Cloud 101: Introduction to Commercial Cloud Computing

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Working with Cloud

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Slides: https://github.com/ResearchComputing/cloud101_primer
Survey: http://tinyurl.com/curc-survey18
Website: www.rc.colorado.edu/rc
Documentation: https://curc.readthedocs.io

Meet the User Support Team

Layla Freeborn
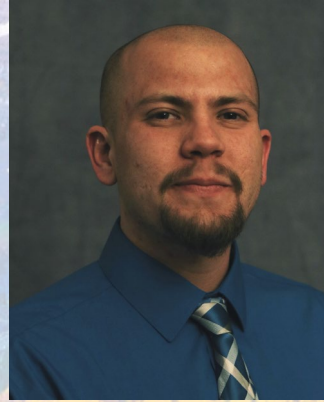
Brandon Reyes

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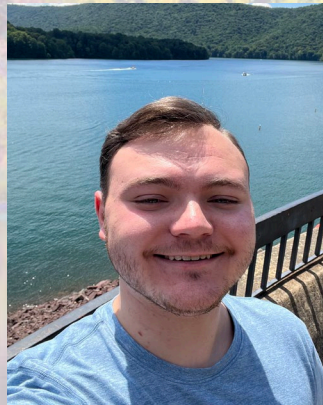
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Outline

- What is the Cloud?
- Services offered
- Advantages of using the Cloud
- Shared Responsibility Model
- Example Use-Cases
- Cost-Saving Considerations
- Live Demo
- Learning Materials
- How to get started

What is the Cloud?

"The cloud" refers to servers that are accessed via the Internet. This includes the Operating Systems, software, and databases that run on those servers.

Commercial Cloud Providers

- Amazon AWS
- Microsoft Azure
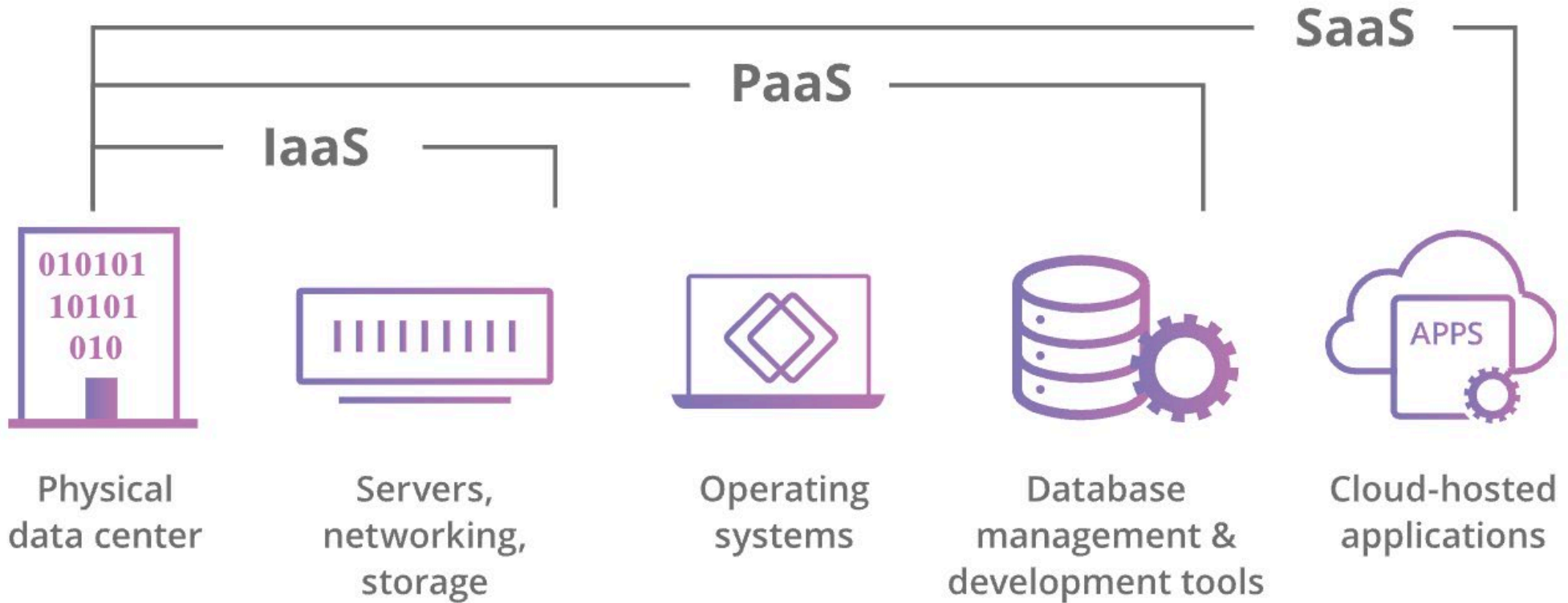- Google Cloud Provider
- Many more

Cloud Service Models: IaaS, PaaS, and SaaS

- Everything as a Service (XaaS) – a business model (generally subscription based) in which something is provided to the customer as a service

- Infrastructure as a Service (IaaS) - Raw IT resources offered to the user by the cloud service provider
  - Most control, most advanced setup
  - Servers
  - Networking

Cloud Service Models: IaaS, PaaS, and SaaS

- Platform as a Service (PaaS) – A platform that a provider offers to its customers via the internet
  - Some control, simplified setup
  - Windows Virtual Machine

- Software as a Service (SaaS) - Software that runs on a provider's infrastructure
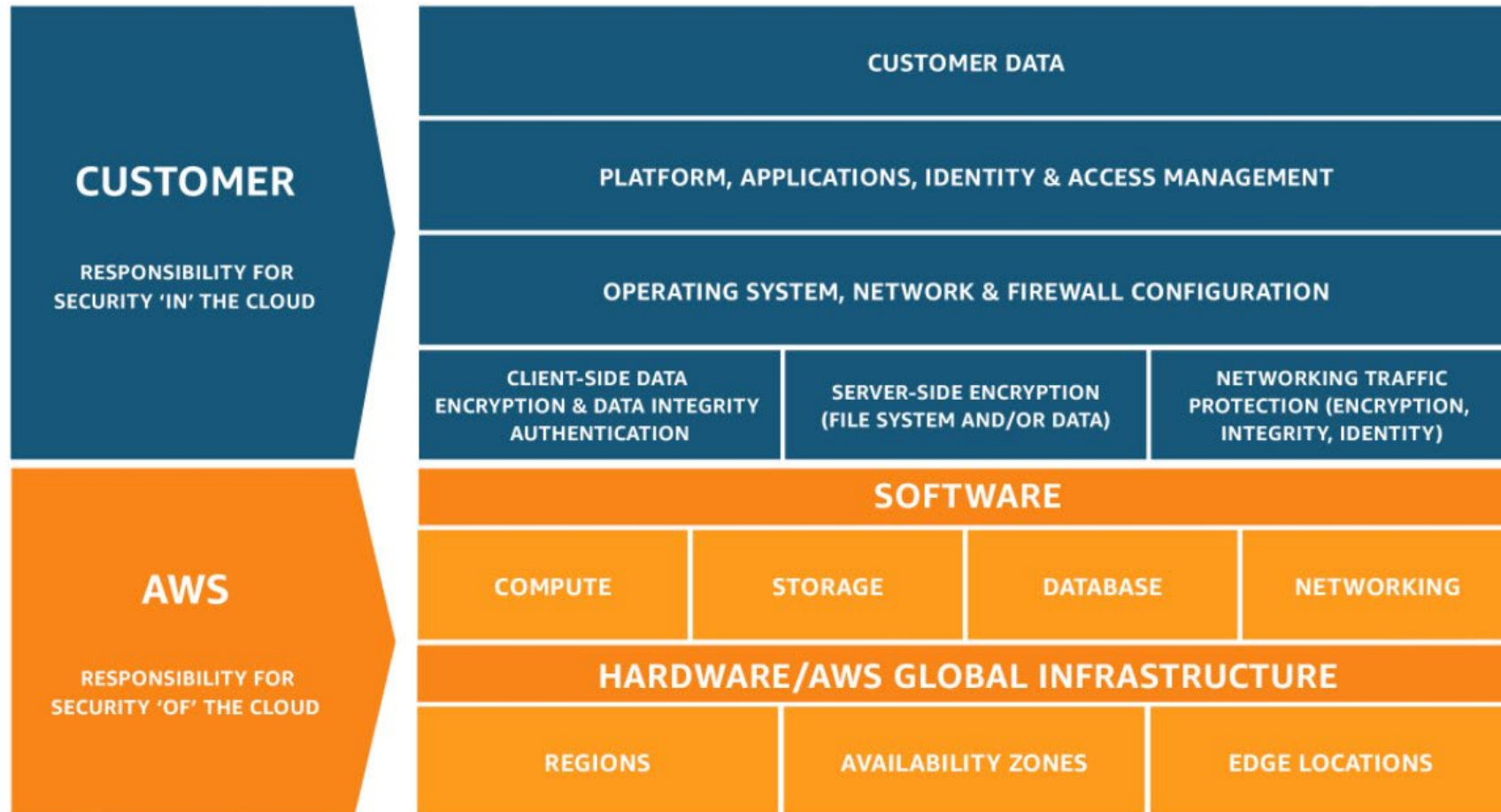 - Least control, most simple setup
  - Jupyterhub

Cloud Service Models

SaaS

PaaS

IaaS

010101
10101
010

APPS

Physical
data center

Servers,
networking,
storage

Operating
systems

Database
management &
development tools

Cloud-hosted
applications

Why use the cloud?

- Availability
- Data durability
  - 99.999999999% (11 9's) of data durability
  - "If you store 10,000 objects with us, on average we may lose one of them every 10 million years or so." – Jeff Barr (AWS)
- Quick and easy Scalability
- Get closer to the data
- Wide array of Computing Power
- Cost
- Alleviate operational burden

Shared Responsibility Model

CUSTOMER — RESPONSIBILITY FOR SECURITY 'IN' THE CLOUD	CUSTOMER DATA		
	PLATFORM, APPLICATIONS, IDENTITY & ACCESS MANAGEMENT		
	OPERATING SYSTEM, NETWORK & FIREWALL CONFIGURATION		
	CLIENT-SIDE DATA ENCRYPTION & DATA INTEGRITY AUTHENTICATION	SERVER-SIDE ENCRYPTION (FILE SYSTEM AND/OR DATA)	NETWORKING TRAFFIC PROTECTION (ENCRYPTION, INTEGRITY, IDENTITY)

AWS — RESPONSIBILITY FOR SECURITY 'OF' THE CLOUD	SOFTWARE			
	COMPUTE	STORAGE	DATABASE	NETWORKING
	HARDWARE/AWS GLOBAL INFRASTRUCTURE			
	REGIONS	AVAILABILITY ZONES	EDGE LOCATIONS	

Example use-cases

- Netflix

- Using cloud to meet needs for expensive or otherwise unavailable resources (e.g., specialized GPUs, huge amounts of RAM)

- Using cloud computing to be "near" huge bioinformatics or geophysical datasets that are impractical to download (because these huge datasets are often stored in the public cloud)

- Teaching "hubs" such as Rstudio and Jupyter, which provide a common software environment for all students

What scares you about working in the cloud?

Cost-Saving Considerations

- Budget Alerts and Actions – Alert when budget is reached and shutdown resources

- Analyze Cost Data – Understand cost on a resource level

- Spot Instances – Utilize cloud provider's unused resources at discount

- Reserved Instances – Commitment to use VM for extended period at a discount

- Autoscaling – Scale resources as demand grows

- Utilizing serverless functions – 1 million requests/month free

- Microservices - Separate monolithic applications into smaller pieces

- Appropriate Storage Options – Utilize cold storage when applicable

Cloud DEMO

Learning Materials

- [AWS Educate](#)
- [Azure Learn](#)
- [Google Cloud Training](#)
- AWS Events on Campus
  - Build Chatbots with Amazon Bedrock Knowledge Bases and Agents – Nov 5
  - Building with Generative AI Apps on AWS – Nov 12

AWS Resources

- Free Trials offered by AWS

- [AWS Free Tier](#)

Azure Resources

- [Microsoft Student](#)
  - Free $100 credit for students
  - Free trials of services

Google Cloud Resources

- [Google Free Tier](#)
  - Free trials of services

How to get started

- Reach out to the Cloud Foundations Service at CU
  - https://www.colorado.edu/rc/userservices/contact
- Cloud Foundations Service
  - Amazon AWS, Microsoft Azure, & Google Cloud Platform
- What we Offer
  - Basic Security Guardrails
  - Billing against CU funds (Purchase Order / Speedtype)
  - Connection to internal CU network
  - Federated Access
  - Support & Consulting

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Survey and feedback

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Slides: https://github.com/ResearchComputing/cloud101_primer

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