

# **Configurazione “Public Network” e Load Balancer as a Service**

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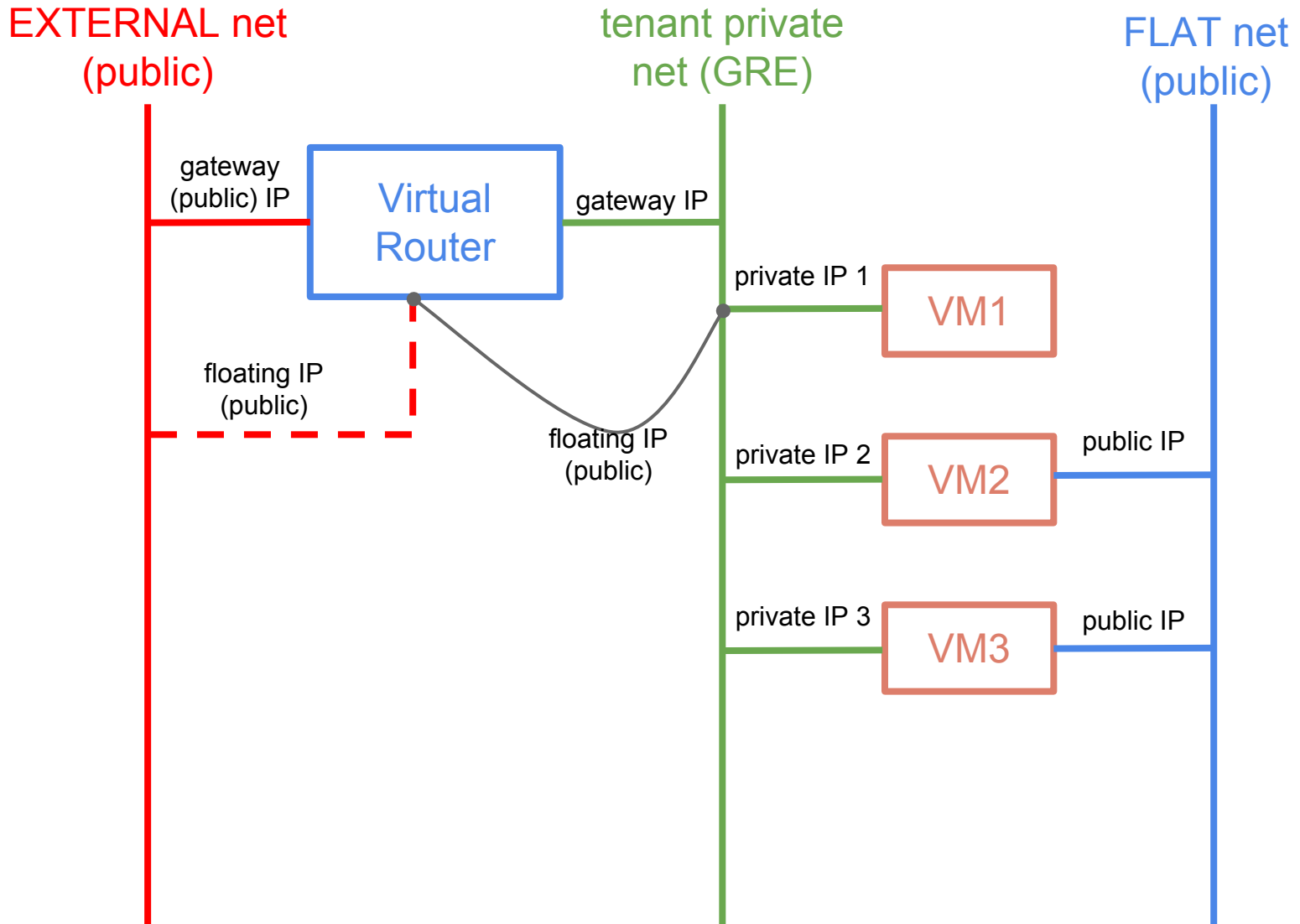
# Outline

- **Configurazione “Flat Public Network”**
  - Rete PRISMA IaaS Bari
  - Requisiti hardware
  - Descrizione Bridge
    - GRE
    - Flat public network
  - Configurazione Open vSwitch
  - Configurazione interfacce di rete
  - Configurazione Neutron
  - Creazione rete
  - Esempi e use-case
- **Load Balancer as a Service**
  - use-case ed esempi
  - pool, membri e Virtual IP
  - Installazione e configurazione
  - GUI - Esempi

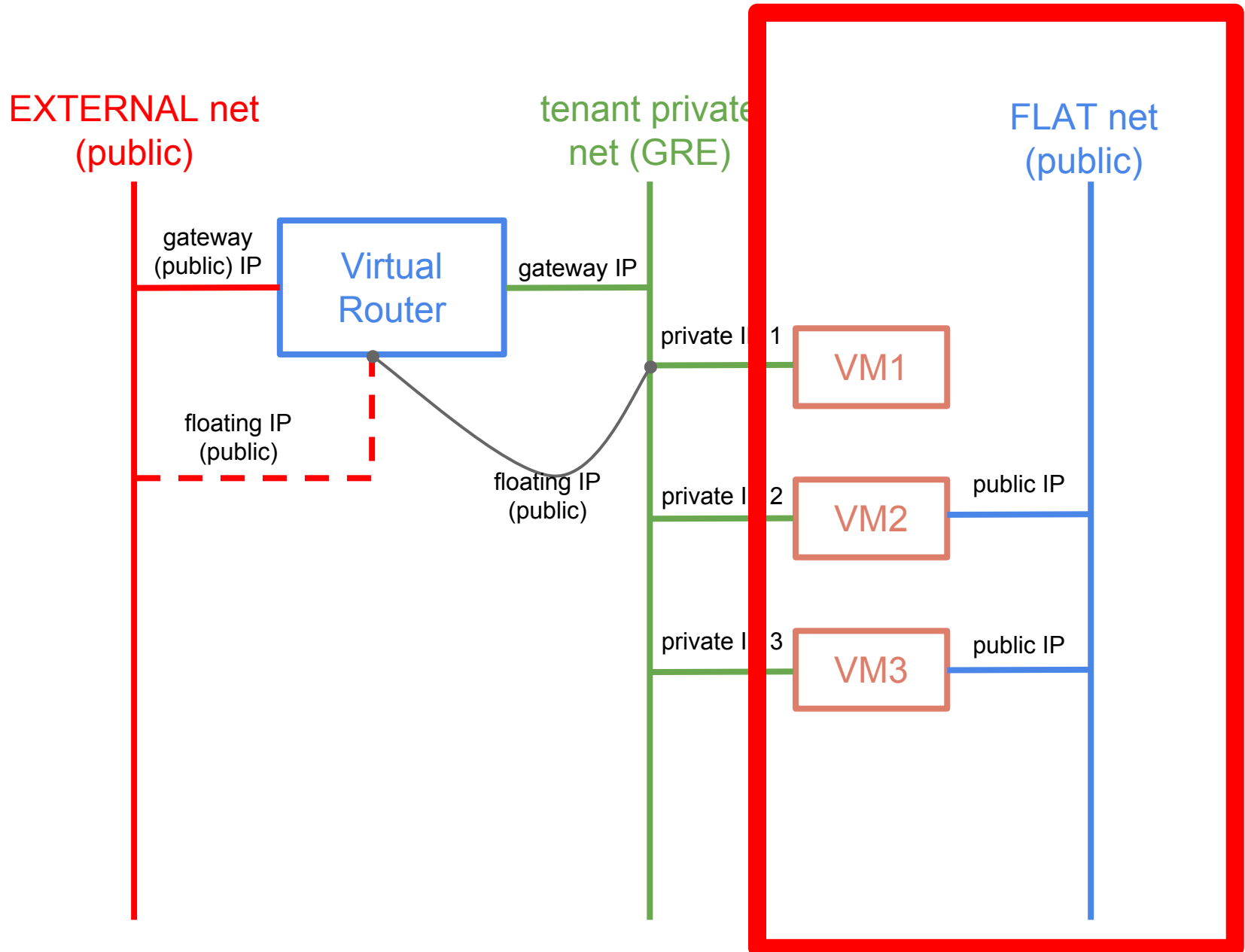
# Configurazione

**“Flat Public Network”  
(+GRE)**

# Rete PRISMA IaaS Bari



# Rete PRISMA IaaS Bari



# Requisiti hardware

## Network node e compute node(s)

NIC aggiuntivo rispetto a quelli della configurazione standard

## Sottoreti

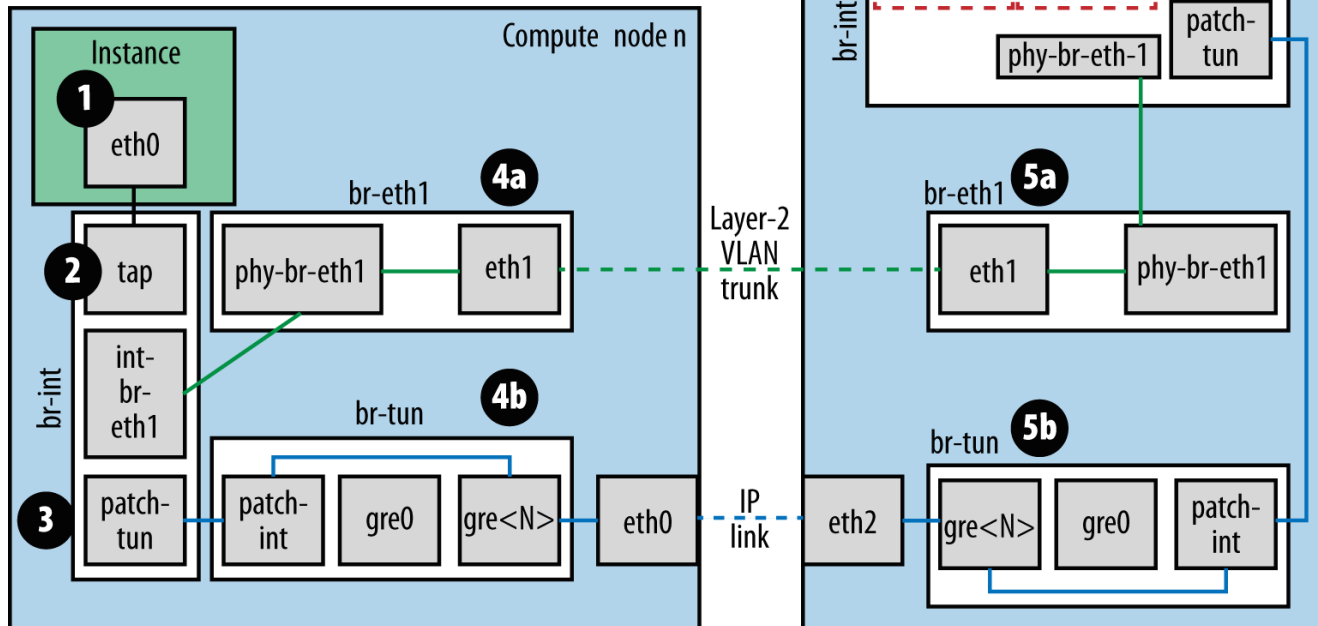
Sottorete (pubblica) aggiuntiva con indirizzo diverso dalla ext-net (su cui vengono assegnati gli IP ai gateway dei virtual router o i floating IP)

( possibilità di configurazione con 2 soli NIC?..... )

# Bridge in OpenStack

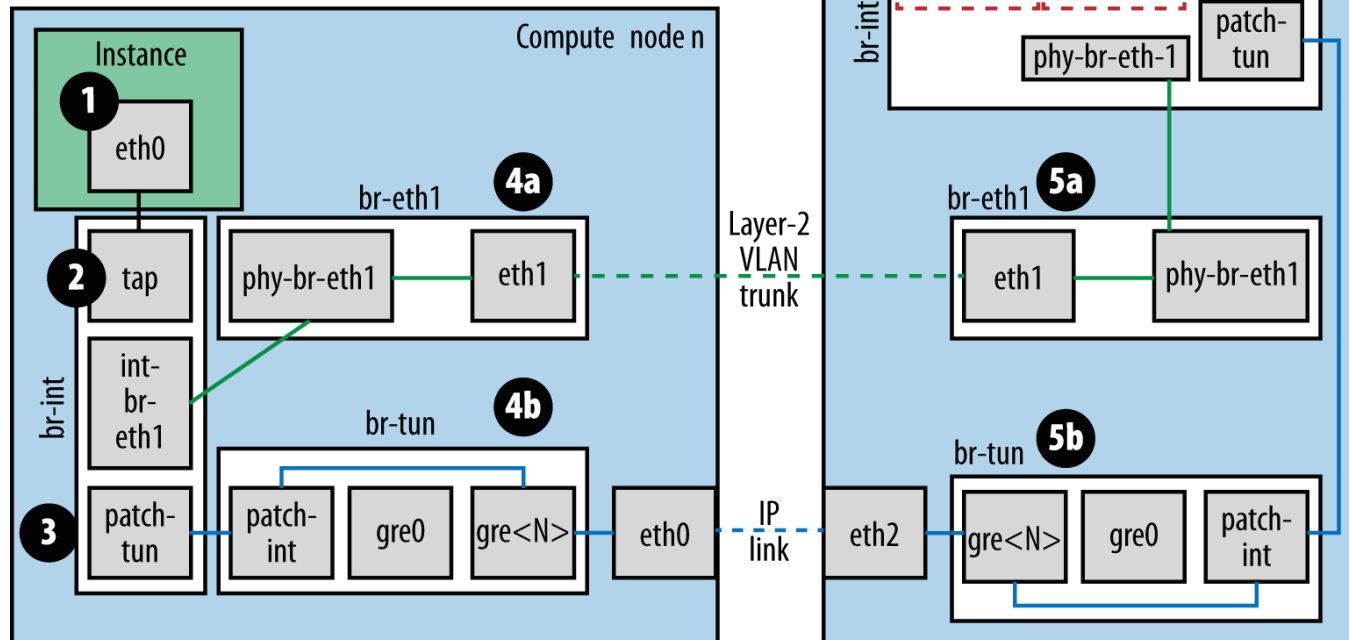
Neutron network paths

- VLAN networks
- GRE networks
- VLAN and GRE networks



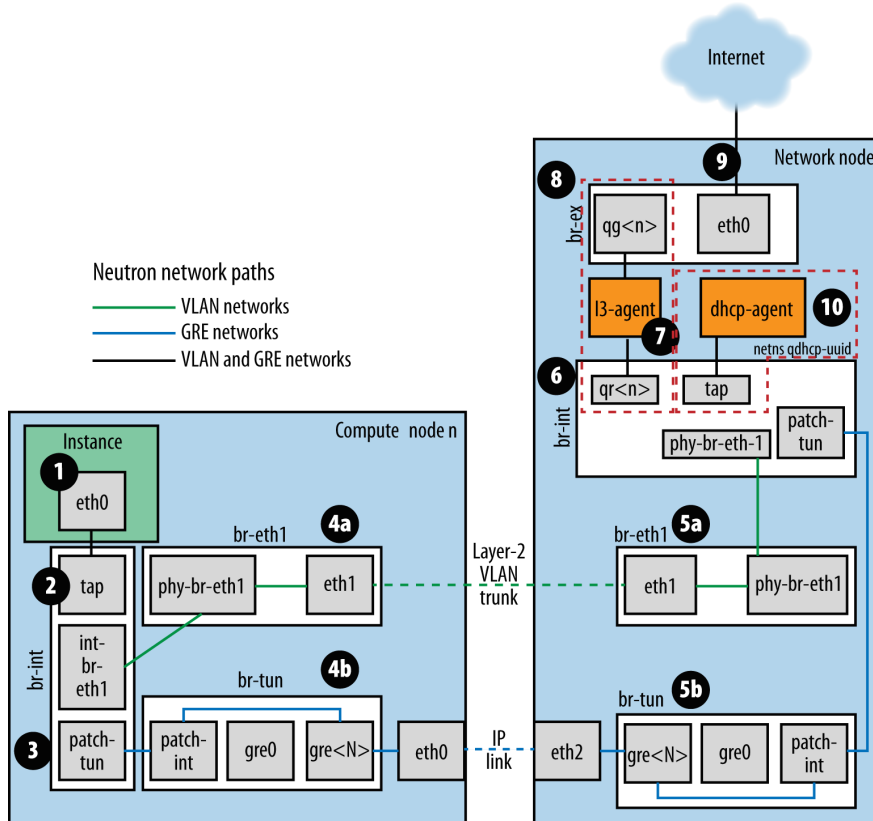
# Configurazione base → GRE

- **br-ex** → connettività con l'interfaccia esterna
- **br-int** → bridge a cui sono connesse le VM
- **br-tun** → bridge per i tunnel GRE





# Configurazione base → GRE

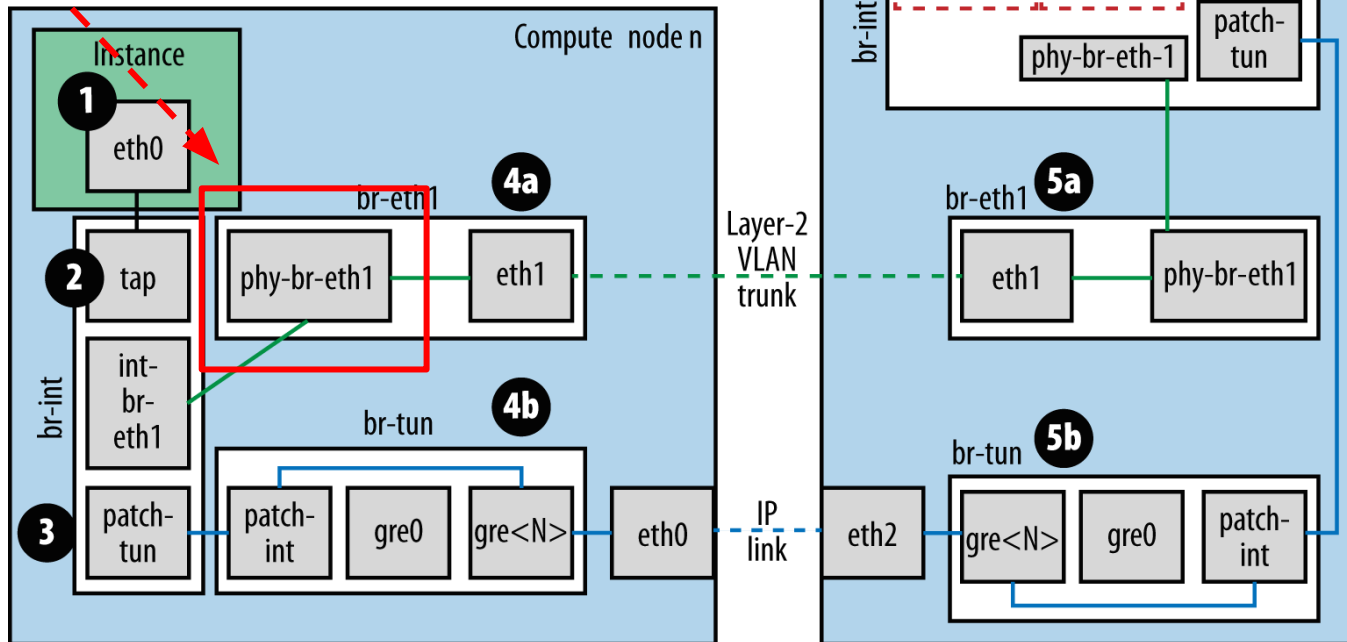


- **br-ex** e **br-int** creati e configurati dall'amministratore
- tutto il resto creato da Neutron
- gestione bridge → Neutron
- gestione interfacce virtuali → Neutron
- gestione patch → Neutron
- struttura trasparente per le VM

semplicità di gestione per il sysadmin

# Bridge per rete pubblica FLAT

- **br-ex** → connettività con l'interfaccia esterna
- **br-int** → bridge a cui sono connesse le VM
- **br-tun** → bridge per i tunnel GRE
- **br-ex2** → bridge per flat public network



# Configurazione Open vSwitch

```
# ovs-vsctl add-br br-ex2  
# ovs-vsctl add-port-br-ex2 eth2  
# ip a add <PUBLIC_IP>/24 dev br-ex2
```

→ creare bridge per rete flat

→ agganciarlo alla seconda interfaccia pubblica

→ assegnargli un IP (opz.)

```
br-ex2  Link encap:Ethernet  HWaddr 00:25:90:48:53:b6  
        inet6 addr: fe80::225:90ff:fe48:53b6/64 Scope:Link  
        UP BROADCAST RUNNING MTU:1500 Metric:1  
        RX packets:2213980434 errors:0 dropped:341451 overruns:0 frame:0  
        TX packets:22333 errors:0 dropped:0 overruns:0 carrier:0  
        collisions:0 txqueuelen:0  
        RX bytes:267676932429 (267.6 GB)  TX bytes:938418 (938.4 KB)  
  
eth2    Link encap:Ethernet  HWaddr 00:25:90:48:53:b6  
        inet6 addr: fe80::225:90ff:fe48:53b6/64 Scope:Link  
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1  
        RX packets:2831396241 errors:0 dropped:0 overruns:125060 frame:0  
        TX packets:68104172 errors:0 dropped:0 overruns:0 carrier:0  
        collisions:0 txqueuelen:1000  
        RX bytes:1157528807093 (1.1 TB)  TX bytes:10196694149 (10.1 GB)  
        Memory:df920000-df940000
```

è possibile configurare  
bridge e interfaccia  
senza IP

# Configurazione interfacce di rete

```
auto eth2
iface eth2 inet manual
up ip address add 0/0 dev $IFACE
up ip link set $IFACE up
down ip link set $IFACE down
```

interfaccia  
pubblica

```
auto br-ex2
iface br-ex2 inet manual
up ip address add 0/0 dev $IFACE
up ip link set $IFACE up
down ip link set $IFACE down
```

bridge

# Configurazione Neutron

configurare `ml2_conf.ini` per flat network, sez. `[ovs]`

```
network_vlan_ranges = physnet1  
bridge_mappings = physnet1:br-ex2
```

e sez. `[ml2_type_flat]`

```
flat_networks = physnet1
```

su network e compute node

specificare nel file `l3_agent.ini` l'ID della rete *external*  
su cui settare i gateway dei virtual router

```
gateway_external_network_id = <EXT_NET_ID>
```

<EXT\_NET\_ID> è l'ID della rete EXT (NON FLAT)

# Creazione rete

```
# neutron net-create \
--tenant-id <ADMIN_TENANT_ID> \
--provider:network_type=flat \
--provider:physical_network=physnet1 \
--shared True \
--router:external True \
public-net
```

→ creare la rete

→ nel tenant **admin**

→ di tipo **flat**

→ collegata alla rete fisica

→ condivisa fra i tenant

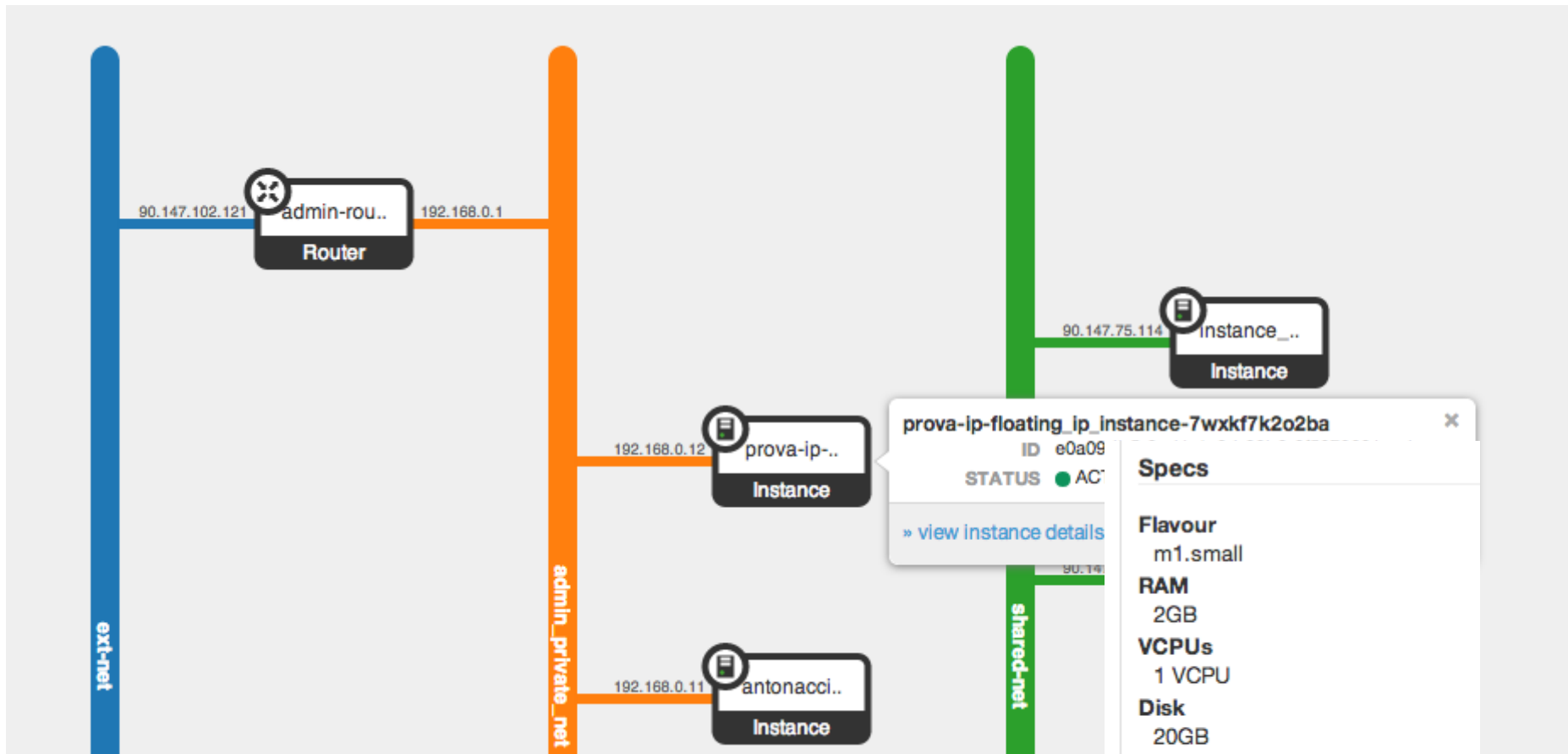
→ con routing esterno

→ di nome **public-net**

creare le subnet, senza dhcp, e settando adeguatamente gateway e DNS

...ready to go...

# Esempio: VM con IP pubblico Floating IP



prova-ip-floating\_ip\_instance-7wxkf7k2o2ba

ID e0a09

STATUS ● ACTIVE

[» view instance details](#)

---

**Specs**

**Flavour**  
m1.small

**RAM**  
2GB

**VCPUs**  
1 VCPU

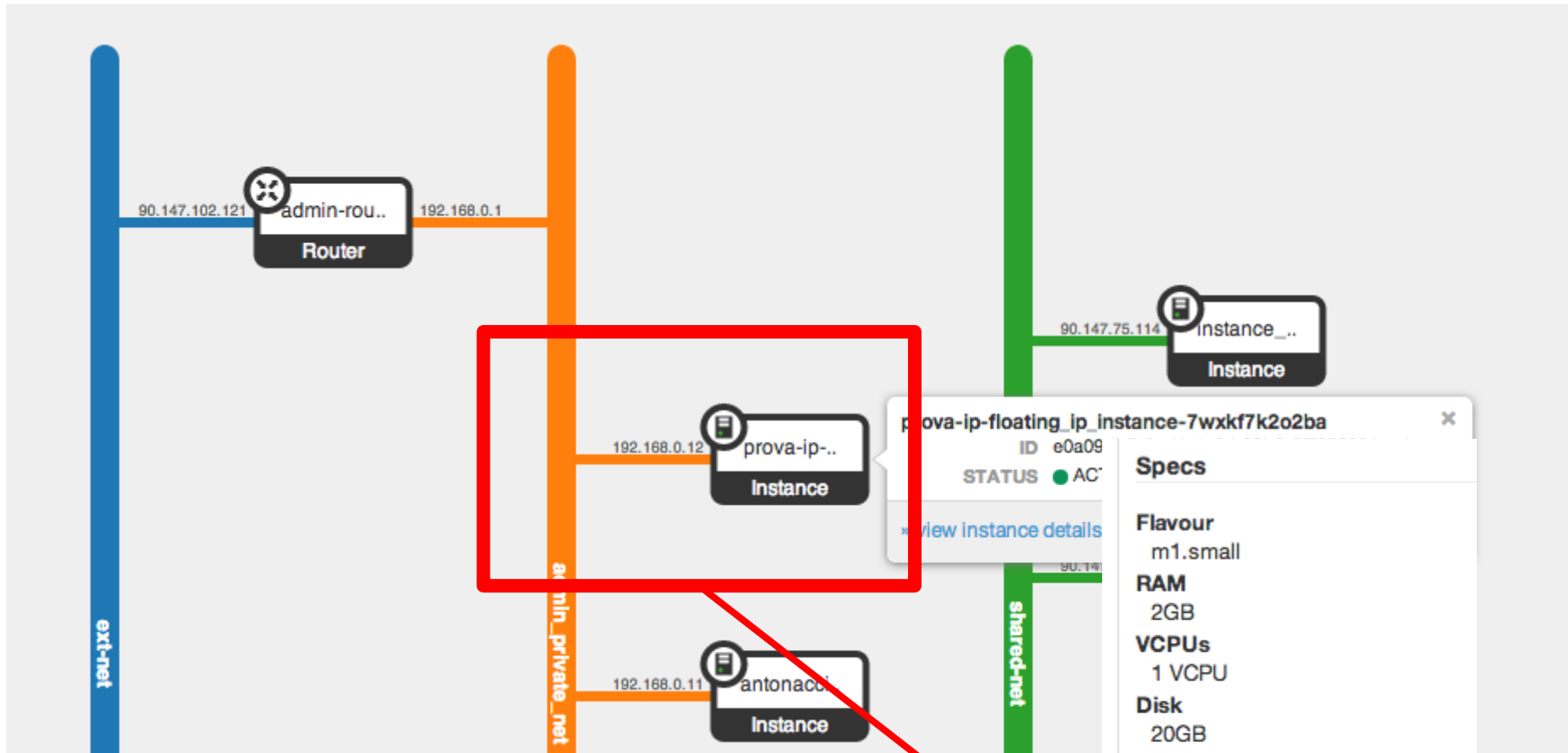
**Disk**  
20GB

---

**IP Addresses**

**Admin\_Private\_Net**  
192.168.0.12, 90.147.102.130

# Esempio: VM con IP pubblico Floating IP



prova-ip-floating\_ip\_instance-7wxkf7k2o2ba

ID e0a09

STATUS ● AC

[view instance details](#)

### Specs

**Flavour**  
m1.small

**RAM**  
2GB

**VCPUs**  
1 VCPU

**Disk**  
20GB

### IP Addresses

**Admin\_Private\_Net**  
192.168.0.12, 90.147.102.130

IP privato **tradotto** dal virtual router



# Esempio: VM con IP pubblico Flat Network

The screenshot displays the OpenStack dashboard interface. On the left, a vertical green bar is labeled "public-net". Below it, two VM instances are listed: "sharelate.." with IP address 90.147.102.200 and "elephant" with IP address 90.147.102.178. A tooltip for the "sharelate.." instance shows its ID as 07446c65-9759-49 and its status as ACTIVE. On the right, a "Specs" panel is open, showing the configuration for the selected instance: Flavour (2cpu-4GB-20dsk), RAM (4GB), VCPUs (2 VCPU), and Disk (20GB). Below the specs, the "IP Addresses" section shows the instance is connected to the "Public-Net" with the IP address 90.147.102.200.

**public-net**

90.147.102.200 sharelate.. Instance

90.147.102.178 elephant

**sharelate..**  
ID 07446c65-9759-49  
STATUS ● ACTIVE

» view instance details » open console

**Specs**

**Flavour**  
2cpu-4GB-20dsk

**RAM**  
4GB

**VCPUs**  
2 VCPU

**Disk**  
20GB

**IP Addresses**

**Public-Net**  
90.147.102.200

# Esempio: VM con IP pubblico Flat Network

The image shows a screenshot of an OpenStack dashboard. On the left, a green vertical bar is labeled "public-net". Below it, a table lists VM instances. One instance, "sharelate..", is highlighted with a red box. A red arrow points from this instance to a detailed view on the right. The detailed view shows the instance name "sharelatex", its ID "07446c65-9759-49...", and its status "ACTIVE". Below this, there are links for "view instance details" and "open console". To the right of the instance details is a "Specs" panel showing the VM's configuration: "Flavour" (2cpu-4GB-20dsk), "RAM" (4GB), "VCPUs" (2 VCPU), and "Disk" (20GB). Below the specs is an "IP Addresses" panel, also highlighted with a red box, showing a "Public-Net" with the IP address "90.147.102.200".

Instance Name	IP Address
sharelate..	90.147.102.200
elephant	90.147.102.178

**Instance Details:**

- Instance Name: sharelatex
- ID: 07446c65-9759-49...
- Status: ACTIVE

**Specs:**

- Flavour: 2cpu-4GB-20dsk
- RAM: 4GB
- VCPUs: 2 VCPU
- Disk: 20GB

**IP Addresses:**

- Public-Net: 90.147.102.200

# Esempio: VM con IP pubblico Flat Network

public-net

90.147.102.200

sharelate.. Instance

sharelatex ID 07446c65-9759-49 STATUS ● ACTIVE

» view instance details » open console

Specs

Flavour 2cpu-4GB-20dsk

RAM 4GB

VCPUs 2 VCPU

Disk 20GB

IP Addresses

Public-Net 90.147.102.200

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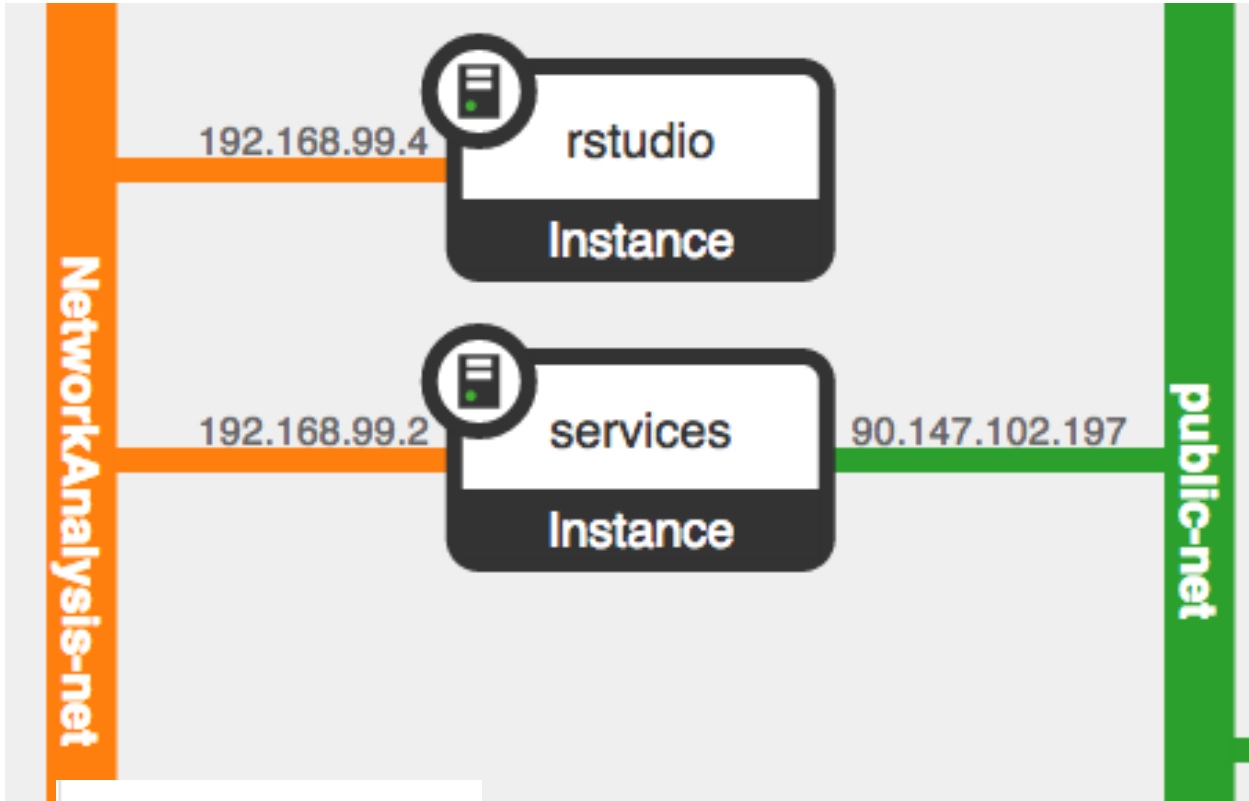
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INFN - Sezione di Bari PRISMA Project

# Use-case: VM con IP pubblico e privato



## IP Addresses

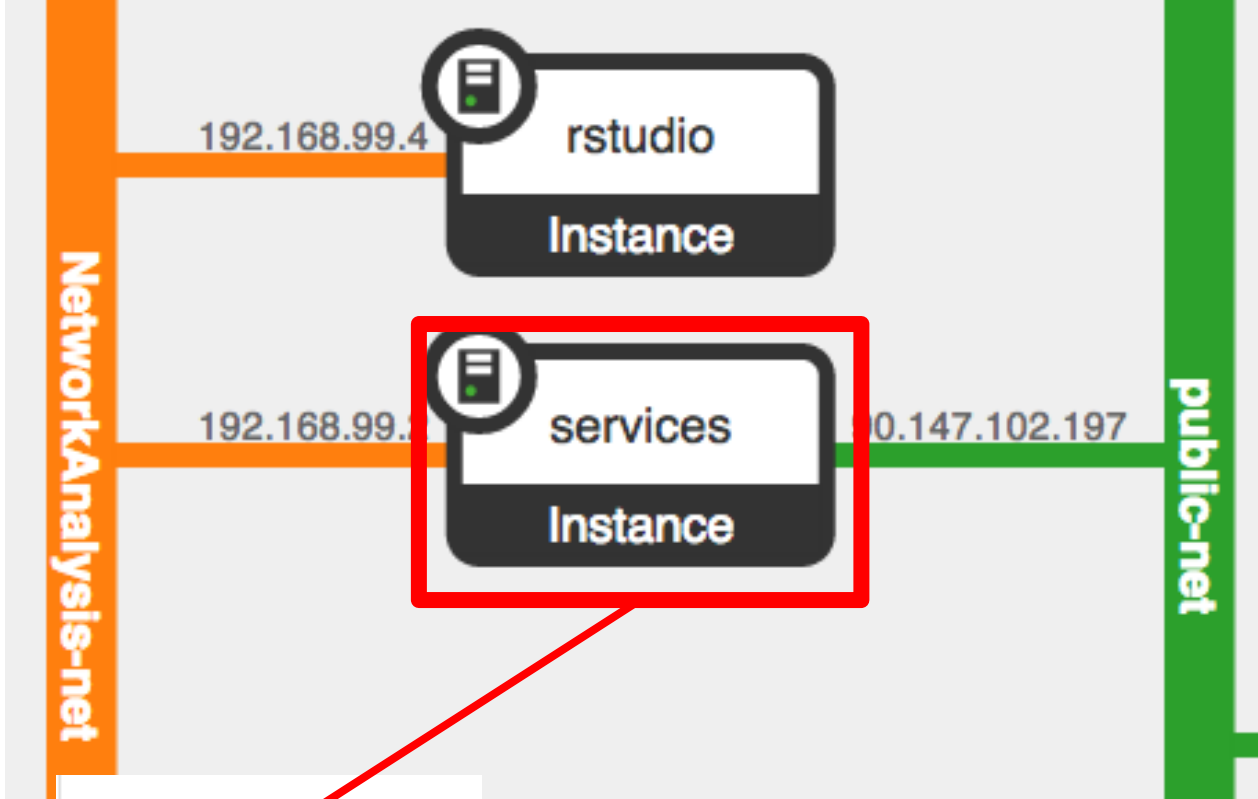
### Networkanalysis-Net

192.168.99.2

### Public-Net

90.147.102.197

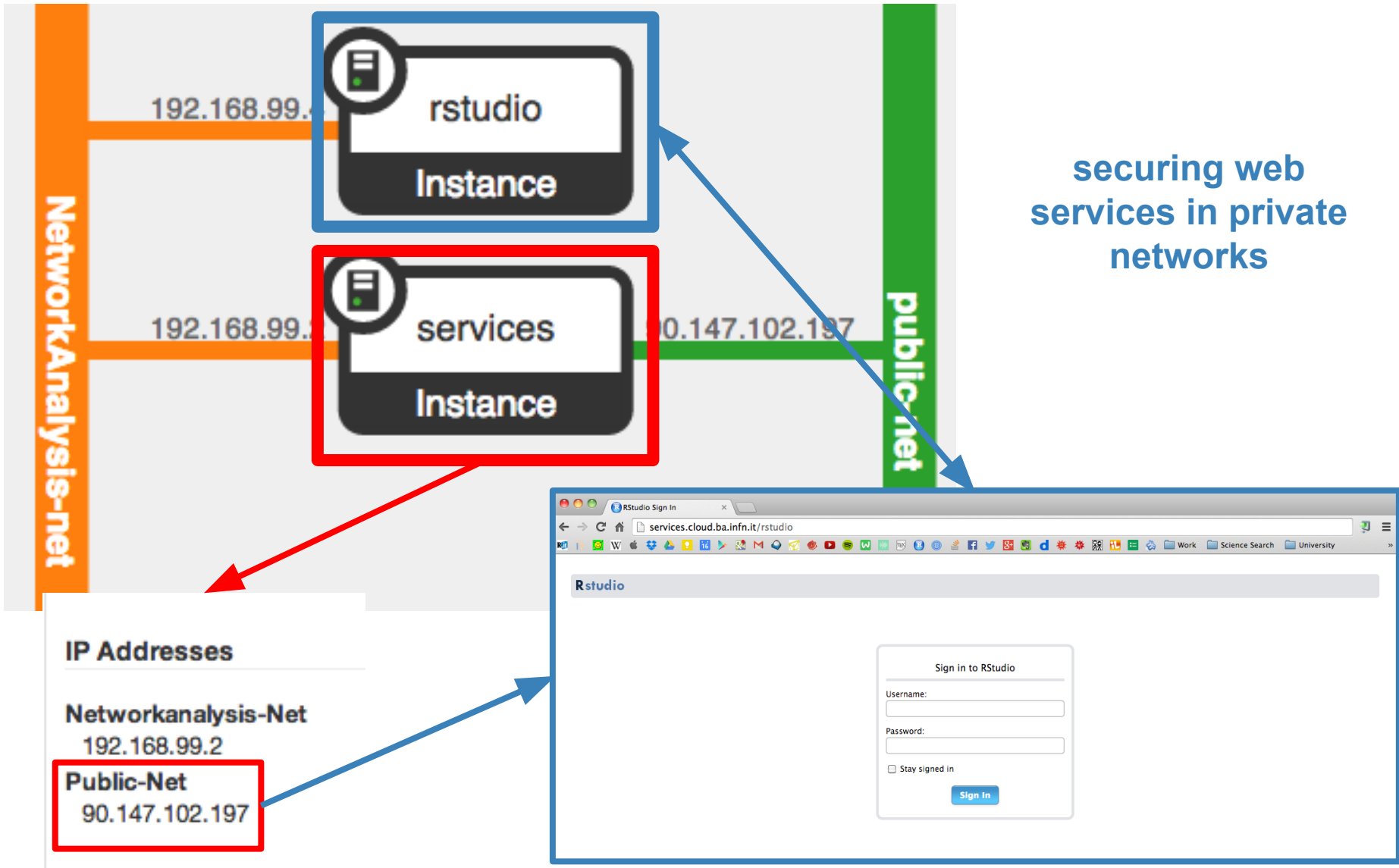
# Use-case: VM con IP pubblico e privato



IP Addresses

Networkanalysis-Net	192.168.99.2
Public-Net	90.147.102.197

# Use-case: VM con IP pubblico e privato



# Altri possibili use-case e osservazioni

- Router più “sostanziosi”
- Ripartizione di servizi su sottoreti differenti (e.g. database, web server, ecc.)
- Gestione di topologie di rete complesse con infrastrutture semplici
- ...

# Guida per la configurazione

<https://github.com/inf-n-bari-school/public-network/wiki>



**LBaaS**

**Load Balancer as a Service**

# Load Balancing in OpenStack

## Neutron fornisce un servizio built-in di load balancing per le VM di un tenant

- protocolli: TCP, HTTP, HTTPS, ...
- metodi: round robin, least connections, source IP, ...
- health monitor: TCP, HTTP, HTTPS, PING, ...
- maggiore scalabilità
- maggiore affidabilità
- built-in → facilità di gestione per l'utente IaaS

# Use-case: 3 server HTTP

**Server A**  
**IP: 8.8.8.10**

**Server C**  
**IP: 8.8.8.12**

**Server B**  
**IP: 8.8.8.11**

# Use-case: 3 server HTTP

pool → insieme di dispositivi raggruppati per bilanciare il traffico

Server A  
IP: 8.8.8.10  
member

Server C  
IP: 8.8.8.12  
member

Server B  
IP: 8.8.8.11  
member

# Use-case: 3 server HTTP

pool → insieme di dispositivi raggruppati per bilanciare il traffico

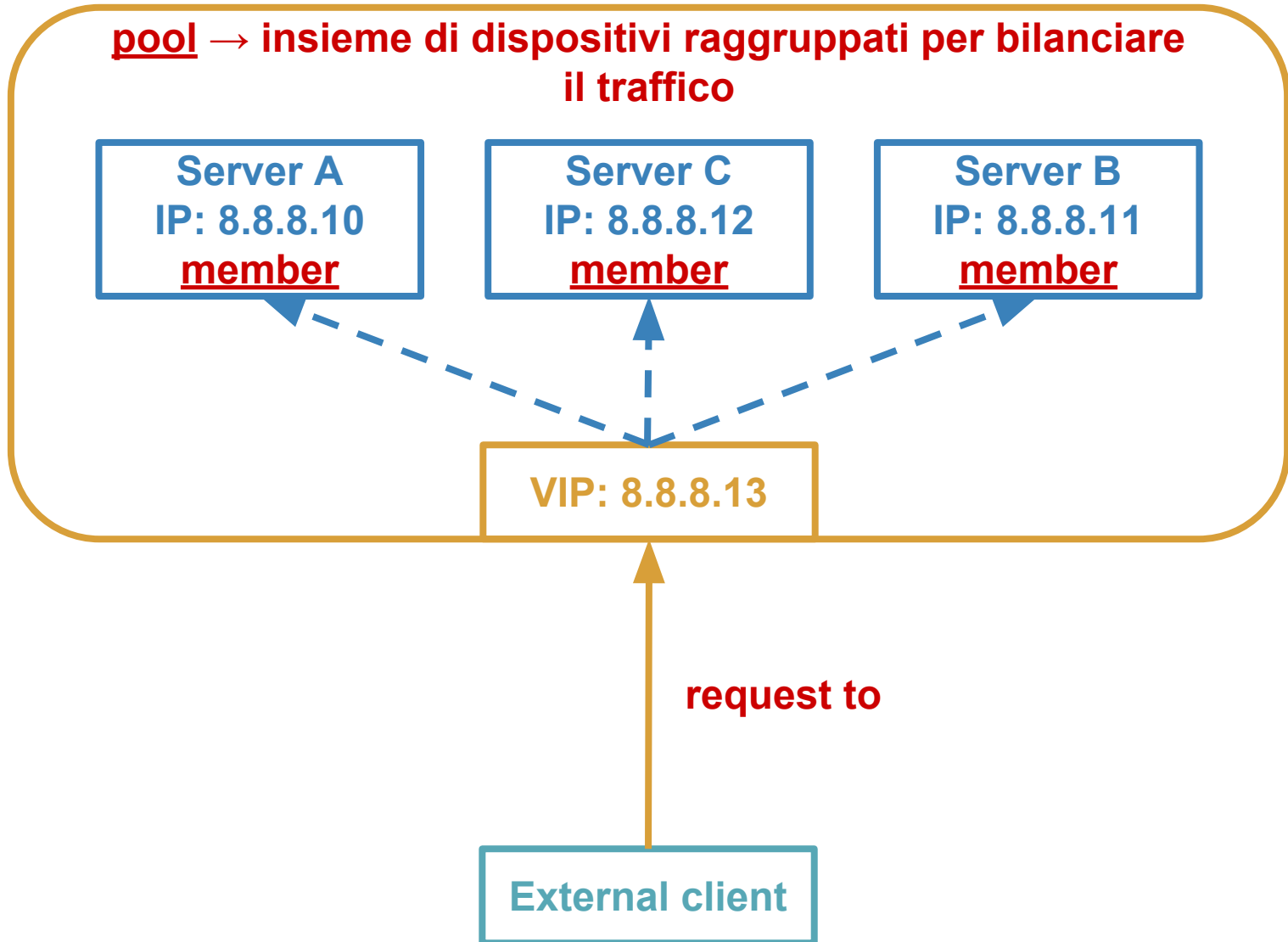
Server A  
IP: 8.8.8.10  
member

Server C  
IP: 8.8.8.12  
member

Server B  
IP: 8.8.8.11  
member

VIP: 8.8.8.13

# Use-case: 3 server HTTP



# Installazione e configurazione

installare l'agente

```
# apt-get install neutron-lbaas-agent
```

configurare il file `/etc/neutron/lbaas-agent.ini` (HAProxy)

```
interface_driver = neutron.agent.linux.interface.OVSInterfaceDriver
device_driver = neutron.services.loadbalancer.drivers.haproxy.
namespace_driver.HaproxyNSDriver
```

configurare il file `/etc/neutron/neutron.conf`

```
service_plugins = neutron.services.loadbalancer.plugin.LoadBalancerPlugin
```

# Installazione e configurazione

abilitare il servizio nella dashboard (/etc/openstack-dashboard/local\_settings)

```
'enable_lb' : True
```

far ripartire i servizi

```
# service neutron-server restart  
# service neutron-lbaas-agent restart  
# service apache2 restart
```



# GUI - Esempi

The screenshot shows the OpenStack GUI interface for managing Load Balancers. The main content area is titled 'Load Balancer' and includes tabs for 'Pools', 'Members', and 'Monitors'. The 'Pools' tab is active, displaying a table with columns: Name, Description, Provider, Subnet, Protocol, VIP, and Actions. The table is currently empty, with the message 'No items to display.' and 'Displaying 0 items'. A red box highlights the '+ Add Pool' button in the top right corner of the table area. A red arrow points from a box containing the text 'creare un pool' to this button.

openstack  
DASHBOARD

Project Admin

CURRENT PROJECT  
admin

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots
- Access & Security

Manage Network

- Network Topology
- Networks
- Routers
- Load Balancers
- VPN

Load Balancer

Logged in as: admin Settings Help Sign Out

Pools Members Monitors

Pools

Name	Description	Provider	Subnet	Protocol	VIP	Actions
No items to display.						
Displaying 0 items						

+ Add Pool

creare un pool

# GUI - Esempi

Load Balancer Logged in as: admin [Settings](#) [Help](#)

Pools [Members](#) [M...](#)

## Pools

Displaying 0 items

[+ Add Pool](#)

Name	VIP	Actions
------	-----	---------

### Add Pool ✕

**Name \***

**Description**

**Provider**

**Subnet \***

**Protocol \***

**Load Balancing Method \***

**Admin State**

Create Pool for current project.

Assign a name and description for the pool. Choose one subnet where all members of this pool must be on. Select the protocol and load balancing method for this pool. Admin State is UP (checked) by default.

# GUI - Esempi

## Load Balancer

Logged in as: admin [Settings](#) [Help](#) [Sign Out](#)

Pools [Members](#) [Monitors](#)

### Pools

[+ Add Pool](#)

[Delete Pools](#)

<input type="checkbox"/>	Name	Description	Provider	Subnet	Protocol	VIP	Actions
<input type="checkbox"/>	<a href="#">try-LBaaS</a>		haproxy	192.168.0.0/24	HTTPS	-	<a href="#">Edit Pool</a> <a href="#">More</a> <a href="#">Add VIP</a> <a href="#">Delete Pool</a>

Displaying 1 item

**creare un VIP**

# GUI - Esempi

## Add VIP ✕

Specify VIP \*

**Name \***  
try-VIP

**Description**  
Additional information here...

**VIP Address from Floating IPs**  
Currently Not Supported

**Specify a free IP address from 192.168.0.0/24**  
192.168.0.137

**Protocol Port \***  
65432

**Protocol \***  
HTTPS

**Session Persistence**  
HTTP\_COOKIE

**Cookie Name**

**Connection Limit \***  
-1

**Admin State**

Cancel Add

Create a VIP for this pool. Assign a name and description for the VIP. Specify an IP address and port for the VIP. Choose the protocol and session persistence method for the VIP. Specify the max connections allowed. Admin State is UP (checked) by default.

# GUI - Esempi

## Add VIP ✕

Specify VIP \*

**Name \***  
try-VIP

**Description**  
Additional information here...

**VIP Address from Floating IPs**  
Currently Not Supported

**Specify a free IP address from 192.168.0.0/24**  
192.168.0.137

**Protocol Port \***  
65432

**Protocol \***  
HTTPS

**Session Persistence**  
HTTP\_COOKIE

**Cookie Name**


**Connection Limit \***  
-1

**Admin State**

Cancel Add

Create a VIP for this pool. Assign a name and description for the VIP. Specify an IP address and port for the VIP. Choose the protocol and session persistence method for the VIP. Specify the max connections allowed. Admin State is UP (checked) by default.

# GUI - Esempi



**openstack**  
DASHBOARD

Project Admin

CURRENT PROJECT  
**admin**

Manage Compute

Overview

## Load Balancer

Logged in as: admin [Settings](#) [Help](#) [Sign Out](#)

Pools **Members** Monitors

### Pools


[+ Add Pool](#)

[Delete Pools](#)

<input type="checkbox"/>	Name	Description	Provider	Subnet	Protocol	VIP	Actions
<input type="checkbox"/>	try-LBaaS		haproxy	192.168.0.0/24	HTTPS	try-VIP	<a href="#">Edit Pool</a> <a href="#">More</a>

Displaying 1 item

**creare un member**



**openstack**  
DASHBOARD

Project Admin

CURRENT PROJECT  
**admin**

Manage Compute

Overview

## Load Balancer

Logged in as: admin [Settings](#) [Help](#) [Sign Out](#)

Pools **Members** Monitors

### Members

[+ Add Member](#)

	IP Address	Protocol Port	Pool	Actions
No items to display.				

Displaying 0 items

# GUI - Esempi

## Add Member ✕

Add New Member \*

**Pool \***  
try-LBaaS

**Member(s) \***

- antonaccci-vm
- au-e\_group-ozu3mzwffabr-instance\_group-0-yo2vcujjutvb
- heat-prova
- instance\_with\_volume
- marica-1
- marica-test
- prova-ip-floating\_ip\_instance-7wxkf7k2o2ba

**Weight \***  
3

**Protocol Port \***  
65432

**Admin State**

Add member to selected pool.  
Choose one or more listed instances to be added to the pool as member(s). Assign a numeric weight for this member. Specify the port number the member(s) operate on; e.g., 80.

Cancel Add

**... and so on ...**



# Guida per l'installazione e la configurazione

<https://github.com/inf-n-bari-school/LoadBalancer-as-a-Service/wiki>

**GRAZIE PER  
L'ATTENZIONE**