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Cybersecurity of Cloud Systems

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What is „cloud computing"?

— Business origin - inconsistent perception

— Typical features:
   — **Computing resources** = networks, servers, operating systems, software, repositories, applications services
   — **Remote acess** = internet
   — **Self-service** = the other side controlled by computer (fast)
   — **Expandable** = almost indefinitely as long as I have money
   — **Shared** = if do not use it, somebody else does, or we can use it together

— Also cloud computing services, cloud service, cloud, etc.
— ISO/IEC 17788, NIST 800-145

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What is „cloud computing"?

– Paradigm for enabling network **access to a scalable and elastic** pool of shareable physical or virtual **resources** with self-service provisioning and administration **on demand**.

– The use of a network of **remote servers** hosted **on the internet** to store, manage and process data rather than a local server.

– For example:
  – Storage, Computing power, Content delivery network, …

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For hosting a website you need:

– Servers
– Databases
– Software
– Space
– Experts (employees)
  – IT, security (fyzical-, cyber-), …
– Time to manage
– Money

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Why cloud computing?

– Cheaper   (pay what you use, maintenance costs)
– Faster   (better equiped)
– Scalable   (scaling down)
– Accessible   (any place)
– Safer?

– „*Outsourcing of IT*"

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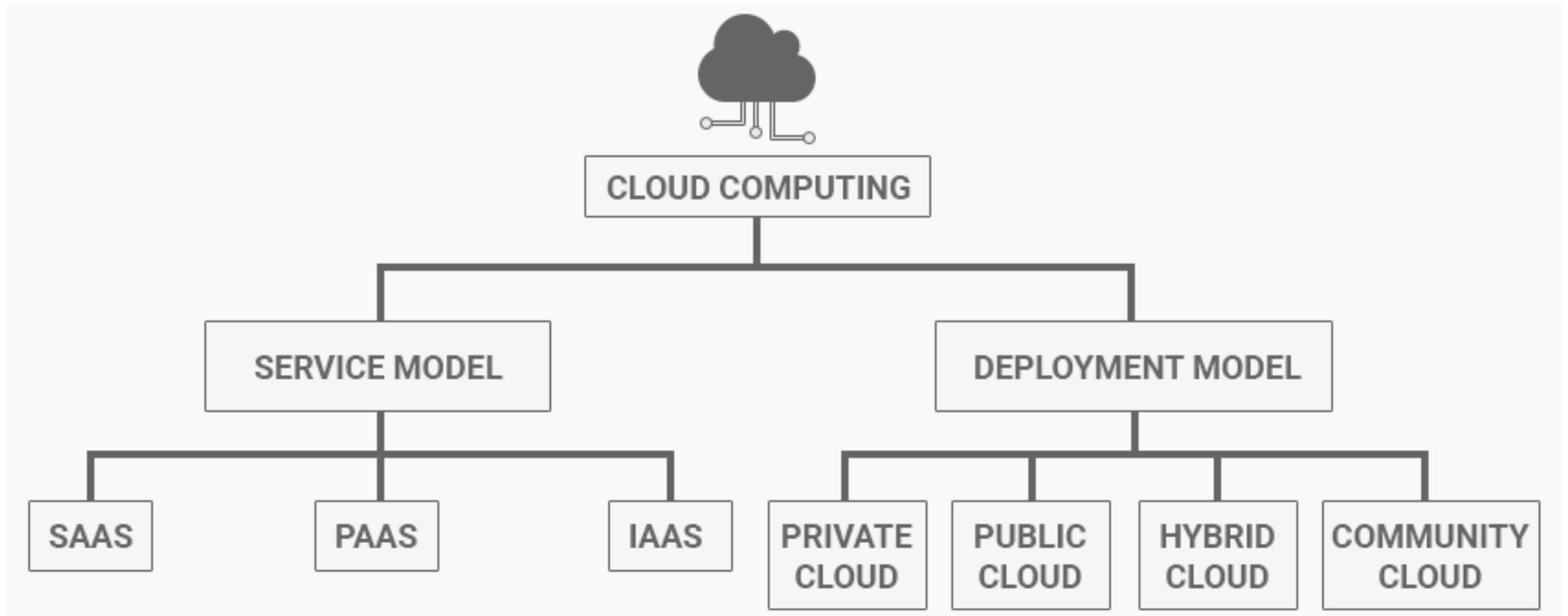# Is cloud computing safe?

— Safety contributions:
  - Central management
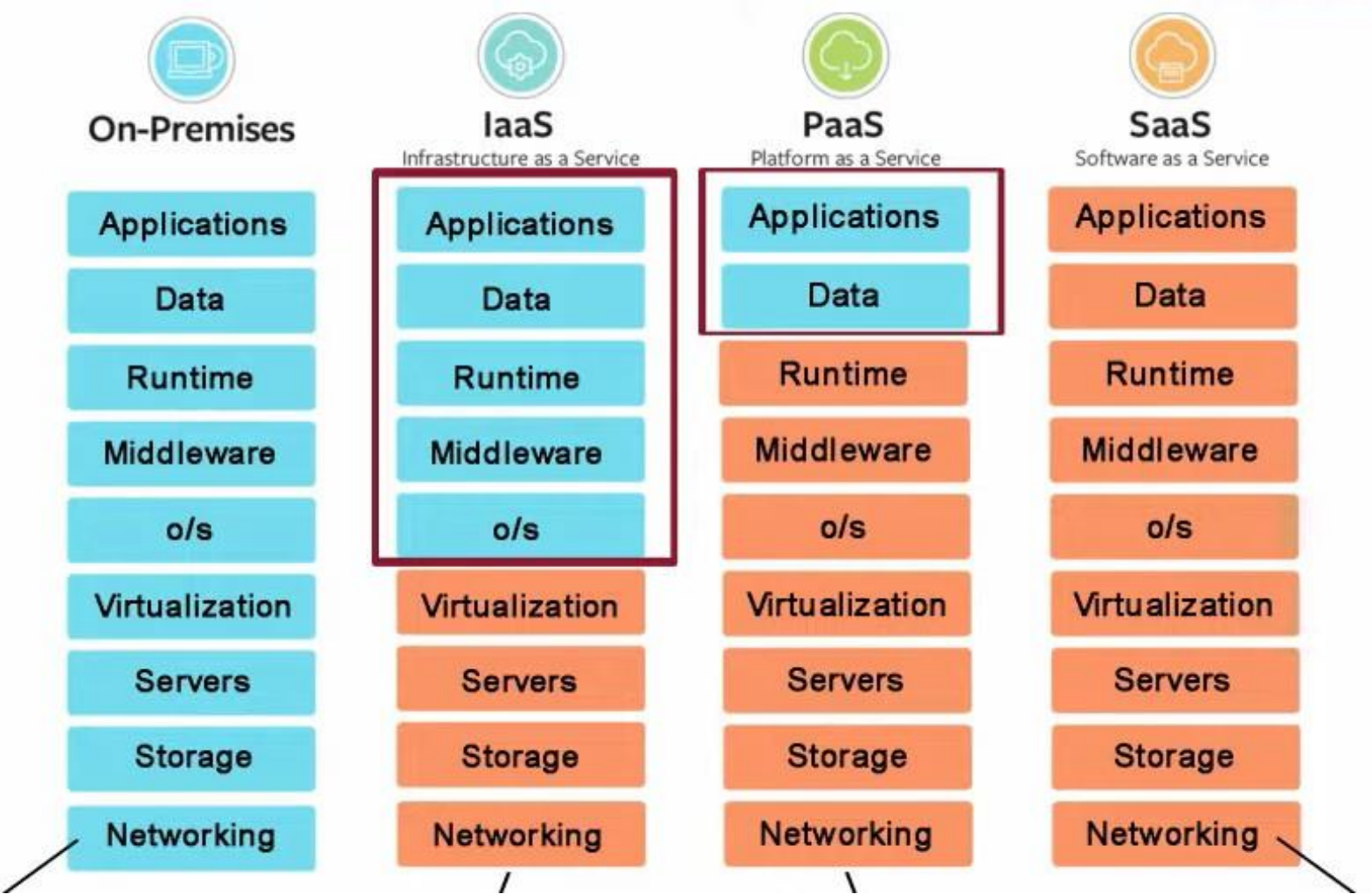 - Surveillance
  - Updating

— Safety risks:
  - The location of data and data processing is often seated abroad (not known where)
  - Legal system of the third country (access of foreign bodies)
  - Significant dependancy on the provider and limited possibilities to verify them,
  - Difficult access for Czech „law enforcement" bodies to data about criminal activities
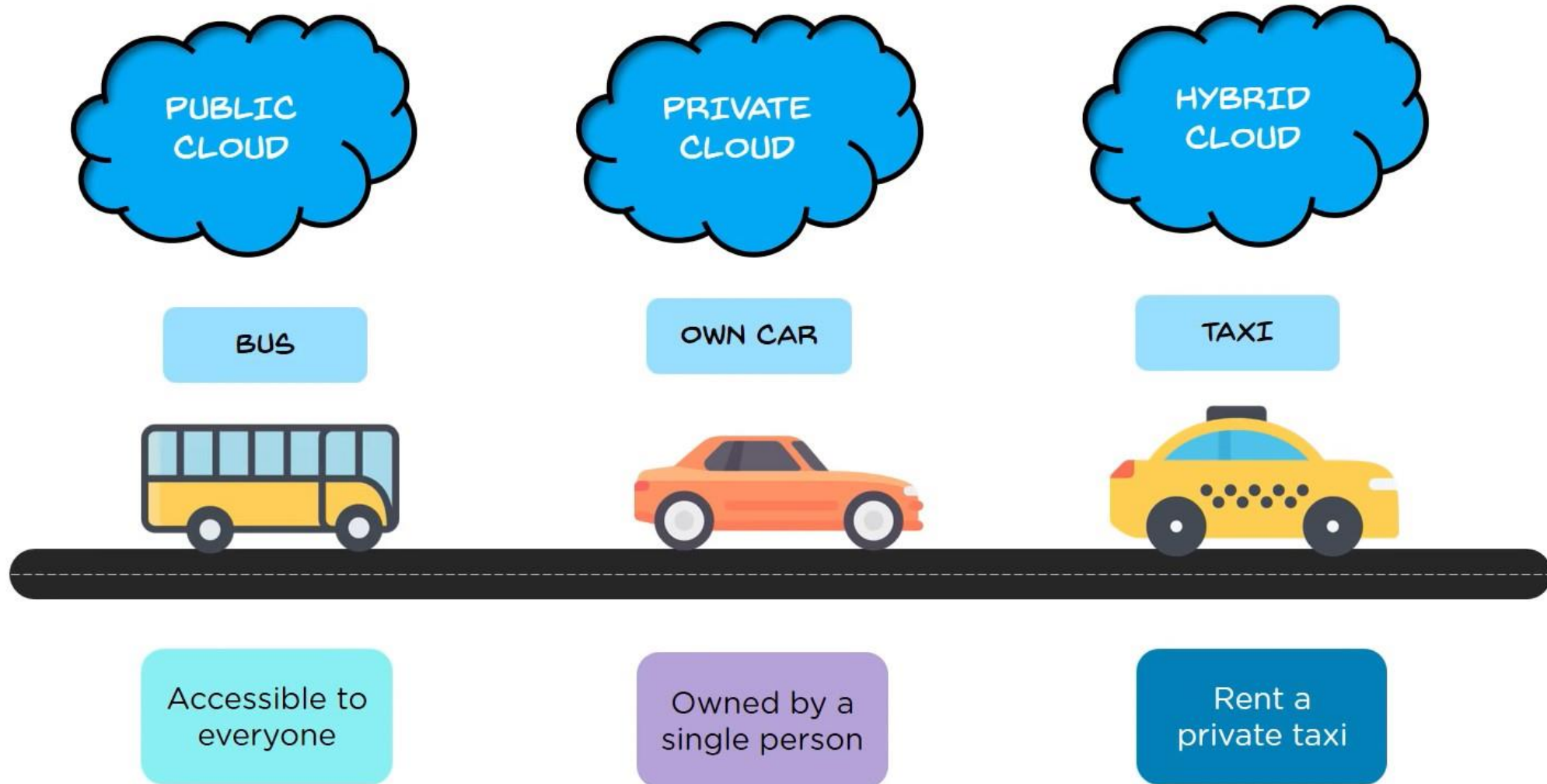
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Money comes first

— The global cloud computing market size is expected to grow from USD 371.4 billion in 2020 to **USD 832.1 billion by 2025**, at a Compound Annual Growth Rate (CAGR) of 17.5%

— Large companies in the US could **save $12.3 billion annually in energy consumption** by adopting cloud computing.

— Running some complex applications in the cloud is cheaper than developing the same by a university. "At least **half of the cost could be saved by outsourcing in the cloud** for each application."

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Types of service model

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Types of deployment model

PUBLIC CLOUD

PRIVATE CLOUD

HYBRID CLOUD

BUS

OWN CAR

TAXI

Accessible to everyone

Owned by a single person

Rent a private taxi

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CC providers

— Amazon (AWS)
— Microsoft (Azure, Office 365)
— Google Cloud Platform

— Alibaba
— Oracle
— IBM
— Tencent
— VMware, SAP, NTT, Dropbox, Salesforce, Cisco…

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EU proposal of regulation

— The European Union Agency for Cybersecurity (ENISA)

— draft of The European Union Cybersecurity Certification Scheme for Cloud Services (EUCS)

  — certification of the cybersecurity of cloud services
  — Based on ISO/IEC 17788, ISO/IEC 27000 and ISO/IEC 17000.

— three assurance levels in the EUCS:

  — '**basic**',   – minimum acceptable
  — '**substantial**'   – business level
  — '**high**'   – state of art level

— guaranteeing some security for customers

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Art. 16 (10) NIS

— *„Without prejudice to Article 1(6), Member States <u>shall not impose</u> <u>any further security or notification requirements</u> on digital service providers.“*

— **Article 1(6) NIS:** *„This Directive is <u>without prejudice</u> to the actions taken by Member States to safeguard their essential State functions, in particular <u>to safeguard national security</u>, including actions protecting information the disclosure of which Member States consider contrary to the essential interests of their security, and to <u>maintain law and order</u>, in particular to allow for the investigation, detection and prosecution of criminal offences.“*

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Relation of Czech and EU regulation

Security level of offered cloud computing:

CZ:		EU:
Low	**-**	Substantial
Medium	-	High
High	**x**	***Maintain Law and Order***
Critical	**x**	***National security***

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Czech regulation

— Act No. 181/2014 Coll. Cyber Security Act

- § 2 l) **Digital services**

  „Cloud computing, which provides access to scalable and customizable storage or computing resources that can be shared"

- § 3 The authorities and persons on whom cyber security obligations are imposed
- § 4 **Public authorities demanding cloud computing**

*„Before concluding a contract with a cloud computing service provider, **public authorities are required to classify** the requested cloud computing at the security level, taking into account the nature of the information or communication system concerned**, in accordance with implementing legislation and to ensure compliance** with the Office's security rules for cloud computing services. upon their request, they will have at their disposal without undue delay the information and data which the cloud computing service provider holds for them, including the possibility of checking the stored information and data in real time."*

— Act No. 365/2000 Coll. on Public Authority Information Systems

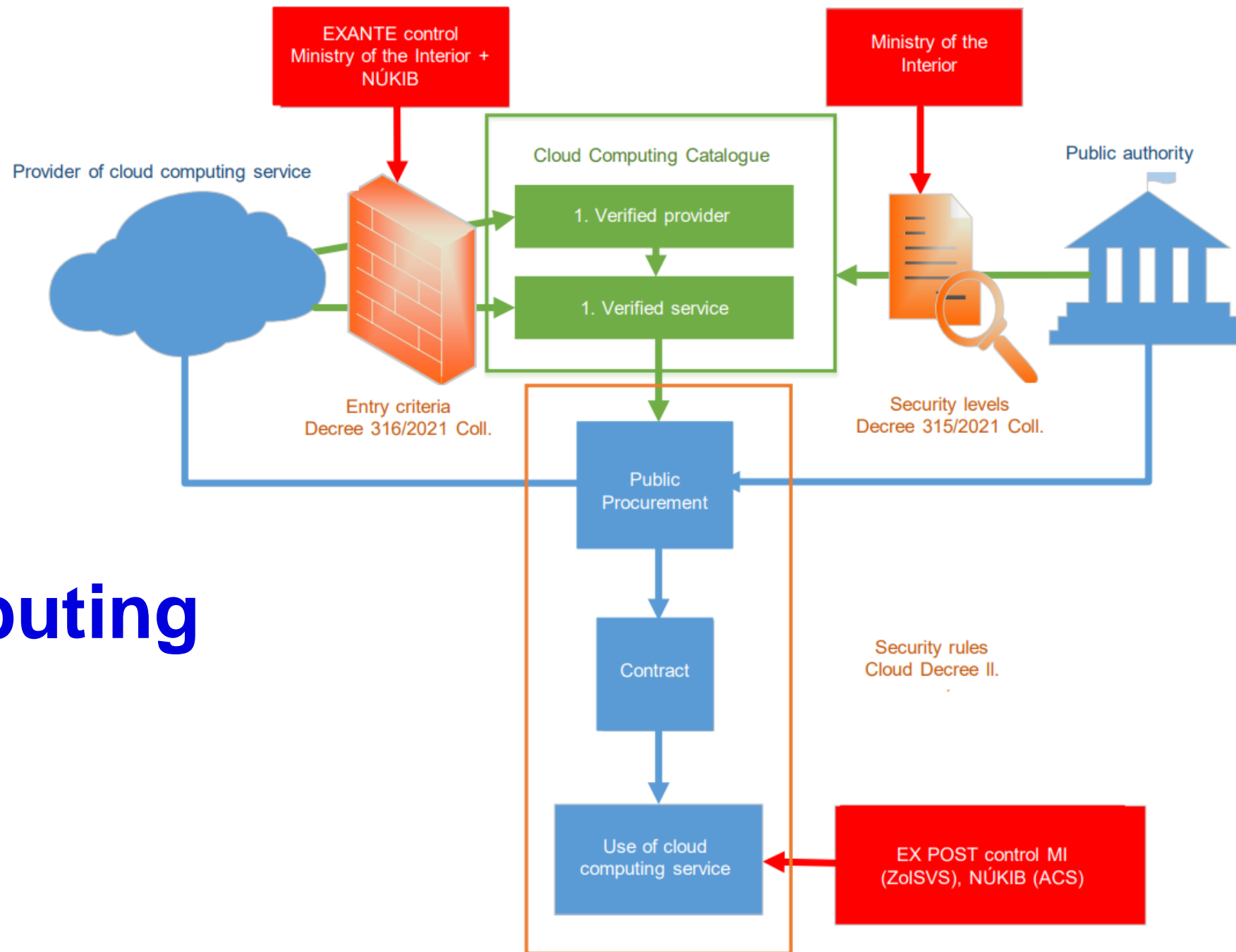- Title VI. - Use of cloud computing by public authorities
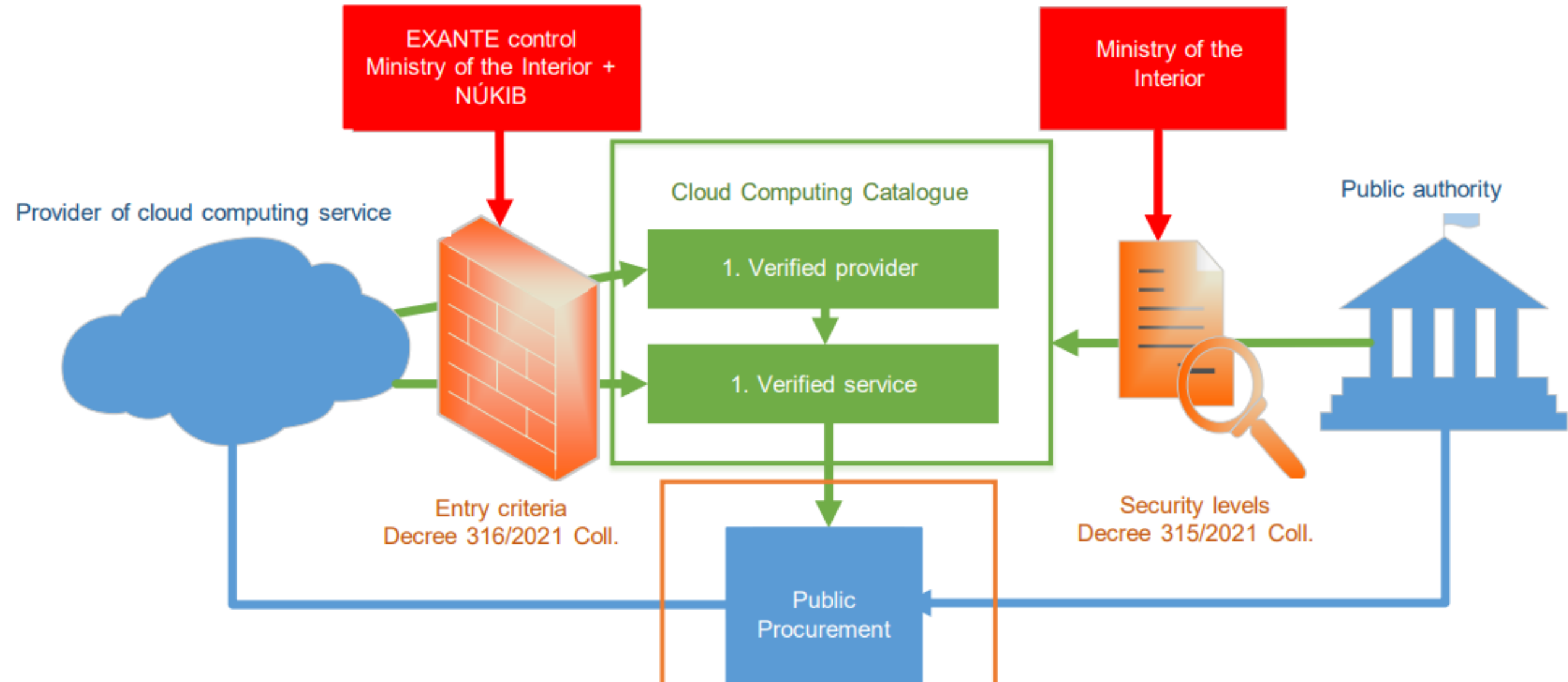
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Czech regulation

— Three cloud decrees:

1) No. 315/2021 Coll. decree on security levels for the use of cloud computing by public authorities

2) No. 316/2021 Coll. on some requirements for writing to the cloud computing catalog

3) No. X on security rules for the use of cloud computing services by public authorities

4) No. 433/2020 Coll. on data kept in the cloud computing catalog (catalog decree)

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Cloud computing Scheme

EXANTE control Ministry of the Interior + NÚKIB

Ministry of the Interior

Provider of cloud computing service

Public authority

Cloud Computing Catalogue

1. Verified provider

1. Verified service

Entry criteria
Decree 316/2021 Coll.

Security levels
Decree 315/2021 Coll.

Public Procurement

Contract

Security rules
Cloud Decree II.

Use of cloud computing service

EX POST control MI (ZoISVS), NÚKIB (ACS)

Cloud computing Scheme - ZoISVS

Cloud computing Scheme - ZKB

Decree 316/2021 Coll.

Public Procurement

Contract

Use of cloud computing service

Security rules
Cloud Decree II.

EX POST control MI
(ZoISVS), NÚKIB (ACS)

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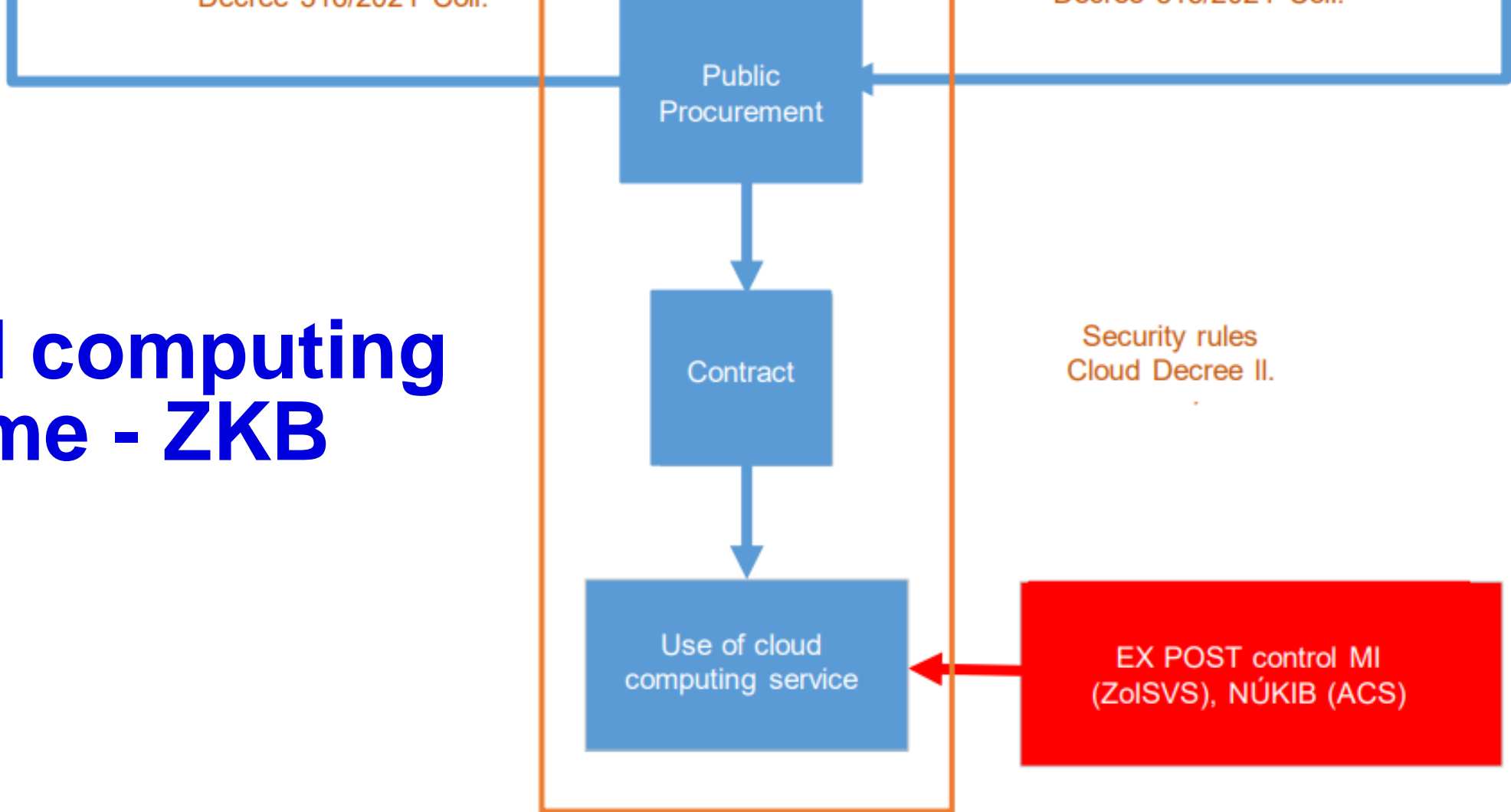
Security requirements

– Storage of data only in EU

– Transparency of data processing in any place

– Not to provide client data if requested by foreign countries

– SLA 99,5%

– Peering node in Czechia

– Business continuity plan

– Geographical distance of two datacenters (for backup)

– Encryption

– ČSN ISO 27001

– Audits

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Questions

1. What is cloud computing?
2. What types of cloud computing do you know?
3. Name some cloud computing services! (Do you use any?)

4. Name legislation governing cloud computing!
5. Explain the relationship between EUCS and Czech cc regulation?
6. What is cloud computing catalogue?
7. Explain some security implications of using cc!
8. Name some security requirements on cc!

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Summary

— EUCS

  — In process

— Czech cloud computing regulation

  — Brand new regulation
  — Cloud computing decrees in process

— Relation in between Czech and EU regulation

— The catalog process of public procurement of cloud computing

— The way of cybersecurity certification

— The Future of eGovernment

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Thank you for your attention!

I am ready for your questions ☺

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