CLOUD COMPUTING

We are going to Explore on :

- The Essence of Cloud Computing
- Necessity of Business Moving to Cloud computing
- The Positives and the Negatives
- Financial Analysis
- State of the Industry
- Service Comparison of the Giants
- Top Cloud Technologies
- Trends in 2021
- Example Applications
- State of Cloud Expertise
- Top Carrier Opportunities
- Skills to develop
- Certifications
- Events and conferences

TNH

CLOUD COMPUTING

Lift and Shift your Application - Save Time and Money

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Special Publication 800-145

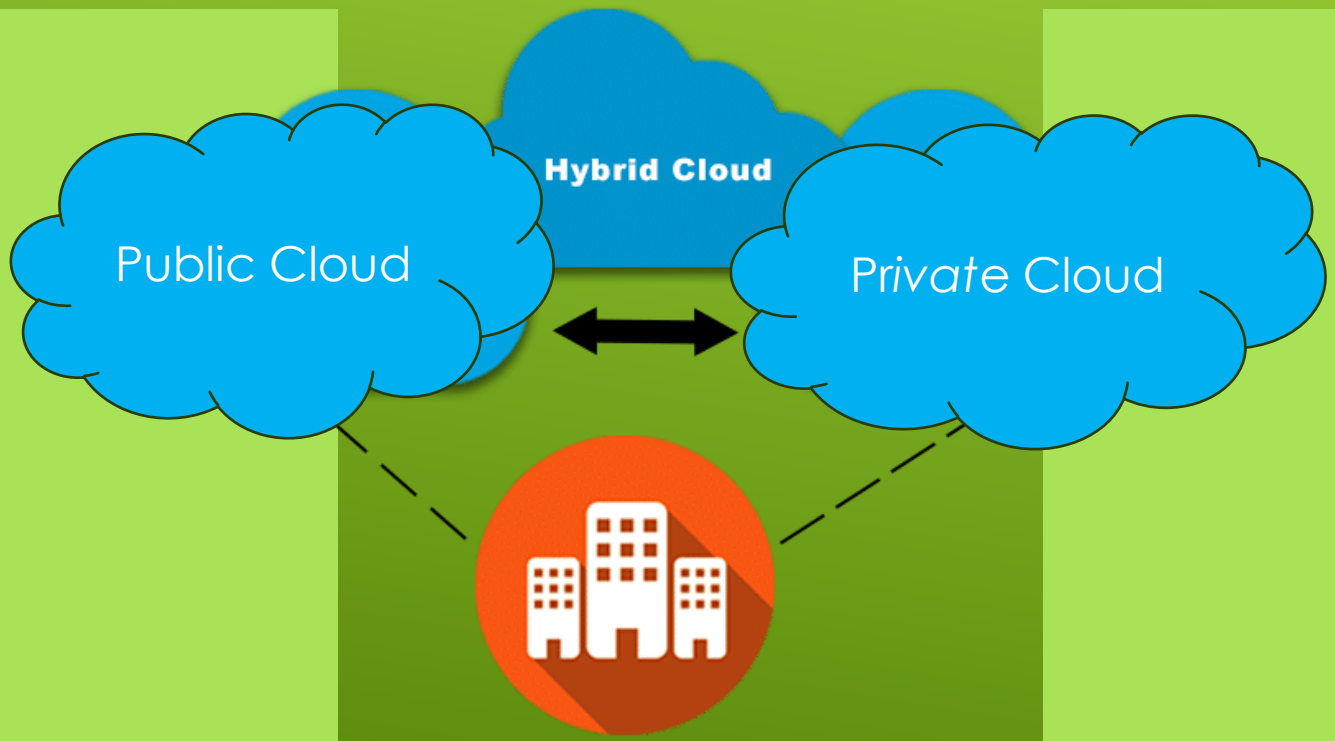
The NIST Definition of Cloud Computing

TNH

What is Cloud Computing ?

Simply put, cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale. You typically pay only for cloud services you use, helping you lower your operating costs, run your infrastructure more efficiently, and scale as your business needs change. Azure

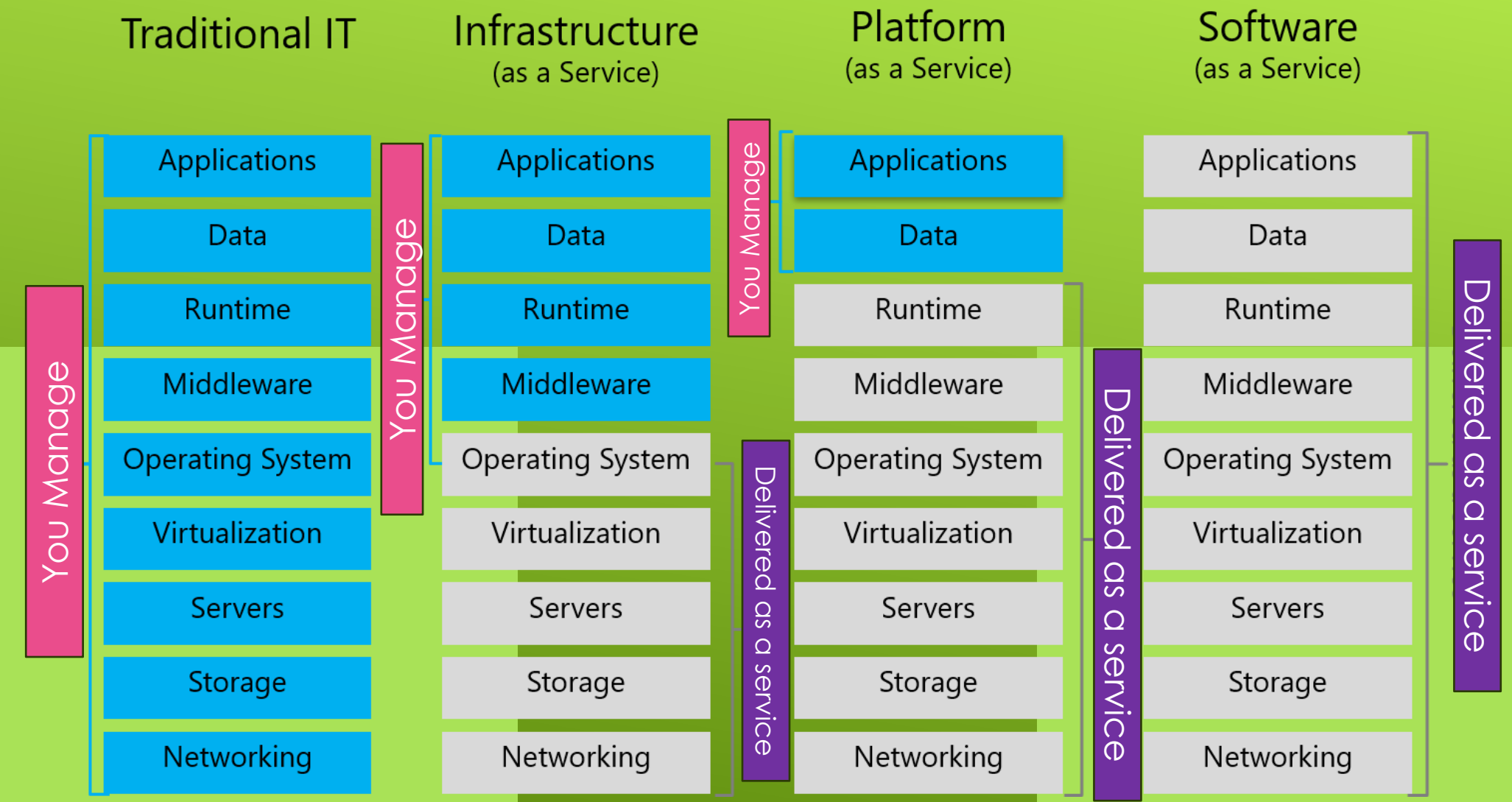
Deployment Models



TNH

What is Cloud Computing ?

Service Models



Serverless computing

Overlapping with PaaS, serverless computing focuses on building app functionality Based on Event driven Architecture only using the resource when the required function triggers. The cloud provider handles the setup, capacity planning, and server management for you.

NH

Why Businesses are Moving to Cloud

1

Software and Hardware Refresh Cycles

horizontechnology.com

2

3

TNH

Why Businesses are Moving to Cloud ?

4

End of Life Events

5

6

Business Acquisitions

7

TNH

Benefits of Moving to Cloud

1 Scalability

2 Cost Savings

3 Competitive Edge

4 Security

TNH

Benefits of Moving to Cloud

5 Sustainability

6 Insights

7 Quality Control

8 Business Continuity

TNH

Benefits of Moving to Cloud

9 Mobility

10 Increased Collaboration

11 Loss Prevention

TNH

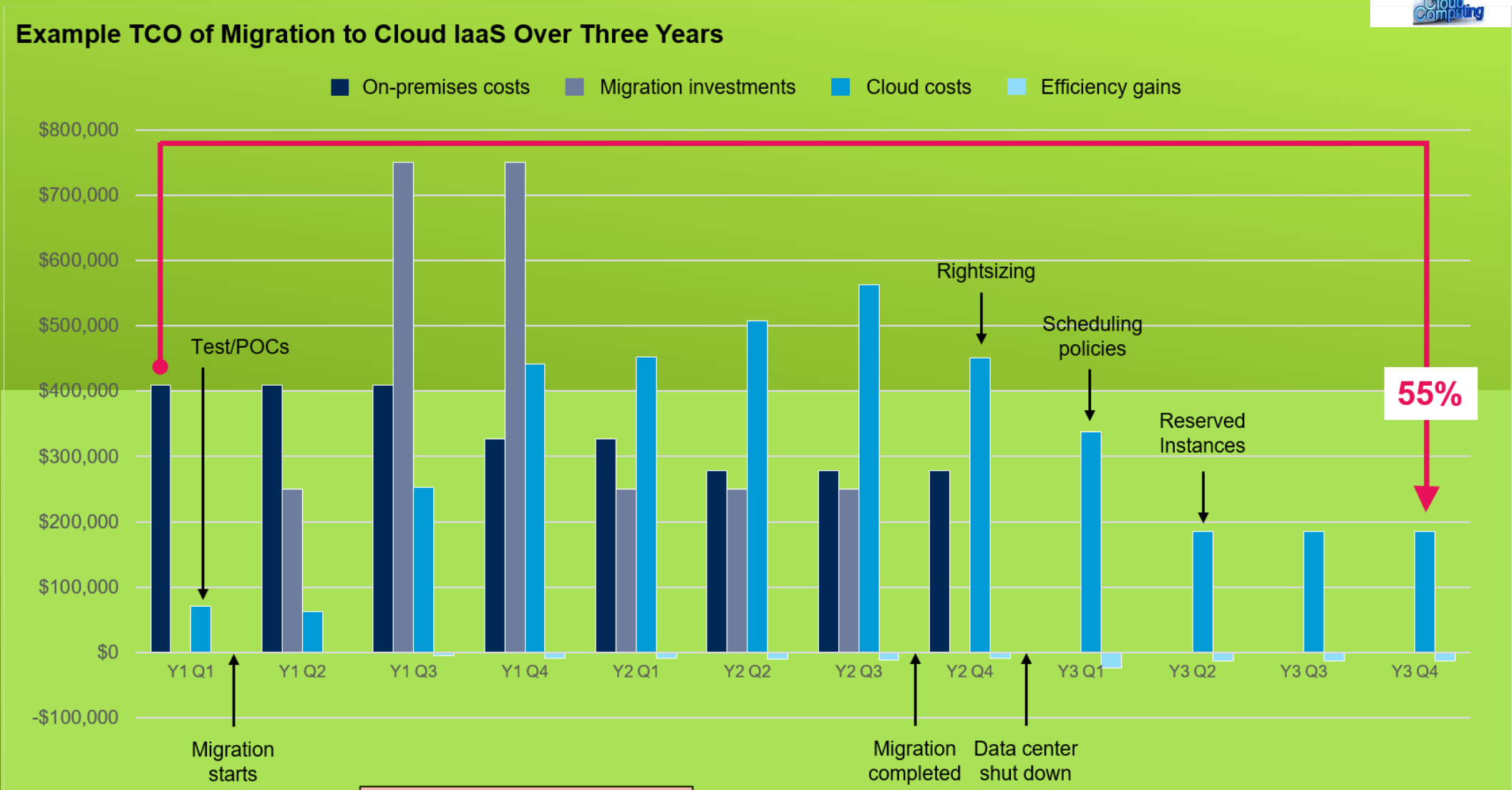
The Few Negatives

- Depends on internet connection
- Risk of data confidentiality
- The level of security
- Compliance
- Vulnerable in the event of an attack
- Vendor Lock-in
- Support Issues
- Account or service Hijacking
- Data loss or Theft
- Data Leakage
- Insecure Interfaces and APIs

But Moving to Cloud may be inevitable !!

TNH

Calculating the Cost for the Business



Gartner - Example TCO

TCO Calculators

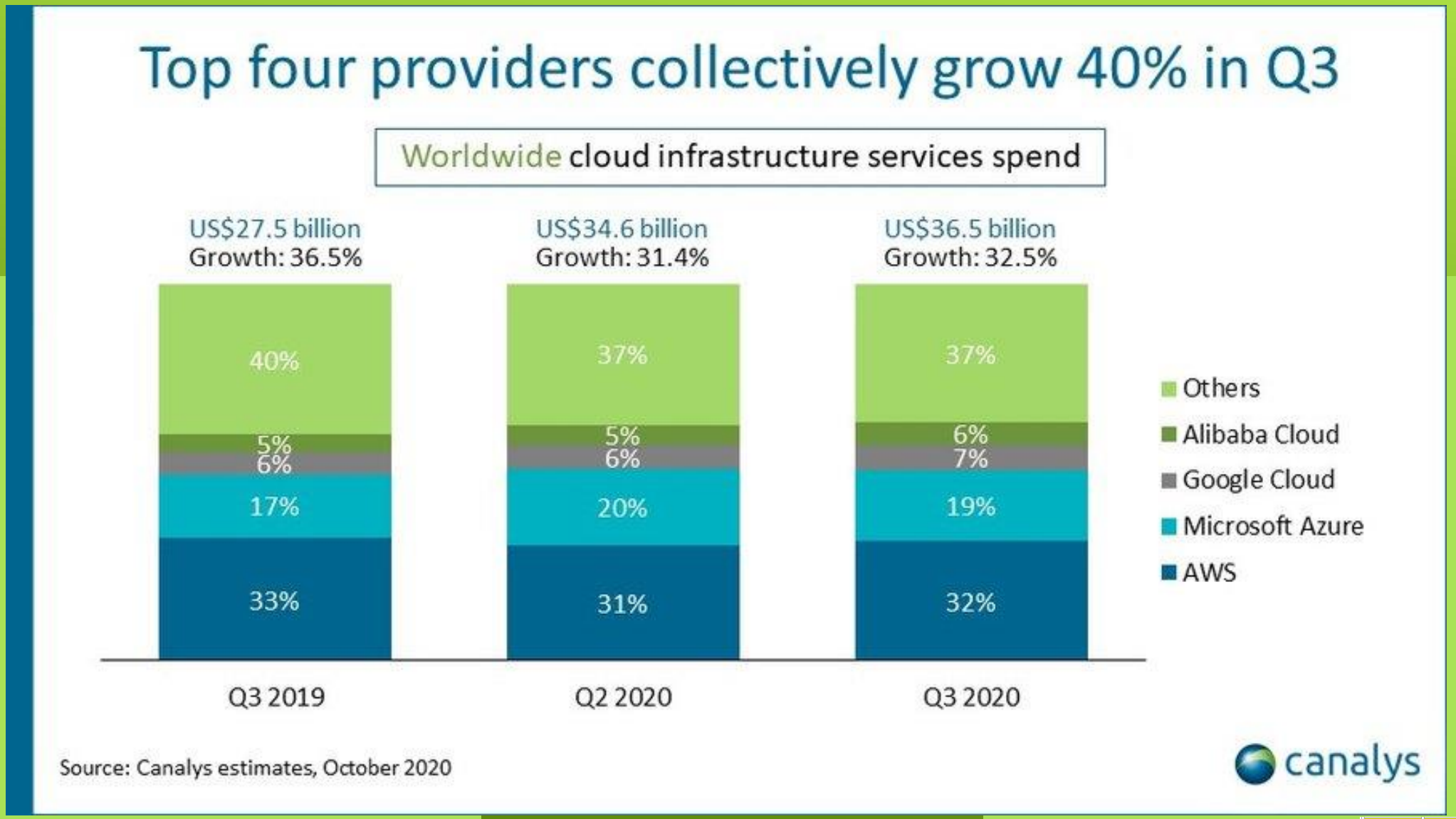
Azure	AWS
Oracle	Google
IBM	Alibaba

AWS Securing Top Spot for the 10th Consecutive year

Magic Quadrant for Cloud Infrastructure and Platform Services

The Dominance of the Two Giants

Azure and AWS combined control more than **50%** of worldwide cloud infrastructure services spend.



The push from the pandemic to work remotely, Gartner forecasts that the number of users for DaaS will grow by over 150% between 2020 and 2023.

TNH

AWS vs Azure vs GCP Service Comparison

Compute Service

SERVICE	AWS	AZURE	GCP
Virtual servers	Elastic Compute Cloud (EC2)	Virtual Machines	Compute Engine
PaaS, deploying apps	Elastic Beanstalk AWS Lightsail	Azure App Service	App Engine Environment
Autoscaling	Auto Scaling	Azure VM Scale Sets	Autoscaling
VMware Cloud	VMware Cloud on AWS	Azure VMware Solution	VMware Cloud on GCP

Serverless Service

FEATURE	AWS	AZURE	GCP
Serverless Compute Offerings	Lambda, Fargate, Aurora Serverless	Serverless Kubernetes, Functions and application environments	Cloud Run, Cloud Functions, App Engine
Languages supported	Node.js, Python, Java, Ruby, C#, Go and PowerShell	C# , F # , Java JavaScript , python , PowerShell , TypeScript	.NET Core , Ruby , Node js , Go , Python ,
Pricing	AWS pricing	Azure Pricing	Google Pricing
Logs	CloudWatch	Azure - Logs	Google - Logs

Container Service

SERVICE	AWS	AZURE	GCP
Managed container services	EC2 Container Service (ECS) Amazon Kubernetes Service (EKS)	Azure Container Service (AKS)	Google Kubernetes Engine
Docker container registry	Elastic Container Registry (ECR)	Container Registry	Container Registry
Serverless container services	AWS Fargate	Azure Container Instances (ACI)	Google Cloud Run
Serverless/Function-as-a-Service	AWS Lambda	Azure Functions	Google Cloud Functions

Security Service

SERVICE	AWS	AZURE	GCP
Authentication and authorization	Identity and Access Management (IAM)	Azure Active Directory	Google Cloud Identity and Access Management (IAM)
Web firewall	AWS Web Application Firewall	Azure Application Gateway Azure Firewall	Firewall Insights
Security assessment	Amazon Inspector AWS Security Hub	Azure Security Center	Cloud Security Command Center
Threat detection and monitoring	Amazon GuardDuty	Azure Advanced Threat Detection	Cloud Armor

AWS vs Azure vs GCP Service Comparison

Storage Service

SERVICE	AWS	AZURE	GCP
Object storage	Simple Storage Service (S3)	Azure Blob Storage	Google Cloud Storage
Block storage	Elastic Block Store (EBS)	Azure Disk Storage	Google Persistent Disks
Infrequent access/archive storage	S3 Glacier, Deep Archive, S3 Infrequent Access Standard and one-Zone IA	Azure Archive Storage Azure Cool Blob Storage	Google Cloud Storage Nearline, Coldline, and Archive
File storage	Elastic File System (EFS)	Azure Files	Google Cloud Filestore
Bulk data transport	AWS Import/Export Service AWS Snow Family	Azure Import/Export Service Azure Data Box	Storage Transfer Service
Backup storage	AWS Backup	Azure Backup	Google Cloud Storage
Disaster recovery	Disaster Recovery	Disaster Recovery Cookbook	Site Recovery

Database Service

SERVICE	AWS	AZURE	GCP
Managed relational database as a service **With serverless options**	Amazon RDS Amazon Aurora	SQL Managed Instances Azure SQL Database	Cloud SQL Cloud Spanner
No SQL database as a service	Amazon DynamoDB	Azure Cosmos DB	Cloud Bigtable
In-Memory database services	Amazon ElastiCache	Azure Cache for Redis	Memorystore
Document database services	DocumentDB	Azure Cosmos DB	Filestore
Data warehouse services	Amazon Redshift	Azure Synapse	BigQuery
Data analysis services	Amazon Athena	Azure Synapse	BigQuery
Ledger services	Amazon QLDB	Azure Workbench	Cloud Spanner
Graph database services	Amazon Neptune	Neo4j (Azure Partner)	Cloud Bigtable

AWS vs Azure vs GCP Service Comparison

Network Service

SERVICE	AWS	AZURE	GCP
Global Content Delivery Networks (CDN)	Amazon CloudFront	Azure Content Delivery Network (CDN)	Google Content Delivery Network (CDN)
Direct connection	AWS Direct Connect	Azure ExpressRoute	Google Cloud Interconnect
DNS	Amazon Route 53	Azure DNS Traffic Manager	Google Cloud DNS
Load balancing	Elastic Load Balancing (ELB)	Azure Load Balancer Application Gateway	Cloud Load Balancer
Virtual private cloud network	Virtual Private Cloud (VPC)	Virtual Networks (VNet)	Google Virtual Private Cloud (VPC)

Support & Pricing

PLAN	AWS	AZURE	GCP
Self Service	Documentation Discussion Forum	Azure Documentation Community Support	Documentation Google community
Support Plans	Support Plans	Support Plans	Support Plans
Pricing	Free Tier Pricing Calculator Pay As You Go Spot Instances Preemptible-Virtual Machines Reserved Instances/	Free Tier Pricing Pay As You Go Calculator Reserved Instances Spot Virtual Machines/ Hybrid-Benefit Dev-Test Pricing	Free Tier Product Pricing Calculator Pay As You Go Sustained-use-discounts Committed-use-discounts

TNH

Cost Comparison Scenario

Which provider is cheaper ?

Aws Calculator **Azure Calculator** **Cloudorado**

Guidance Framework for Managing and Optimizing Costs of Public Cloud IaaS and PaaS

Plan	Define Requirements	Architect With Cost in Mind	Choose Pricing Models	Forecast Consumption	Deploy Pilot Application	Establish Budget
Track	Design Native Hierarchy	Implement Tagging Strategy	Allocate Costs of Shared Resources	Define Metrics to Track	Alert on Anomalies	Implement Chargeback and Showback
Reduce	Dispose Unused Resources	Schedule Services	Rightsize Allocation-Based Services	Leverage Discount Models	Upgrade Instance Generation	Establish a DevOps Feedback Loop
Optimize	Use Preemptible Instances	Set Up Data Storage Life Cycle Policies	Implement Horizontal Autoscaling	Balance Usage of Consumption-Based Services	Use Serverless Technologies	Modernize Your Application for PaaS
Evolve	Adopt Tooling	Onboard New Providers	Broker Cloud Services	Shift Budget Accountability	Incentivize Financial Responsibility	Correlate Costs to Business Value

Source: Gartner
ID: 465208_C

TNH

Top Cloud Technologies 2021

Edge

This architecture involves positioning processors, data storage, and servers as close as possible to the users who need them the most. Further it is extended to the network functionality, resulting in minimal latency, easier maintenance, and a smaller carbon footprint.

SASE

Secure Access Service Edge (pronounced “sassy”) is a network architecture that improves remote access by combining software-defined wide area network (SD-WAN) functions with cloud-native network security assets. These assets include secure web gateways, firewalls as a service, zero-trust network access, and cloud access security brokers. WFH is pushing SASE.

Serverless

Often referred to as Function as a Service (FaaS) or Event Driven, serverless computing lets developers write and deploy code without concerning themselves with provisioning cloud resources. Infrastructure is provided through automation.

Orchestration

More the number of interconnected services more the autoscaling required. With the high demanding nature of quality deliverables, the orchestrations platform has big role to play in terms of managing large number of services.

TNH

Top Cloud Technologies 2021

Multicloud

Due to competitiveness and heavy demand between services offered by different cloud provides , it has caused bridging between providers benefiting the small providers as well.

Cloud Migration with Data Privacy

As the WEH workload went high due to the pandemic the privacy of data when moving to cloud also became very important. The technologies involving Encryption and consumer privacy will be in demand.

TNH

Cloud Computing Example which will bring the world at our fingertips

SAAS

ATLASSIAN

Projection @ Industry: The company's line of products include many of the most widely used SaaS platforms across industries, including Jira, Confluence, Bitbucket, Trello and OpsGenie.

ZOOM

Projection @ Industry : It is all about Virtual meetings**.** Uber, Workday , Service Now and Ticketmaster all use Zoom to boost collaboration between teams and store meetings for future reference.

Microsoft Office 365

cloud-based Microsoft Office 365 dramatically expands the Office suite's parameters. Users now may create, edit and share content from wide range of devices including PC, Mac, iOS, Android or Windows device in real-time, connect with colleagues and customers across a range of tools from email to video conferencing and leverage a range of collaborative technologies supporting secure interactions both inside and outside of the organization.

Box

Dropbox

HubSpot

Spotify

Orderhive

Google Apps

Google G Suite

Netflix

Splunk

TNH

Cloud Computing Example which will bring the world at our fingertips

PAAS

ACQUIA

Projection @ Industry : Johnson & Johnsons **,** Whole Foods, IBM, the BBC and Panasonic use Acquia's Cloud.

Heroku

Projection @ Industry : Heroku provides platform for very large list of well-known customers Thinkmd ,Yabota, Lyft, Soundcloud, Macy's, Charity: Water and Toyota.

Google App Engine

OpenShift

Cloudways

Microsoft Azure

IBM Cloud Foundry

Zoho Creator

AWS Lambda

ENGINEYARD

VIMEO

Oracle Cloud Platform

SAGGEZZA

Wasabi

TNH

Cloud Computing Example which will bring the world at our fingertips

BIGDATA Analytics

SPINS

Projection @ Industry : SATORI, which gives brands and retailers an in-depth look at nutrition and allergen information for natural food products via the cloud.

DATADOG

Projection @ Industry : features more than 400 built-in integrations and powerful dashboards for monitoring the entire infrastructure, making Datadog an unparalleled platform for enterprise-level visibility..

NETFLIX: ANALYTICS

HERE TECHNOLOGIES: LIVE MAPS FOR SELF-DRIVING CARS

TEMPUS: PERSONALIZED ONCOLOGY

MARKETING EVOLUTION: HYPER-PERSONALIZED MARKETING

AWAKE SECURITY: BRAIN-LIKE SECURITY SAVVY

SPLUNK: REAL-TIME DATA MONITORING

TNH

Cloud Computing Example which will bring the world at our fingertips

Data Governance & Cyber Security

CARBONITE

Projection @ Industry : features more than 400 built-in integrations and powerful dashboards for monitoring the entire infrastructure, making Datadog an unparalleled platform for enterprise-level visibility..

ZSCALER

Projection @ Industry : Protects virtualized environments both locally and in the service provider's own cloud.

RED CANARY

Projection @ Industry : Risk mitigation company Kroll chose Red Canary to power its CyberDetectER tool, which is used to detect and quickly respond to credible cyber threats on servers and laptops.

FORCEPOINT

EXTRAHOP

PING IDENTITY

CA TECHNOLOGIES

PALO ALTO NETWORKS

JUMPCLOUD

ONAPSIS

ICRYPTO

CROWDSTRIKE

TNH

Oracle Cloud Infrastructure Gen 2

It is Not about Automation but Autonomous

zoom

Millions of Concurrent meetings run on Oracle Cloud Infrastructure

Moving 7 Petabytes of data per day

McAfee

McAfee ESM Cloud handles up to 500000 events per second with cost savings of 75 percent on Oracle Gen 2 Cloud

Oracle Autonomous Database

Nothing to Learn – Nothing to Do

- Automatic Provisioning
- Automatic Configuration
- Automatic Tuning while running
- Automatic Encryption always on
- Automatic Security Patching while running
- Automatic Elastic Scaling while running
- Automatic Backup, Failover, Recovery

SIEMENS

SKY

Leading Telecom Provider in Brazil

8x8

Moved from AWS to Oracle Gen2 Cloud
Saved 80% on Network Egress Costs

TNH

Cloud Computing Trends in 2021

Edge Is the New Cloud

AI and ML Will Revolutionize Cloud Computing

Increased Demand For Private, Hybrid Cloud Multi-Cloud And Joint Cloud Provider Offerings

Rise of The Cloud Native Technologies

- ✓ **Containerization**
- ✓ **Going Serverless**
- ✓ **Orchestration Platforms**

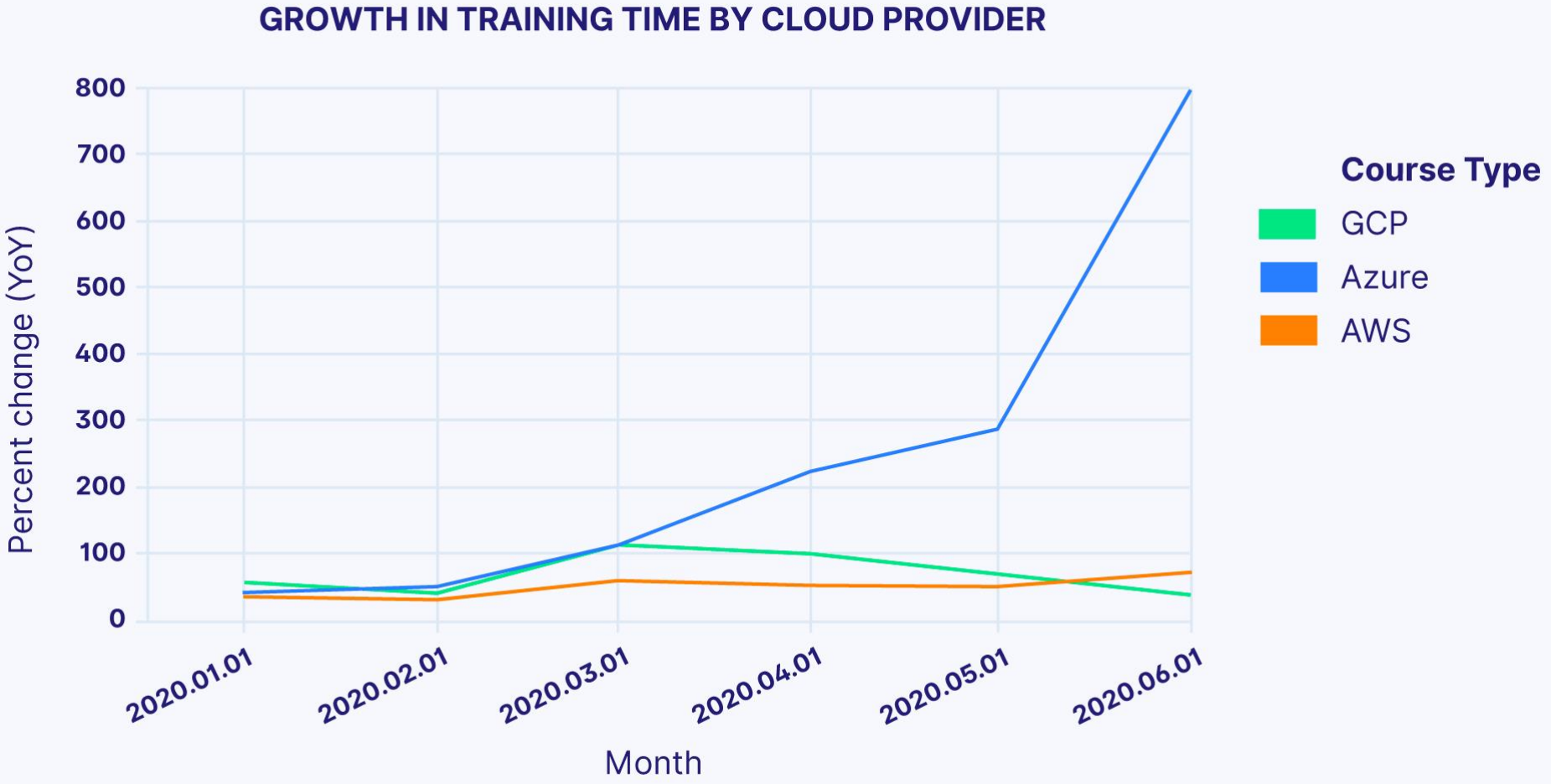
The Growth Of SASE Adoption

Increased need for, Data security, privacy, and Regulations

Virtual Desktops May Be The Workplace of The Future - Google offers this through Chromebook devices.

TNH

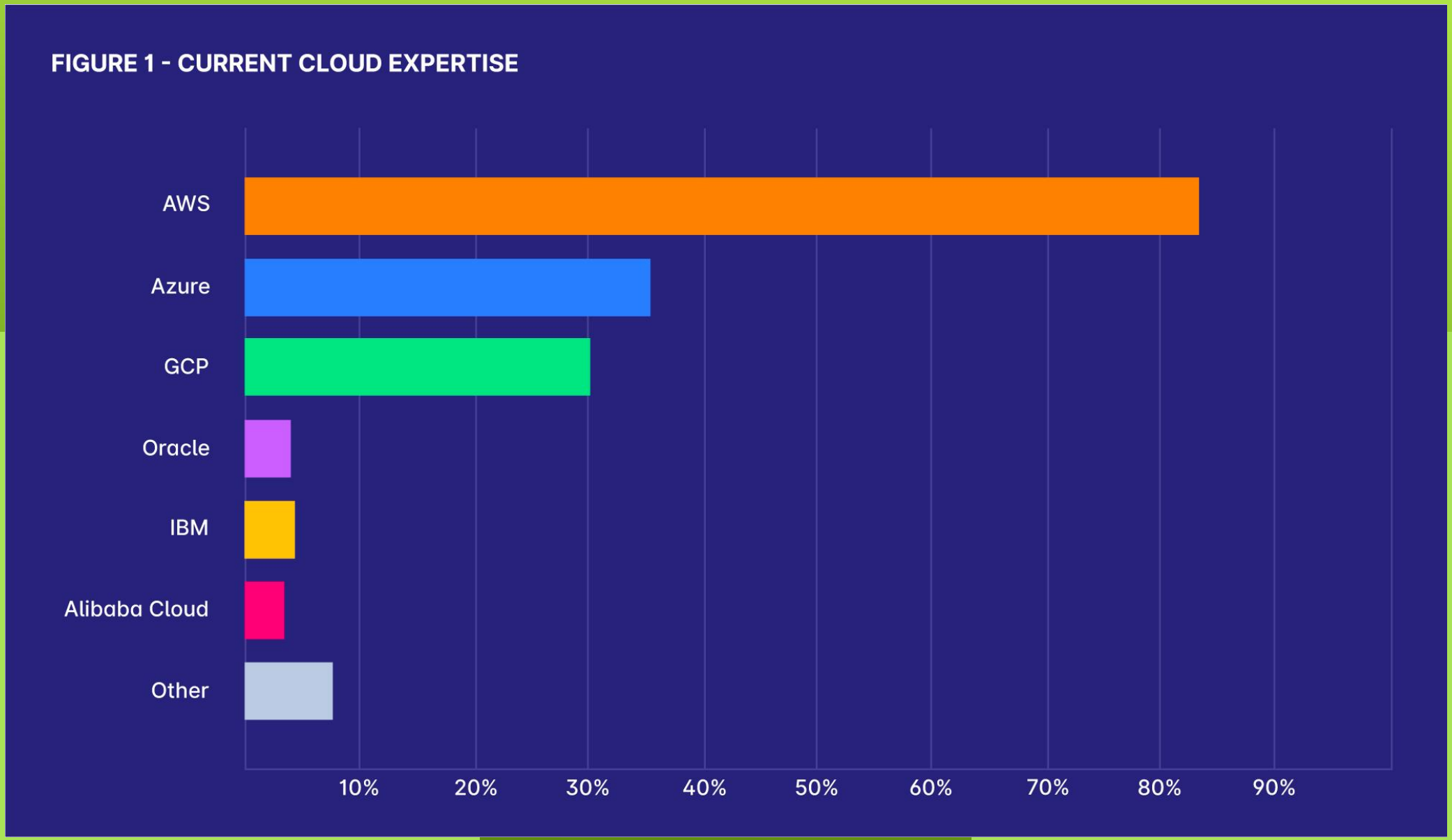
State of the Cloud Expertise - I



Ref : devops.com

TNH

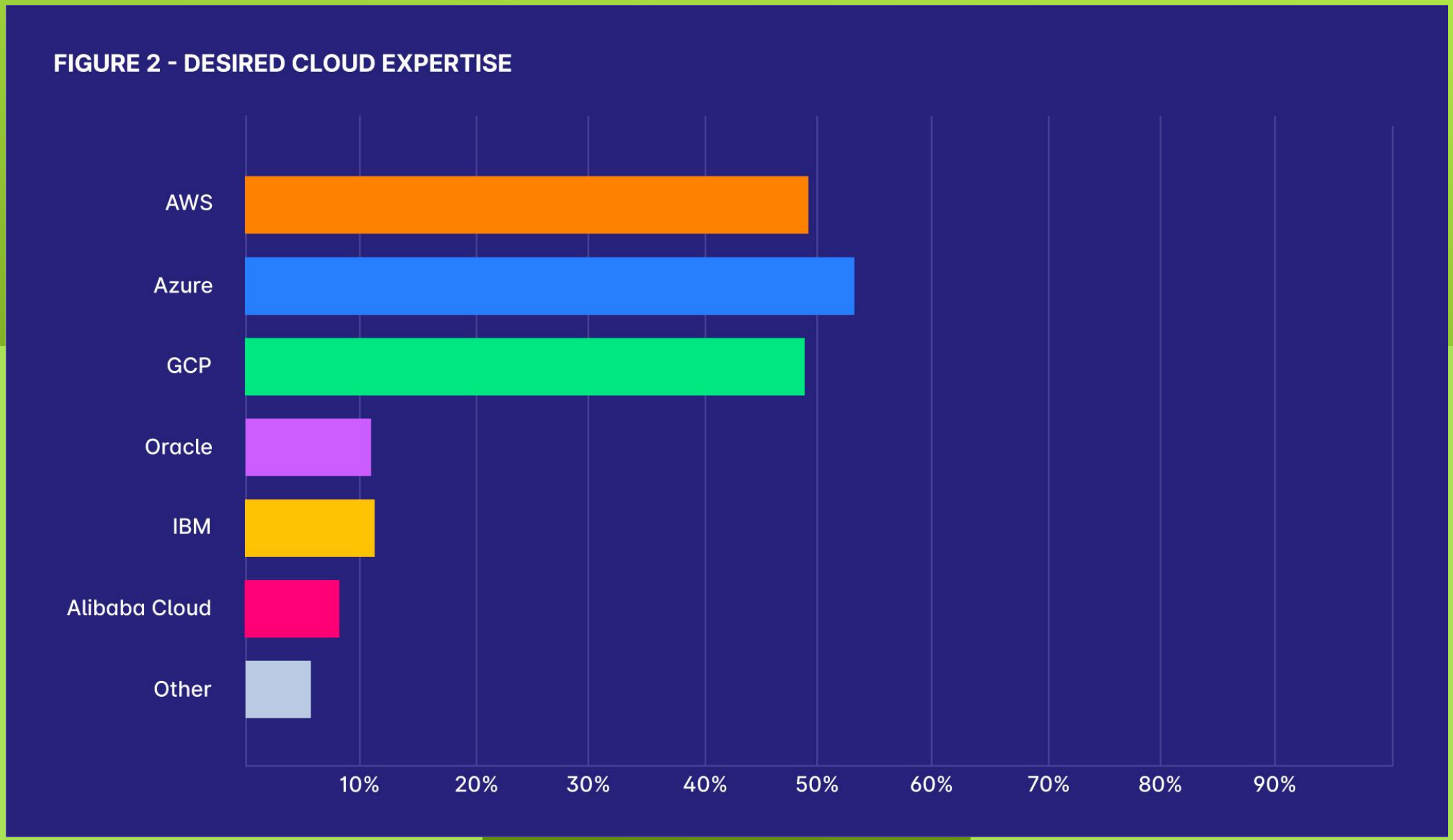
State of the Cloud Expertise - II



Ref : devops.com

TNH

State of the Cloud Expertise - III



Ref : devops.com

TNH

Top 7 cloud computing careers of 2021 and how to get started

Cloud administrator - Average salary: $70,501

Cloud architect - Average salary: $145,820

Cloud automation engineer - Average salary: $141,000

Cloud consultant - Average salary: $109,553

Cloud engineer - Average salary: $123,663

Cloud software engineer - Average salary: $112,897

Ref - TechTarget

TNH

Top cloud computing skills to boost your career in 2021 and Beyond

- DevOps
- Machine learning and AI
- Cloud security
- Database management
- Hybrid cloud
- Data and application migration and deployment
- Storage
- Network management
- Multicloud
- Application programming interfaces (APIs)
- Metrics and analytics
- Cloud service platform expertise
- Automation
- Infra Automation Languages
- Containerization
- Change management
- Orchestration Platforms

TNH

Top cloud certifications

Vendor-specific

Amazon Web Services	Google Cloud Platform (GCP)	Microsoft Certified Azure
AWS Certified Cloud Practitioner	Associate Cloud Engineer	Microsoft Azure Fundamentals
AWS Certified Solutions Architect	Professional Cloud Architect	Azure Administrator Associate
AWS Certified Developer-Associate:	Professional Data Engineer	Azure Developer Associate
AWS Certified SysOps Administrator-Associate	Professional Cloud Developer	Microsoft Azure Solutions Architect
AWS Certified DevOps Engineer - Professional	Professional Cloud Network Engineer	
AWS Certified Solutions Architect-Professional	Professional Cloud Security Engineer	

IBM Cloud

Oracle Cloud

Cisco Certified Network Administrator Cloud

Cisco Certified Network Professional Cloud

System Administrators in Red Hat OpenStack

TNH

Top cloud certifications

Vendor-Neutral

Cloud Institute

Certification of Cloud Security Knowledge - Cloud Security Alliance

Cloud Credential Council

Cloud Genius

Cloud Essentials - CompTIA

CloudMaster - National Cloud Technologists Association

TNH

Popular Cloud Computing Events and Conferences to Attend in 2021

Cloud Expo Europe 2021
Mission Possible
Host: Cloud Expo Europe
Date: July 7-8
Location: Excel, London, UK
From the organizer: *"The Cloud Public Sector Summit is an interactive 1-day event featuring a series of keynotes, presentations and panel sessions, addressing the key challenges and opportunities faced by senior technology professionals and business leaders in the public sector. The agenda features 10 sessions, providing a stack of opportunity for the audience to source information, ideas and inspiration to design, build and manage their technology architecture."*
REGISTER

IEEE International Conference on Cloud Computing 2021
A Prime International Forum for Both Researchers and Industry Practitioners
Host: IEEE
Date: September 5-10
Location: Virtual
From the organizer: *"The IEEE International Conference on Cloud Computing (CLOUD) has been a prime international forum for both researchers and industry practitioners to exchange the latest fundamental advances in the state of the art and practice of cloud computing, identify emerging research topics, and define the future of cloud computing. All topics regarding cloud computing align with the theme of CLOUD. In 2021, we will gather to strive to advance the largest international professional forum on cloud computing."*
REGISTER

TNH

Popular Cloud Computing Events and Conferences to Attend in 2021

Cyber Security and Cloud Congress 2021

Exploring the Security Needs of Future Technology

Host: Cyber Security Cloud Expo

Date: September 22-23

Location: Santa Clara, California, U.S.

From the organizer: *"The Cyber Security & Cloud Congress will cover two days of top-level content and thought leadership discussions looking at the Cyber Security & Cloud ecosystem. Don't miss the opportunity to explore this innovative technology and its impact on a range of industries including, manufacturing, transport, supply chain, government, legal sectors and financial services, energy, utilities, insurance, healthcare, retail, and more!"*

REGISTER

Infrastructure Is Everywhere: Accelerating Business Value Through Innovation

Host: Gartner

Date: December 1-2

Location: Tokyo, Japan

From the organizer: *"Around the world, organizations and entire industries have been forced to regroup and reassess how they do business. Infrastructure and operations (I&O) leaders have had to change plans rapidly to adjust to remote workforces and cost pressures, and keep core systems operational and resilient. As business moves faster into new territory, IT leaders faced a critical mandate and opportunity: Adapt and innovate IT I&O to deliver competitive advantage in a world that is full of disruption."*

REGISTER

TNH

Popular Cloud Computing Events and Conferences to Attend in 2021

Microsoft Ignite

A digital world at your fingertips

Host: Microsoft

Date: March 2-4

Location: Virtual

From the organizer: *"The next Microsoft Ignite is March 2–4, 2021. As we enhance the experience, enjoy and share your favorite moments from September, 2020."*

CloudFest 2021

Building CloudFest Together

Host: CloudFest

Date: March 23-25

Location: Virtual

From the organizer: *"CloudFest returns on an all-digital platform amid a global pandemic as we take stock of the strengths, weaknesses, risks, and opportunities that are revealed by a globe-spanning threat like COVID-19. The internet has delivered when it was needed most, just as its architects predicted—now let's take it to the next level. You, the cloud professional, have an important role to play in the future of technology—so join us at CloudFest 2021 and let's build something great together."*

Cloud Transformation Champions, Online

Connecting Executives Leading their Enterprise Through a Cloud Transformation Journey

Host: Corinium Intelligence

Date: March 2-3

Location: Virtual

From the organizer: *"Join us wherever you are in the world. At home, in the office, on desktop, mobile or tablet for just 90 minutes a day starting 2nd March, 2021."*

Oracle-open-world 2021 Las Vegas

AWS Summit

Google I / O

Alibaba summit-live

TNH

Up Next

Beginners

Getting Started with Different Cloud Vendors

Middle Level Resources

Building Cloud Solutions based on Scenarios

Senior Level Resources

Deriving Enterprise Level Solutions with Client Driven pilot projects

TNH

To be the ultimate knowledge hub for the most demanding technologies in the industry.

tnhwithlaksiri@gmail.com

Technology Innovation Hub

Thank You.

TNH