

# The Software Industry

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**COSS B01**

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# Agenda

1. Definition (software)
2. The software industry
3. A (very) short history
4. The main players
5. Software products
6. Software platforms
7. Software ecosystems

# 1. What is Software?

# Software Definition

- Software (technical definition)
  - Is a set of instructions to make computers act
  - Comes in equivalent forms (source, binary)
  - Is formed into components and programs
  - Programs can be built from components
- Software (economic definition)
  - Is a digital good that can be sold



# Software as a Product

- **A Product**
  - Is a man-made artifact sold to customers in a market
  - Has a life-cycle
    - Is born,
    - Grows and matures,
    - Eventually dies
- **A software product** is a product that
  - Is intellectual property
  - Is non-physical, does not rot
  - Has near-zero copying costs
  - Is extremely malleable

## 2. The Software Industry

# The Software Industry

- The software industry
  - Is the set of business that provide
    - Software products and
    - Software services such as
      - Operating services
      - Consulting services
        - Development services
        - Implementation services
  - to other industries as well as itself
- The software industry
  - Is highly concentrated
  - Is highly internationalized
  - Has strong network effects
  - Has a high speed of innovation
  - Is rapidly expanding into new domains



# The Software Industry in 2016 [1]

market capitalization	total	\$1.298 trillion
	median	\$744.2 million
	highest	\$415.4 billion (Microsoft)
	lowest	\$177700 (Innovaro Inc.)
earnings per share	median	\$0.20
	highest	\$13.23 per year (IBM)
	lowest	– \$3.40 per year (Wave)
dividend yield	mean	8.913%
	highest	170.3% (Aware)
	lowest	0.07106% (FICO)

[1] <https://www.wolframalpha.com/input/?i=how+big+is+the+software+industry>

**“Software is eating the world”**  
**Wall Street Journal**  
**2020-08-20**



## The CEO Interview

“Industrial companies are in the information business whether they want to be or not.”

—Jeff Immelt

McKinsey&Company



# Change and Innovation at the Speed of Software

- Products increasingly include software components
  - Hardware components traditionally have long innovation cycles
  - Software has a significantly faster innovation cycle
  - Innovation speed is continuously increasing
- Products are being adapted to take advantage of software
  - Products can be reconfigured at speed of software
  - Products evolve at speed of software innovation
- Examples increased innovation speed
  - Cars are fully delivered with features switched off
  - Cars evolve at speed of over-the-air update
- Software is eating established industries and products

# Societal Significance of Software and Software Systems

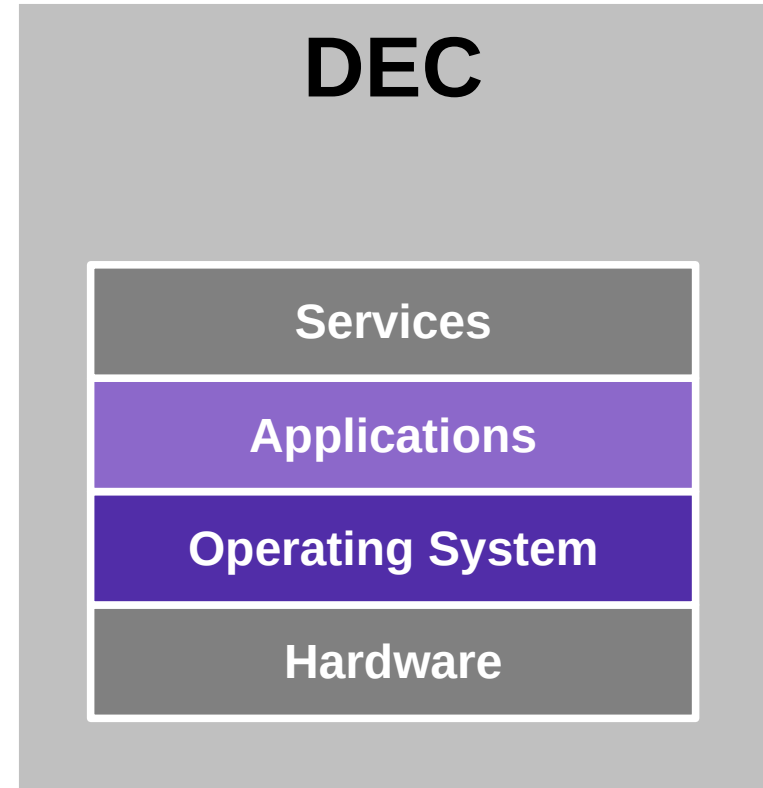
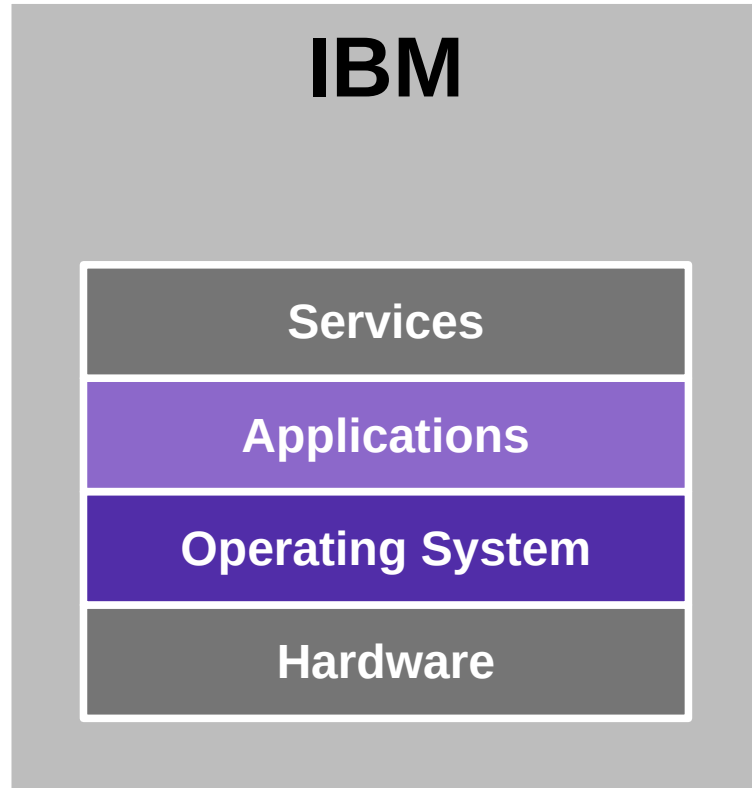
- Software and software systems are changing society
  - Empowerment vs. stratification
  - Enlightenment vs. misinformation
  - Sociability vs. isolation
- Internet and email have become basic utilities

### **3. A (Very) Short History**

# Short History of the Software Industry

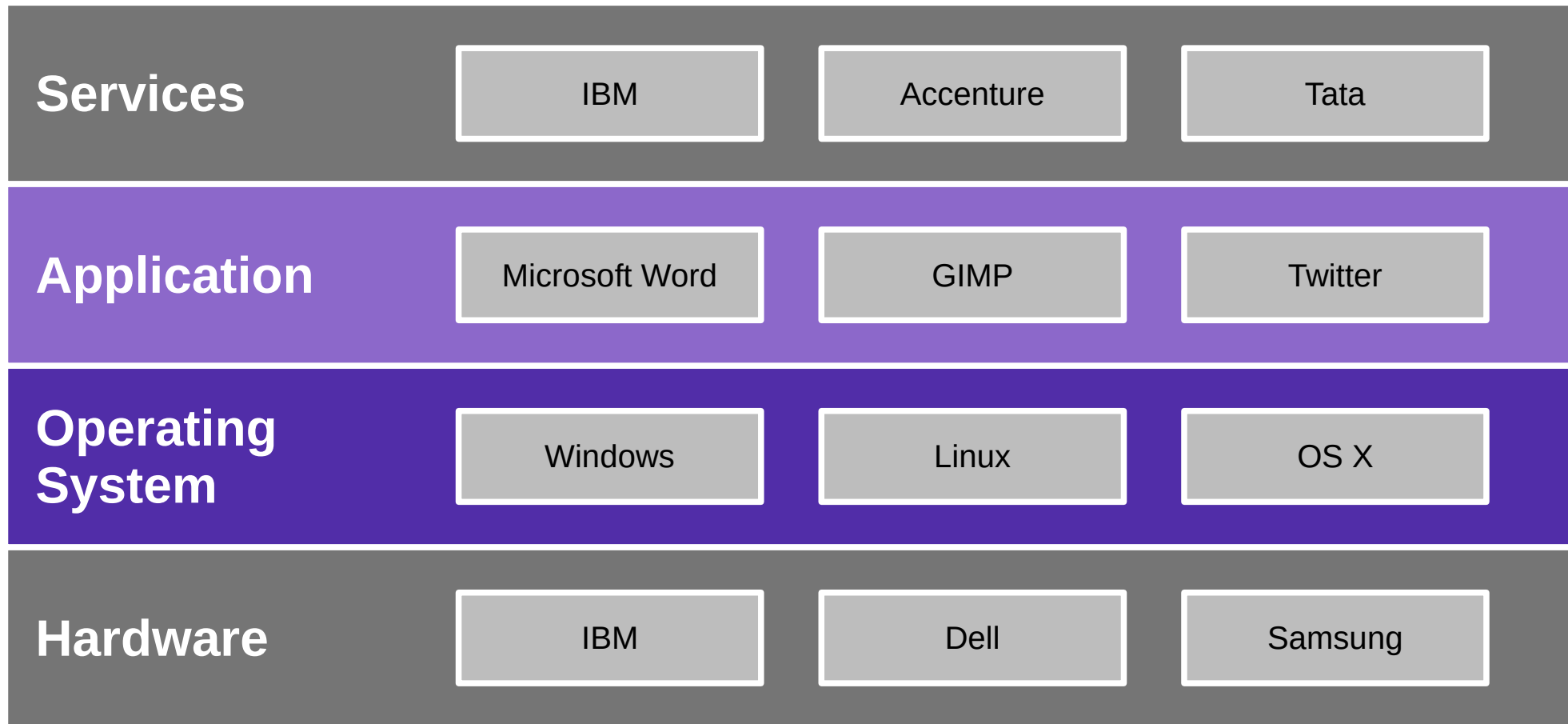
- 1959
  - First mentioning of term “software”
- 1969
  - US Dept. of Justice separates hard- from software in landmark decision
- 1980ties
  - From vertical to horizontal integration; growth of platforms and ecosystems
- 1990ties
  - Centralization, dominance of Windows
- 2000ties
  - Diversification, multiple platforms; growth of open source software
- 2010ties
  - Back to vertical integration in the form of cloud computing

# Vertical Integration (Until 1980ties)

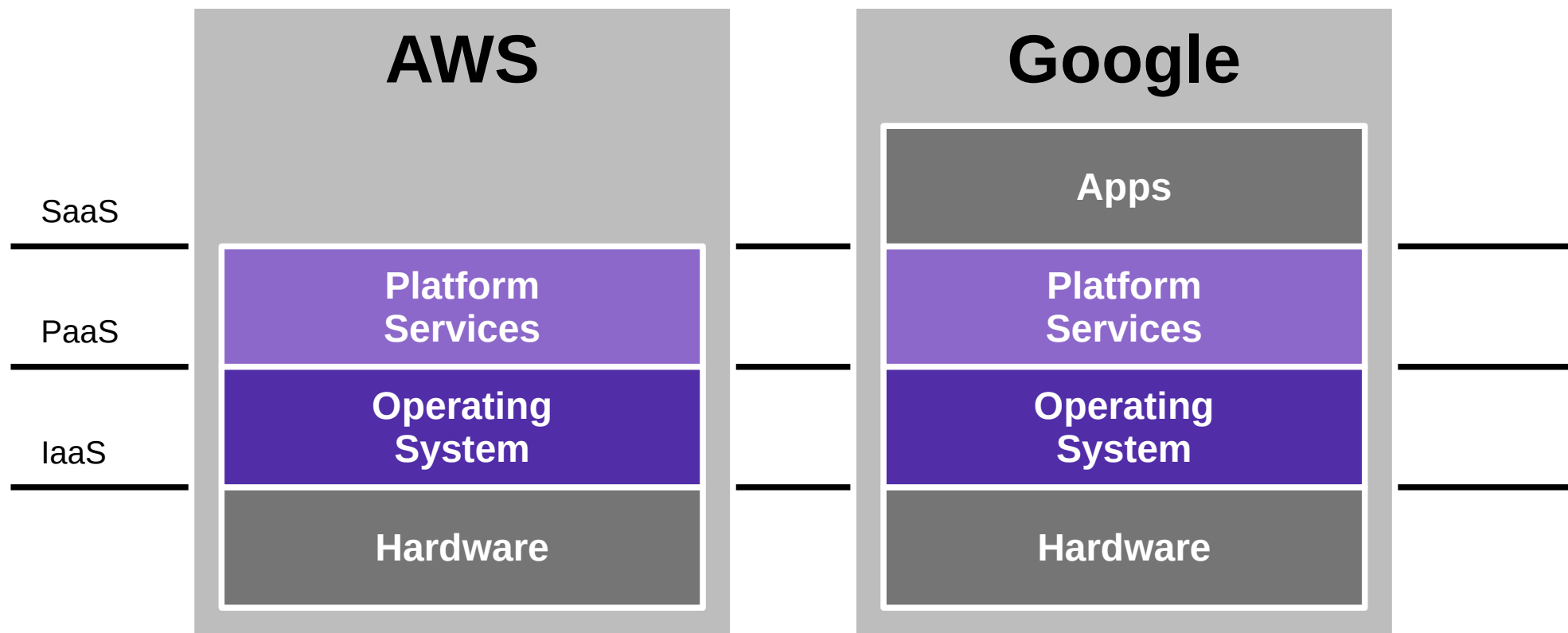


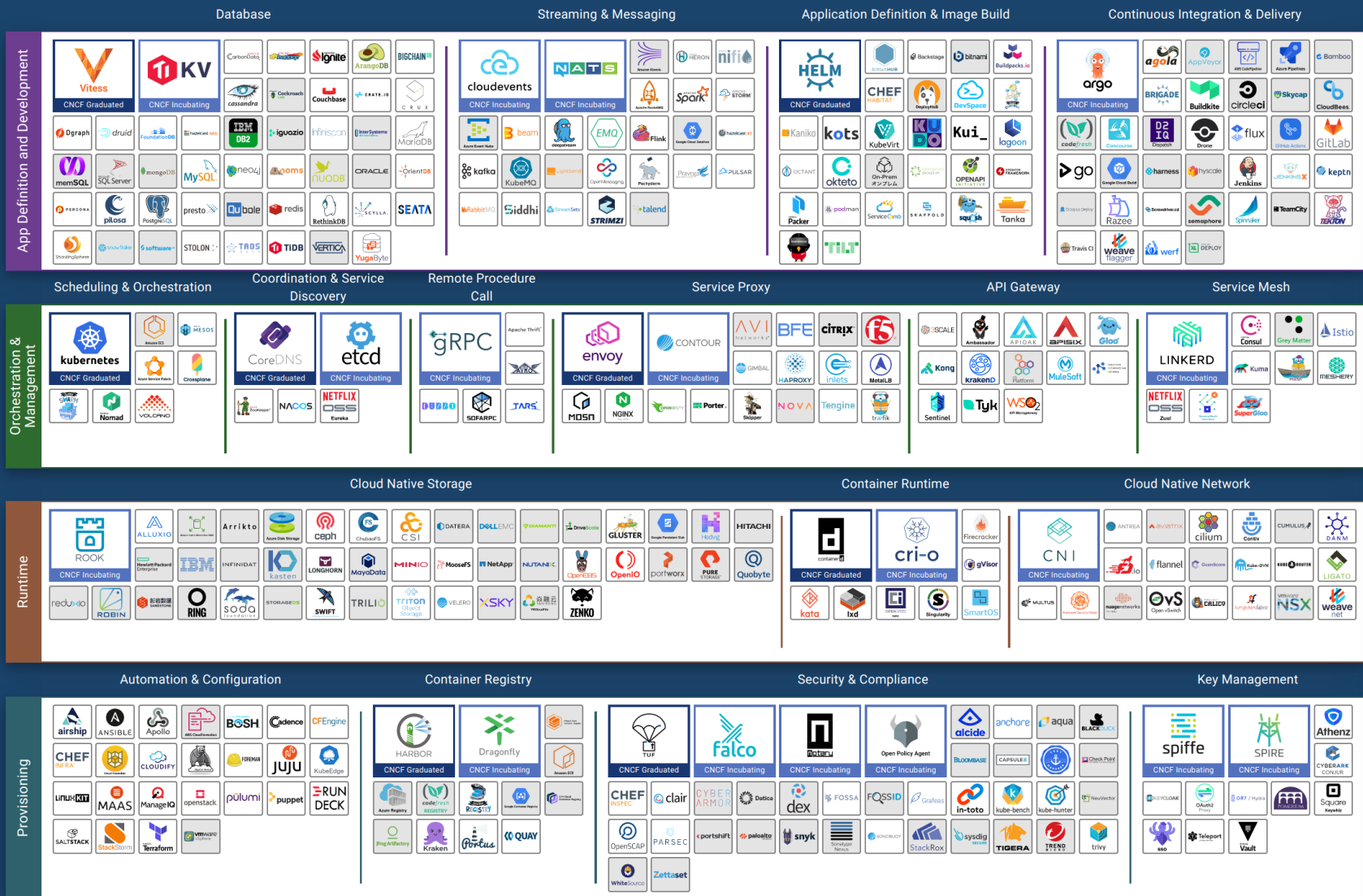


# Horizontal Integration (Since 1990ties)

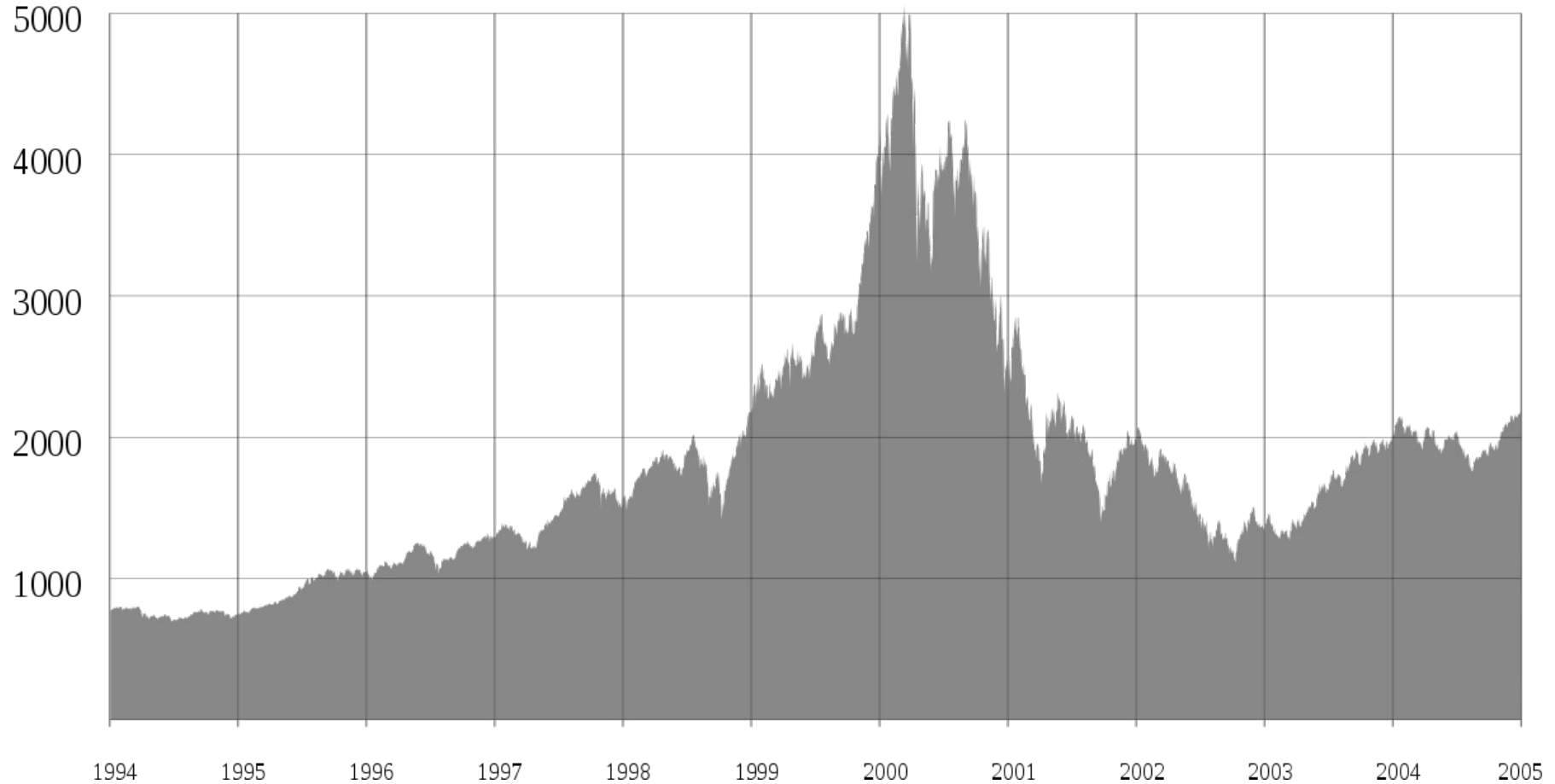


# Cloud Computing (Since 2000ties)





# The So-called “Dot-Com” Bubble and Burst (1995-2000)



[1] See [https://en.wikipedia.org/wiki/File:Nasdaq\\_Composite\\_dot-com\\_bubble.svg](https://en.wikipedia.org/wiki/File:Nasdaq_Composite_dot-com_bubble.svg)

## 4. The Main Players

# The Main Types of Industry Players

- Standard product providers
  - (Independent) software vendors (ISVs)
    - Produce software products (“standard software” or “commercial off-the-shelf software”)
  - Software service providers (e.g. “Internet companies”)
    - Operate any form of software (and hardware)
- Software consulting firms
  - Development services firms
    - Produce custom software
  - Implementation services firms
    - Configure software products for use by customers
- Regulatory bodies
  - Regulate the industry

# Top 10 Independent Software Vendors (ISVs) in 2019 [1]

Rank ↕		Organization ↕	Sales (B\$) ↕	FY ↕	Market cap (B\$) ↕	Headquarters ↕
1		Microsoft	118.2	2019	946.5	Redmond, WA, US
2		Oracle	39.6	2019	186.3	Redwood City, CA, US
3		SAP	29.1	2019	134.9	Walldorf, Germany
4		Adobe Inc.	9.5	2019	132	San Jose, CA, US
5		Salesforce	13.3	2019	120.9	San Francisco, CA, US
6		VMware	9.0	2019	77.2	Palo Alto, CA, US
7		Intuit	6.4	2019	66.8	Palo Alto, CA, US
8		ServiceNow	2.6	2019	42.9	Santa Clara, CA, US
9		Workday	2.8	2019	41.7	Pleasanton, CA, US
10		Dassault Systèmes	4.1	2019	39.2	Vélizy-Villacoublay, France

# Software Vendors vs. “Internet Companies” [1]



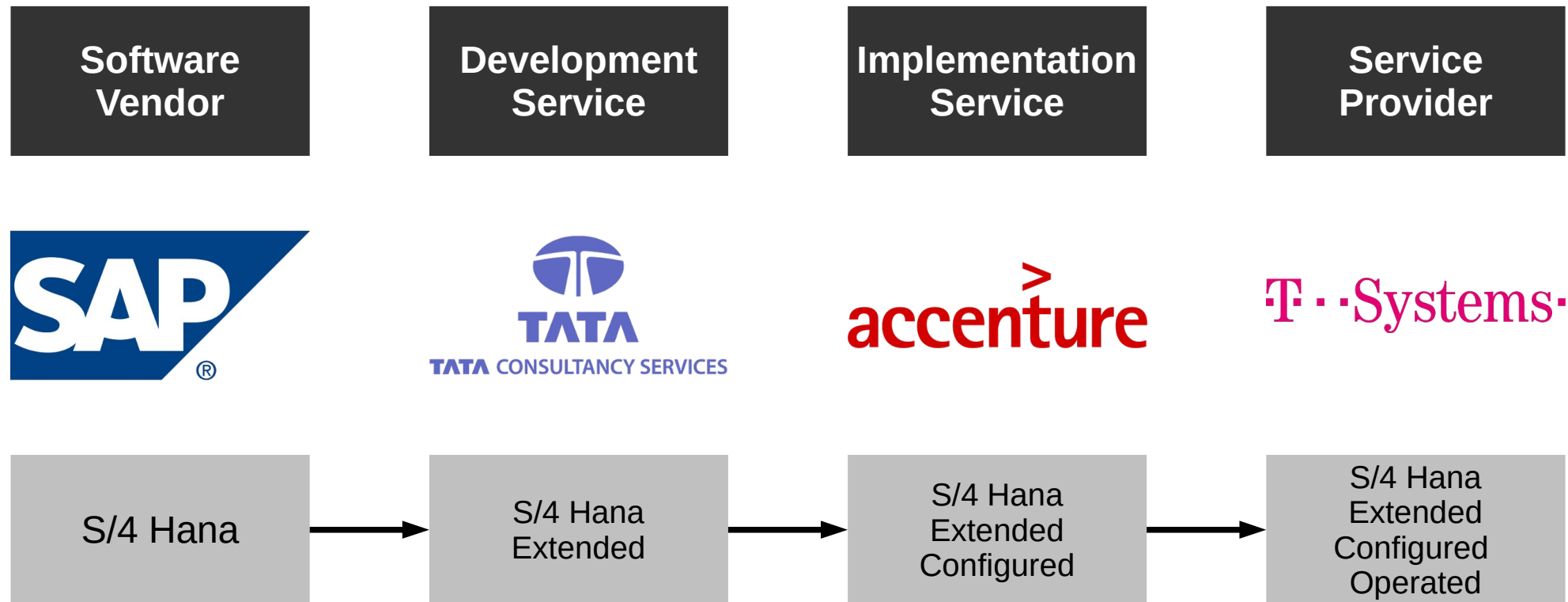
[1] See [https://en.wikipedia.org/wiki/List\\_of\\_largest\\_Internet\\_companies](https://en.wikipedia.org/wiki/List_of_largest_Internet_companies)



# Software Vendors vs. Service Provider / Operator

- Software vendor
  - Product is a licensed-out artifact
- Examples (before cloud offering)
  - Microsoft
  - Oracle
  - SAP
  - Adobe
- Service provider / operator
  - Product is a standardized service
- Examples
  - Amazon Web Services (if it was broken out)
  - Various Google services
  - Salesforce
  - Facebook

# Software Vendors, Consulting Firms, and Service Providers



# Regulatory Bodies (Regulators)

- Regulatory body
  - Is a public organization or government agency (state-level, federal-level, union-level)
  - Which by way of laws and directives regulates industries and industry player behavior
  - To protect the public by preventing undesired behavior and enforcing desired one
- Examples
  - European Union
    - European commission → Data protection (GDPR) → Enforcement by Information Commissioner's Office (ICO)
  - U.S.A.
    - Federal and state governments → Antitrust law → Enforcement by Federal Trade Commission (FTC), DoJ

## 5. Software Products

# Consumer vs. Enterprise Customers

- Retail customers (B2C)
  - Are willing to trade time for money
- Enterprise customers (B2B)
  - Are willing to trade money for time

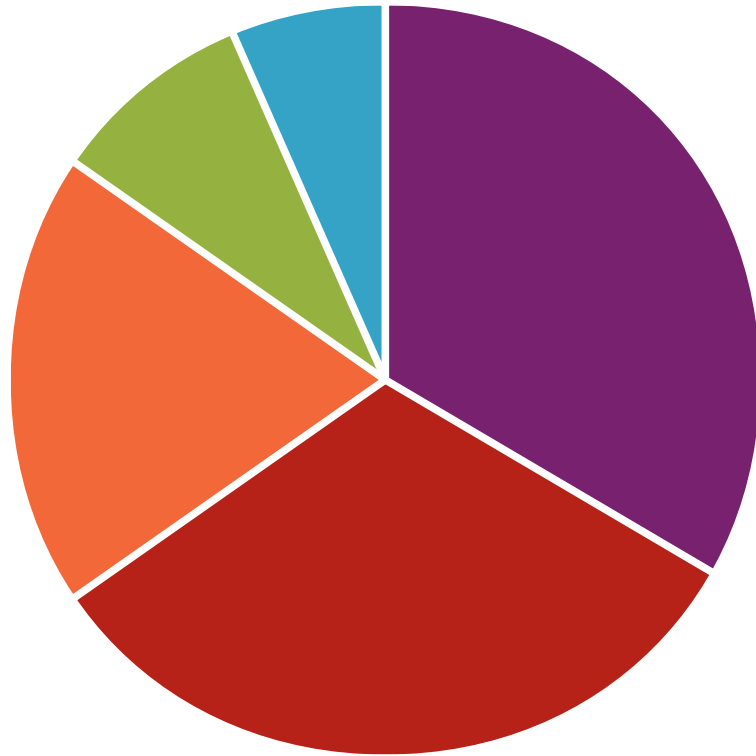
# Software Products (Recap)

- **A software product**
  - Is a digital good (software, intellectual property)
  - Is non-physical, does not rot
  - Has near-zero copying costs
  - Is a man-made artifact sold to customers in a market
  - Has a life-cycle (is born, grows and matures, eventually dies)
  - Is both extremely malleable and hard to change

# Consumer vs. Enterprise Software Products (and Markets)

- Consumer (also: retail) products
  - Pricing
    - Comparatively cheap
    - Often free, then subsidized
  - Segmentation
    - Usually by demographics, e.g.
      - By age group
      - By gender
  - Adoption
    - Out of the box
- Enterprise software products
  - Pricing
    - Into million Euros
    - Often the real product behind consumer software
  - Segmentation
    - Horizontal vs. vertical, e.g.
      - By business function
      - By industry
  - Adoption
    - May require implementation project

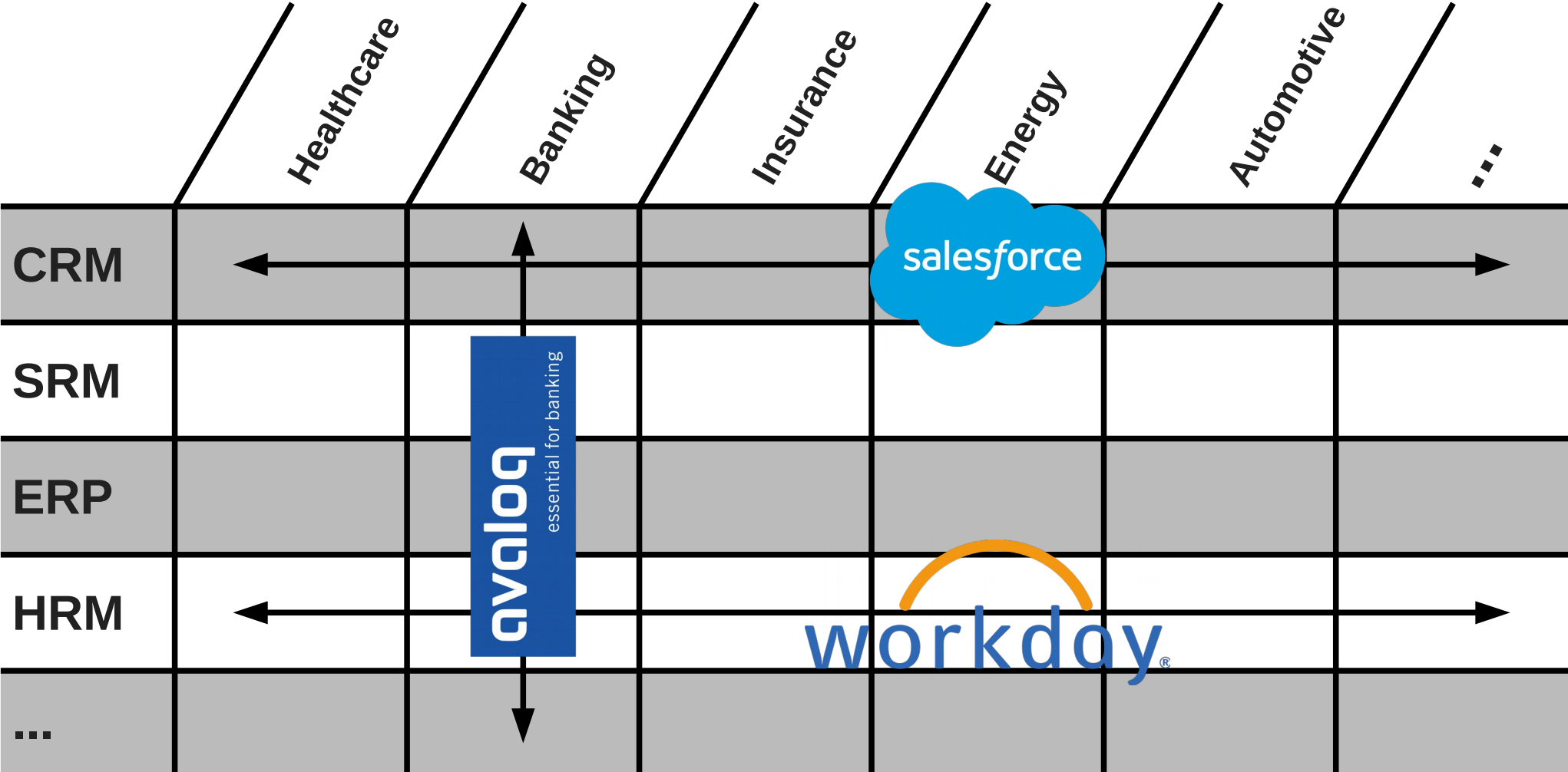
# Consumer Market (Segments)



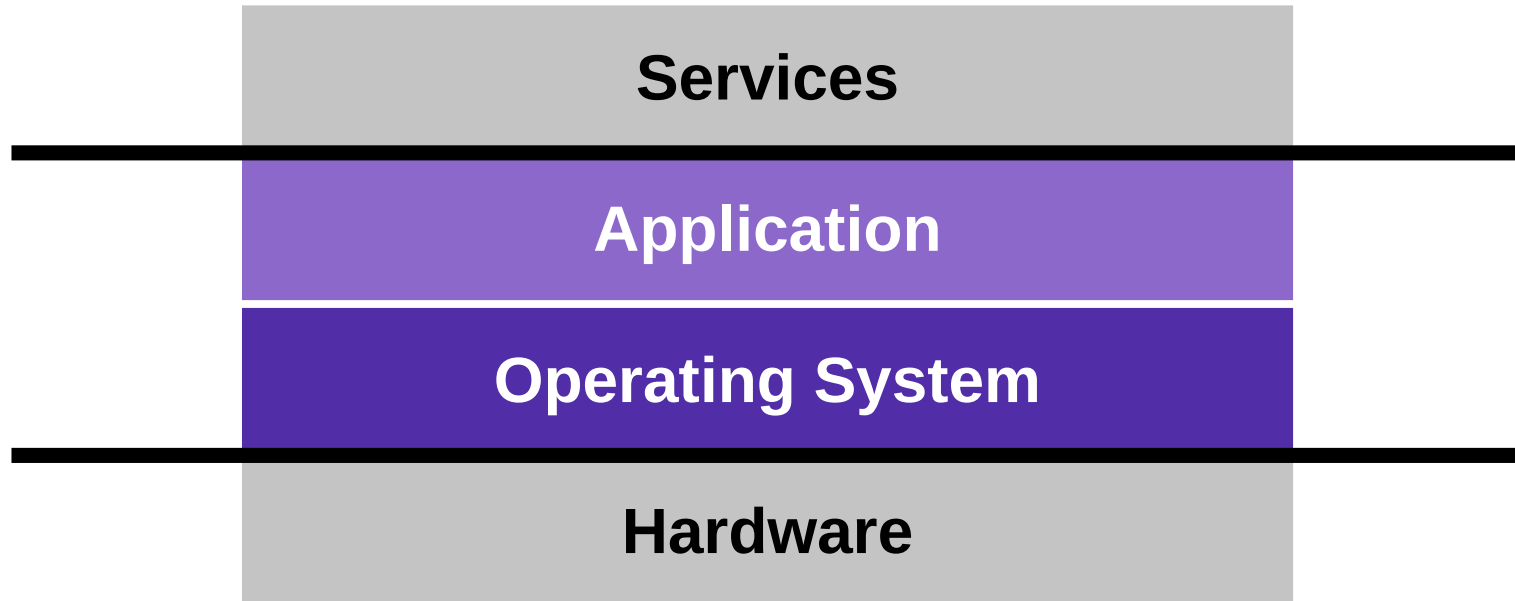
- **Child**
- **Teenager**
- **Single adult**
- **Married no kids**
- **Parent**



# Enterprise Software Market Segmentation

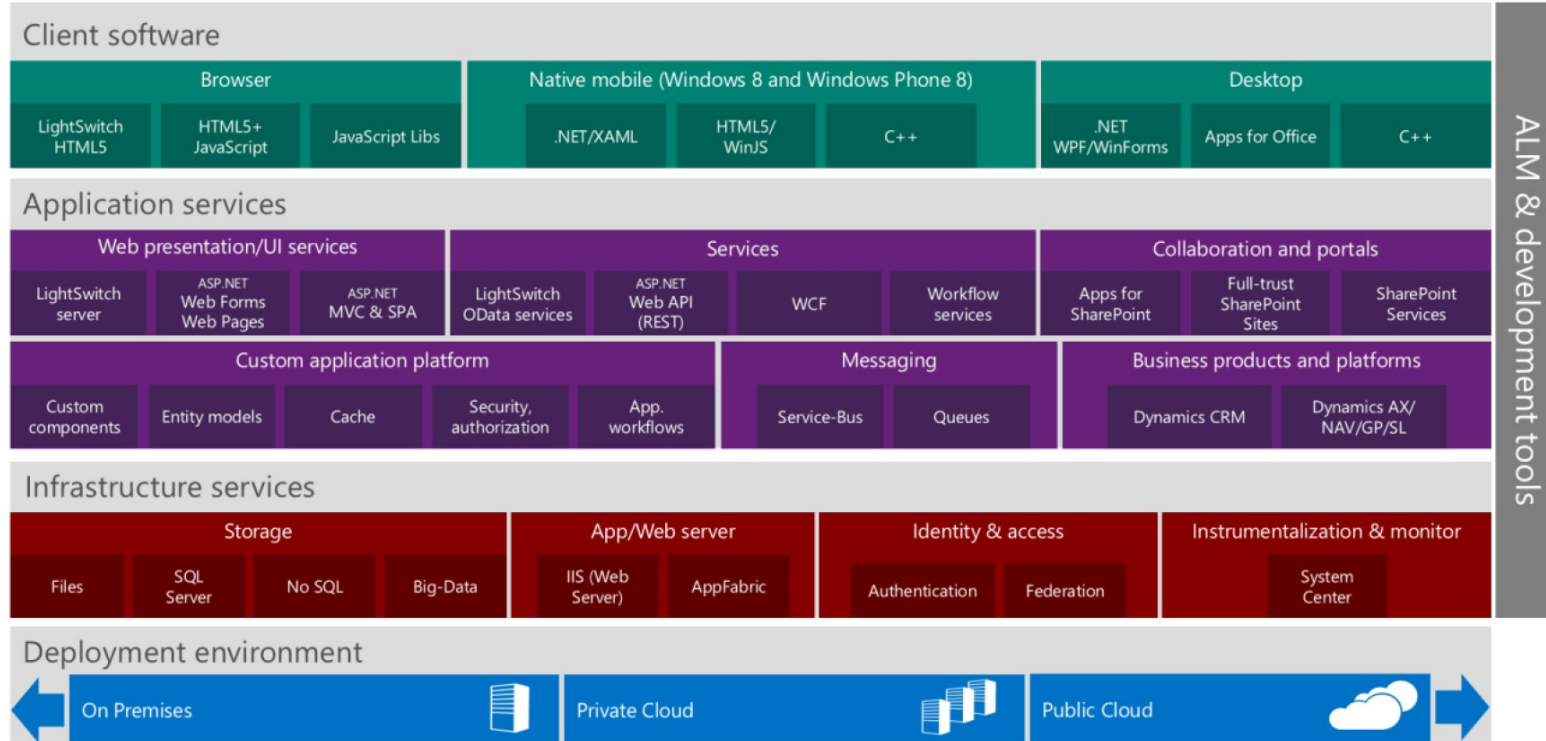


# Customers Want to Buy a “Solution”



# Technology Stacks

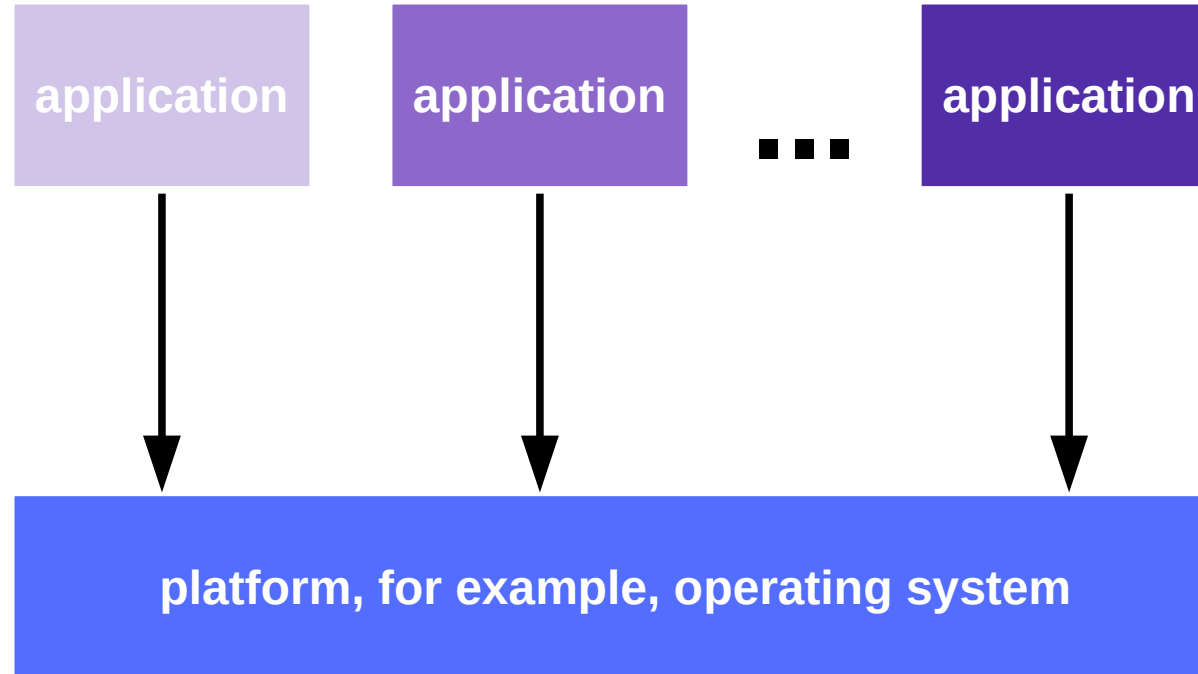
## Microsoft Development Platform Technologies



## 6. Software Platforms

# Categories of Software Products

- **Applications**
  - Software that is not built upon
  - Top-layer of the solution stack
- **Platforms**
  - Software that is built upon
  - Everything that is not the top layer
- **Why does everyone want to be a platform?**



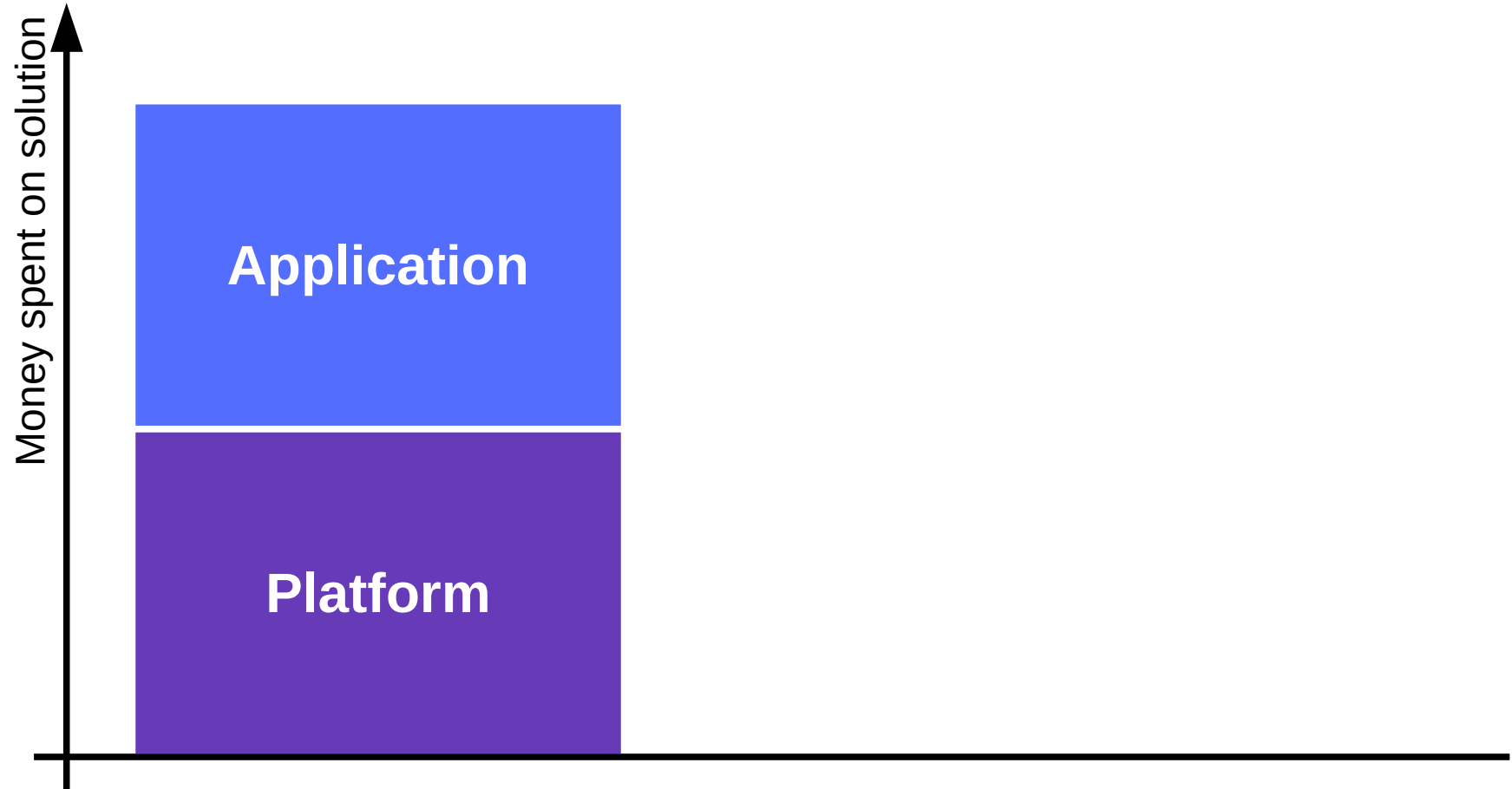
- Software platform
  - Is an environment for the development and deployment of applications
    - Implies split between applications on top of the platform
  - Is a full set of application-independent life-cycle functions for applications
    - Among many components, the largest collection (i.e. not just a library)
- Customer (user) value of software platforms
  - By definition, a platform in itself is useless
  - Customer value is only created by applications

# Software Platforms as a Product

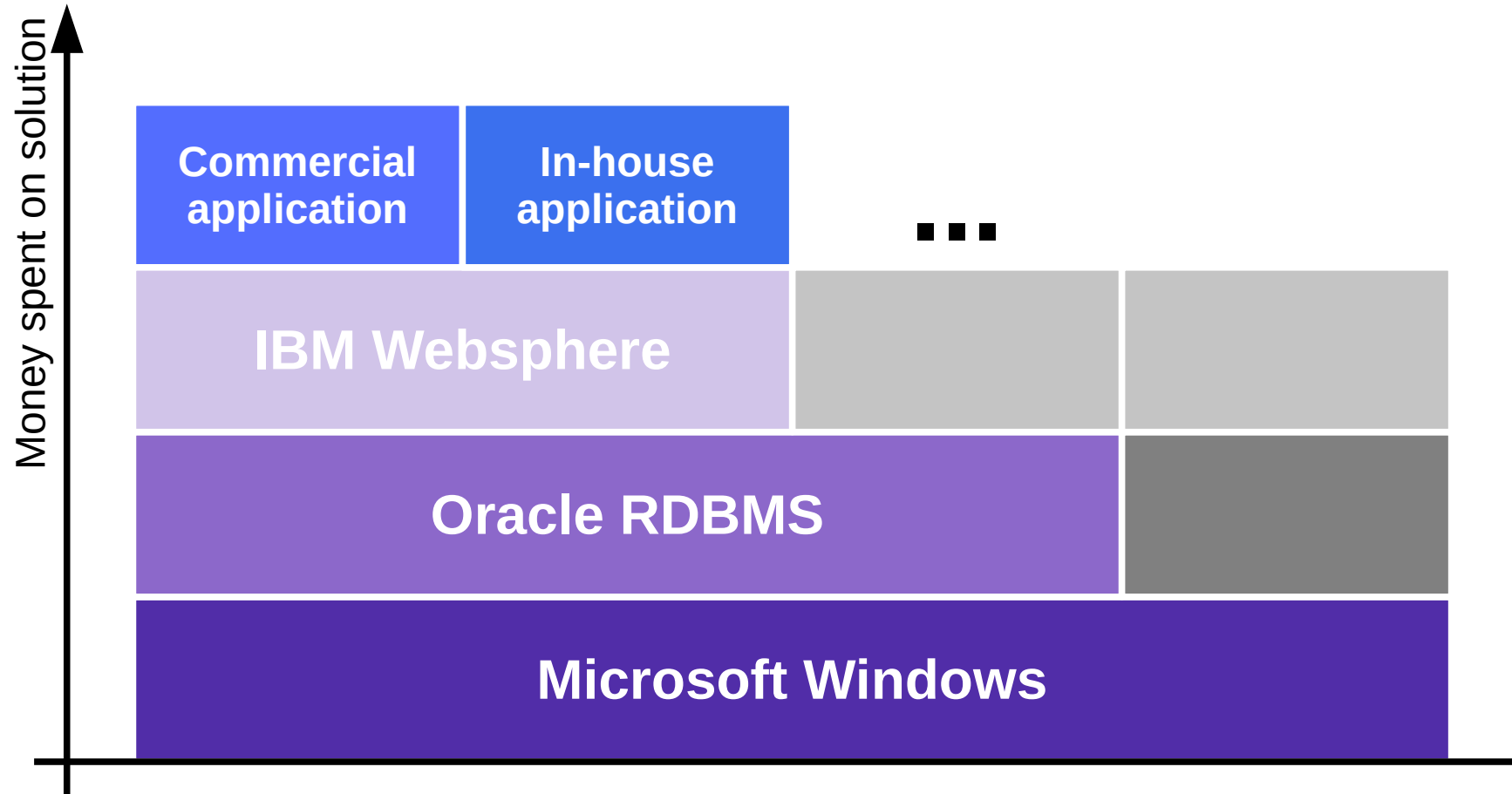
- Platforms are valuable
  - Platforms are needed by the applications running on top of it
  - Platforms can simplify IT department operations costs
- An application license sale implies a platform sale



# Pricing Power 1 / 2



# Pricing Power 2 / 2 [1]



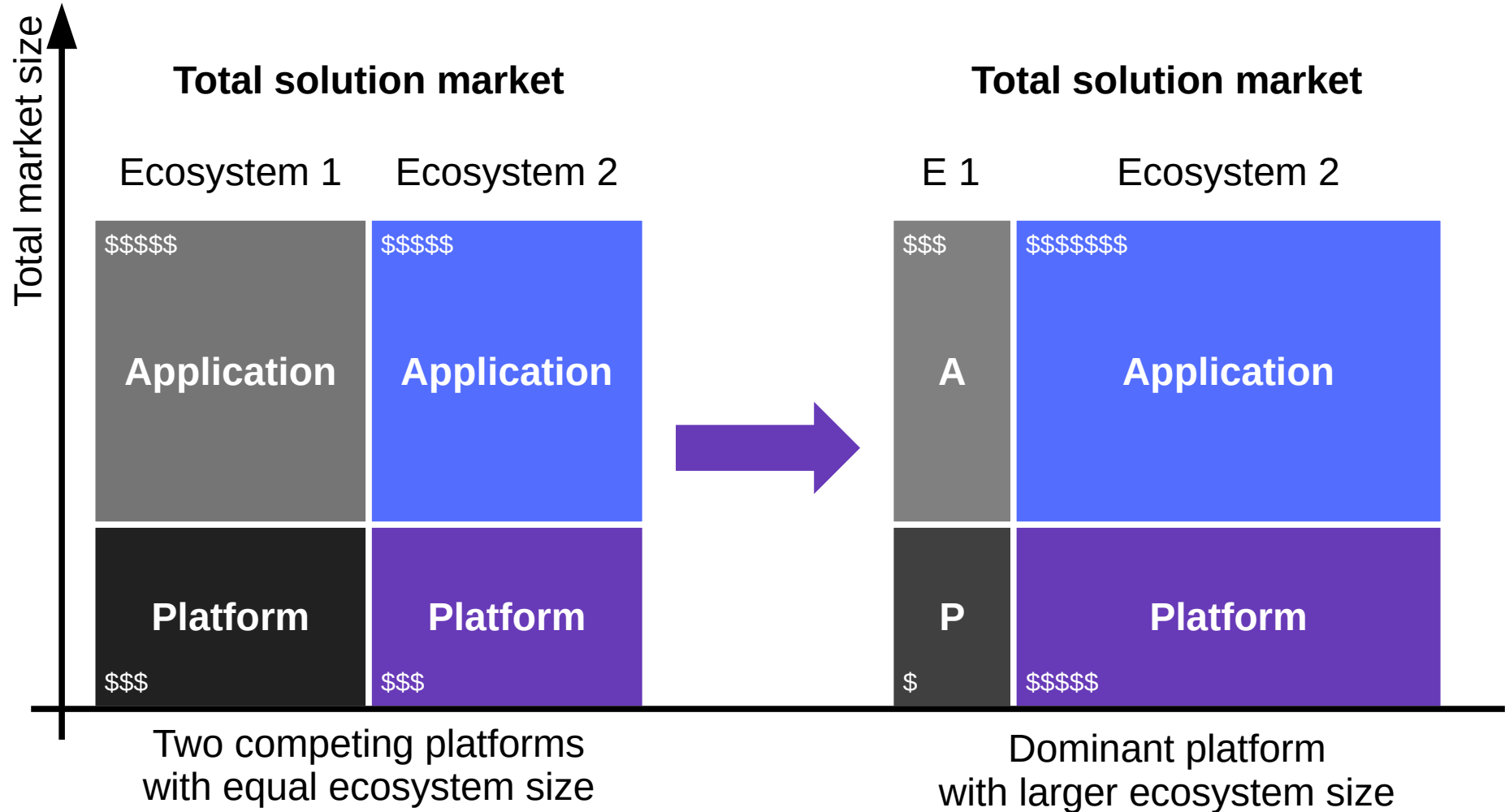
[1] Not drawn to scale

## 7. Software Ecosystems

# Software Ecosystem

- **Software ecosystem**
  - The totality of actors (businesses and individuals)
  - Software applications and components
  - Their relationships and goals
  - On and around a software platform

# The Software Ecosystem Wars



# Summary

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# Thank you! Questions?

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