



Doctor Demo

Carlos Goncalves, NEC
Ryota Mibu, NEC

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Doctor demo

- 2 use cases being showcased
 - UC1: infrastructure monitoring
 - What will be shown? VMs evacuation on compute node failure
 - How it is realized?
 - Zabbix as monitoring tool; alerts are published to a messaging queue
 - Platform integrated with Nova blueprint proposed to OpenStack
 - UC2: virtual resources monitoring
 - What will be shown? VNF ACT/SBY scenario
 - How is it realized?
 - Ceilometer as monitoring tool; alerts are sent to a HTTP callback URL
 - Platform integrated with Ceilometer blueprint proposed to OpenStack

Blueprint status

Project	Name	Lead contributor	Developer	Status
Nova	New nova API call to mark nova-compute down *	Tomi Juvonen	Roman Dobosz (server) Carlos Goncalves (client)	BP approved & merged Code under review
Ceilometer	Add 'event' type and 'event_rule' to alarm API *	Ryota Mibu	Ryota Mibu	BP approved & merged Ongoing implementation
Nova	Get valid server state	Tomi Juvonen		BP under review M-release
Nova	Add notification for service status change	Balazs Gibizer	Balazs Gibizer	BP under review M-release

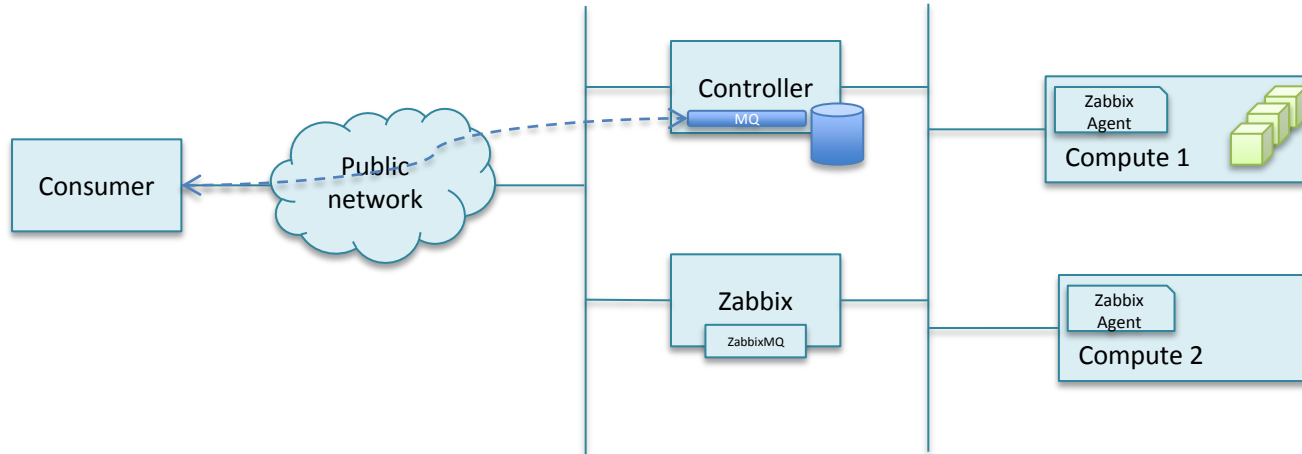
* These blueprints were accepted in OpenStack Liberty cycle and are being showcased in this demo

For more information and latest status, please refer to https://etherpad.opnfv.org/p/doctor_bps

Doctor demo

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 - **UC1: infrastructure monitoring**
 - What will be shown? VMs evacuation on compute node failure
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Fault Management UC1: infrastructure

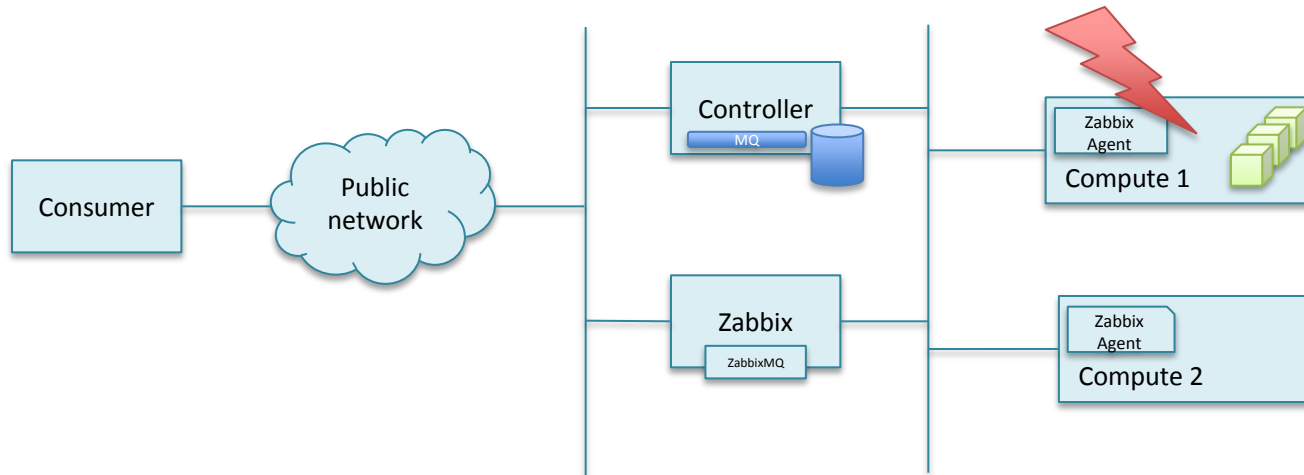


Initial deployment

Consumer* is subscribed to a AMQP system

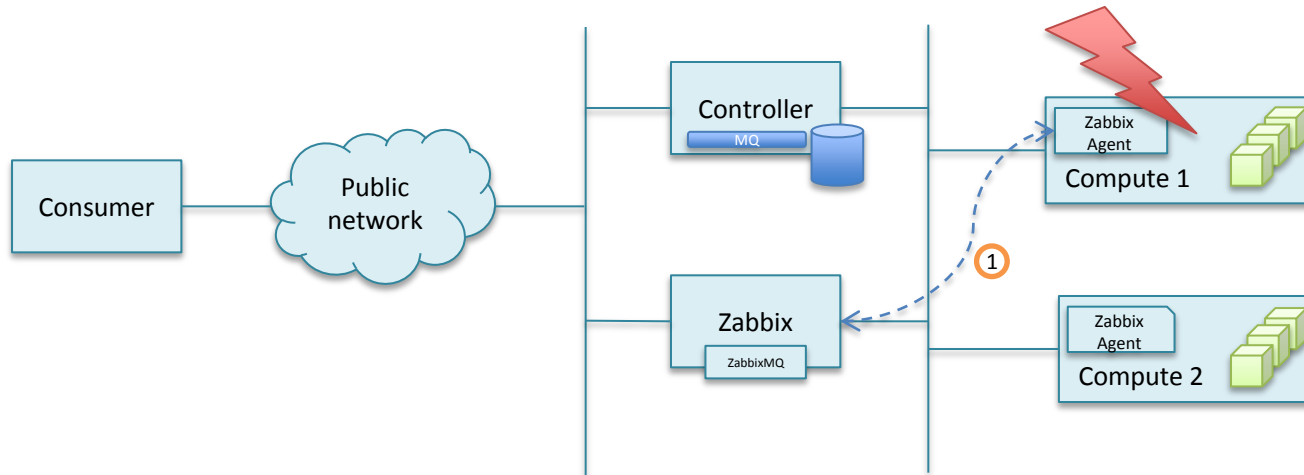
* User-side Manager; consumer of the interfaces produced by the VIM; VNFM, NFVO, or Orchestrator in ETSI NFV terminology

Fault Management UC1: infrastructure



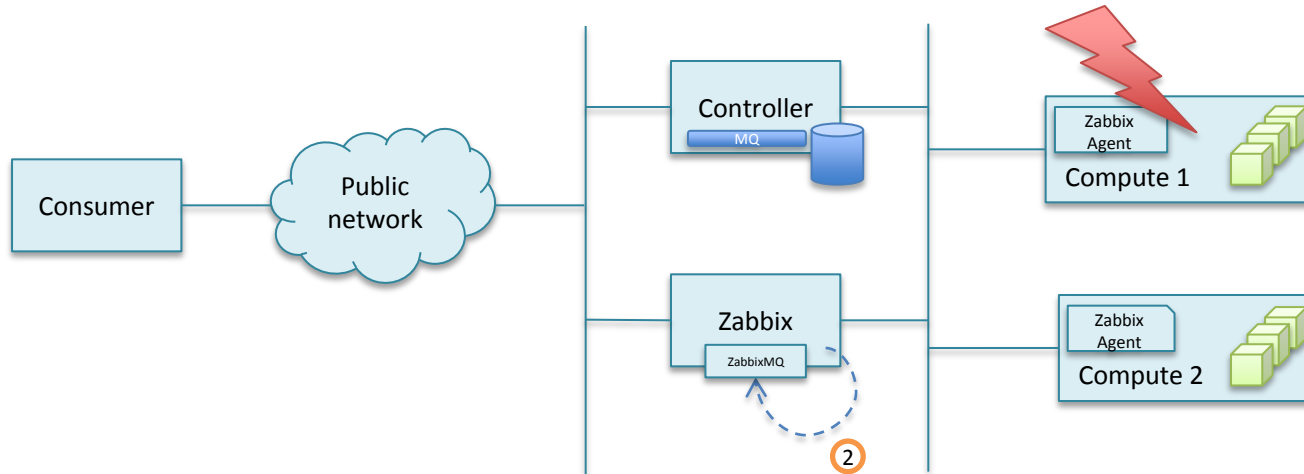
0. Failure occurs

Fault Management UC1: infrastructure



1. Failure detected

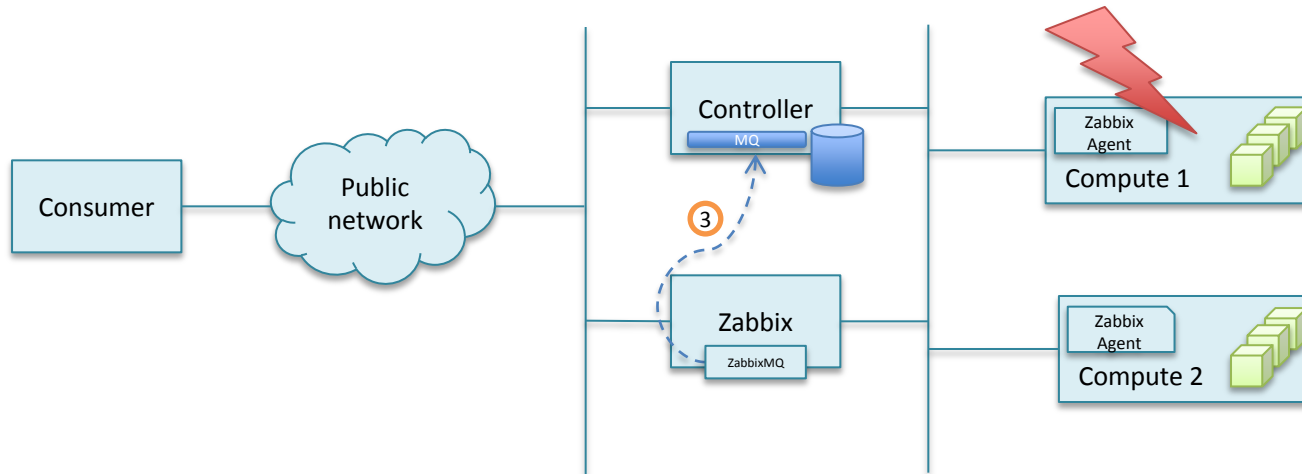
Fault Management UC1: infrastructure



2. Forward alert to ZabbixMQ

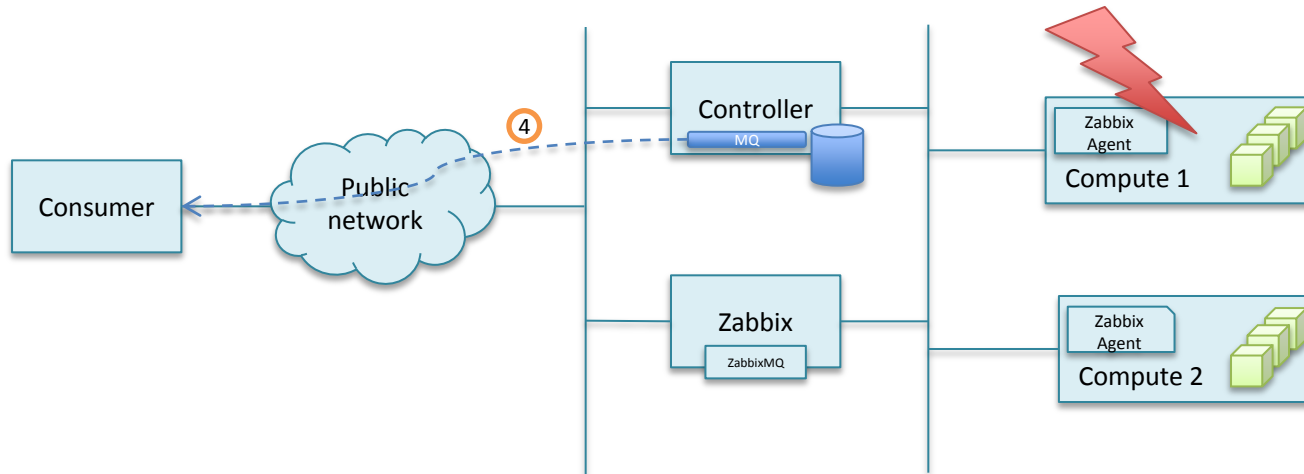
ZabbixMQ developed to publish alerts to a AMQP system (e.g. RabbitMQ, Qpid)

Fault Management UC1: infrastructure



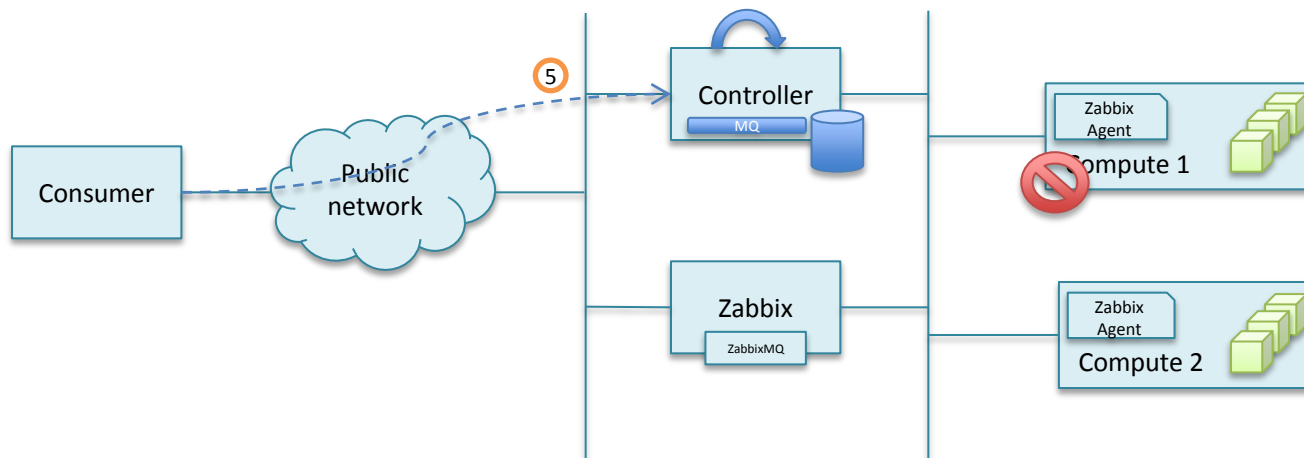
3. Publish alert to RabbitMQ (pub/sub)

Fault Management UC1: infrastructure



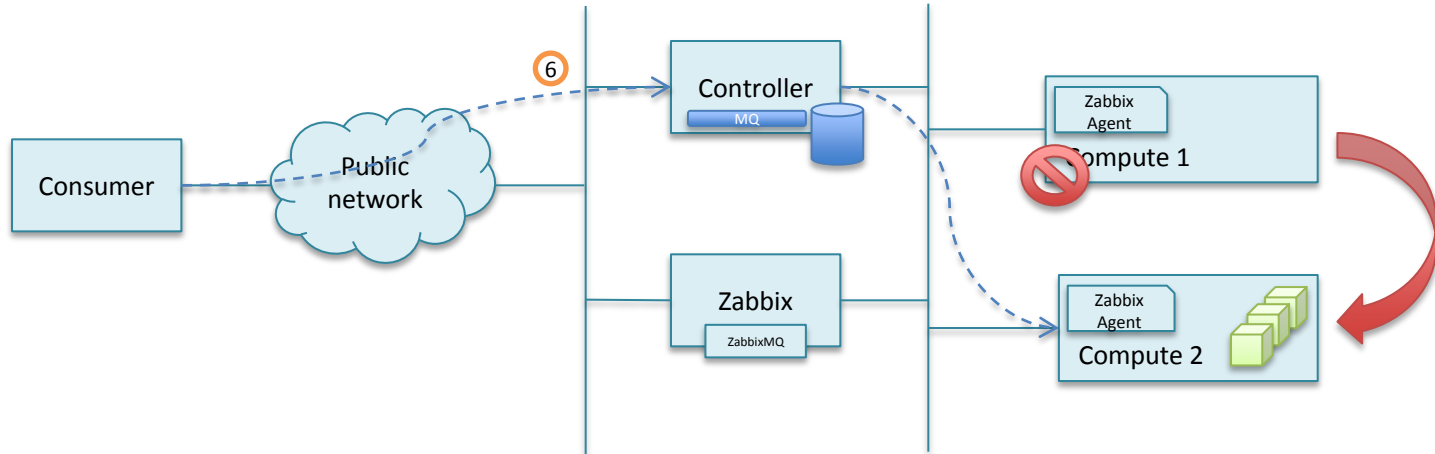
4. Consumer is notified of failure (pub/sub)

Fault Management UC1: infrastructure



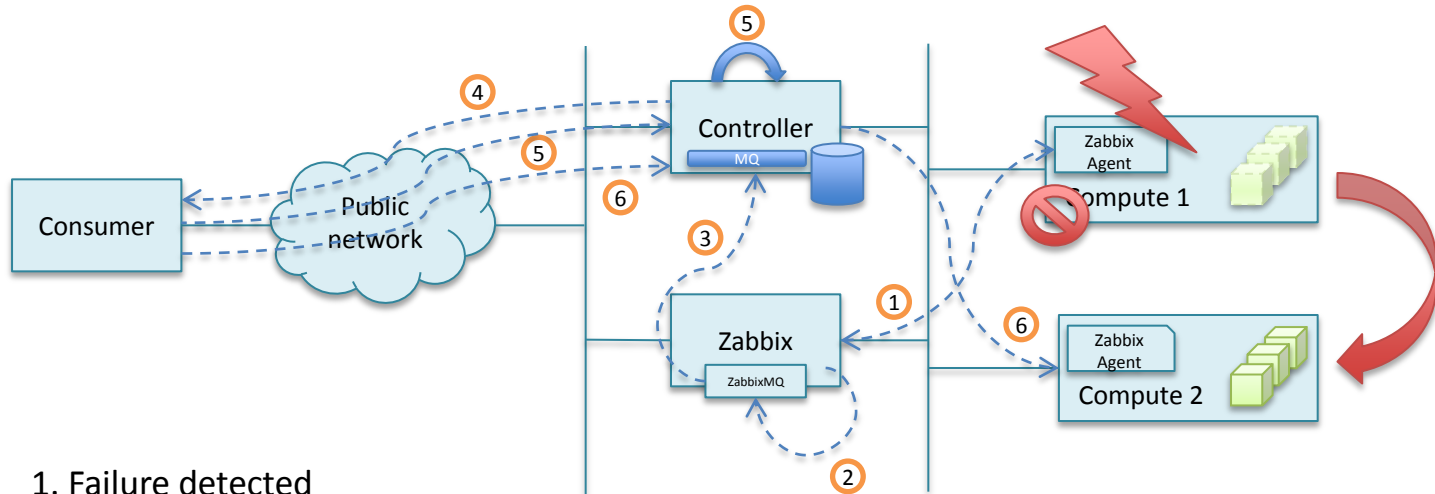
- 5. Consumer invokes fault management action
 - 5.1. Mark compute as down (Nova blueprint)

Fault Management UC1: infrastructure



- 6. Consumer invokes fault management action
 - 6.1. Evacuate VMs from Compute 1 to Compute 2

Fault Management UC1: infrastructure



1. Failure detected
2. Forward alert to ZabbixMQ
3. Publish alert to RabbitMQ (pub/sub)
4. Consumer is notified of failure (pub/sub)
- 5 & 6. Consumer invokes fault management action

Steps 1-4: failure detection and reporting to Consumer

```
2015-07-28 14:33:52.%f.191 root[29335] Thread-1 INFO - Received message # 1 from None: {"origin": "zabbix/zabbix", "rawData": {"status": "PROBLEM", "thresholdInfo": "Template ICMP Ping: {doctor-compute1:icmping.max(#1)}=0", "group": "Zabbix", "severity": "minor", "event_time": "14:33:46", "tags": "ipaddr=192.168.1.68,id=13828,event_id=112251", "ack": "No", "text": "doctor-compute1 is unavailable by ICMP", "value": "Down (0)", "environment": "Production", "service": "Hypervisors, Linux servers", "resource": "doctor-compute1", "type": "zabbixAlert", "event": "icmping"}, "summary": "PROBLEM: doctor-compute1 is unavailable by ICMP"}
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2015-07-28 14:34:57.%f.438 root[29335] Thread-1 INFO - Received message # 2 from None: {"origin": "zabbix/zabbix", "rawData": {"status": "OK", "thresholdInfo": "Template ICMP Ping: {doctor-compute1:icmping.max(#1)}=0", "group": "Zabbix", "severity": "minor", "event_time": "14:34:50", "tags": "ipaddr=192.168.1.68,id=13828,event_id=112265", "ack": "No", "text": "doctor-compute1 is unavailable by ICMP", "value": "Up (1)", "environment": "Production", "service": "Hypervisors, Linux servers", "resource": "doctor-compute1", "type": "zabbixAlert", "event": "icmping"}, "summary": "OK: doctor-compute1 is unavailable by ICMP"}
2015-07-28 14:34:57.%f.439 root[29335] Thread-1 INFO - Acknowledging message 2
2015-07-28 14:34:57.%f.439 root[29335] Thread-1 INFO - Received alarm: {'event_at': '14:34:50', 'status': 'OK', 'notified_at': '14:34:57.439853', 'resource': 'doctor-compute1', 'description': 'doctor-compute1 is unavailable by ICMP'}
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Step 5: Mark compute host state as down by Consumer

```
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Step 5: Mark compute host state as down by Consumer

```
ubuntu@doctor-controller:~/devstack$ nova service-list
```

Id	Binary	Host	Zone	Status	State	Updated_at	Disabled Reason
1	nova-conductor	doctor-controller	internal	enabled	up	2015-07-24T08:59:14.000000	-
2	nova-cert	doctor-controller	internal	enabled	up	2015-07-24T08:59:17.000000	-
3	nova-scheduler	doctor-controller	internal	enabled	up	2015-07-24T08:59:14.000000	-
4	nova-consoleauth	doctor-controller	internal	enabled	up	2015-07-24T08:59:16.000000	-
5	nova-compute	doctor-compute1	nova	enabled	down	2015-07-24T08:59:19.000000	-
6	nova-compute	doctor-compute2	nova	enabled	up	2015-07-24T08:59:19.000000	-

Step 6: Evacuate all VMs running on affected compute node

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```

Step 6: Evacuate all VMs running on affected compute node

Instance Overview

Information

Name	vm1
ID	4c3106f7-4fda-4c31-a322-5598e2d1044b
Status	Active
Availability Zone	nova
Created	July 28, 2015, 2:28 p.m.
Time Since Created	4 minutes
Host	<u>doctor-compute1</u>

Instance Overview

Information

Name	vm1
ID	4c3106f7-4fda-4c31-a322-5598e2d1044b
Status	Active
Availability Zone	nova
Created	July 28, 2015, 2:28 p.m.
Time Since Created	8 minutes
Host	<u>doctor-compute2</u>

```
root@doctor-compute1:~# virsh list
Id      Name                                     State
-----
2       instance-00000001                      running
```

```
root@doctor-compute2:~# virsh list
Id      Name                                     State
-----
2       instance-00000001                      running
```

```
root@doctor-compute2:~# virsh list
Id      Name                                     State
-----
2       instance-00000001                      running
```

```
PING 10.0.0.3 (10.0.0.3) 56(84) bytes of data:
64 bytes from 10.0.0.3: icmp_seq=1 ttl=64 time=4.59 ms
64 bytes from 10.0.0.3: icmp_seq=2 ttl=64 time=1.38 ms
64 bytes from 10.0.0.3: icmp_seq=3 ttl=64 time=1.62 ms
64 bytes from 10.0.0.3: icmp_seq=4 ttl=64 time=1.30 ms
64 bytes from 10.0.0.3: icmp_seq=5 ttl=64 time=1.67 ms
64 bytes from 10.0.0.3: icmp_seq=6 ttl=64 time=1.52 ms
64 bytes from 10.0.0.3: icmp_seq=7 ttl=64 time=1.87 ms
64 bytes from 10.0.0.3: icmp_seq=8 ttl=64 time=1.24 ms
64 bytes from 10.0.0.3: icmp_seq=9 ttl=64 time=1.50 ms
64 bytes from 10.0.0.3: icmp_seq=10 ttl=64 time=1.16 ms
64 bytes from 10.0.0.3: icmp_seq=11 ttl=64 time=1.77 ms
64 bytes from 10.0.0.3: icmp_seq=12 ttl=64 time=1.26 ms
64 bytes from 10.0.0.3: icmp_seq=13 ttl=64 time=1.52 ms
64 bytes from 10.0.0.3: icmp_seq=14 ttl=64 time=1.27 ms
64 bytes from 10.0.0.3: icmp_seq=41 ttl=64 time=1.54 ms
64 bytes from 10.0.0.3: icmp_seq=42 ttl=64 time=1.45 ms
64 bytes from 10.0.0.3: icmp_seq=43 ttl=64 time=1.48 ms
64 bytes from 10.0.0.3: icmp_seq=44 ttl=64 time=1.27 ms
64 bytes from 10.0.0.3: icmp_seq=45 ttl=64 time=1.39 ms
64 bytes from 10.0.0.3: icmp_seq=46 ttl=64 time=1.59 ms
```

} 27 seconds

Compute node 1 is back after admin maintenance

Setting state UP

```
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Doctor Consumer

10.40.0.72:5000

Search

OPNFV Doctor Consumer

Monitoring report

Event at	Notified at	Resource	Status	Message
14:34:57.492927	-	doctor-compute1	RECOVERING	Set compute host state as UP
14:34:50	14:34:57.439853	doctor-compute1	OK	doctor-compute1 is unavailable by ICMP
14:33:52.554448	-	doctor-compute1	RECOVERING	Evacuating instance 4c3106f7-4fda-4c31-a322-5598e2d1044b
14:33:52.483752	-	doctor-compute1	RECOVERING	Evacuating all instances from failed host
14:33:52.483128	-	doctor-compute1	RECOVERING	Set compute host state as DOWN
14:33:46	14:33:52.193217	doctor-compute1	PROBLEM	doctor-compute1 is unavailable by ICMP

Doctor Consumer
+

10.40.0.72:5000
Search

OPNFV Doctor Consumer

Monitoring report

Event at	Notified at	Resource	Status	Message
14:34:57.492927	-	doctor-compute1	RECOVERING	Set compute host state as UP
14:34:50	14:34:57.439853	doctor-compute1	OK	doctor-compute1 is unavailable by ICMP
14:33:52.554448	-	doctor-compute1	RECOVERING	Evacuating instance 4c3106f7-4fda-4c31-a322-5598e2d1044b
14:33:52.482750	-		RECOVERING	Evacuating all instances from failed host
14:33:46	14:33:52.193217	doctor-compute1	PROBLEM	doctor-compute1 is unavailable by ICMP

Steps 1-4

Zabbix took 6 seconds to send out alert notification

Doctor Consumer

10.40.0.72:5000

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OPNFV Doctor Consumer

Monitoring report

Event at	Notified at	Resource	Status	Message
14:34:57.492927	-	doctor-compute1	RECOVERING	Set compute host state as UP
14:34:50	14:34:57.439853	doctor-compute1	OK	doctor-compute1 is unavailable by ICMP
14:33:52.554448	-	doctor-compute1	RECOVERING	Evacuating instance 4c3106f7-4fda-4c31-a322-5598e2d1044b
14:33:52.483128	-	doctor-compute1	RECOVERING	Set compute host state as DOWN
14:33:46	14:33:52.193217	doctor-compute1	PROBLEM	doctor-compute1 is unavailable by ICMP

Step 5

Doctor Consumer

10.40.0.72:5000

OPNFV Doctor Consumer

Monitoring report

Event at	Notified at	Resource	Status	Message
14:33:52.554448	-	doctor-compute1	RECOVERING	Set compute host state as UP
14:33:52.483752	14:34:57.439853	doctor-compute1	OK	doctor-compute1 is unavailable by ICMP
14:33:52.554448	-	doctor-compute1	RECOVERING	Evacuating instance 4c3106f7-4fda-4c31-a322-5598e2d1044b
14:33:52.483752	-	doctor-compute1	RECOVERING	Evacuating all instances from failed host
14:33:52.483128	-	doctor-compute1	RECOVERING	Set compute host state as DOWN
14:33:46	14:33:52.193217	doctor-compute1	PROBLEM	doctor-compute1 is unavailable by ICMP

Doctor Consumer
+

10.40.0.72:5000
Search

OPNFV Doctor Consumer

Monitoring report

Event at	Notified at	Resource	Status	Message
14:34:57.492927	-	doctor-compute1	RECOVERING	Set compute host state as UP
14:34:50	14:34:57.439853	doctor-compute1	OK	doctor-compute1 is unavailable by ICMP
14:33:52.554448	-	doctor-compute1	RECOVERING	Evacuating instance 4c3106f7-4fda-4-21-222-5508-2110441
14:33:52.483752	-	doctor-compute1	RECOVERING	host
14:33:52.483128	-	doctor-compute1	RECOVERING	
14:33:46	14:33:52.193217	doctor-compute1	PROBLEM	doctor-compute1 is unavailable by ICMP

Consumer took 0.36 seconds to react

Doctor Consumer

10.40.0.72:5000

OPNFV Doctor Consumer

Monitoring report

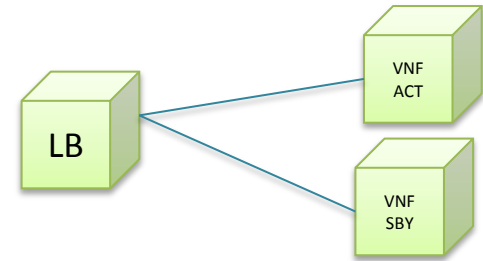
Event at	Notified at	Resource	Status	Message
14:34:57.492927	-	doctor-compute1	RECOVERING	Set compute host state as UP
14:34:50	14:34:57.439853	doctor-compute1	OK	doctor-compute1 is unavailable by ICMP
14:33:52.483128	-	doctor-compute1	RECOVERING	Evacuating instance 4c3106f7-4fda-4c31-a322-5598e2d1044b
14:33:52.483128	-	doctor-compute1	RECOVERING	Evacuating all instances from failed host
14:33:52.483128	-	doctor-compute1	RECOVERING	Set compute host state as DOWN
14:33:46	14:33:52.193217	doctor-compute1	PROBLEM	doctor-compute1 is unavailable by ICMP

Compute node is back online

Doctor demo

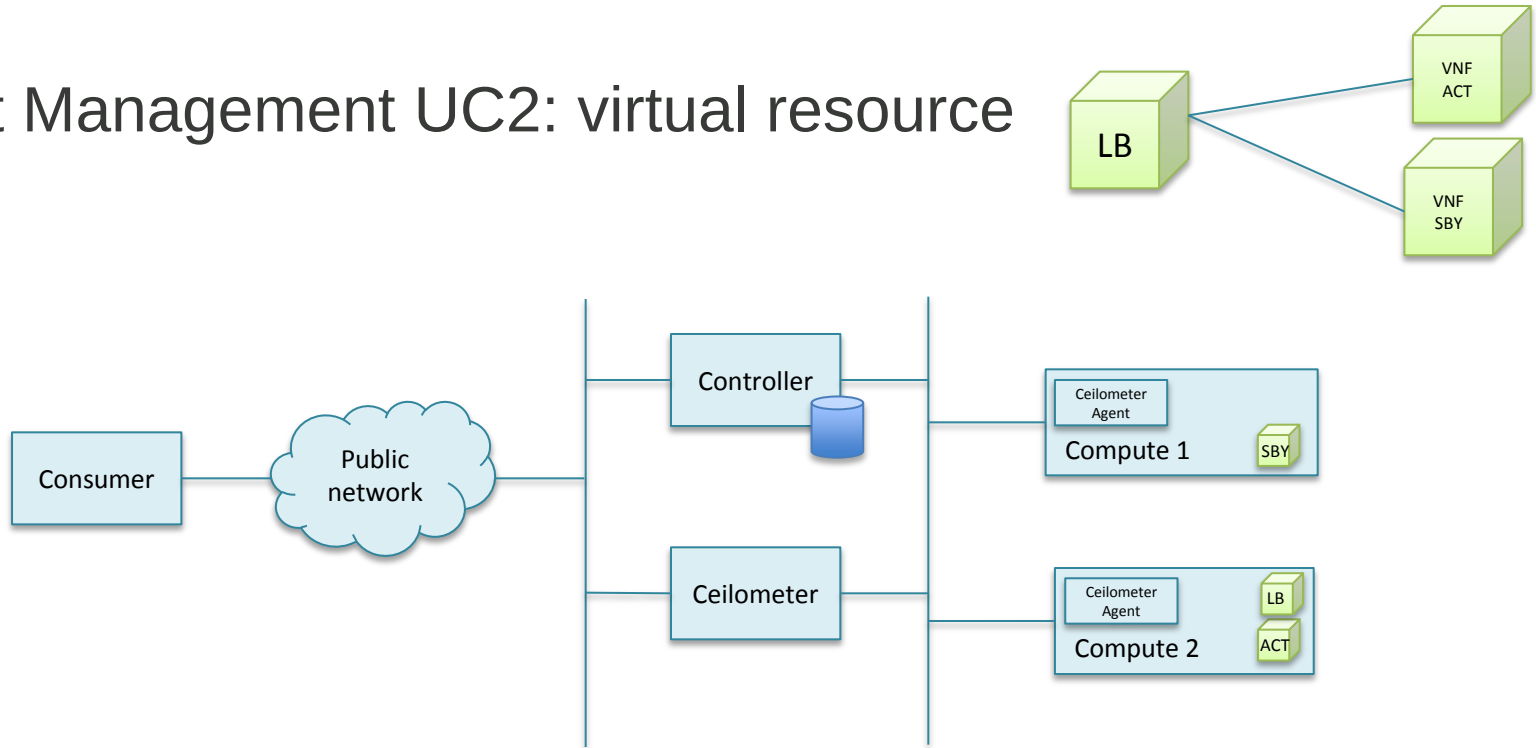
- 2 use cases being showcased
 - UC1: infrastructure monitoring
 - What will be shown? VMs evacuation on compute node failure
 - How it is realized?
 - Zabbix as monitoring tool; alerts are published to a messaging queue
 - Platform integrated with Nova blueprint proposed to OpenStack
 - **UC2: virtual resources monitoring**
 - What will be shown? VNF ACT/SBY scenario
 - How is it realized?
 - Ceilometer as monitoring tool; alerts are sent to a HTTP callback URL
 - Platform integrated with Ceilometer blueprint proposed to OpenStack

Fault Management UC2: virtual resource



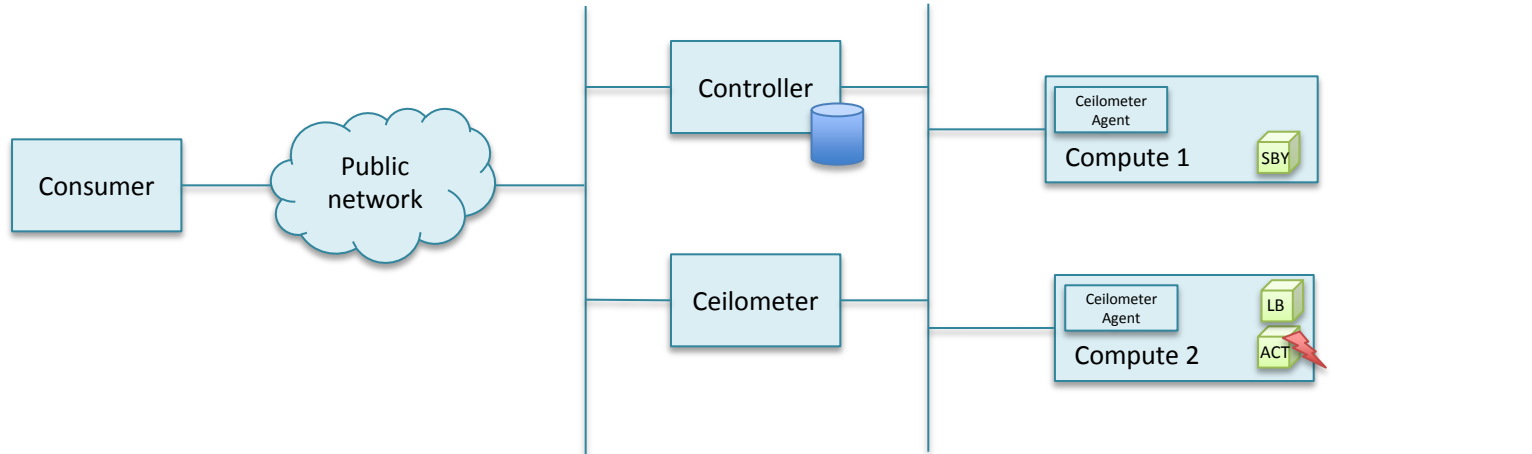
2 VMs running a VNF in
ACT/SBY mode logically
connected to a load balancer

Fault Management UC2: virtual resource



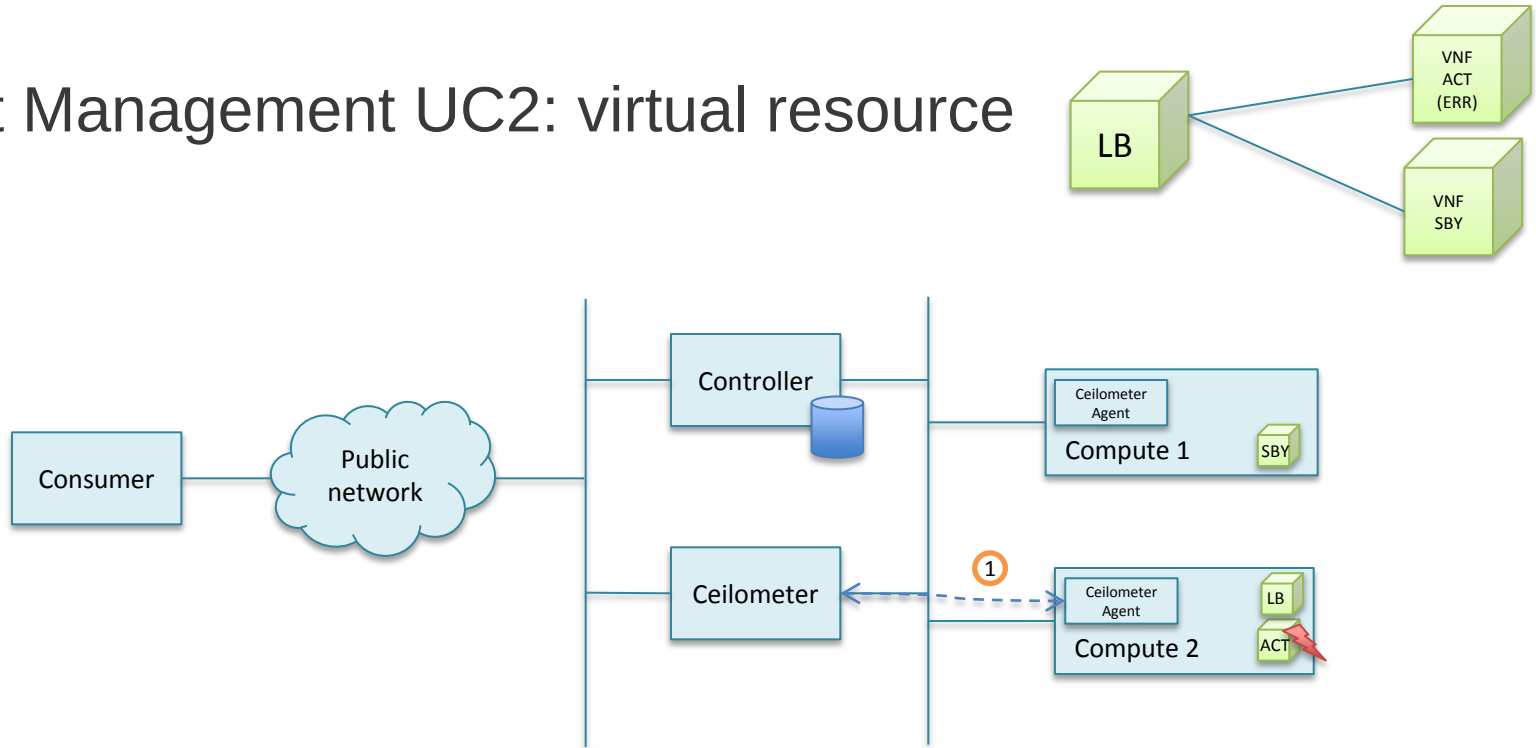
Initial deployment
VNF Active / Standby mode

Fault Management UC2: virtual resource



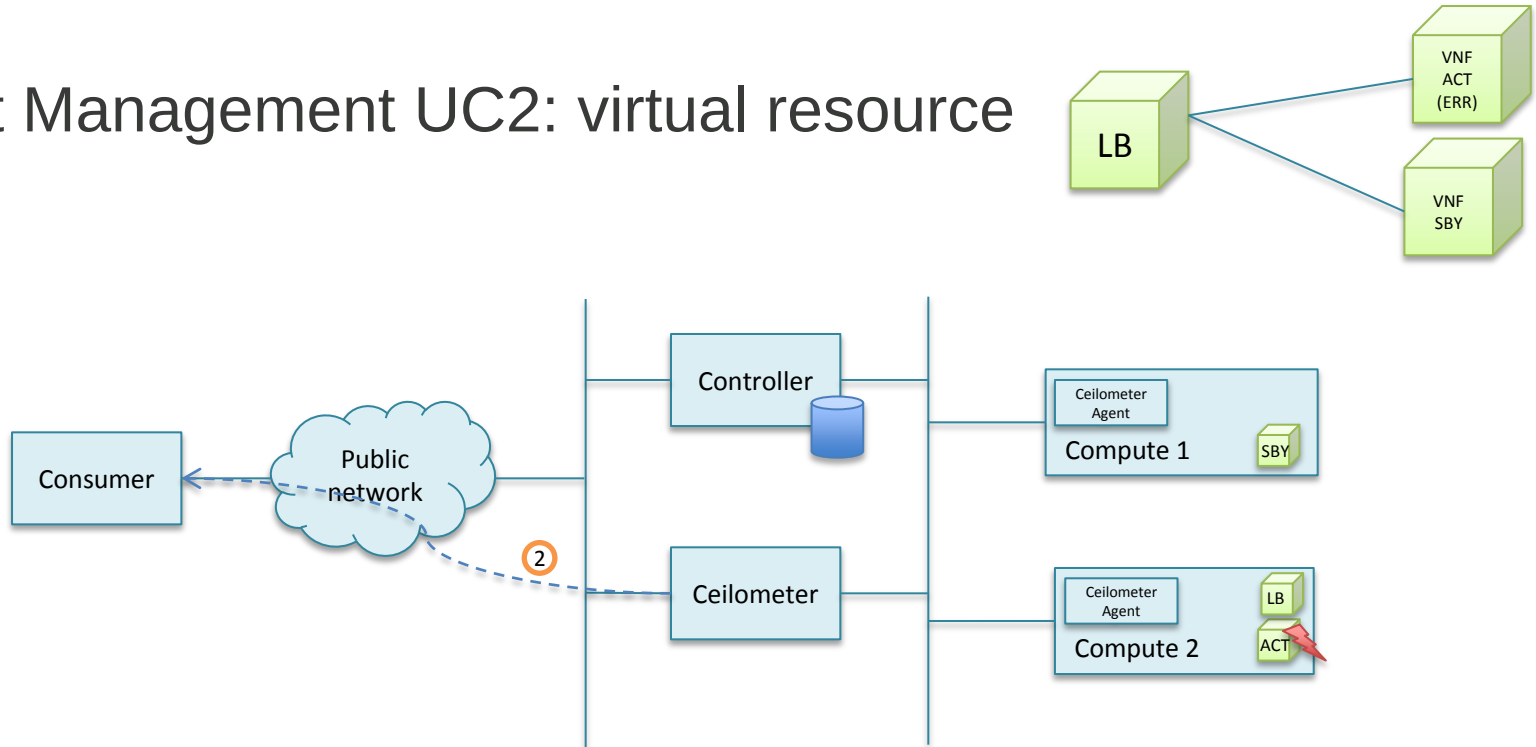
0. failure occurs

Fault Management UC2: virtual resource



1. Failure detected

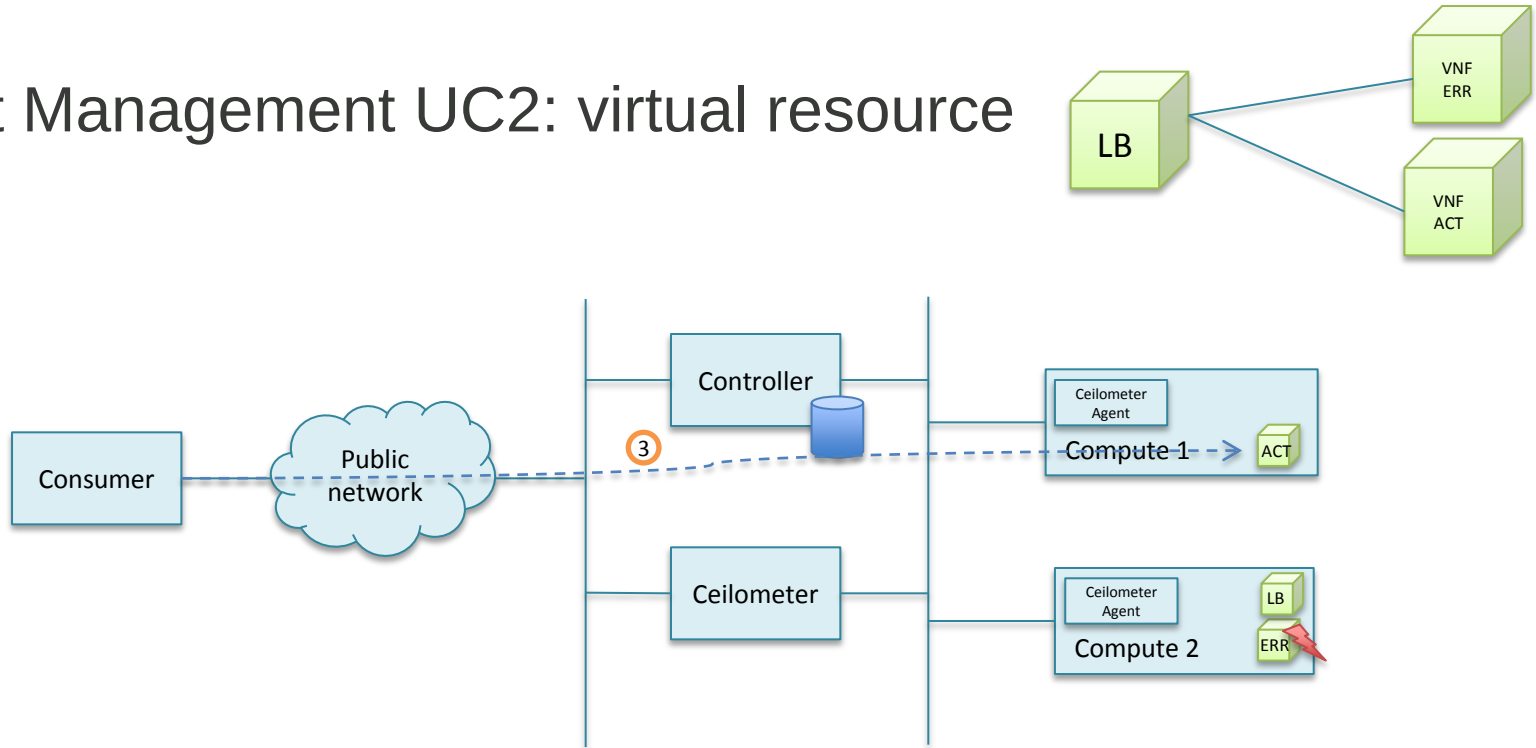
Fault Management UC2: virtual resource



2. Ceilometer notifies Consumer of failure (Ceilometer blueprint)

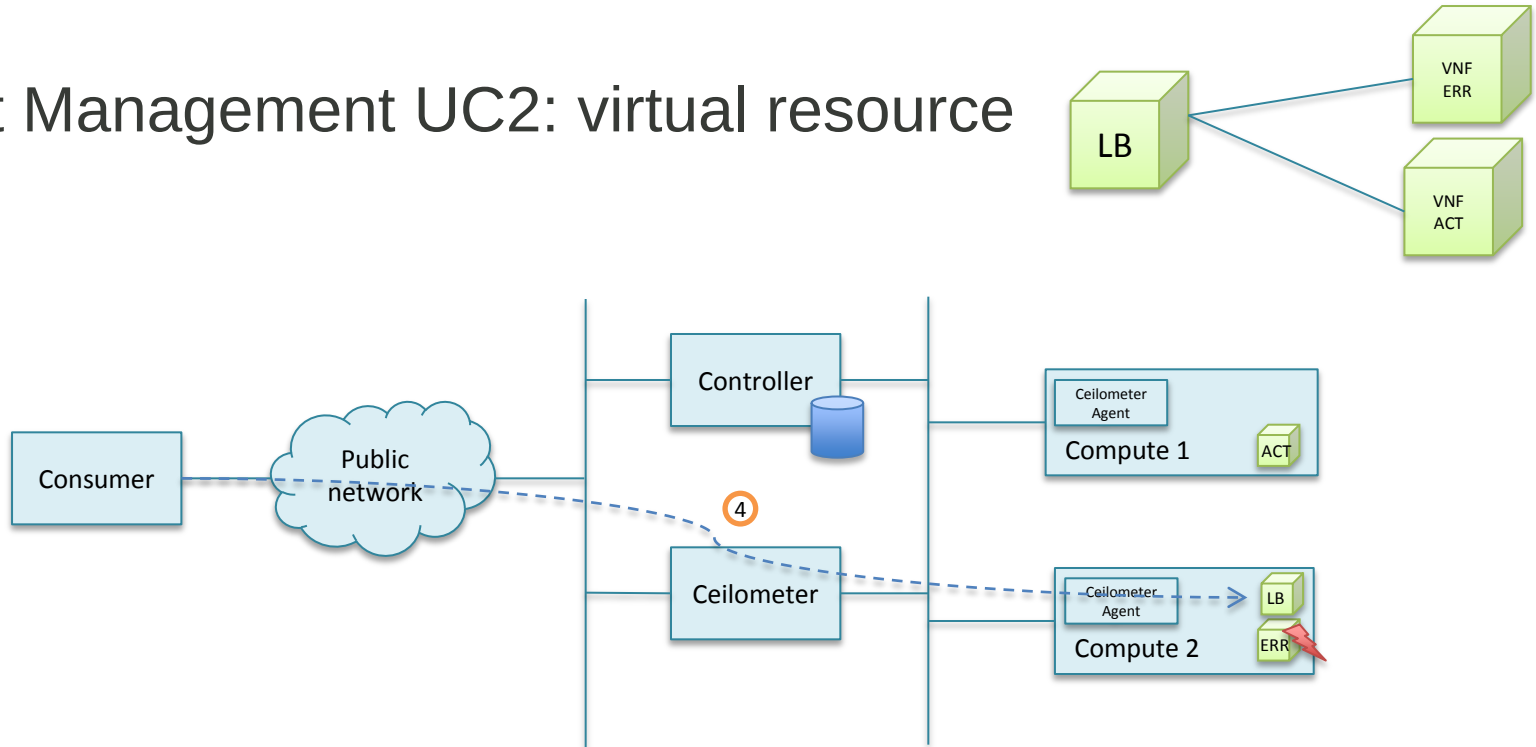
2.1. HTTP callback

Fault Management UC2: virtual resource



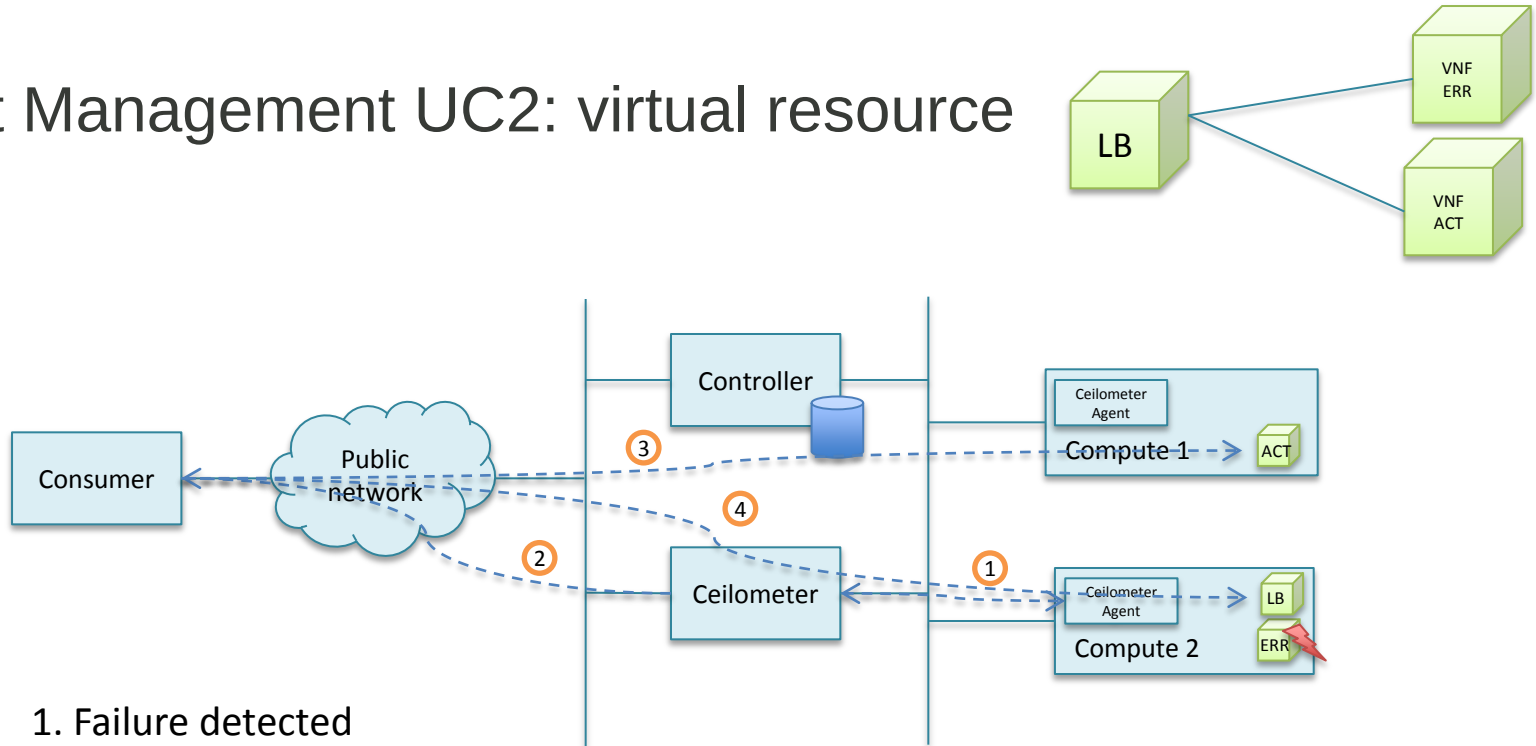
3. Activate SBY server

Fault Management UC2: virtual resource



4. Switch to SBY configuration

Fault Management UC2: virtual resource



1. Failure detected
2. Ceilometer notifies Consumer of failure
3. Activate SBY server
4. Switch to SBY configuration

UC2 Deployment

```
tipica@d718:~$ nova list
```

ID	Name	Status	Task State	Power State	Networks
bec98651-cbbb-4036-bba8-dedd1dc96e76	server1	ACTIVE	-	Running	private=10.0.0.4
41e092a4-eb39-44be-846d-ecdee007f9b8	server2	ACTIVE	-	Running	private=10.0.0.5

```
tipica@d718:~$ neutron lb-member-list
```

id	address	protocol_port	weight	admin_state_up	status
49f1b303-dfc7-4076-9377-059da3fe1c26	10.0.0.4	80	1	True	ACTIVE
7e1b3152-afe0-4875-8442-01d1fcb75165	10.0.0.5	80	1	False	ACTIVE

```
tipica@d718:~$ neutron lb-vip-list
```

id	name	address	protocol	admin_state_up	status
926d6bfa-2b7f-4fc7-9cb5-f05961c3cc34	pool1.vip	10.0.0.3	HTTP	True	ACTIVE

```
tipica@d718:~$ neutron floatingip-list
```

id	fixed_ip_address	floating_ip_address	port_id
a037ce66-efe2-4c91-af81-6f9b4c1d0630	10.0.0.3	172.24.4.3	01d8d4ef-40e1-47eb-93d2-1dbc4e741297

UC2 Initial State

```
tipica@d718:~$ neutron lb-member-list
```

id	address	protocol_port	weight	admin_state_up	status
49f1b303-dfc7-4076-9377-059da3fe1c26	10.0.0.4	80	1	True	ACTIVE
7e1b3152-afe0-4875-8442-01d1fcb75165	10.0.0.5	80	1	False	ACTIVE

```
tipica@d718:~$ ssh -i demokey.private fedora@10.0.0.4 "/bin/systemctl status app.service | grep Active"
Active: active (running) since Wed 2015-07-29 16:19:05 UTC; 12min ago
tipica@d718:~$ ssh -i demokey.private fedora@10.0.0.5 "/bin/systemctl status app.service | grep Active"
Active: inactive (dead)
```

```
tipica@d718:~$ curl http://172.24.4.3/
Served by server1.
tipica@d718:~$ curl http://172.24.4.3/
Served by server1.
tipica@d718:~$ curl http://172.24.4.3/
Served by server1.
tipica@d718:~$ curl http://172.24.4.3/
Served by server1.
tipica@d718:~$ curl http://172.24.4.3/
Served by server1.
```

UC2 Failure Injection and Auto Healing

```
tipica@d718:~$ ps aux | grep instance-00000001 | grep -v grep | sed -e 's/-smbios.*$//'  
libvirt+ 27953  1.3  1.1 3676568 272476 ?        S1   01:46   0:07 qemu-system-x86_64 -enable-kvm -name instance-00000001  
-S -machine pc-i440fx-trusty,accel=kvm,usb=off -m 1024 -realtime mlock=off -smp 1,sockets=1,cores=1,threads=1 -uuid  
bec98651-cbbb-4036-bba8-dedd1dc96e76  
tipica@d718:~$ sudo kill 27953; date "+%H:%M:%S.%N"  
01:55:05.044890318
```

OPNFV Doctor Consumer

Monitoring report

Event at	Notified at	Resource	Status	Message
01:55:07.063166		service_a	OK	The service has been recovered.
01:55:07.062887		server2	RECOVERING	Add the new VM entry on the LB
01:55:06.960573		server2	RECOVERING	Activate standby VM
01:55:06.755528		server1	RECOVERING	Remove active VM entry on the LB
2015-07-29T16:55:05.899619	01:55:06.121192	server1	PROBLEM	Active VM down (alarm=da7bc320-ad4d-4cdc-9a05-2d8e9c90ca03)

UC2 Recovered State

```
tipica@d718:~$ neutron lb-member-list
```

id	address	protocol_port	weight	admin_state_up	status
49f1b303-dfc7-4076-9377-059da3fe1c26	10.0.0.4	80	1	False	ACTIVE
7e1b3152-afe0-4875-8442-01d1fcb75165	10.0.0.5	80	1	True	ACTIVE

```
tipica@d718:~$ ssh -i demokey.private fedora@10.0.0.4 "/bin/systemctl status app.service | grep Active"
^C
tipica@d718:~$ ssh -i demokey.private fedora@10.0.0.5 "/bin/systemctl status app.service | grep Active"
Active: active (running) since Wed 2015-07-29 16:55:06 UTC; 5min ago
```

```
tipica@d718:~$ curl http://172.24.4.3/
Served by server2.
tipica@d718:~$ curl http://172.24.4.3/
Served by server2.
tipica@d718:~$ curl http://172.24.4.3/
Served by server2.
tipica@d718:~$ curl http://172.24.4.3/
Served by server2.
tipica@d718:~$ curl http://172.24.4.3/
Served by server2.
```

Questions?

