SUPA Examples

Oscar Gonzalez, Telefonica
Dacheng Zhang, Alibaba
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Scenario-VPC

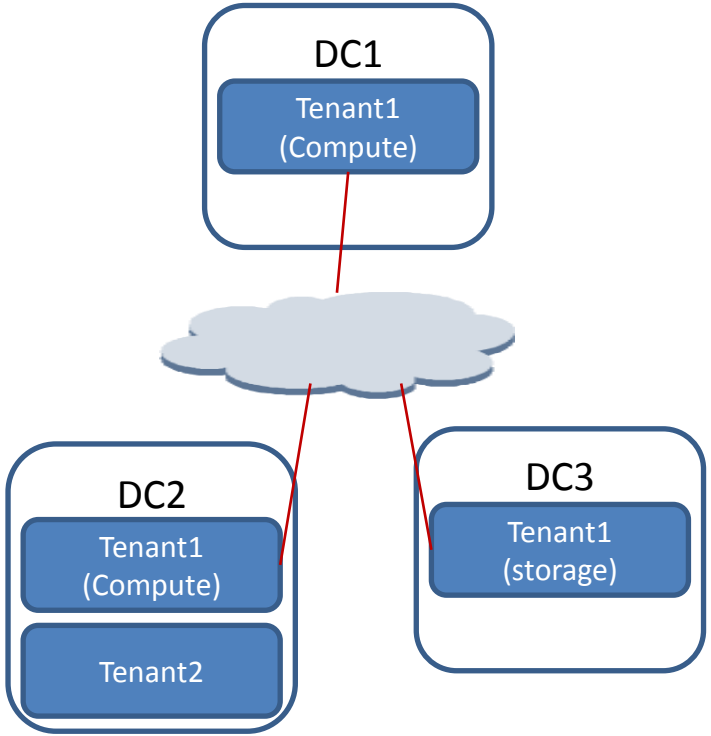
- VPC provide virtualized private cloud service for customers.
- The operator needs to flexibly generate a VPC, manage it, and delete it.
- When managing a VPC, an operator needs to
  - Manage VMs in the VPC
    - Generate/move/delete
  - Generate/modify the overlay network connecting VPC
    - Manage the connections between switches
    - Manage connections between VPC and the private cloud of the customer
    - Manage the connections between VPNs connecting different DCs and ensure sufficient QoS
- Management should be flexible and dynamic
  - Disaster recovery/migration/
- Performance is important
  - Millions of VMs distributed in different regions
- Generality is important-why we need an abstract model
  - Various type of services
  - New operations which will occur in future

VPC Example: Declarative Policy

Target: Provide VPC service to customer A with specified resources and function (storage, computing, DNS, etc)

Declarative policy:

1. allocate the required services on DCs according to a user's profile
2. services located in multiple distributed DCs must be interconnected via VPNs
3. the VPNs associated to the services provided for a user must match the user's profile in terms of latency, speed and bandwidth



VPC Example: ECA Policy

Target: Perform VM migration when user location changed and the network load between the DCs is low

ECA Policy:

Event: a VPC user's location is changed (near to another DC)

Condition: network_load(DC_old, DC_new) < threshold

Action:

1. migrate the VM to the new data center (DC_new)
2. update the VPNs connecting the user's services

Example: LB when Link Load Too High

Target:

DC have multiple external links; when the load on a link is too high, perform traffic steering for better bandwidth resource usage

ECA Policy

Event: load on a DC link exceeds threshold

Condition: multiple disjoint links between DCs

Action: steer some traffic to link with low load

Example: Virtual SP Traffic Steering

Problem:

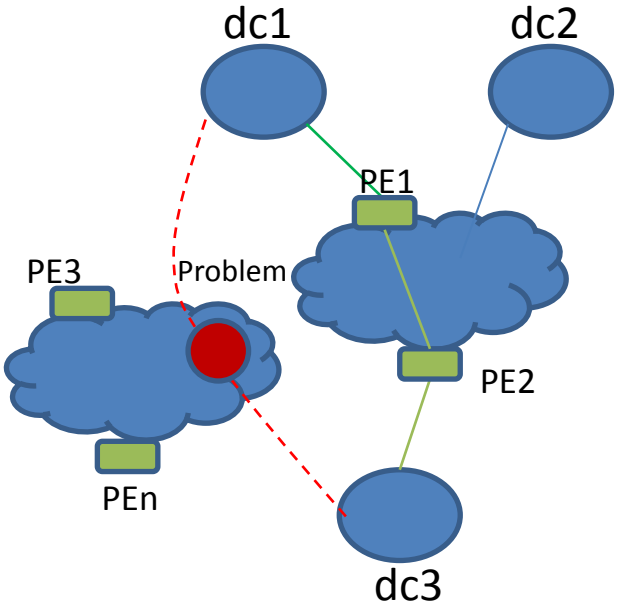
- Virtual operator can connect DCs via GRE tunnels;
- but if direct tunnel is built between DCs (e.g. dc1-to-dc3), route is out of control -- the route may go through network node with problems, or with high load, or cross border of different operators where QoS can not be guaranteed.

Solution:

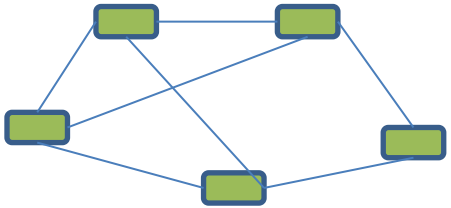
- Virtual operator rent routers in network operators' DCs;
- build multiple tunnels instead of one E2E tunnel , e.g. dc1-to-PE1, PE1-to-PE2, PE2-to-dc3
- network wide optimization based on real-time QoS value

ECA Policy:

- Event: QoS parameters < threshold
- Condition: multiple disjoint tunnels available
- Action: Network wide tunnel optimization + traffic steering



Network wide tunnel optimization and monitoring



Example: Automated VPN Configuration

Target:

Configure VPN for an enterprise customer to connect its enterprise network with VPC

ECA Policy:

Event: service management system receive a CE request for VPN creation (forwarded by PE)

Condition: Authentication OK

Action: Configure VPN based on received request, including user grade and physical info (port/slot/frame/route id, etc, from which the request is received)

Traditional method: service staff make wire connection and feedback physical information.