MC^{2}E : MetaCloud Computing Environment

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Content

Brief talks where presenters highlight:

a) Where their individual testbeds will be in 3-5 years - not necessarily where they are projected to be at this point but where they **should** be
b) The special facilities/features/resources they will support
c) Willingness to interoperate with their colleagues around the world

Mark Berman & Joe Mambretti e-mail dated 13/02/2017

MC²E project: Main Components

User with
Special equipment

CPE

Telco equipment for connection to the MC2E network of customer special resources or facilities

Web Portal

User

Meta Cloud

VNF Developer

DC

DC

Local loosely coupled DCs

Local tightly coupled racks

Local tightly coupled racks

DC closely coupled HPC

Massively Parallel Computing Environment

MC²E project: Service Direction of Attention

Telco Services

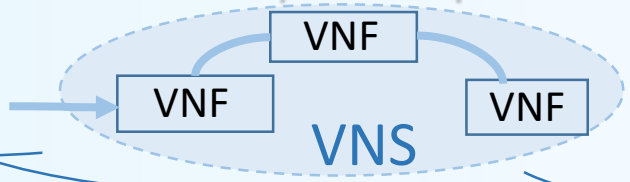
- Packet Flow Centric
- Chaining supportive
- Service continuation and performance sensitive
- Virtual Infrastructure Particular

Enterprise services

- Application centric
- SLA not so much particular
- Soft requirements to service continuation

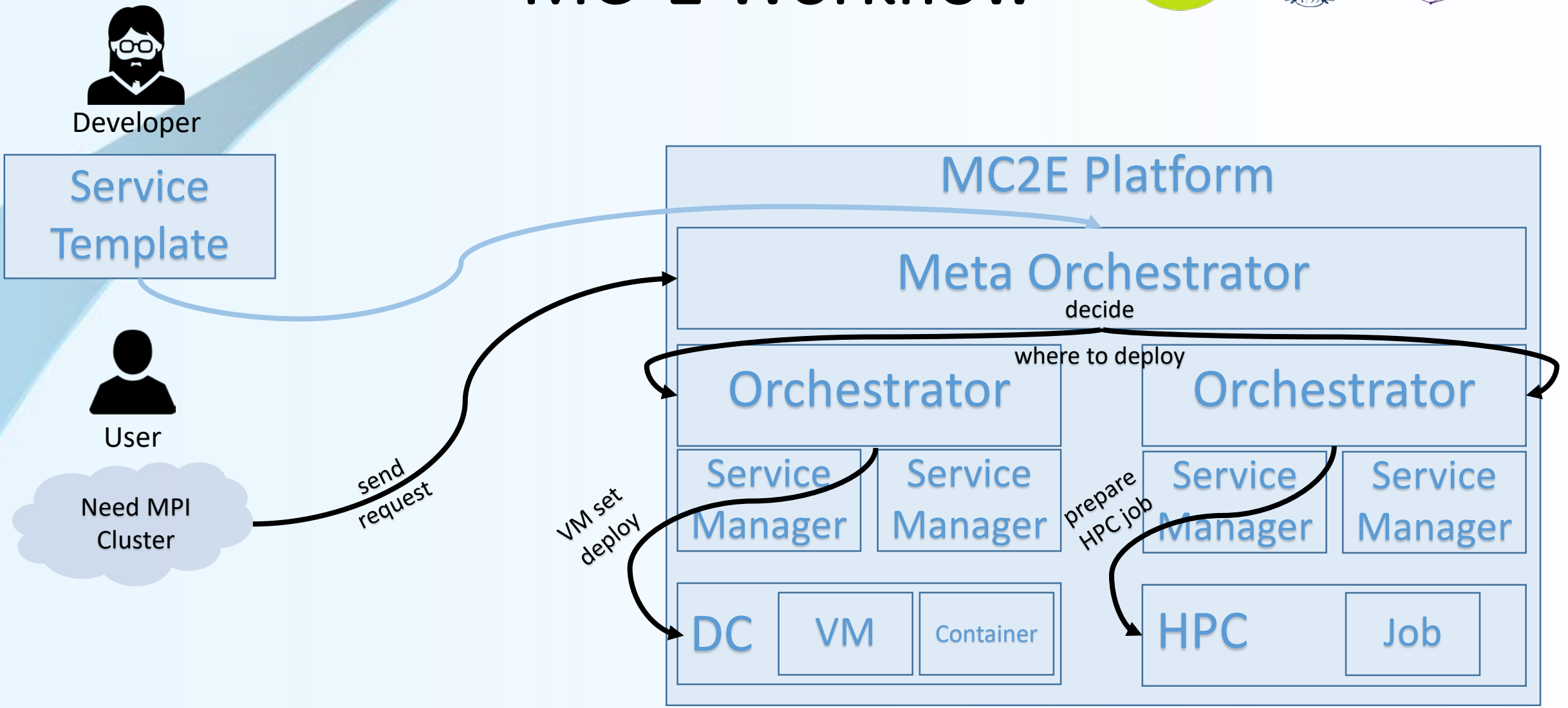
Academic / Research Services

Telco | Enterprise



IaaS |
PaaS | SaaS

MC²E Workflow



MC²E project: Service Template

How to describe a service?

TOSCA description

Infrastructure description

Image (optional)

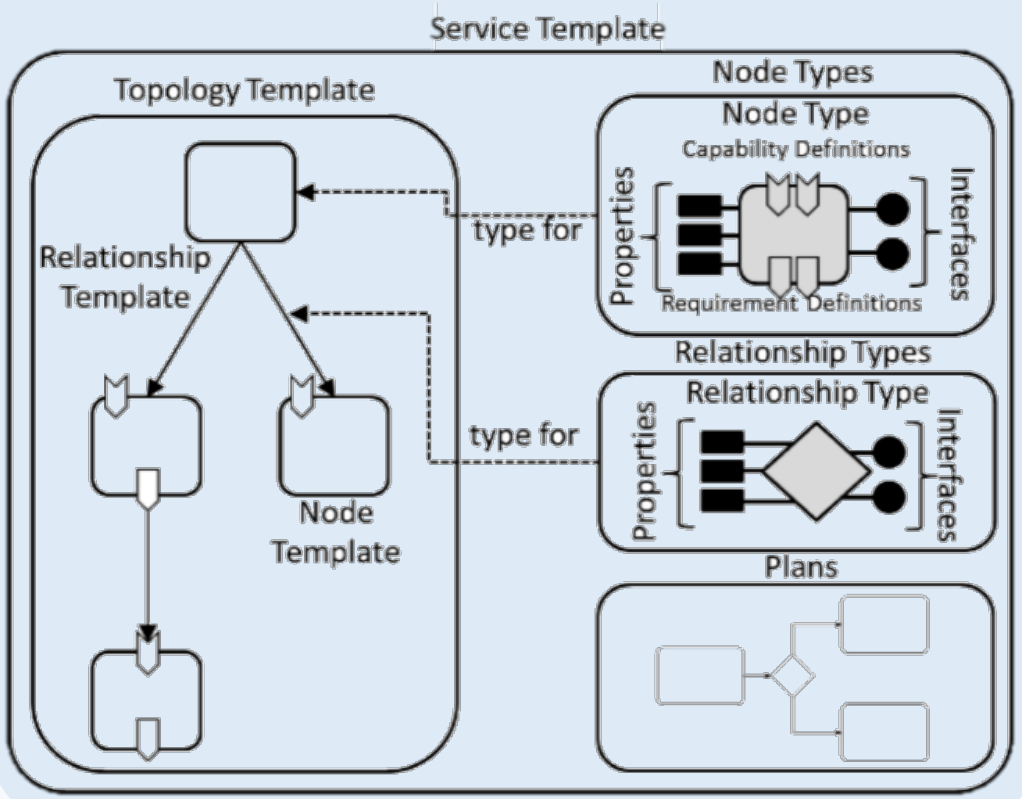
RAW, OVA, VMDK...

Scripts

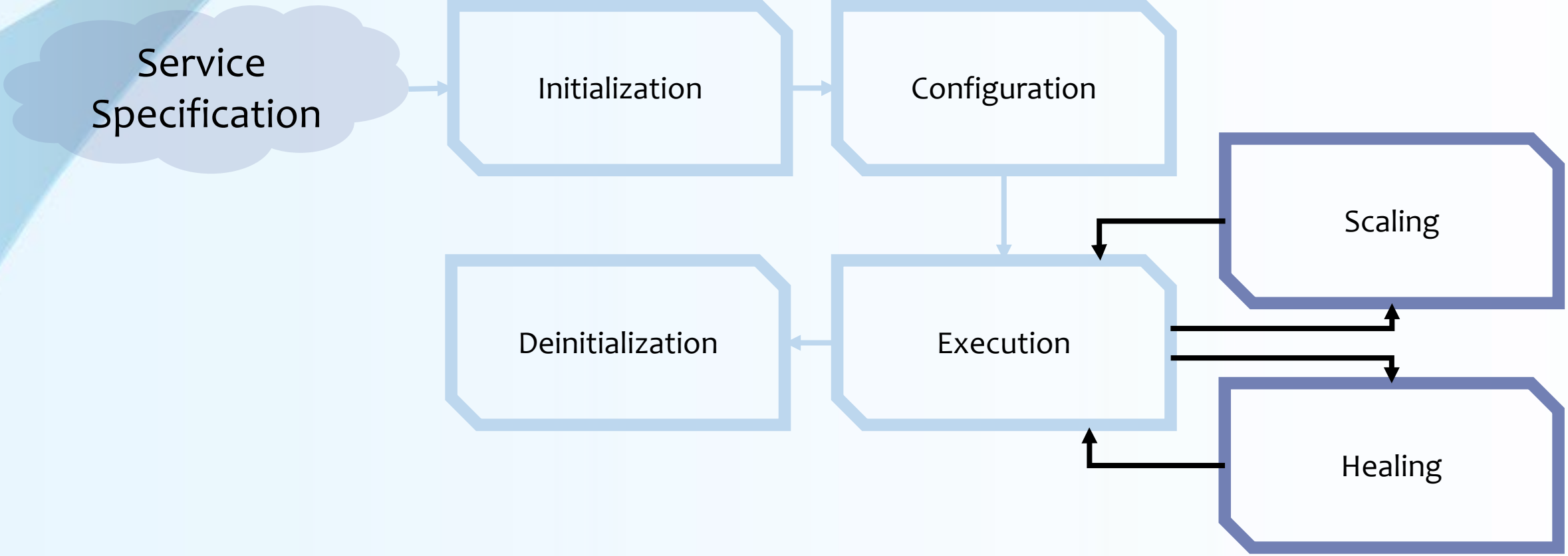
Bash/Shell...

Containment
Connectivity
Composition
Reuse

TOSCA Description

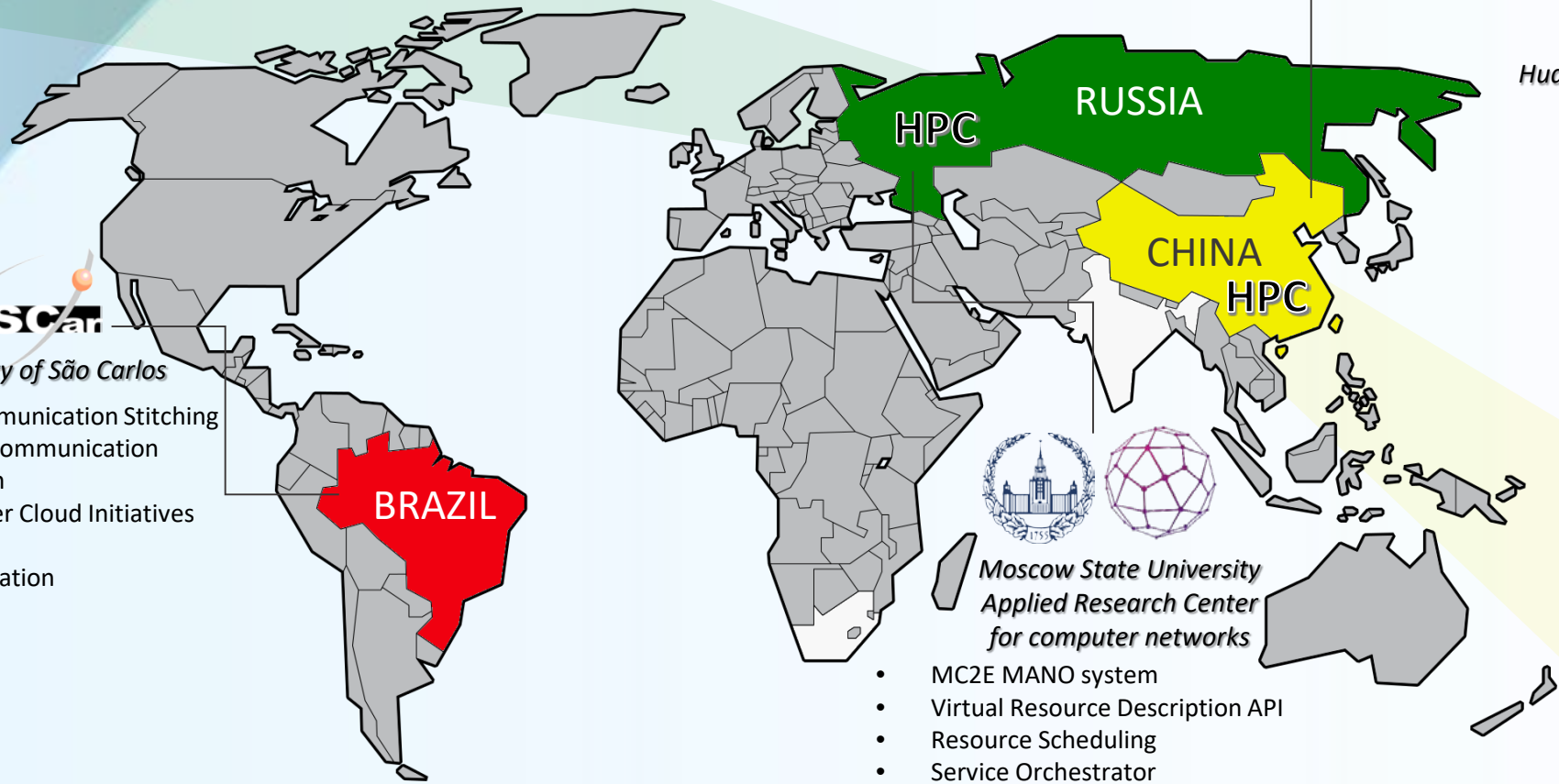


MC²E project: Service Life Cycle Management



MC²E international cooperation

Lomonosov-2 # 52 in top500
IBM Blue Jean



Federal University of São Carlos

- Inter-DC communication Stitching
- HPC and DC Communication Normalization
- MC2E to Other Cloud Initiatives Gateway
- WAN Optimization

Peking University
National Tsing Hua University
Huazhong University of Science & Technology

- Virtual Cloud Workspace
- Virtual Cluster Manager
- Virtualization Software for HPC-Oriented Users
- User-oriented QoS provisioning for resource-consuming Scientific Computing
- Survivability/reliability
- Cognitive SDN based MC2E Orchestration

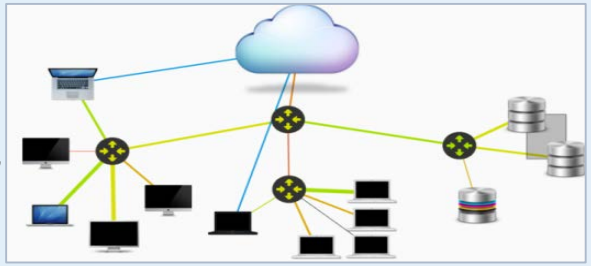
Moscow State University
Applied Research Center for computer networks

- MC2E MANO system
- Virtual Resource Description API
- Resource Scheduling
- Service Orchestrator
- Classifying Network Services for MC2E and Inter-Communication
- System Federation and Federate Resource Usage Policy
- Clearing System
- Monitoring System

TaihuLight
1 in top500

Where we are

The first Russian SDN-controller – RUNOS (RUssian Network Operation System)



RUNOS Specifications:

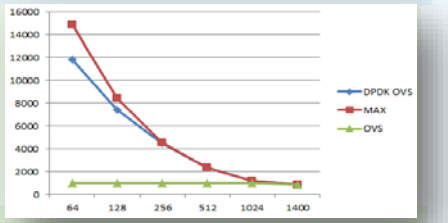
- 30 million flows per sec,
- 45 mcs to set up a new connection,
- 1000 switches support,
- GUI.

Target clients: Network administrators and engineers in DC, Telecom, ISP, developers

Integration OpenFlow switches: NEC, IBM, HP, Arista, Juniper, Brocade, Extreme Networks, Huawei

Network applications: L2/L3 routing with QoS and multithreads forwarding multi-flows routing, network resources virtualization, Anti DDOS, network resources monitoring, load balancing, traffic filtration, authentication, SPAN-ports, NAT, ARP, DNS, DHCP, BGP

Software Open Flow switch on x86 servers



- x86 servers with lot of NICs
  - OC Linux, Ubuntu 14.04, REHL.
  - Software switch a kind of Open vSwitch
  - Network stack on Intel DPDK
- Ports: Up to 24x 1Gbps / Up to 12x 10Gbps / 80Gbps per unit
- Protocols: OpenFlow1.3, LACP, VLan, BFD, STP, QoS, IPv6, GRE, VxLan

+: full OpenFlow 1.3 support (all fields, metering, QoS)

+: unlimited number of tables and records

+: easy to customize

+: performance scaling

QoS management by FDMP

Cloud platform with SLA support «Cloud Conductor» (C2)

MANO
NFV life-cycle support

Meta-orchestrator for DC heterogeneous cloud infrastructure

Resource scheduling

Cloud Conductor scheduler takes into account :

- VM RAM
- CPU units and cores
- HW resources accessibility in local network

Monitoring: SDN allows to collect data on loading resources, to react on incidents in network and to manage forwarding policy

Cloud Conductor allows network resources virtualization to fit user defined channels widths.

Hardware Switch on network processor

+ OpenFlow v1.3 support
+ Performance up to 100 Gb/sec (w/o over subscription) и 180 mln packets per sec
+ Group table support including reserve and load balance
+ 3 flow table support with arbitrary dimensions and purposes (TCAM with 208 bit key, L2 hash, L3 + L4 hash)
+ QOS: supporting 4 priority queues (4PQ) per a port
+ Support counters for statistics per flows and ports
+ 11x40 Gb/sec or 44x10 Gb/sec or 4x100 Gb/sec

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