Using Netkit, implement the network depicted in the figure and described below.

- Routing within AS3 is implemented by using OSPF, with the following setup:
  - All the routers belong to the backbone area.
  - BGP is redistributed into OSPF
    (note: enabling redistribution automatically injects into OSPF only routes learned from E-BGP).
  - Interface eth1 of as3r3 is assigned the indicated cost.

- The BGP configuration is as follows:
  - Border routers within AS3 establish I-BGP peerings with each other
    (remember to establish the peerings between interfaces that are consistent with the internal routing of AS3).
  - All peering LANs are announced in BGP. Routers do not filter any updates. No routers announce the default route.
  - AS1’s and AS2’s border routers also announce their own subnet, as an aggregated prefix indicated in the gray box.
  - as1r1 sets the indicated Multi Exit Discriminator (MED) value on outgoing updates.
  - as2r1 sets the indicated local preference value on incoming updates.

- **Warning**: it may take several minutes (up to 5) for the peerings to be established and for the routing protocols to converge, even if the configuration is correct!

**Goals**: All BGP peerings as well as OSPF routing must operate correctly.

- Packets from as2r1 to 1.0.0.1 must traverse routers as3r4, as3r3, as3r2, and as3r1.
- Internal routers of AS3 do not need to be visible from outside the AS.
Using Netkit, implement the network depicted in the figure and described below.

- **Routing within AS200** is implemented by using OSPF, with the following setup:
  - All the routers belong to the backbone area.
  - BGP is redistributed into OSPF
    (note: enabling redistribution automatically injects into OSPF only routes learned from E-BGP).
  - Interface eth2 of as200r1 is assigned the indicated cost.
- The BGP configuration is as follows:
  - Border routers within AS200 establish I-BGP peerings with each other
    (remember to establish the peerings between interfaces that are consistent with the internal routing of AS200).
  - All peering LANs are announced in BGP. Routers do not filter any updates. No routers announce the default route.
  - as100r1 sets the indicated Multi Exit Discriminator (MED) value on outgoing updates.
  - as300r1 sets the indicated local preference value on incoming updates.
- **Warning**: it may take several minutes (up to 5) for the peerings to be established and for the routing protocols to converge, even if the configuration is correct!

**Goals:**

All BGP peerings as well as OSPF routing must operate correctly.
Packets from as300r1 to 100.0.0.1 must traverse routers as200r4, as200r1, as200r3, and as200r2.
Internal routers of AS200 do not need to be visible from outside the AS.
Using Netkit, implement the network depicted in the figure and described below.

- Routing within AS20 is implemented by using OSPF, with the following setup:
  - All the routers belong to the backbone area.
  - BGP is redistributed into OSPF
    (note: enabling redistribution automatically injects into OSPF only routes learned from E-BGP).
  - Interface eth1 of as20r2 is assigned the indicated cost.
- The BGP configuration is as follows:
  - Border routers within AS20 establish I-BGP peerings with each other (remember to establish the peerings between interfaces that are consistent with the internal routing of AS20; in particular, use the IP address of as20r2’s eth0 interface for the peering between as20r2 and as20r3).
  - All peering LANs are announced in BGP. Routers do not filter any updates. No routers announce the default route.
  - AS10’s and AS30’s border routers also announce their own subnet, as an aggregated prefix indicated in the gray box.
  - as30r1 sets the indicated Multi Exit Discriminator (MED) value on outgoing updates.
  - as10r1 sets the indicated local preference value on incoming updates.
- Warning: it may take several minutes (up to 5) for the peerings to be established and for the routing protocols to converge, even if the configuration is correct!

Goals: All BGP peerings as well as OSPF routing must operate correctly.
Packets from as10r1 to 30.0.0.1 must traverse routers as20r2, as20r1, as20r4, and as20r3.
Internal routers of AS20 do not need to be visible from outside the AS.
Using Netkit, implement the network depicted in the figure and described below.

- Routing within AS12 is implemented by using OSPF, with the following setup:
  - All the routers belong to the backbone area.
  - BGP is redistributed into OSPF
    (note: enabling redistribution automatically injects into OSPF only routes learned from E-BGP).
  - Interface eth0 of as12r2 is assigned the indicated cost.

- The BGP configuration is as follows:
  - Border routers within AS12 establish I-BGP peerings with each other (remember to establish the peerings between interfaces that are consistent with the internal routing of AS12; in particular, use the IP address of as12r2's eth1 interface for all the peerings with as12r2).
  - All peering LANs are announced in BGP. Routers do not filter any updates. No routers announce the default route.
  - AS1's and AS2's border routers also announce their own subnet, as an aggregated prefix indicated in the gray box.
  - as1r1 sets the indicated Multi Exit Discriminator (MED) value on outgoing updates.
  - as2r1 sets the indicated local preference value on incoming updates.

- **Warning**: it may take several minutes (up to 5) for the peerings to be established and for the routing protocols to converge, even if the configuration is correct!

**Goals**: All BGP peerings as well as OSPF routing must operate correctly.
Packets from as2r1 to 1.0.0.1 must traverse routers as12r2, as12r3, as12r4, and as12r1.
Internal routers of AS12 do not need to be visible from outside the AS.