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/
Cloud

- SaaS
- PaaS
- IaaS

automation and outsourcing

provisioning on-demand

pay-per-use

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

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

Service Clouds

Software-as-a-Service

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

BPaaS
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

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

Client C1

Client C2

Client C3
Composition execution

Client C1

Cloud based

Client C2

Client based
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 concern **state** management and **execution** of services.

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

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/