HW1 - Comparing cloud services from 3 vendors

IaaS: Compute

IBM (Virtual Server): IBM provides 2 options for cloud infra solutions – The IBM Cloud Virtual Server for VPC (supports multi-tenant compute) and bare metal virtual servers (single tenant compute only). IBM has 60 data centres and six multizone regions with availability zones.[1] Features include accelerated performances, integrated services, and the broadest range of SAP-certified cloud environments. IBM Cloud allows management of multiple cloud environments regardless of provider.[2] The bare metal solutions offer a wide range of highly configurable options that give the users a lot of control. IBM Cloud user can store objects up to 10 TB.[3]

AWS (EC2): Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in AWS. It has 66 available Zones within 21 geographic regions. System specifications for the service can be configured and used directly from the network. There are no costs incurred while expanding the system. It is highly scalable, and allows multi-tenancy. EC2 provides preconfigured templates for particular server instances, known as Amazon Machine Images (AMIs). EC2 has various configurations of CPU, memory, storage, and networking capacity for your instances to meet the specific compute needs.[4]

Google (GCE): The Google Compute Engine is a secure and customizable compute service which enables the creation and running of virtual machines using Google's existing infrastructure. New users get 300 USD in credits to use on joining. It has pre-built and ready to go configurations, offering various options of machine types and series.[5] It also offers spot VMs, which are highly affordable compute instances, used for batch jobs and fault-tolerant workloads. There are Confidential VMs with data encryption, while it is being used. Machine type recommendations are available free of charge.[6] They have a wide array of GPUs and CPUs to choose from, and provide global load balancing with support for Windows and Linux machines.

PaaS: ML Solutions

IBM (Watson Studio): IBM provides PaaS service through a GUI to work across the entire application development lifecycle. IBM Watson Cloud provides a platform to data scientist and analysts to build and deploy AI and ML models, providing open source frameworks like Pytorch, TensorFlow, Jupyter Lab, etc.[6] It gives an option to push models through REST APIs across any cloud, helping in reducing manual monitoring by almost 35%.

AWS (SageMaker): Amazon SageMaker is a common service gives a platform to build ML models for multiple use cases with well defines workflows and infrastructure. It boasts of upto 50% faster model training and more than hundred billion predictions per month. It supports leading ML toolkits like Jupyter, TensorFlow, PyTorch, Hugging Face, etc. [7]

Google (Vertex AI): Vertex AI lets one build and deploy ML models within a unified AI platform.[8] It supports advanced ML coding, reducing as much as 80% of code to be written. It gives a single UI for building the entire ML workflow like deep learning, labelling, metdata and neural architecture. It provides open source frameworks like TensorFlow, PyTorch, etc.

SaaS: Smart Assistant

IBM (Watson Assistant): This is deployed for enriching customer engagement and delivering exceptional customer experiences. It works on fast and accurate customer engagement across any channel. On usage, it seemed to be fast with tailored interactions including rich media. It lets users create an AI powered bot in under an hour without having to write a single piece of code. It also allows integrating with existing channels and back-end systems.[9] It is highly scalable and can be used for deployment at a global level. Chatbots also offers analytics like blockers, progress markers, conversation logs, etc. that helps users understand the whole picture.[10]

AWS (Alexa for Business): Amazon Alexa for Business empowers organization to use Alexa as their digital assistant to get more work done. One of the biggest advantages is adding a voice interface to

applications like Salesforce and ServiceNow. It collects and utilizes information about devices, users and skills in the organization. Alexa uses speech recognition to interpret user requests, uses additional context and information, and responds accordingly to the requested task.[11] It has found use cases in improving meeting rooms utilization and overall experience. It offers various APIs to automate tasks. Alexa private skills can be used be used to restrict access to other users in an organization without writing a single line of code.[12]

Google (Google Assistant): Google Assistant integrates the Google Suite tools, and this provides high flexibility within the apps. It aids in business communication, setting reminders and notes, If-This-Then-That (IFTT) integration among many other things.[13] It can pair up with other smart devices and hardware like security systems and thermostats and gives the convenience of operating them from your smartphone with a single click. It can partner with various existing applications and can be integrated on a number of devices (laptop, watch, television, speaker, display, etc.). It helps in amplifying existing apps with a voice. [14]

Comparison

IaaS: Compute

	IBM Virtual Server	**Amazon EC2**	**Google GCE**
Container	Kubernetes and Docker	Kubernetes and Docker	Kubernetes
Price and Trials (8 CPU, 32 GB configuration)	Free trial available. $0.2688 per hour for t4g.2xlarge instance.	Free trial available. $0.384 per hour.	Free trial unavailable. $0.268024 per hour.
Regions and Availability	6 Regions, 19 Zones. 99.9% uptime per instance.	26 Regions, 84 Zones. 99.5% uptime per instance.	29 Regions, 88 Zones. 99.5% uptime per instance.
Ease of use	Good documentation and easy UI.	Good documentation, but a little confusing UI. (Not as good as the other two).	Good documentation and UI.

PaaS: ML

	IBM Watson Studio	**Amazon SageMaker**	**Google Vertex AI**
GPU	NVIDIA T4, V100, P100. High availability.	NVIDIA V100, M60, T4, A100. Moderate availability.	V100, P100, k80, TPU, PODS, T4. High availability.
Frameworks	Scikit-learn, TensorFlow, Pytorch, Python functions, Python scripts, RScript, Decision Optimization.	Apache MXNet, Apache Spark, Chainer, Hugging Face, PyTorch, Scikit-learn, SparkML Serving, TensorFlow, Triton Inference Server.	Integrates with widely used open source frameworks such as TensorFlow, PyTorch, and scikit-learn, along with supporting all ML frameworks and artificial intelligence.
Models and their deployment	Build and deploy models using Watson ML Python client library or Watson ML API.	Edge Manager used to deploy ML models on physical devices.	Association of physical resources with the model to serve online predictions.
UI and Documentation	Detailed documentation. ML modelling is slightly tricky.	Very good documentation, but UI is not very user friendly.	Cleanest UI with detailed documentation.

SaaS: Smart Assistant

	IBM Watson Assistant	**Amazon Alexa for Business**	**Google Assistant**
Usability	Enhance customer engagement. Tailored for rich media interaction.	Enhance meeting rooms utilization and bookings. Existing APIs to help with tasks.	Managing team calendar and communication. IFTT integration. Can integrate with other smart devices.
Features with integration	Create personalised assistant. Can create AI powered chatbot without having to write a single piece of code.	Create personalised assistant. Provides user-controlled access.	Create personalised assistant. Integrates all features into mobile phones.
Analytics	Provides analytics to go over usage and business requirements.	Provides analytics to go over usage and business requirements.	Provides analytics to go over usage and business requirements.

References

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