-premises, runs with the same code that we're running on Windows Azure," says Patti. "Anybody can use Windows Azure without doing a lot of custom code, so it was very simple for us to make that move."

The company is also using Windows Azure Traffic Manager to balance user traffic between two Microsoft data centers. In addition to ensuring continuous operations if one data center goes offline, the solution also improves performance by serving content from the closest location.

AccuWeather is currently serving its global traffic from multiple data centers in the United States with plans to expand to European and Asian data centers in the future. AccuWeather plans to move its website to the cloud within 18 months, to ensure optimal performance and availability as well as disaster recovery. Patti explains, "We want to reduce our dependency on a single geographic location."

Benefits

With the Windows Azure platform, AccuWeather is accelerating time-to-market, serving millions of people faster worldwide, and cutting its own operating costs significantly.

Speeds Time-to-Market and Innovation

Instead of spending months expanding its data center, AccuWeather accelerated implementation with a cloud deployment. "We went from learning about Windows Azure to production in less than six months," says Patti. "It was really easy for the development team to test and deploy code in the cloud without having to set up servers. It's push-button deployment, and that kind of speed is hard to match with other cloud providers."

Besides speeding its initial deployment, AccuWeather looks forward to implementing new features quicker too. "Velocity is a word I use a lot," says Patti. "It refers to speed as well as direction. With Windows Azure, we gain velocity because we can be innovative without worrying about complex infrastructure. A proof of concept that might have taken three months to execute now takes three days."

Scales on Demand

With Windows Azure, the company has the flexibility it needs to adapt faster to changing conditions. "Our data and traffic are driven 100 percent by weather," says Patti. "Before, we couldn't do any type of adaptive scaling. Now, we can spin up virtual servers on Windows Azure to serve 20 minutes of traffic when we need it, then turn them off. That type of on-demand scalability is a huge benefit."

Faster development and better scalability help the company respond more rapidly to business requirements as well as weather patterns. AccuWeather provides multimedia content to 72,000 websites for other companies, and it designs customized solutions for government, media, and other businesses. "People ask us for new solutions all the time," says Patti. "We have some really big media partners, and we need to be able to meet their needs. With Windows Azure, we have the on-demand resources to be more agile and get products to market faster."

Improves Access to Real-Time Weather Data

AccuWeather delivers weather information worldwide to multiple kinds of mobile devices and platforms, including Windows 8, Android, and iOS phones and tablets. Now, with Windows Azure, the company can support more types of devices, and deliver content in more languages, than ever before. "We can update content much more frequently in the cloud. And because we can cache on Windows Azure in almost any language, we can provide near-real-time localized information virtually anywhere in the world."

Cuts Capital Expenditure Costs by 40 Percent

Deploying in the cloud is also helping the company cut costs and implement new capabilities affordably, including a disaster recovery solution. "We didn't need to spend the funds to build out another site for disaster recovery," says Patti. "With Windows Azure, we achieve business continuity while reducing our on-premises footprint."

The company has cut its existing, on-premises API back-end servers from 16 to 4 server computers by handling its workload in the cloud, and saved US$100,000 in server costs. "We're starting to see a 40 percent reduction in capital expenditure costs related to server overhead with Windows Azure," says Patti. "Instead of hardware, we're just paying for subscriptions costs."

Question 3: Answer the below questions based on the case study above.

A. What were the changes which prompted AccuWeather to move away from their on premise datacenter to Azure public cloud platform? **[5]**
B. Which Azure solution is it using for High availability and reduced network latency for the end user? Draw a high level logical diagram to visualize the solution . What other purpose can this be used for ? **[5]**
C. Summarize some of the benefits by going for PAAS in Azure (give you own inputs also along with case study inputs) **[5]**

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