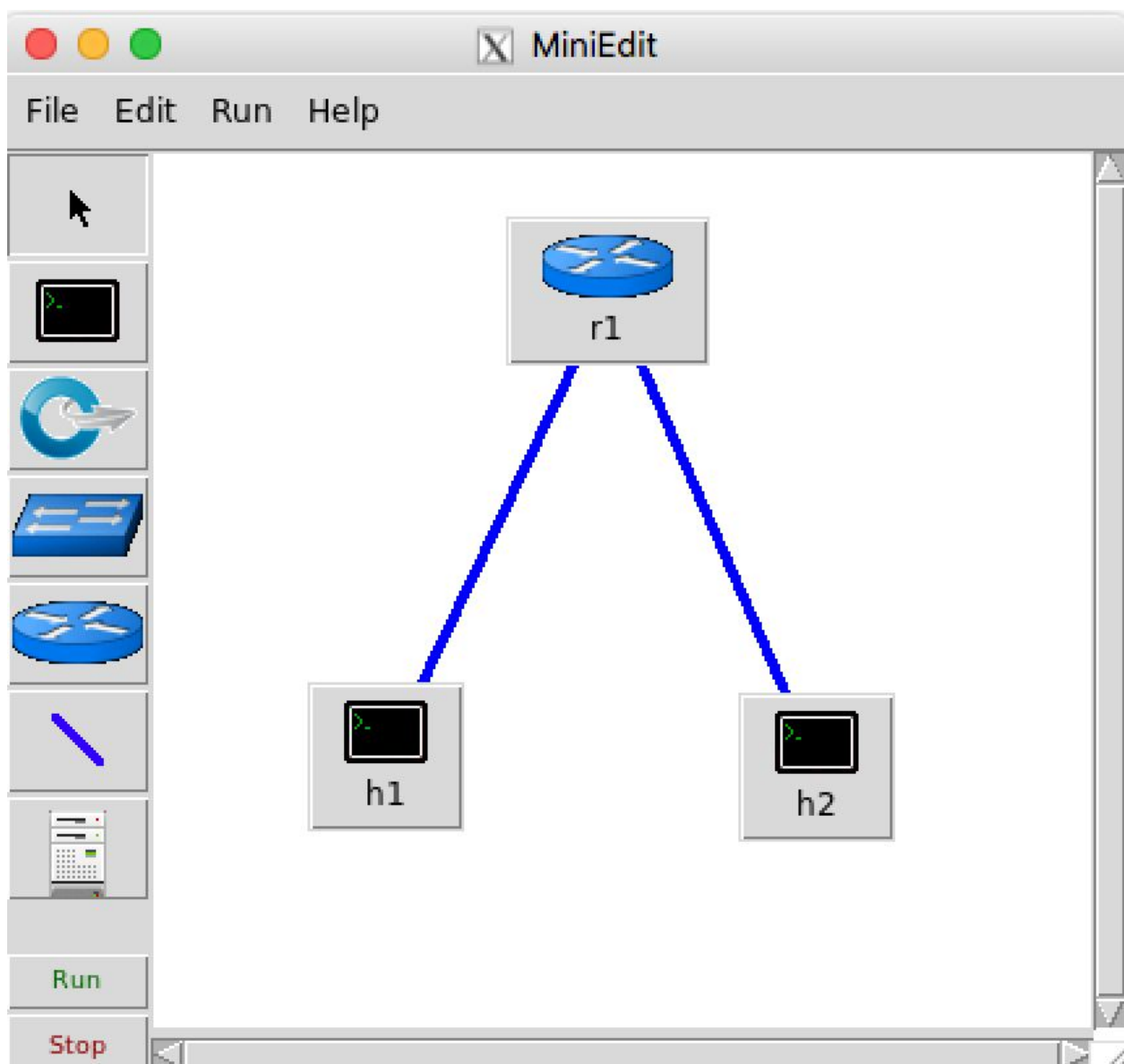


**CST 311**  
**Instructor: Michael McCann**  
**Lab 3: Subnet addressing in Mininet**

In this assignment you will start with Python code that builds a 2 host network connected by a legacy router. You will modify it such that the two hosts can send packets to each other. It requires that you understand subnet addressing and the function of a router.

The network built using Miniedit on a Mininet virtual machine:

```
python mininet/examples/miniedit.py
```



The code generated by exporting it as a Level 2 Script: (unused imports and code added by Miniedit have been removed):

```
#!/usr/bin/python

from mininet.net import Mininet
from mininet.node import Host, Node
from mininet.cli import CLI
from mininet.log import setLogLevel, info

def myNetwork():

    net = Mininet( topo=None,
                  build=False,
                  ipBase='10.0.0.0/8')

    info( '*** Adding controller\n' )
    info( '*** Add switches\n' )
    r1 = net.addHost('r1', cls=Node, ip='0.0.0.0')
    r1.cmd('sysctl -w net.ipv4.ip_forward=1')

    info( '*** Add hosts\n' )
    h2 = net.addHost('h2', cls=Host, ip='10.0.0.2', defaultRoute=None)
    h1 = net.addHost('h1', cls=Host, ip='10.0.0.1', defaultRoute=None)

    info( '*** Add links\n' )
    net.addLink(h1, r1)
    net.addLink(h2, r1)

    info( '*** Starting network\n' )
    net.build()

    CLI(net)
    net.stop()

if __name__ == '__main__':
    setLogLevel( 'info' )
    myNetwork()
```

Executing this code and trying a ping results in “Destination Host Unreachable”:

```
mininet@mininet-vm:~$ sudo python legacy_router.py
*** Adding controller
*** Add switches
*** Add hosts
*** Add links
*** Starting network
*** Configuring hosts
r1 h2 h1
*** Starting CLI:
mininet> h1 ping h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
From 10.0.0.1 icmp_seq=1 Destination Host Unreachable
From 10.0.0.1 icmp_seq=2 Destination Host Unreachable
From 10.0.0.1 icmp_seq=3 Destination Host Unreachable
```

Your task is to modify this program (perhaps using different IP addresses) such that the legacy router is able to forward packets between the two hosts. You will need to understand Internet addressing, subnets, and the function of a router as described in the “IPv4 Addressing” Section of Kurose and Ross (4.3.3 in 7th Edition, 4.4.2 in 6th Edition). You may also find the example Python programs in `mininet/examples` helpful.

As you modify the program commit those changes using the ‘git’ version control software – use meaningful commit messages. Before committing and modifying the above program initialize your local repository with your name, e.g.:

```
git init
git config user.name "Jane Student"
```

### What to turn in:

1. Screen capture of successful ‘h1 ping h2’ and ‘h2 ping h1’ commands at the mininet> prompt.
2. Output of ‘git log’ command, showing changes you made to the program above.
3. Answers to these questions:
  - a. Why didn’t the original program forward packets between the hosts?
  - b. Is the line ‘r1.cmd(‘sysctl -w net.ipv4.ip\_forward=1’)’ required?
  - c. Intentionally break your working program, e.g.: change a subnet length, IP address, or default route for a host. Explain why your change caused the network to break.