

# Support for Highly-configurable Services and Adaptive Compliance




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## 1 Problem

**Highly-configurable Services (HCSs)** are services with multiple and interrelated configuration options.

Configuration options

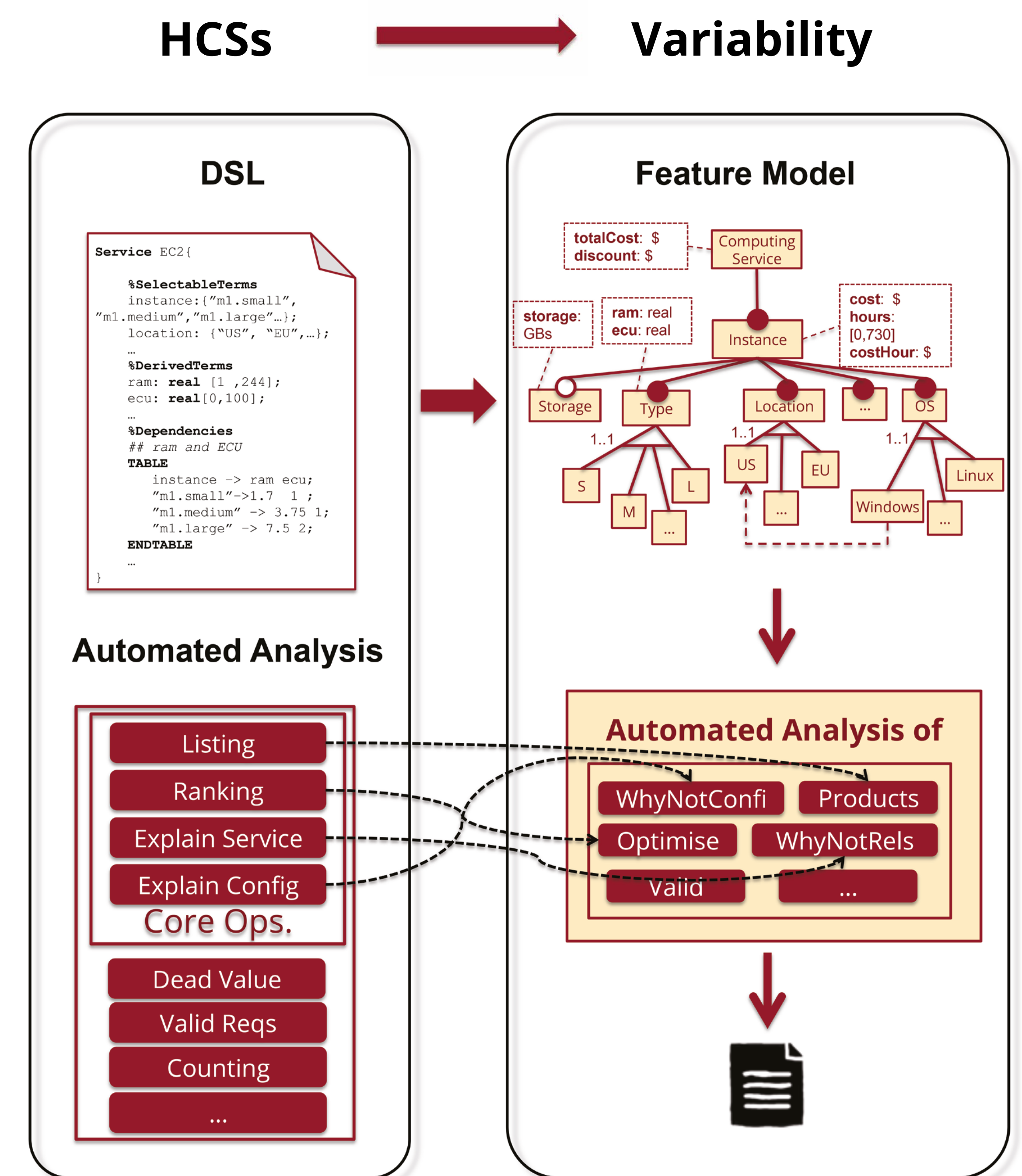


Instance	OS	Region	Memory	vCPUs	cost/h
t2.small	Windows	Virginia	2	1	0.026 \$/h
t2.small	Red Hat	Oregon	2	1	0.086 \$/h
m3.large	Red Hat	Virginia	7.5	2	0.2 \$/h

Configuration

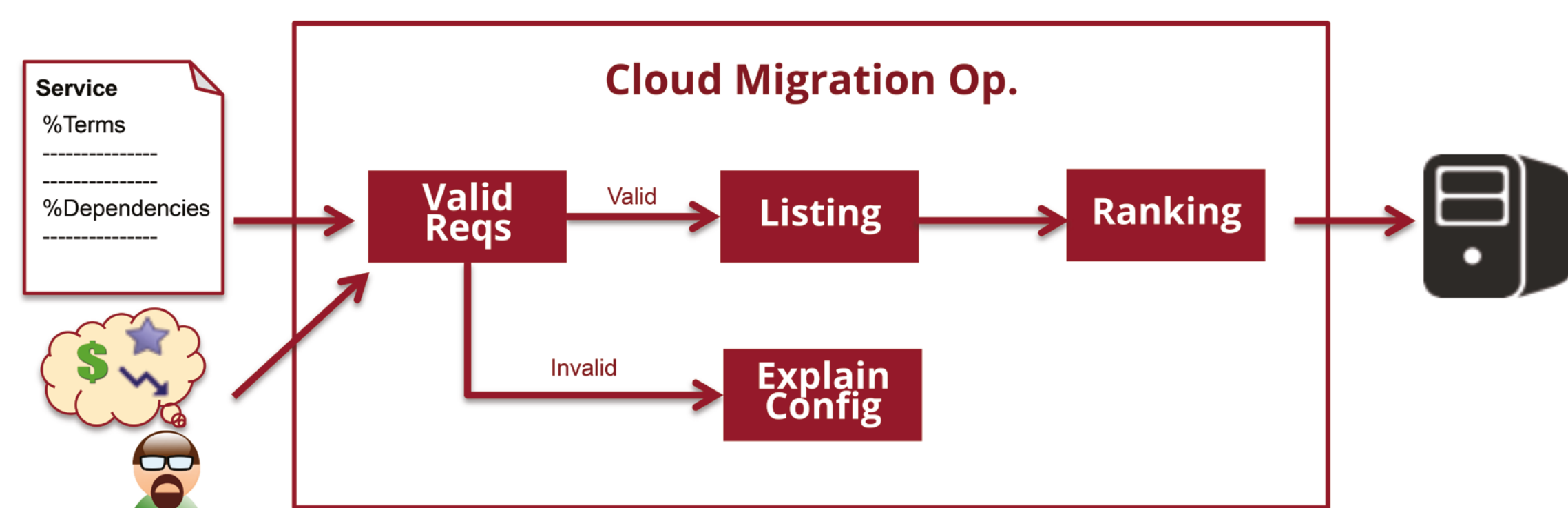
- » **HCSs** in the cloud may have **thousands of** different **configurations**.
  - » Amazon EC2 has 16,991 configurations (by July 2014)
- » From **user's side**, searching for the **best configuration** of a HCS is **tedious** and **error-prone**.
- » From **provider's side**, such a number of configurations may conceal **anomalies**.
  - » What if a given value of a configuration option can never be selected?

## 2 Approach

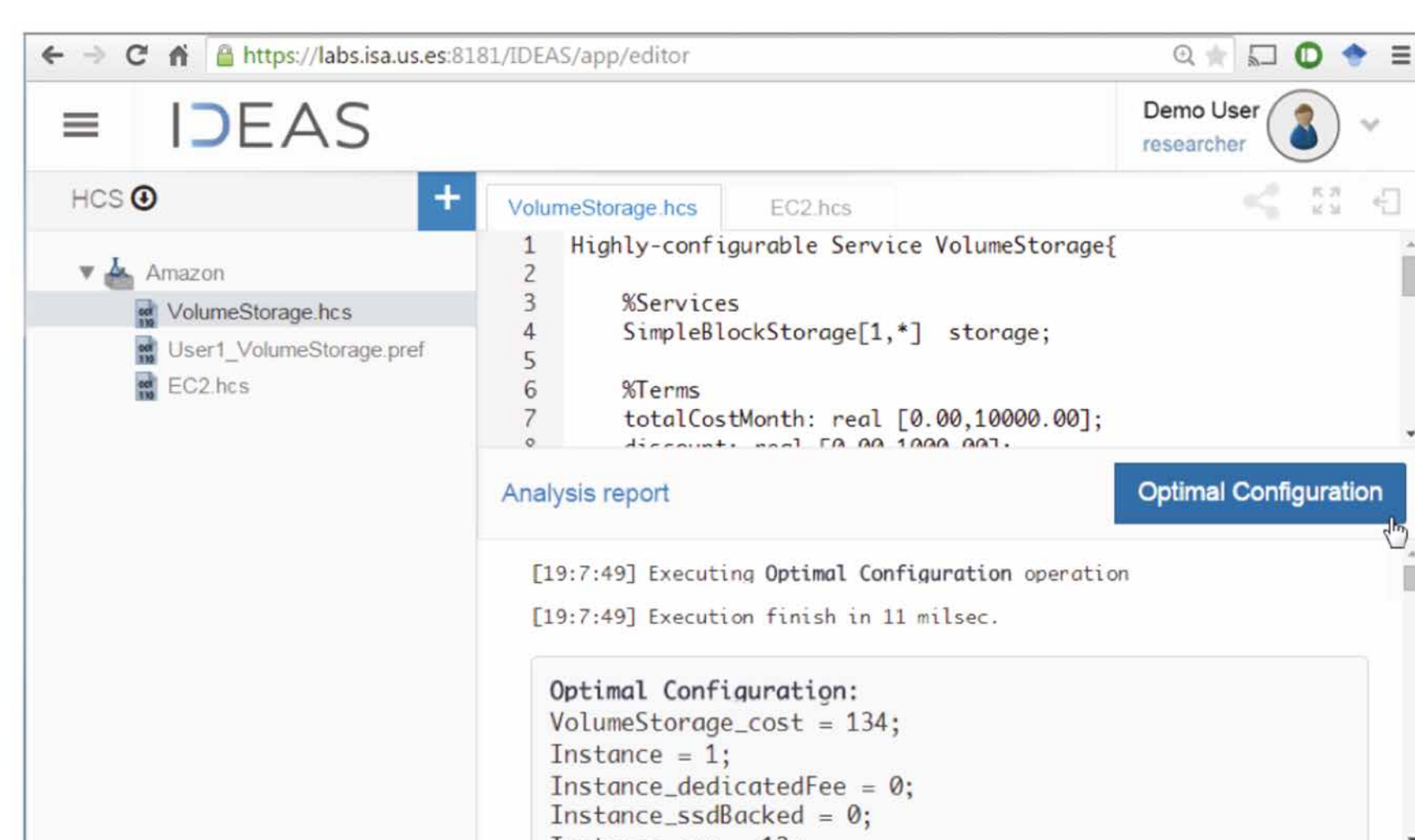


## 3 Results

- » **Automating** the **migration to the Cloud** by means of analysis operations.



- » **Tool support** for the description and analysis of HCSs.

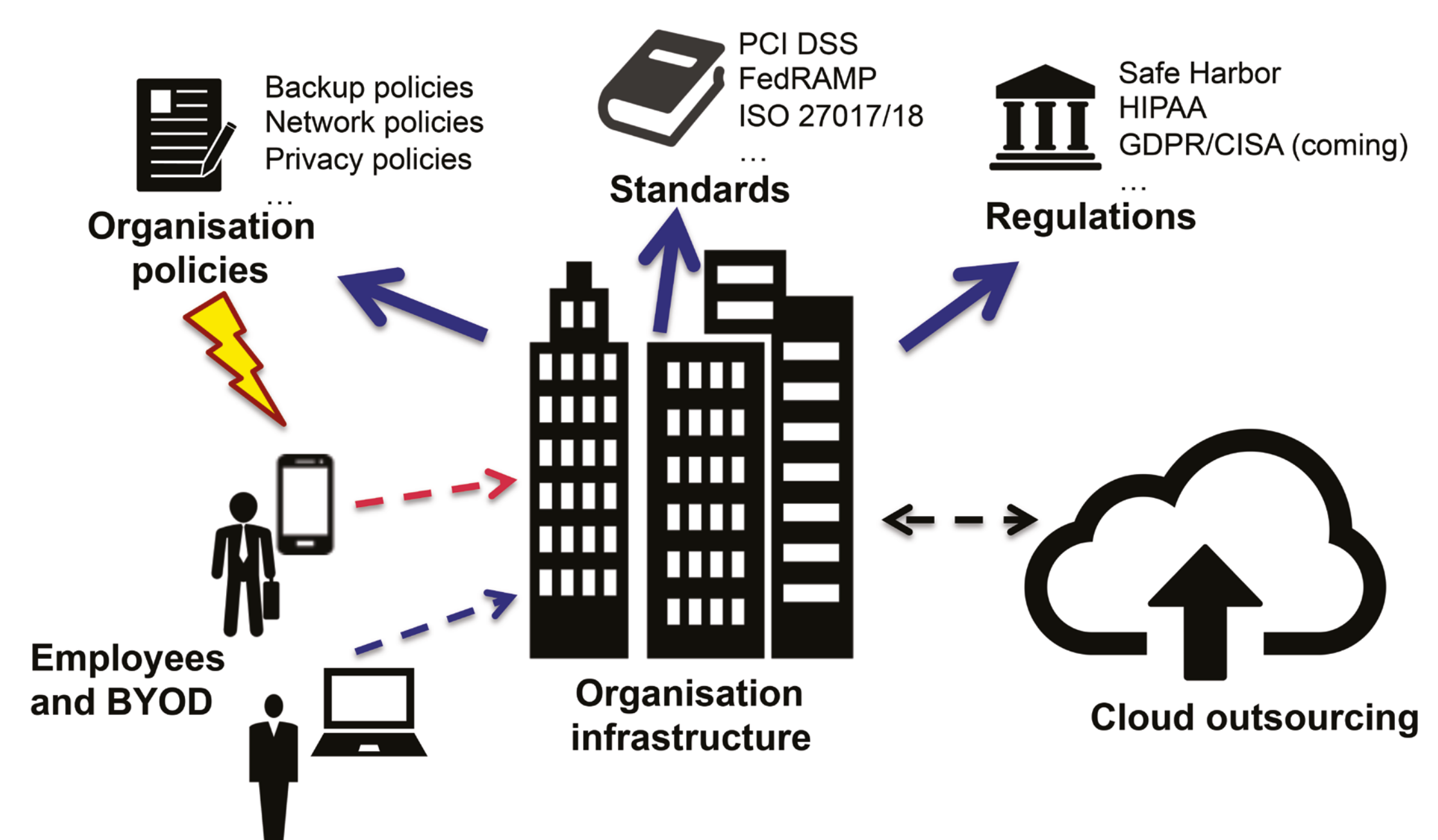


- » We **improve results of** commercial apps, such as **CloudScreener**, to search for the best configuration.

	OS	Area	ECU/CSPU	RAM	Cloud screener			Our approach	
					Config	Cost/h	Sat. reqs	Config	Cost/h
C1	Linux	Virginia/US East	12/6	8	m3.large	0.14 \$	No	m3.xlarge	0.28 \$
C2	Linux	South America	4/2	9	m3.xlarge	0.381 \$	Yes	m2.xlarge	0.323 \$
C3	Windows	Singapore	8/4	40	hs1.8xlarge	5.901 \$	Yes	r3.2xlarge	1.292 \$
C4	Linux	California/US West	68/34	160	r3.8xlarge	3.12 \$	Yes	r3.8xlarge	3.12 \$
C5	Windows	Europe	16/8	5	c3.xlarge	0.376 \$	No	c3.2xlarge	0.752 \$

## 4 Adaptive compliance

- » Organisations face multiple **regulations, standards** and **policies** to comply with.
  - » HIPAA, ISO/IEC 27000 series, internal security policies...
- » Different **changes** may **affect** the **compliance level**.
  - » Changes in the operating environment (BYOD, cloud services...).
  - » Changes in regulation (Safe Harbor was recently invalidated!) or internal policies.



### Challenges:

- » Identify different **scenarios of adaptive compliance**:
  - » Cloud
  - » Cyber-physical systems
- » Develop **modelling** and **reasoning techniques**.
  - » Existing support in the literature for "classic" compliance.
  - » Techniques for the configuration of Highly-configurable Services may fit.