NOVI's experience in monitoring tools and measurements

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Overview

- What is NOVI
- The Monitoring Service component
- The use of information models
- An on-line demonstration
NOVI facts

Full title: Networking Innovations Over Virtualized Infrastructures

URL: http://fp7-novi.eu

Duration: 2.5 years since 2010

Partners:

- NTUA, MARTEL, UPMC, GARR, UvA, i2CAT, DFN, INRIA, ELTE, PSNC, Cisco, Fokus, UPC.
NOVI objectives

Study control and management plane extensions for federated virtual infrastructures

- Integrated resource discovery, allocation, and scheduling
- Efficient allocation of virtual resources
- Proof-of-concept prototype on PlanetLab-Federica

Provide joint monitoring and measurements

- Support slice creation
- Synchronize measurements and monitoring tools
- Study the effect of virtual environments on existing measurement tools
MS use cases

Provide monitoring data to Resource Information Service for slice creation

- RIS can narrow the possible selection of resources for a user slice according to user constraints based on monitoring data

Monitoring service for the user (especially failure detection)

- User can book monitoring tools as part of the slice
  - Delay monitoring, bandwidth monitoring
- User can introduce conditions which if met raise signals to the user and/or NOVI C&M components to take necessary actions
  - Delay exceeds a given threshold → Signal Policy → Rebuild topology
MS functionalities

From the resource's perspective:

- Host/Substrate monitoring: *to provide up-to-date characteristics of physical resources*
- Slice monitoring: *to provide the temporal behavior of users' slice characteristics. Optionally, signal monitoring events.*

From the users's perspective:

- Metric monitoring: *to hide the details of specific tools*
Metrics to handle

- **Passive**: no additional sample packets inserted in the network
  - CPU load, disk usage, memory usage, resource uptime, network volume, bandwidth
- **Active**: extra traffic inserted in the network
  - Node wise:
    - RTT, packet paths
  - Multi node-wise:
    - Packet loss, OWD, OWDV, bandwidth
Tools to integrate

A heterogeneous set of tools accessible in platforms

The flow of an example measurement

A heterogeneous set of tools accessible in platforms
Status of implementation
Information model

- Unit aware metrics
- Abstraction of tools and control
- Statistical transformation of data

*Root of the model comes from Moment (FP7 STREP)*
IM components

Queries by RIS / User

Site specific configuration from RIS

query.owl

task.owl

features.owl

event.owl

parameter.owl

unit.owl

statistics.owl

NOVI IM Core model

Dynamic knowledge

Basic knowledge

WORK IN PROGRESS

THE OWL
Parameter ontology

- **Thing**
  - is a **Parameter**
  - is a **ParameterValueType**

**ParameterValueType**:
- **Float**
- **Integer**
- **String**

**Parameter**
- **paramName** 1..1: name
- **paramValue** 0..1: value
  - **hasDimension** 1..1: Dimension
    - **hasType** 1..1: ParameterValueType
    - **hasPrefix** 0..1: Prefix
    - **hasUnit** 0..1: Unit
Features ontology

- Thing
  - is a
  - MonitoredFeature
    - is a
    - BandwidthFeature
    - is a
    - DelayFeature
    - is a
    - MemoryFeature
    - is a
    - MiscFeature
    - is a
    - ProcessorFeature
    - is a
    - StorageFeature

- MonitoredFeature
  - featureName 1..1
    - name
  - hasDimension 1..1
    - Dimension
  - obligatorParameter 0..*
  - optionalParameter 0..*
Define a metric

Extension of the basic knowledge
Task ontology

Diagram showing the relationships between various concepts within the task ontology.
Bind tools to metrics

Platform specific configuration details
Demonstrate using GUI
Conclusion

The monitoring information model
- abstracts measurable metrics
- describes the control flow
- represents data in a unit aware form
- enables transformation

MS is a framework
- hides the details of tools from caller
- caters for synchronization of tools
- delivers data in a uniform way
Thank You for your attention!
Backup notes

Calibration:

- Reference node at ELTE (pass through DAG card and GPS synchronization)
- Nodes in NOVI are NTP synchronized
- Different tools measuring the same metrics

Investigate the effect of virtualization:

- How precision of geolocation is deviated