FNSNF
Fonds national suisse
Schweizerischer Nationalfonds
Fondo nazionale svizzero
Swiss National Science Foundation

Università della Svizzera italiana
Faculty of Informatics

RESTful Business Process Management in the Cloud

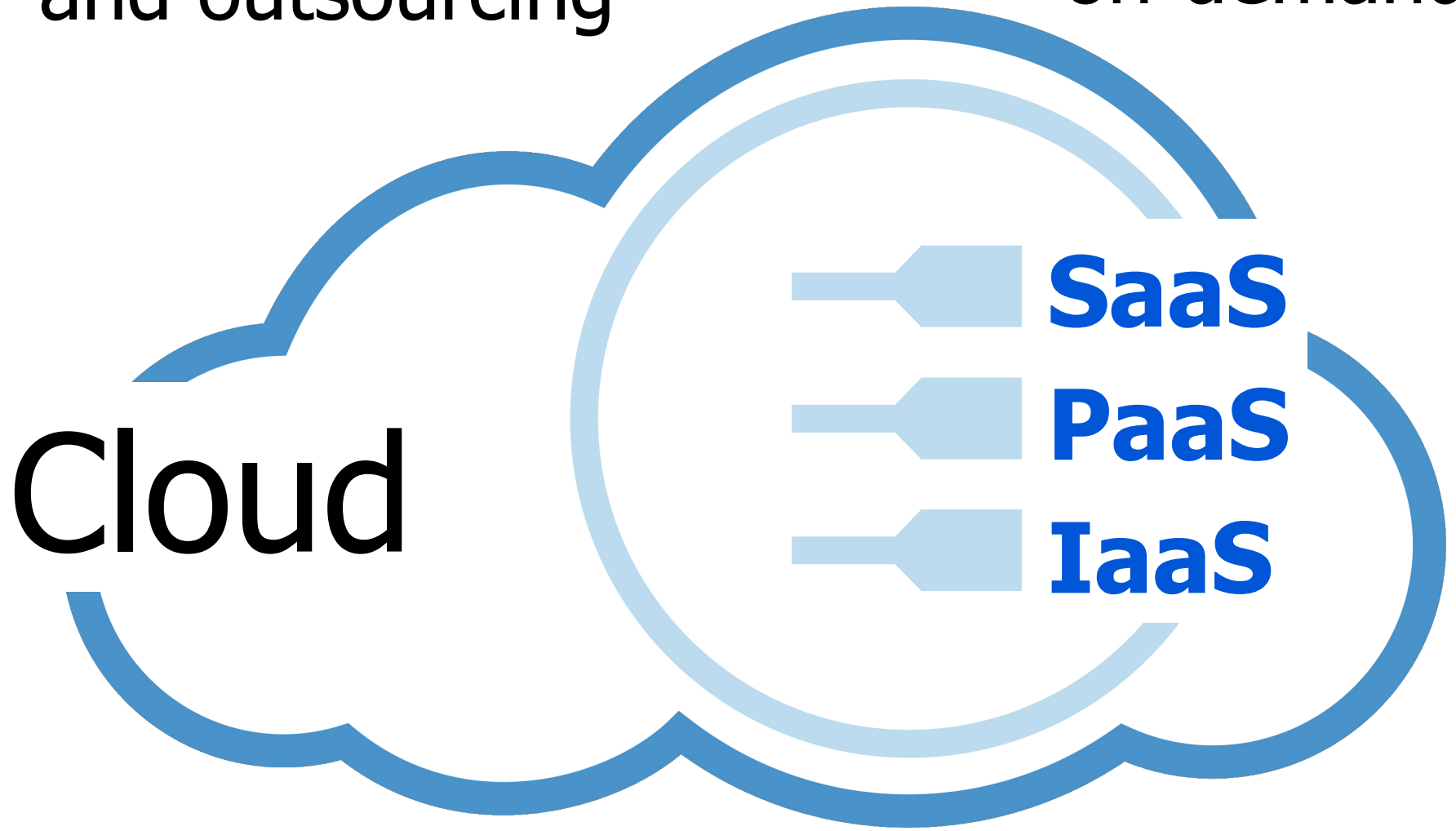
Alessio Gambi
alessio.gambi@usi.ch

Cesare Pautasso
cesare.pautasso@usi.ch

http://www.hdwallpaperspot.com/simple-sky-cloud-wallpaper/

automation
and outsourcing

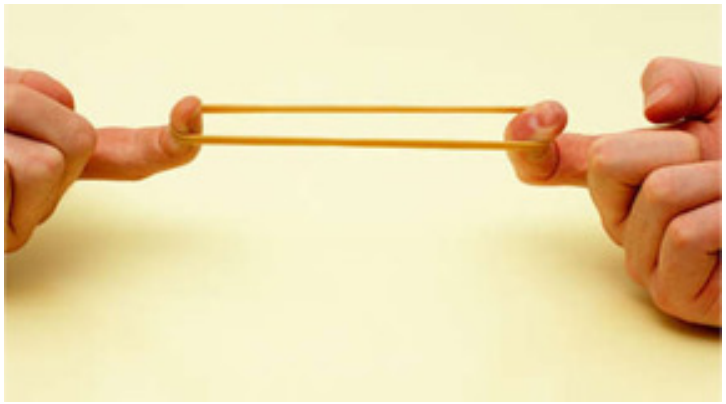
provisioning
on-demand



pay-per-use

http://www.maketecheasier.com/what-is-cloud-computing/2013/01/26

Cloud-user Expectations



http://i756.photobucket.com/albums/xx206/HeroesForLife/Hulk_Transformation.jpg

Design for the Cloud

It's not just a matter of creating and starting virtual machines

Cloud native applications

modular architecture, loose coupling, stateless interaction, async communication

message queues and parallelism

Cloud Native Services

http://ctmls.ctreal.com/wp-content/uploads/2012/03/purzen_Icon_with_question_mark.png

Long-Livedness

Main difference w.r.t. Cloud apps

sessions

Against elasticity

computing nodes "blocked" alas instances run

Need for basic primitives for managing
state of **instances** and
state of **external interactions**

Service Composition on the Cloud

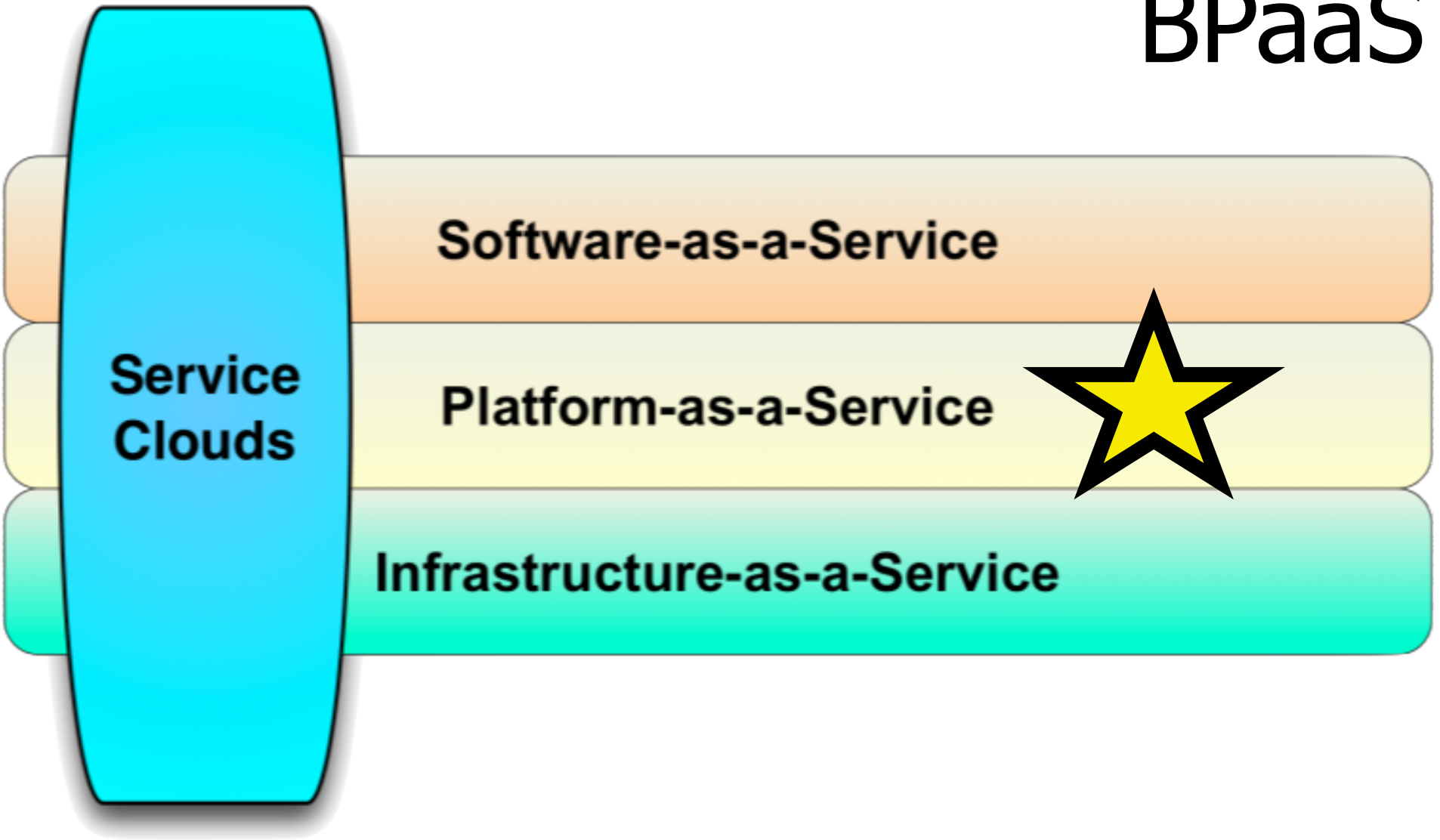
http://spotstrackingsystems.com/features/cloud-software/

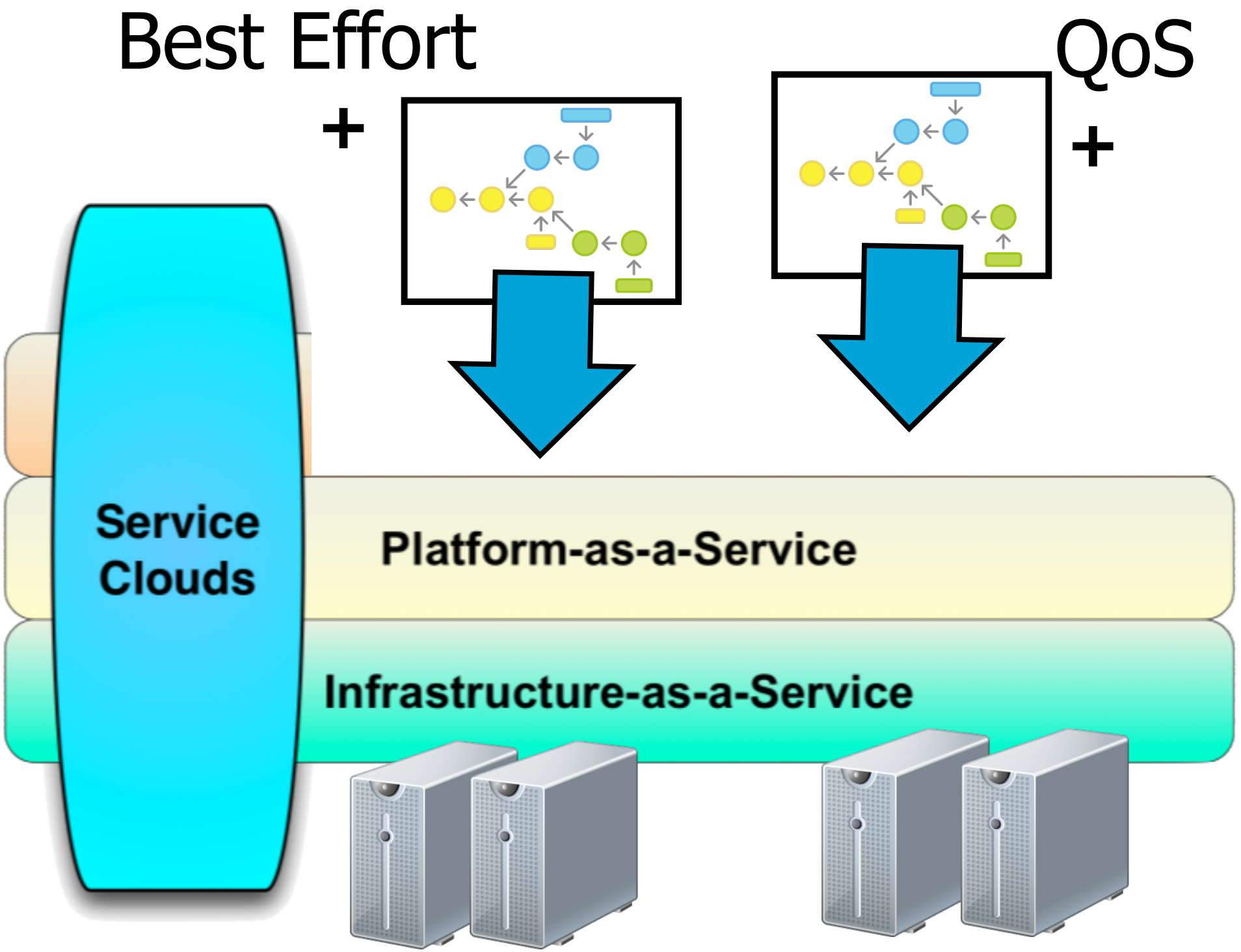
Where do we cloud ?!

Providers used to high level declarative languages for defining compositions

Leave everything else to the Cloud

The Sweet Spot
BPaaS




Best Effort
+
QoS
+
Service Clouds
Platform-as-a-Service
Infrastructure-as-a-Service

How do we cloud ?!

IaaS aligned with service execution

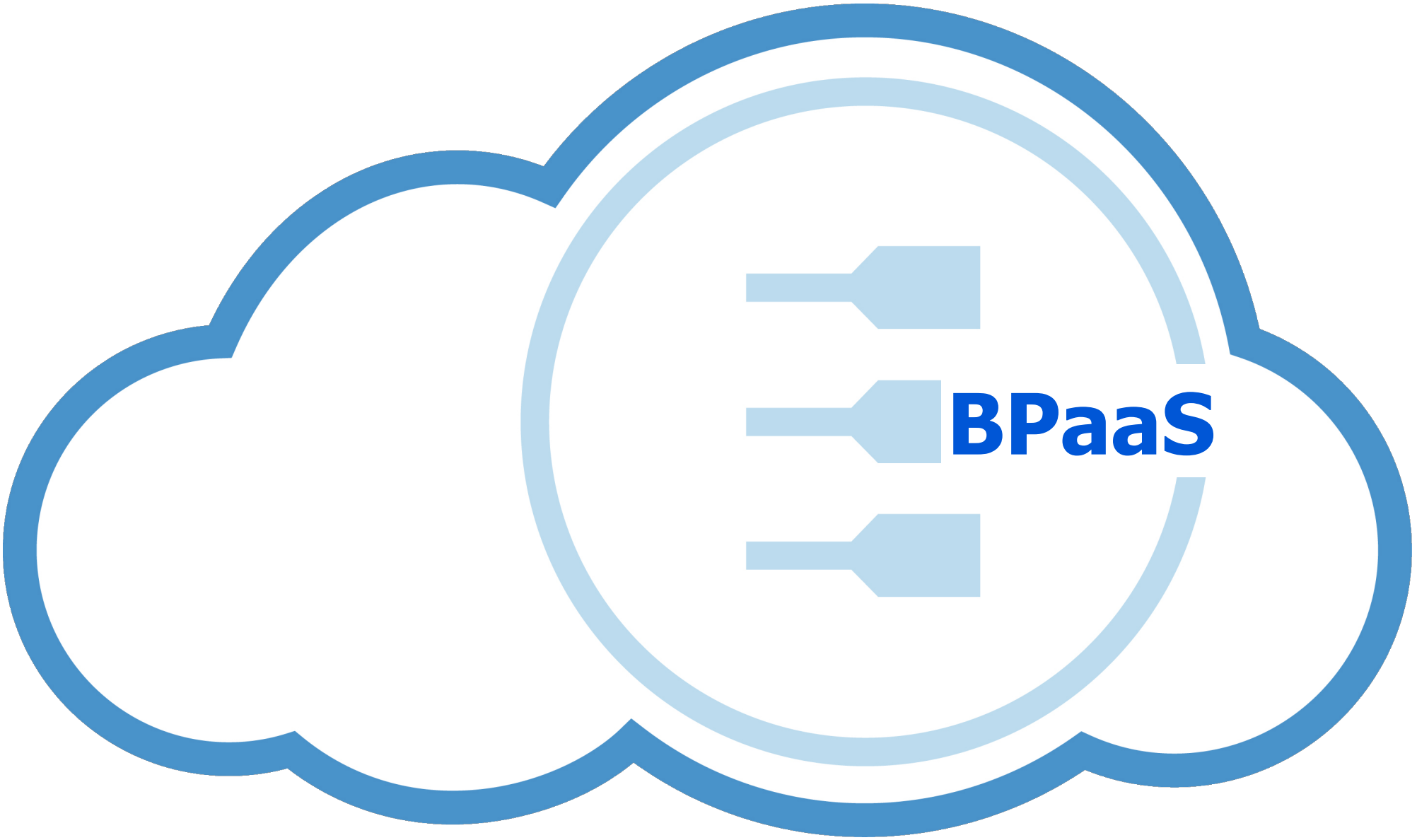
PaaS changes the composition to optimize and balance QoS/Cost

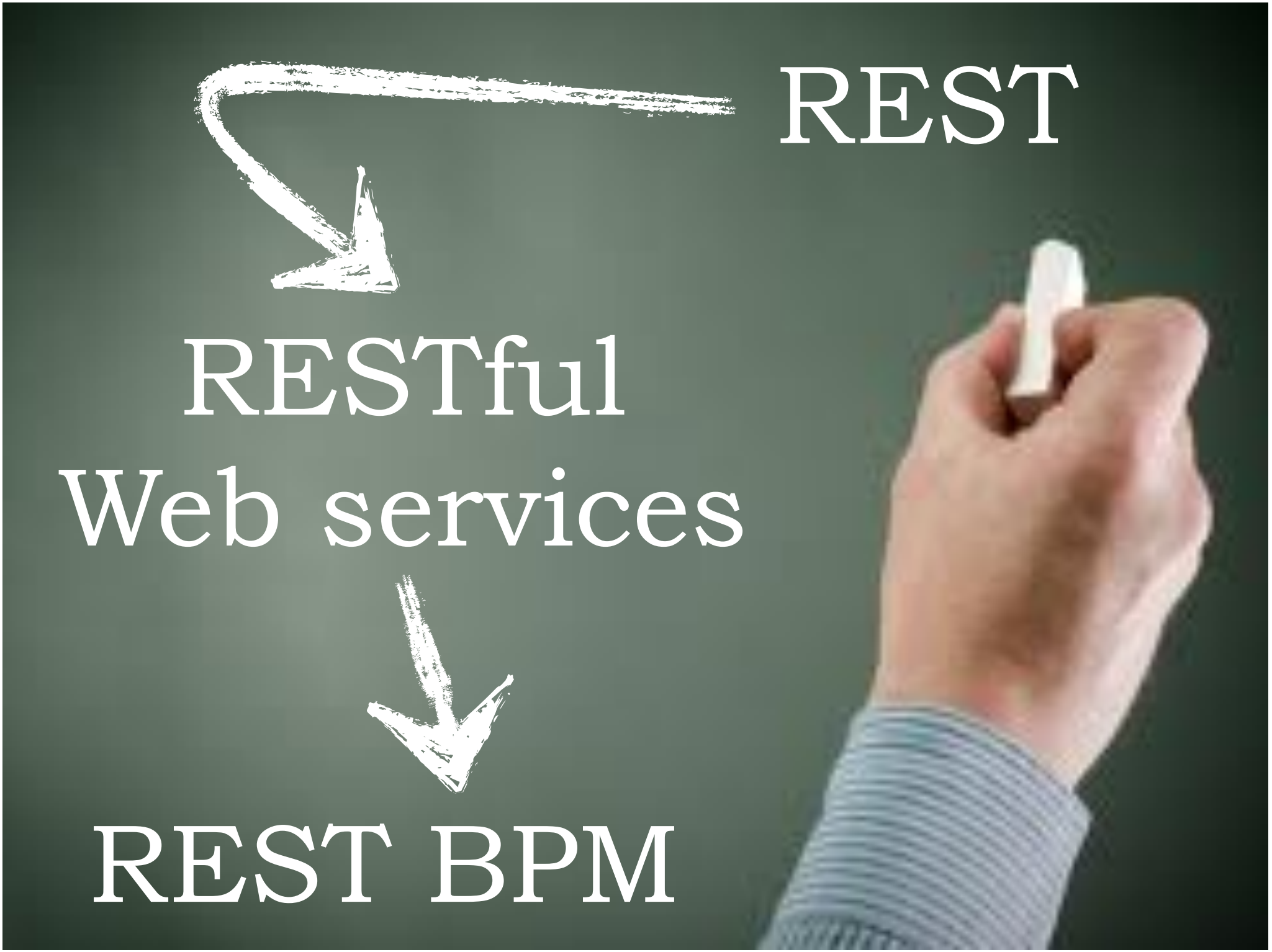
- while preserving semantics

Elastic tasks and sub-processes

- parallel executions of a variable number of sub-processes/tasks instances

REST BPM on the Cloud




REST
RESTful
Web services
REST BPM

Cloud Native Services

Similar architecture as cloud native apps

REST promotes stateless interactions and loose coupling

RESTful Web services can be provisioned and deployed easily on a set of elastic computing nodes

REST BPM on the Cloud

Exploits explicit management of services-as-resources (long-livedness)

- Elastic URIs
- REST distributed transactions

REST BPM on the Cloud

Dynamically replicate and redistribute running instances for scalability and elasticity

- live migrate service state (waiting, active)
- live cloning (elastic services)

Externally managed state and push notifications for dependability and monitorability

Architectural Alternatives

http://www.ieet.org/images/uploads/choice.png

Basic alternatives

State management

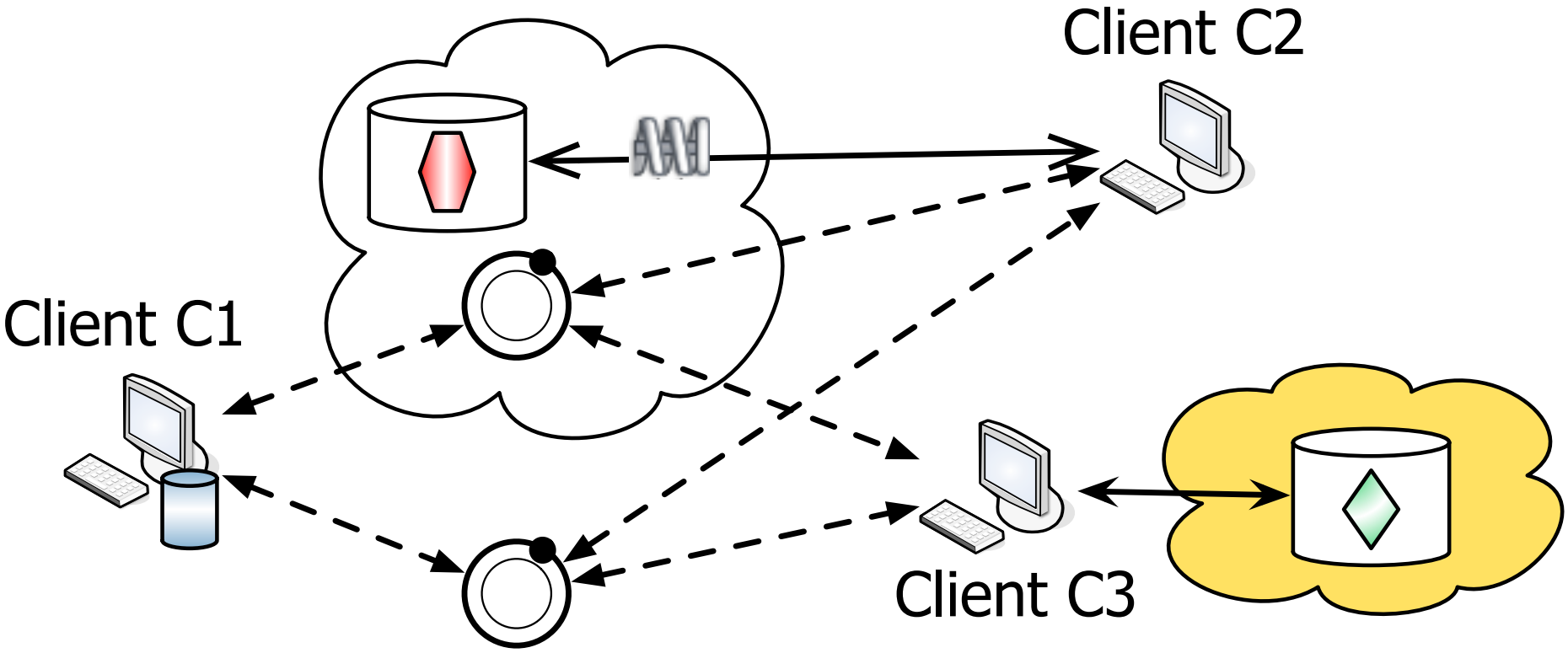
- Client vs Cloud (persistence)
- Co-located vs Remove (processing)

Composition execution

- On-Premises vs Cloud

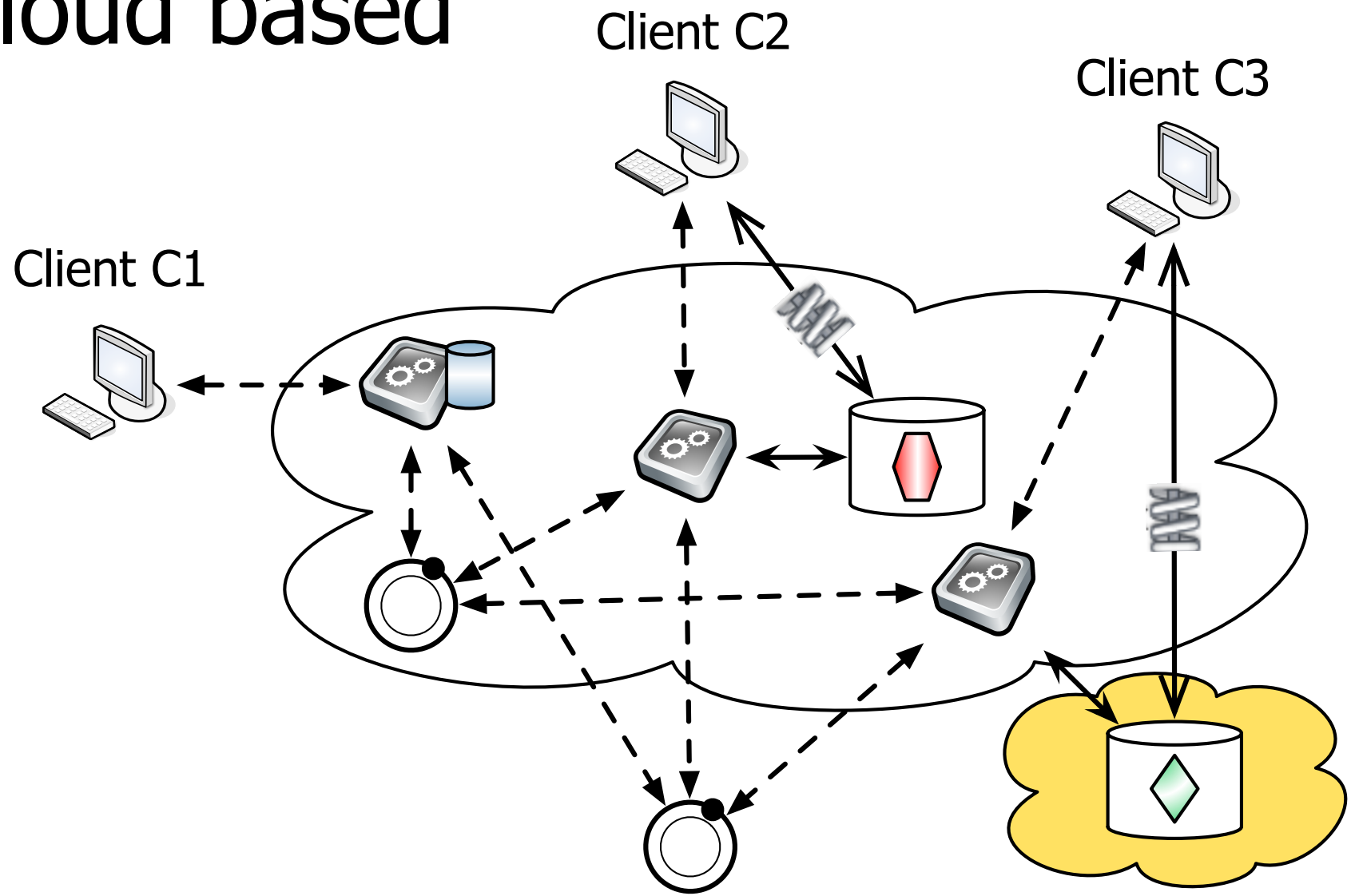
State management

Client based

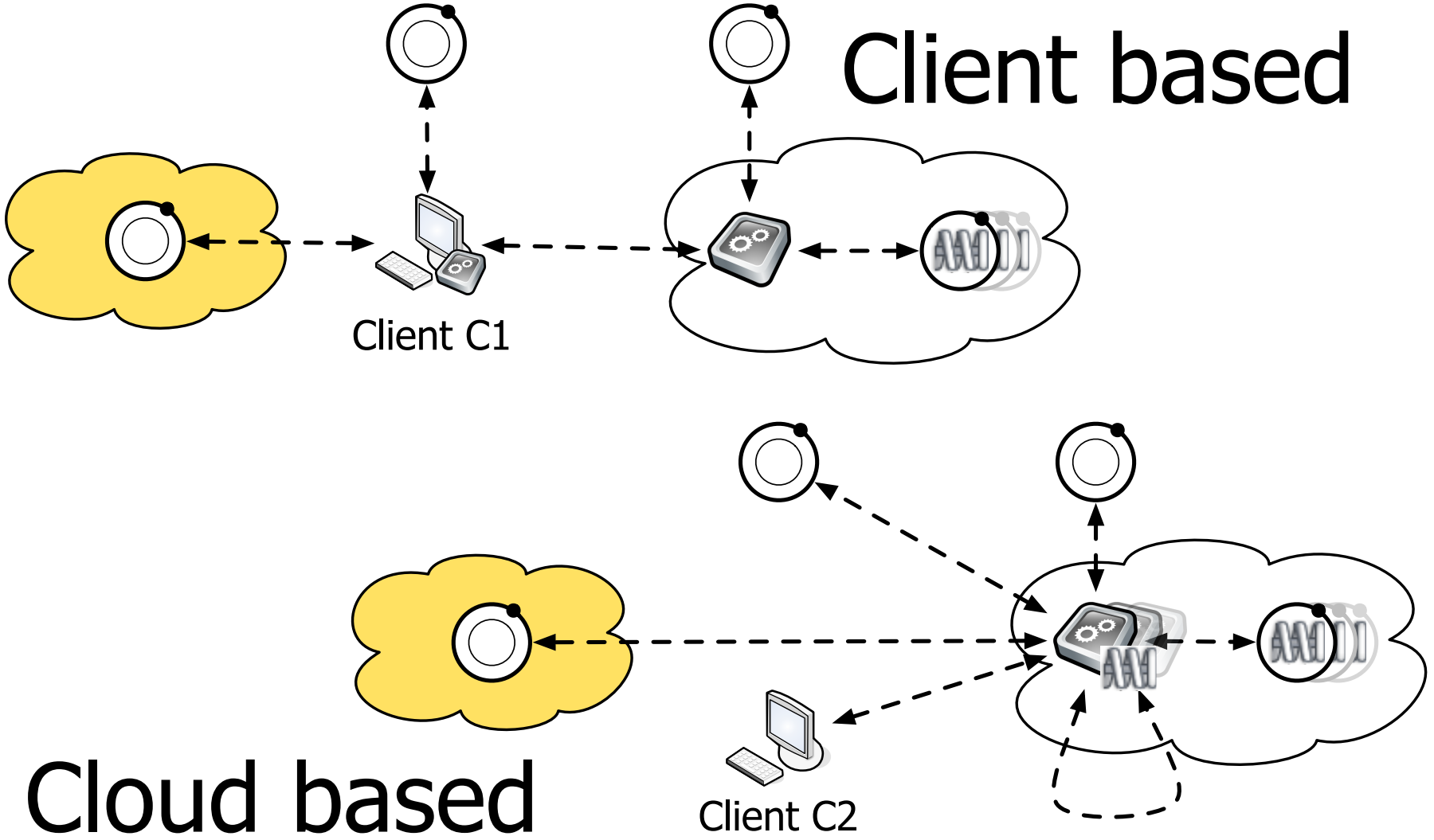


State management

Cloud based



Composition execution



Complete Architectures

Valid

state and execution inside Cloud

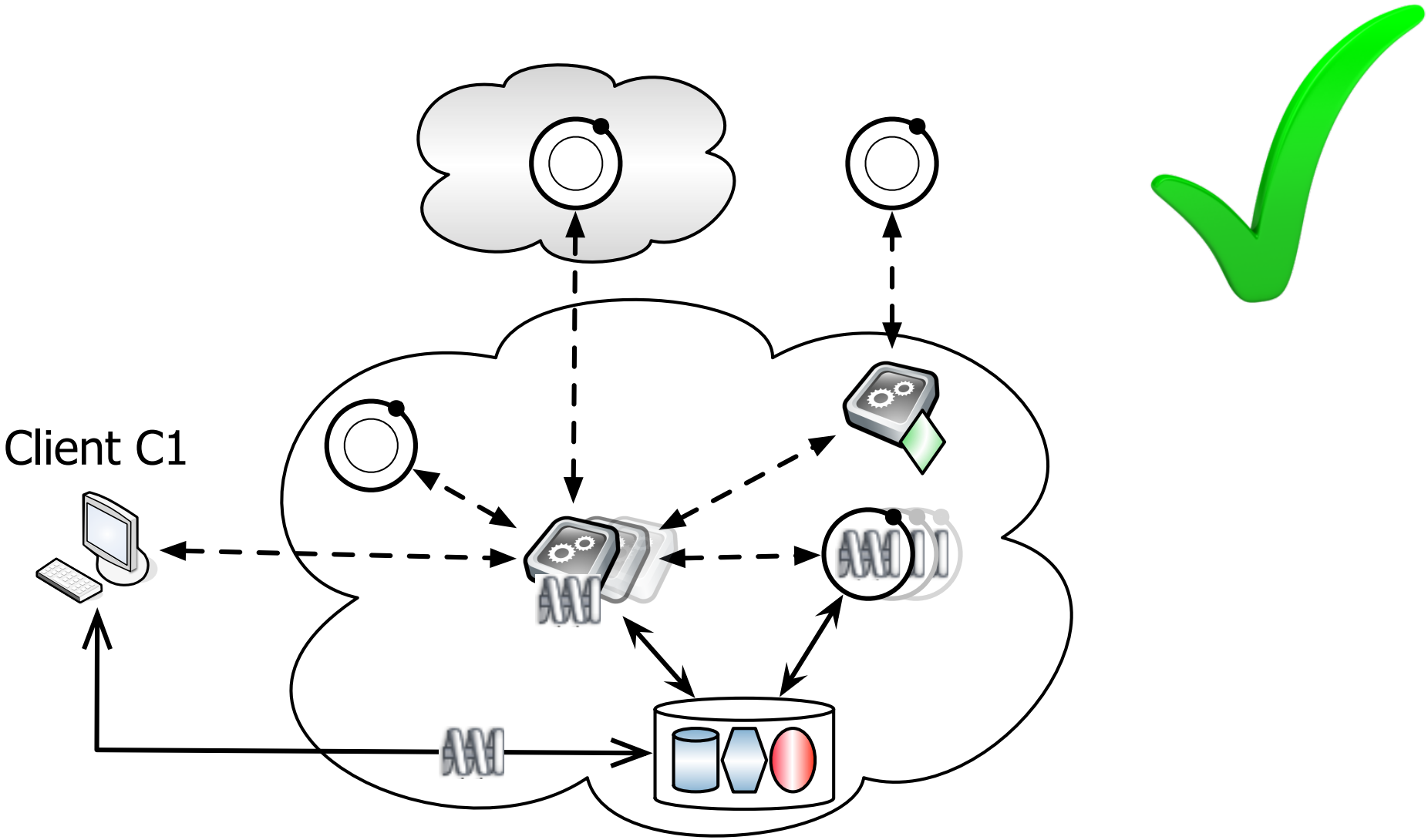
Not Valid

state and execution on client

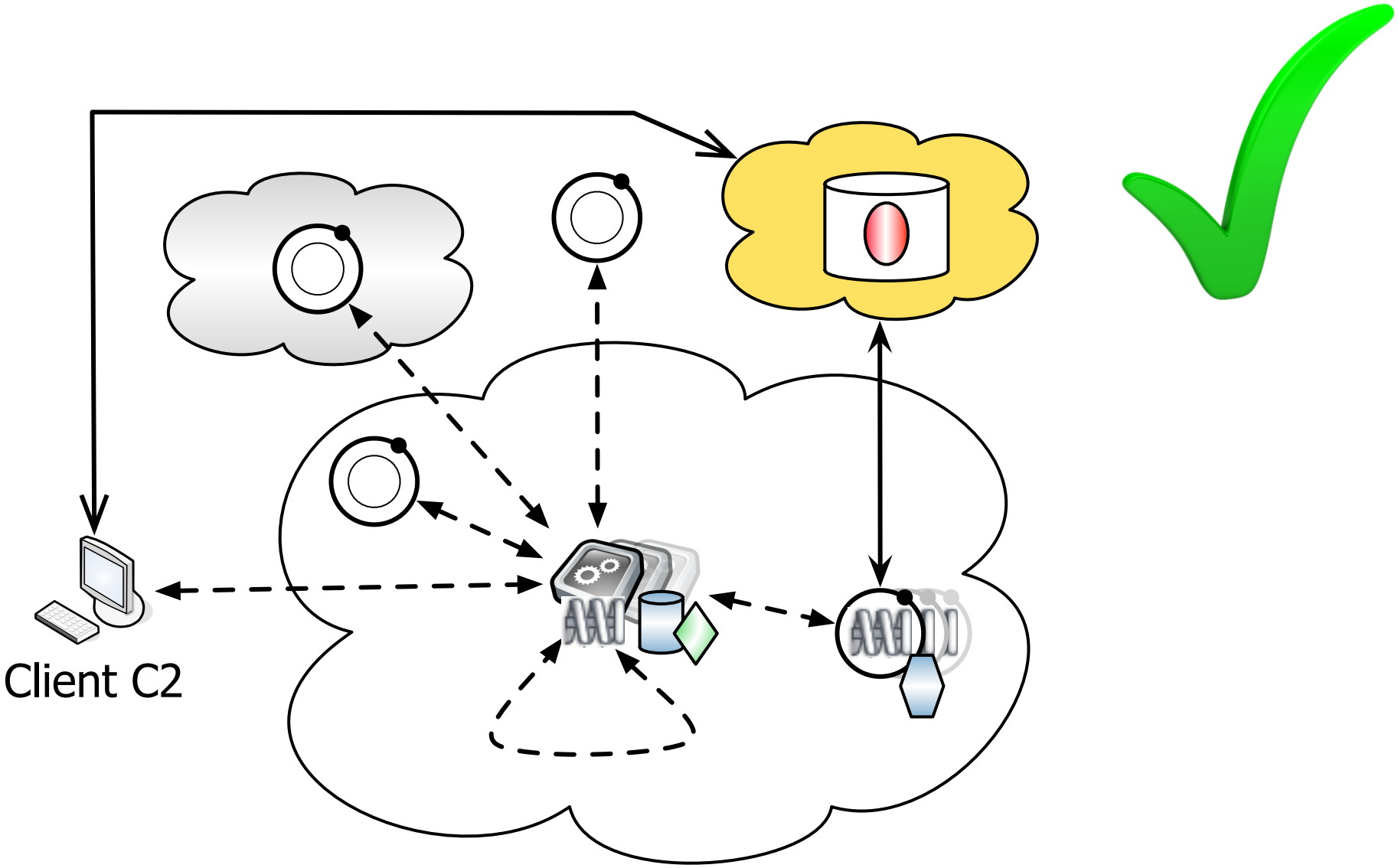
Weak

state on client

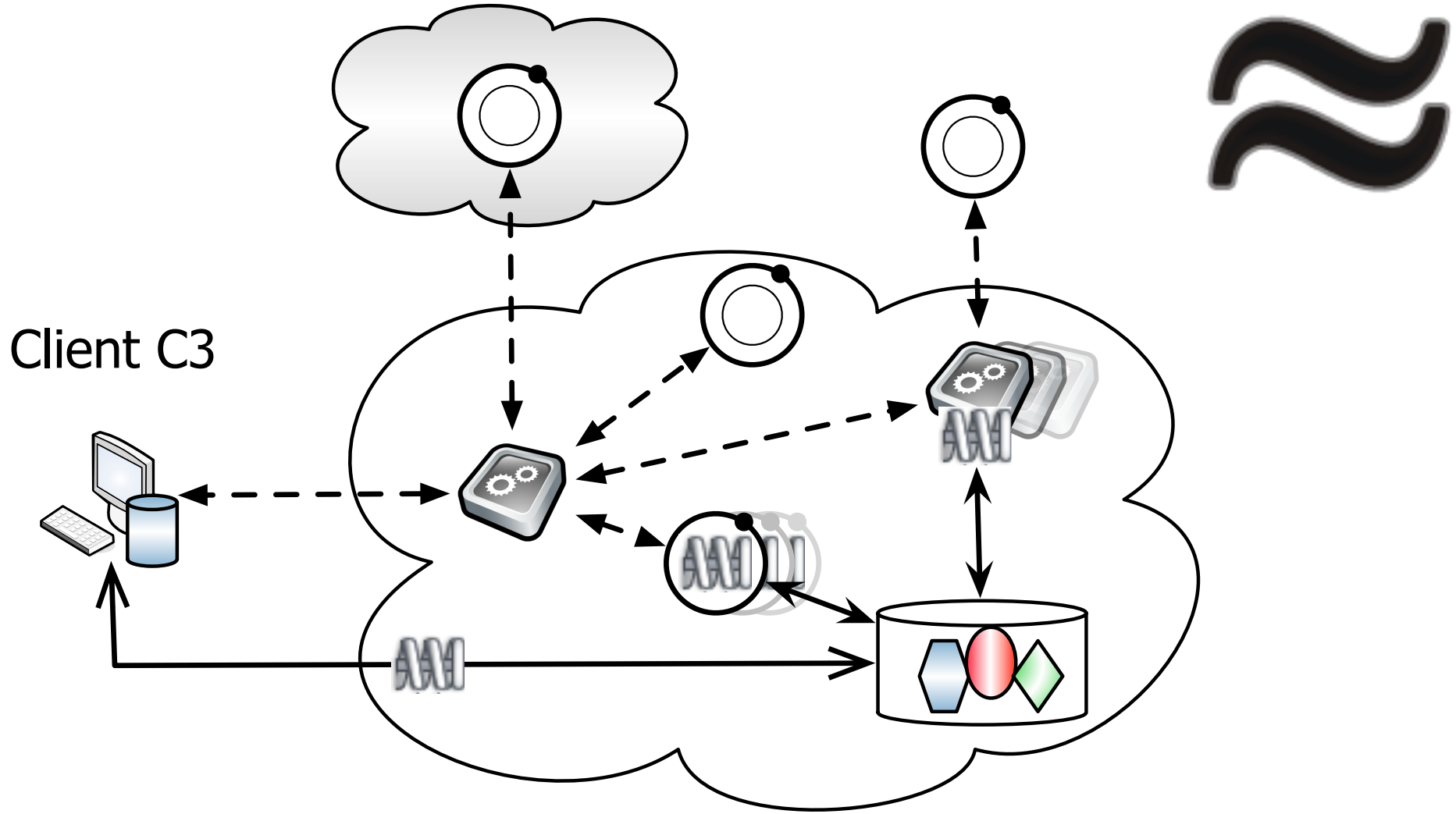
execution inside Cloud



Managed execution and remote state



Managed execution and co-located state

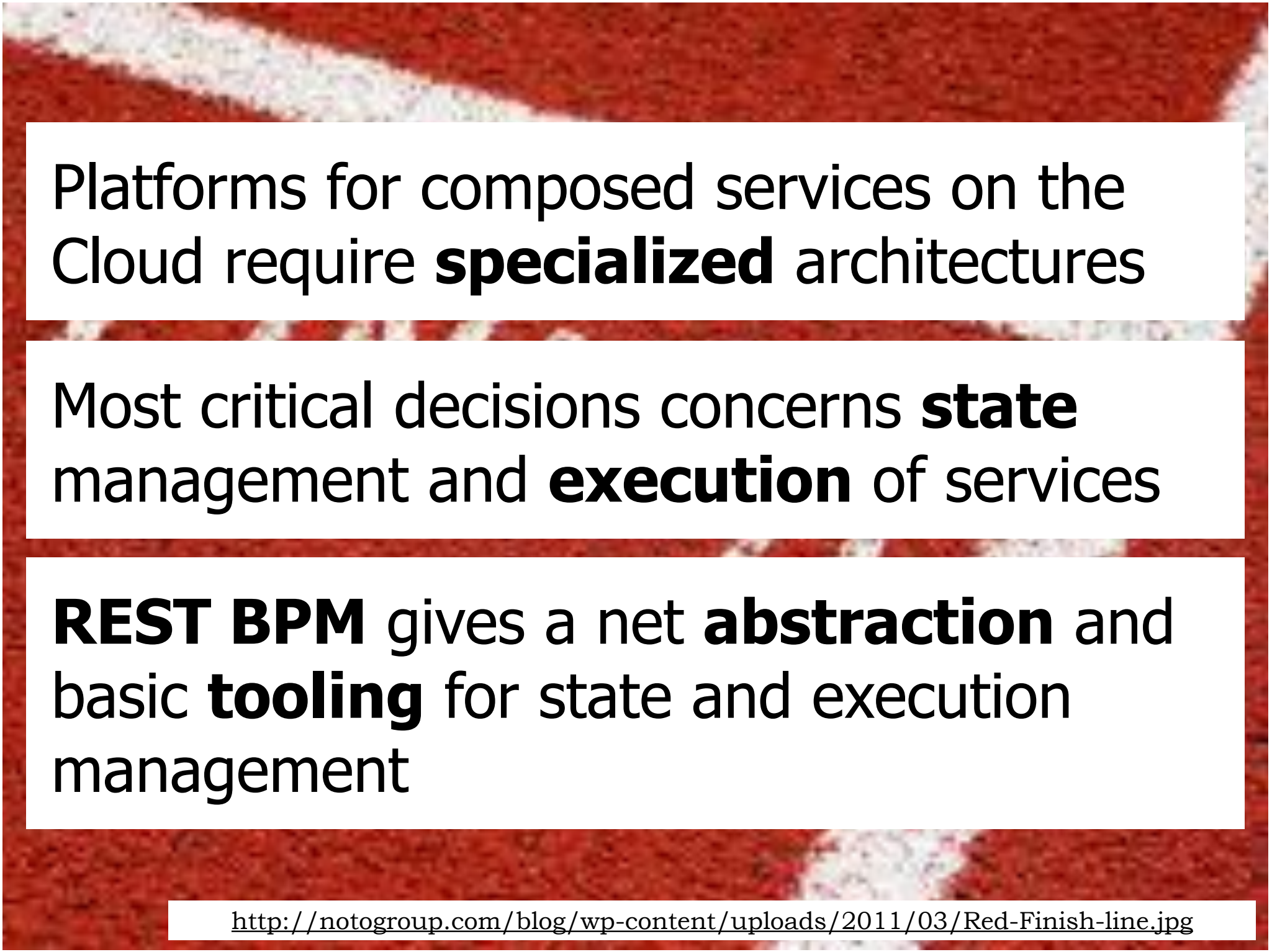


Client side state with managed execution

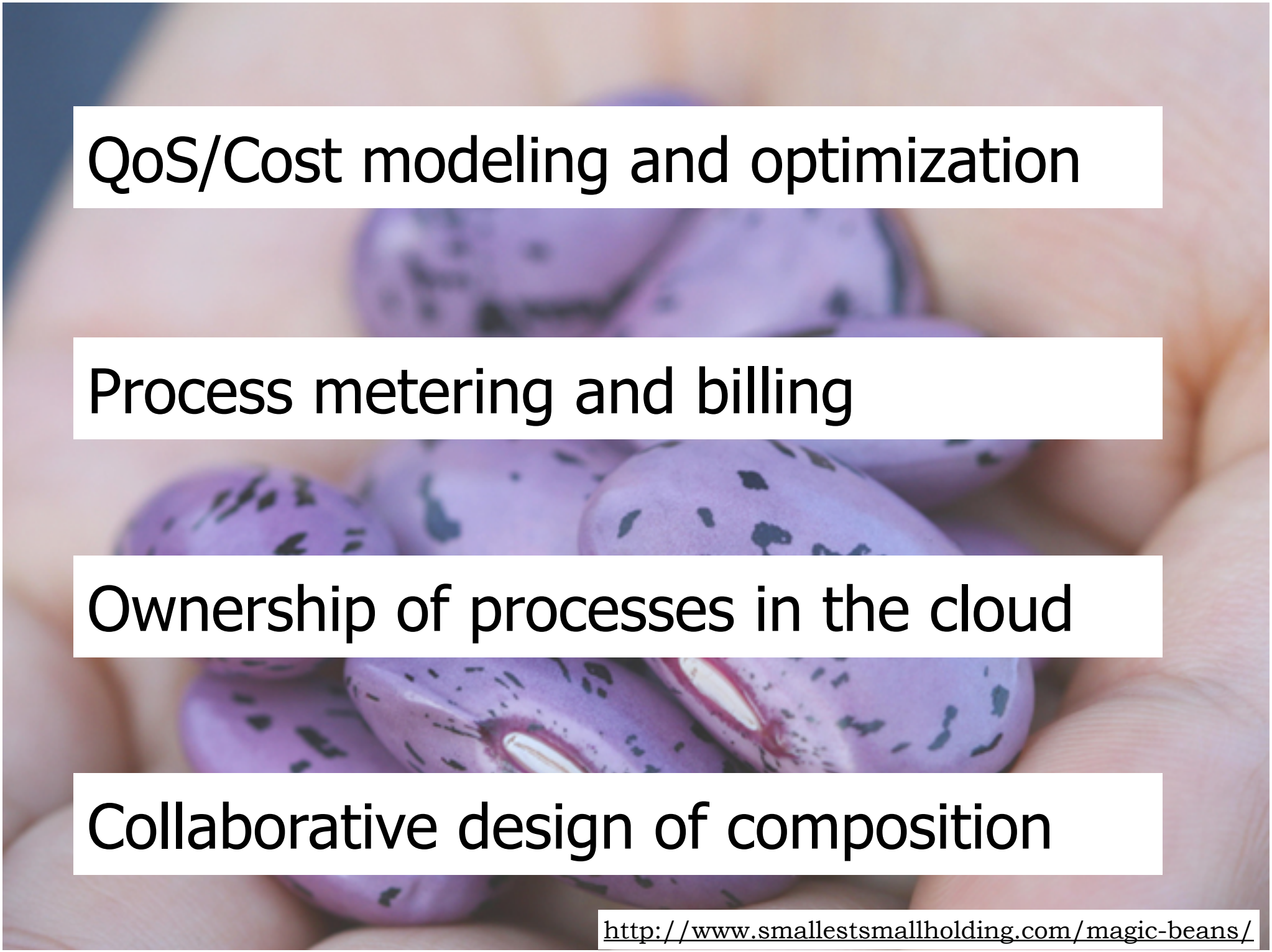
Platforms for composed services on the Cloud require **specialized** architectures

Most critical decisions concerns **state** management and **execution** of services

REST BPM gives a net **abstraction** and basic **tooling** for state and execution management



http://notogroup.com/blog/wp-content/uploads/2011/03/Red-Finish-line.jpg


QoS/Cost modeling and optimization
Process metering and billing
Ownership of processes in the cloud
Collaborative design of composition
http://www.smallestsmallholding.com/magic-beans/