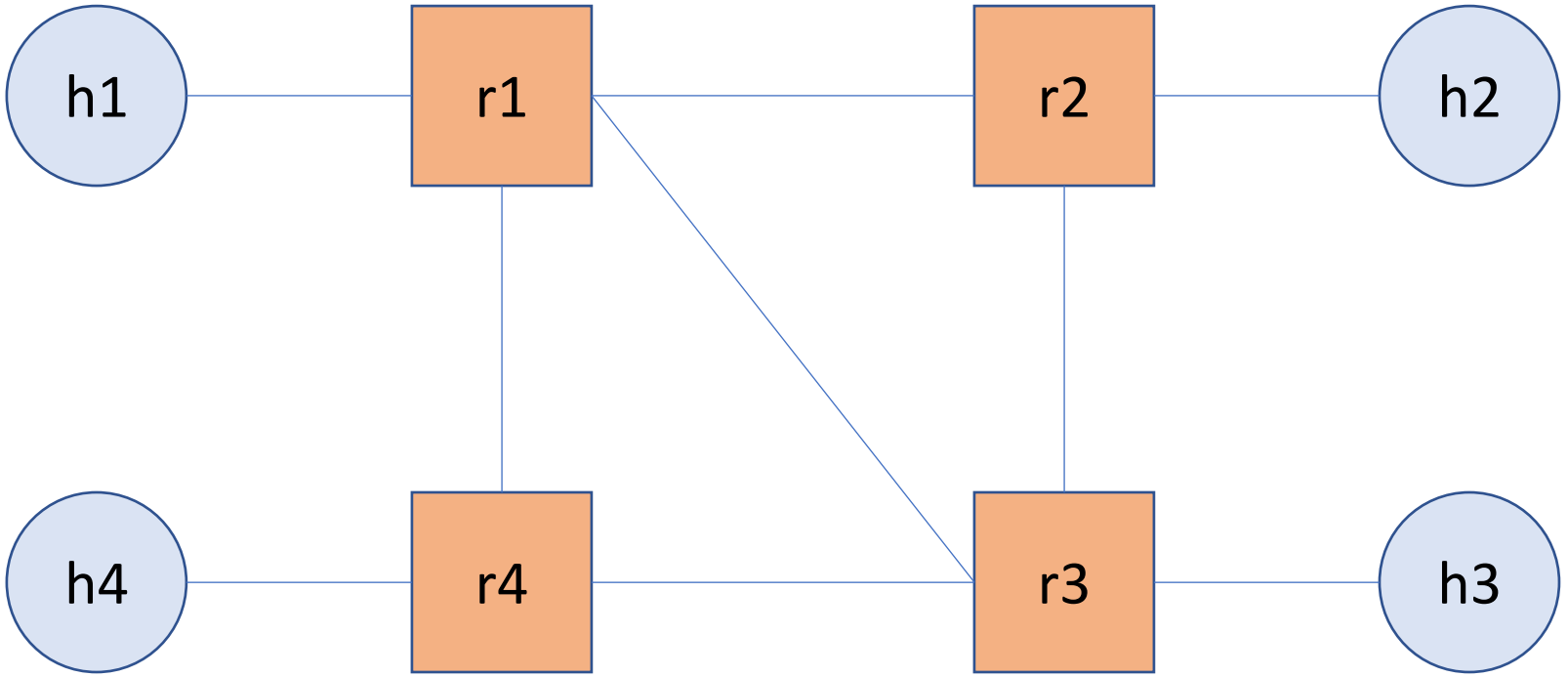
Lab 7

Build a Simple IP Network



Build a Simple IP Network

- Create the topology
- Configure static routes
- Explore simple commands
- Show the impact of segment failure

Dest. Prefix	Next Hop
a.b.c.d/24	r.x.y.z.
…	…
…	…

Using `ipmininet`

- An emulation tool to experiment with IPv4 and IPv6 networks
- Built on top of `mininet`; an SDN emulation tool

- These tools enable you to:
  - Create various components: routers, hosts, and links
  - Control link bandwidth and delay
  - Create subnets
  - Run various routing protocols
  - …

on a single machine using simple APIs!

Installation

- Vagrant (Recommended)

```
$ cd <WORK_DIR>
$ vagrant init ipmininet/ubuntu-18.04
$ vagrant up
$ vagrant ssh
```

- Manual
  - time consuming and may break dependencies

- Both are OK for the lab

Vagrant Installation

- Create a VirtualBox VM
- Can be accessed through ssh
- A shared directory is created at:
  - Host: <WORK_DIR>
  - Guest: /vagrant

- So, you don’t need to write code inside the VM.

`ipmininet`

- Hosts and routers are processes
- Routers using existing software tools such as FRR (`zebra, ospfd, ospf6d, bgpd, staticd`)
  - These daemons run “inside” the routers!

- You control them by simple APIs

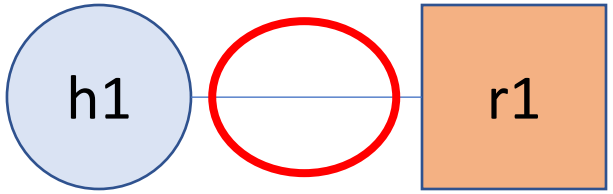
APIs: Overview

- Main class called `IPTopo`
  - To create a new topology, you inherit from that class
  - E.g., `class MyNewTopo(IPTopo)`

- To build the actual topology, you override the `build` function
- You can add:
  - routers: `addRouter, addRouters`
  - links: `addLinks, addLink`
  - host: `addHost`
  - subnet: `addSubnet`
  - daemon: `addDaemon`

APIs: Subnets

```
self.addSubnet(nodes=[…], subnets=[…])
```



APIs: Daemons

- Run specific routing daemons and configure them!
- If you need to run BGP, you need to configure bgpd
  - https://ipmininet.readthedocs.io/en/v0.9/daemons.html
- In our lab, we need to install static routes
  - Run `staticd`
  - Configure static_routes list
    - Each item is a StaticRoute object
      - StaticRoute defines destination prefix and next hop!
  - https://ipmininet.readthedocs.io/en/v0.9/addressing.html#static-routing

Command Line

- Run your program using `sudo`
- Will open a new prompt

```
mininet>
```

- Explore available commands using `help`

Questions?