Cloud Computing

> The entire history of software engineering is that of the rise in levels of abstraction.

-- Grady Booch

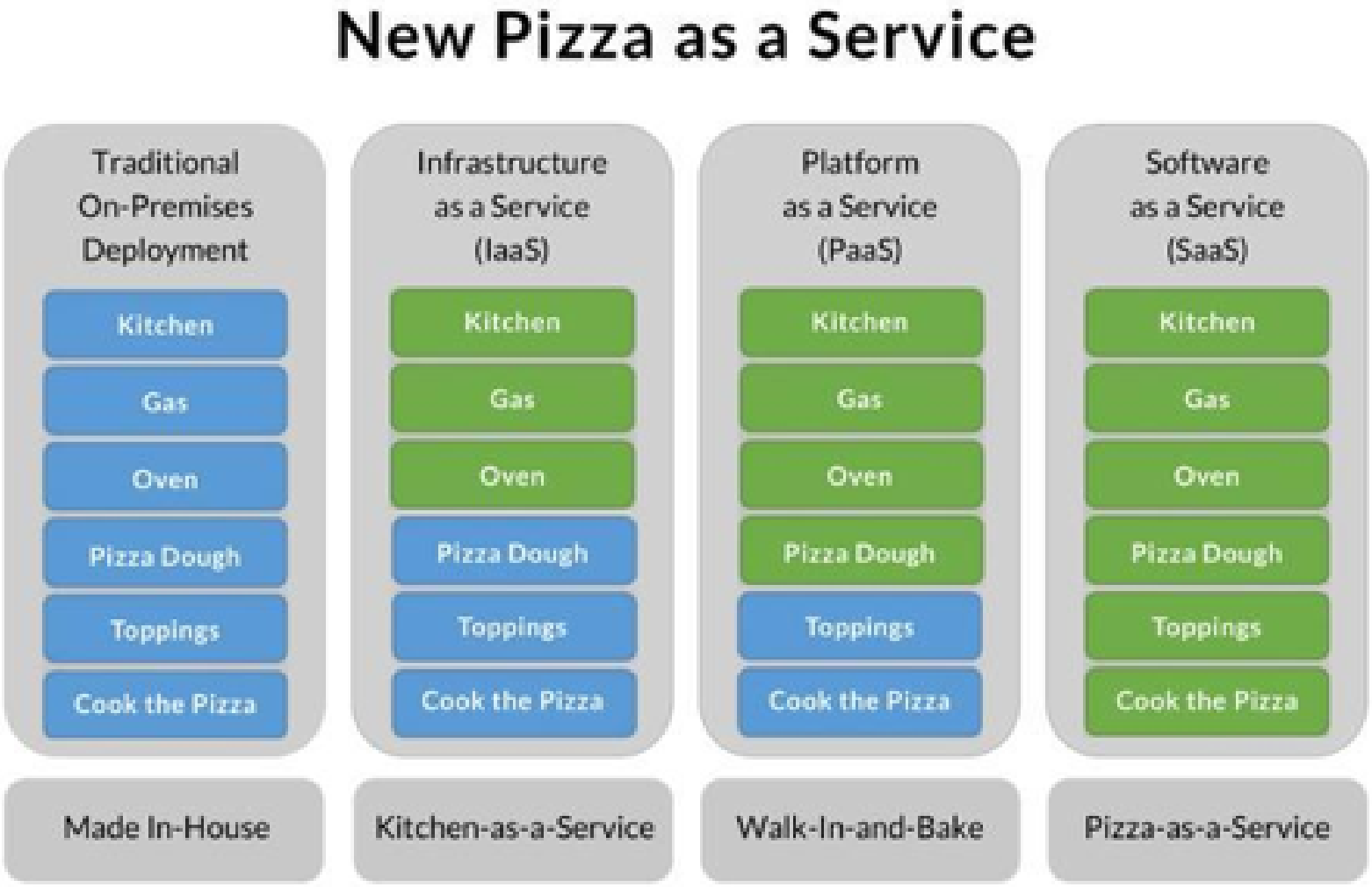
> Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

https://csrc.nist.gov/pubs/sp/800/145/final

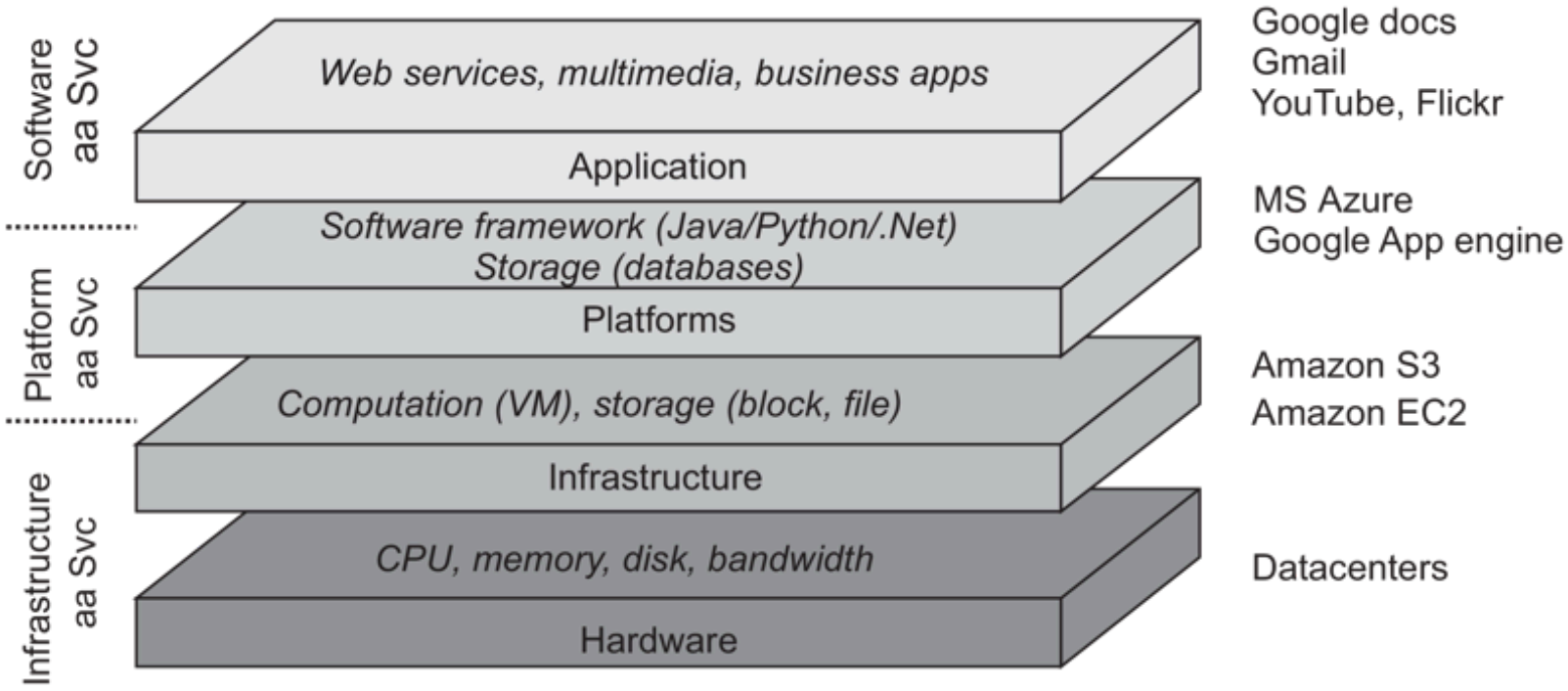
Essential Characteristics:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Service Models

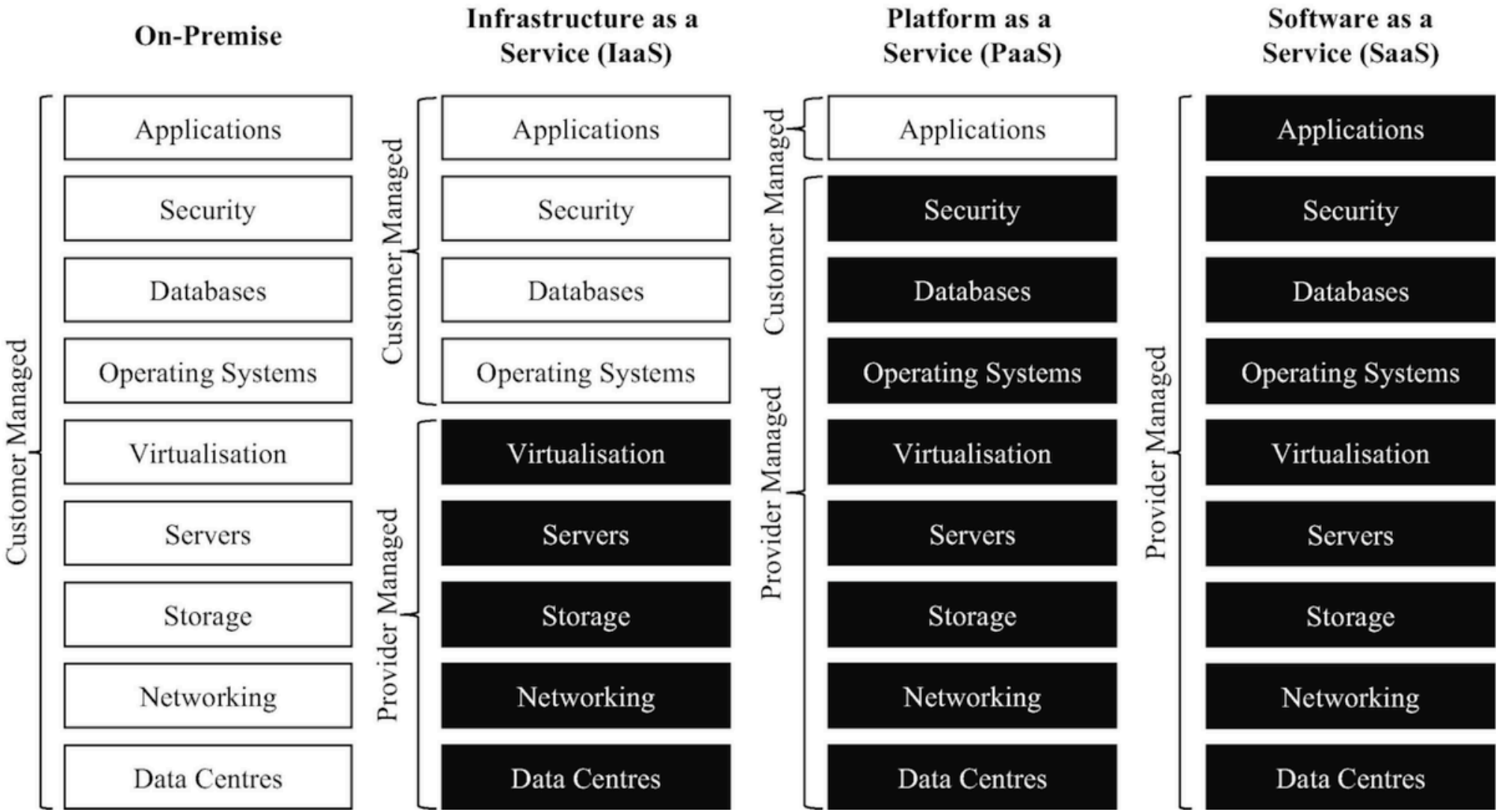


- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)



(VanSteen, 2017, S. 30)

XaaS


On-Premise
Infrastructure as a Service (IaaS)
Platform as a Service (PaaS)
Software as a Service (SaaS)
Customer Managed
Provider Managed
Applications
Security
Databases
Operating Systems
Virtualisation
Servers
Storage
Networking
Data Centres

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Low Cost                                                  High Cost
=========================================================================
FARM      WHOLESALER      GROCERY      RESTAURANT      DOORDASH
BUILD     CO-LOCATION     HETZNER      AWS             VERCEL
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https://news.ycombinator.com/item?id=45614922#45616049

Deployment Models

- Private cloud
- Community cloud
- Public cloud
- Hybrid cloud

Cloud Native Applications

- A "cloud native" application has adapted and evolved to be maximally efficient in its environment: the cloud.
- The cloud is a harsher environment than the idealistic environment of a dedicated single node system.
- In the cloud, an application becomes distributed.
- It is forced to be resilient to hardware/network unpredictability and unreliability.

(vgl. https://www.reactiveprinciples.org/cloud-native/index.html)

- Ensuring responsiveness and reliability in this environment is difficult.
- The applications we build after embracing this environment better match how the real world actually works.
- This provides better experiences for our users, whether humans or software.

(vgl. https://www.reactiveprinciples.org/cloud-native/index.html)

The constraints of the cloud environment include:

- Applications are limited in the ability to scale vertically on commodity hardware.
- All inter-service communication takes place over unreliable networks.
- You must operate under the assumption that the underlying hardware can fail or be restarted or moved at any time.
- The services need to be able to detect and manage failure of their peers—including partial failures.
- Strong consistency and transactions are expensive. Because of the coordination required, it is difficult to make services that manage data available, performant, and scalable.

Therefore, a Cloud Native application is designed to leverage the cloud operating model.

It is predictable, decoupled from the infrastructure, right-sized for capacity, and enables tight collaboration between development and operations.

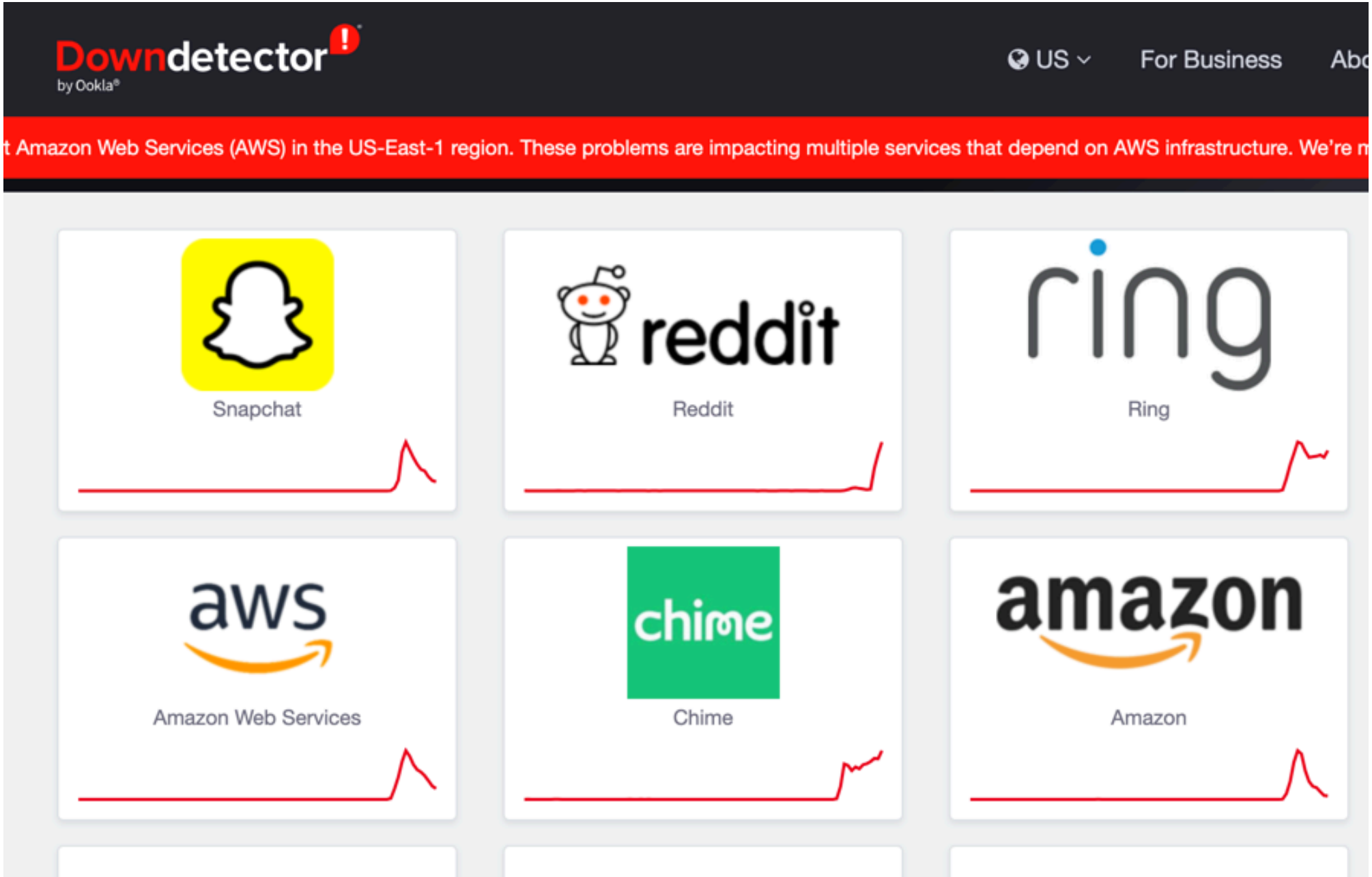
It can be decomposed into loosely-coupled, independently-operating services that are resilient from failures, driven by data, and operate intelligently across geographic regions.

While Cloud Native applications always have a clean separation of state and compute, there are two major classes of Cloud Native applications: stateful and stateless.

Each class addresses and excels in a different set of use-cases; non-trivial modern Cloud Native applications are usually a combination and composition of the two.

Chancen

Risiken und Herausforderungen


Downdetector
by Ookla®
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