

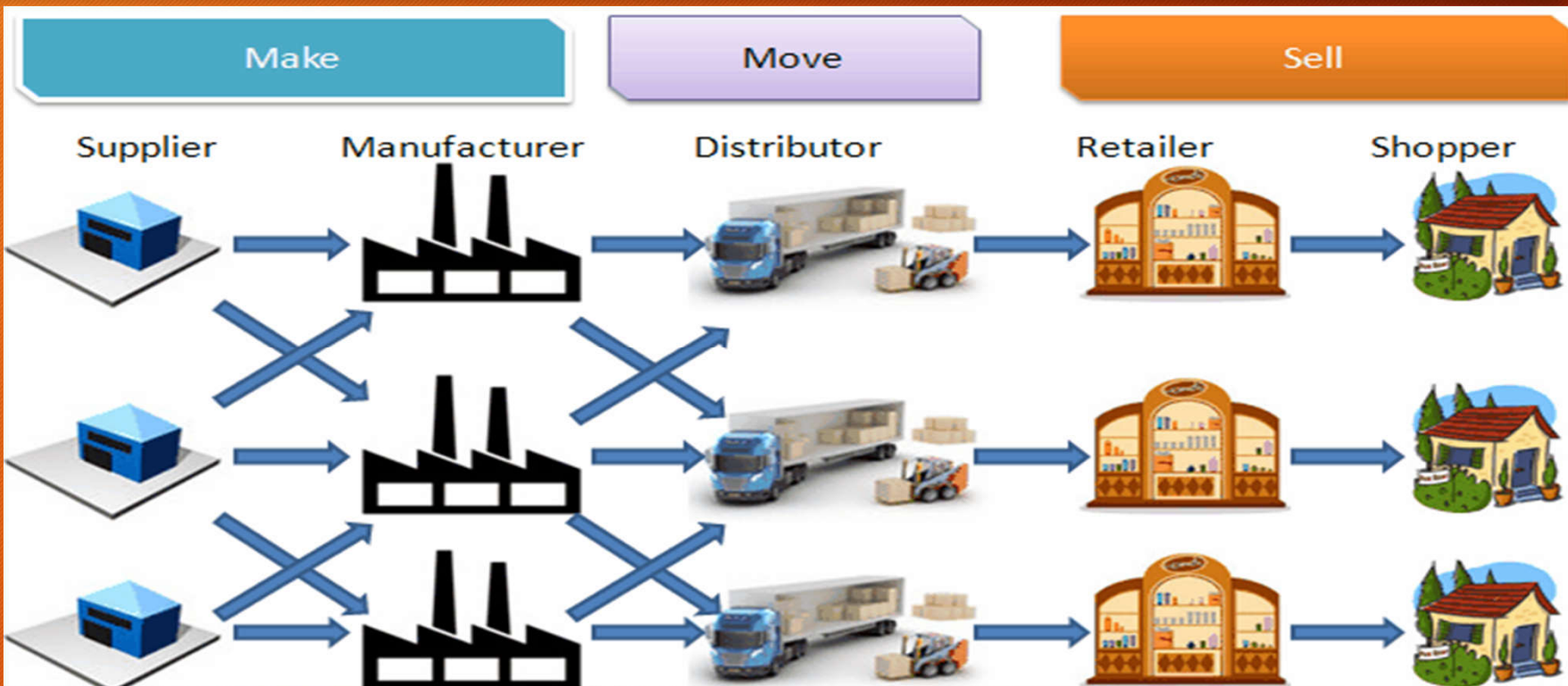
# The New Frontier ?

## Edge/Fog Microservices Supply Chain

Alex Pongpech

# Traditional Supply Chain

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# Next Generation Supply Chain



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# Changing of Scenarios and Technologies

Population Density

4

Varied Demographics

Consumers Behaviors

Cloud Computing

5G

Edge/Fog Computing

AI Technology

# Condo

5

Sort by **Best match** ▼

**RE/MAX Executive Homes Real Estate**  
**Ad** 2 reviews · Real Estate Agency  
9.0 km · 145 Sukhumvit Soi 39  
02 018 7812

[WEBSITE](#) [DIRECTIONS](#)

**Acknowledge Centre**  
**Ad** 5.0 ★★★★★ (23) · Langua...  
14.2 km · 427/11 ชั้น 2 อาคารไดมอ...  
081 426 7996

[WEBSITE](#) [DIRECTIONS](#)

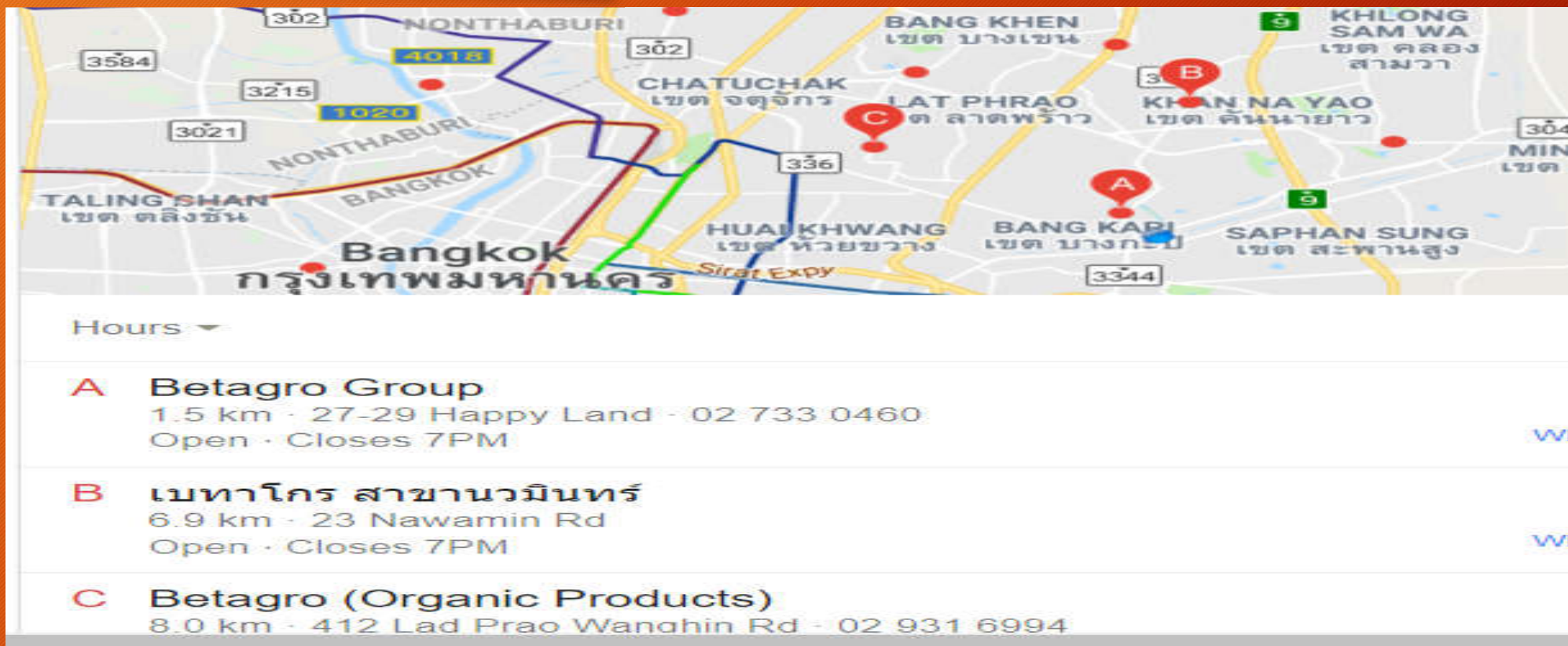
**Lumpini Condo Town NIDA - Seri second.**  
4.3 ★★★★★ (35)  
850.0 m · 304 Seri Thai Rd  
02 689 6888

[WEBSITE](#) [DIRECTIONS](#)

Map data ©2018 Google 2 km Terms of Use

# Betrigo

6





# Tops Market

7

Sort by **Best match** ▼

**Tops market Sukhapiban 3**  
1.9 km · 59 Ramkhamhaeng Rd  
02 729 4970  
**Closed** · Opens 8AM Tue

[WEBSITE](#) [DIRECTIONS](#)

**Tops market Navamin**  
3.4 km · 10/1300 Moo 6 Navamin ...  
02 379 0452  
Open · Closes 11PM

[WEBSITE](#) [DIRECTIONS](#)

**Tops market Amorini**  
6.2 km · 1 Amorini G Fl. Suan Say...  
02 919 6806  
Open · Closes 10:30PM

[WEBSITE](#) [DIRECTIONS](#)

**Tops Market Robinson**

Map data ©2018 Google 5 km Terms of Use

# Next Generation Supply Chain

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## Data Driven



## Data Driven Product Development

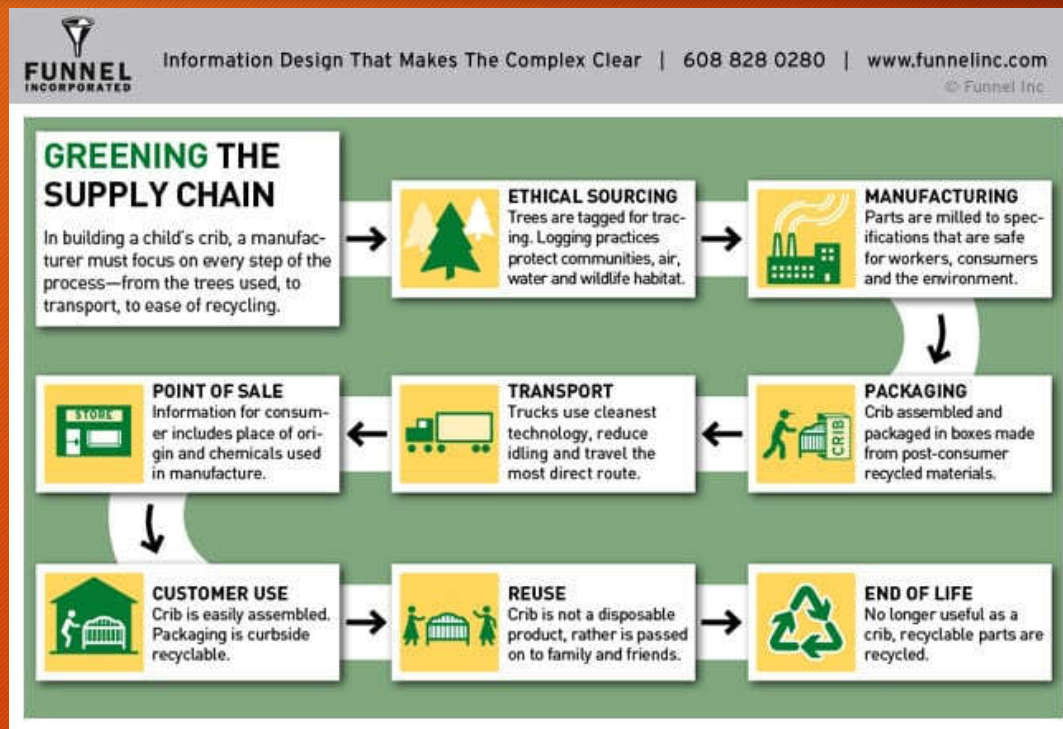




# Next Generation Supply Chain

9

Green



# Next Generation Supply Chain

10

Fast





# Next Generation Supply Chain

11

## Flexible

TRENDS  
REQUIRE

## SUPPLY CHAIN FLEXIBILITY



Modern supply chain trends can introduce inefficiencies:

- Additional trading partners increase latency
- Global supply chains increase complexity
- Redundant judgments exacerbate demand uncertainty





# Next Generation Supply Chain

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## Proactive

### PROACTIVE

VS

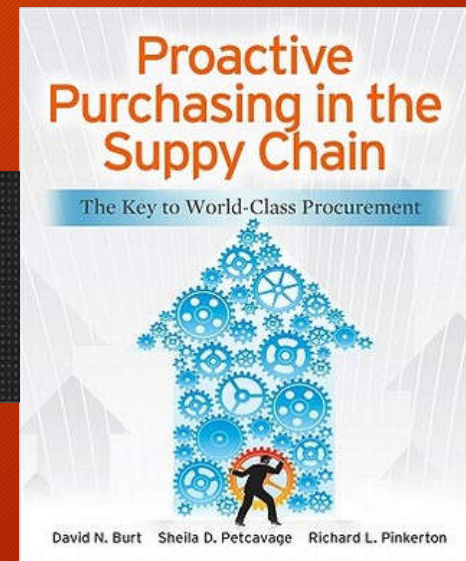
### REACTIVE

Creating or taking controlling  
of a situation.

Acting in response to a  
situation.



  
**PROACTIVE  
SUPPLY CHAIN MANAGEMENT**



# Next Generation Supply Chain

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- Optimized





What  
technologies  
would enable ?

Data driven

Speed

Flexibility

Green

Optimized

Proactive



Well, say  
hello to

IoT

15

Microservices

Edge/Fog  
Computing

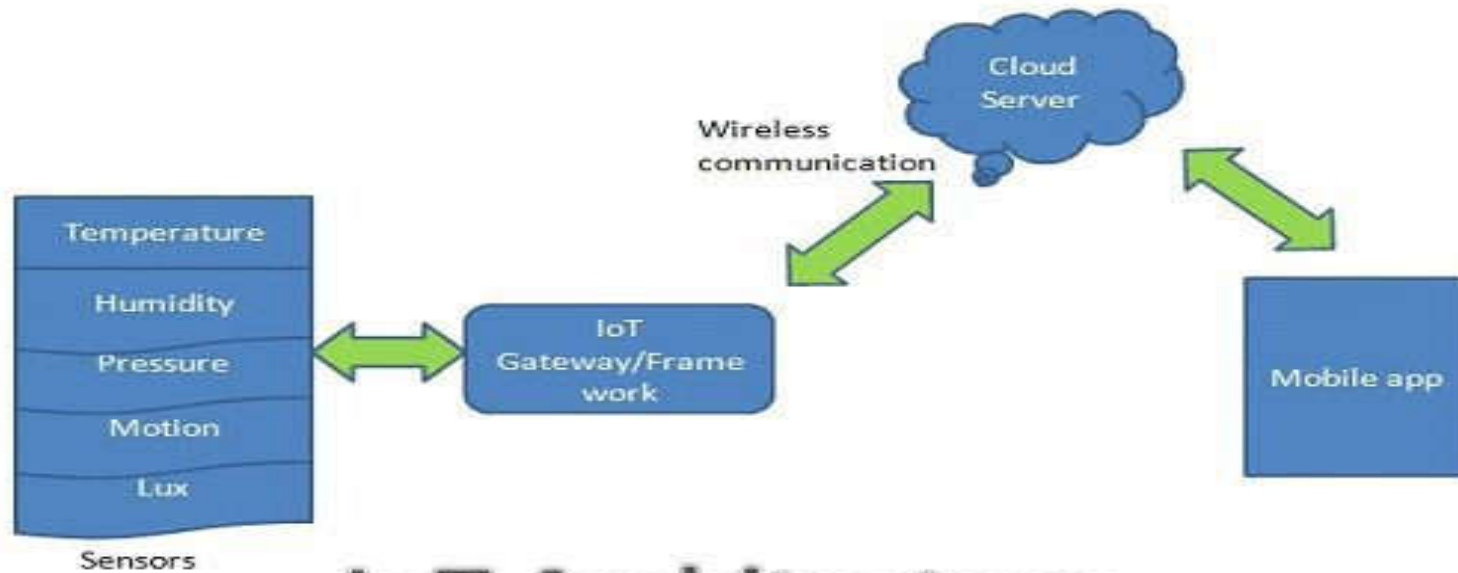
# Internet of Things

16



# IoT Architecture

17



## IoT Architecture

# IoT Three tier Architecture

18

## IoT THREE TIER ARCHITECTURE

### THE DATA-DRIVEN IoT

- Business processing
- Reporting
- Long-term data analytics
- Data infrastructure
- Enterprise integration
- Software-defined storage

### DATACENTER

Hundreds of instances

- Communications/messaging
- Data pre-processing
- Real-time data analytics
- Real-time actions/rules
- Software-defined infrastructure

### INTELLIGENT GW (Edge Computing)

Thousands of instances

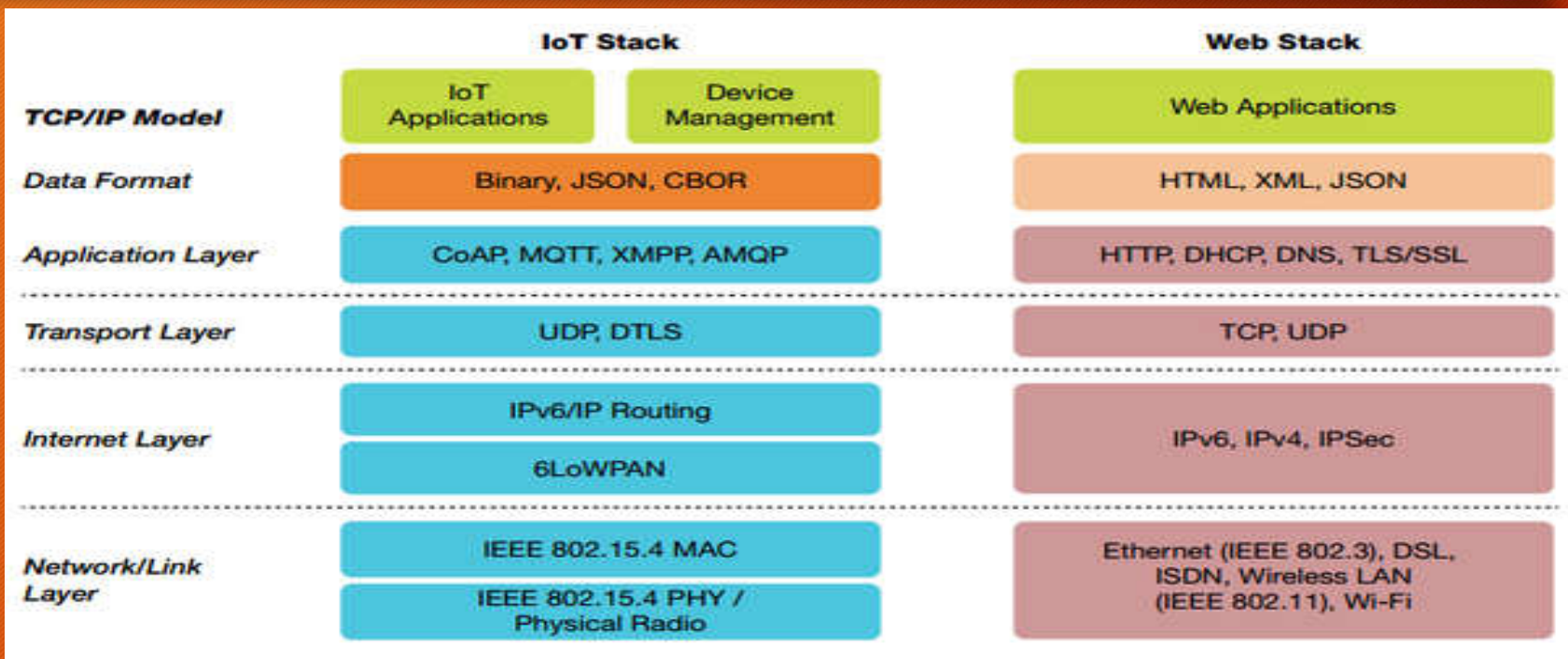
- Communications/  
messaging
- Data acquisition

### DEVICES

Millions of instances

# IoT Protocols

19





# Microservices

20

# Why smaller scale/fine grained business services ?

21

Data Driven  
Locality

Security  
Containment

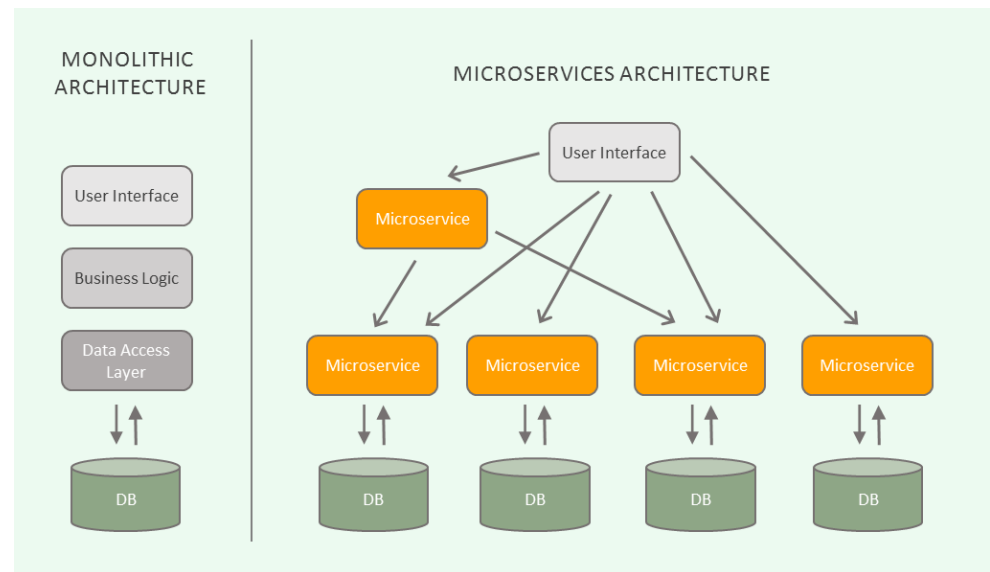
Independent  
Manage



# Microservices

- Microservices is a variant of the service-oriented architecture (SOA) architectural style that structures an application as a collection of loosely coupled services.

22



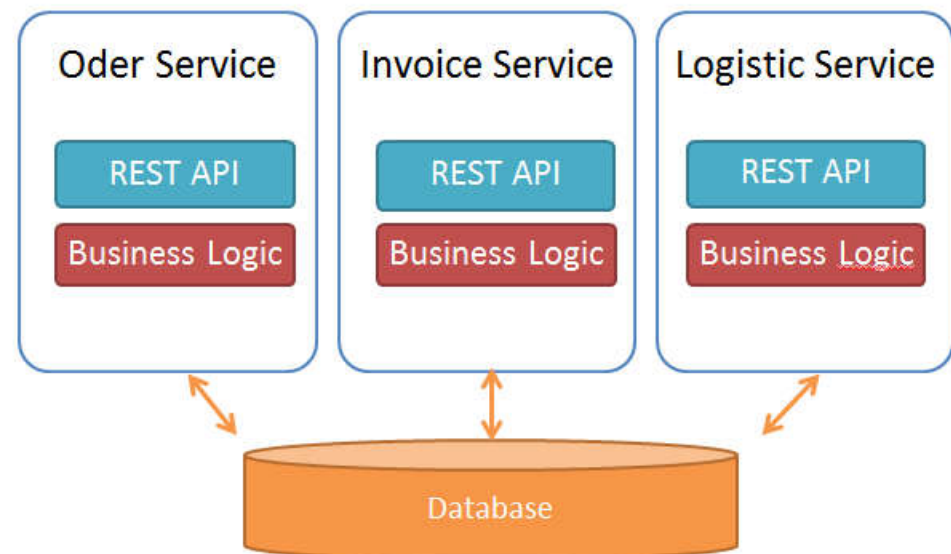


## Microservices

- In a microservices architecture, services should be fine-grained and the protocols should be lightweight.

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### Microservices



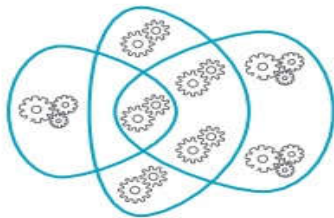
# We no longer need to buy one size fit all services

24

## ONE SIZE FITS ALL

<2000

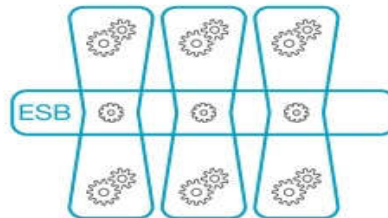
Monolithic Approach / 1<sup>st</sup> Platform



## FINE-GRAINED COMPONENTS

2000–2010

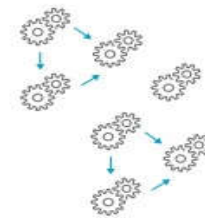
Service-oriented / 2<sup>nd</sup> Platform



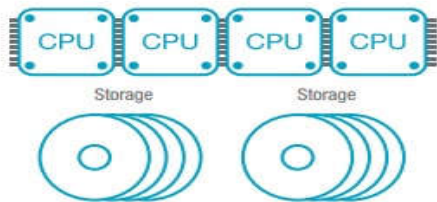
## SUPERFINE

>2010

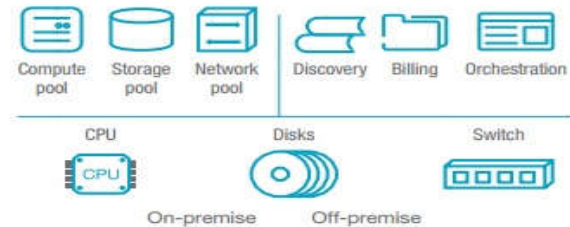
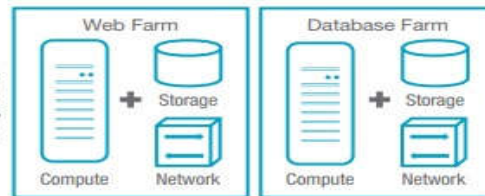
Microservices / 3<sup>rd</sup> Platform



Physical



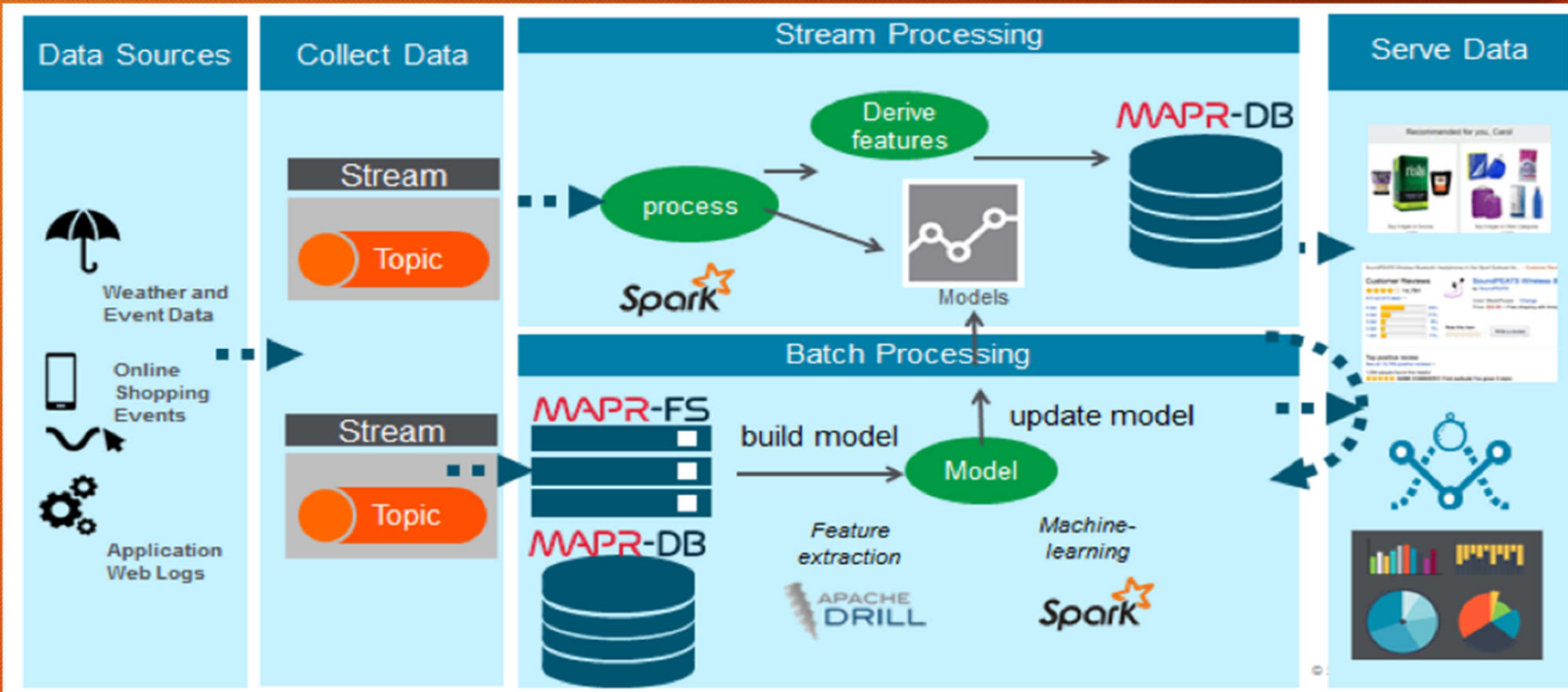
Physical





# Event Driven Microservices

25



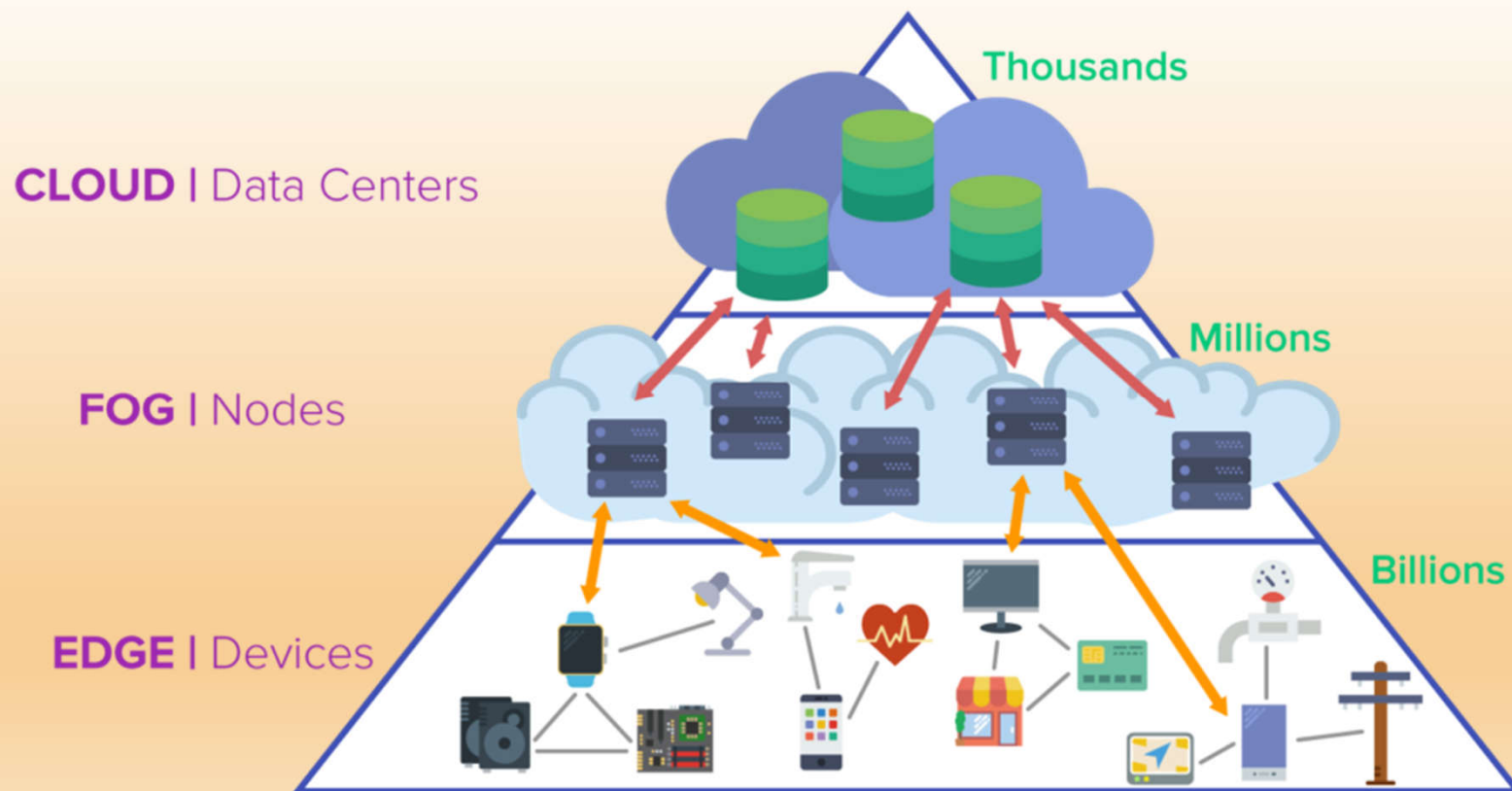
# Edge and Fog Computing

26



# Edge and Fog Computing

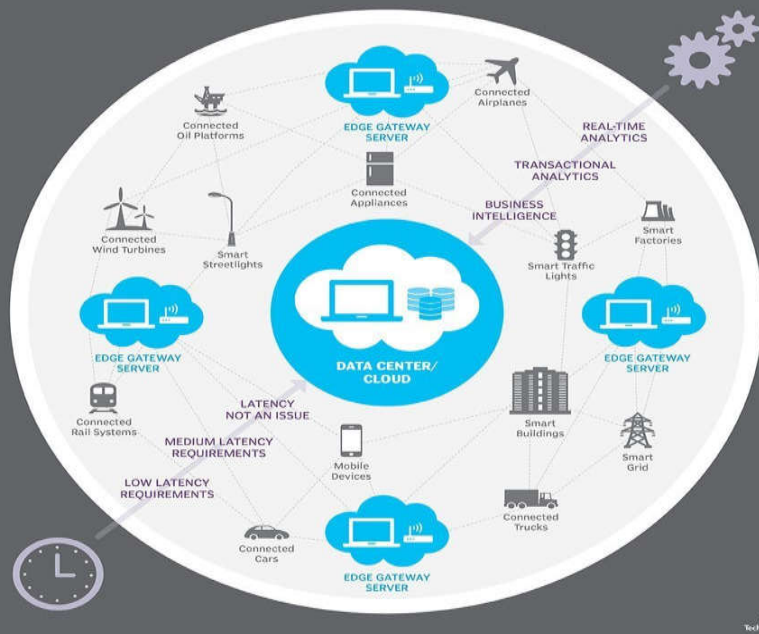
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# EDGE Computing

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## Edge Computing



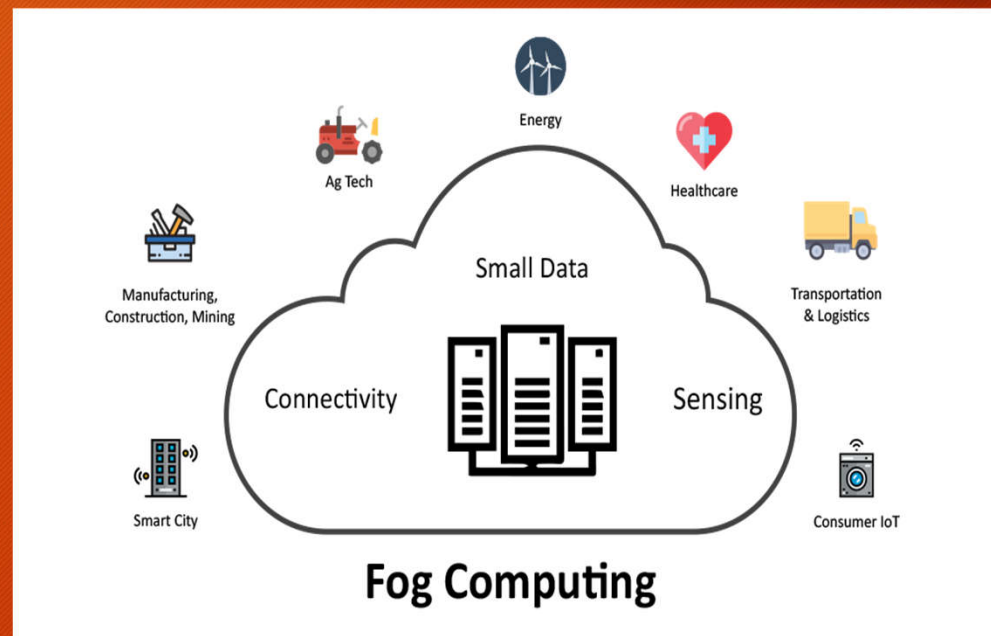
- Edge computing is a method of optimizing cloud computing systems by performing data processing at the edge of the network, near the source of the data.
- reduces the communications bandwidth needed between sensors and the central datacenter by performing analytics and knowledge generation at or near the source of the data.
- requires leveraging resources that may not be continuously connected to a network such as laptops, smartphones, tablets and sensors.



# FOG computing

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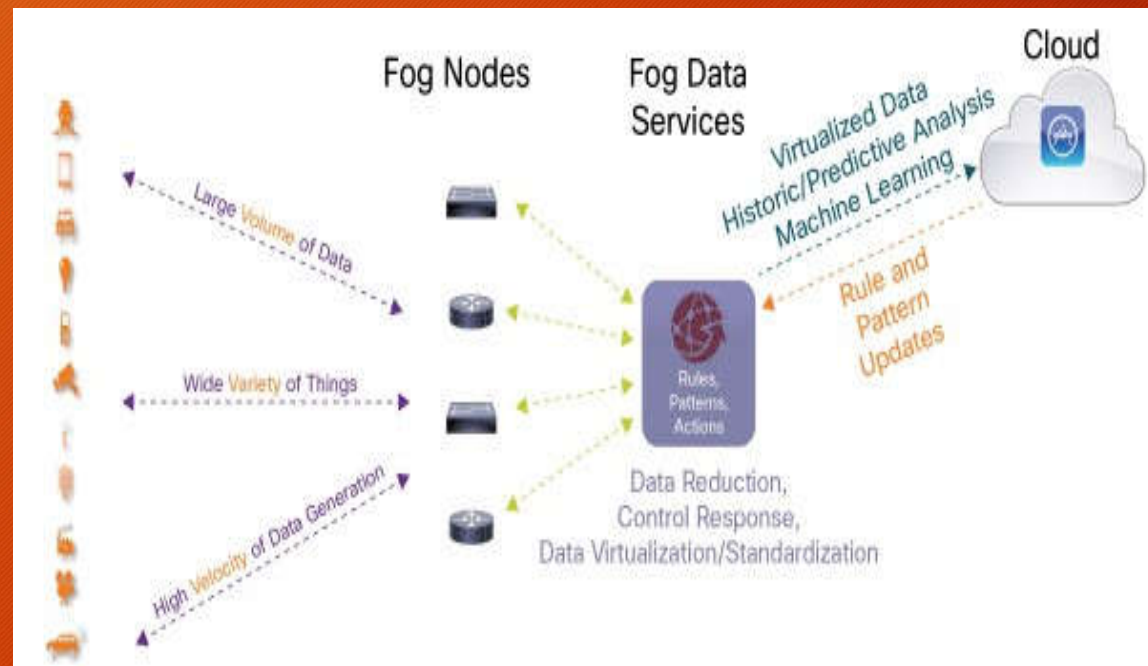
- Fog computing focuses processing efforts at the local area network end of the chain.
- Data is gathered, processed, and stored within the network by way of an IoT gateway or fog node.
- Information is transmitted to this gateway from various sources in the network where it is processed and pertinent data, as well as any additional commands, are transmitted back out to the necessary devices.



# FOG computing

30

- When compared to edge computing, fog computing is more scalable as it gives a centralized processing body a more big-picture view of the network as it has multiple data points feeding it information.





# Advantages

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- Edge application services significantly decrease the volumes of data that must be moved, the consequent traffic, and the distance the data must travel, thereby reducing transmission costs, shrinking latency, and improving quality of service (QoS).
- Edge computing eliminates, or at least de-emphasizes, the core computing environment, limiting or removing a major bottleneck and a potential point of failure. QUICKER SERVICES
- Security improves as encrypted data moves further in, toward the network core. As it approaches the enterprise, data is checked as it passes through protected firewalls and other security points, where viruses, compromised data, and active hackers can be caught early on. MORE SECURE
- The ability to "virtualize" (i.e., logically group CPU capabilities on an as-needed, real-time basis) extends scalability. The edge-computing market generally operates basically on a "charge for network services" model, and it could be argued[original research?] that typical customers for edge services are organizations desiring linear scale of business application performance to the growth of, e.g., a subscriber base. FINER SCALE

Putting them together

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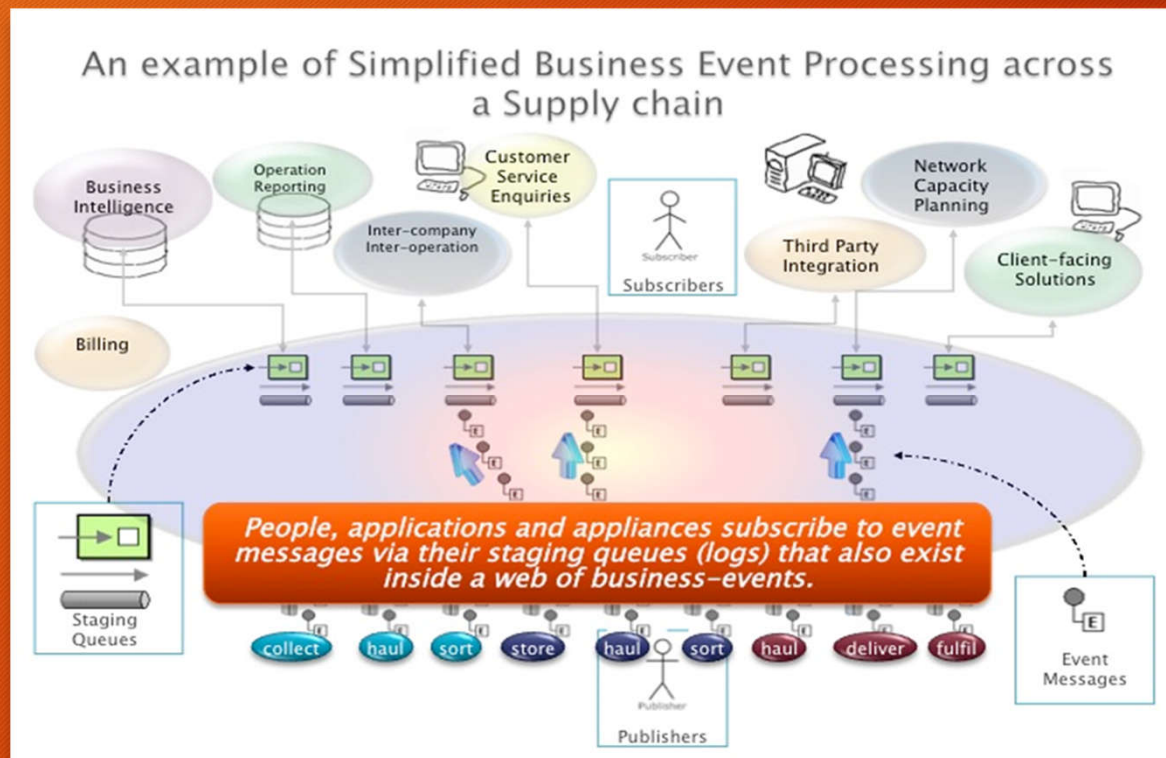




# Traditional shop

# Online microservice shop

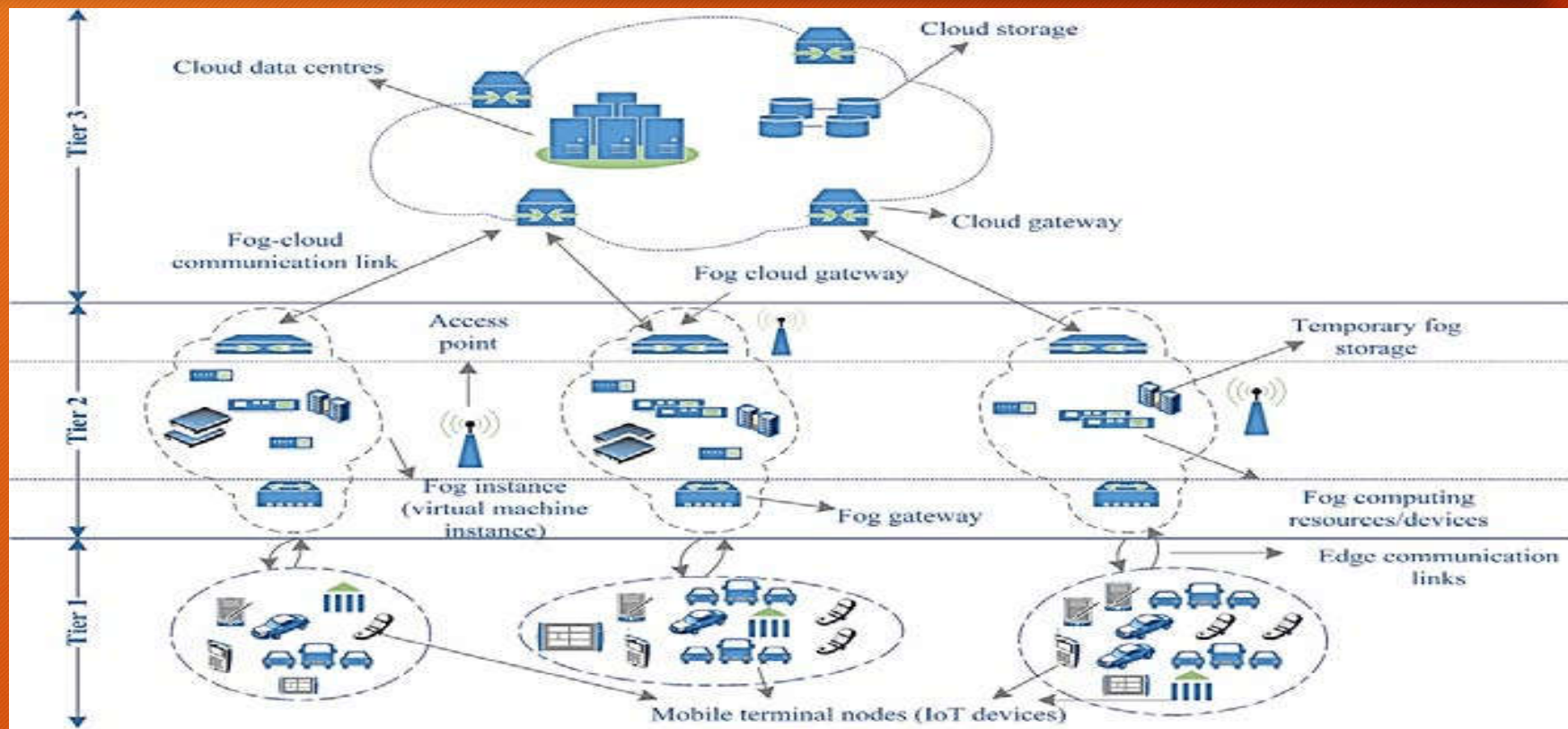
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# Edge and Fog Applications

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# Edge and Fog Applications

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## INDUSTRIAL IoT DATA PROCESSING LAYER STACK

### CLOUD LAYER

Big Data Processing  
Business Logic  
Data Warehousing

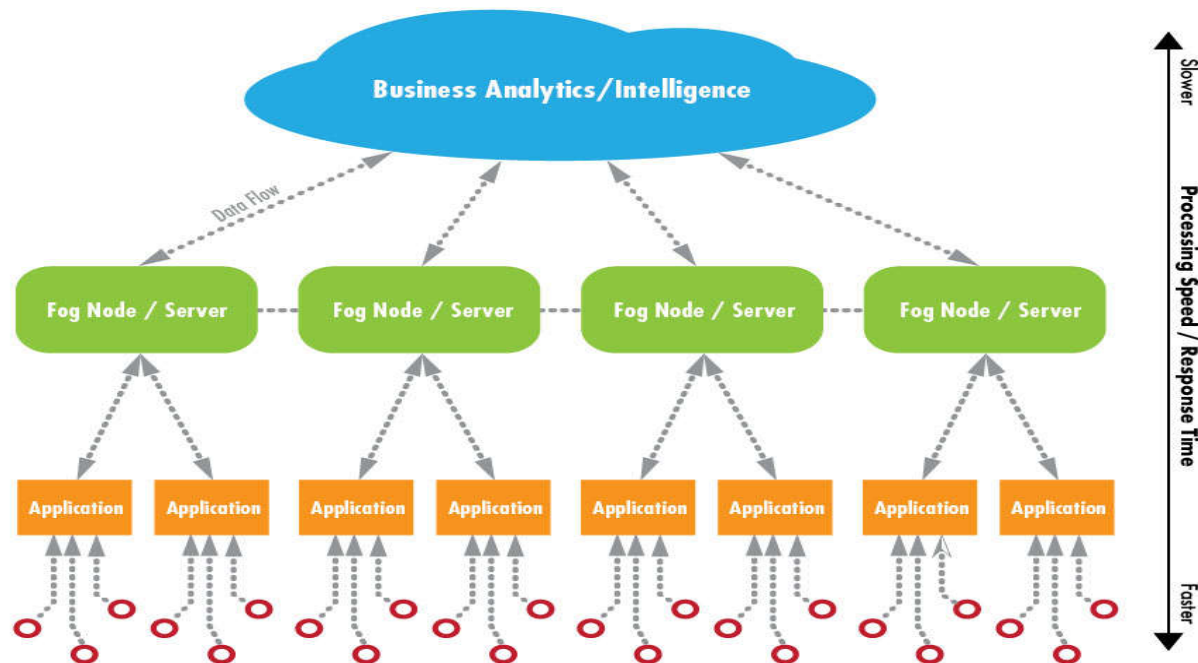
### FOG LAYER

Local Network  
Data Analysis & Reduction  
Control Response  
Virtualization/Standardization

### EDGE LAYER

Large Volume Real-time Data Processing  
At Source/On Premises Data Visualization  
Industrial PCs  
Embedded Systems  
Gateways  
Micro Data Storage

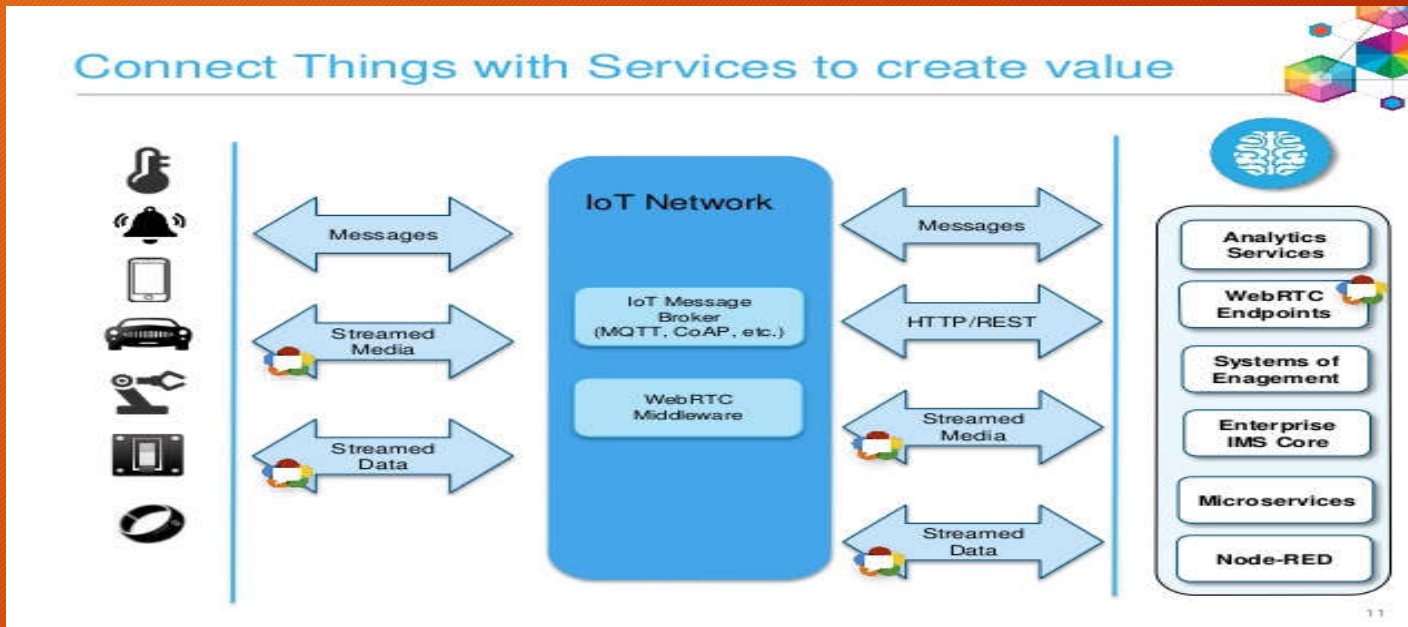
Sensors & Controllers (data origination)





# Edge, Fog, and Applications

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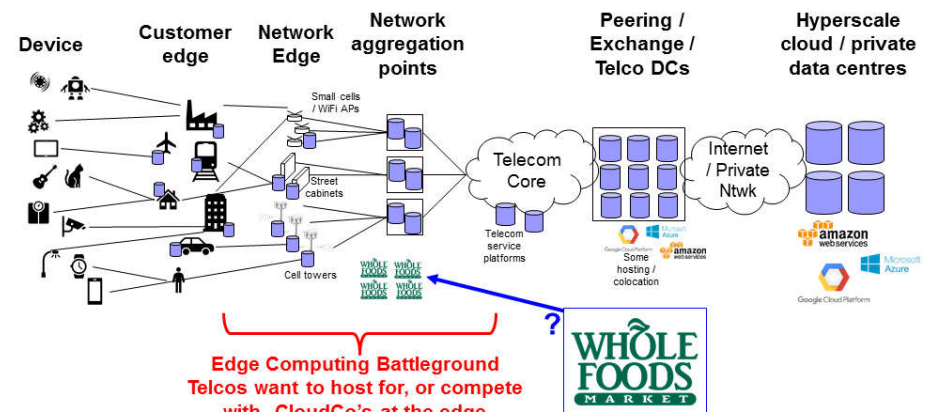


# Edge/Fog Supply Chain

- From the farmers directly to customer
- From micro warehouses to customers and customers to micro
- From warehouses to micro-warehouses and vice versa
- From raw material producers to
- Everyone can be both supplier distributors and customers

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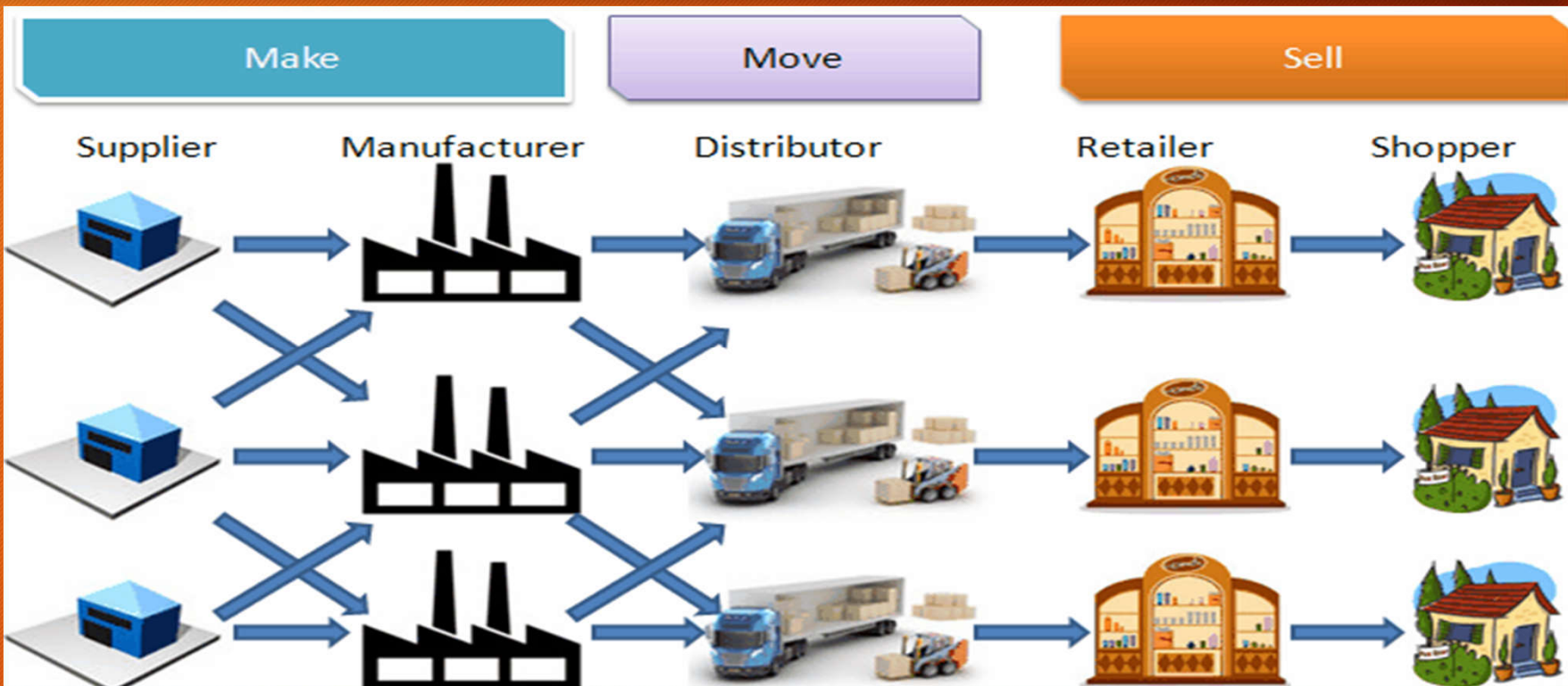
Where *\*is\** the edge, for edge computing?





# Traditional Supply Chain

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# Where are we going?

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# References

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