Application and Network Services Management with TOSCA 2.0
WHO ARE WE?

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Chair of OASIS TOSCA Technical Committee
WHAT IS TOSCA?

- TOSCA is an **OASIS Standard**
- That defines a **Domain-Specific Language (DSL)**
- For automating the **Lifecycle Management** of application, network, and infrastructure services.
WHAT IS TOSCA USED FOR?

**Infrastructure-as-a-Service Clouds**
Automate the deployment and management of workloads in IaaS clouds such as OpenStack, Amazon Web Services, Google Cloud Platform, Microsoft Azure, and others.

**Network Functions Virtualization**
Define the management of Virtual Network Functions and their composition into complex network services.

**Cloud-native applications**
Deploy containerized applications and micro-services, for example by interfacing to orchestration platforms such as Kubernetes.

**Software Defined Networking**
Support on-demand creation of network services (for example SD-WAN).

**Functions-as-a-Service**
Define abstract software applications without any deployment or operational considerations.

**IoT and Edge computing**
Deploy services at the network edge with the goal of minimizing latency.

**Process automation**
Support open and interoperable process control architectures.
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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Speakers</th>
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<tr>
<td>Jan. 27, 2021</td>
<td>Turandot: A Lightweight Open-Source Orchestrator That Enables TOSCA for Kubernetes</td>
<td>• Tal Liron—Red Hat</td>
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<td>Feb. 24, 2021</td>
<td>Inter-Cloud Computing: How TOSCA Helps Open Telekom Cloud Users Run Anywhere</td>
<td>• Tri Vo—T-Systems</td>
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| Mar. 31, 2021| C-Plane: Using TOSCA for Automation Industrial Operations             | • John Casey—CTO  
• Brandon Williams—Business Development          |
| Apr. 28, 2021| Ubicity: Pure TOSCA Orchestration                                   | • Chris Lauwers—CEO                                                     |
| May 26, 2021 | Comcast: Commercial Network Services Lifecycle Management Using Model Driven Software Automation | • Gaurav Khandpur—Director, Software Engineering  
• Pattabi Ayyasami—Principal Engineer                |
| June 30, 2021| Holistic modeling of HPC, FaaS, and Edge applications with RADON and SODALITE TOSCA extensions | • Giuliano Casale—Imperial College                                      |

https://youtube.com/playlist?list=PLaYKtNo_BitYlGRp4NtuuPdd5zIrt9ZKV
# TOSCA’S UNIQUE FEATURES

<table>
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<tr>
<th>Feature</th>
<th>Benefit</th>
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<tr>
<td>Graph-based models</td>
<td>Topology graphs encode service components and their dependencies</td>
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<td>Typed language</td>
<td>• Reusable building blocks</td>
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<td>• Design-time service validation</td>
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<tr>
<td>Requirements and capabilities</td>
<td>• Service design and service resource requirements specified in the same place</td>
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<td>• Automated resource allocation</td>
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<td>Substitution mapping</td>
<td>• In support of service decomposition</td>
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<td>• In support of abstraction</td>
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<td>Automated workflow generation</td>
<td>Based on dependencies defined in the service topology graph</td>
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<td>Technology-independent</td>
<td>Plug-in paradigm based on generic and general-purpose artifacts concept</td>
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HOW IS TOSCA DIFFERENT FROM TERRAFORM?

- Hard coding for a specific cloud provider.
- Limitation: cloud workloads may change their infrastructures frequently.
How does Open Telekom Cloud use TOSCA?
Infrastructure-as-a-Service since 2016
Biggest OpenStack platform in Europe
6000 m² = a football field
450 Petabytes of storage
Based on the open-source projects: **Alien4Cloud** and **Yorc** from ATOS.

We enhance with Security, Single-Sign-On with OpenStack keystone & Google OAuth, multiple networks, service catalogs, etc.
WHAT ARE THE LIMITATIONS OF TOSCA 1.3?

Many powerful features are poorly documented (and as a result underappreciated)
• Substitution mapping—for service decomposition
• Requirement fulfillment—for automated resource allocation
• Automatic workflow creation—for desired state orchestration

Simple Profile type definitions are part of the standard
• Tied to Infrastructure-as-a-Service clouds
• Too abstract to be readily usable

Interface between Orchestrator and External Resources is underspecified
• Relies on artifact processing (e.g., of shell script artifacts)
• Lack of examples for REST interfaces, Netconf interfaces, Ansible playbooks, etc.

Insufficient support for event-driven paradigms
• Asynchronous orchestration
• FaaS
• Alerts and error handling
WHAT IS NEW IN TOSCA 2.0?

TOSCA Version 2.0 removes Simple Profile Types
- TOSCA v2.0 is a pure language specification only
- TOSCA v2.0 removes language dependencies on Simple Profile types

Support for custom Named Profiles
- Defined by the community for specific application domains
- E.g., Kubernetes profile

Clear definition of Orchestrator Operational Model
- To guide orchestrator implementors

Standardized Membrane between Orchestrator and External Resource Managers
- In support of a wide variety of interface paradigms
- REST, Netconf, Ansible, etc.

Support for additional orchestration paradigms
- Desired state/intent
- Asynchronous and event-driven
HOW CAN I CONTRIBUTE TO TOSCA?

Our community depends on participation, as well as use. If you benefit from open source and open standards, consider contributing to help them be successful:

- **OASIS TOSCA Technical Committee**
  https://www.oasis-open.org/committees/tosca

- **TOSCA LinkedIn Group**
  https://www.linkedin.com/groups/8505536/

- **TOSCA Simple Profile in YAML v1.3**
  https://docs.oasis-open.org/tosca/TOSCA-Simple-Profile-YAML/v1.3/TOSCA-Simple-Profile-YAML-v1.3.html

- **TOSCA Version 2.0 (Committee Spec Draft)**
  https://docs.oasis-open.org/tosca/tosca/TOSCA-v2.0/TOSCA-v2.0.html

- **TOSCA Community Contributions**
  https://github.com/oasis-open/tosca-community-contributions

- **(Partial) List of Known TOSCA Implementations**
  https://github.com/oasis-open/tosca-community-contributions/wiki/Known-TOSCA-Implementations
Q&A

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