Tutorial (Elasticity on the Cloud): “Demonstration on Elasticity Control, Monitoring and Testing”

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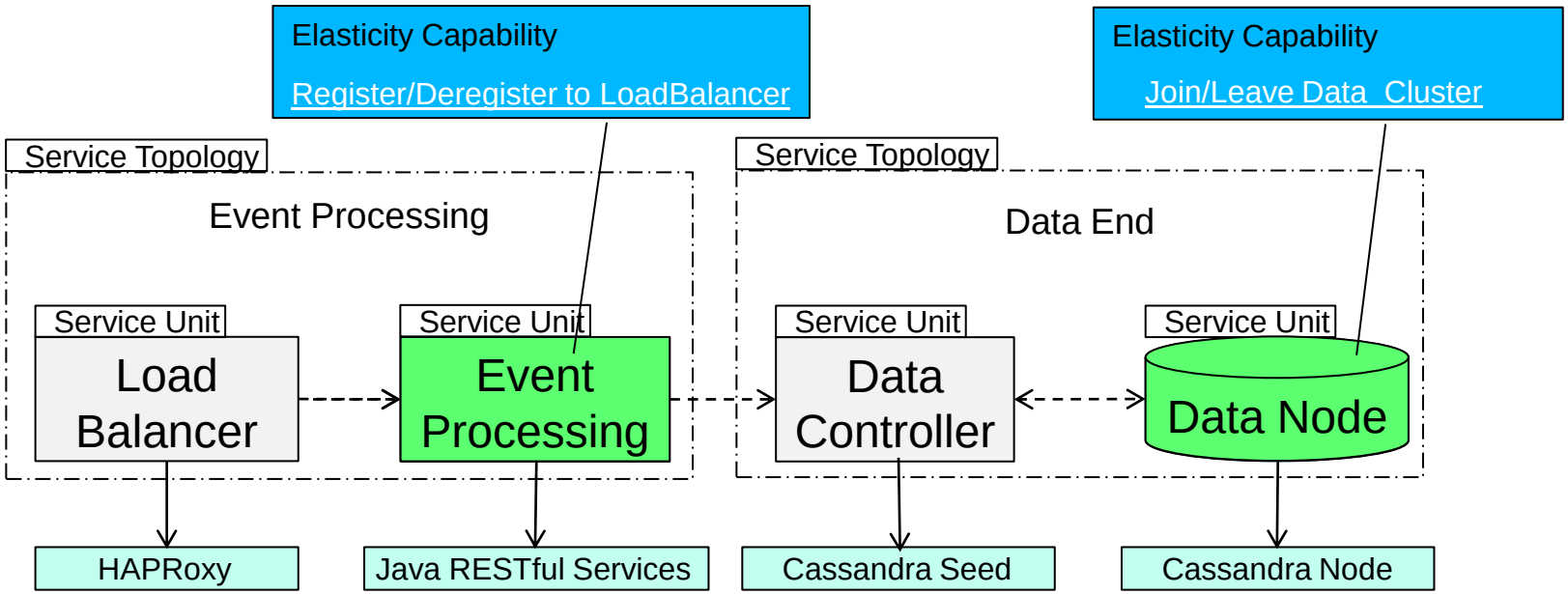
Agenda

- Elastic cloud service (M2M DaaS)
  - Elasticity capabilities
- COMOT
  - Programming
    - Domain specific language for programming elastic cloud services
  - Customization
    - Monitoring of elastic cloud services
    - Analyzing elasticity of cloud services
      - Elasticity Boundary and Pathway
    - Controlling elasticity of cloud services
      - Elasticity policy specification and enforcement

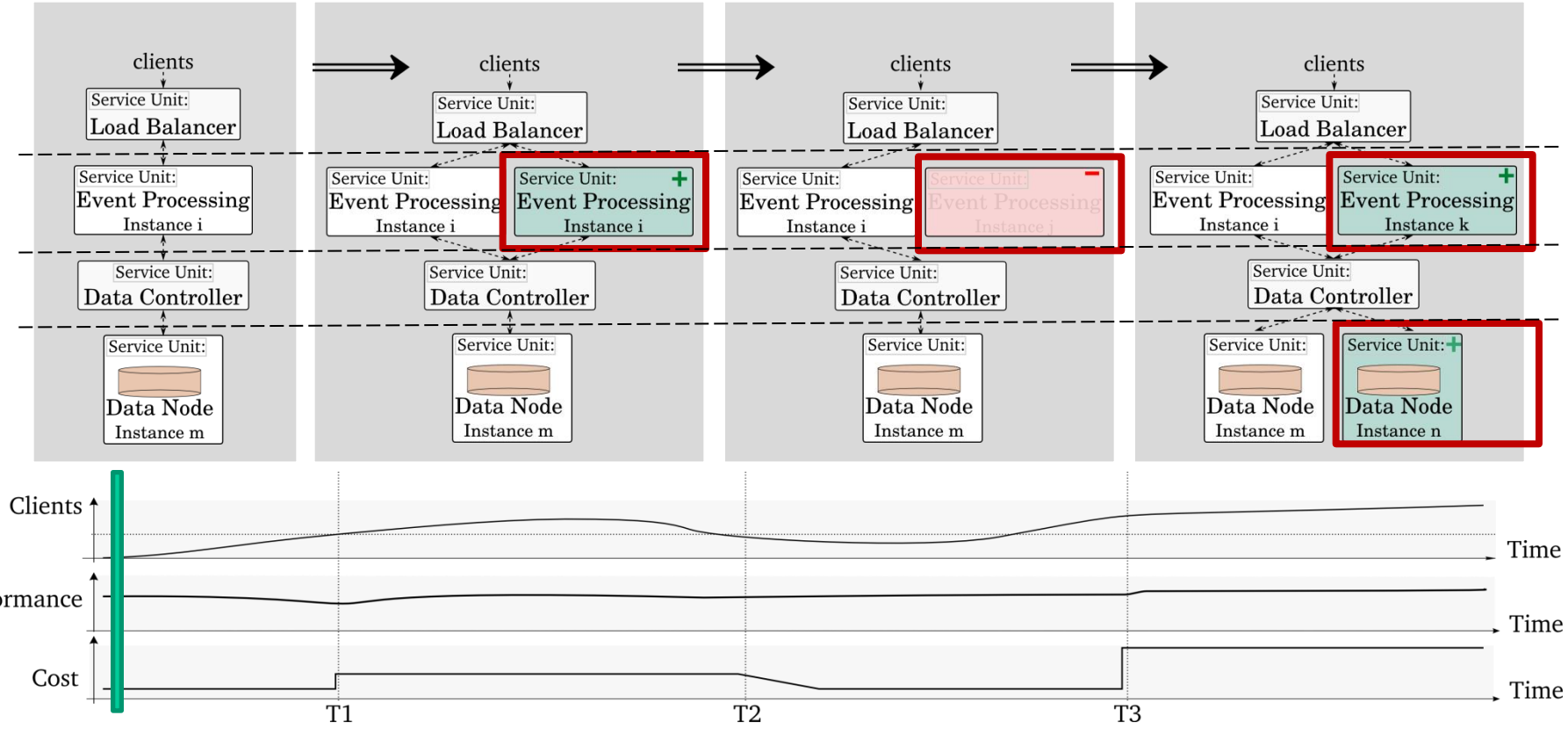
Elastic cloud service (M2M DaaS)

Elasticity Capabilities



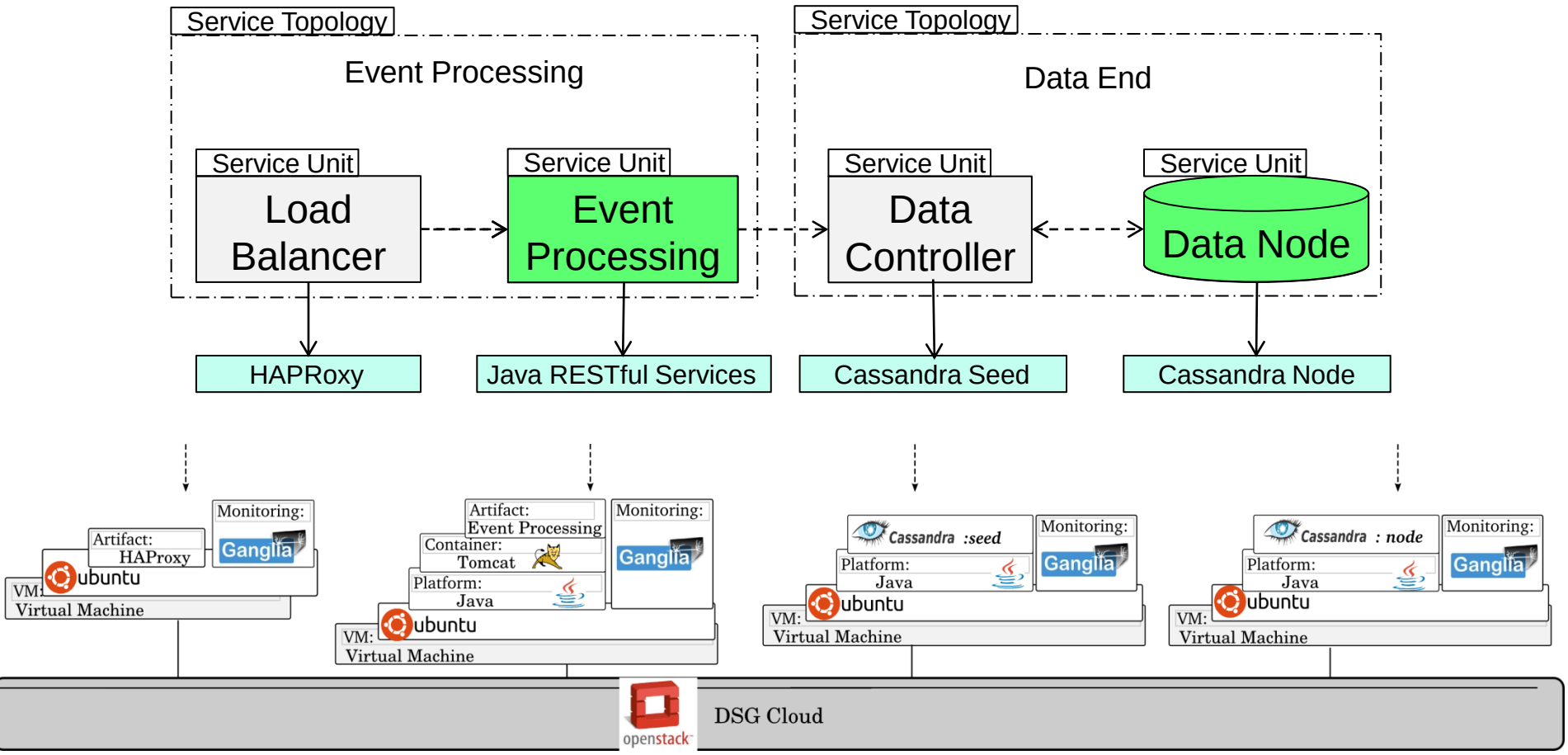
Elastic cloud service (M2M DaaS)

Elasticity Capabilities



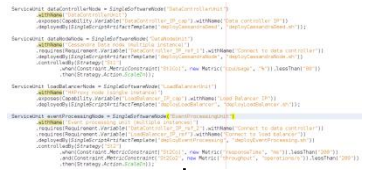
Elastic cloud service (M2M DaaS)

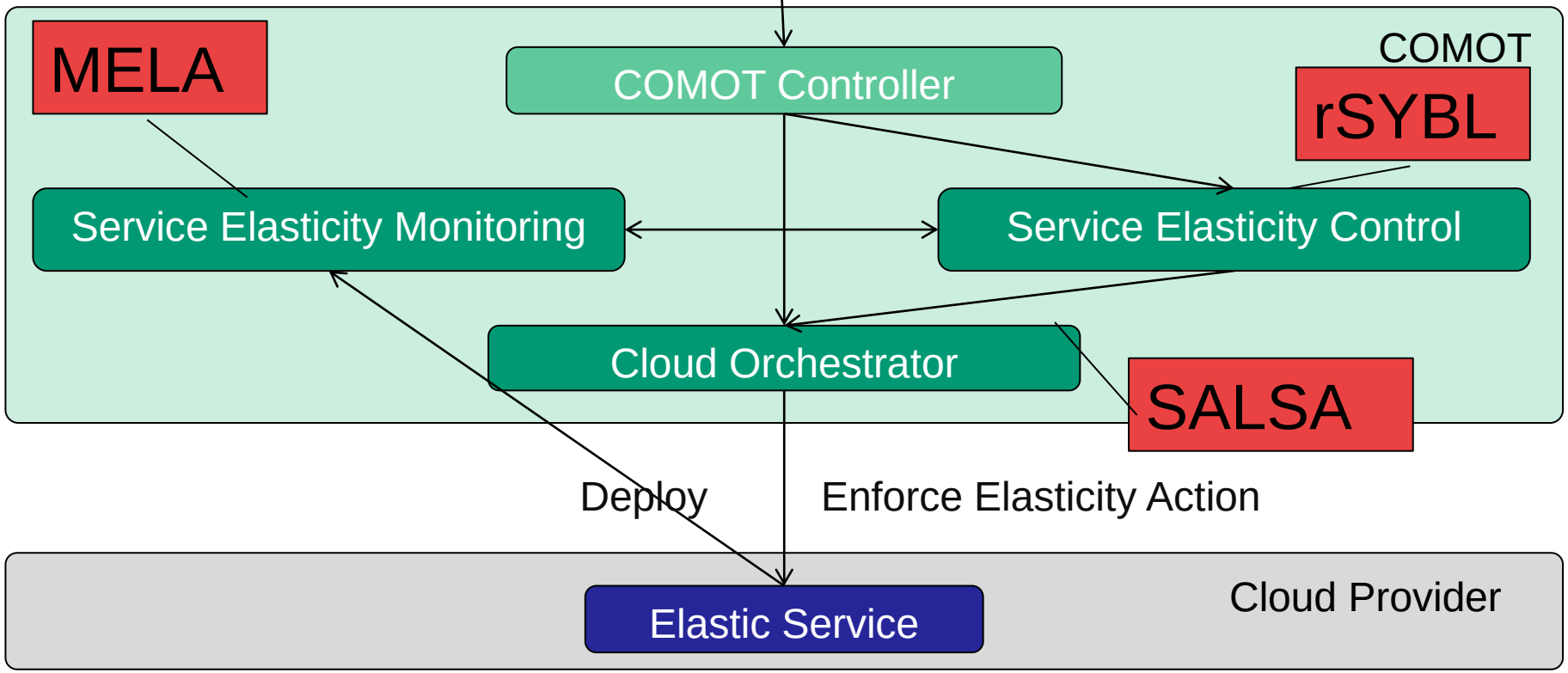
Elasticity Capabilities



COMOT – configuration example

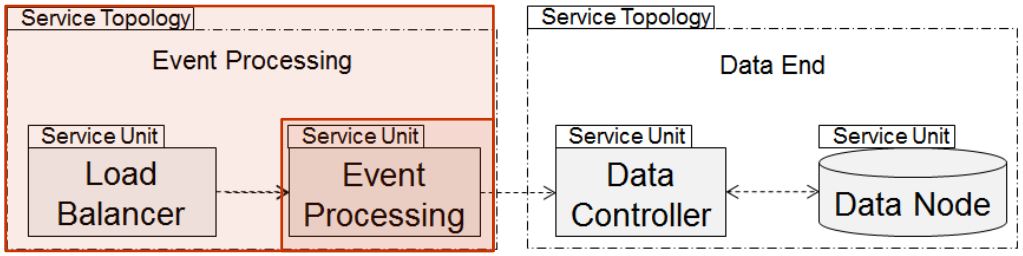
Domain Specific Language





Controlling elasticity of cloud services

Elasticity constraints and strategies




```
▼<CloudService id="CloudService">

▼

</CloudService>
```

Domain Specific Language

```
ServiceUnit dataNodeUnit = SingleSoftwareUnit("DataNodeUnit")
        .deployedBy(SingleScriptArtifactTemplate("artifactID", "artifact"))
        .requires(Requirement.Variable("dataControllerIP"))
        .controlledBy(Strategy("ST1")
                .when(Constraint.MetricConstraint("ST1C01",
                        new Metric("metric", "unit")).lessThan("value"))
                .then(Strategy.Action.ScaleIn));
```

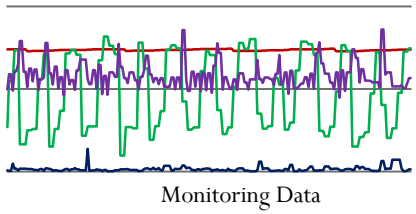
```
OperatingSystemUnit dataNodeOS = OperatingSystemUnit("DataNodeVM")
        .providedBy(OpenstackMicro("OS_DataNode_Small")
                .withProvider("dsg@openstack")
                .addSoftwarePackage("openjdk-7-jre")
        );
```

Domain Specific Language

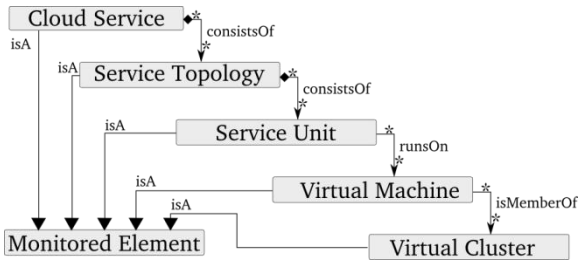
```
ServiceTopology dataEndTopology = ServiceTopology("DataEndTopology")
        .withServiceUnits(dataControllerUnit, dataNodeUnit,
                dataControllerOS, dataNodeOS);

dataEndTopology.constrainedBy(
        Constraint.MetricConstraint("DataEnd_C01",
                new Metric("metric", "unit")).lessThan("value"));
```

Monitoring elastic cloud services

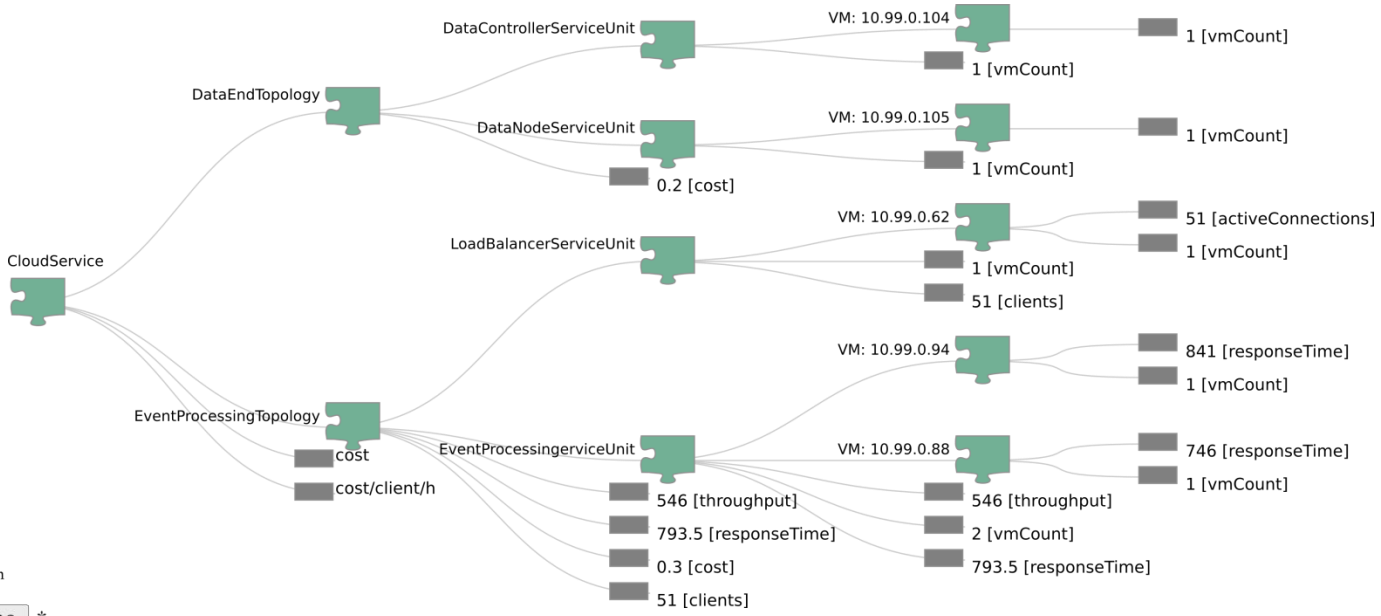
Logically structuring monitoring information



Monitoring Data



Service Structure

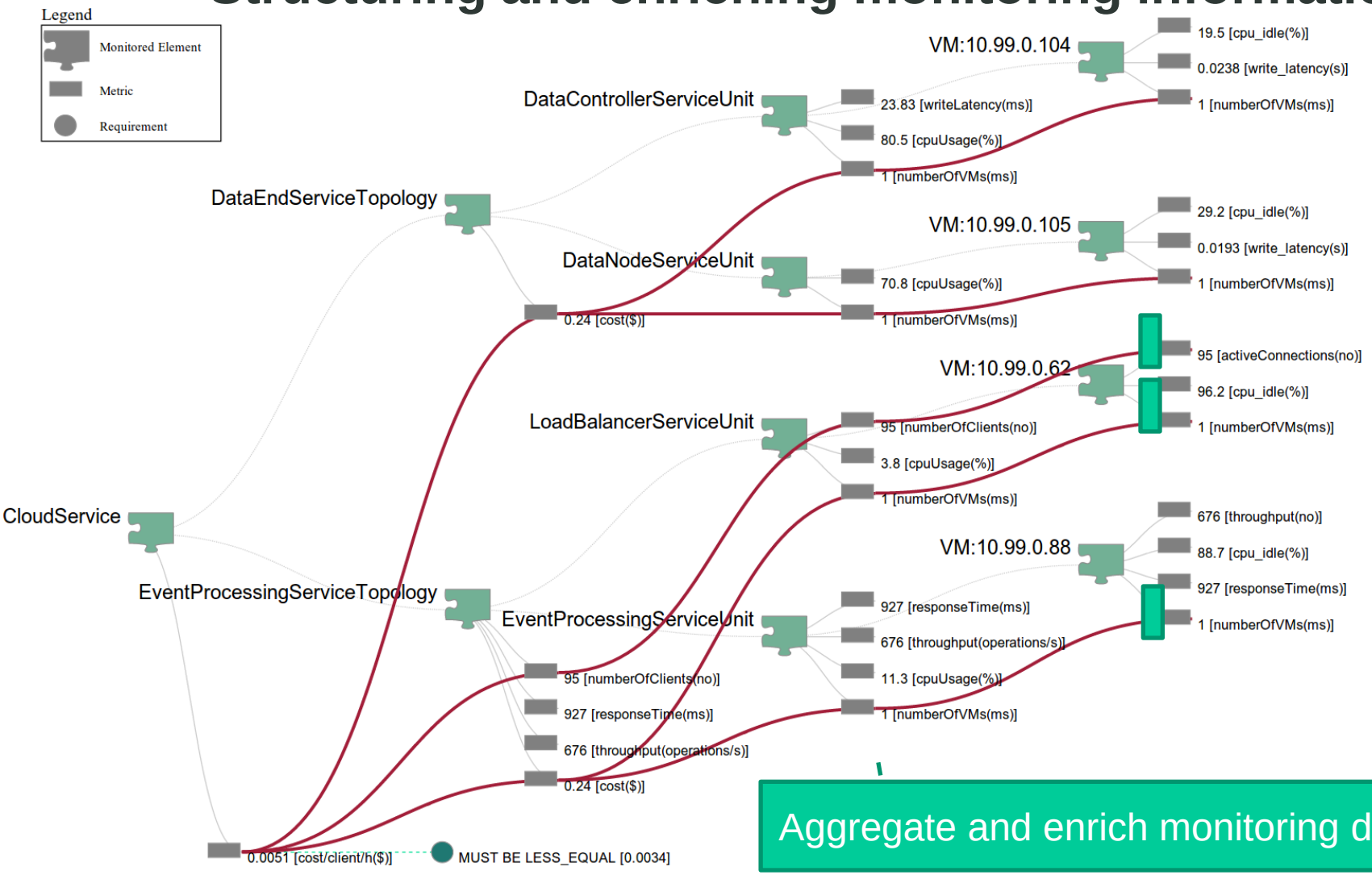


DEMO:

PROGRAMMING, DEPLOYING AND CONTROLLING ELASTIC CLOUD SERVICES

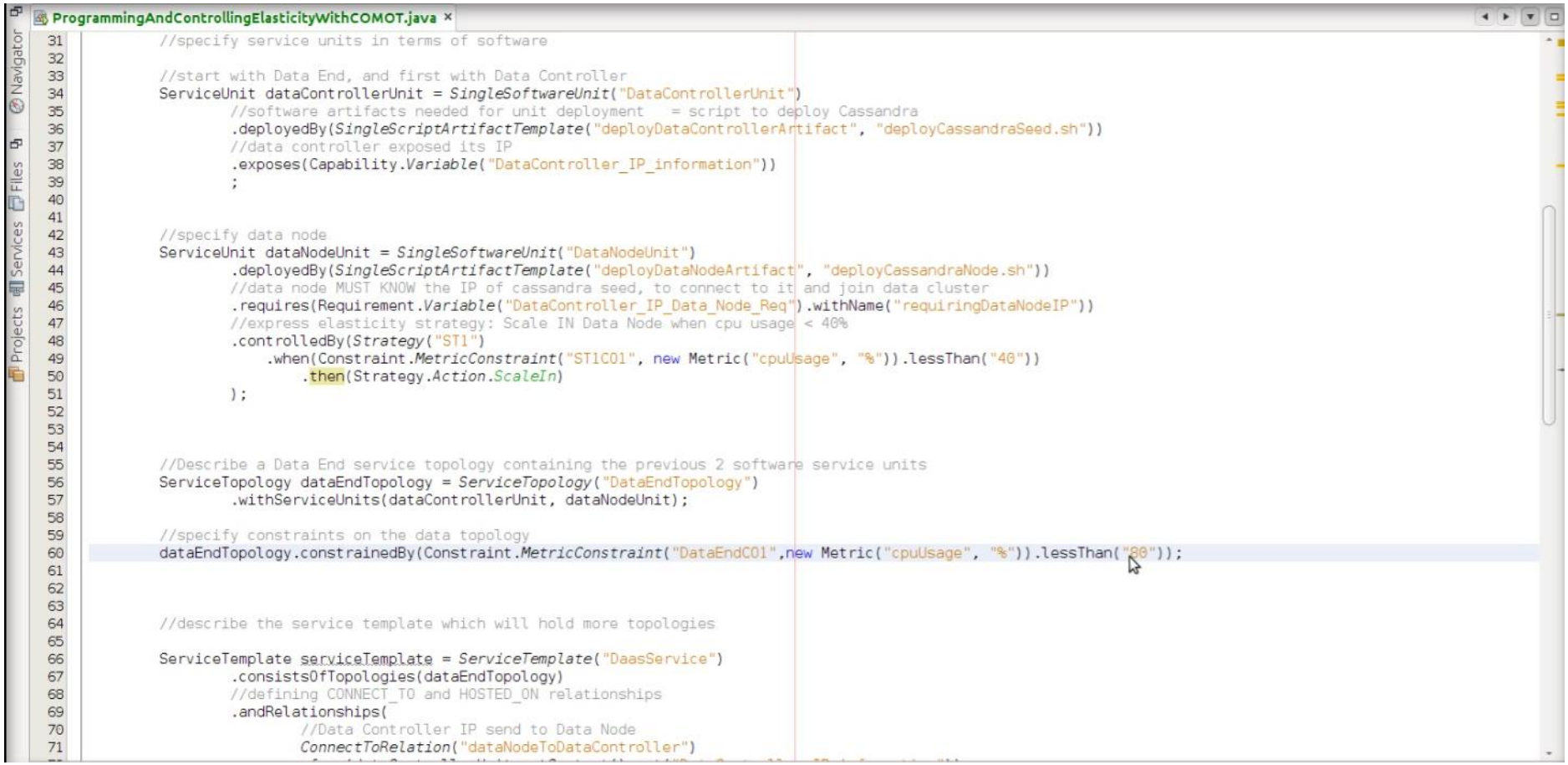
Monitoring elastic cloud services

Structuring and enriching monitoring information

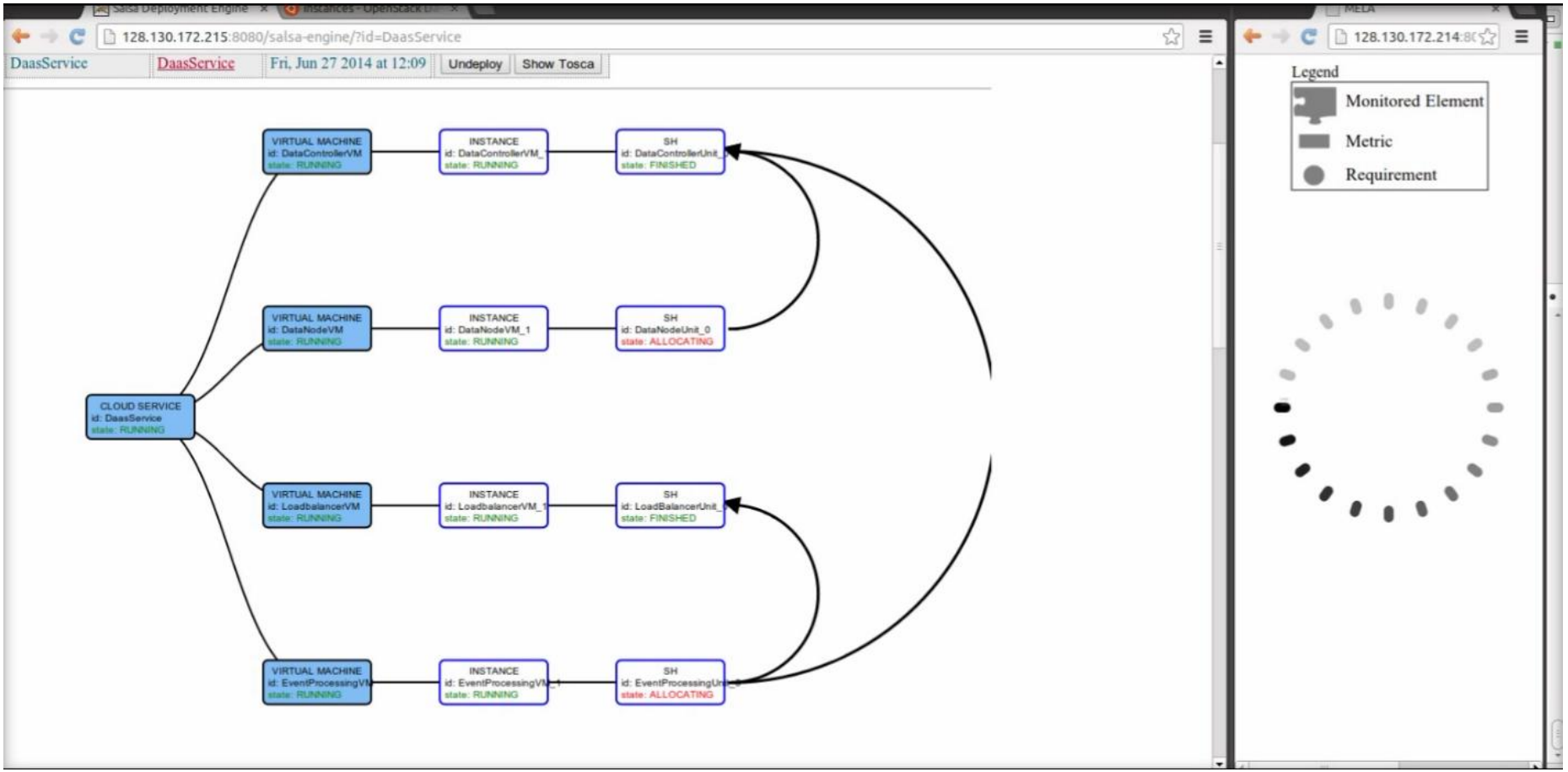


Aggregate and enrich monitoring data

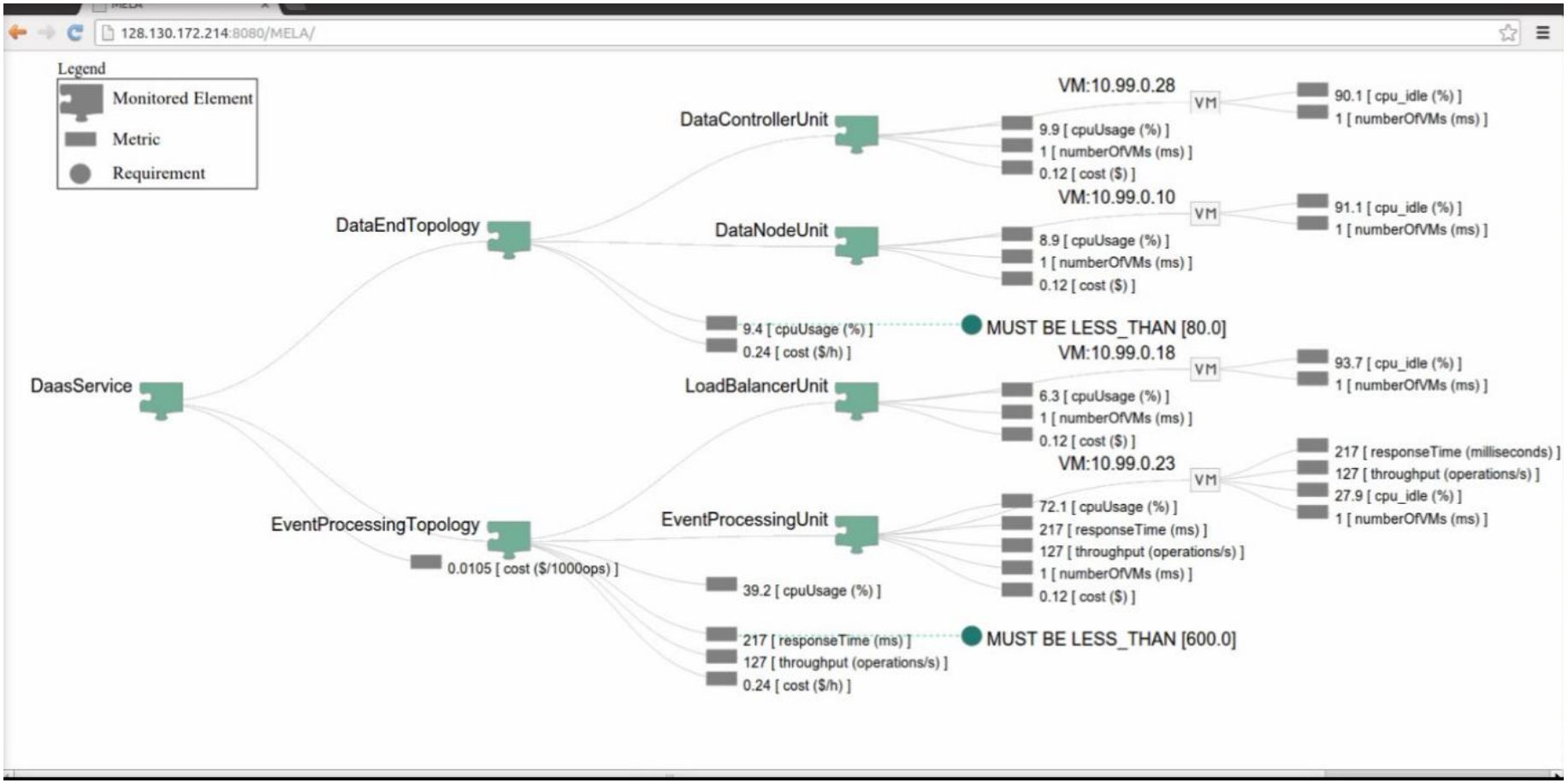
Demo Screenshots
Programming



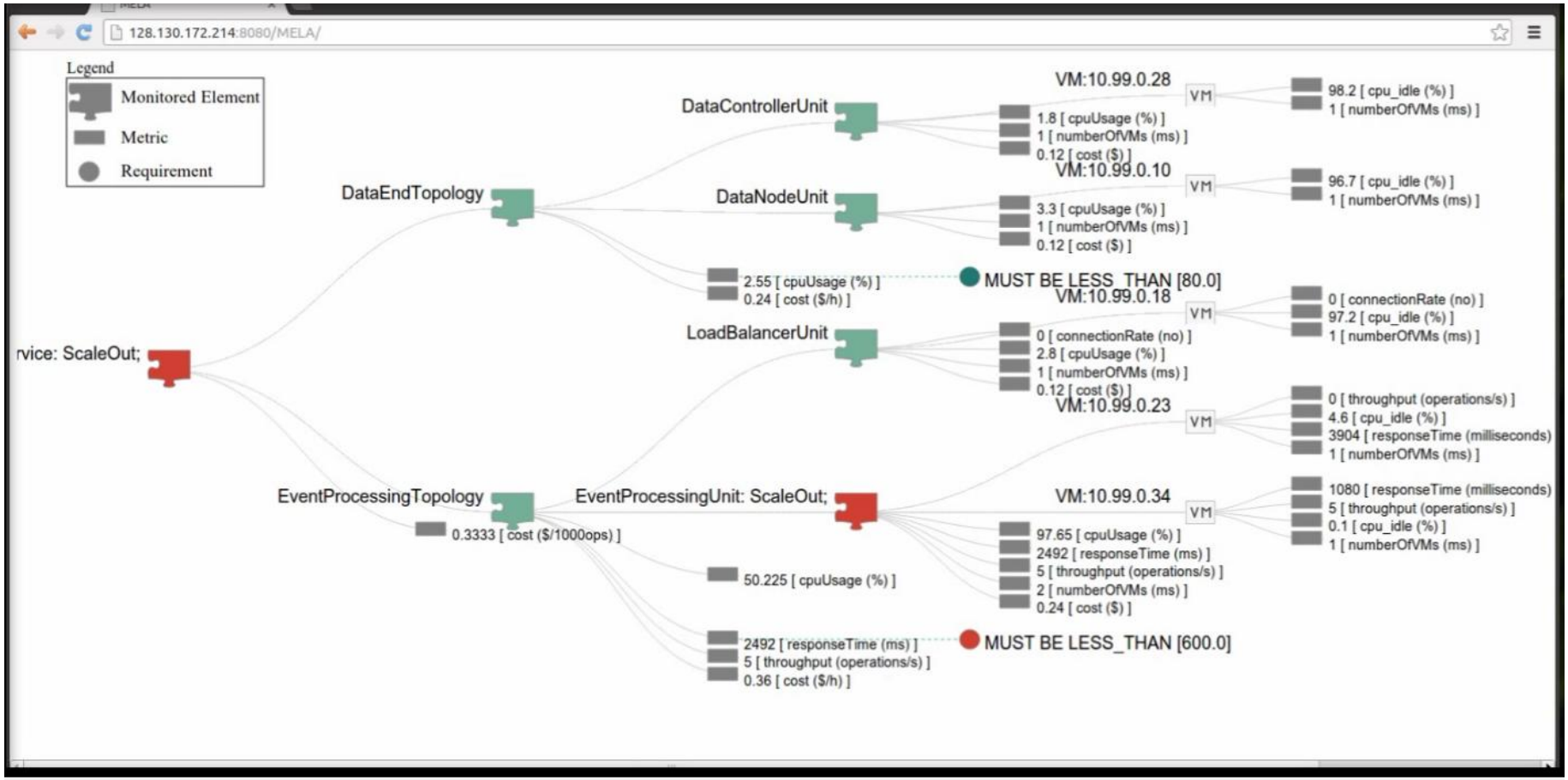
Demo Screenshots
Deploying



Demo Screenshots
Monitoring

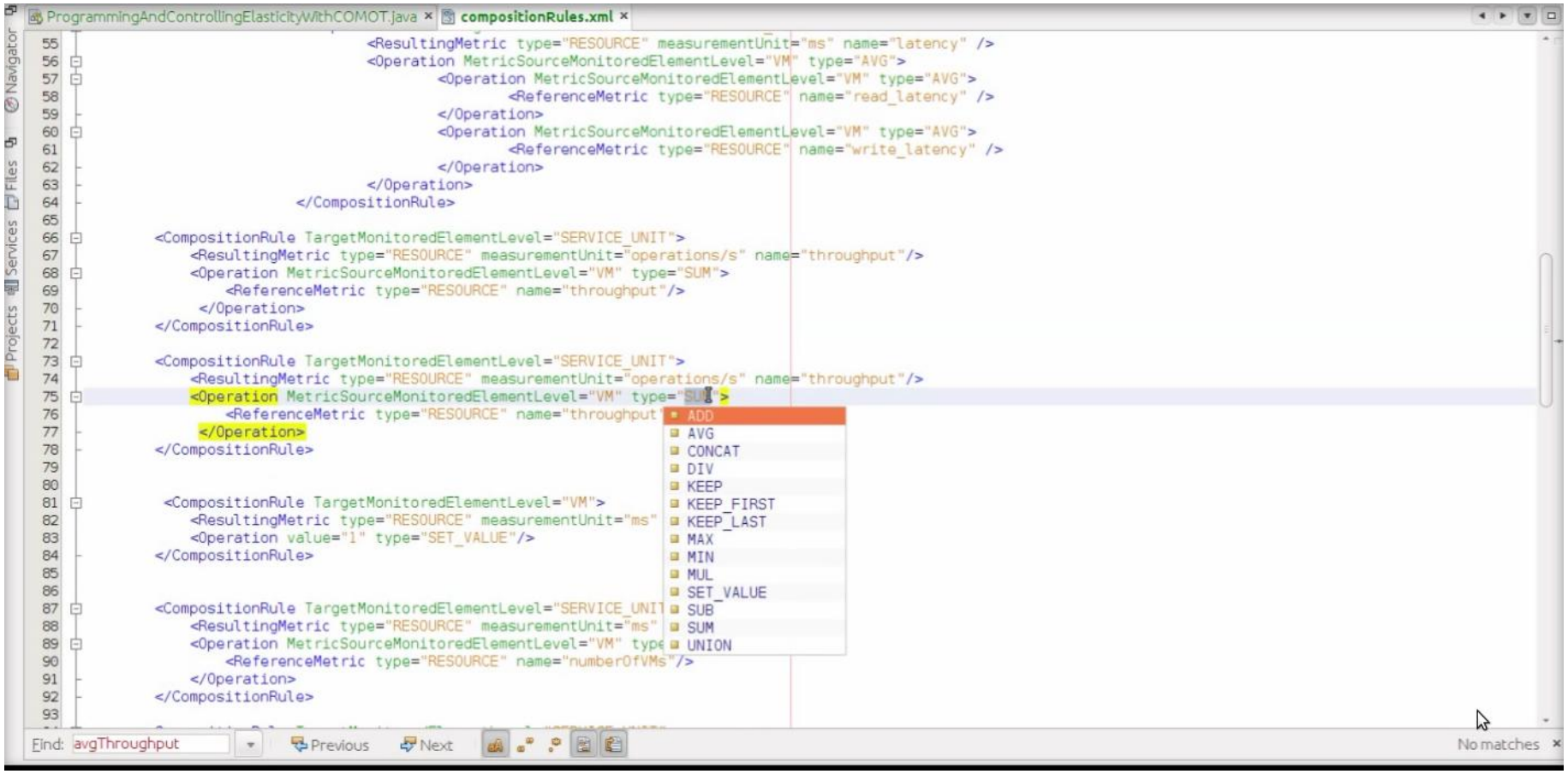


Demo Screenshots
Controlling



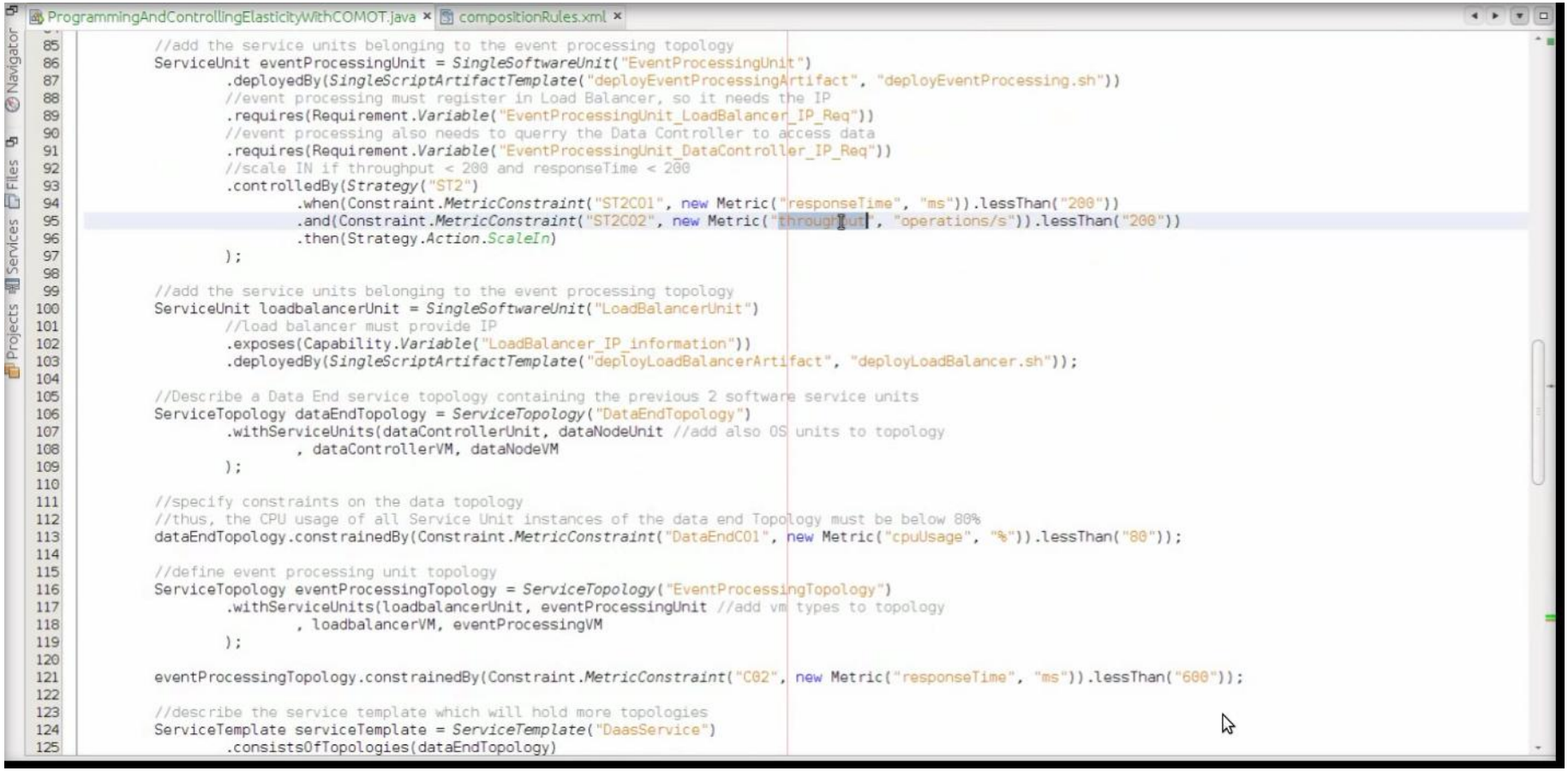
Demo Screenshots

Customizing metrics



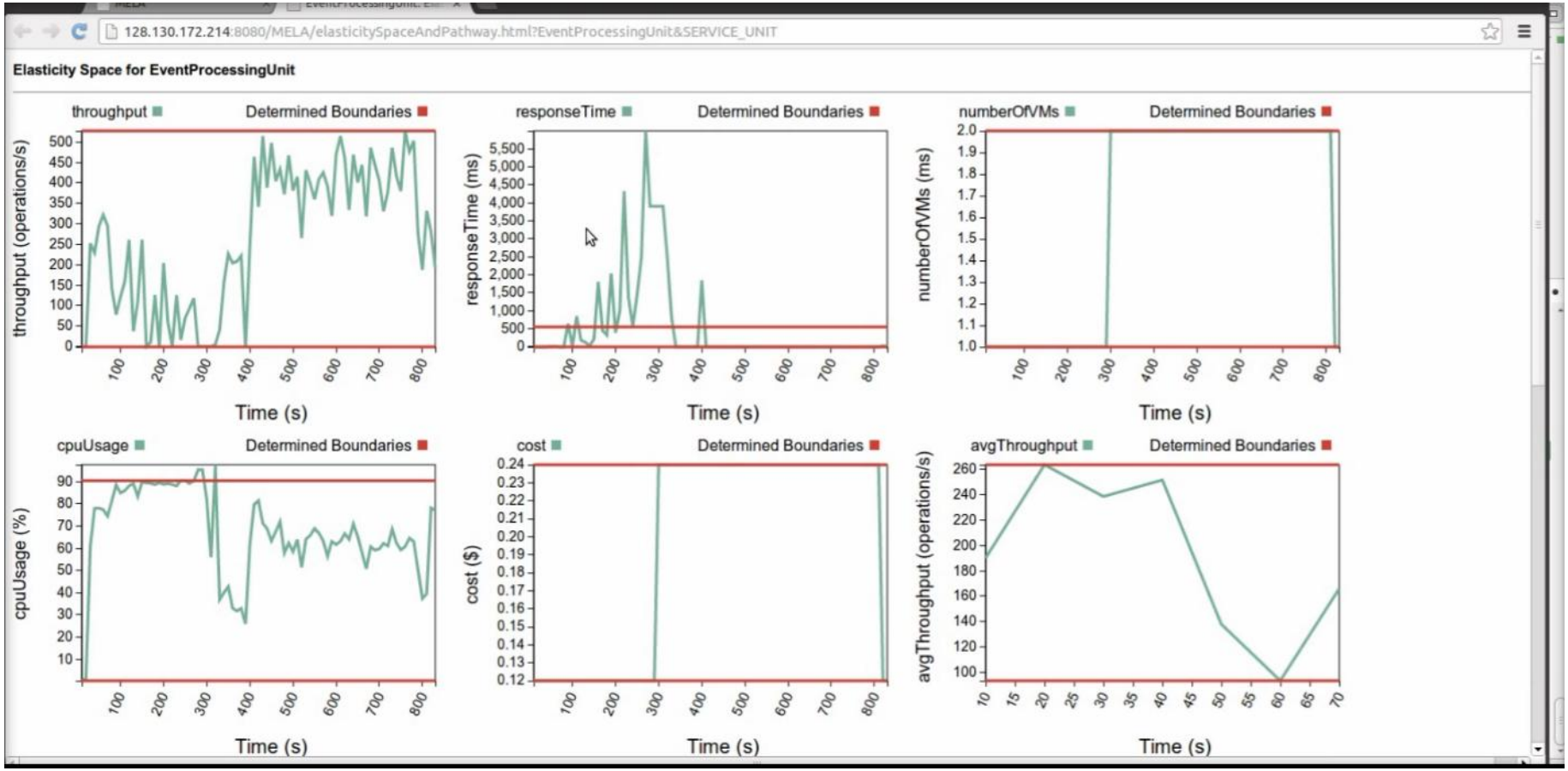
Demo Screenshots

Customizing elasticity requirements

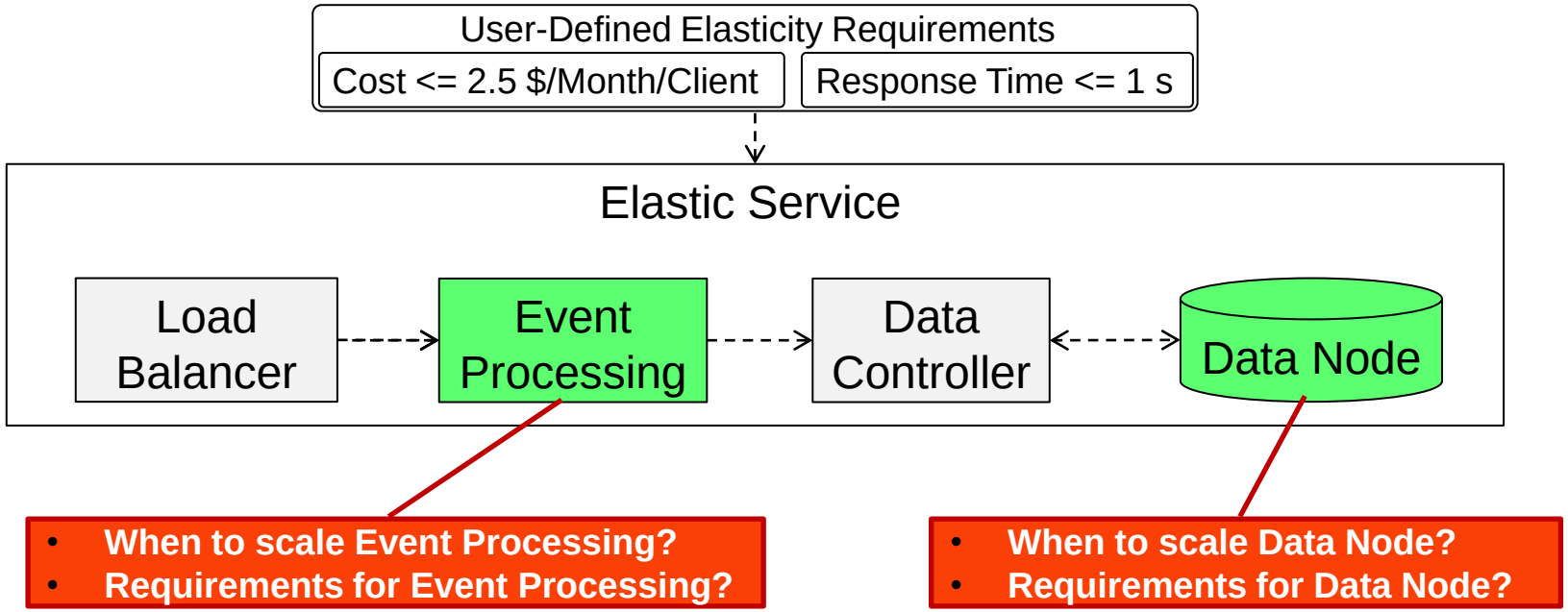


Demo Screenshots

Elasticity Space and Boundaries



Analyzing elasticity of cloud services

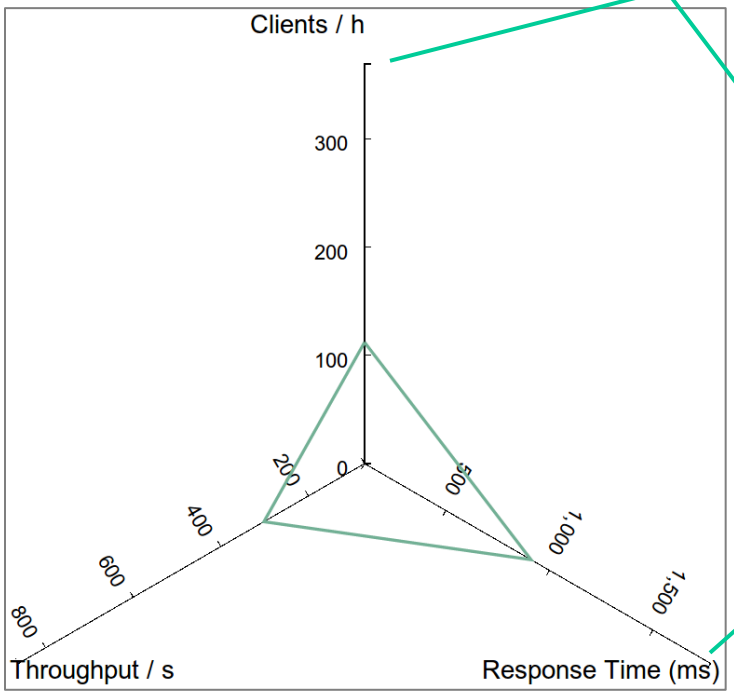


Analyzing elasticity of cloud services

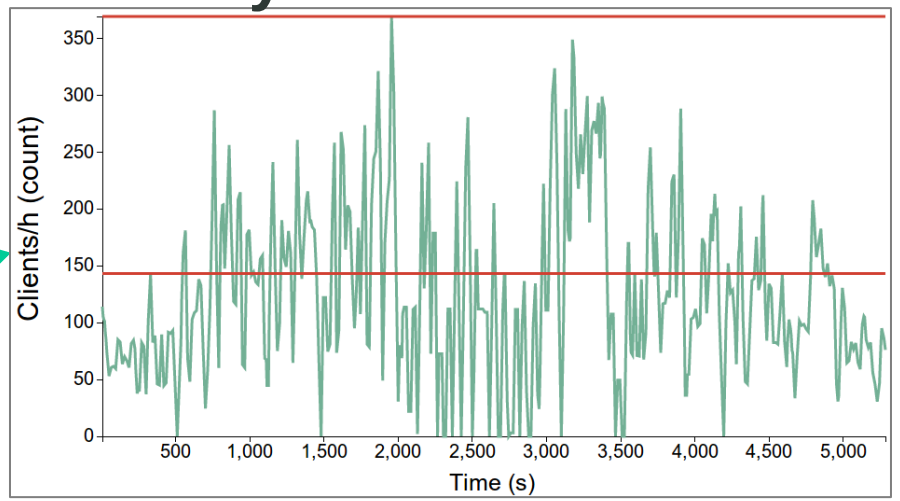
Elasticity Space and Boundary

User-Defined Elasticity Requirements

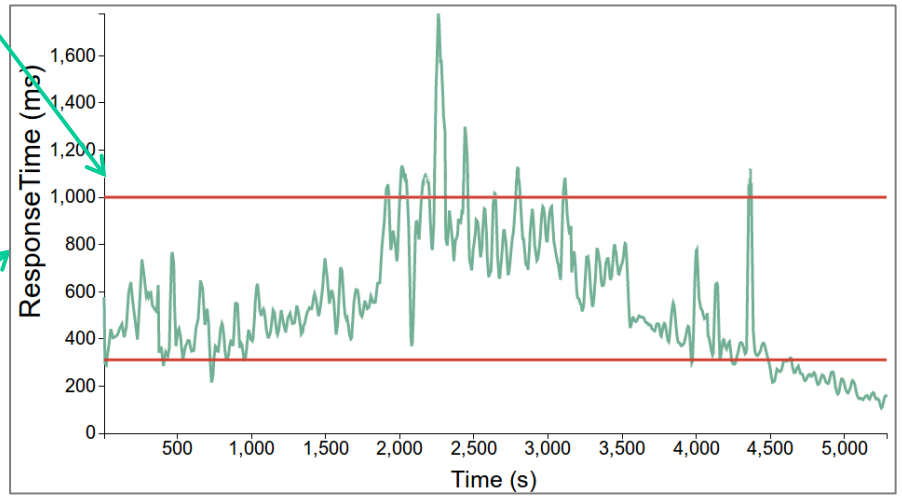
Cost <= 2.5 $/Month/Client | Response Time <= 1 s



Elasticity Space Snapshot



Elasticity Space “Clients/h” Dimension



Elasticity Space “Response Time” Dimension

Conclusions

- Elastic cloud services
  - Elasticity capabilities
- COMOT
  - Domain specific language for programming elastic cloud services
  - Monitoring of elastic cloud services
  - Analyzing elasticity of cloud services
  - Controlling elasticity of cloud services

The Vienna Elastic Computing Model (http://dsg.tuwien.ac.at/research/viecom)

Distributed Systems Group (http://dsg.tuwien.ac.at/)

Vienna University of Technology (http://www.tuwien.ac.at/)

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