DrACO: Discovering Available Cloud Offerings

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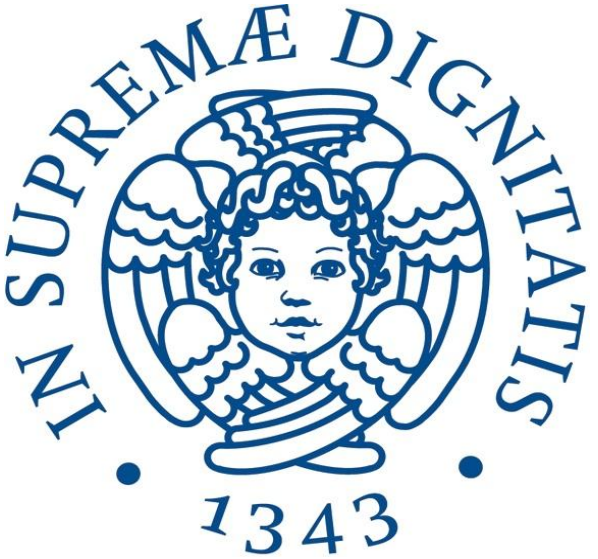

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Outline

- Introduction
- Modelling cloud offerings
  - Modelling IaaS offerings in TOSCA
  - Modelling PaaS offerings in TOSCA
- DrACO: Discovering Available Cloud Offerings
- Conclusions

Introduction

Existing cloud offerings are **heterogeneous**.

- Difficult to analyse and compare them.
- «Impedance mismatch» when deploying applications on multiple cloud offerings.

To ease the design of cloud-based applications, there is a need for:

- Languages that permit defining applications.

OASIS TOSCA

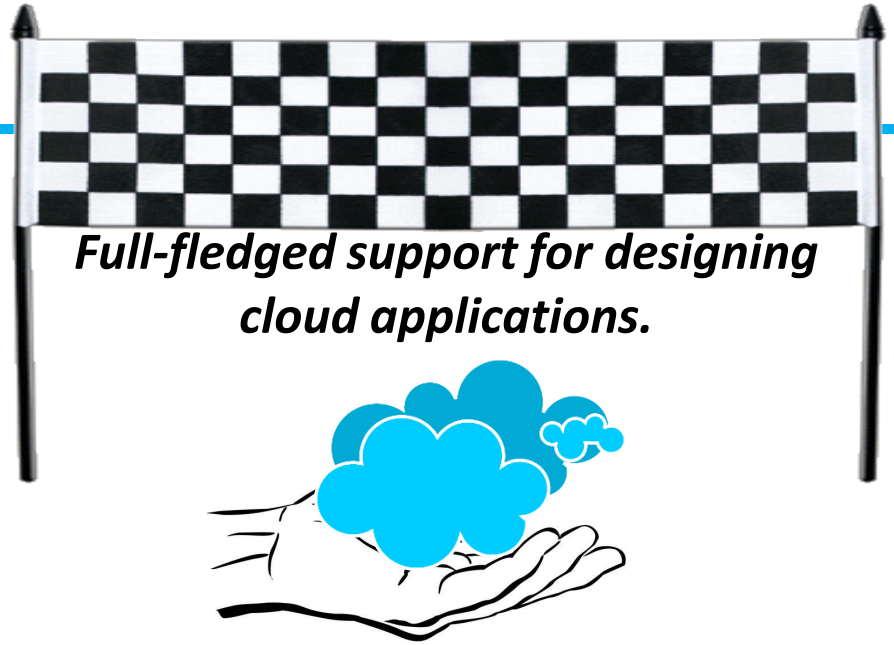
- Full-fledged support for designing cloud-based applications

  e.g., automated and flexible matching of automatically discovered interoperable cloud offerings.

Motivation

TOSCA started to pave the way towards supporting an interoperable design of cloud-based applications…

OASIS TOSCA



Full-fledged support for designing cloud applications.

…but, for instance, there is currently no repository of TOSCA-based cloud offerings…

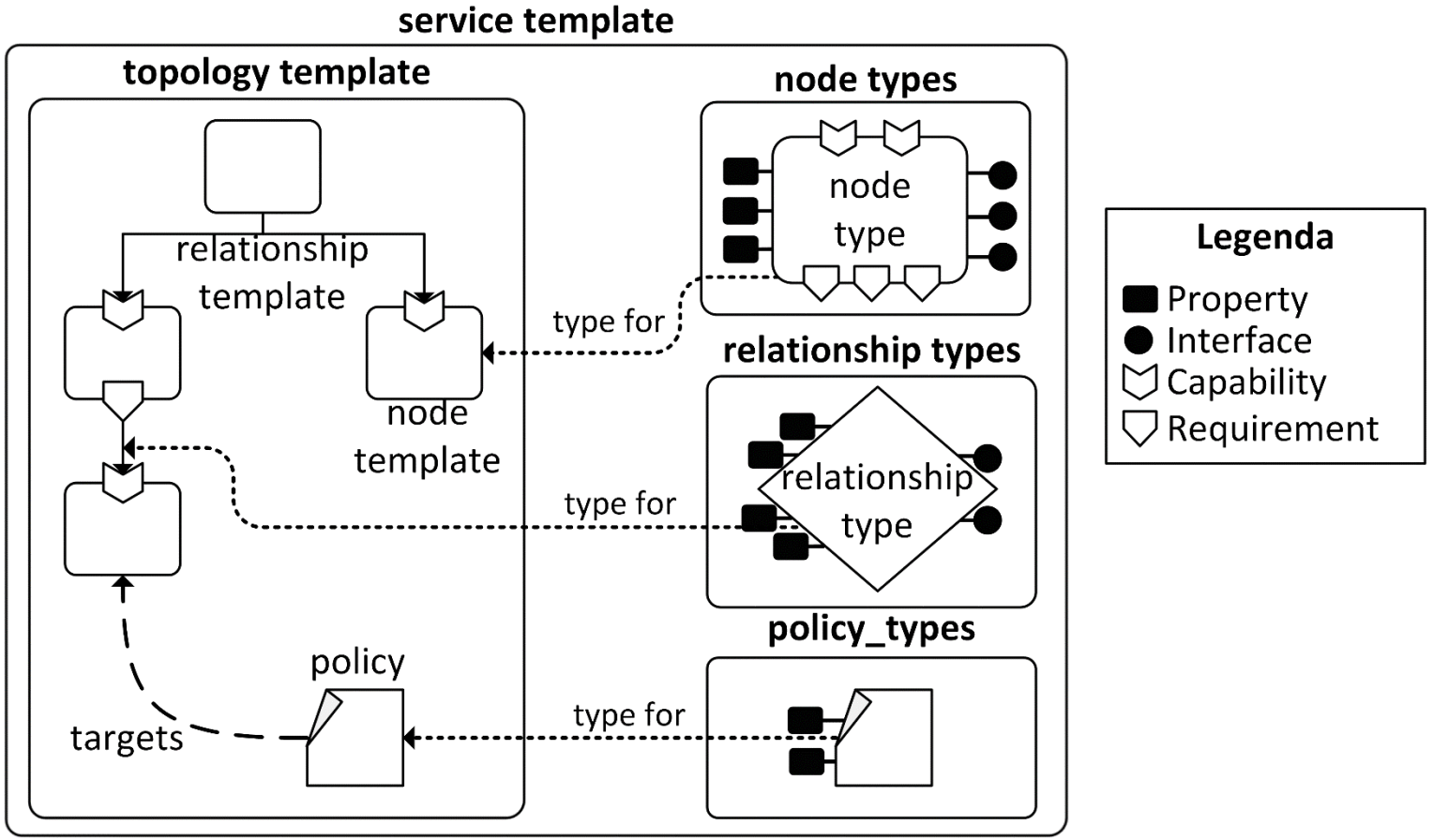
Our goal(s)

To pave the way towards a full-fledged support for designing cloud-based applications.

1. We show how cloud offerings can be naturally modelled in TOSCA.
   - » To reduce the «impedance mismatch» among cloud offerings.
   - » To ease the description of an application's deployment.

2. We present the open-source prototype tool **DrACO (Discovering Available Cloud Offerings)**, which permits
   - » to look-up for cloud offerings, and
   - » to retrieve them in a standardised TOSCA format.

Background
TOSCA (Topology and Orchestration Specification for Cloud Applications)



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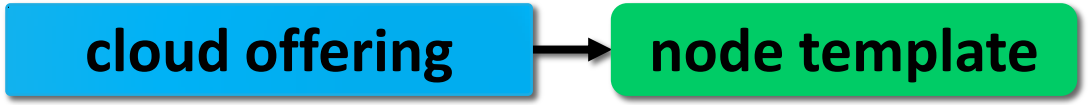
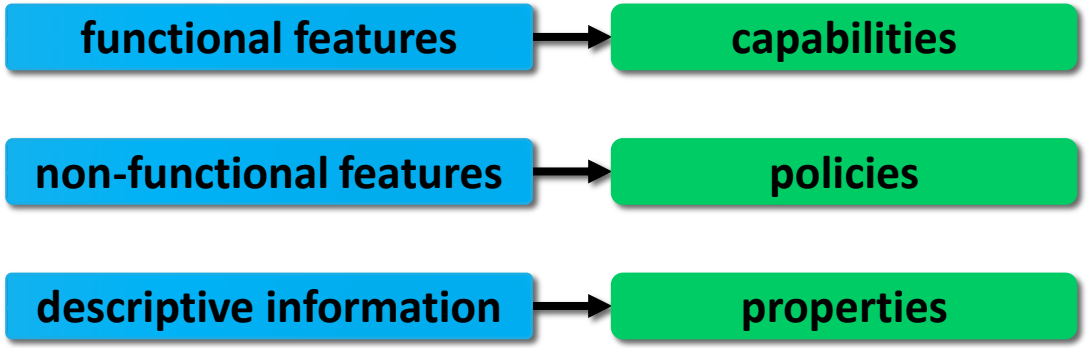
Modelling cloud offerings in TOSCA



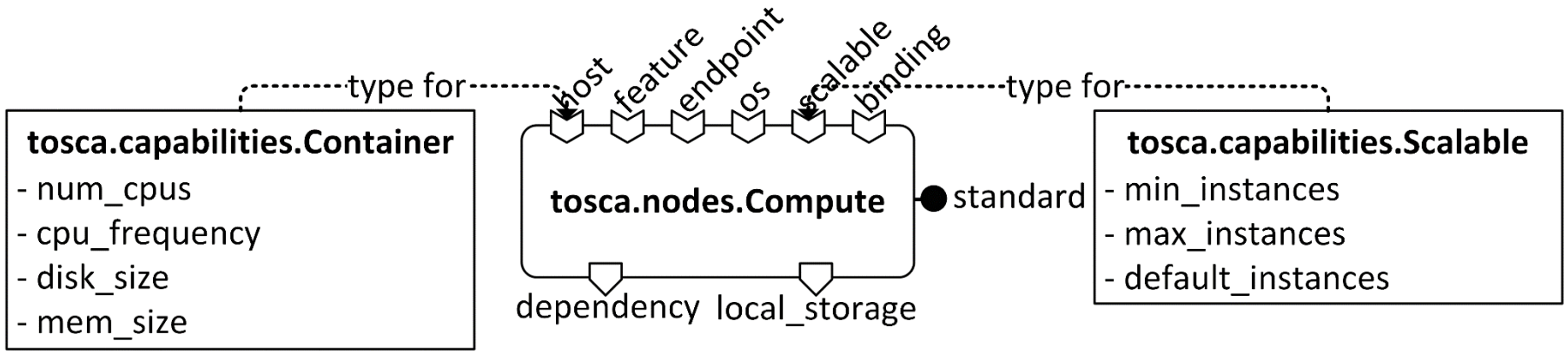
We will follow the guidelines given by the TOSCA primer*:



* OASIS: Topology and Orchestration Specication for Cloud Applications (TOSCA) Primer. http://docs.oasis-open.org/tosca/tosca-primer/v1.0/tosca-primer-v1.0.pdf (2013)

tosca.nodes.Compute

A normative representation of cloud-hosted computing resources is already available in TOSCA.



We will model IaaS/PaaS offerings by extending such a representation.

CloudHarmony **PaaSify.it**

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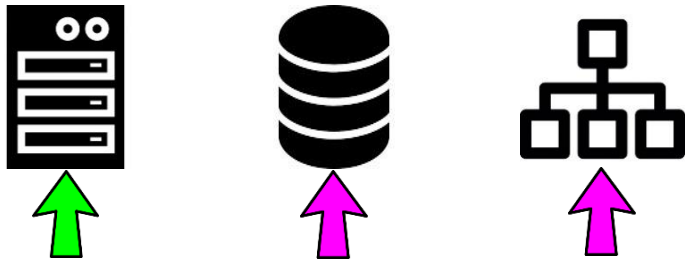
IaaS offerings

IaaS providers essentially offer remote access to
- » cloud-hosted virtual machines, and
- » to storage and network resources.



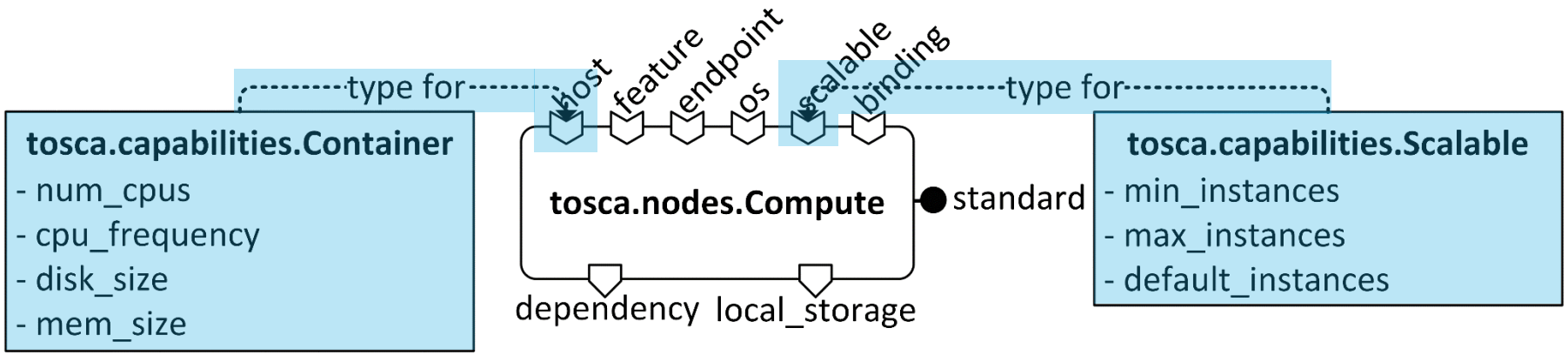
We will show how **IaaS-offered virtual machines** can be modelled in TOSCA.

The model we will propose is **extensible**.
- » It can be easily adapted to model also storage and network resources.

Modelling IaaS offerings in TOSCA

tosca.nodes.Compute permits describing, among others,

- the hosting capabilities of a cloud-hosted virtual machine, and
- whether/how it is scalable.



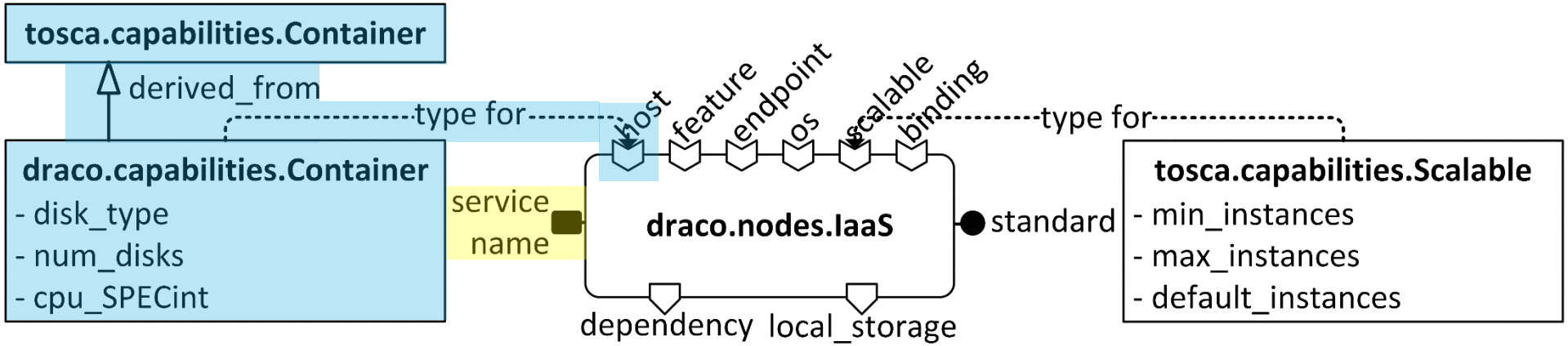
It however does not permit describing other functional features we may need to specify:

- how many disks are available in the offered virtual machine,
- their type, and
- the SPECint benchmarking value of the available CPUs.

Modelling IaaS offerings in TOSCA
draco.nodes.IaaS

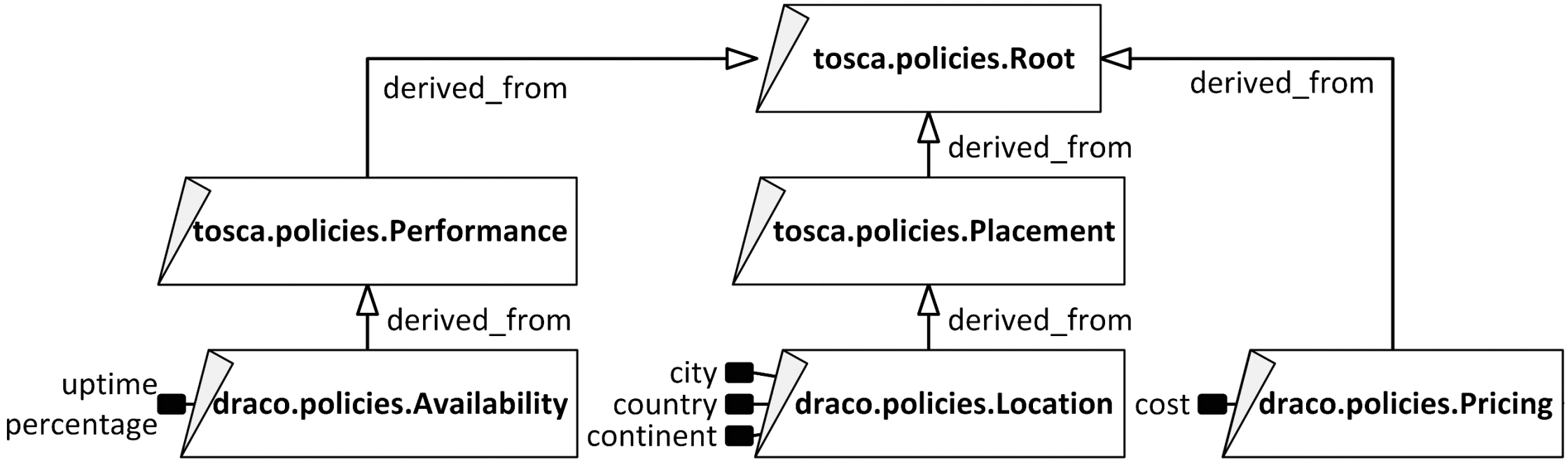
We define **draco.nodes.IaaS** to model IaaS-offered virtual machines.

- It extends **tosca.nodes.Compute**, thus permitting to specify at least the same information.
- It also permits specifying the number and type of disks, and the CPUs' SPECint value.
- It also permits indicating the service name.

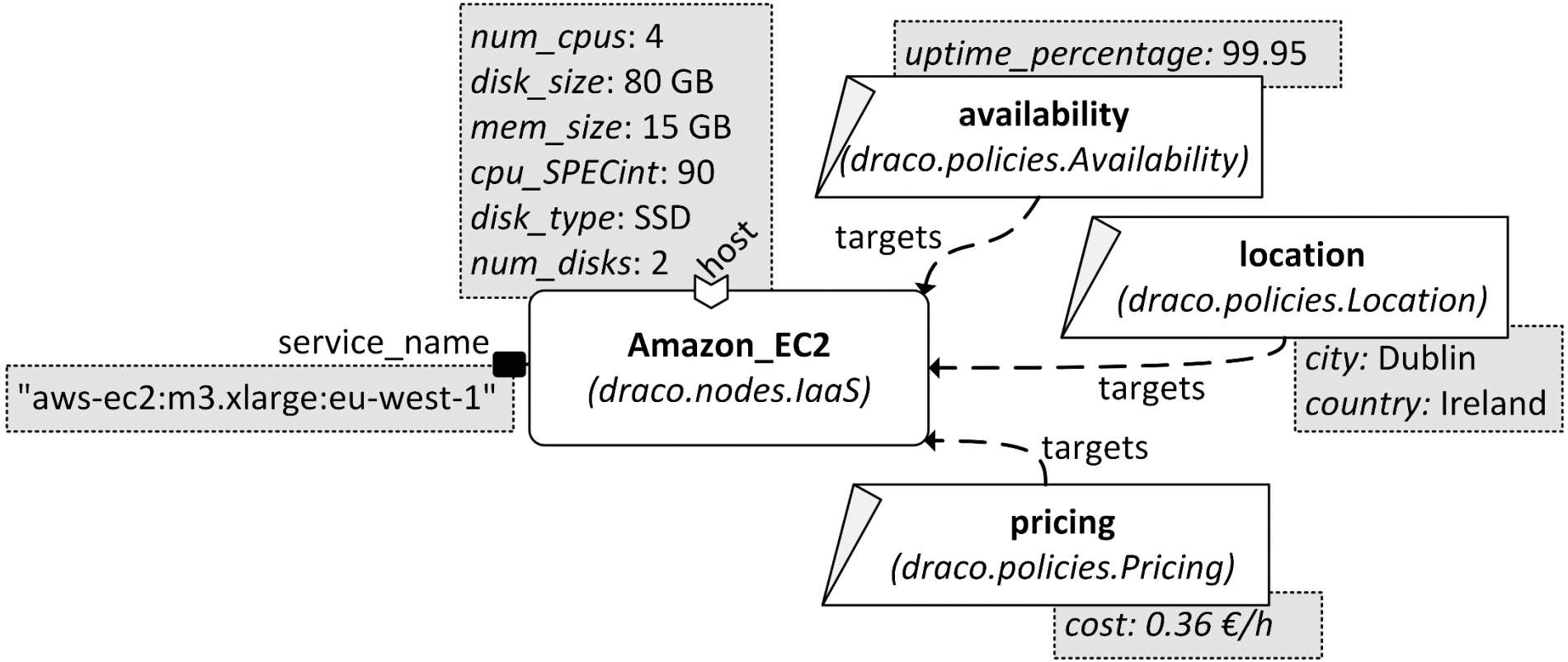


…what about non-functional features?

Modelling IaaS offerings in TOSCA
Policies



Modelling IaaS offerings in TOSCA
An example



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PaaS offerings

PaaS providers offer platforms (rather than virtual machines) to users.

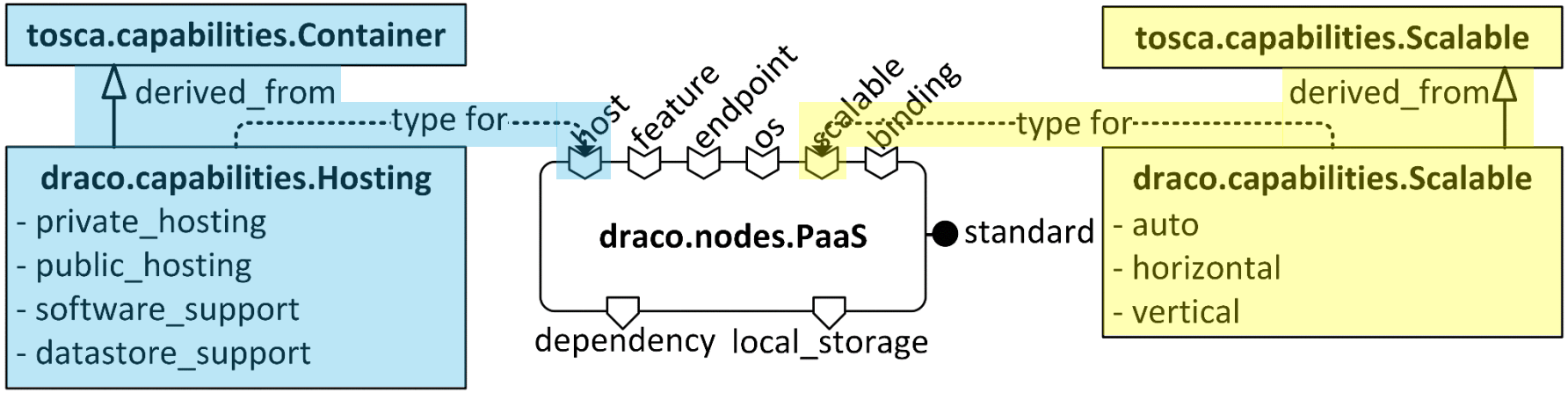
Such platforms are already configured

- to support some software distributions,
- to be hosted privately or publicly, and/or
- to be able to scale automatically, horizontally or vertically.

Modelling PaaS offerings in TOSCA
draco.nodes.PaaS

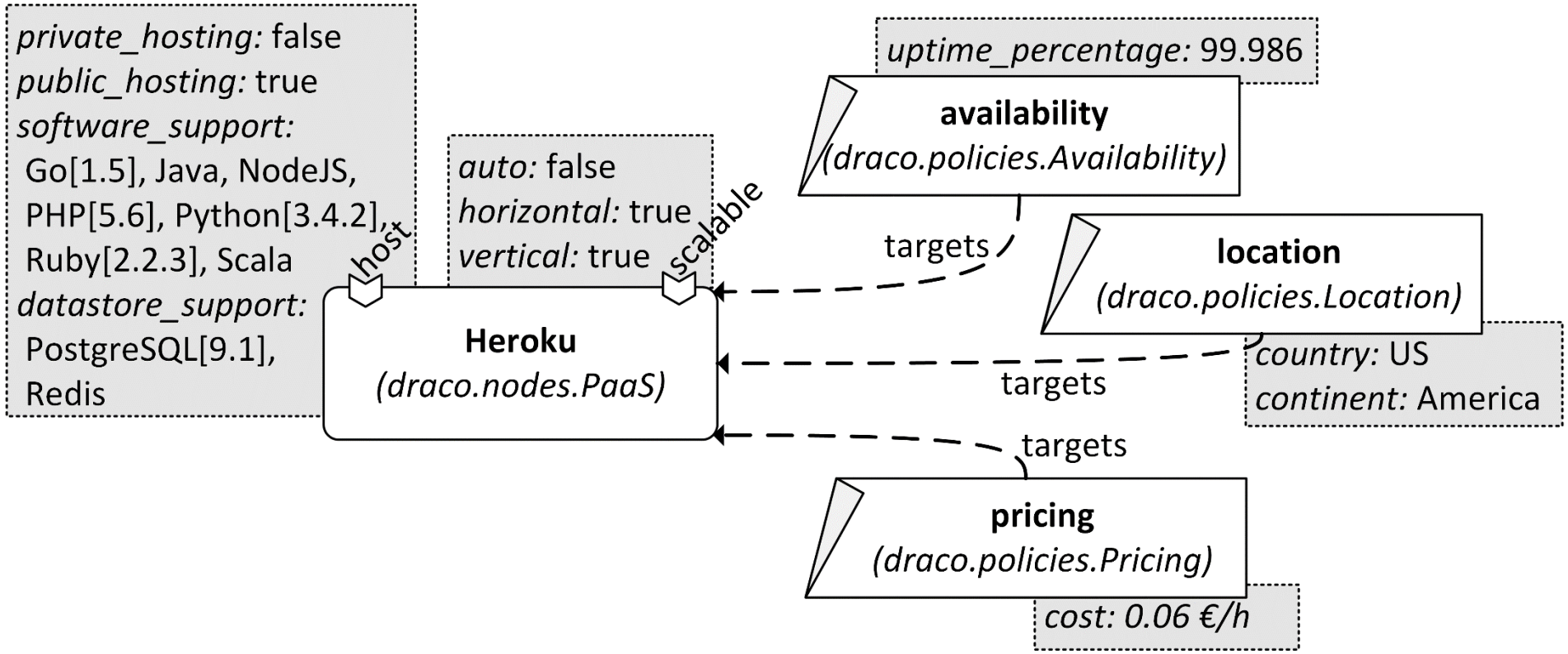
We define **draco.nodes.PaaS** to model PaaS offerings.

- It extends **tosca.nodes.Compute**, thus permitting to specify at least the same information.
- It also permits specifying the hosting type, and the supported software/datastore distributions.
- It also permits indicating whether the platform scales automatically, horizontally or vertically.



- Non-functional features can be described with the already introduced policies.

Modelling PaaS offerings in TOSCA
An example



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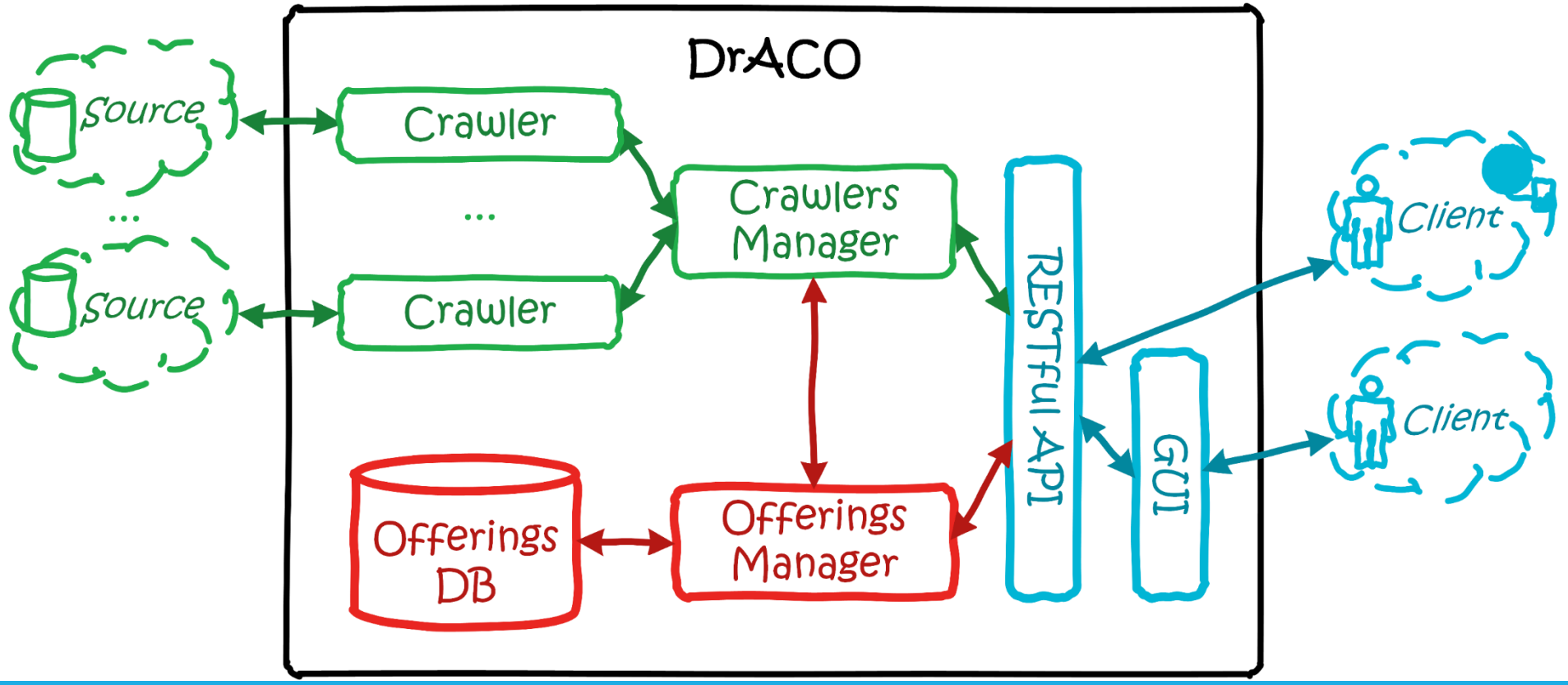
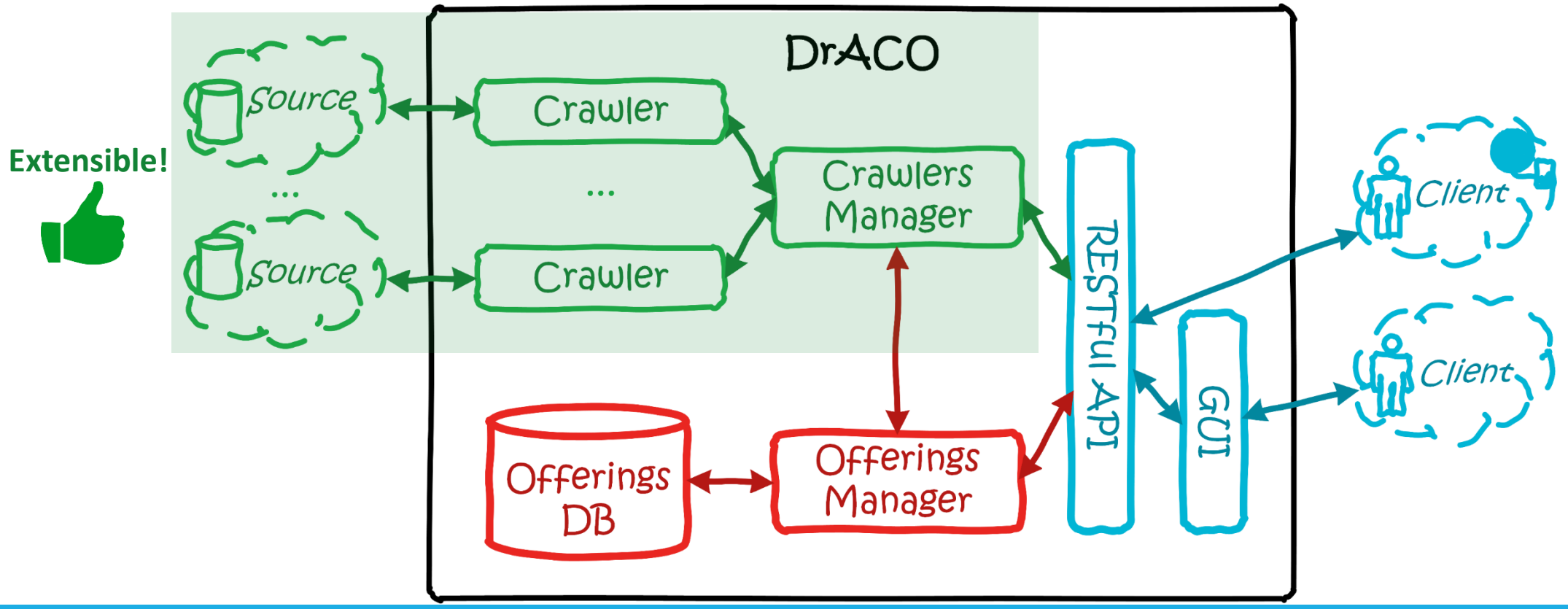
Discovering Available Cloud Offerings

DrACO (*Discovering Available Cloud Offerings*) is an open-source, extensible prototype tool that permits to look-up for IaaS/PaaS offerings and to retrieve them in a standardised TOSCA format.



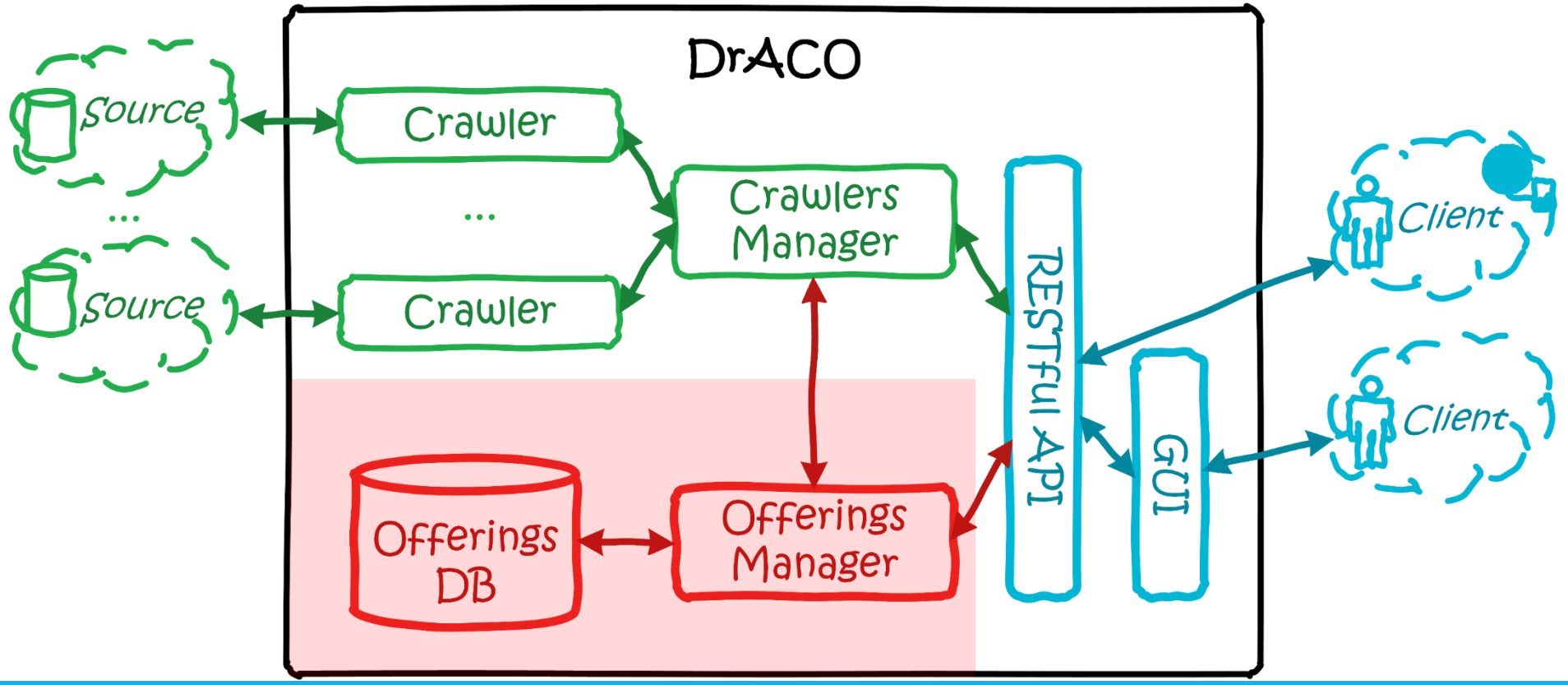
Discovery

DrACO discovers available cloud offerings by crawling information from existing and heterogeneous sources (e.g., CloudHarmony, Paasify).



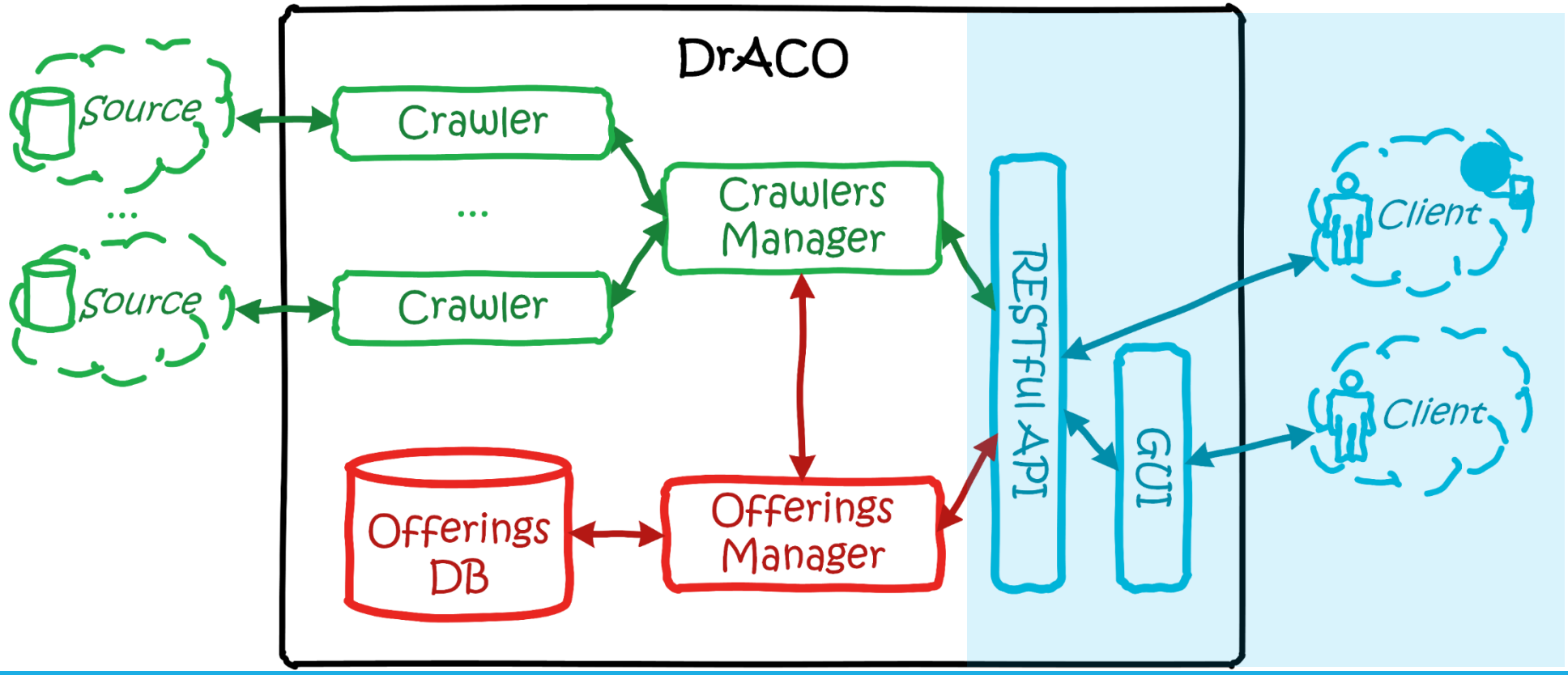
Storage

DrACO translates all the cloud offerings it discovers into a standardised TOSCA format, and it stores them in a local repository.

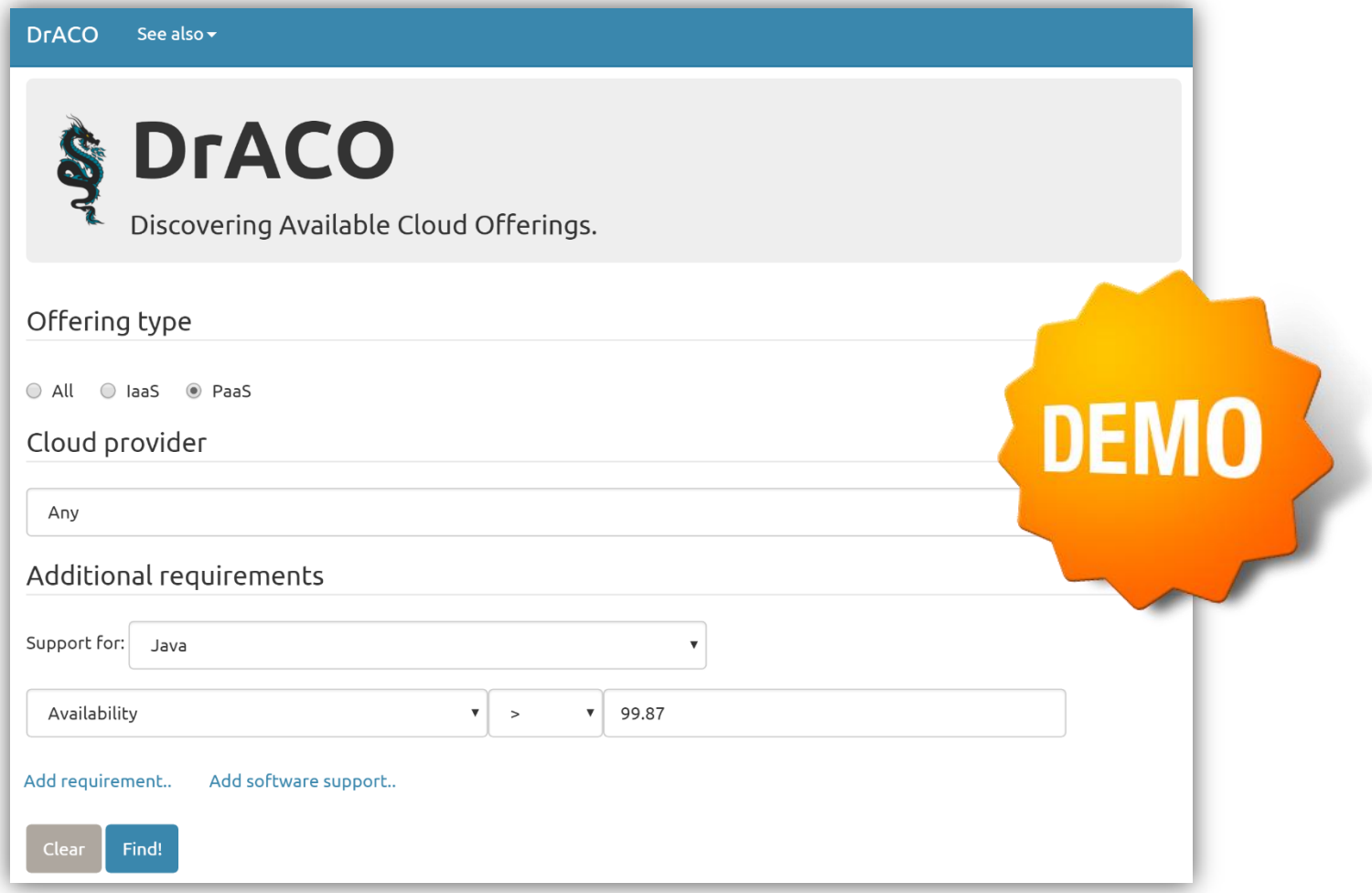


Retrieval

DrACO permits accessing its repository of cloud offerings via a RESTful API or via a web-based graphical user interface.



Exploiting DrACO



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Conclusions

✓ We have shown a way to reduce the «impedance mismatch» among cloud offerings.

- Cloud offerings can be functionally modelled as TOSCA node templates.

  draco.nodes.IaaS → IaaS-offered virtual machines

  draco.nodes.PaaS → PaaS offerings

- The non-functional features of an offering can be given through TOSCA policies

  draco.policies.Availability, **draco.policies.Location**, **draco.policies.Price**

✓ We have illustrated **DrACO**, an open-source, extensible prototype tool that permits

- to look-up for cloud offerings, and
- to retrieve them in a standardised TOSCA format.

A success story

SeaClouds permits automatically deploying and managing TOSCA-based applications over multiple and heterogeneous cloud offerings.

http://seaclouds-project.eu/

SeaClouds automatically determines the best deployment solution,

- by matchmaking each application component's requirements with available offerings, and
- by analyzing all potential deployment solutions to determine an optimal one.

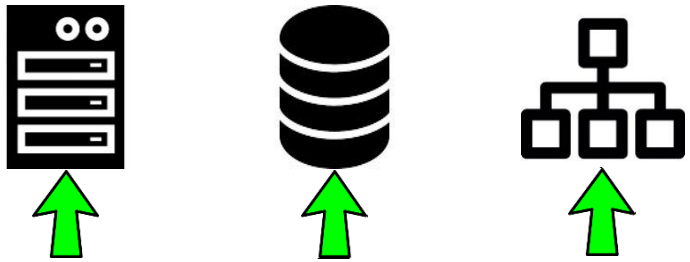
SeaClouds needs to discover available cloud offerings, and to retrieve them in a TOSCA-based representation.

Such need is accomplished by exploiting the capabilities of DrACO!

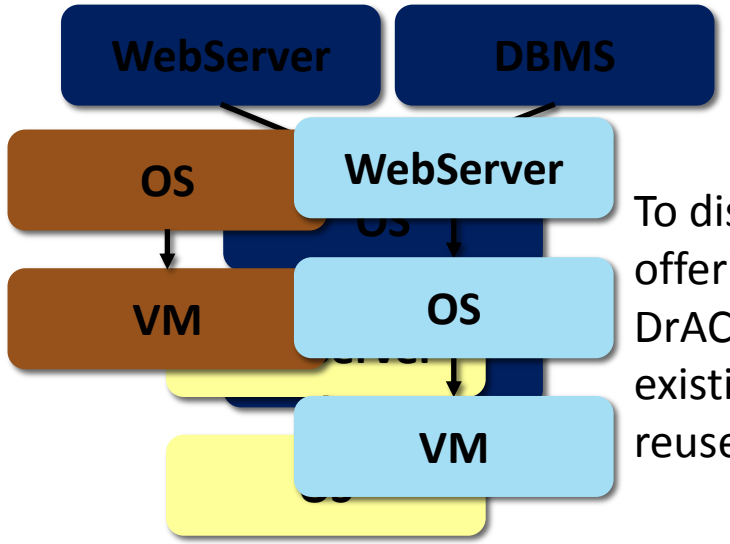
Future Work

To integrate DrACO with the open-source OpenTOSCA environment

open Tosca



To model also IaaS-offered storage and networking resources



To discover more complex offerings by integrating DrACO with already existing TOSCA-based reuse techniques.

Thank you!

TRY IT **http://seaclouds.di.unipi.it/draco.html**

https://github.com/seacloudseu/draco