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Cloud Computing

google.com/datacenters

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3. Advantages and disadvantages of Cloud
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2007-2010

BSc. Comp Sci. at JKUAT

2011-2014

MSc. Mobile Tel & Innovation at Strathmore U

2014-2015

Research student at JAIST

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Ph.D Information Science at JAIST

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IT Business Analyst, EY, Kenya

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Cloud services researcher, Hitachi, Tokyo

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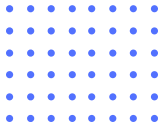
2. OVERVIEW

What is cloud computing?

Cloud computing means storing and accessing applications and data over the internet instead of the hard disks of local servers or computers.

3. (1) ADVANTAGES

- Quick and easy setup
- Elasticity and flexibility
- Pay for your use
- High Accessibility and Availability
- Automated software updates
- Enhanced collaboration

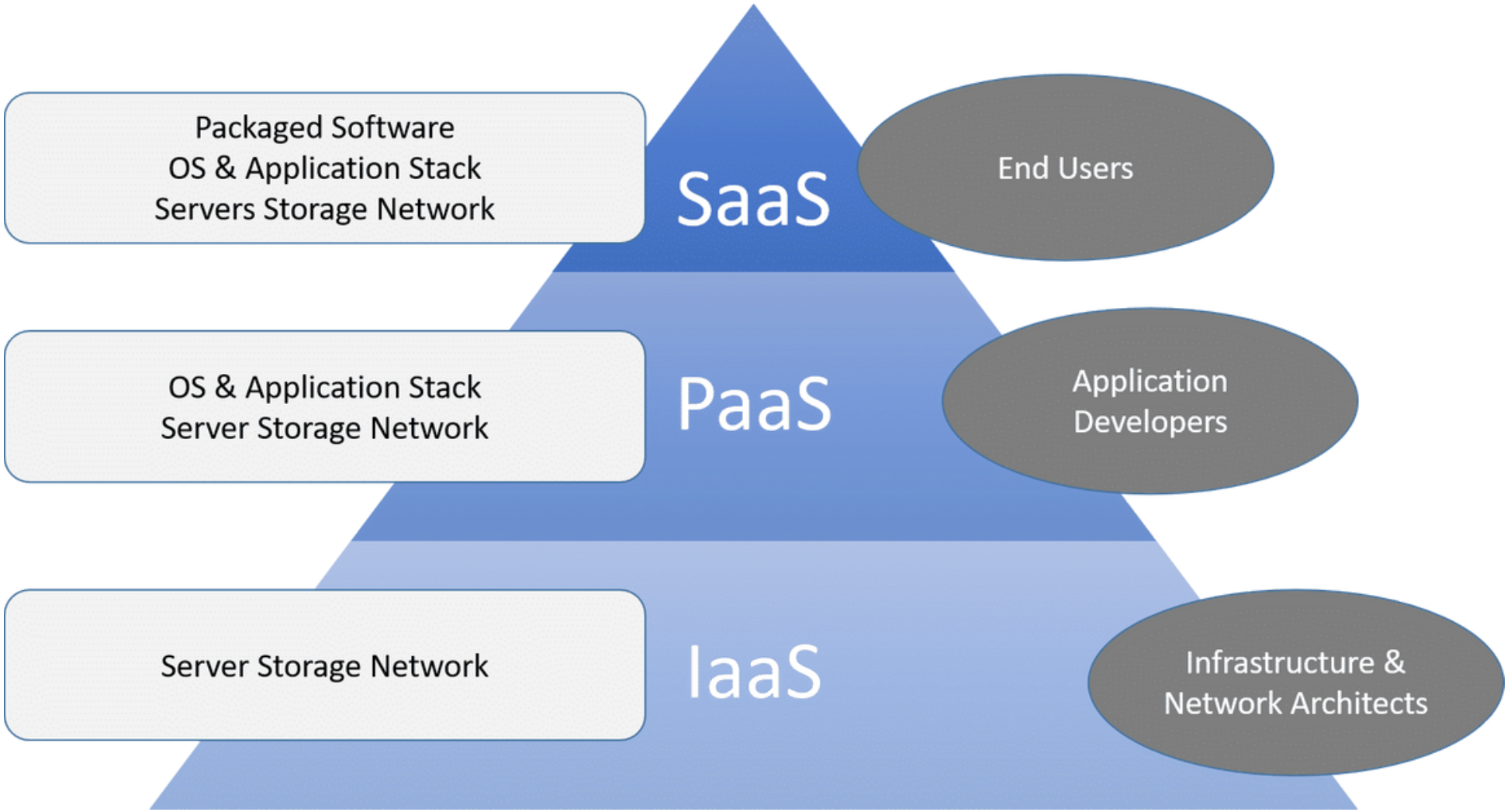


3.(2) DISADVANTAGES

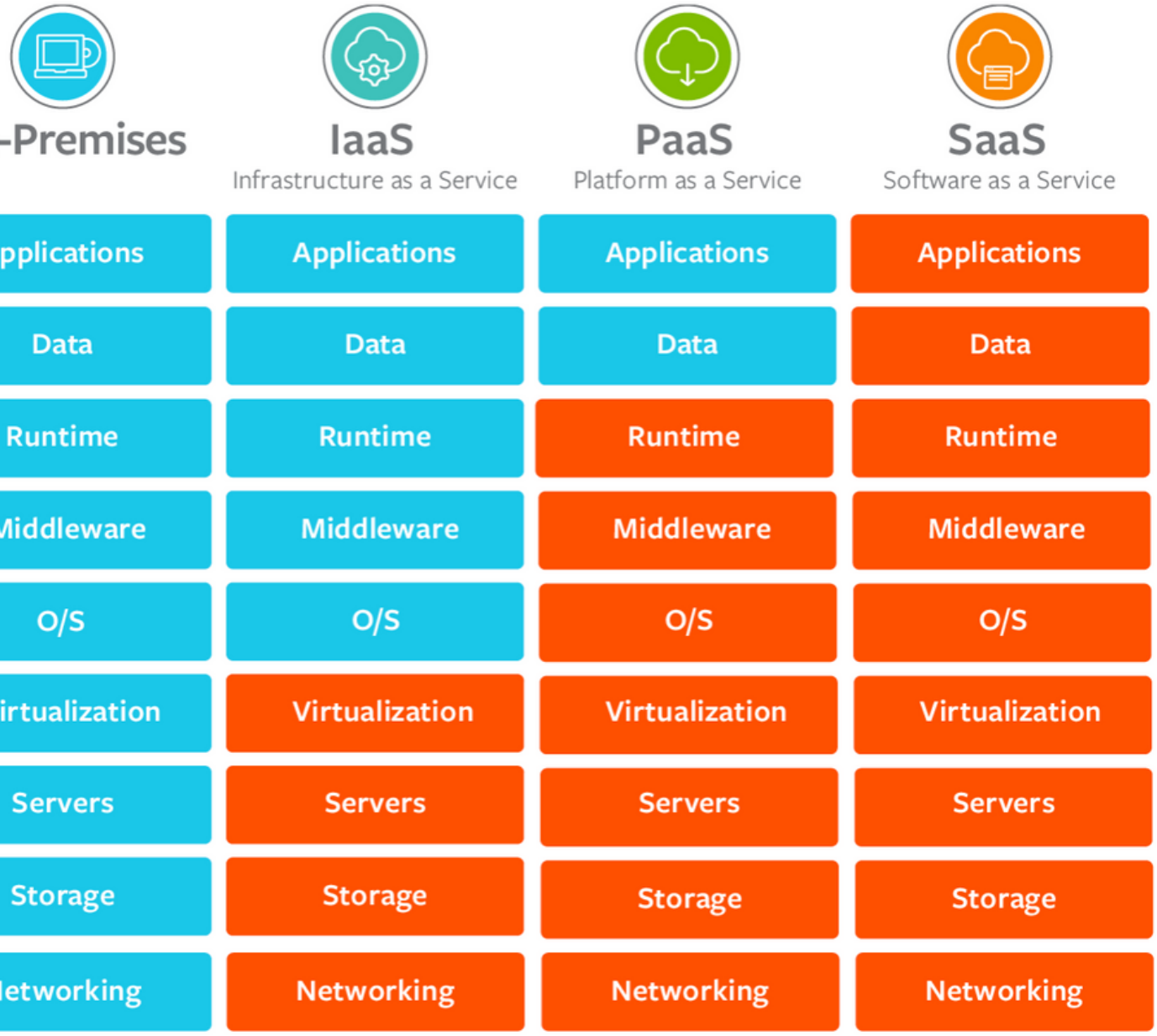
- Fully dependent on highly reliable internet
- Higher Operation Costs for larger org.
- Greater Dependency on Service Providers
- Vendor lock-in
- Security concerns*
- Downtime*

*rare occurrences

4. Cloud Service Models



Summary of Key Differences



bmc

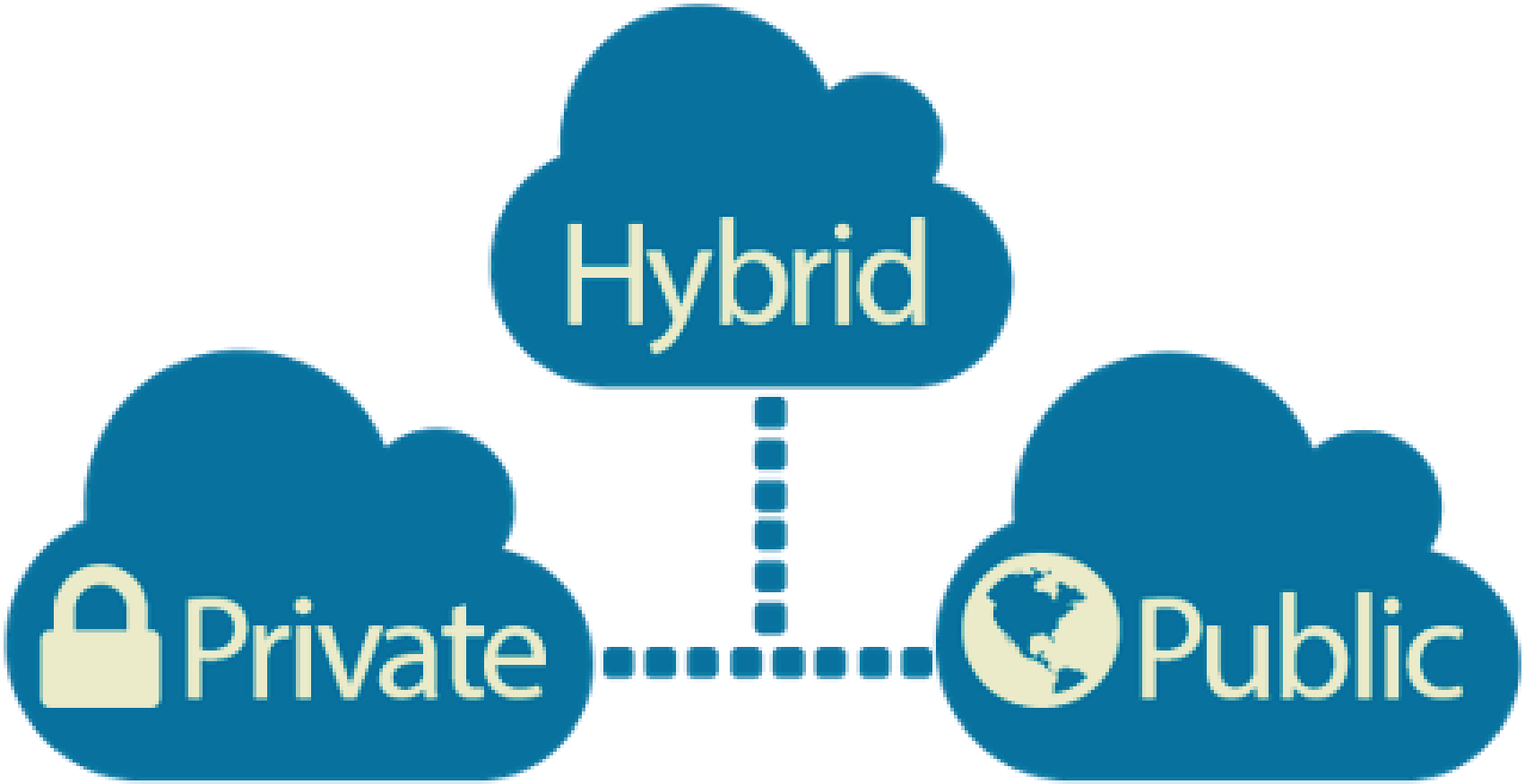
You Manage

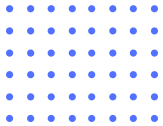
Other Manages

Common Examples of SaaS, PaaS, & IaaS

Platform Type	Common Examples
SaaS	Google Apps, Dropbox, Salesforce, Cisco WebEx, Concur, GoToMeeting
PaaS	AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, OpenShift
IaaS	DigitalOcean, Linode, Rackspace, Amazon Web Services (AWS), Cisco Metapod, Microsoft Azure, Google Compute Engine (GCE)

5. CLOUD DEPLOYMENT MODELS





5.(1) PUBLIC CLOUD

Adv

- No hardware cost
- High scalability and flexibility
- Reduced complexity
- Flexible pricing options

Limitations

- Low visibility so hard for compliance
- Lack of control over infrastructure
- Can be hard to switch clouds (vendor lock-in)
- Security/privacy concerns

Suitable For

- Small and predictable number of users
- Common apps and services

5.(2) PRIVATE CLOUD - ON PREMISE/OUTSOURCED

Adv

- Full control
- Customizable configurations
- Secure
- Scalable
- Uninterrupted service

Limitations

- Relatively more expensive
- Remote access may be limited
- If cloud center is on premise, may not be easily scalable
- More complexity than public

Suitable For

- Regulated industries and government agencies
- Large enterprises that can afford it
- If strong control is required

5. (3) HYBRID - MIX OF BOTH PRIVATE AND PUBLIC

Adv

- Flexibility and scalability
- Reliability
- Security for sensitive workloads in private cloud

Limitations

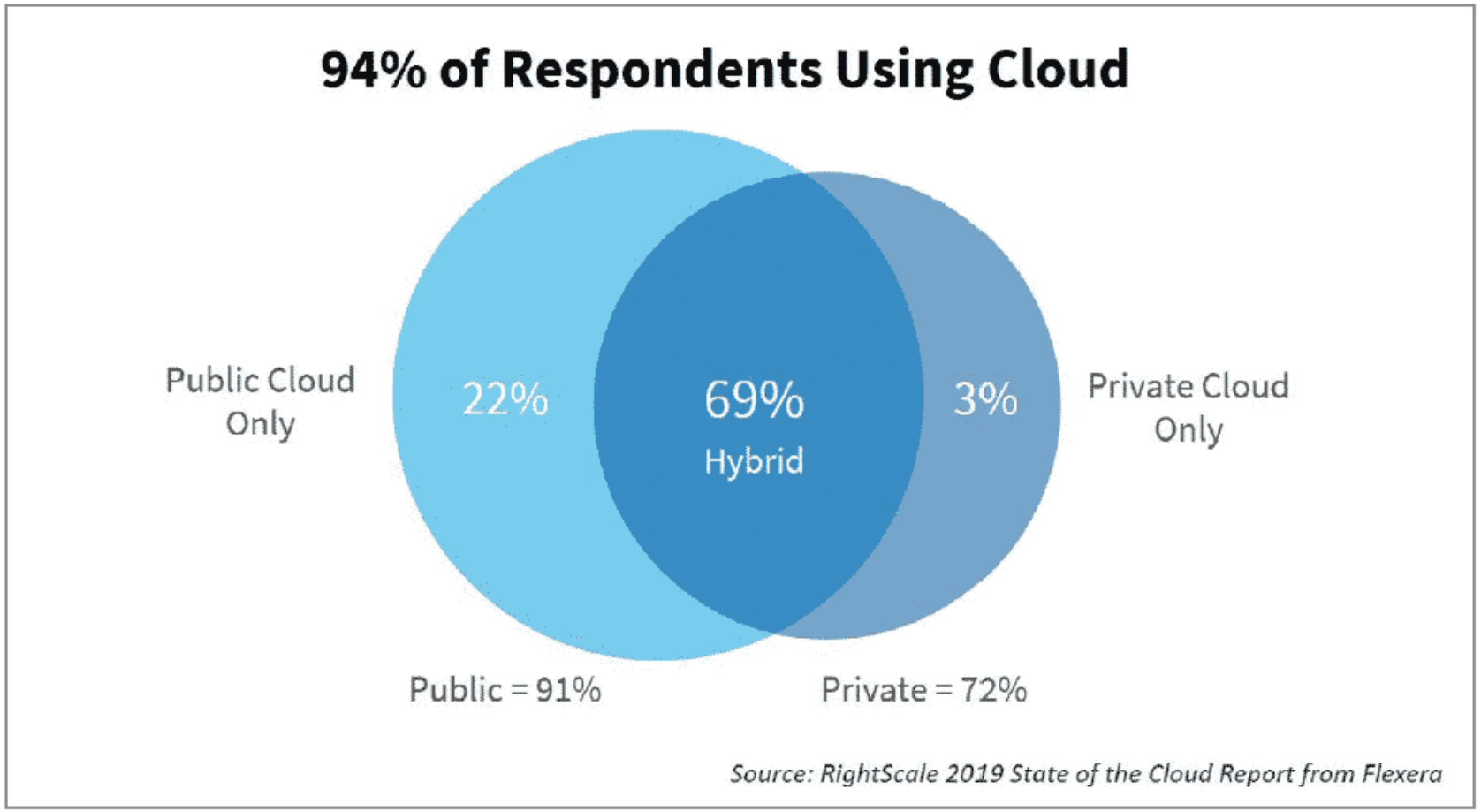
- Costly
- Additional complexity
- Compatibility and integration required for the different infrastructures

Suitable For

- Optimizing on security for sensitive information and cost for public cloud applications

6. STATE OF CLOUD COMPUTING IN 2019

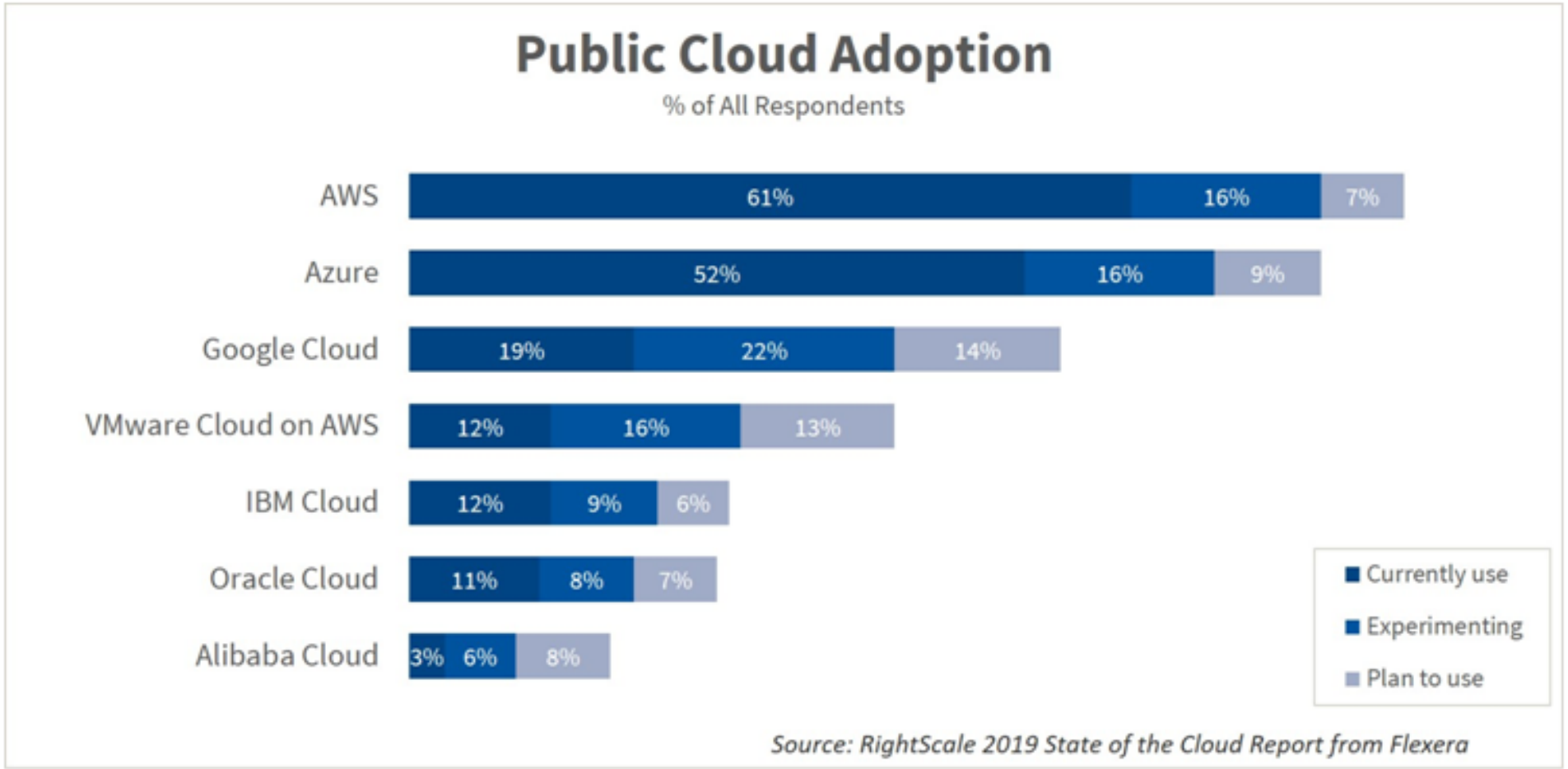
- Based on a Jan 2019 survey by Flexera



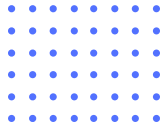
https://www.flexera.com/about-us/press-center/rightscale-2019-state-of-the-cloud-report-from-flexera-identifies-cloud-adoption-trends.html

6.1 STATE OF CLOUD COMPUTING IN 2019

- Who are the market leaders?



Top cloud providers 2019: https://www.zdnet.com/article/top-cloud-providers-2019-aws-microsoft-azure-google-cloud-ibm-makes-hybrid-move-salesforce-dominates-saas/



6.2 STATE OF CLOUD COMPUTING IN 2019

- Who are the market leaders? (per service model)

IaaS and Paas

1. AWS
2. Ms Azure
3. Google Cloud Platform
4. Alibaba
5. IBM

SaaS

1. Oracle
2. Salesforce
3. SAP
4. Workday

Top cloud providers 2019: https://www.zdnet.com/article/top-cloud-providers-2019-aws-microsoft-azure-google-cloud-ibm-makes-hybrid-move-salesforce-dominates-saas/

6.3 STATE OF CLOUD COMPUTING IN 2019

- Challenges Facing Cloud Management

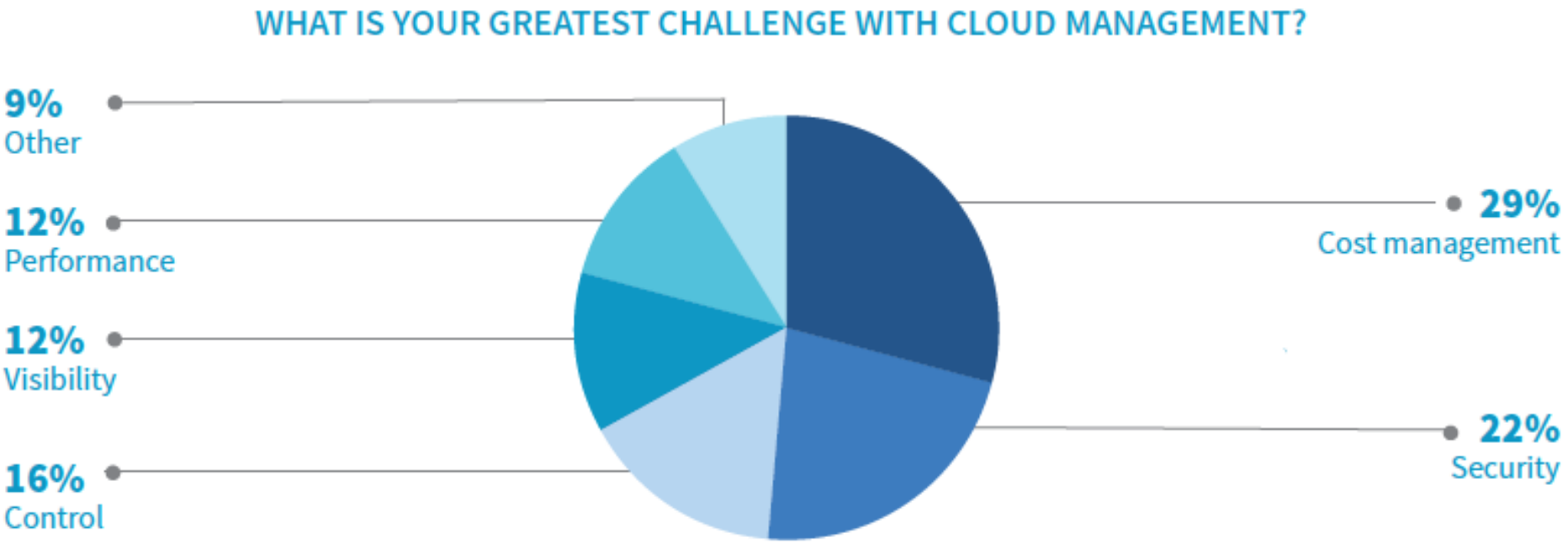
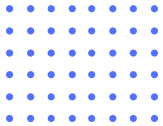
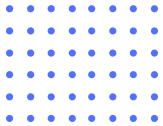


Chart 2



7. TRENDS IN CLOUD COMPUTING IN 2019

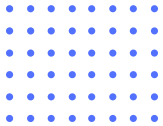
- Serverless: top-growing cloud service
- AI, Machine Learning, Data Analytics Platforms
- Containers-as-a-Service (Docker and Kubernetes)
- IOT Platforms



7.1 TRENDS IN CLOUD COMPUTING IN 2019

Serverless: top-growing cloud service

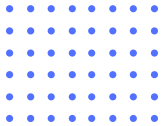
- Only pay for the time the code is executing
- Cheaper than being billed for a fixed quantity of servers
- Examples: AWS Lambda, Google Cloud Function



7.2 TRENDS IN CLOUD COMPUTING IN 2019

AI, Machine Learning, Data Analytics Platforms

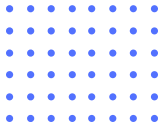
- Developers and data scientist can now run their models in the public cloud
- Accessible and affordable platforms esp. for individuals
- Examples: AWS Sagemaker, Microsoft Azure ML, Google Cloud ML Engine, Nvidia's CUDA for DL
- ML Platforms: *serverless cloud



7.3 TRENDS IN CLOUD COMPUTING IN 2019

Containers-as-a-Service (Docker and Kubernetes)

- Natural evolution to virtual machines
- Standard unit of software that packages code and all dependencies
- Most popular containers are Docker, managed by Docker Engine
- Kubernetes (k8s) for orchestrating Docker containers, but can also operate stand-alone
- Docker and k8s can run with or without each other



7.4 TRENDS IN CLOUD COMPUTING IN 2019

IOT Platforms

- Large number of sensors
- Data is aggregated on the cloud for analysis
- Public cloud providers have set up data collection infra and cloud analysis platforms
- Applications - car manufacturers, equipment management in industries, transport and logistics, etc.
- Examples of IoT platforms: Salesforce IoT Cloud, Google Cloud IoT, Microsoft, IBM, AWS, Cisco, SAP, **Hitachi Lumada***, etc.

8. CLOSING REMARKS

For individuals: hot careers

- Cloud consultant
- Cloud solutions architect
- AI/Cloud solutions architect
- (AWS/Google/Microsoft Cloud certifications)
- Cloud (services) researcher*

Advice For companies:

Have an in-house cloud team, cloud policy and guideline for which apps on the premise and which on the public cloud