



UNIVERSITÄT
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UPB — Computer Networks Group

Management of ServiCes Across MultipLE clouds

SCrAMbLE — Scalability Challenges

Agenda

- 1 Introduction
- 2 Effects of Scaling
- 3 Scalability Techniques
- 4 Scalability Approaches

Definition of Scaling

- Ability to handle service loads
- Addition of resources
- Meeting demands of distributed systems

Why do we need MANO Scaling?

- System Load
- Lifecycle management and service provisioning

Heterogeneity as an effect of Scaling

- Administration in MANO
 - Infrastructure domain - based on type of resources like networking, compute, and storage environments.
 - Tenant domain - based on type of the network services.
- Multi-MANO interworking
 - Two service platforms cooperate.
 - One orchestrator interface on the other orchestrator.

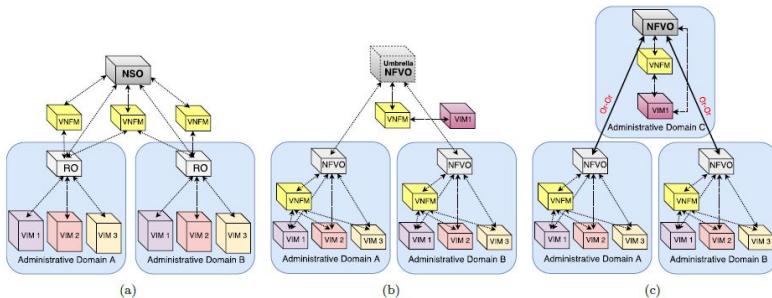
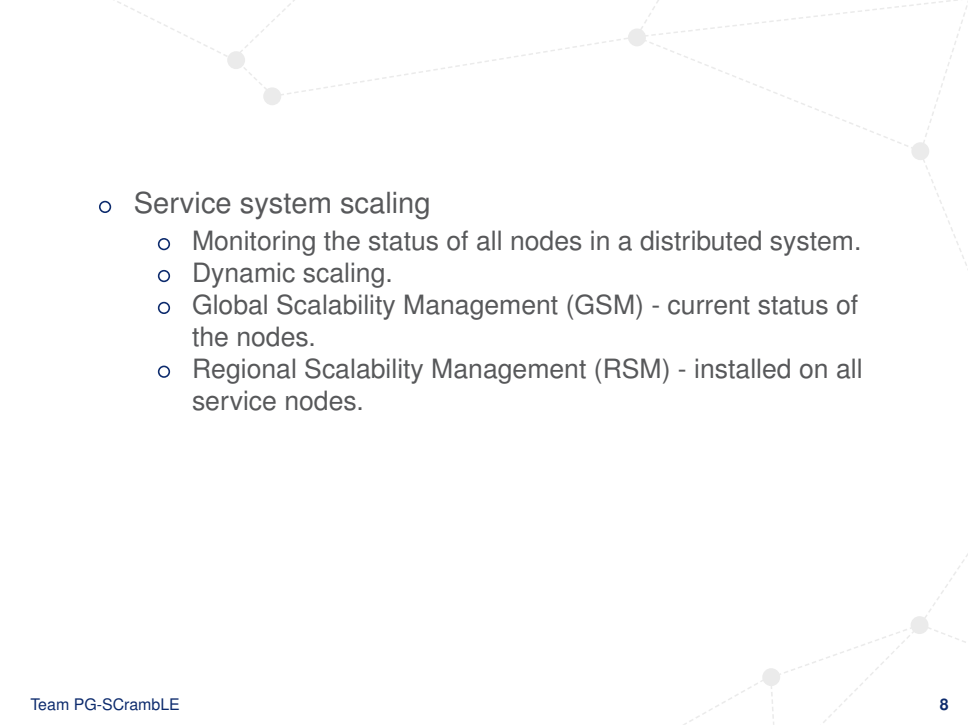


Figure: ETSI Approaches for Multiple Administrative domains [?]

Scalability Techniques

- Service replication
 - Clone services on other nodes.
 - Additional resources are provided to handle larger service loads.
- Service migration
 - Placing service on a different node.
 - Migrated service performs same role as the unstable node.

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- Service system scaling
 - Monitoring the status of all nodes in a distributed system.
 - Dynamic scaling.
 - Global Scalability Management (GSM) - current status of the nodes.
 - Regional Scalability Management (RSM) - installed on all service nodes.

Scalability Approaches

- Proactive Scaling - scheduled scaling
- Reactive Scaling - auto scaling
- Predictive Scaling - predicts traffic based on machine learning models.
- Hierarchical service placement - split into Execution Zones(EZ).

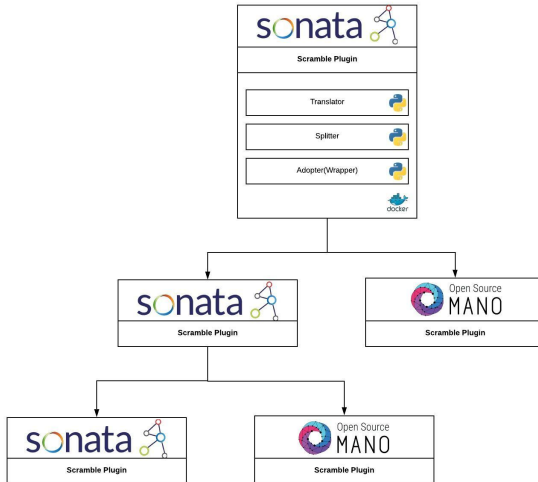
Types of Orchestration

- Peer-to-Peer orchestration
- Hierarchical orchestration

Hierarchical Orchestration

- Using Hierarchical service placement technique.
 - Split of EZs based on Resolution Domains(RDs).
 - Higher level orchestrator makes the placement decision.
- Minimum number of levels and number of MANOs required can be determined.

SCrAMbLE depicting hierarchical orchestration



References

- Nathan F Saraiva de Sousa, Danny A Lachos Perez, Raphael V Rosa, Mateus AS Santos, and Christian Esteve Rothenberg. Network service orchestration: A survey. arXiv preprint arXiv:1803.06596, 2018. ii, 10
- Raul Muoz, Ricard Vilalta, Ramon Casellas, Ricardo Martinez, Felipe Vicens, Josep Martrat, Victor Lopez, and Diego Lopez. Hierarchical and recursive nfv service platform for end-to-end network service orchestration across multiple nfvi domains. In 2018 20th International Conference on Transparent Optical Networks (ICTON), pages 15. IEEE, 2018. 7