

New Applications of Distributed Computing in Industrial Transformation

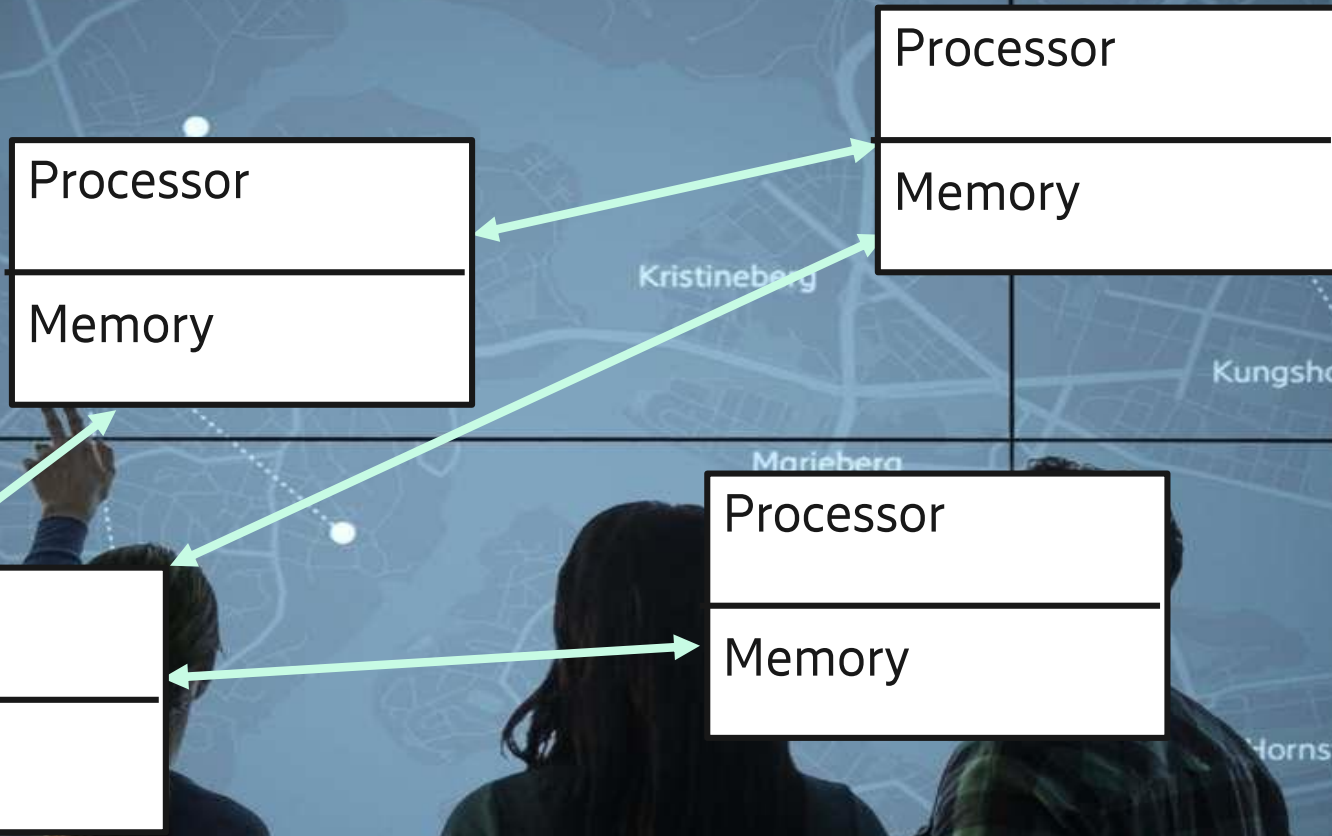


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Distributed Computing

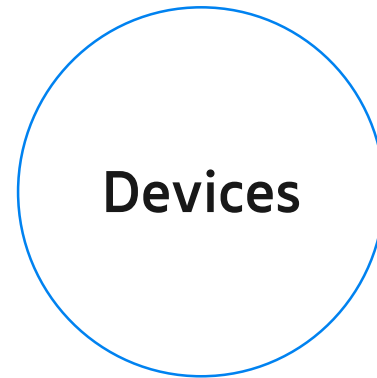
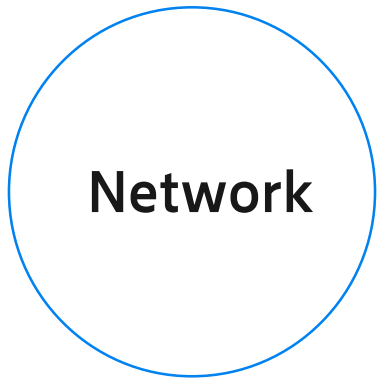
Number of users	Points to follow	Number of points
23 781	97% →	257
911 214	93% →	211
1 031 990	92% →	180
16 282	81% →	365
785 541	79% →	499
2 384 112	74% →	214
1 984 781	71% →	281
1 744 082	65% →	318
28 931	58% →	289
47 569	42% →	374
122 582	37% →	375
9 781	24% →	385
1 465 751	23% →	462
87 583	15% →	478
680 233	12% →	476
2 832 528	9% →	492



Complexity
Network problems
Security

Grid computing
Cloud computing
Telecom networks
Internet

Transformation in progress



Cloud Evolution

Cloud 1.0



Virtualization of servers

Manual and custom management

Cloud 2.0



Centrally controlled services

Complex management stacks

Cloud developer pain-points:

Efforts spent on infrastructure programming
Network management gets in the way



Datacenter operator pain-points:

Lack of insight from operation metrics
Complex maintenance and upgrade of DC management software
Cost of low resource utilization



Programming Evolution



Machine Language
Assembly Language
Compiled languages



Concurrent
Interactive
Platform independent
Distributed
Web based



Procedural
Modular
Structural
Object Oriented



Observability
Security
Adaptability
Intelligence
Model based

Industrial UseCases

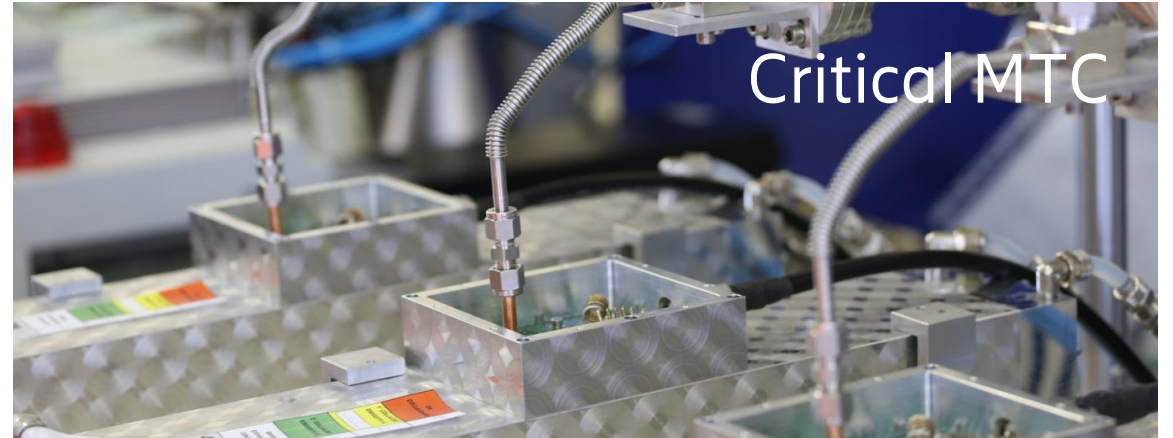


Massive MTC

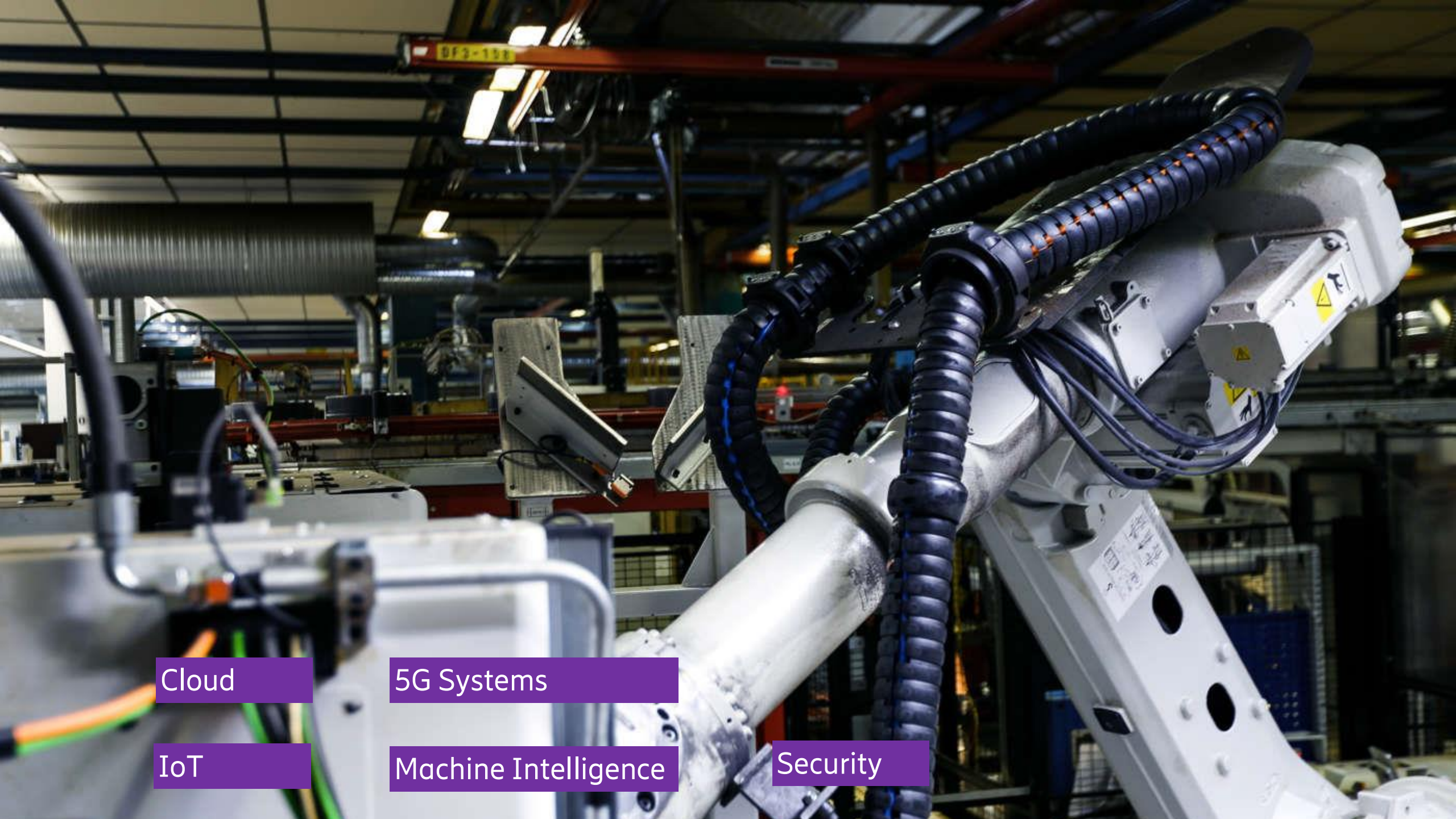


Low cost, low energy
Small data volumes
Massive numbers

Critical MTC



Ultra reliable
Very low latency
Very high reliability



Cloud

5G Systems

IoT

Machine Intelligence

Security

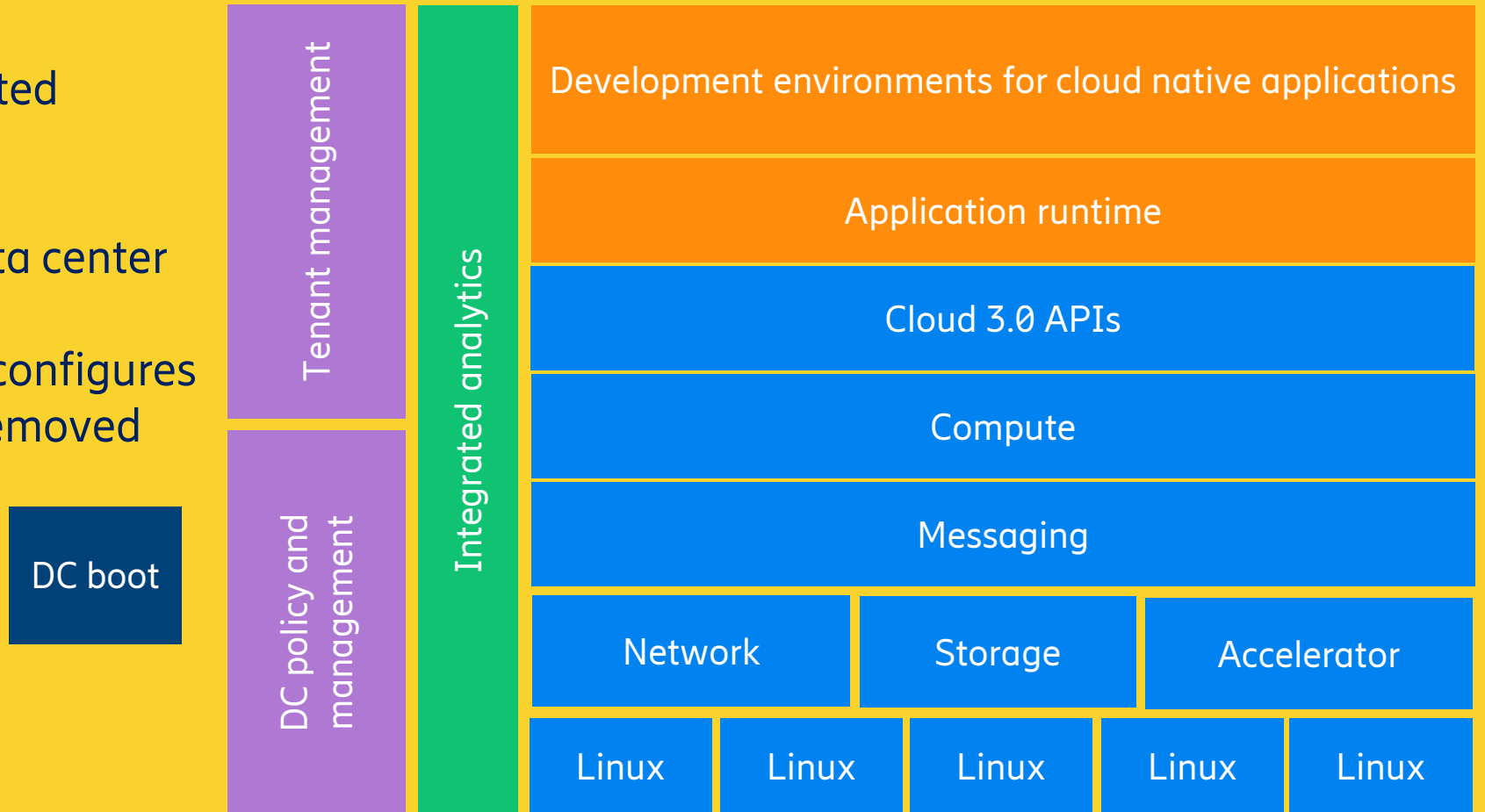
Distributed Operating System



Services are fully distributed

No unit of management abstraction below the data center

Datacenter capacity self configures as servers are added or removed



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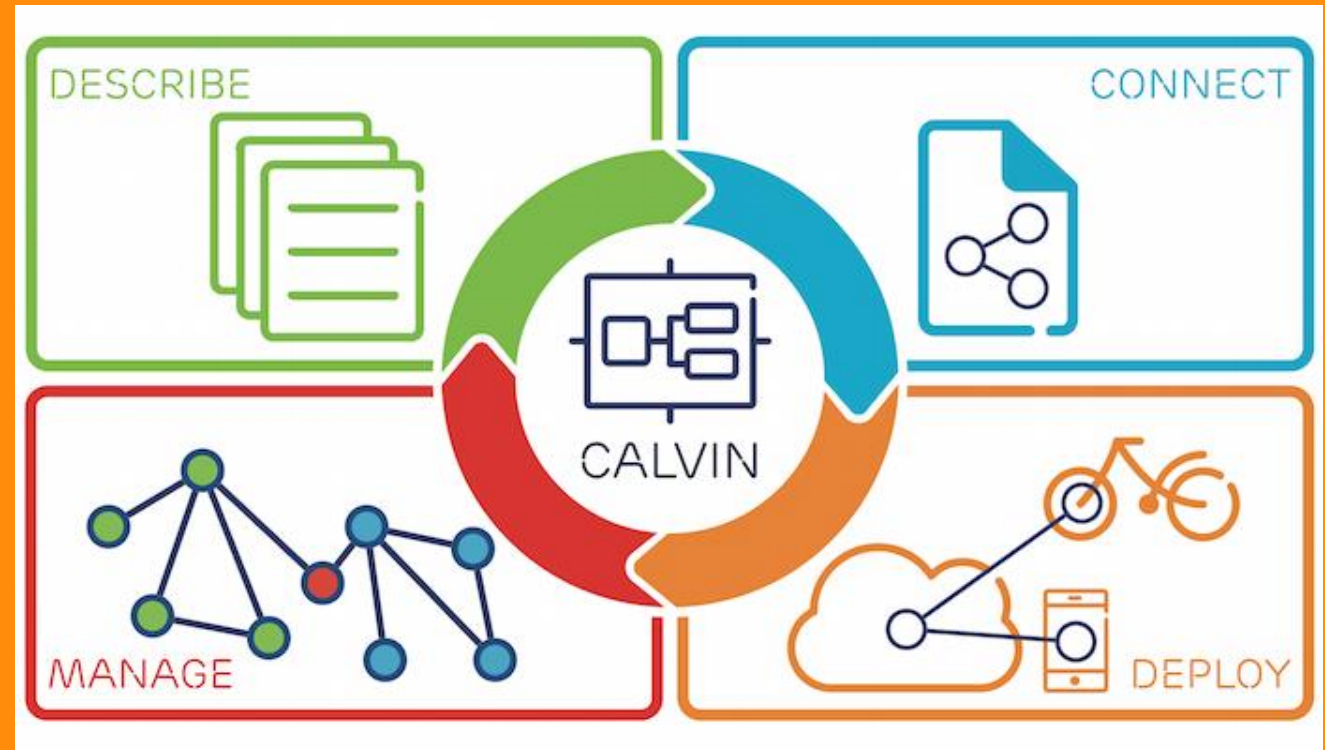
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Distributed Application Environment



Serverless application runtime
with fast key-value store for
state handling

Calvin a distributed
application environment that
lets things talk to things



Data Sharing and Replication



Ultra-fast Data Access Layer (DAL)

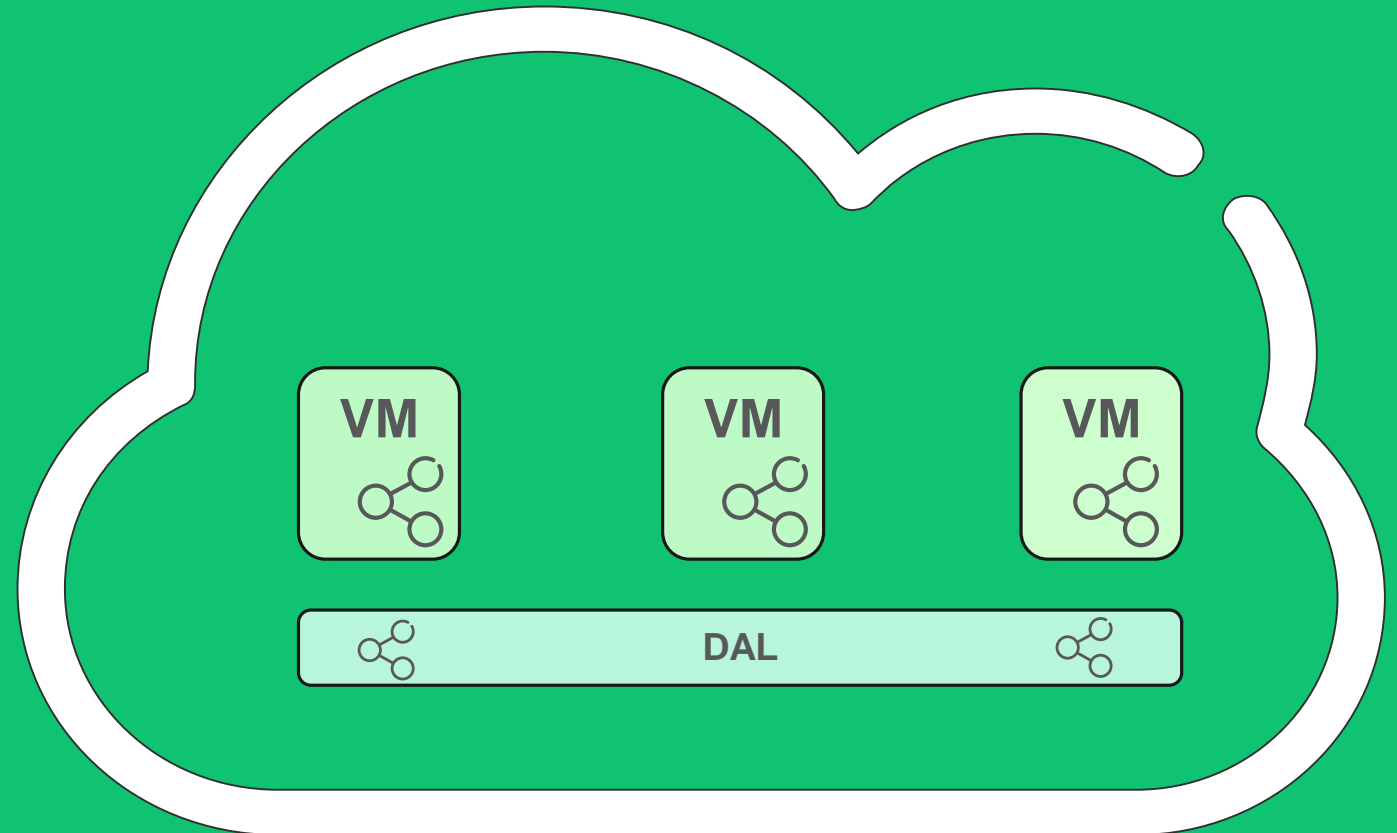
Key-value API:

Store & retrieve data

Messaging

Replication

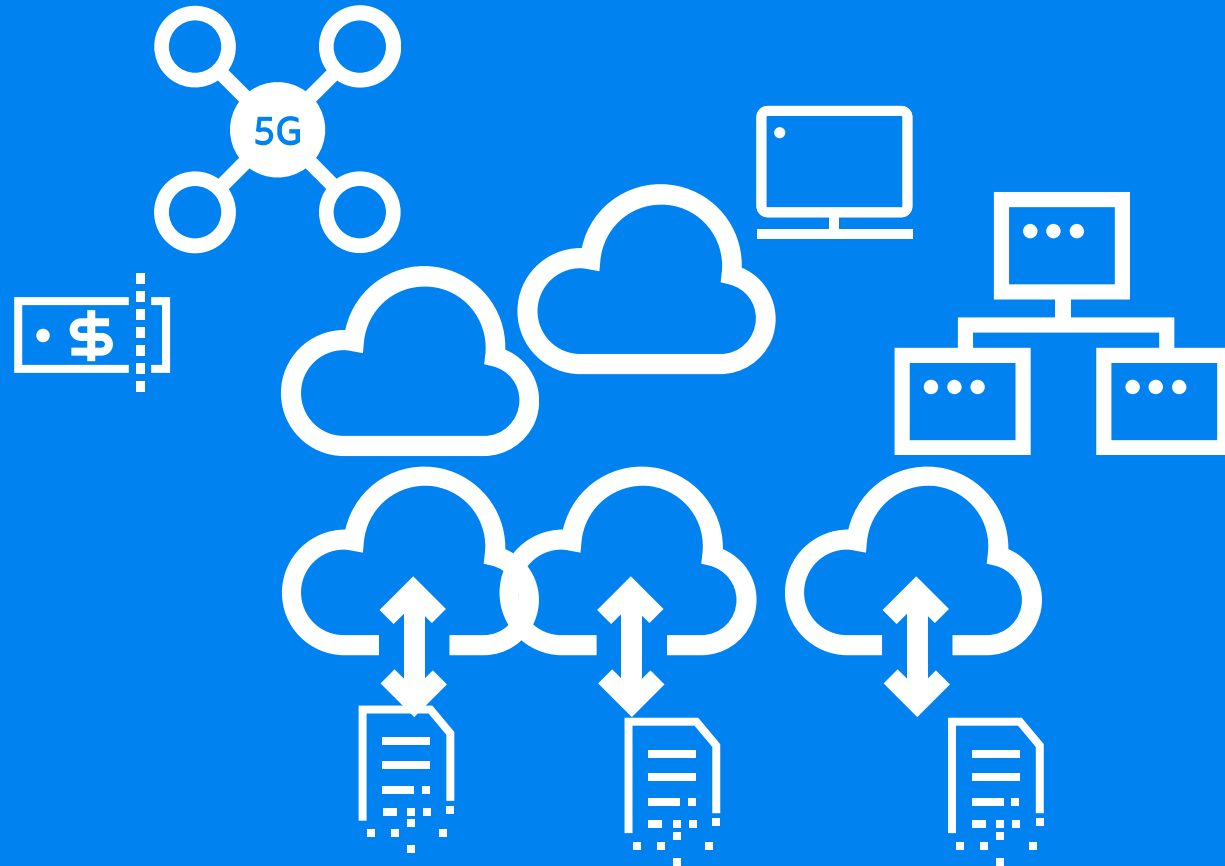
Locality optimization



Distributed Service composition



Automated composition,
deployment and management of
cloud-based NFV and 5G
services, both B2B and B2C,
reducing costs for businesses
and consumers



More Applications of Distributed Computing

Blockchains and smart contracts



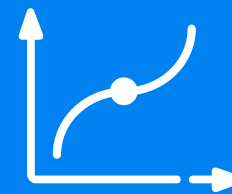
Neuromorphic Computing



Autonomous networking



Federated Machine Learning



Final Remarks



Industries are Transforming



Technologies are Evolving



Distributed Computing is the Foundation



Embedded Optimization in E/// IndustrialCloud





<https://www.ericsson.com/research-blog/>
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