Network Self-Management and Vertical Policy Interactions in E2E Virtualized Networks

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The Composition

• Grid computing, Virtualised networks, Cloud computing

• The distinction between them is really fuzzy, but for us the network is most interesting
Shared Aspects: Technical

• Loosely-coupled

• Distributed

• Acting in concert to achieve a set of well defined goals
Shared Aspects: Implication

• Dynamic composition

• Slow

• Conflict between local and global interest

• Prone to failure
Managing the *Network*

• Should there be a core “network” which is always existing and which is self-managing?

• If the network is self-managing, does it matter whether it is virtual or fixed (dedicated)? Whether it is monolithic and homogeneous or distributed and heterogeneous?
Two Aspects of Management

• Topology creation and management
  – Efficient discovery of and binding to network elements
  – Support for of-the-fly negotiation

• Besides this there is also the need for managing an already established and running network

• Abstract network management accordingly
Complexity

- Numerous protocols
  - BGP, OSPF, IS-IS, EIGRP, RIP

- Data-plane mechanisms
  - Class-based queuing, RED, access control lists

- Innumerable configurable parameters
• Limited guidelines on:
  – Selecting and composing these features to build a network
  – Setting the tunable parameters to optimize the performance, reliability, and security of a running network
• SLA as a business goal

• Viewing the achievement of policies as goals

• Standard goal oriented requirement engineering can be used to refine goals into lower-level policies
Methodology and Tools

Requirements Analysis
  - Goal
  - Transformation

High-level Design
  - Task
  - Concept

Detailed Design
  - Context
  - AUI
  - Functional CoreAdaptor
  - Modality

Implementation
  - Code

3rd party tools
  - 3rd party tools
  - m2m-transf. (QVT)
  - QVT engine

model editors
  - model editors
  - m2c-transf. (JET, XTL)

Eclipse IDE
  - Eclipse IDE
  - Eclipse Workbench

Eclipse
  - Eclipse

m2m-transf. (QVT)
  - QVT engine

m2c-transf. (JET, XTL)
  - JET
  - XTL engine

MOF repository
  - MOF repository
Transition to Runtime

Design Time Environment

- Task Model
- Concept Model
- FCA Model
- AUI Model
- Modality Model
- Context Model

Application Data Model
- Data Classes

Application Workflow
- Runtime Task Model
- Functional Core Adapter
- Multimodal User Interface

Context Configuration
- Provider Configurations
- Context Patterns

Context Sources
- Context Provider

Runtime Environment
- Task Process Engine
- Multimodal Services Component
- Context Service
Model for PBNM

Model for PBNM

New Aspects

• Heterogeneity of network elements

• Need for deploying entirely new agents (event detectors, software modules, etc.)