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Recap

Kari Systä, 29.11.2022

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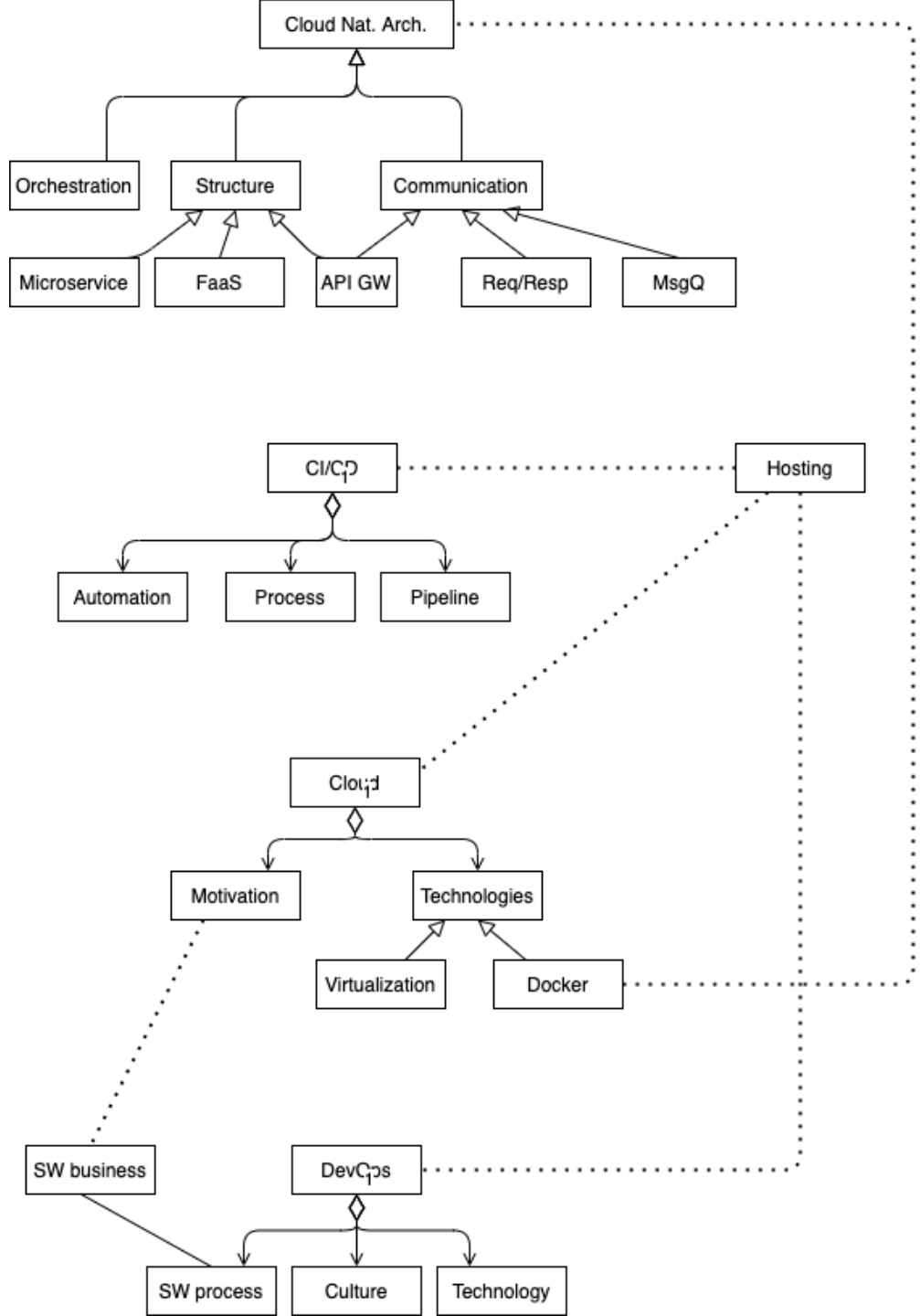
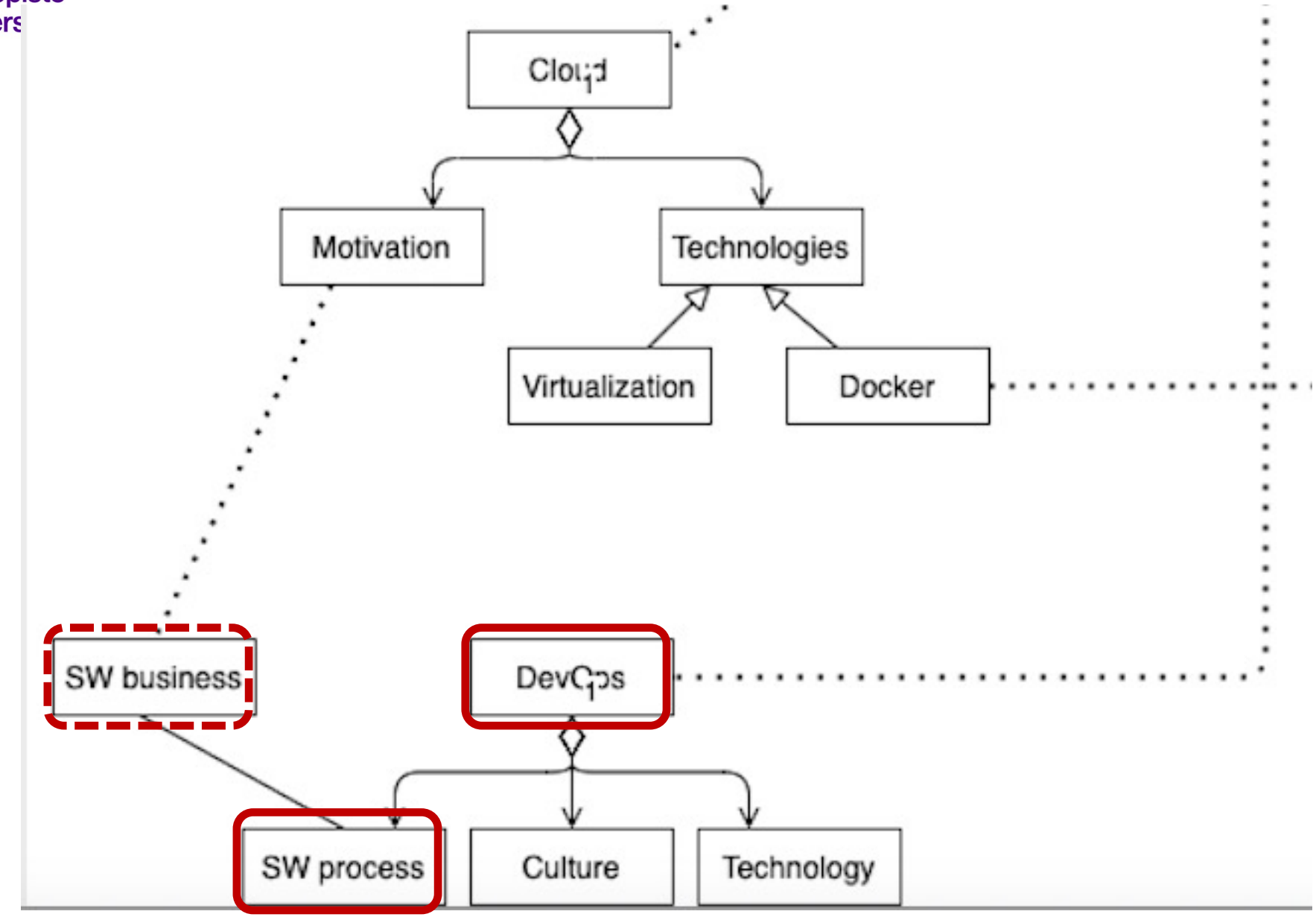
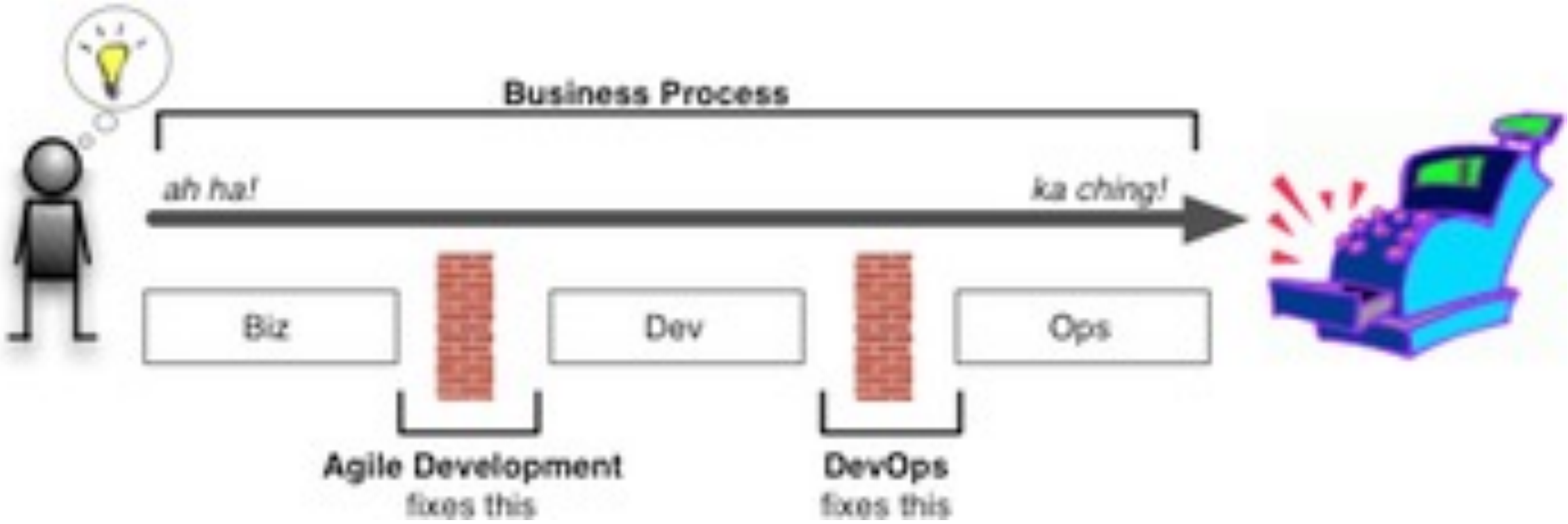



Cloud
Motivation
Technologies
Virtualization
Docker
SW business
DevOps
SW process
Culture
Technology

The lifecycle



DevOps practices

- Organizational
  - increased scope of responsibilities for developers;
  - intensified cooperation between development and operations.

- Technical
  - automation,
  - monitoring
  - measurement

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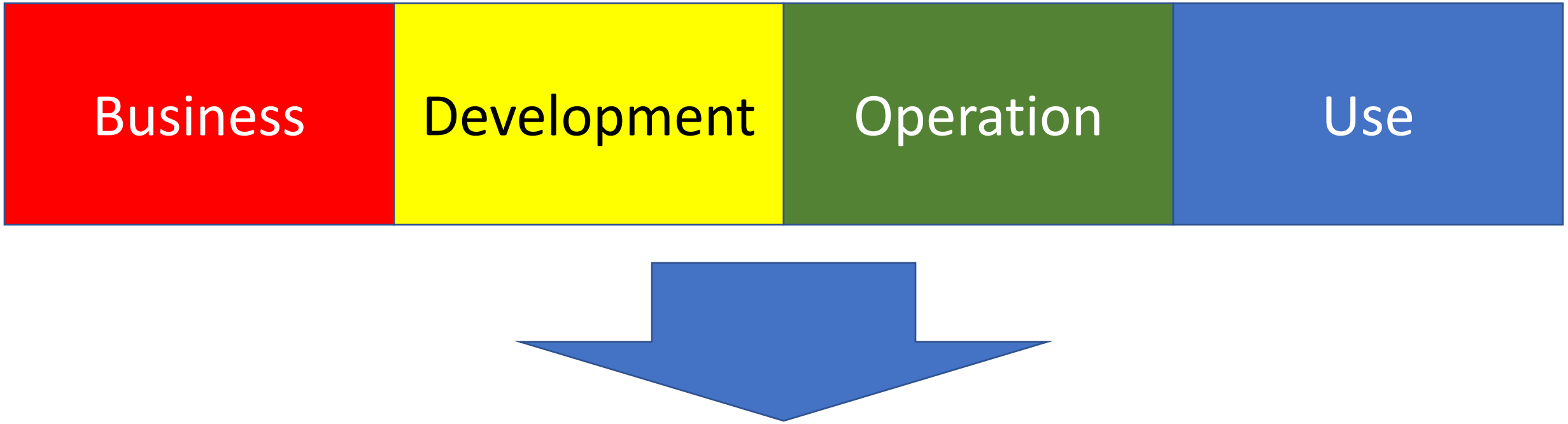
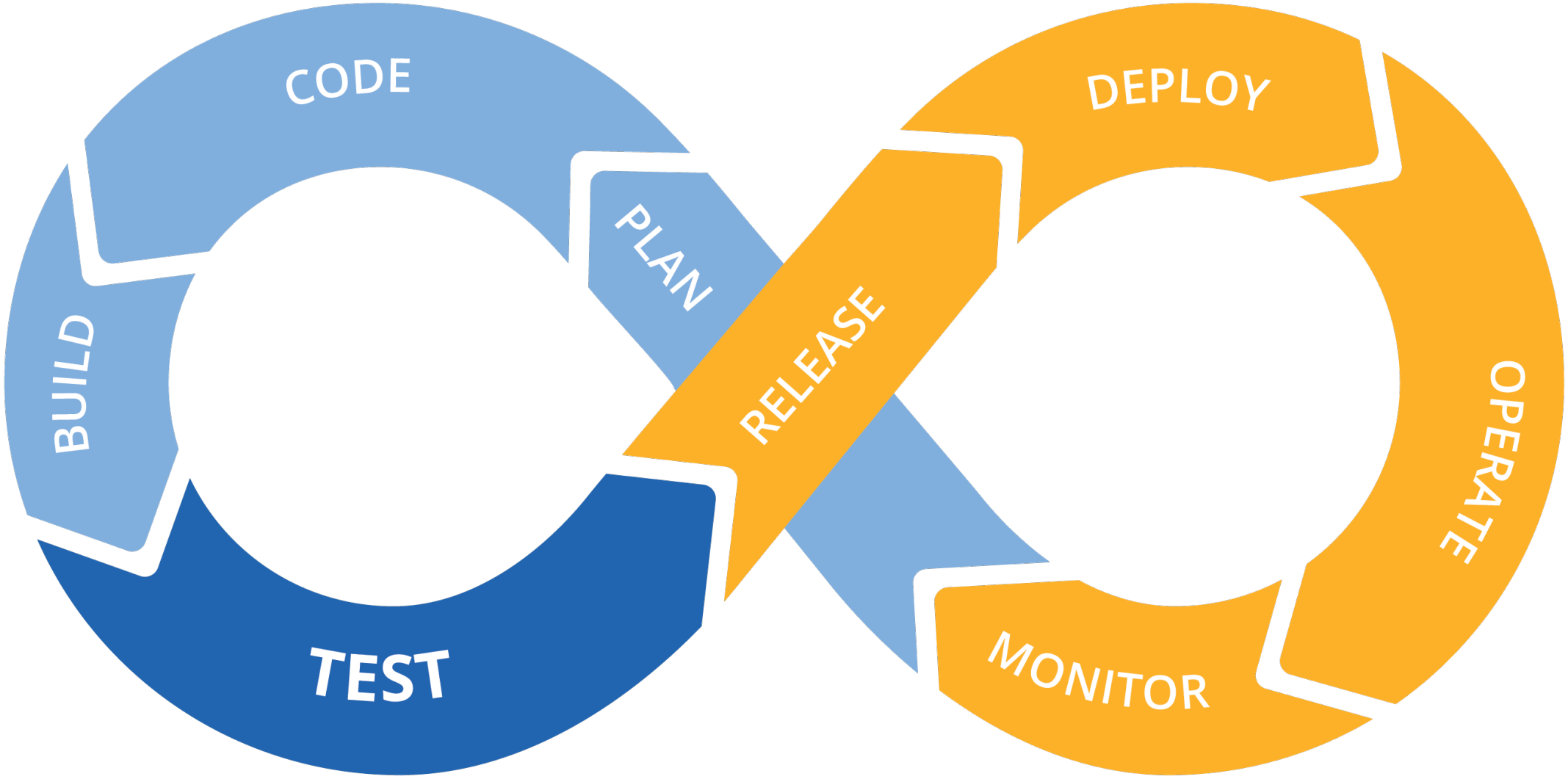
Where was the beef?



DevOps



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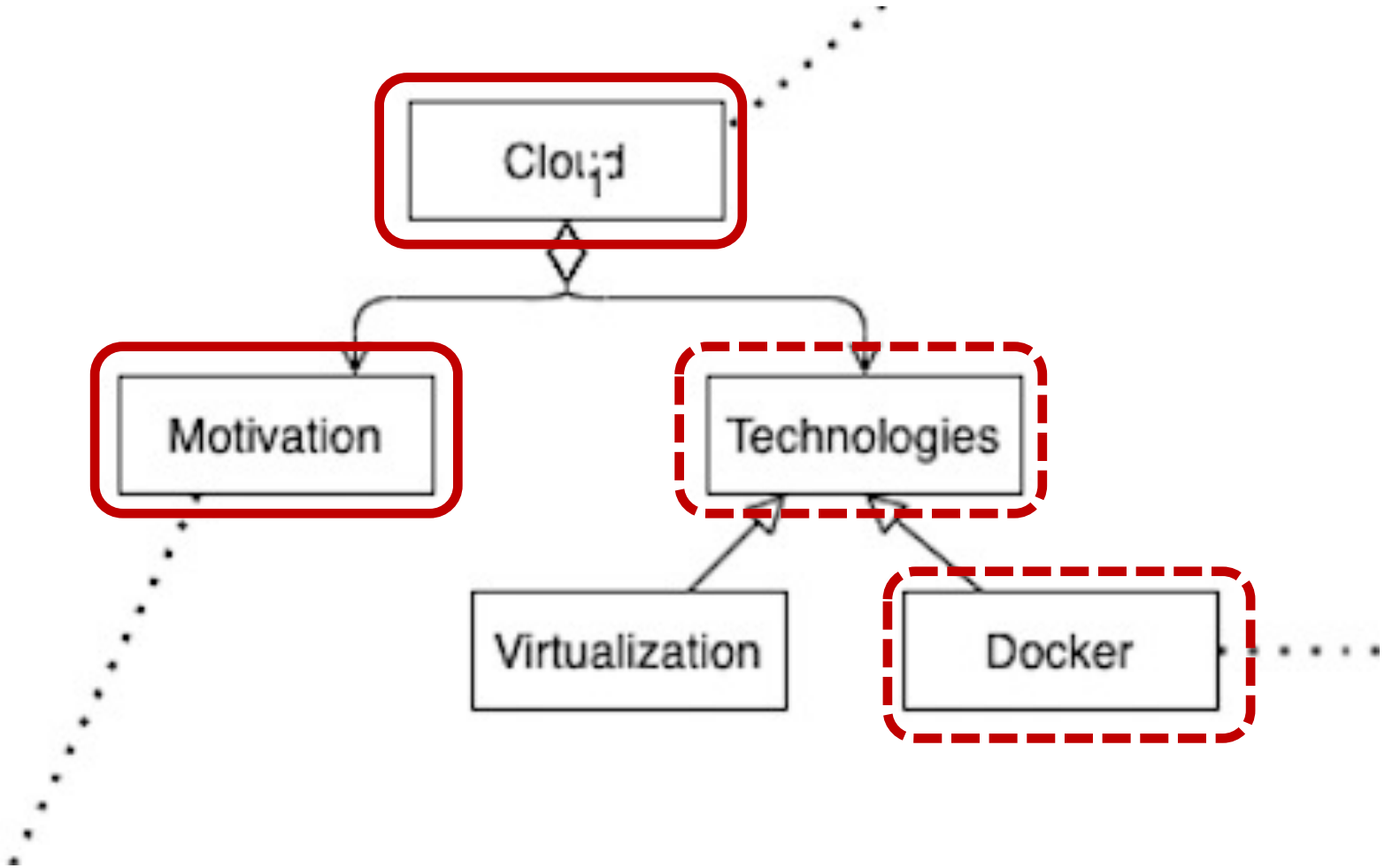
Reading material for the exam

- Lwakatare, Lucy Ellen, Doctoral Dissertation, University of Oulu, 2017, DevOps adoption and implementation in software development practice : concept, practices, benefits and challenges, <http://jultika.oulu.fi/files/isbn9789526217116.pdf>
  - Pages 25-30


Cloud
Motivation
Technologies
Virtualization
Docker

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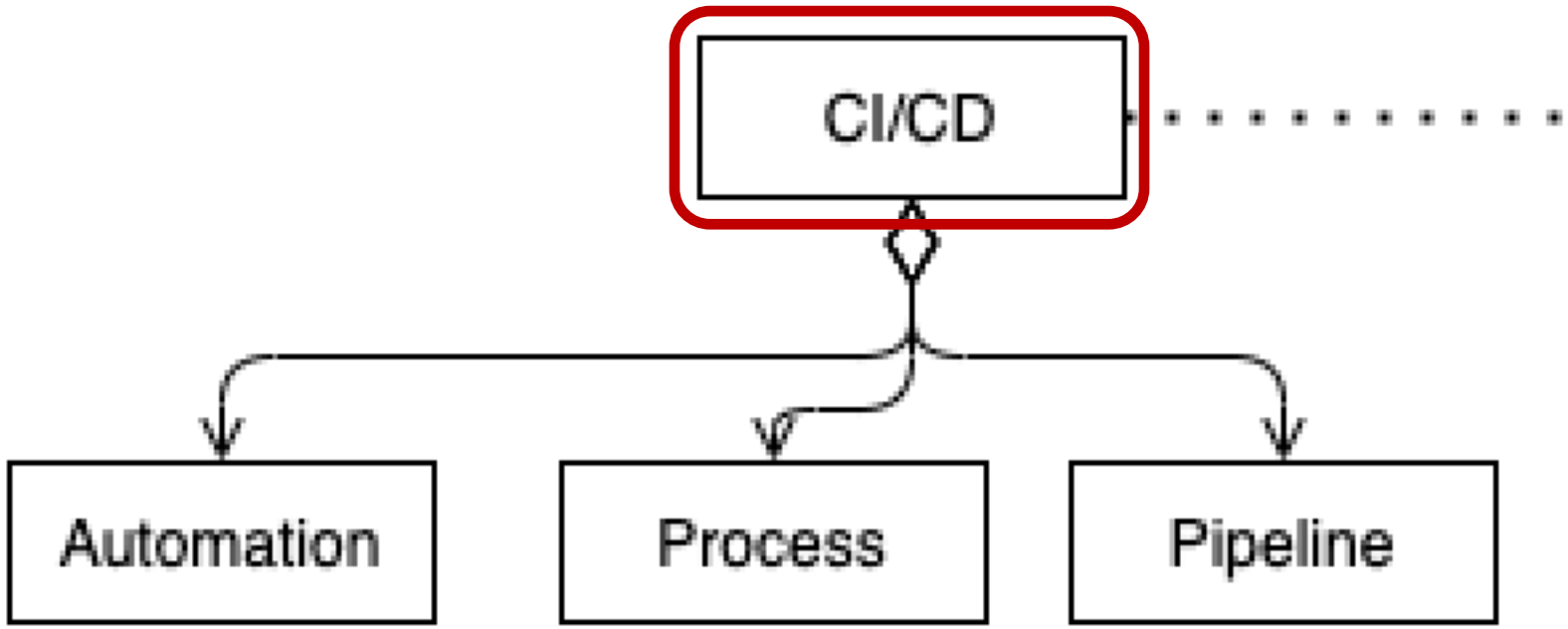
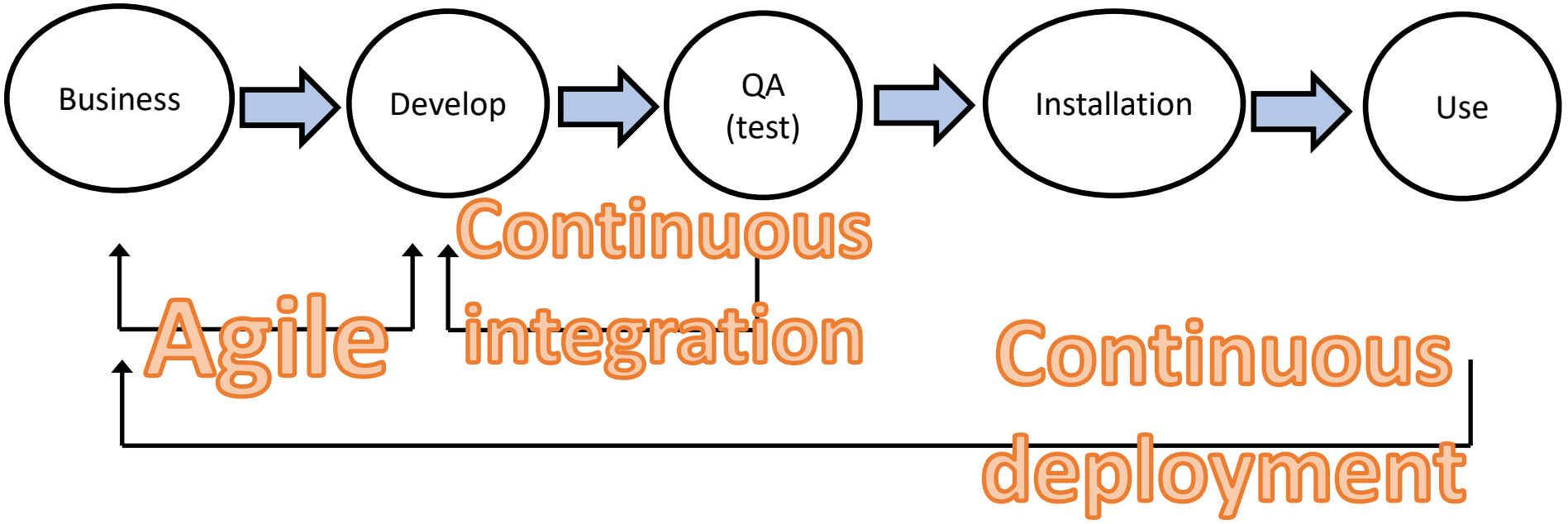
Cloud computing - definition

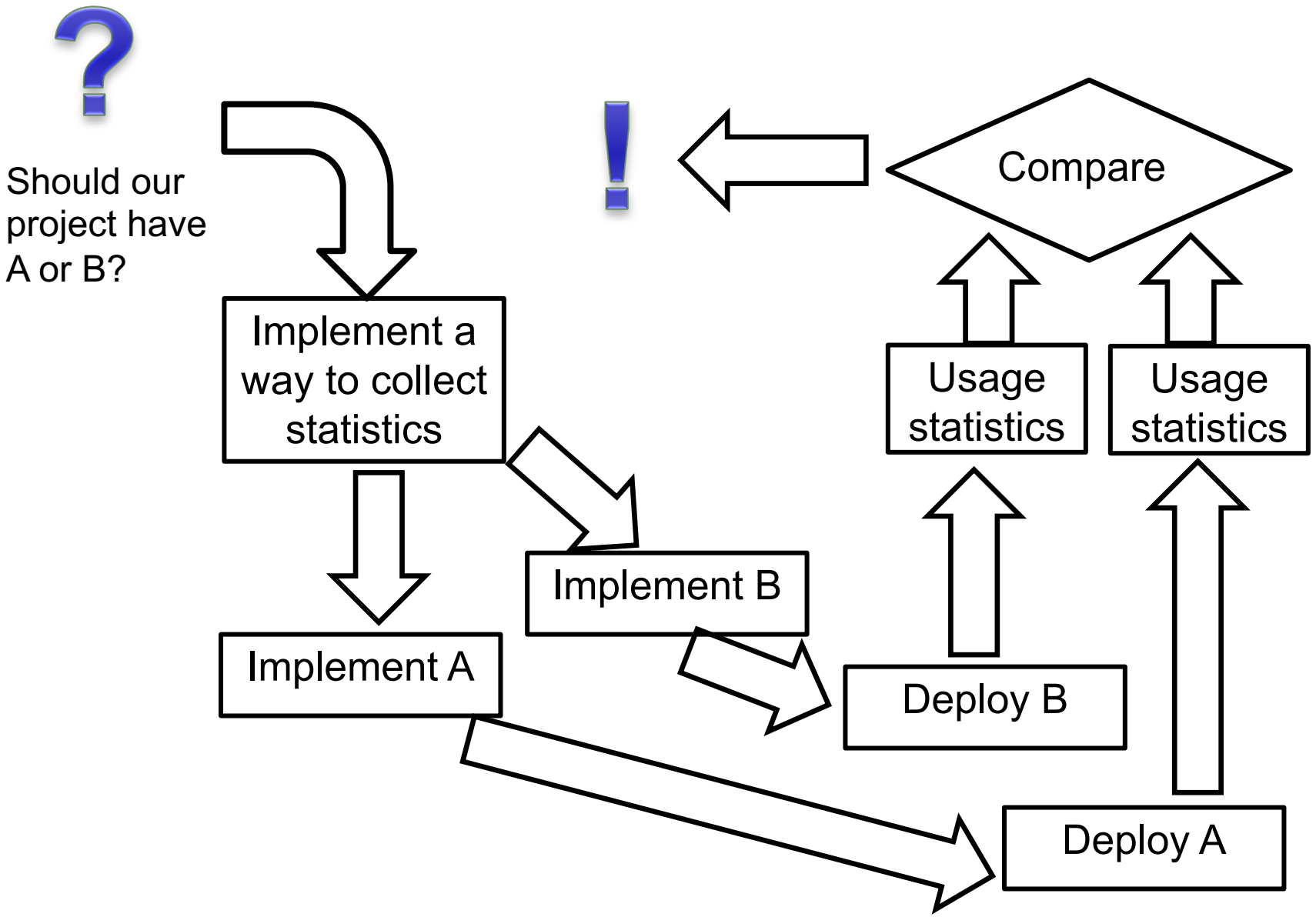
- In 1997, Professor Ramnath Chellapa of Emory University defined Cloud Computing as the new *'computing paradigm, where the boundaries of computing will be determined by economic rationale, rather than technical limits alone.'*
- *NIST:* Cloud computing is a model for enabling ubiquitous, convenient, **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.
-


CI/CD
Automation
Process
Pipeline

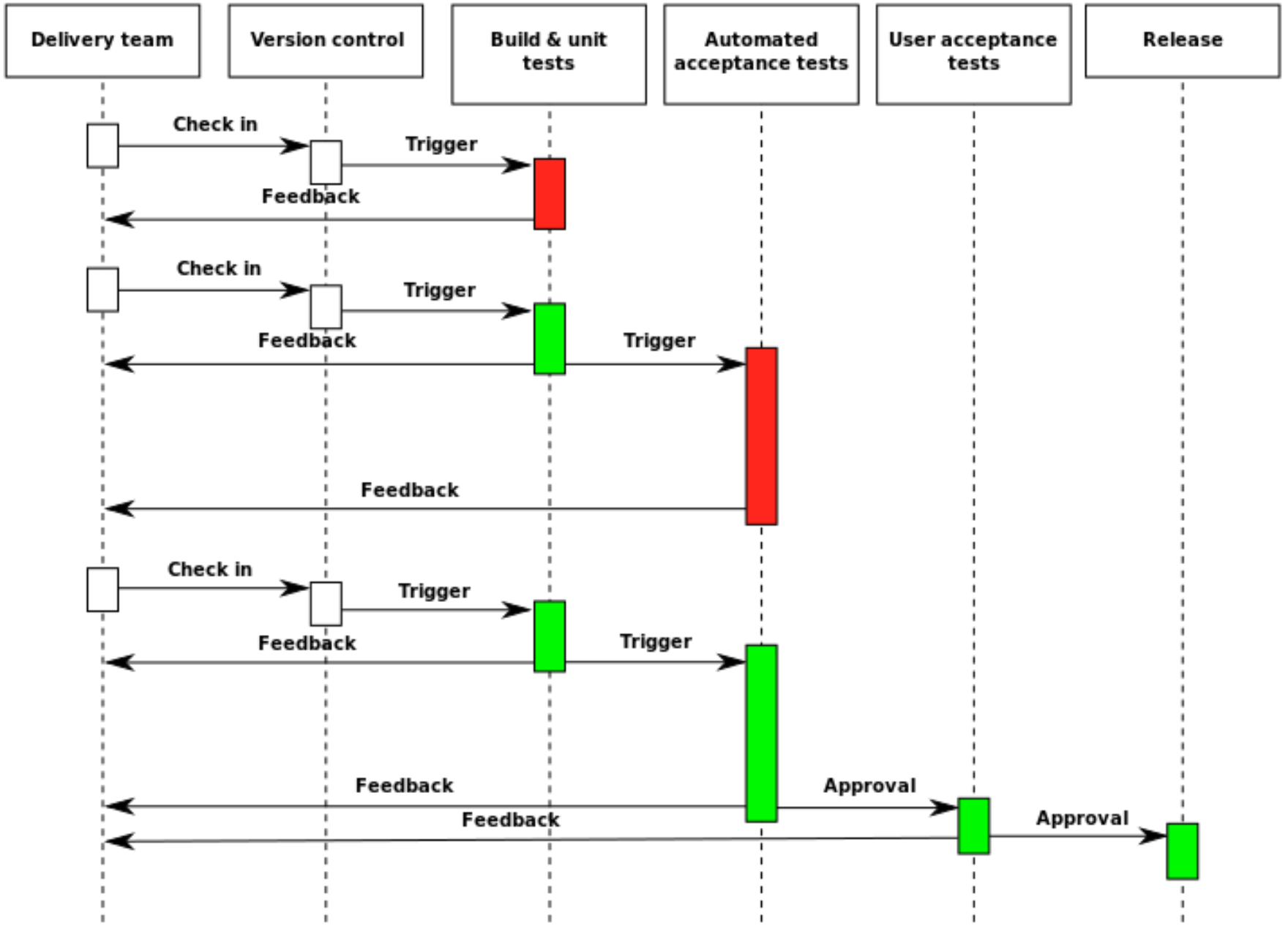
Feedback in traditional development (Case: Internet-based service; based on slide by Antti Tirilä)



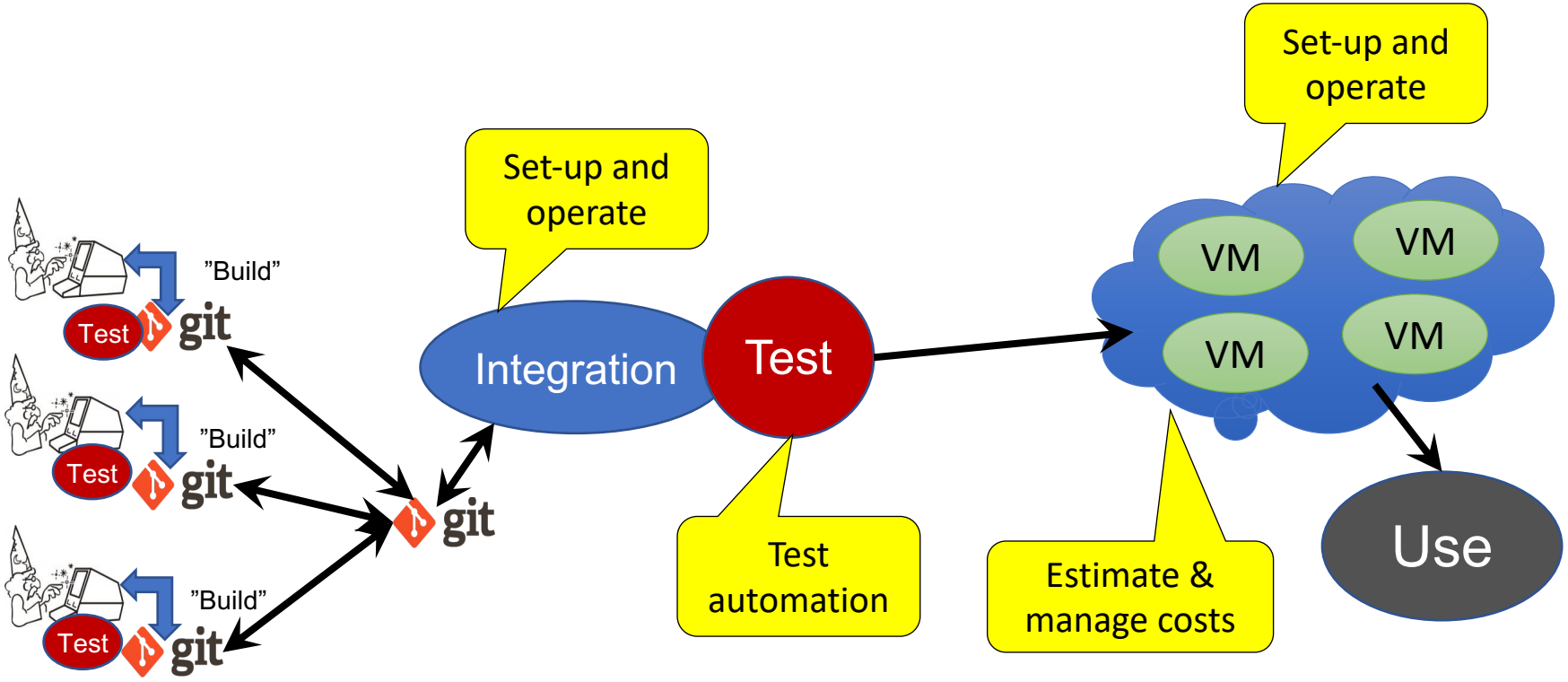
A/B Testing


Should our project have A or B?
Implement a way to collect statistics
Implement A
Implement B
Deploy B
Deploy A
Usage statistics
Usage statistics
Compare

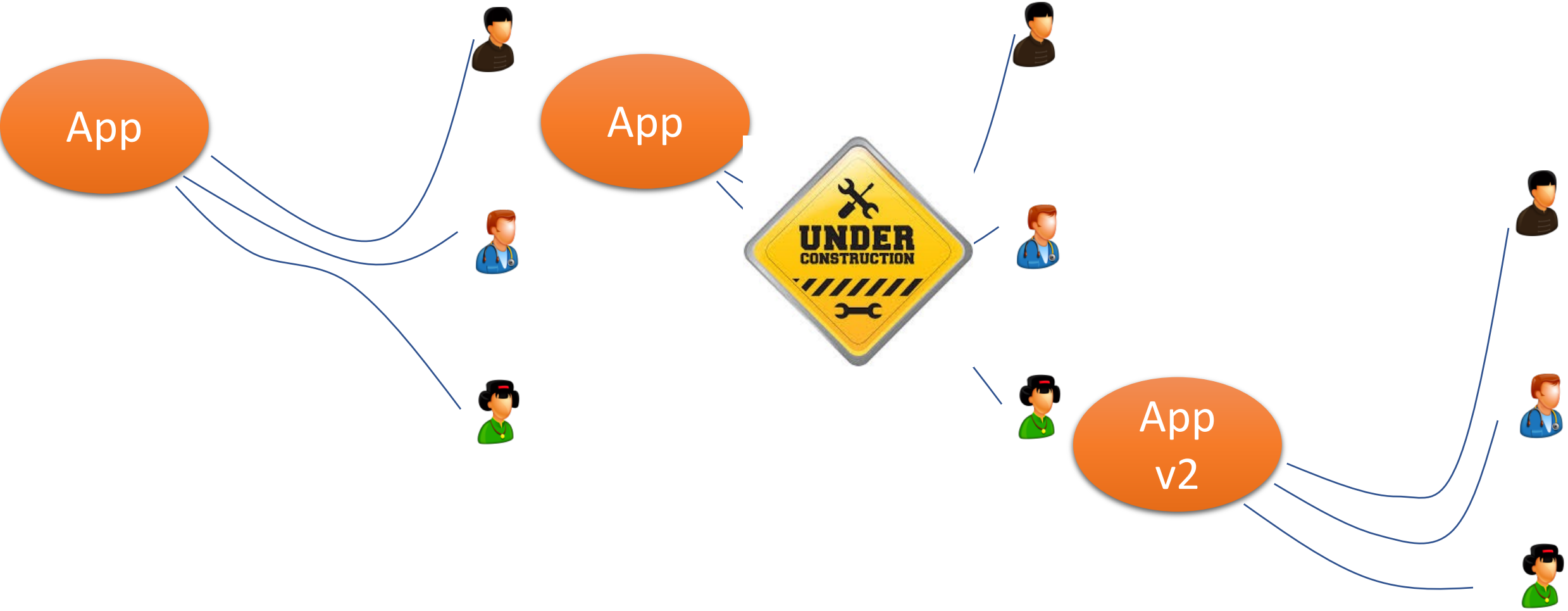
Deployment pipeline (a possible example)



What does it really take to run CD?



A possible strategy to deploy a new version?



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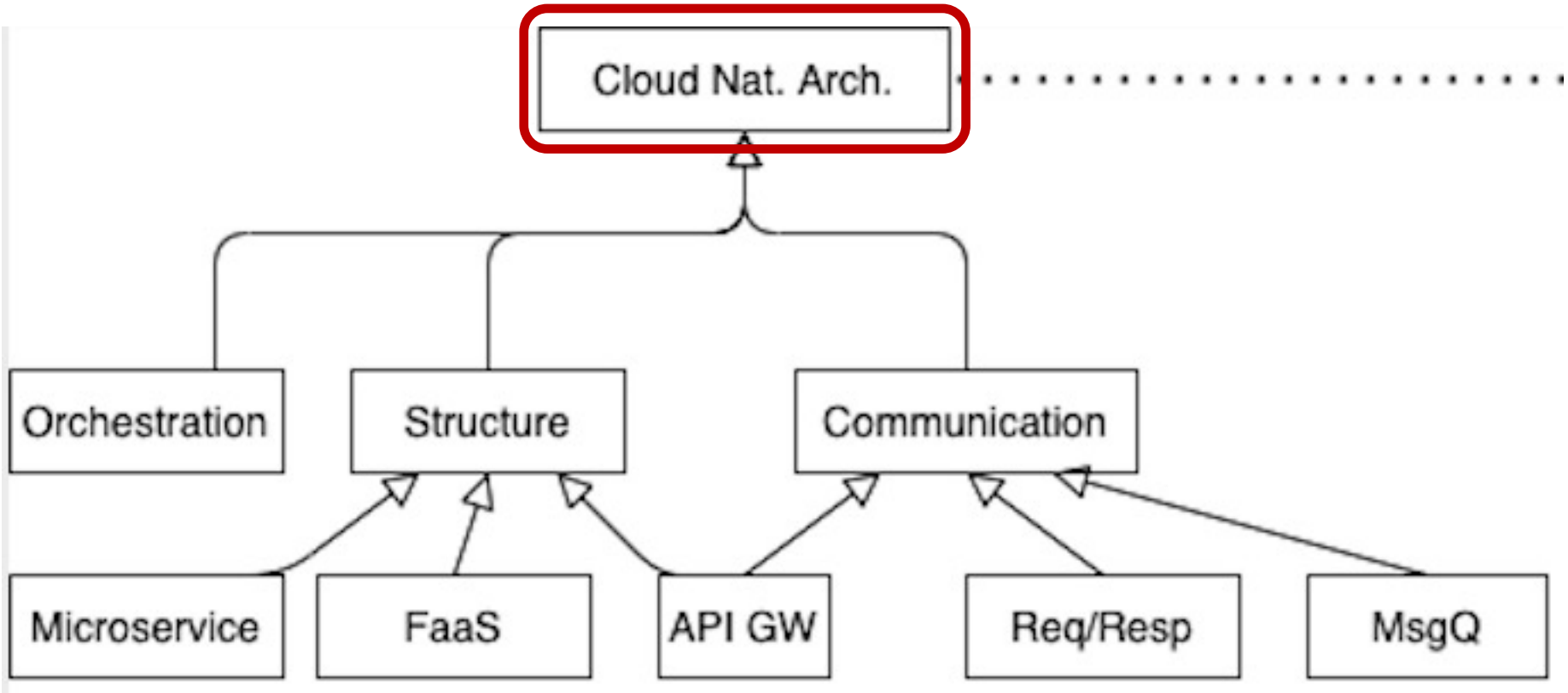
Reading material for exam

- https://continuousdelivery.com
  - (introduction, principles, and foundations)

- https://harness.io/blog/blue-green-canary-deployment-strategies/


Cloud Nat. Arch.
Orchestration
Structure
Communication
Microservice
FaaS
API GW
Req/Resp
MsgQ

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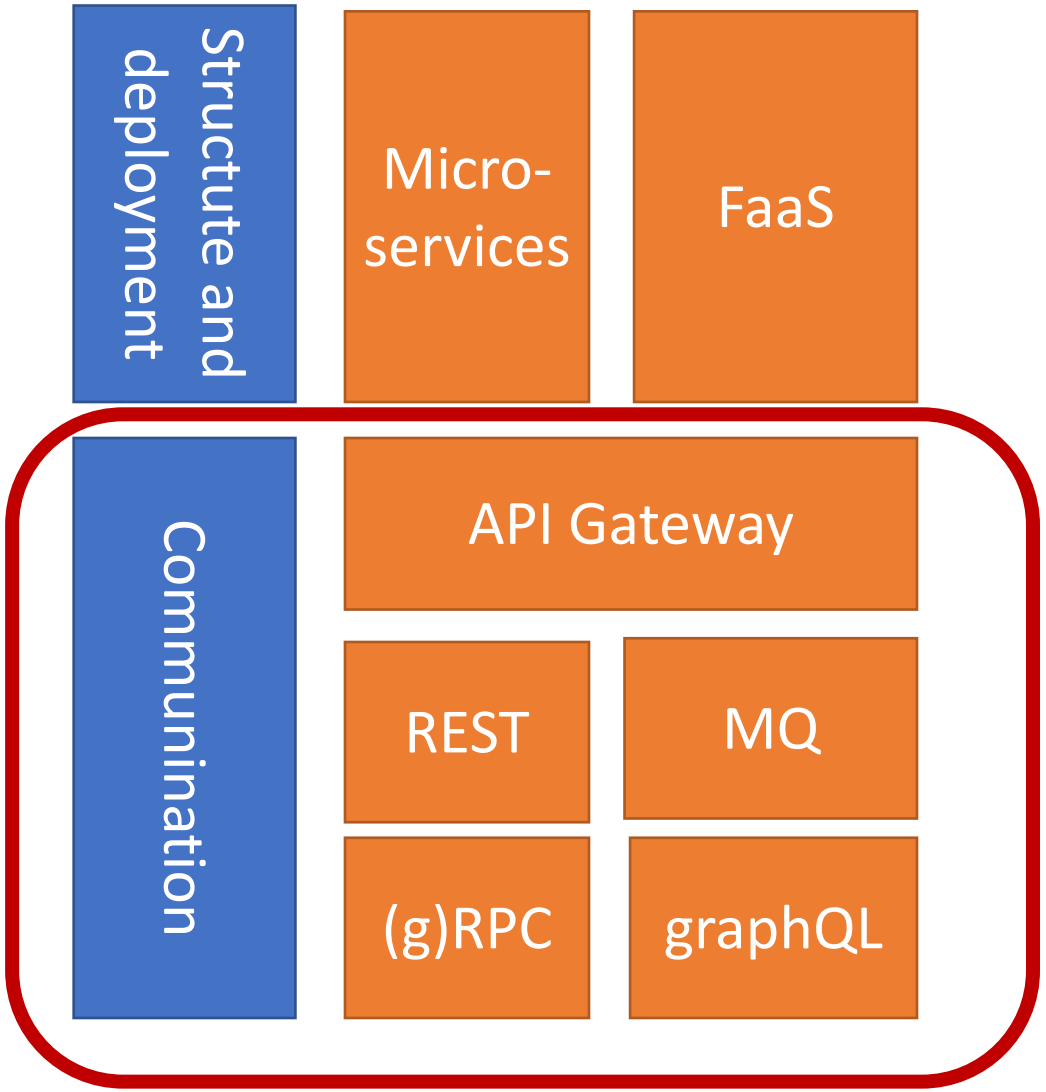
More about cloud-native architectures



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Some links

- 10 Key Attributes of Cloud-native Applications, <https://thenewstack.io/10-key-attributes-of-cloud-native-applications/>
- What are cloud-native applications? <https://opensource.com/article/18/7/what-are-cloud-native-apps>
- Native cloud application (NCA), <https://searchitoperations.techtarget.com/definition/native-cloud-application-NCA>
- Understanding cloud-native applications, <https://www.redhat.com/en/topics/cloud-native-apps>
- David S. Linthicum, Cloud-Native Applications and Cloud Migration: The Good, the Bad, and the Points Between, IEEE Cloud Computing, December 2017.

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7R's of cloud Micration

Replace
with imilar or improved but SaaS

Reuse
in the new SaaS version

Refactor
towards cloud-native architecture

Replatform
by using cloud services

Rehost
to a VM

Retain

Retire

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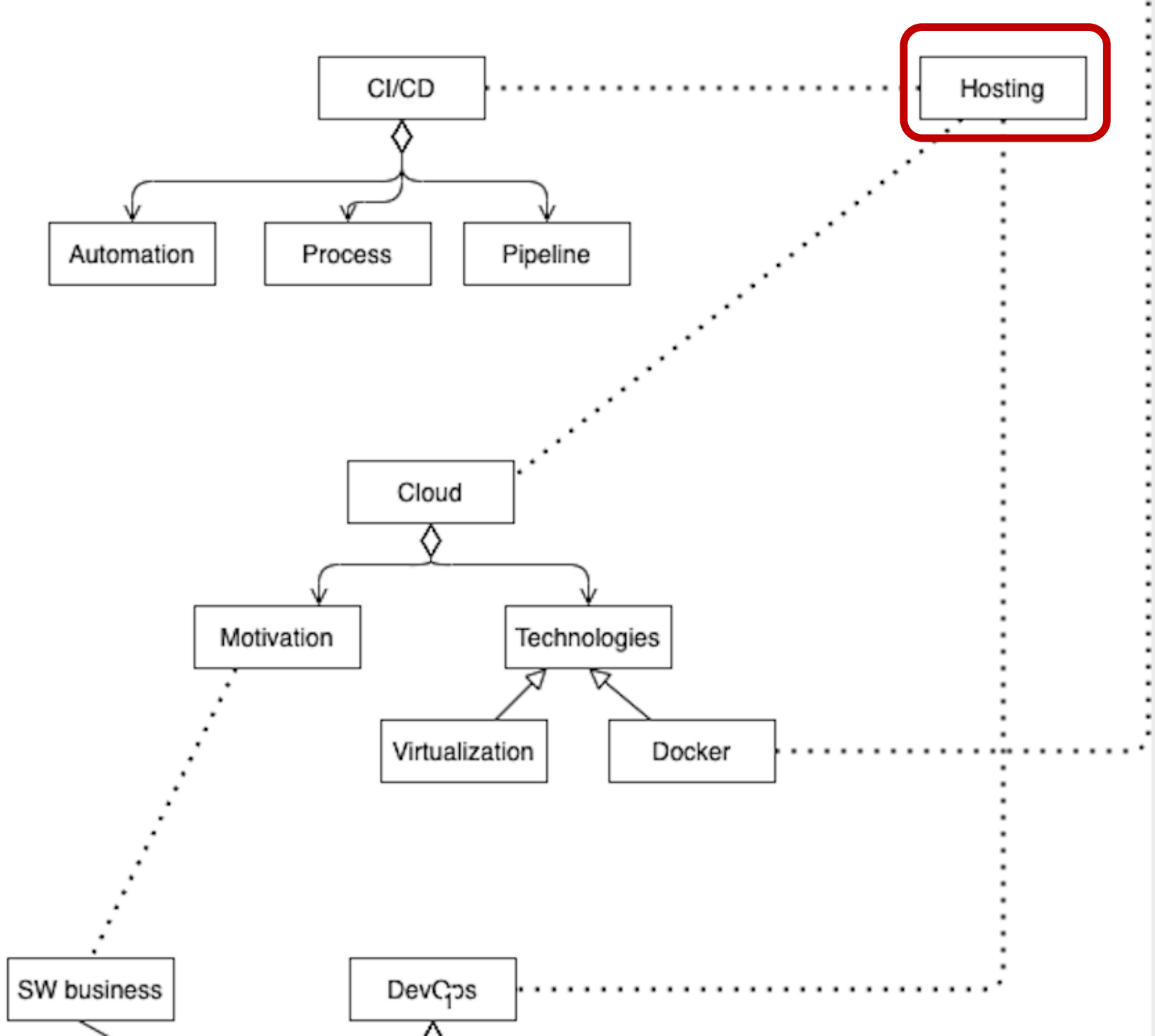
Reading material

- D. S. Linthicum, "Cloud-Native Applications and Cloud Migration: The Good, the Bad, and the Points Between," in *IEEE Cloud Computing*, vol. 4, no. 5, pp. 12-14, September/October 2017, doi: 10.1109/MCC.2017.4250932. https://ieeexplore.ieee.org/document/8125545/
- N. C. Mendonça, C. Box, C. Manolache and L. Ryan, "The Monolith Strikes Back: Why Istio Migrated From Microservices to a Monolithic Architecture," in *IEEE Software*, vol. 38, no. 5, pp. 17-22, Sept.-Oct. 2021, doi: 10.1109/MS.2021.3080335. https://ieeexplore.ieee.org/document/9520758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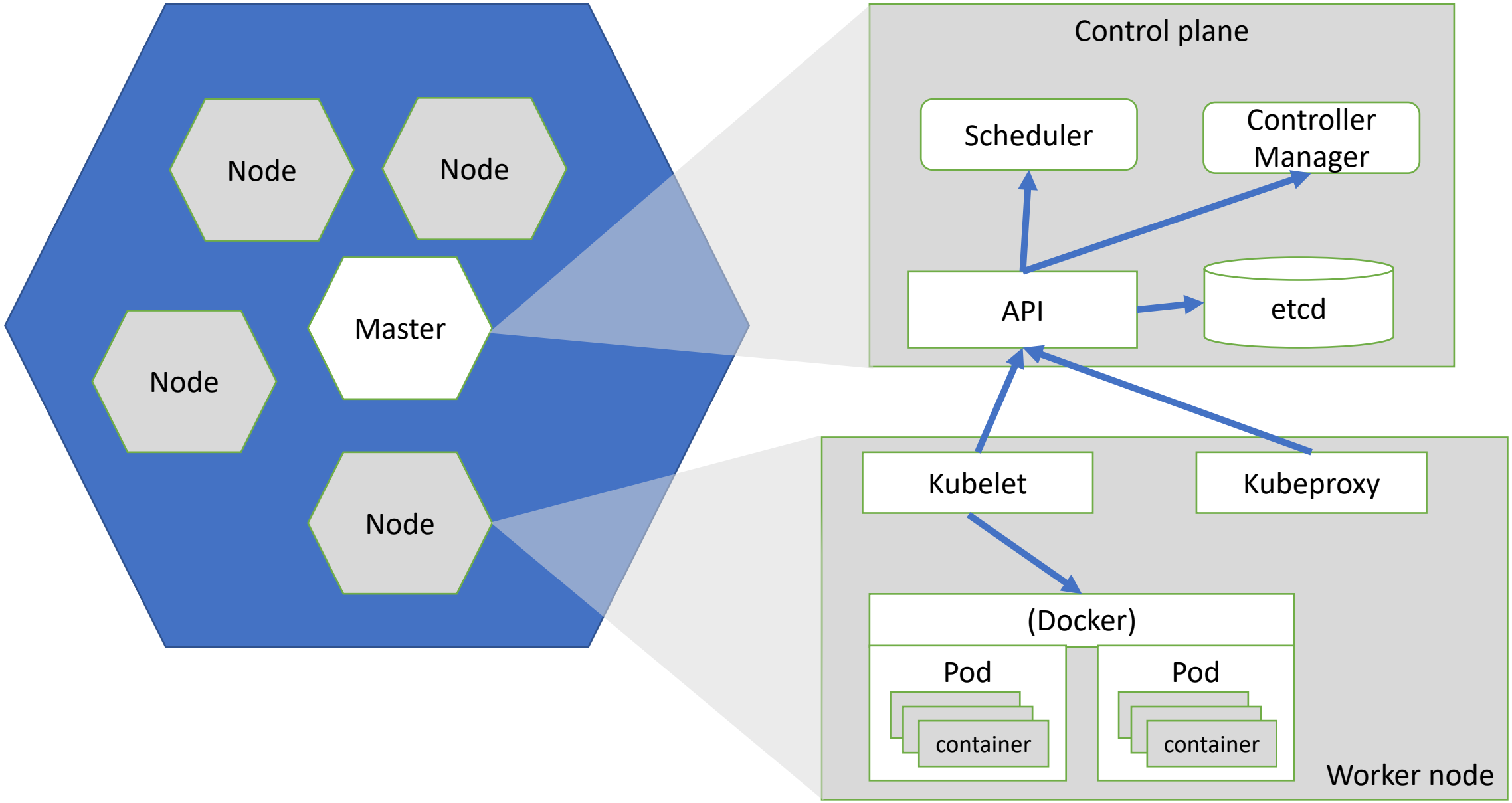
Infrastructure as code

From: https://docs.microsoft.com/en-us/azure/devops/learn/what-is-infrastructure-as-code

Infrastructure as Code (IaC) is

- the management of infrastructure (networks, virtual machines, load balancers, and connection topology) in a descriptive model,
- using the same versioning as DevOps team uses for source code.
- Like the principle that the same source code generates the same binary, an IaC model generates the same environment every time it is applied.
- IaC is a key DevOps practice and is used in conjunction with continuous delivery.

Kubernetes Kluster



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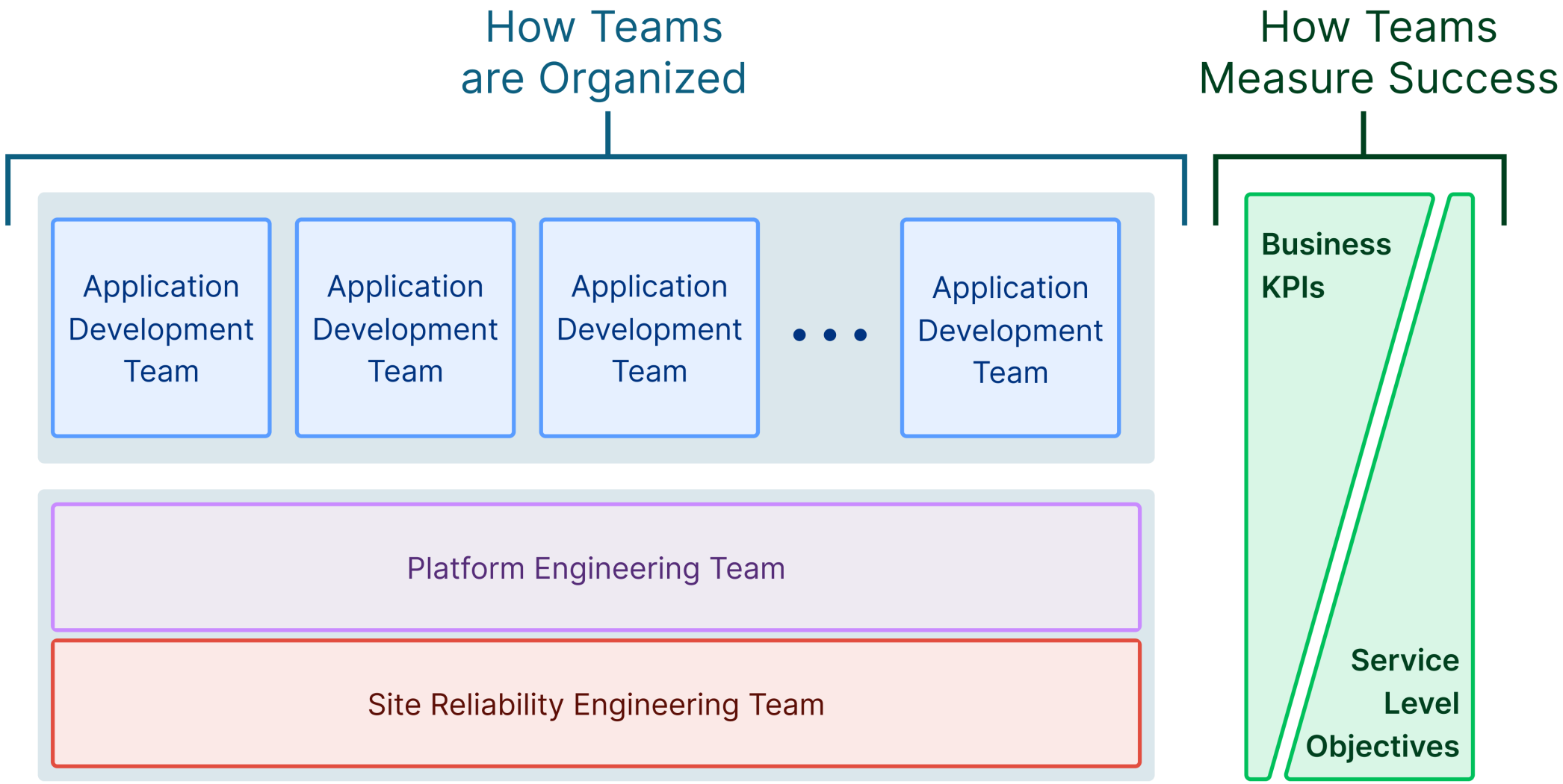
Example from https://aws.amazon.com/ec2/pricing/ (as of 13.09.2021)

- Free tier
  - AWS Free Tier includes 750 hours of Linux and Windows t2.micro instances, (t3.micro for the regions in which t2.micro is unavailable) each month for one year. To stay within the Free Tier, use only EC2 Micro instances.
- On-Demand
  - With On-Demand instances, you pay for compute capacity by the hour or the second depending on which instances you run.
- Spot instances
  - Amazon EC2 Spot instances allow you to request spare Amazon EC2 computing capacity for up to 90% off the On-Demand price.
- Reserved Instances
  - provide you with a significant discount (up to 72%) compared to On-Demand Instance pricing. In addition, when Reserved Instances are assigned to a specific Availability Zone, they provide a capacity reservation, giving you additional confidence in your ability to launch instances when you need them.

Name	vCPUs	Memory (GiB)	Baseline Performance/v CPU	CPU Credits earned/hr	Network burst bandwidth (Gbps)	EBS burst bandwidth (Mbps)	On-Demand Price/hr*	1-yr Reserved Instance Effective Hourly*	3-yr Reserved Instance Effective Hourly*
t3.nano	2	0.5	5%	6	5	Up to 2,085	$0.0052	$0.003	$0.002
t3.micro	2	1.0	10%	12	5	Up to 2,085	$0.0104	$0.006	$0.005
t3.small	2	2.0	20%	24	5	Up to 2,085	$0.0209	$0.012	$0.008
t3.medium	**2**	**4.0**	**20%**	**24**	**5**	**Up to 2,085**	**$0.0418**	**$0.025**	**$0.017**
t3.large	2	8.0	30%	36	5	Up to 2,780	$0.0835	$0.05	$0.036
t3.xlarge	4	16.0	40%	96	5	Up to 2,780	$0.1670	$0.099	$0.067
t3.2xlarge	8	32.0	40%	192	5	Up to 2,780	$0.3341	$0.199	$0.133

https://www.getambassador.io/resources/rise-of-cloud-native-engineering-organizations



Grading

- Exercises 20%
  - Max points: 4+8+12+12+12 = 48
  - => for grading: **points/48*20**
- Exam 40%
  - 4*6p => max = 24
  - => for grading: **points/24*40**
- Project 40% + “bonuses”
  - For grading: **min(points,50)**

- Grades last year
  - 40-50: 1
  - 50-61: 2
  - 61-73: 3
  - 73-85: 4
  - 85-.. : 5

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How prepare to exam

- Lecture videos & slides can be used as background material
- Basics and motivations (these are covered in the “lectures”, too)
  - [Chapter 2] Lwakatare, Lucy Ellen, Doctoral Dissertation, University of Oulu, 2017, DevOps adoption and implementation in software development practice : concept, practices, benefits and challenges, http://jultika.oulu.fi/files/isbn9789526217116.pdf [Pages 25-30]
  - https://www.linkedin.com/pulse/outdated-belief-7-post-deployment-relevant-only-serious-jan-bosch/
  - Peter Mell; Timothy Grance (September 2011). The NIST Definition of Cloud Computing (Technical report). National Institute of Standards and Technology: U.S. Department of Commerce. doi:10.6028/NIST.SP.800-145. Special publication 800-145. https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf
  - Keith D. Foote, A Brief History of Cloud Computing, June 2017, https://www.dataversity.net/brief-history-cloud-computing
  - https://continuousdelivery.com (introduction, principles, and foundations)
  - https://harness.io/blog/blue-green-canary-deployment-strategies/
- Issues and critics (this material is for those who aim at grade 5)
  - https://platformengineering.org/blog/what-is-platform-engineering https://www.getambassador.io/resources/rise-of-cloud-native-engineering-organizations
  - D. S. Linthicum, "Cloud-Native Applications and Cloud Migration: The Good, the Bad, and the Points Between," in IEEE Cloud Computing, vol. 4, no. 5, pp. 12-14, September/October 2017, doi: 10.1109/MCC.2017.4250932. https://ieeexplore.ieee.org/document/8125545/
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  - https://www.freecodecamp.org/news/7-cases-when-not-to-use-docker/