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UPB — Computer Networks Group

Management of ServiCes Across MultipLE clouds

SCrAMbLE — Scalability Challenges

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Agenda

1. Introduction
2. Effects of Scaling
3. Scalability Techniques
4. Scalability Approaches
5. Conclusion

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Definition of Scaling

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

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Why do we need MANO Scaling?

- System Load
- Lifecycle management and service provisioning

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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.

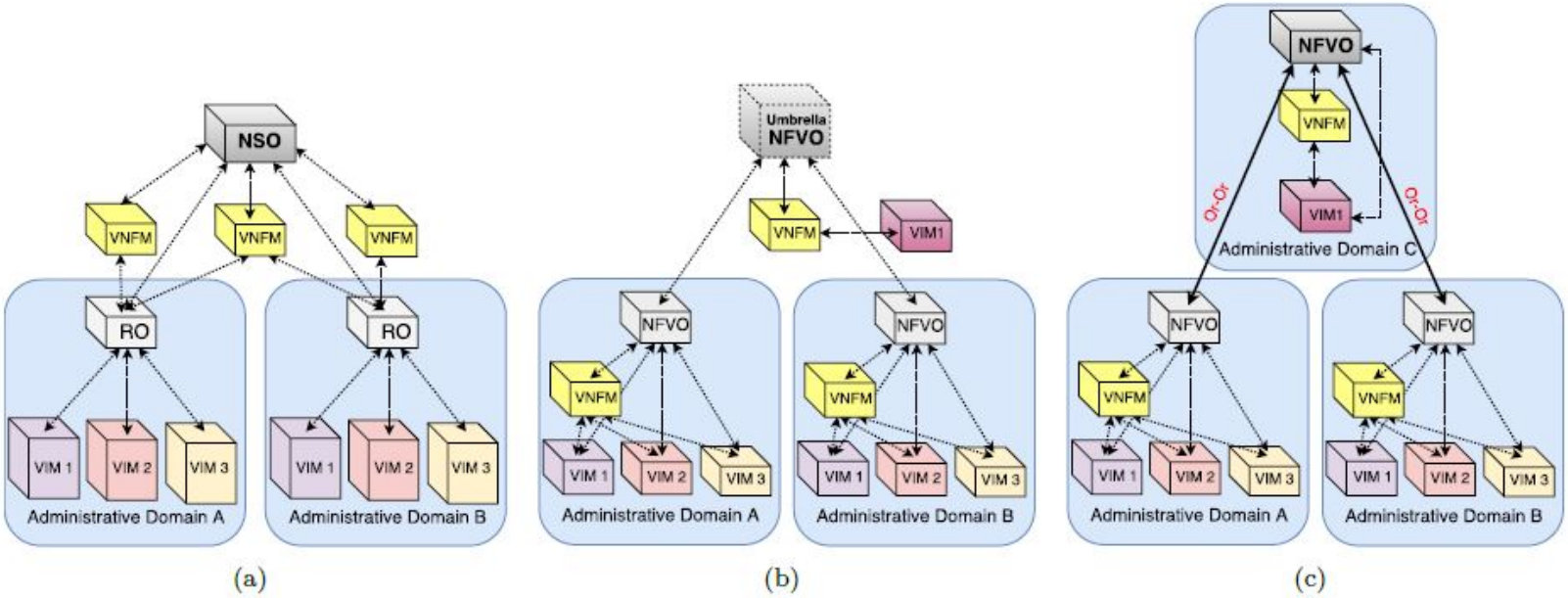

Figure: ETSI Approaches for Multiple Administrative domains [**?**]

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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.

- 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.

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Scalability Approaches

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

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Types of Orchestration

- Peer-to-Peer orchestration
- Hierarchical orchestration

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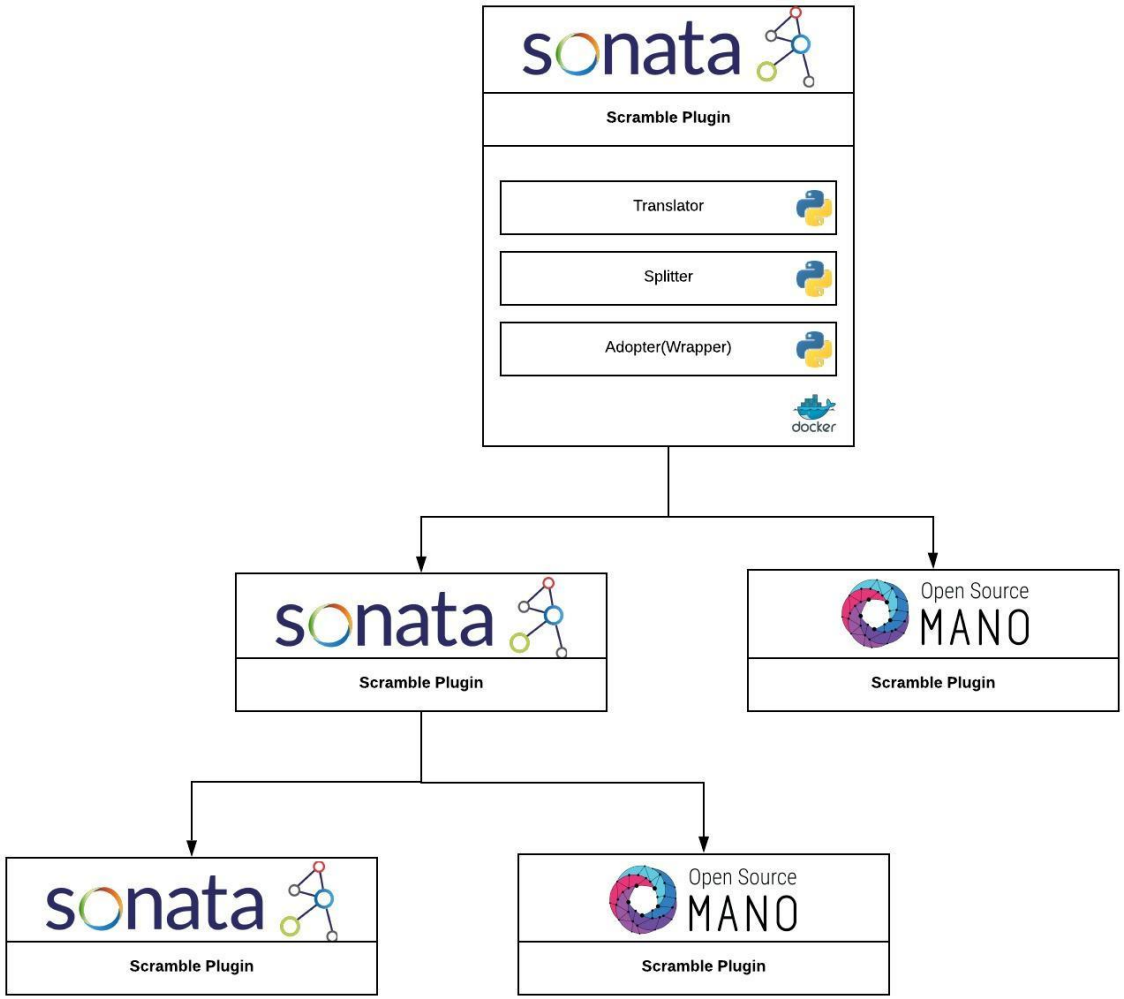
SCrAMbLE depicting hierarchical orchestration



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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.

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References

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- Raul Muoz, Ricard Vilalta, Ramon Casellas, Ricardo Martnez, Felipe Vicens, Josep Martrat, Vctor Lpez, and Diego Lpez. 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