



Modernize by migrating to Google Cloud

Jack Lo, Director of Engineering, Google Cloud

Google Cloud

Every industry is going digital.

By 2021,

Over 75% of midsize and large organizations will have adopted a multicloud and/or hybrid IT strategy*

By 2022,

Public cloud services will be essential for 90% of business innovation*

And by 2025...

The sum of the world's data is expected to swell more than 5 times its current size**



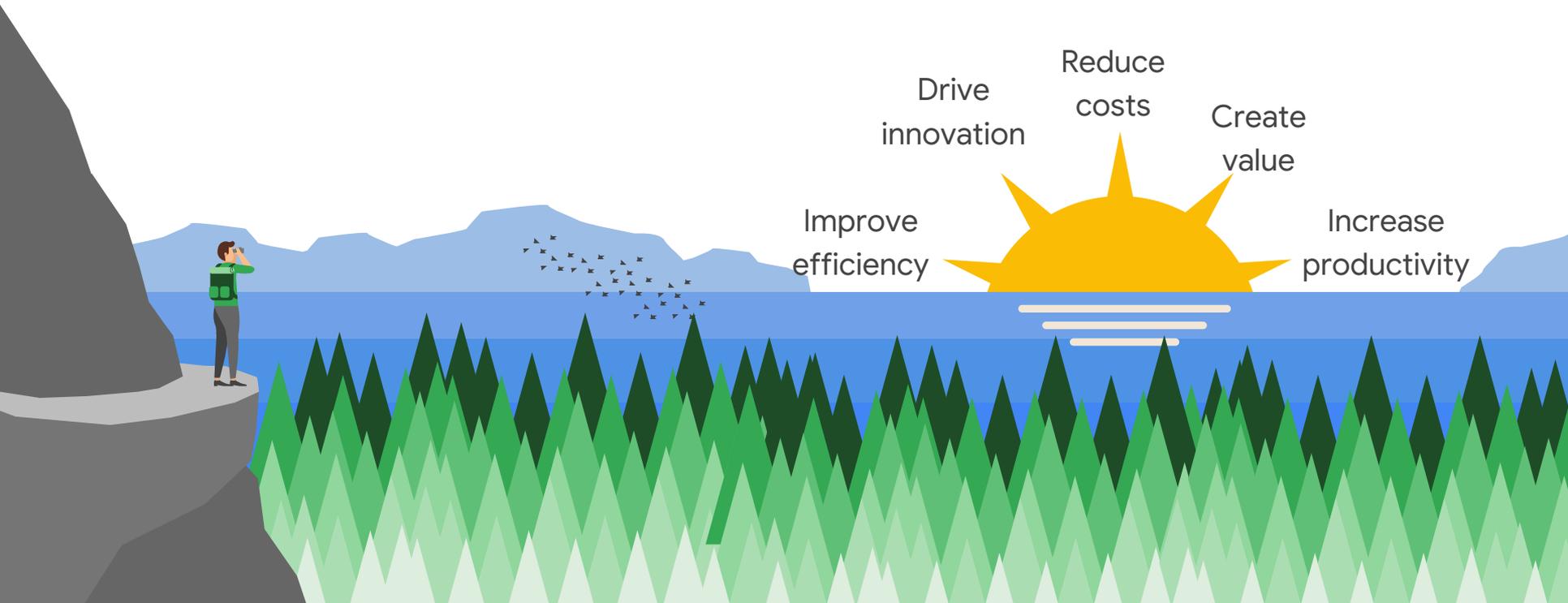
*Gartner, Predicts 2019: Increasing Reliance on Cloud Computing Transforms IT and Business Practices, December 2018.
**IDC White Paper, sponsored by Seagate, "The Digitization of the World from Edge to Core," November 2018 (Available on [Google Cloud site](#)).

That is why migration and modernization are top of mind



70%
of current IT spend goes to “keeping the lights on” -- not towards innovation that drives the business forward.

But migration pathway not always clear



Drive innovation

Reduce costs

Create value

Increase productivity

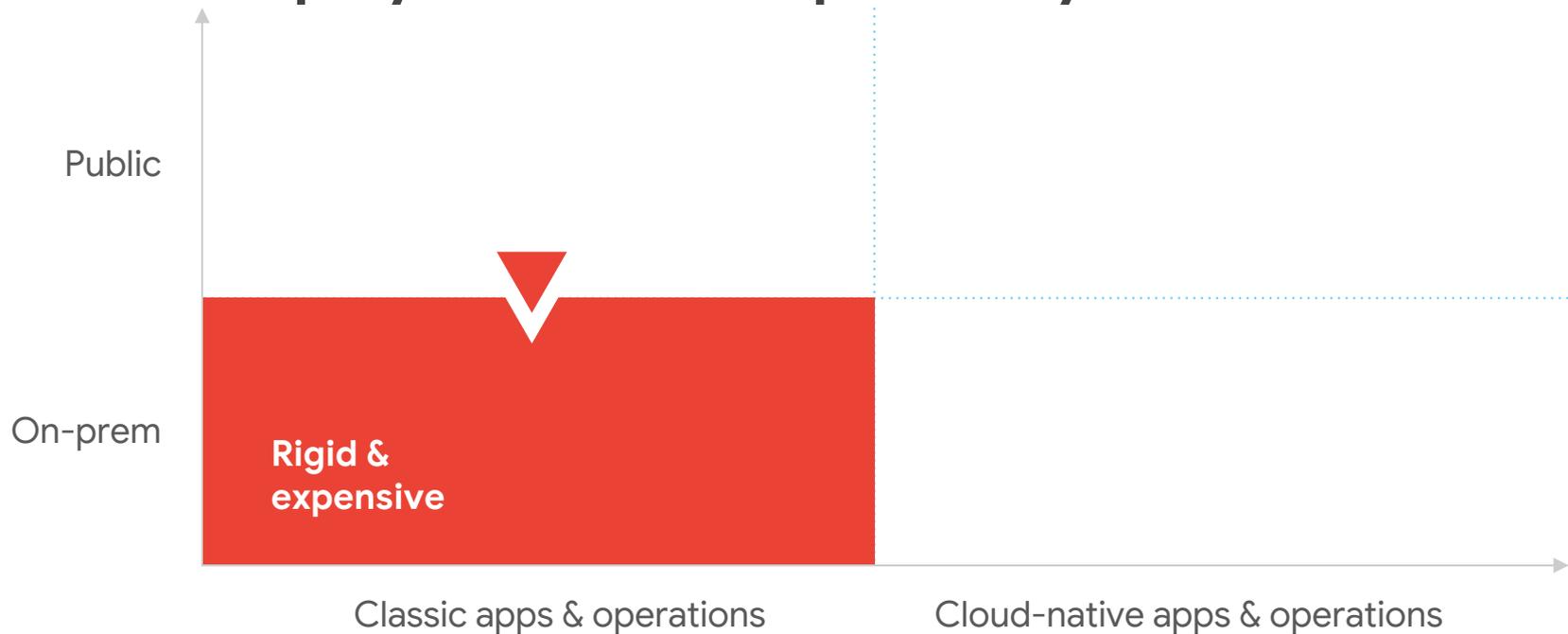
Improve efficiency



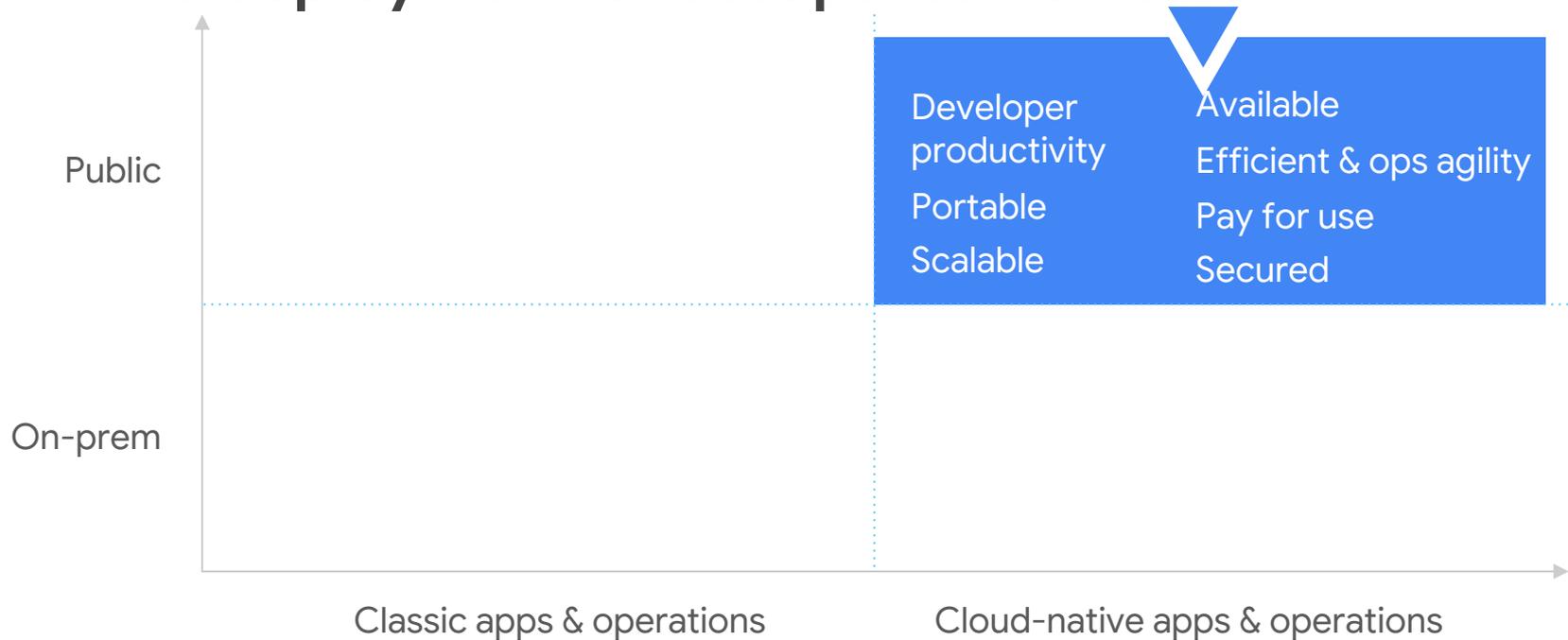
Migration and Modernization 101

Google Cloud

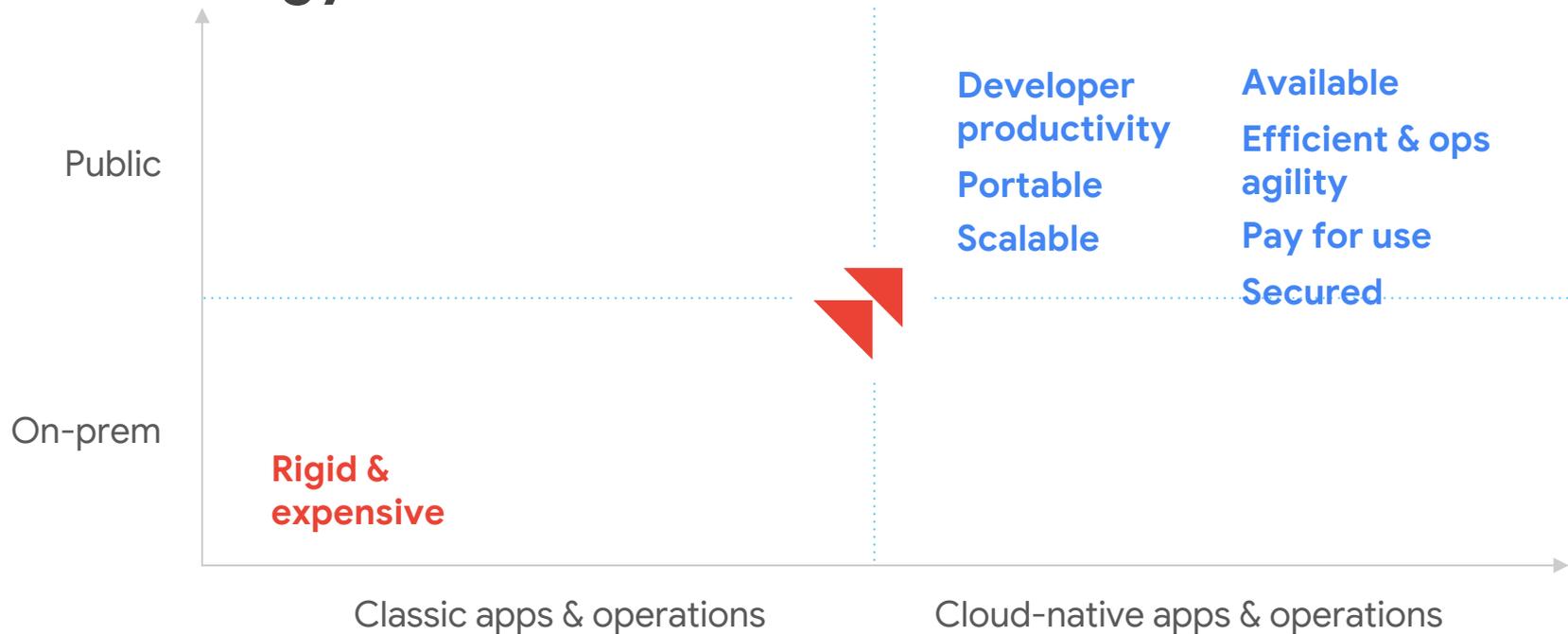
The deployment landscape: today



The deployment landscape: tomorrow



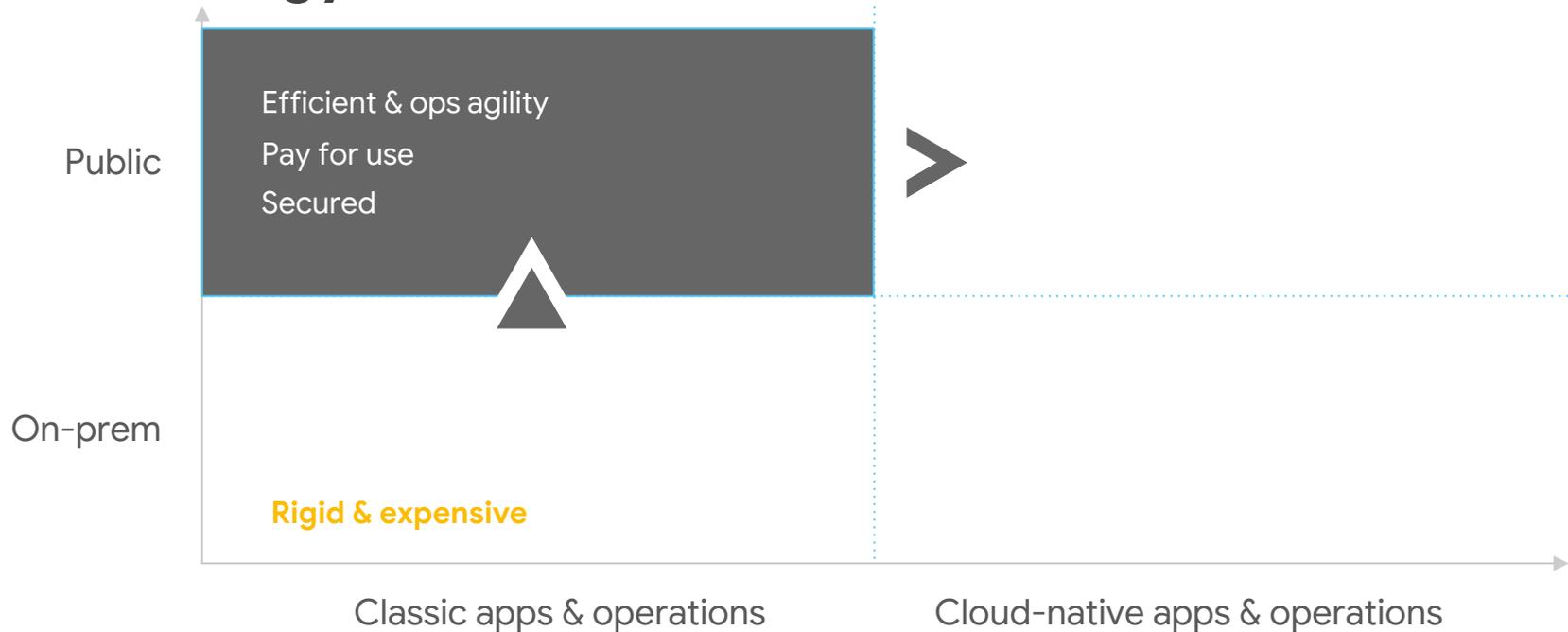
Strategy 1: Rebuild



Strategy 1: Rebuild (but not practical for most apps)



Strategy 2: Lift & shift



Lift & shift: overview

What it is



Moving applications as they exist to the cloud

When to use it



Applications that can run unmodified in the cloud

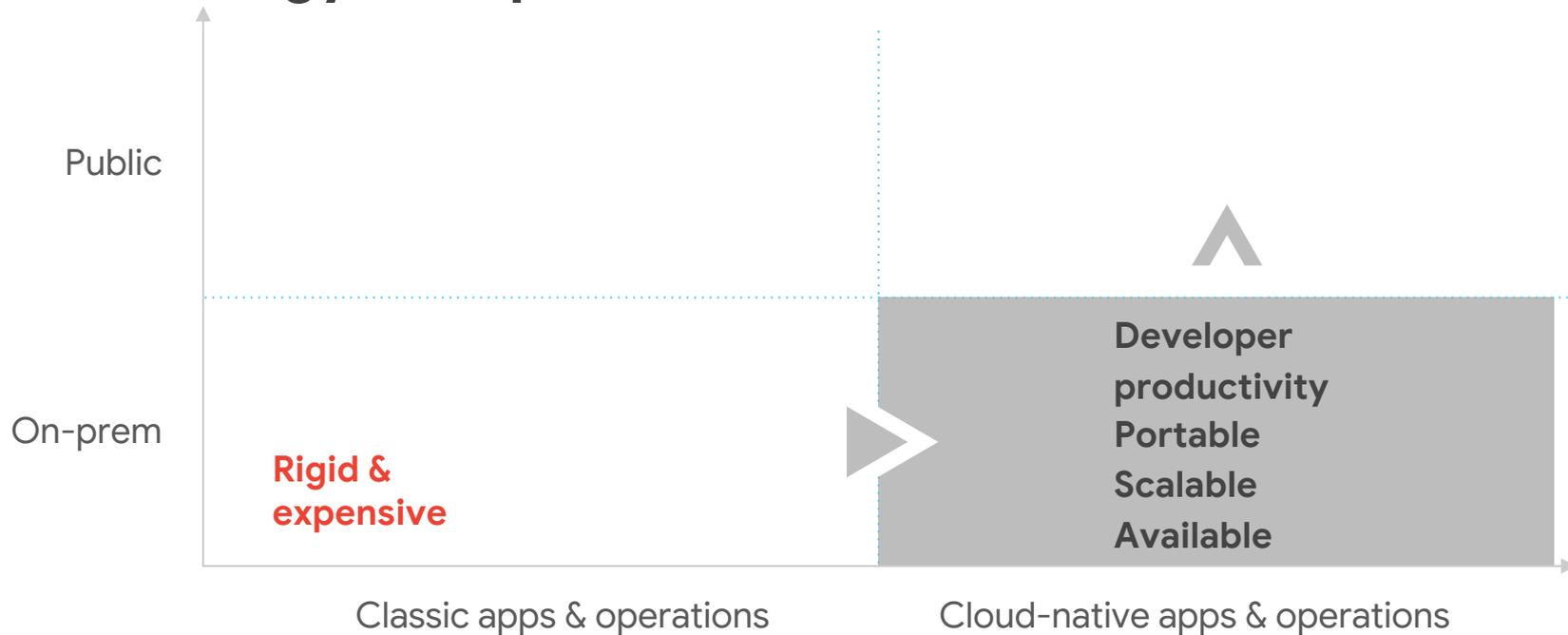


Speed is necessary



Little appetite or need for change

Strategy 3: Improve & move



Introducing Google Cloud's Anthos

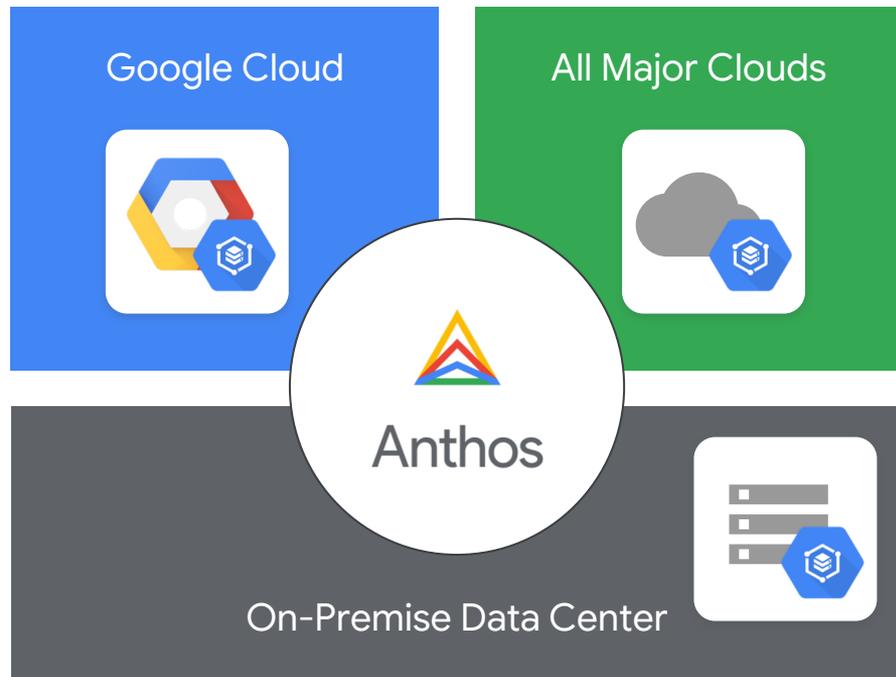
Anthos lets you build and manage modern **hybrid and multi-cloud** applications without lock-in

Build once, to run anywhere, across your existing on-premise infrastructure and all major public cloud providers

Marketplace, Service Management, and Managed Operations

“Anthos' multi-cloud capabilities are so far unique in the industry”

[Forbes, April 2019](#)





“At HSBC, we needed a consistent platform to deploy both on-premise and in the cloud. Google Cloud's **software-based approach** for managing hybrid environments provided us an innovative, differentiated solution that was able to be **deployed quickly** for our customers.”

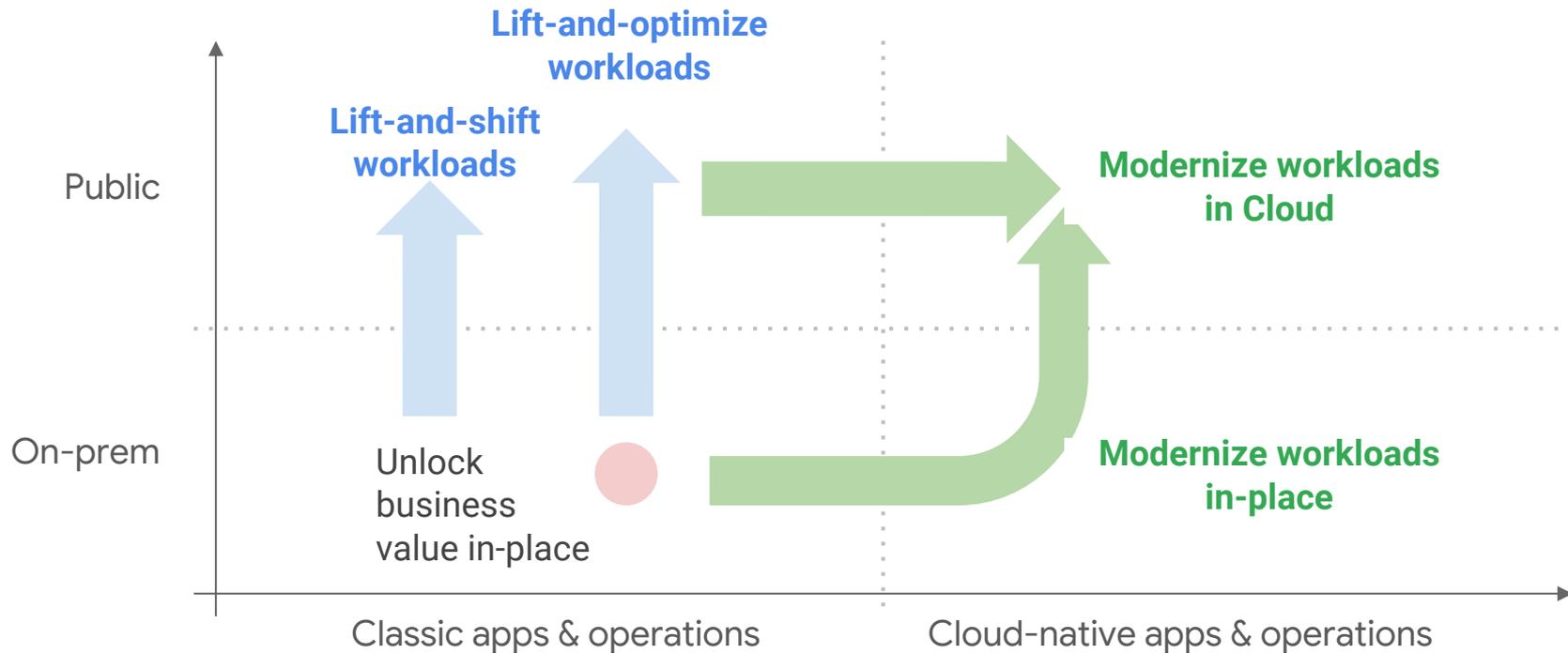
Darryl West
Group CIO



“At Siemens we believe that having a winning hybrid strategy is going to be instrumental in achieving our vision of being a leading provider of Industrial Internet of Things solutions. Anthos is a great fit for us as it gives us the ability to have a **unified management view** of our hybrid deployment while giving us a **consistent platform** to run our workloads **across environments**”

Martin Lehofer
Head of Research
Group IoT/Distributed Computing

It's not one-size-fits-all



Google Cloud is here to meet you where you are,
to be your partner
in crafting a migration journey
that lets you run
what you want, where you want, how you want

Why move to Google Cloud



Hybrid and Multi-Cloud

Enables choice

Open source gives customers the freedom to choose where to deploy workloads and avoid vendor lock-in



Best-in class security

Security by design

Privately managed network with > 100 POPs worldwide



Faster provisioning and scale

Infrastructure that underpins **8 products with > 1B users** each

On-demand pricing

Scale up quickly as your needs change



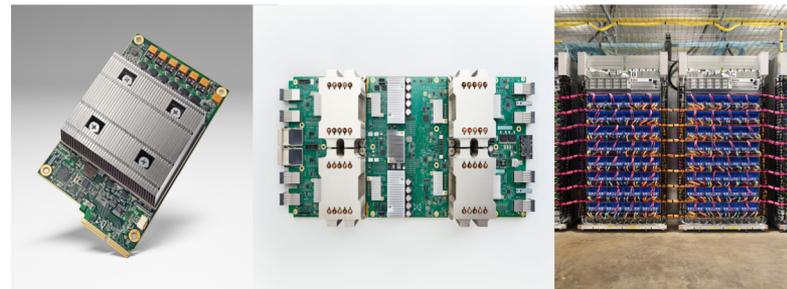
Drive your innovation

Ease of use with Serverless and Managed Services

Cutting-edge compute, AI & ML capabilities

Unlock the ability to solve problems that previously were not possible

Cutting-edge compute platforms in Google Compute Engine



Latest CPUs

Intel Skylake CPU available on GCP 4 months before public launch

First to market with Intel Cascade Lake CPU and Optane DC



GPU and accelerators

HPC is entering a new era defined by new accelerator technologies, rapidly enabling significant new advances.

Nvidia K80, P100, V100, P4, and T4 GPUs on Compute Engine

Google's Cloud TPUs

Cloud TPU v2 and v3 Pods now publically available

Cloud TPUs 84% faster on MLPerf benchmark

Cloud TPU Pods - Supercomputers for ML

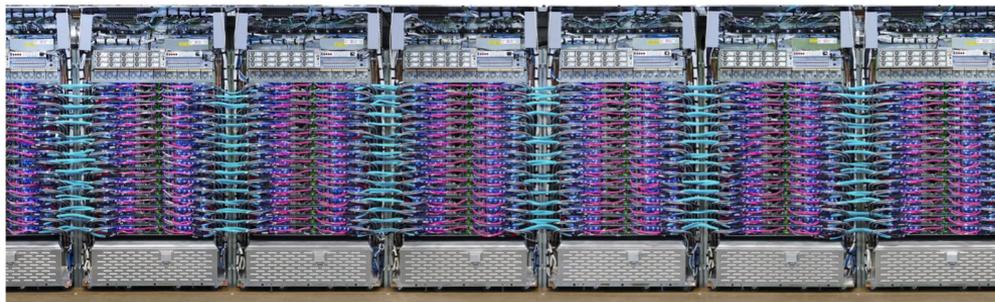


Cloud TPU v2 Pod^{Beta}

11.5 petaflops

4 TB HBM

2-D toroidal mesh network



Cloud TPU v3 Pod^{Beta}

100+ petaflops

32 TB HBM

2-D toroidal mesh network

Unlocking discoveries

MIT research: computational mathematics

- 1.8 M cores on Preemptible VMs
- 300 CPU-yrs of computation in a single afternoon

"It changes your whole outlook on research when you can ask a question and get an answer in hours rather than months," he said. "You ask different questions."

– Andrew Sutherland

<https://cloudplatform.googleblog.com/2017/04/220000-cores-and-counting-MIT-math-professor-breaks-record-for-largest-ever-Compute-Engine-job.html>



RECURSION
pharmaceuticals

Recursion Pharmaceuticals: AI-enabled discovery to treat rare diseases

The potential of using Cloud TPU pods to accelerate our deep learning research while keeping operational costs and complexity low is a big draw.

*It takes us now a little **over 24 hours to train models on our local GPU cluster**. It will take us, depending on the size of the **TPU pod**, anywhere from 7 hours to **15 minutes**.*

*Getting answers to our researchers in an order of **minutes or hours versus days** is a definite value add for the business."*



Ben Mabey, Vice President, Engineering, Recursion Pharmaceuticals

Google and Schlumberger's partnership

Schlumberger is shifting the development and innovation focus away from individual technologies towards complete and high-performing technology systems and has selected Google Cloud as a preferred Cloud provider to develop cloud-native E&P applications to help its customers derive actionable insights from data and harness and for its clients' digital journey to the cloud on the DELFI cognitive energy and production (E&P) environment.

Schlumberger is making a critical investment in high performance computing and we've chosen Google Cloud as our preferred platform. By scaling data, processing workflows, and using advanced algorithms, we can innovate faster than ever.

Ashok Belani, Executive Vice President of Technology, Schlumberger

“Our strategic collaboration with Google Cloud enables Schlumberger and our customers to take advantage of the latest digital technologies to unlock the value in all data for making critical business decisions. Using GCP, Schlumberger is launching several cloud-native applications for its customers, including global exploration screening, seismic processing, field development planning, and production optimization workflows...”
– said Hinda Gharbi, Executive Vice President, Schlumberger Reservoir & Infrastructure.





Beginning your migration journey

Google Cloud

Strategies differ; approach remains similar



Assess

your application
landscape



Plan

what you can move,
what you should
move, and in what
order



Migrate

work with your
team and/or
partner to pick a
path and start
migrating!

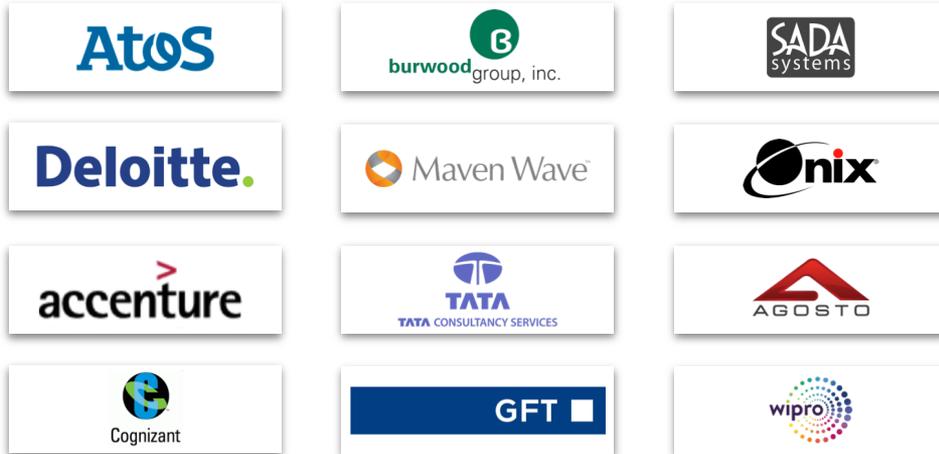


Optimize

your systems and
operations, help
save on costs

Partners to help you on your journey

Full-Service Partners



Discovery & Assessment Partners



Google is the best cloud partner for your journey

New Workloads

Build new cloud-native applications or spin up new data warehouse

Only Google Cloud lets you **write once, run anywhere** on prem or in any cloud



On-Prem Migration

Modernize data and applications, enabling AI/ML

We pioneered the use of data to help you **gain unique insight** at extreme **global scale**



Digital Transformation

Deliver new customer experiences, redesign business models and transform culture

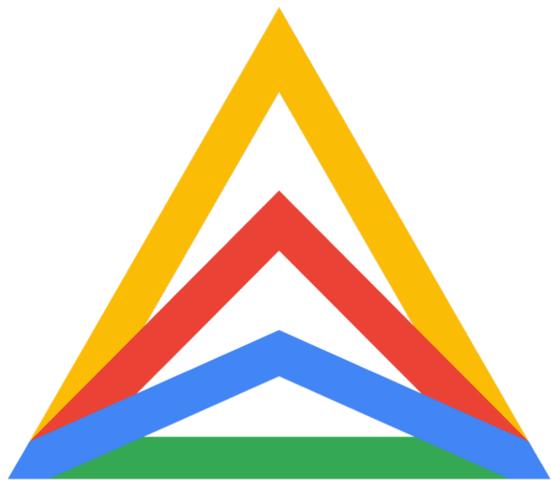
Google is an **innovation company** at the core; we build cultures of collaboration & agility





Appendix

Beginning your migration journey



Anthos

Modernize in place

Automate policy &
security at scale

Consistent experience



Multi-cluster management
Secure service management
Marketplace



Built on Kubernetes, Istio, and Knative

A **portable platform** that's **consistent across environments**

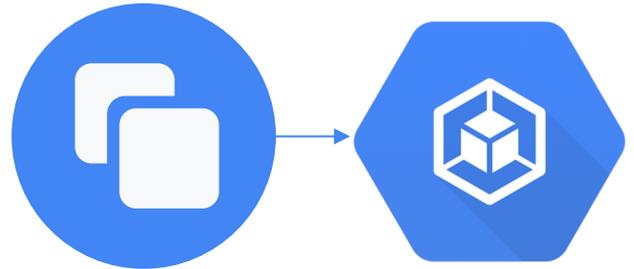
Anthos Migrate

Migrate VMs as-is or upgrade to containers

Negligible app downtime
(often < 10 minutes)

Built-in pre-migration testing and post-migration rollback options

Cloud instance rightsizing



KeyBank



“Put simply, Anthos provides us the **security we need**, the **portability we want**, and the **productivity that our developers crave**”

Keith Silvestri

Chief Technology Officer



Google Compute Engine

Compute power

- Up to 416 vCPUs
- Up to 12TB RAM

Compute Optimized VMs

- Fast Clocks - 3.8 GHz
- Up to 60 vCPU, 240GB RAM
- vNUMA exposure

Easy to manage

- Flexible configuration
- Managed Instance Groups
- Deployment Manager scripts
- Powerful APIs

Cost-effective computing

- Preemptible VMs
- Custom Machine Types
- Rightsizing Recommendations
- Auto-scaling HPC clusters

GPUs

- NVIDIA K80, P100, V100
- NVIDIA P4/T4
- Up to 8 GPUs per VM via PCIe x16

