

# Managing and Monitoring Elastic Cloud Applications

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<http://linc.ucy.ac.cy/CELAR/icwe2014/>



## Introduction

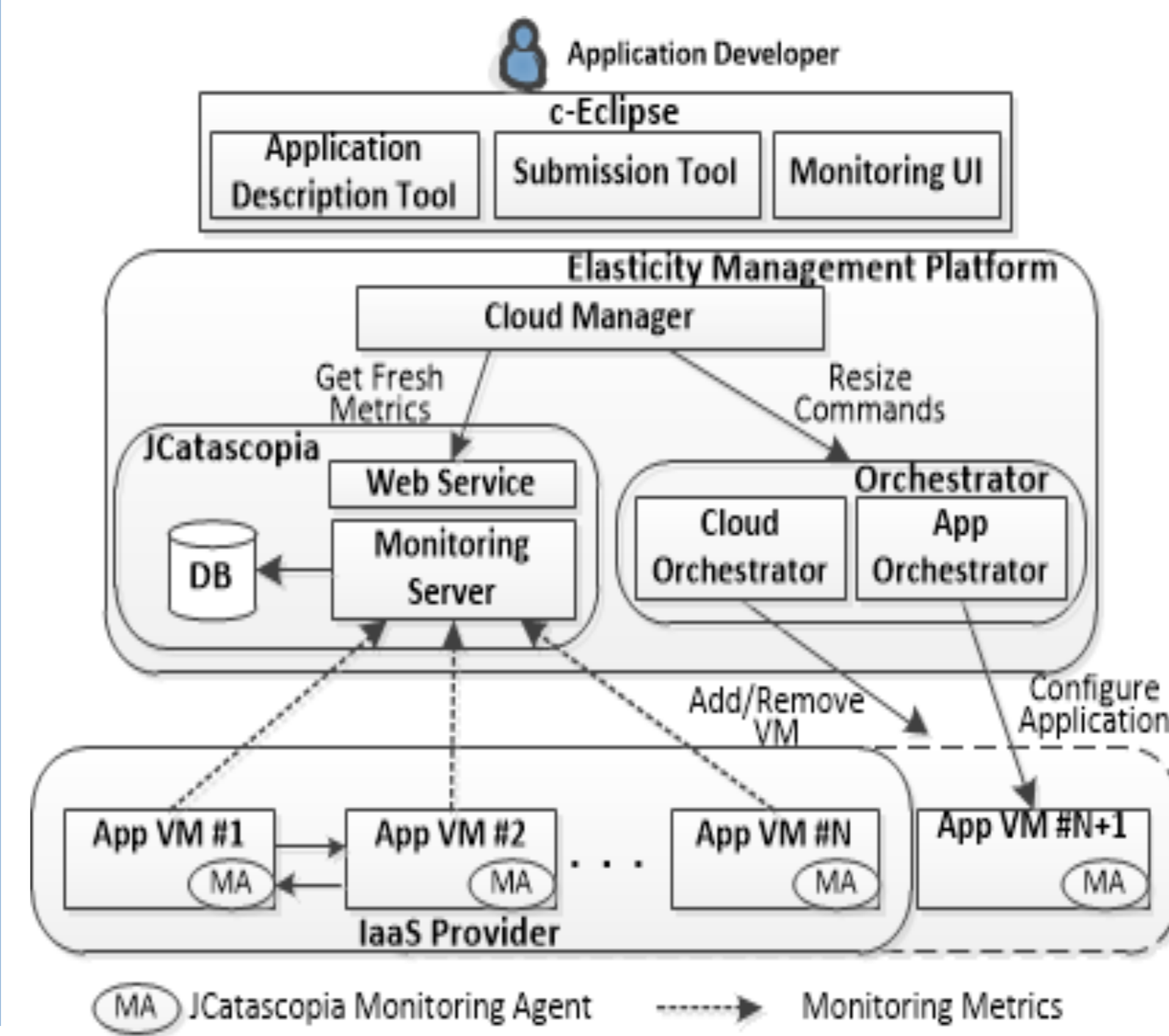
- Elastic Cloud applications** have the ability to expand or contract their comprised resources to meet runtime demands
- Managing** and **monitoring** Cloud applications' lifecycle is a challenging endeavor
- Current Application Management Frameworks and Monitoring Tools lack in **portability** and **interoperability**

## Contribution

We present two **open-source tools** for **managing and monitoring elastic Cloud applications**:

- c-Eclipse**: Facilitates portable descriptions of elastic Cloud applications by adopting an open Cloud standard (TOSCA), and a language for elasticity requirements specification
- JCatascopia**: Fully automated, platform independent, interoperable Cloud monitoring system, that considers application topology changes due to elasticity actions

## Our Approach: Elasticity Management Platform

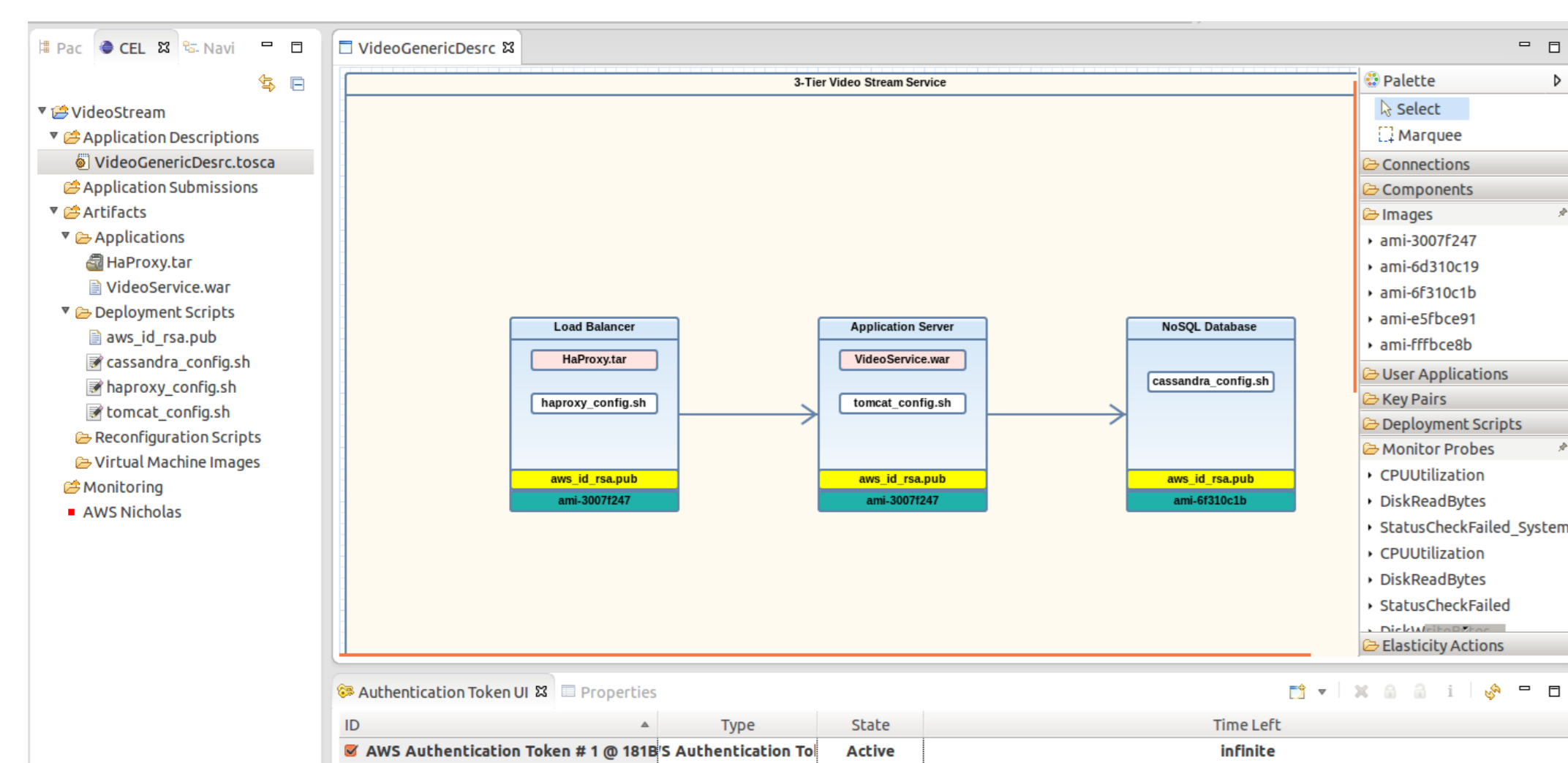


- Graphically **describe** application **structure** & **management** operations
- Specify **elasticity strategies**
- Deploy** application over selected Cloud providers
- Monitor** Cloud platform resources and application's performance
- Scale** deployed application based on elasticity strategies

## Application Description

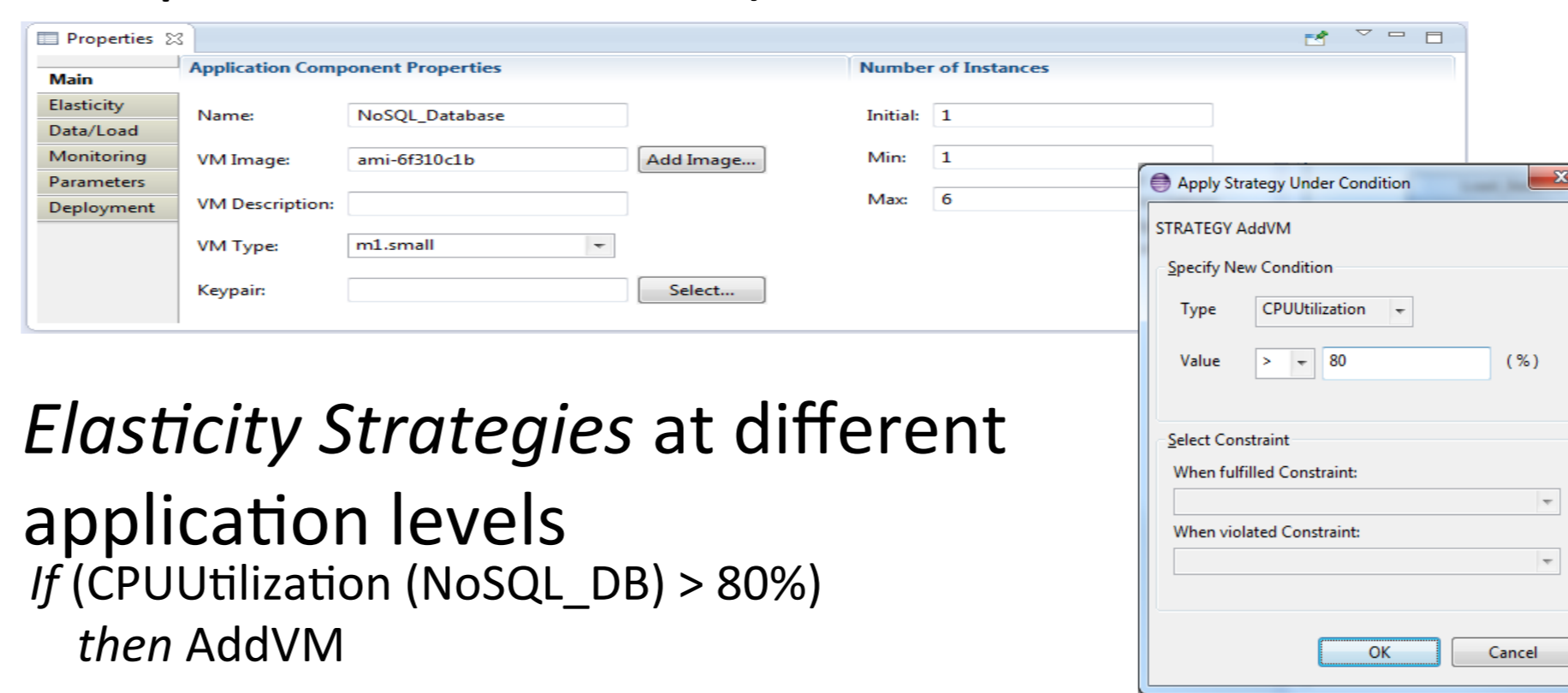
### c-Eclipse Application Management Framework

- Portable application descriptions via a GUI
- On the fly translation of graphical descriptions into TOSCA
- Specification of elasticity capabilities/ requirements



### Application Description Contents

- Application Topology** (components & relationships)
- Deployment Files** (deployment/configuration scripts, executable files, VM images, key pairs)
- Deployment Preferences** (VM flavors, number of components' instances)

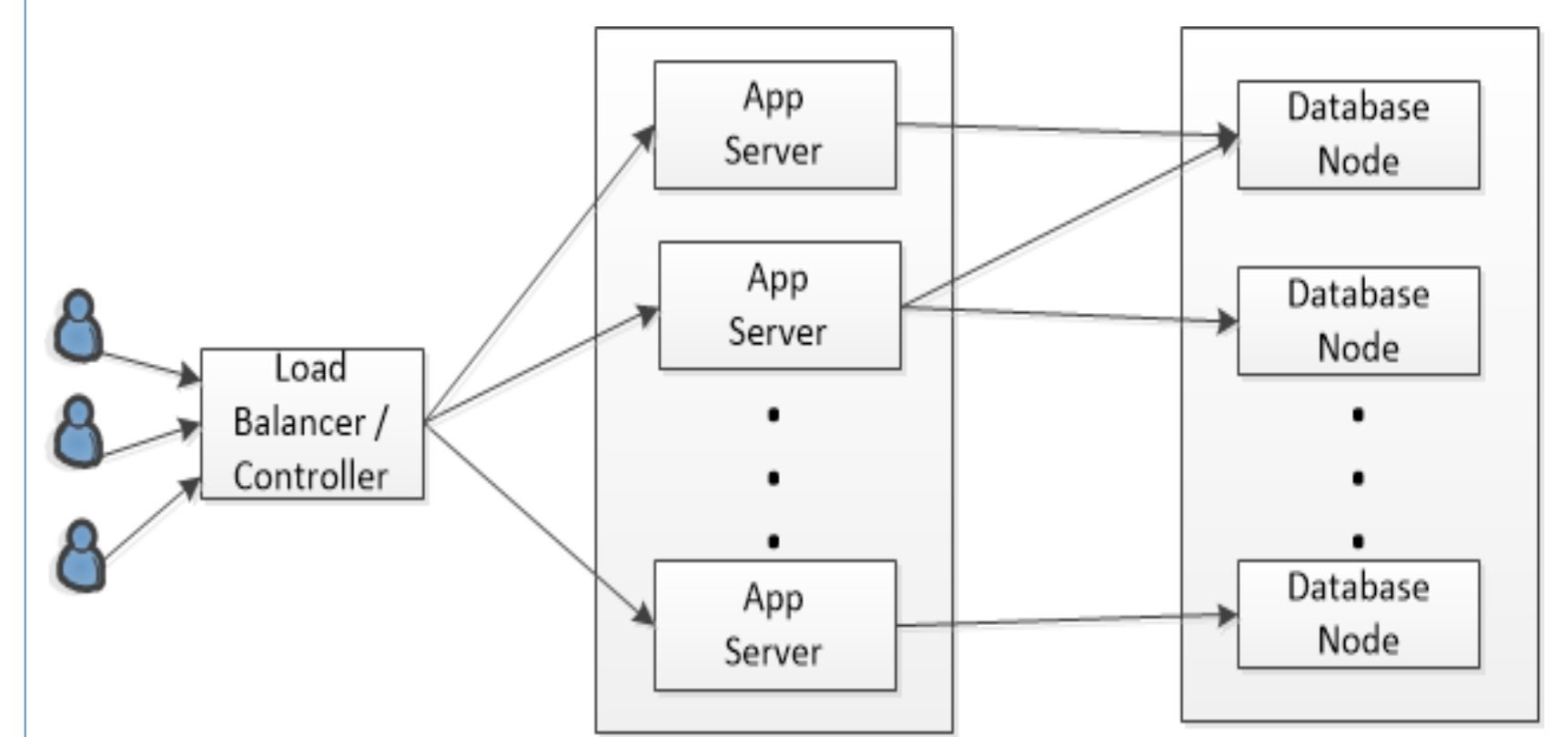


- Elasticity Strategies** at different application levels  
If (CPUUtilization (NoSQL\_DB) > 80%)  
then AddVM

## Use - Case

### 3-Tier Online Video Streaming Service

- Load Balance Tier**  
HAProxy
- Application Server Tier**  
Tomcat with Video Streaming Web Service
- Database Tier**  
Cassandra NoSQL



## Application Deployment

- c-Eclipse sends **deployment requests** to the **Cloud Manager**
- Requests contain all necessary contextualization artifacts**
- Deployments Tab** shows details for each node status per IaaS

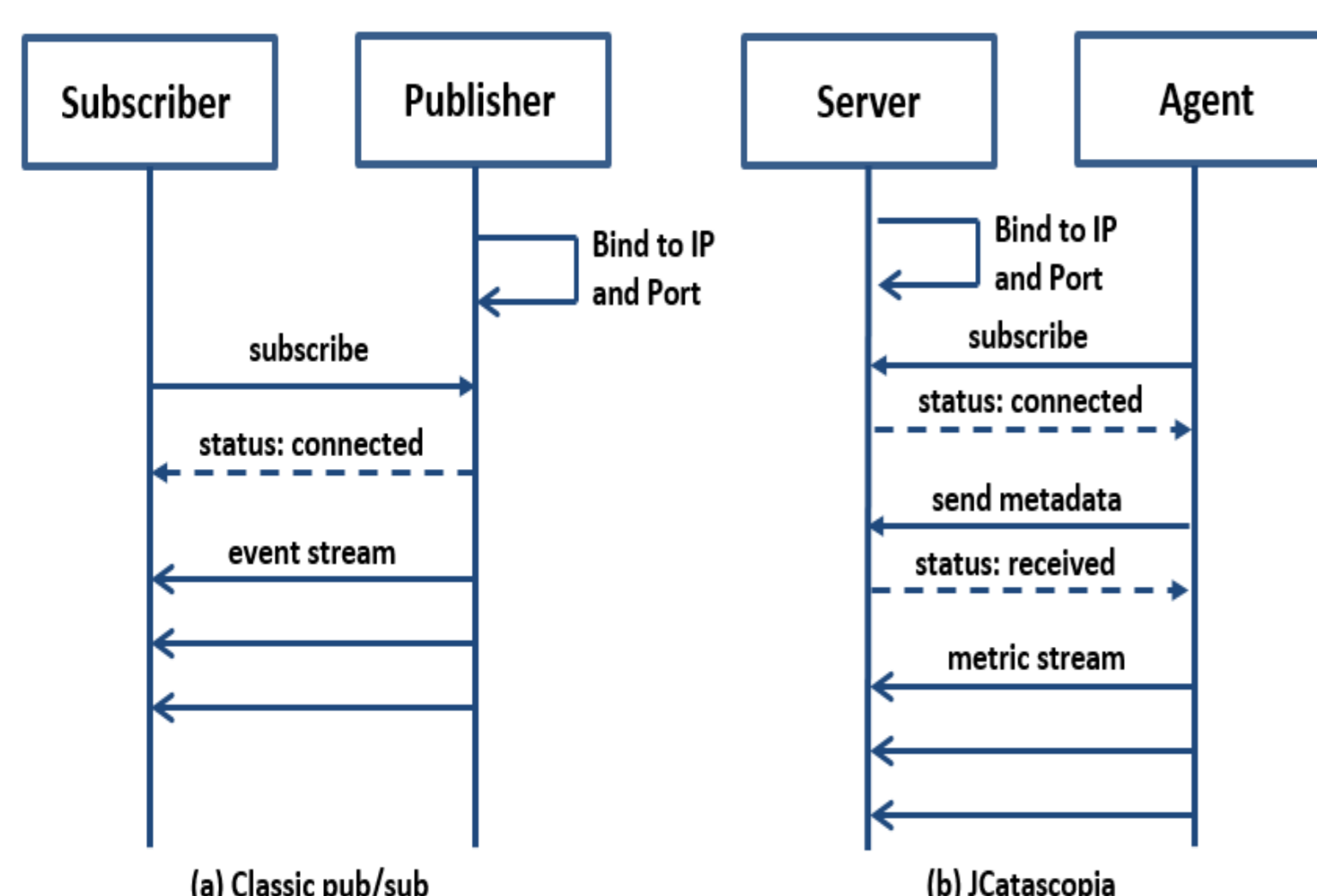
| Application Name                   | Status   | Instance ID  | IP Address      |
|------------------------------------|----------|--------------|-----------------|
| 3-Tier Video Streaming Service (3) | DEPLOYED |              |                 |
| Load Balancer                      | RUNNING  | i-13461e53   | 100.231.122.181 |
| Application Server                 | RUNNING  | i-a4411cea   | 100.231.122.187 |
| NoSQL Database                     | RUNNING  | i-ab441ceb   | 100.231.122.155 |
| 3-Tier Video Streaming Service (3) | DEPLOYED |              |                 |
| Load Balancer                      | RUNNING  | 8e3c4c6      | 10.16.5.3       |
| Application Server                 | RUNNING  | f097a72a3c2  | 10.16.5.4       |
| NoSQL Database                     | RUNNING  | 21697a72a6c1 | 10.16.5.5       |

"c-Eclipse: An Open-Source Application Management Framework for Cloud Applications", C. Sofokleous, N. Loulloudes, D. Trihinas, G. Pallis, M.D. Dikaiakos, Euro-Par 2014, Porto, Portugal, 2014.

## Application (& Cloud) Monitoring

### JCatascopia Monitoring System

- Deployable in a fully automatic manner
- Deployable on any underlying platform
- Dynamically detects application topology changes due to elasticity actions
- Provides filtering capabilities
- Dynamically generates high-level app metrics



### JCatascopia Pub/Sub Message Pattern

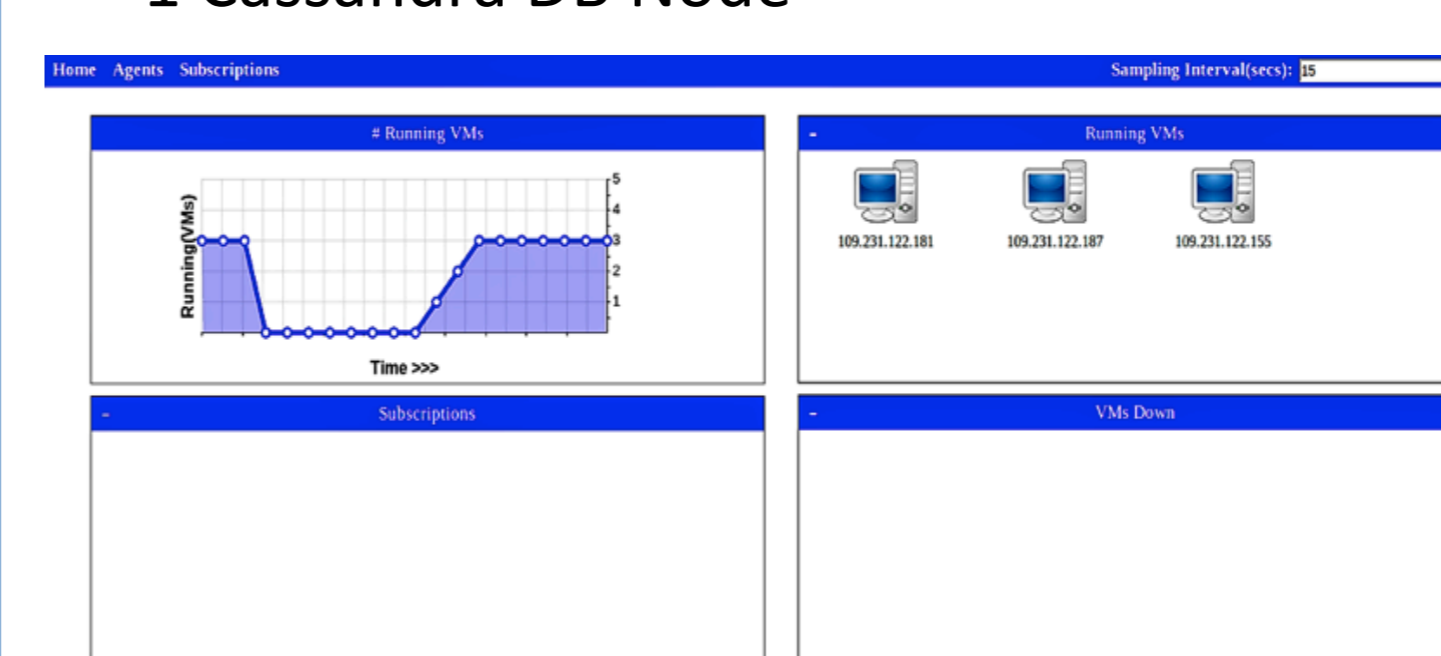
- Monitoring Servers bind to network interface, awaiting for incoming requests
- Monitoring Agents initiate **subscription** by pinging the Monitoring Server and **publish** collected metrics

"JCatascopia: Monitoring Elastically Adaptive Applications in the Cloud", D. Trihinas and G. Pallis and M. D. Dikaiakos, "14th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing" (CCGRID 2014), Chicago, IL, USA 2014

## Application Scaling

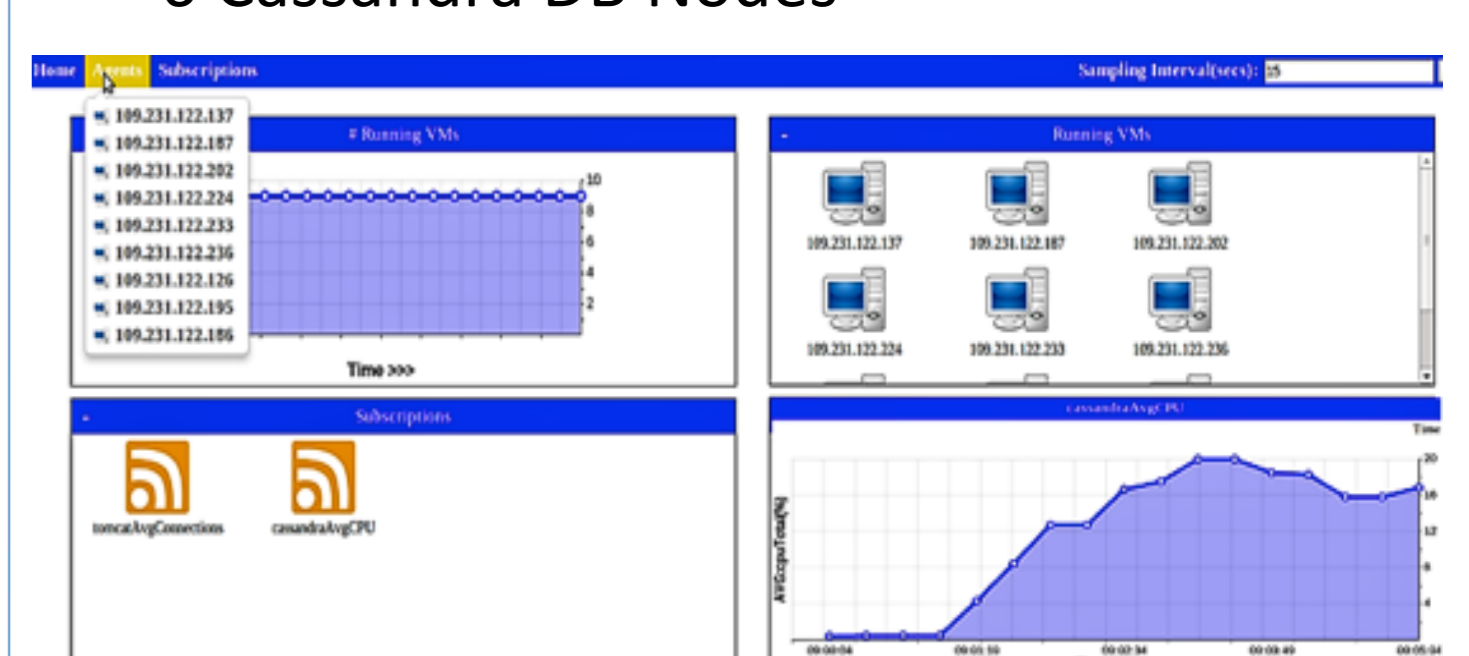
### Initial Deployment

- 1 Load Balancer
- 1 App Server
- 1 Cassandra DB Node



### After 1 hour

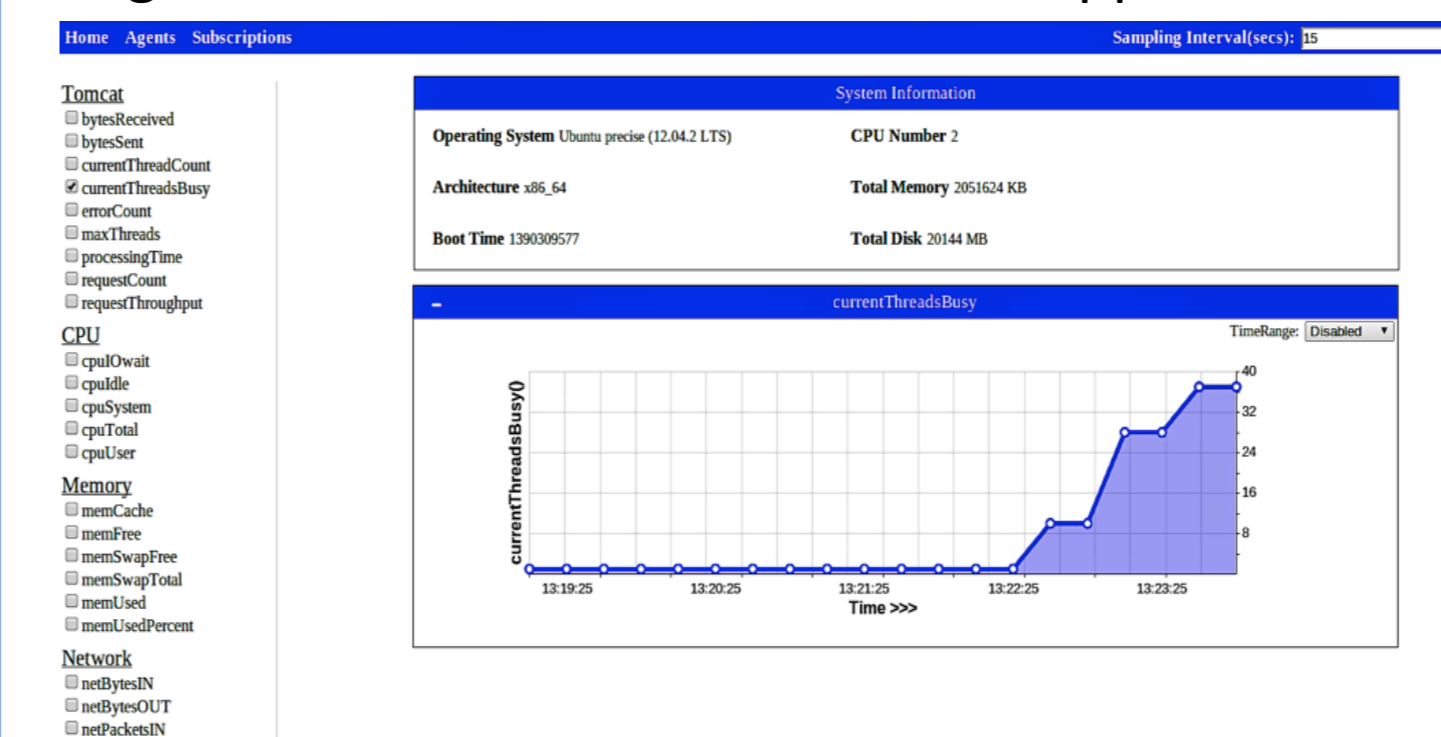
- 1 Load Balancer
- 2 App Servers
- 6 Cassandra DB Nodes



### Scaling Strategies

#### Application Server:

High # of client connections → Add App. Server



#### Cassandra Ring:

High CPU utilization → Add Cassandra Node

