# CS 436
# Cloud Computing

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# About the instructor

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Research Interests: Edge Computing, Telecommunication Systems, IoT, Industry 4.0, 5G Systems, 6G and beyond, Cloud Computing, Applied Machine Learning, Computer Game Engines.

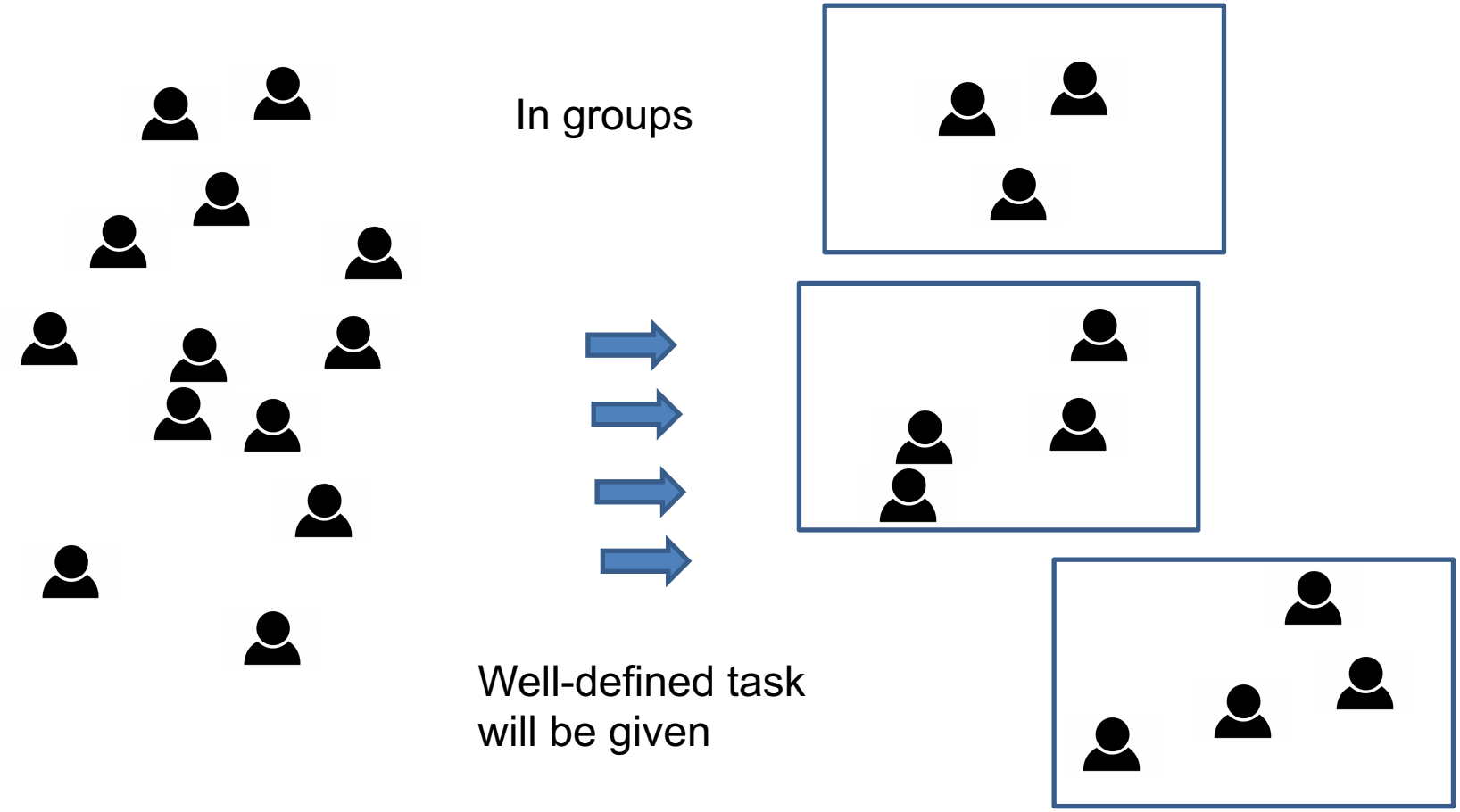
# About the course

Lecture Hours: Thursdays (13:40 – 16:30)

Grading:
Term Project & Assignments -> 20%
Quizzes & in-class work -> 15%
Midterm -> 25%
Final Exam -> 40%

Attendance Policy:
Students must attend 80% of the in-class assessments

# In Class Work



# Practical Work Involved

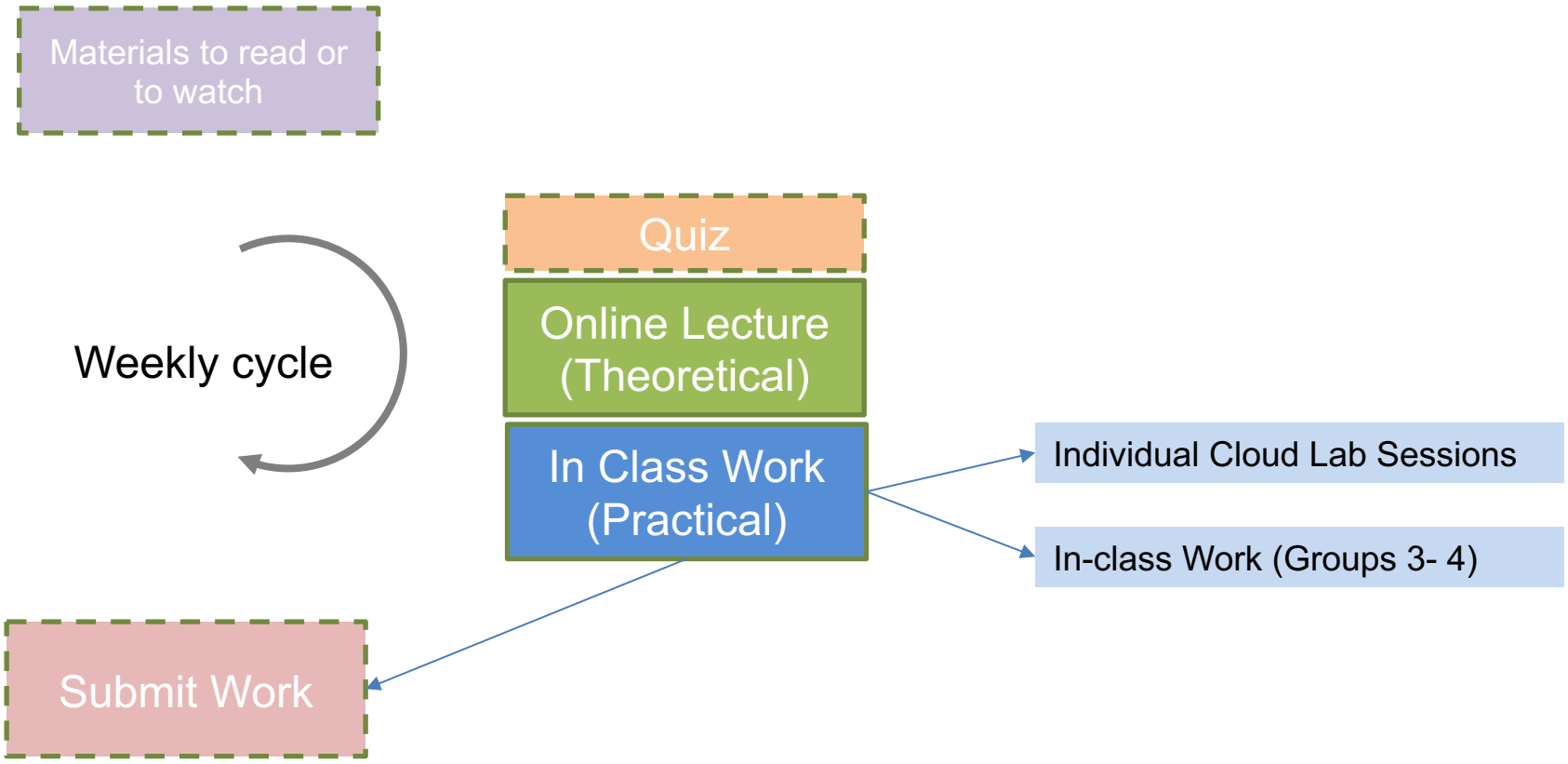



On your computer
(Standalone)

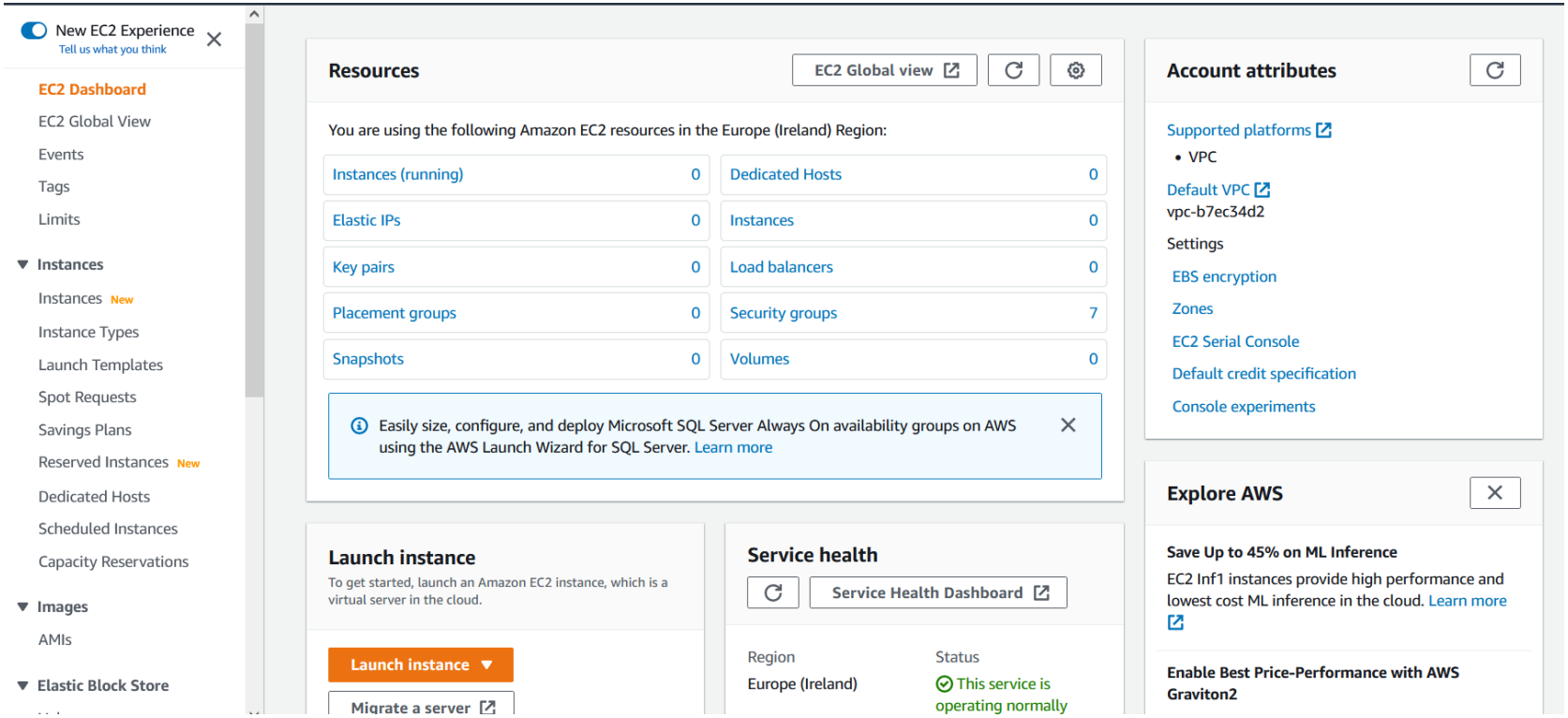
On the cloud –
Web based dashboards

Warm up with Linux-Ubuntu if not used before !

# Typical Flow of the Course



# Aim of this course

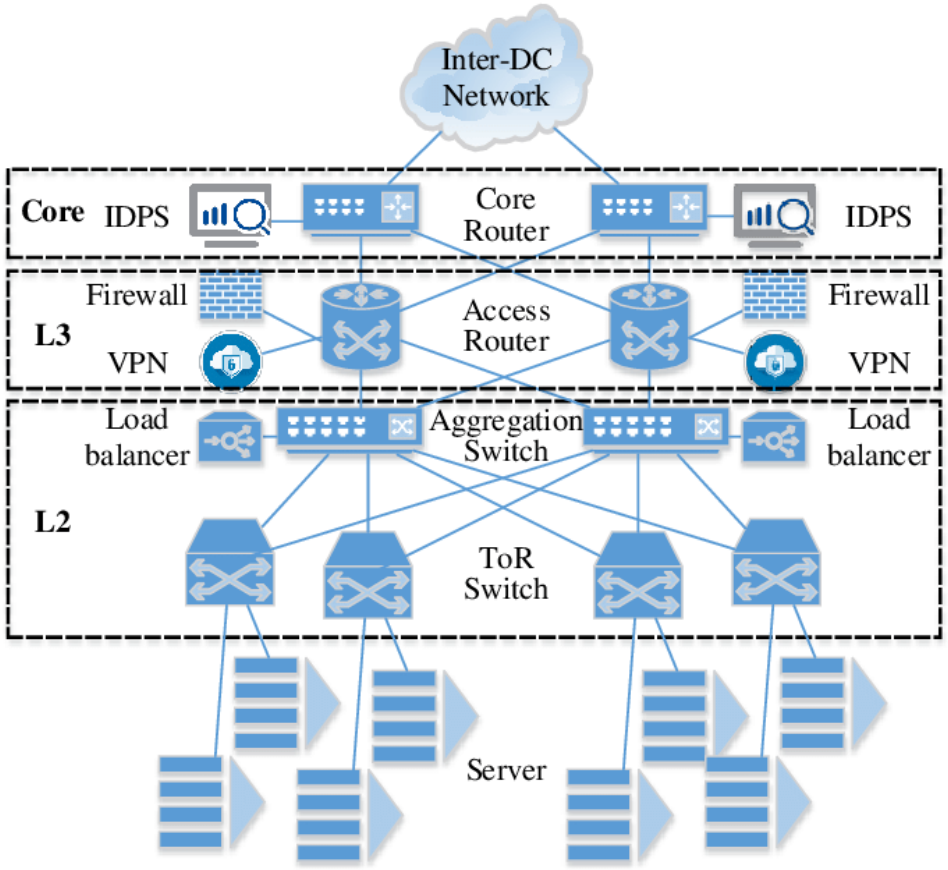


# VERY IMPORTANT

BUDGET ALARM !

***Never*** operate on AWS, GCP, AZURE without first turning on Budget Alarm.

# Aim of this course




Ref: Liu, Y., Ren, G., Wu, J., Zhang, S., He, L., & Jia, Y. (2015). Building an IPv6 address generation and traceback system with NIDTGA in Address Driven Network. *Science China Information Sciences*, *58*(12), 1-14.

# One last word: Vendor Independence

Concepts on which Cloud Computing Systems operate are **same** everywhere: AWS, GCP, Azure, IBM, DigitalOcean ….

Virtualization

Datacenter

VM

Container

However, when you engineer a solution, you need to know the tools, jargon and approach of a vendor.
**This course does not endorse any vendor !**, but names and brands of them will be unavoidably all over the slides.

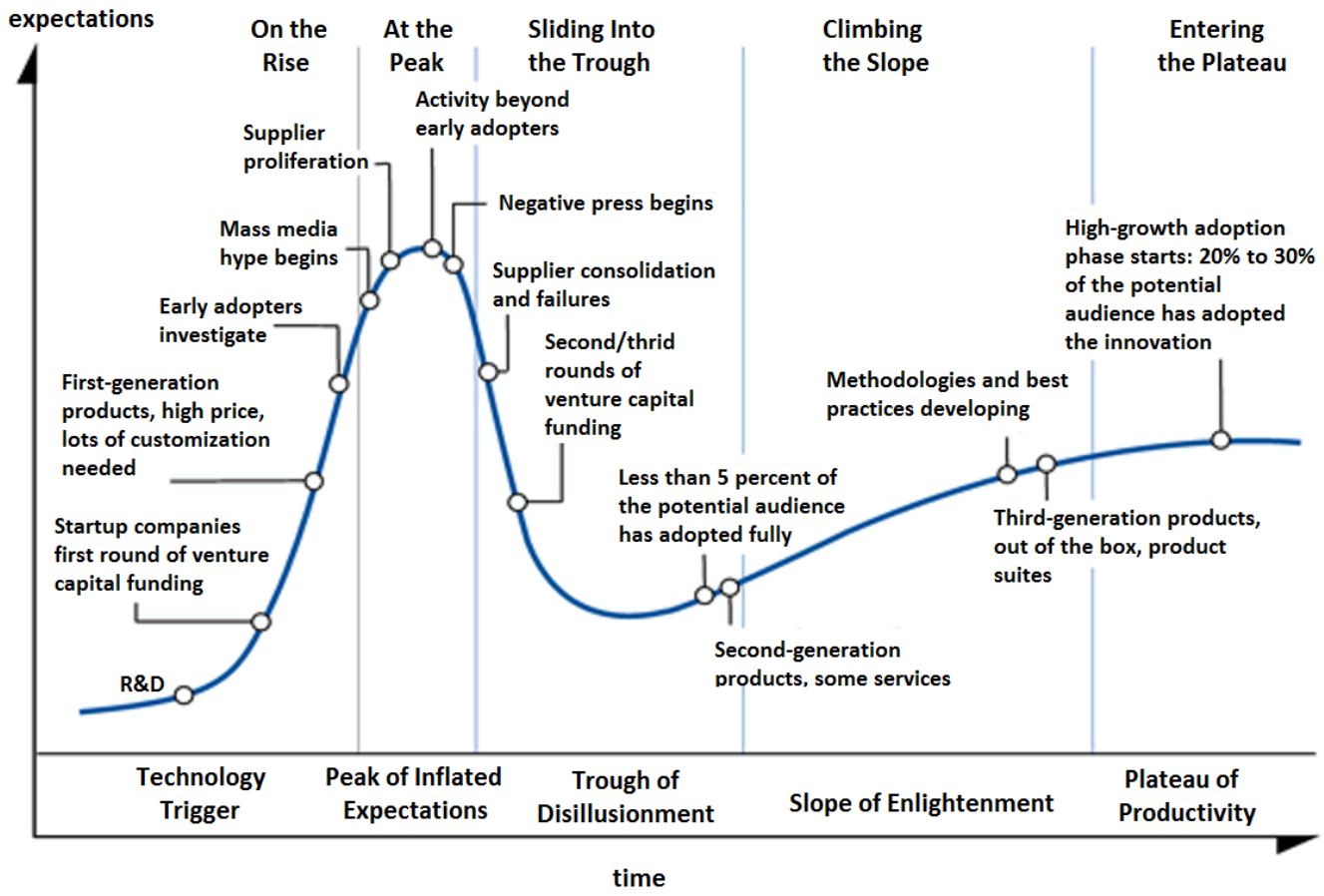
**Aim: (i)** to give strong understanding of the principles of Cloud Systems,
**(ii)** Enable enough acquaintance on how certain services operate on real world CSPs.

# Now, the course begins!

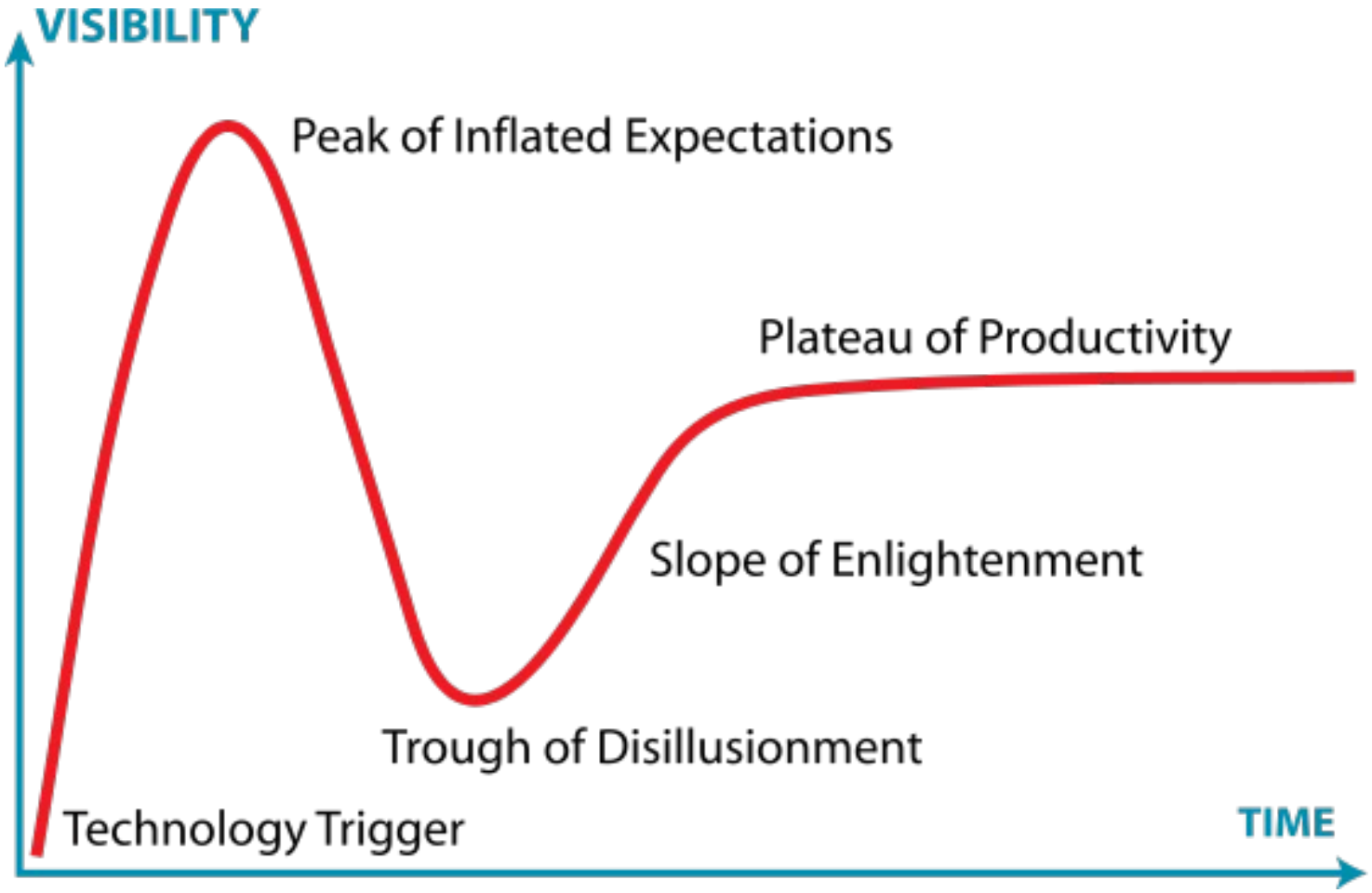
# One Slide Summary

# Hype Cycle

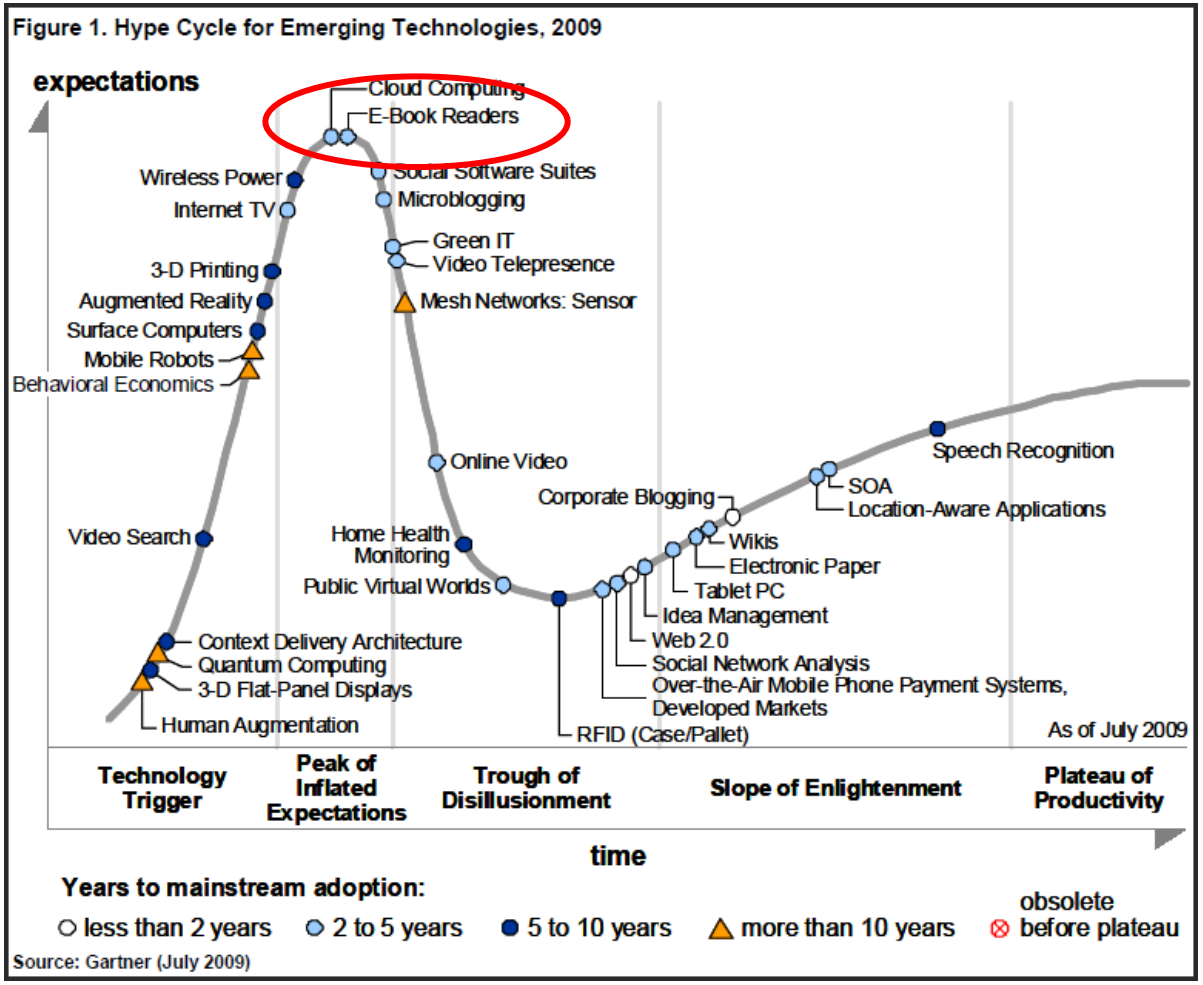
*(Teknoloji Balonu Çevrimi)*



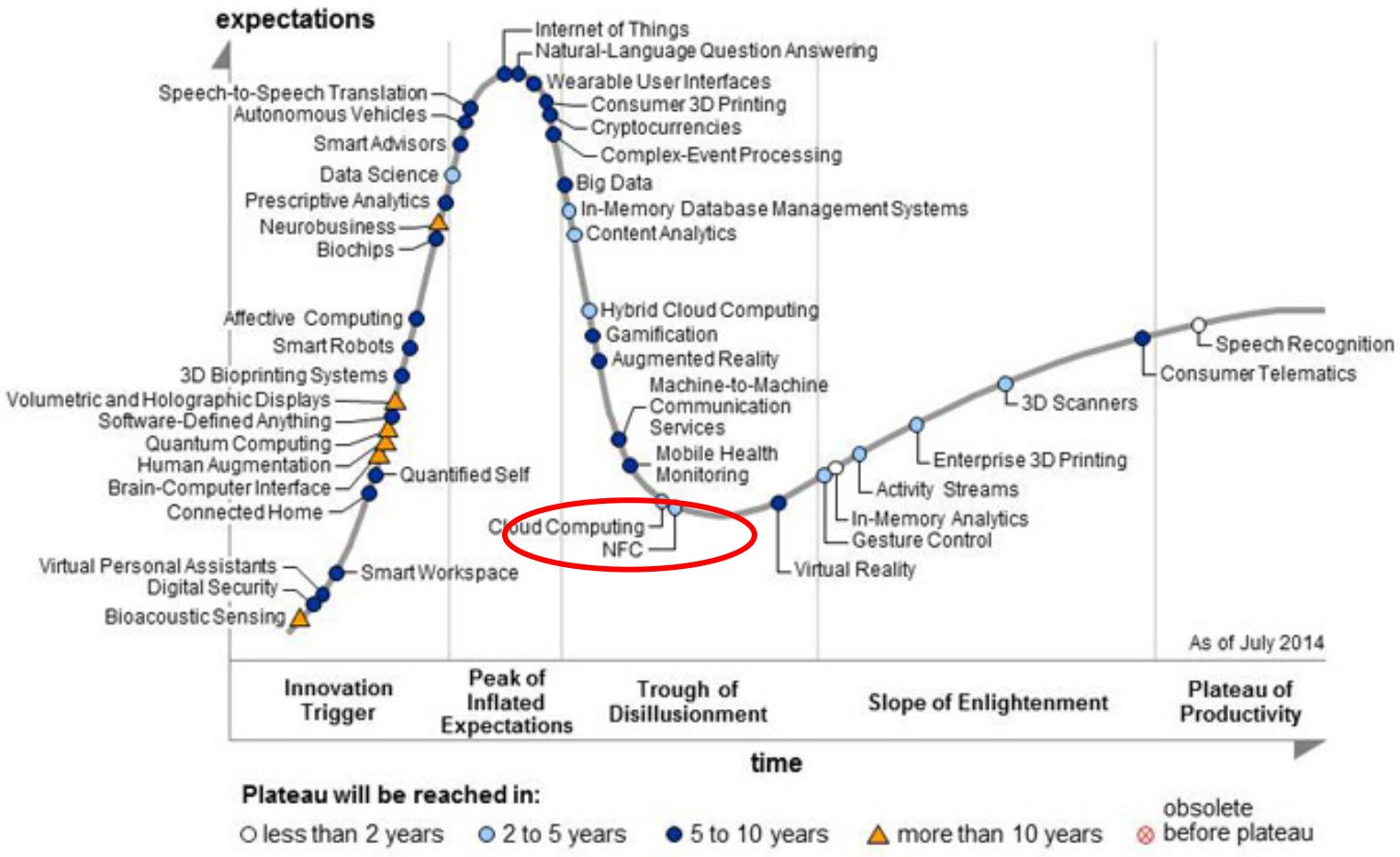
# “Hype Cycle” Özü



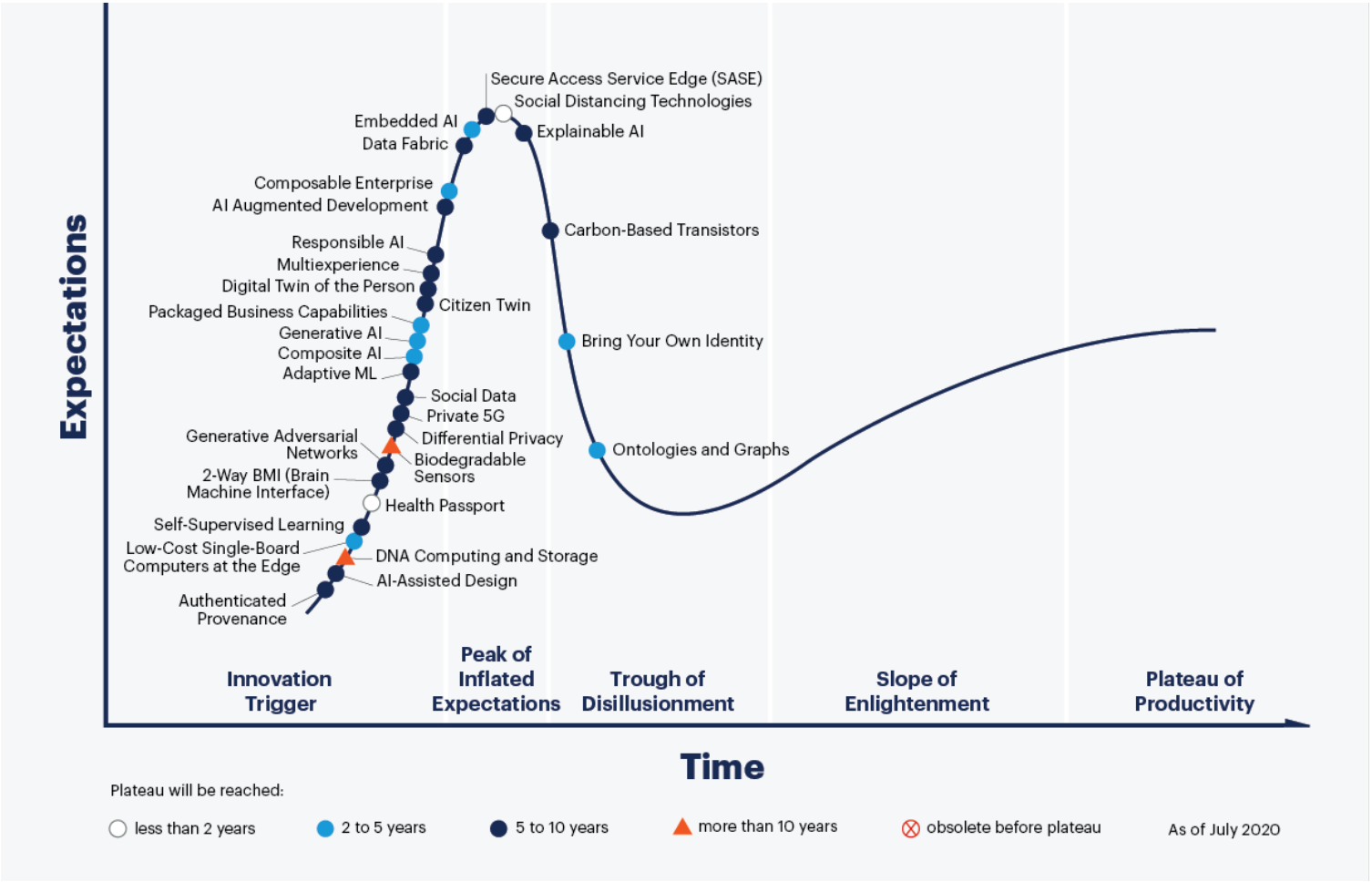
# Gartner Hype Cycle 2009



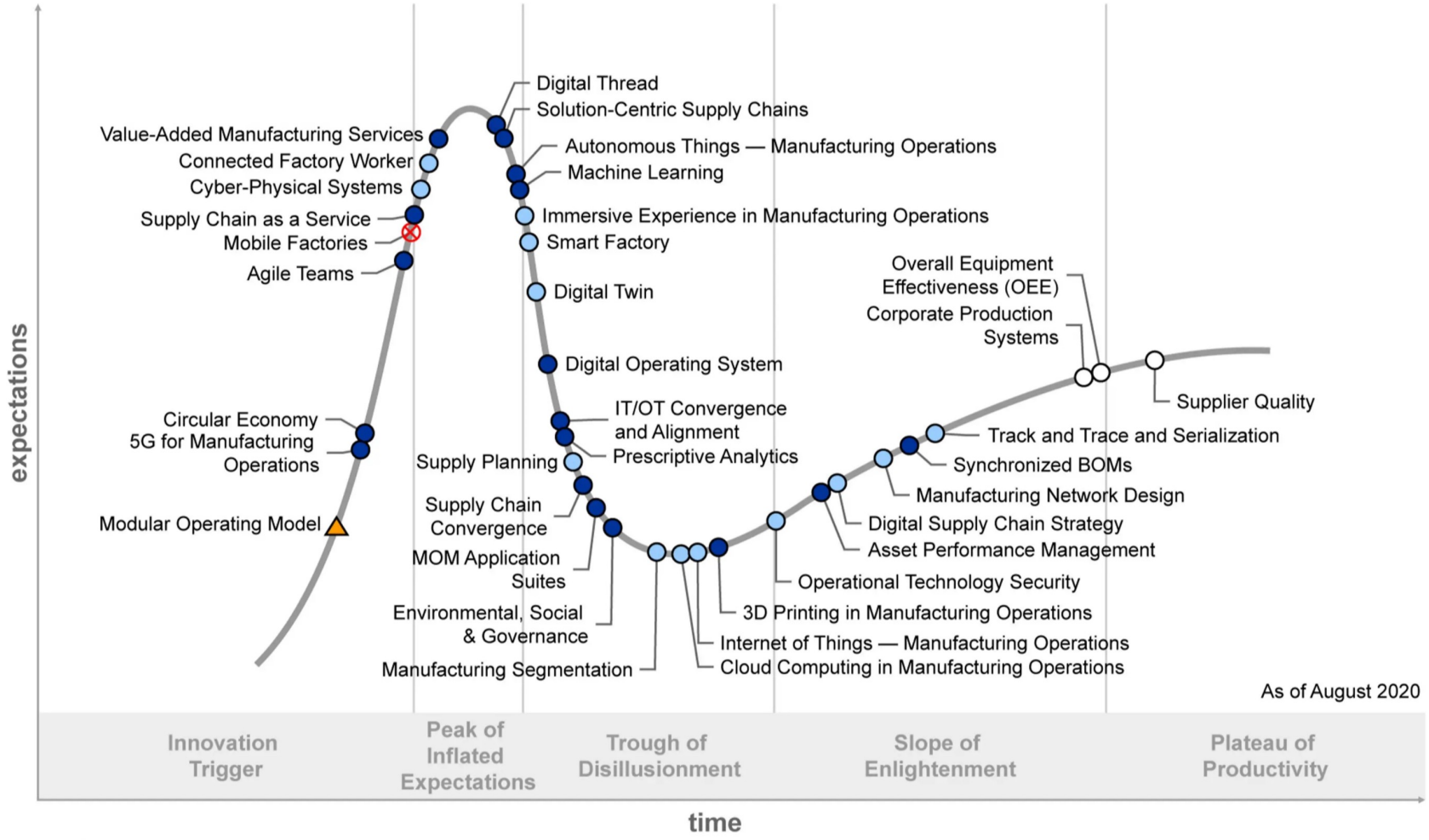
# Gartner Hype Cycle 2014



# Hype Cycle, Emerging Technologies 2020



# Hype Cycle for Manufacturing Operations Strategy, 2020




Source: Gartner
ID: 450325

# Bulut Bilişim Tanımı

*(Cloud Computing Definition)*

NIST (ABD Ulusal Standartlar ve Teknoloji Enstitüsü) Tanımı

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.

Bulut bilişim, düşük yönetim çabası veya servis sağlayıcı etkileşimi ile, hızlı alınıp salıverilebilen ayarlanabilir bilişim kaynaklarının paylaşılır havuzuna, istendiğinde ve uygun bir şekilde ağ erişimi sağlayan bir modeldir.

Türkçe çevrimi Yakup Korkmaz

# Temel Özellikler

*(Essential Characteristics)*

*On-demand self-service.* A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

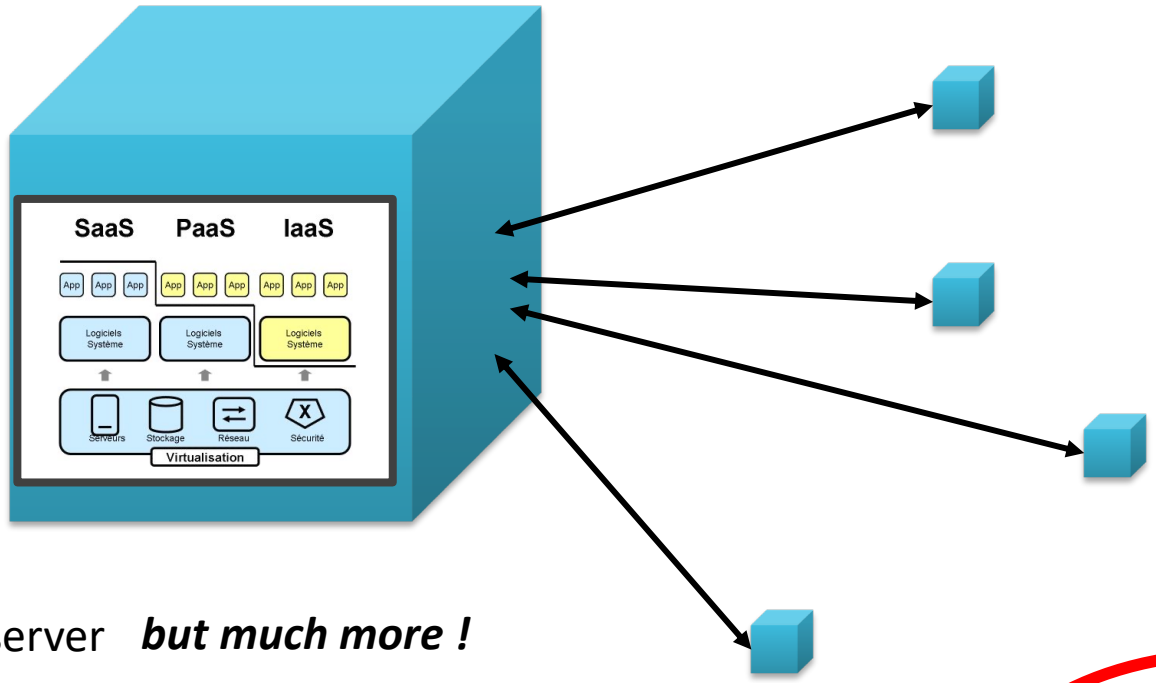
*Broad network access.* Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).

*Resource pooling.* The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, and network bandwidth.

*Rapid elasticity.* Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

*Measured service.* Cloud systems automatically control and optimize resource use by leveraging a metering capability[1] at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

# Understanding Cloud Computing




Resembles client-server ***but much more !***

Virtualization

Change usage dynamically on customer demand. Dynamicaly allocate-deallocate resources

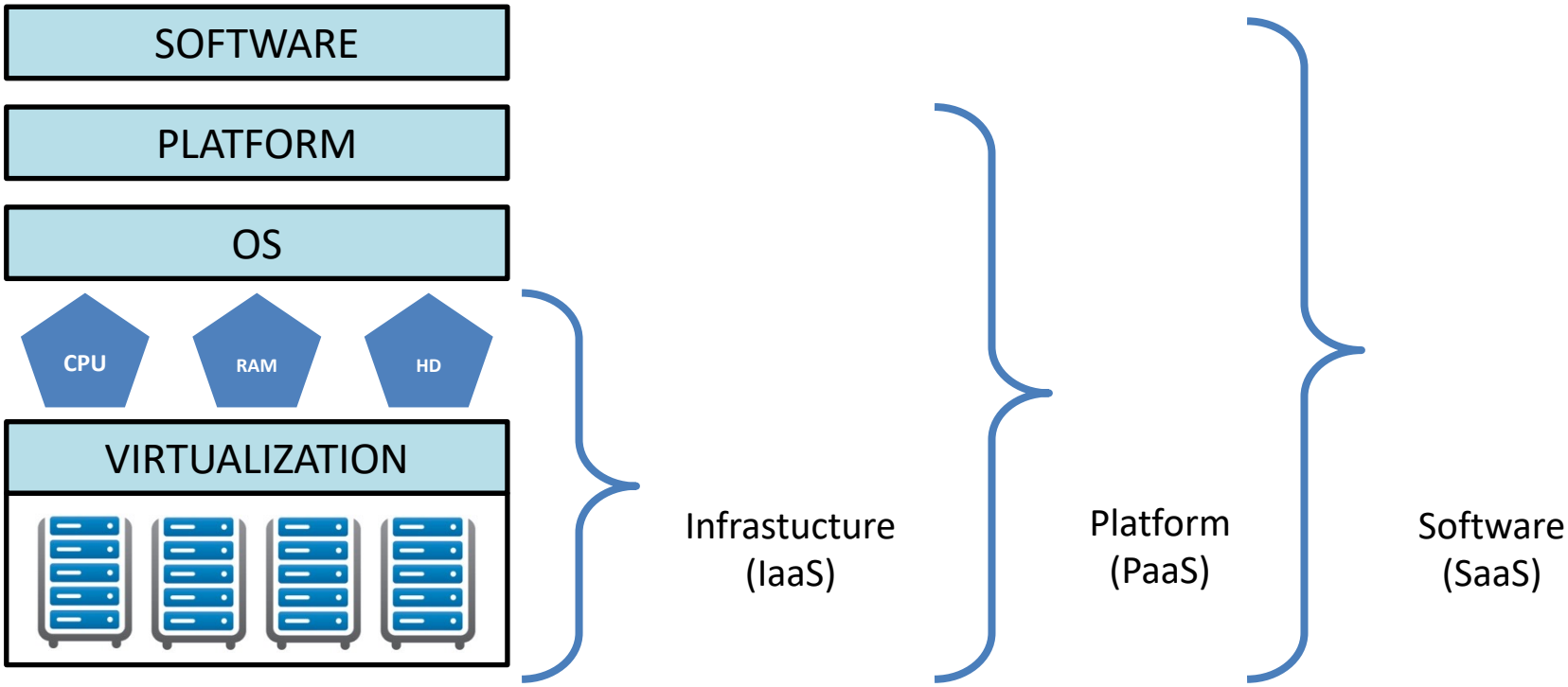
Elastic

On-demand

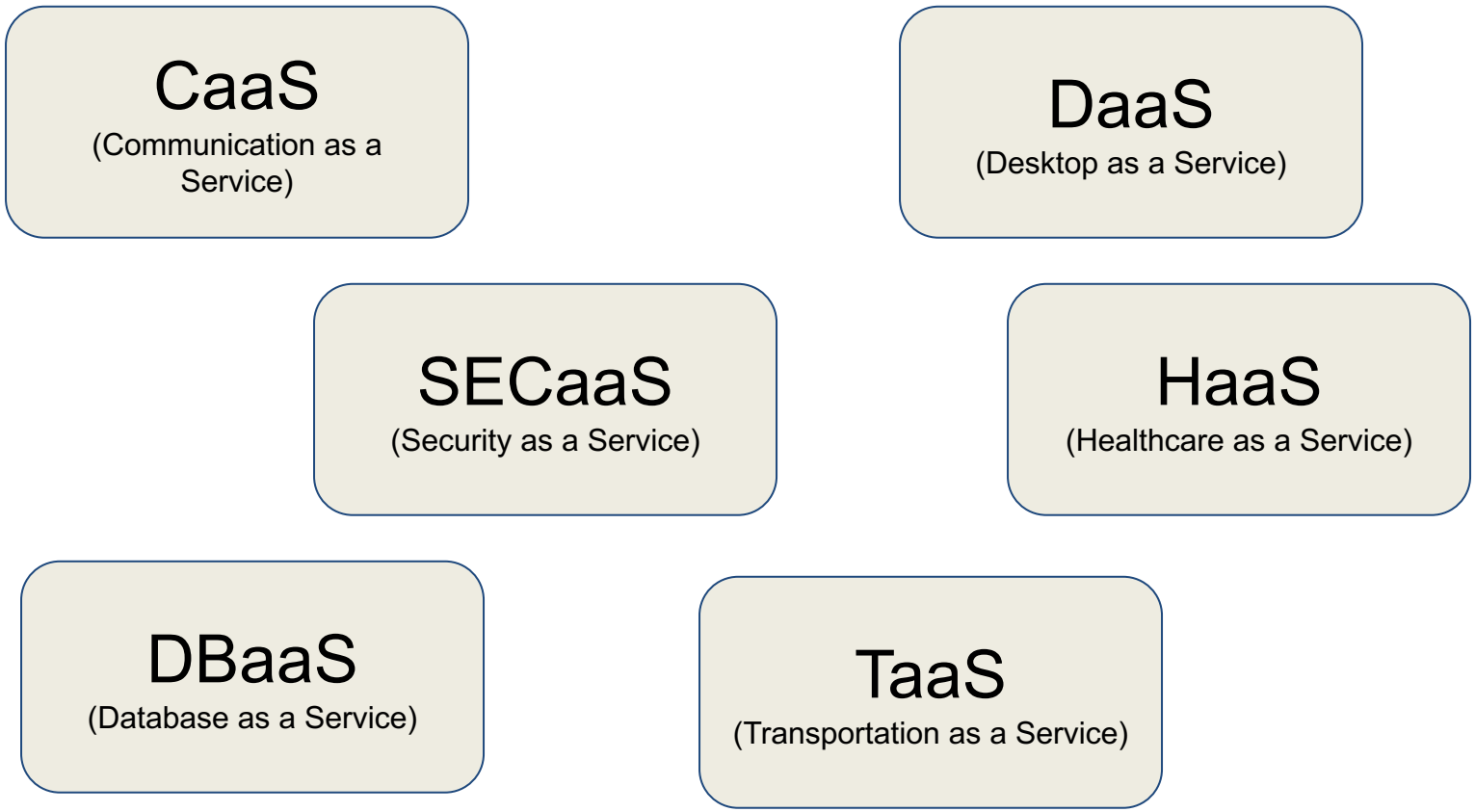
Computation becomes a utility that you consume as much as you like (money, money, money)

# Cloud Computing Service Models

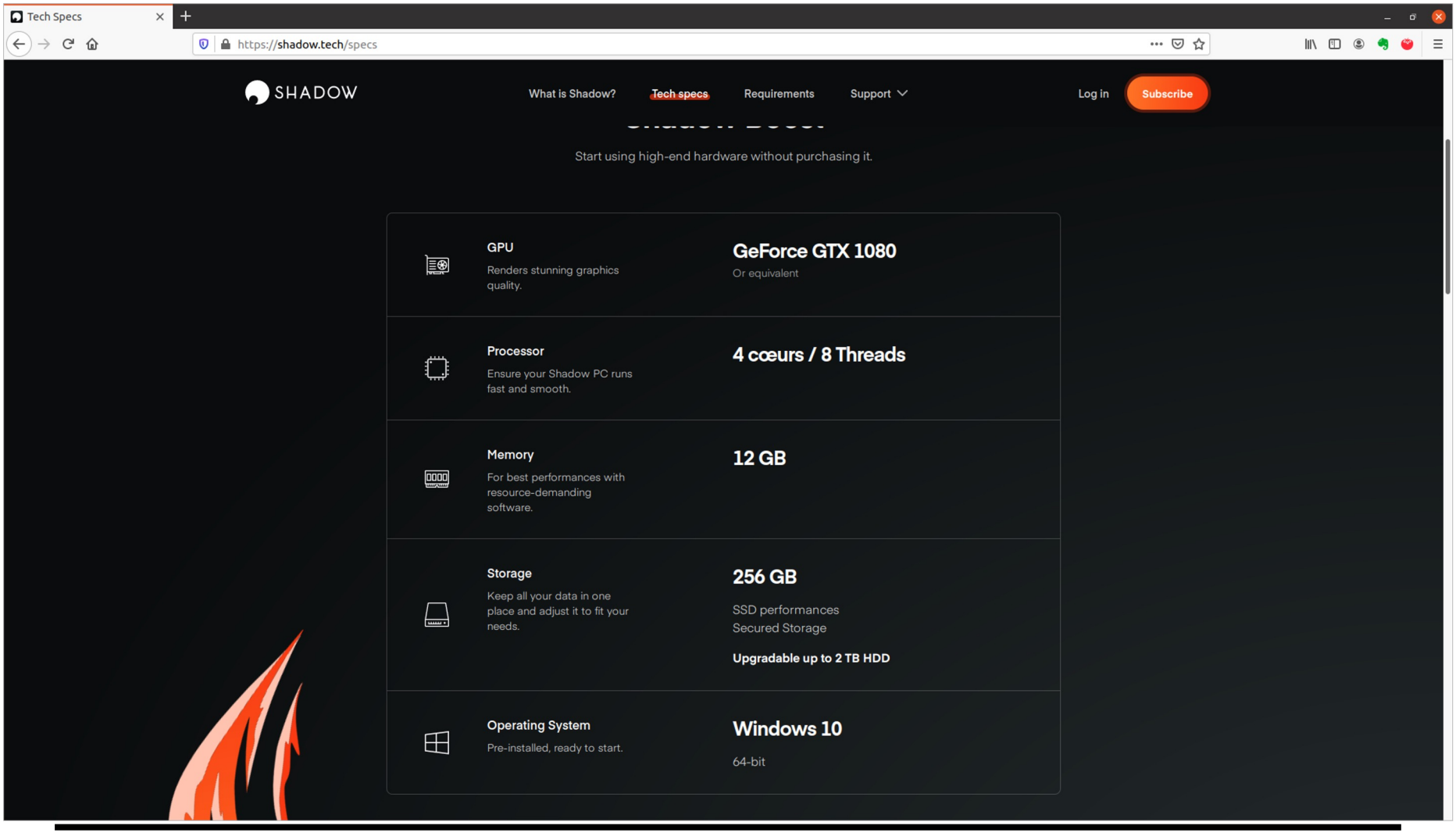
In what forms can I buy this utility (computing) ?



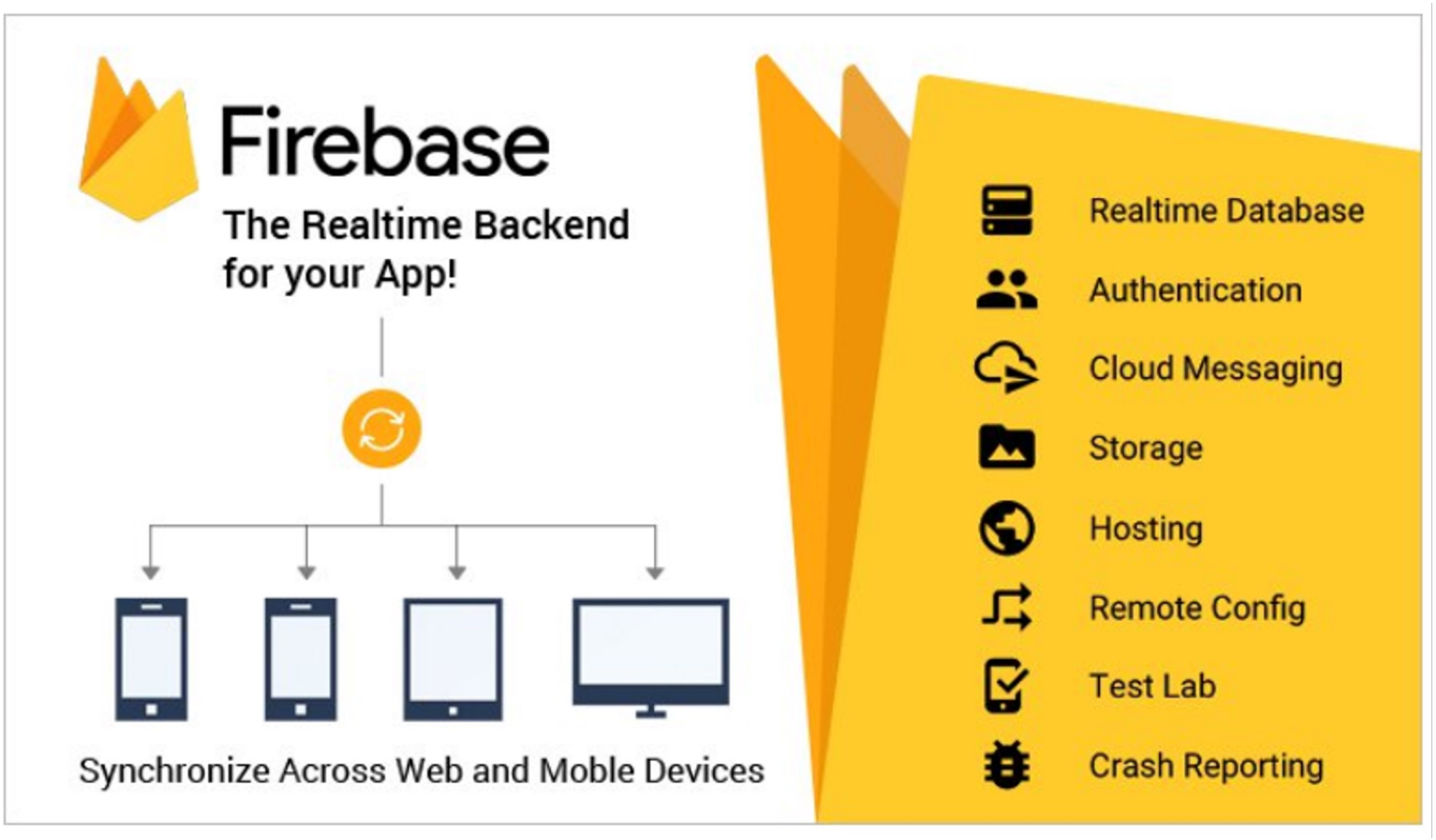
# XaaS Anything as a Service



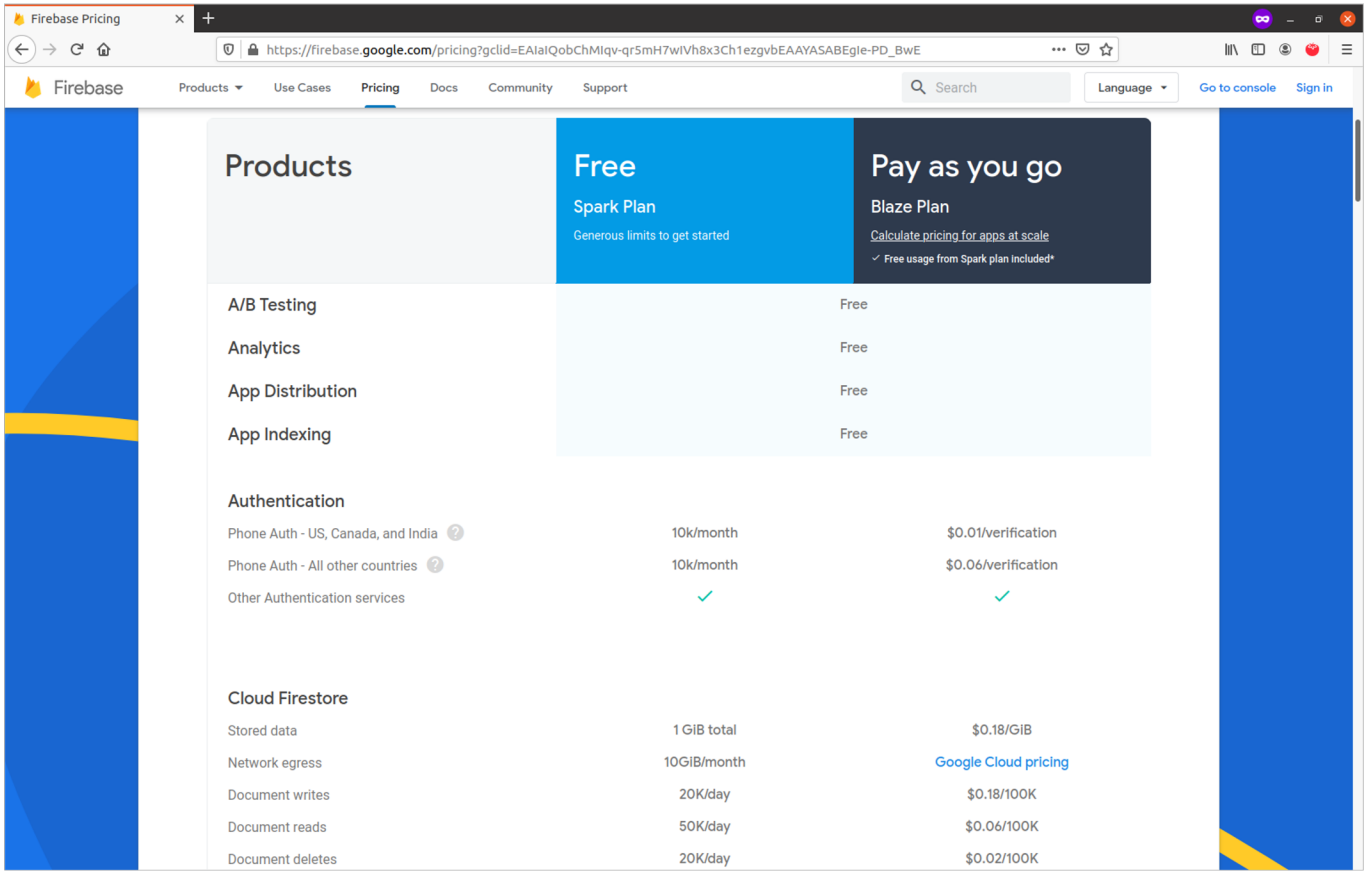
# Game Desktop as a Service



# Backend as a Service



# Firebase Pricing




https://firebase.google.com/pricing