Architecture of Distributed Systems

Example HWA1

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Where innovation starts
NRS: a system for automated network virtualization in IaaS cloud infrastructures

Taken from: http://dx.doi.org/10.1145/2465829.2465832
Questions about the model

1. What building blocks (AEs) do you see? What do they represent? Are they conceptual (C) or physical (P)?
2. Same questions as 1, but now for connectors?
3. To which view(point)s does the model belong?
   1. Motivate why, and identify corresponding stakeholders and their concerns.
4. Which of the following EFRs are addressed (Y + motivation | N)?
   1. Performance/scalability,
   2. availability/reliability,
   3. security,
   4. maintainability,
   5. other?
5. Is there a concept of distribution (Y + motivation | N)?
6. Comment on the clarity/semantics of the diagram
   ( ☺ | ☹ | ☹️ ) + motivation

Keep you answers crisp!
Building blocks (C | P)

- Services, lifelines (C)
- Canvas object (C)
- Two scenarios (C)
  - initialization
  - update
- A global library (C)
- A software package (C | P)
- Actors
  - human (C)
  - runtime environment (C)
  - server (C | P)
Connectors (C | P)

- Message,
- Method invocation
- Is_a relationships, to indicate special services
- Part-of relationships (black diamond arrows)
- Dependency relationship (uses)
• Development view: the class structure of some entities is shown which is of interest to programmers.
• Process view: system integrators, testers can see how the various parts interact. Developers (programmers) can see which class methods are used.
• Scenario: testers can run these to test interaction. Users can see how to interact with the system. Because of the latter, it can be argued that the model also belongs to the logical view.
Extra-functional requirements (Y + motivation | N)

- Security: N
- Availability & reliability: Y
  - There are error methods exhibited
- Maintainability: Y
  - Class structure is shown at a level useful for implementation and modification
- Performance and scalability: N
Distribution, Clarity and Semantics (😊 | 😐 | ☹️) + motivation

Clarity/Semantics (😊 | 😐 | ☹️) + motivation: 😊
- A mix of a class diagram and a sequence diagram. So on the one hand, a lot of information crammed into a single model, but on the other hand this guarantees consistency between development and process view models.
Building blocks (C | P)

- Sites, machines, gateways, bridges, network cards, networks (LAN, WAN) (all P)
- VLANs (C)
- NRS controller process (C)
Connectors (C | P)

All (C)
- Inclusion/containment relations (production network in site, etc.)
- Bindings of network cards (NICs) to networks or bridges
- OpenVPN connections
• Physical view, because we see devices and machines. Important for suppliers, system engineers and network operators and administrators who have to put the system together and operate it.

• Logical view, because it gives an overview of intra- and inter-cloud network services. Useful for system acquirers and developers. It also indicates a management network, which is used for configuration of the network and therefore of interest to the network operators and administrators.
• Security: Y
  • because VLANs isolate network traffic of various cloud tenants
• Availability & reliability, maintainability, performance & scalability: N
• Others:
  • Operability and configurability, presence of a management network
YES:
Because we can see sites, bridges, multiple machines, multiple networks
• No clear drawing conventions
• Physical configuration clear, but not much context on the intended purpose, i.e., cloud tenants requiring their applications to run on isolated networks that have no interference from other applications, of the system. Therefore, VLANs have to be configured/deployed on a physical network.