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MATRÍCULA: 2043 - 1932

- Com uso de linha de comando padrão do Mininet, crie a topologia considerando o endereço MAC padronizado, larguras de banda bw de 30 Mbps e controlador do Mininet (não precisa especificar);

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mininet@mininet-vms:~$ sudo mn --topotree,depth=3,fanout=5 --mac --link=tc,bw=30
*** Creating network
*** Adding controller
c1
*** Starting controller
c1
*** Adding links
t1 s1 s2 s3 s4 s5 s6 s7 s8 s9 s10 s11 s12 s13 s14 s15 s16 s17 s18 s19 s20 s21 s22 s23 s24 s25 s26 s27 s28 s29 s30 s31
*** Starting network
t1 s1 s2 (30.00Mbit) (s1, s2) (30.00Mbit) (s1, s3) (30.00Mbit) (s1, s4) (30.00Mbit) (30.00Mbit) (s1, s26) (30.00Mbit) (30.00Mbit) (s2, s3) (30.00Mbit) (30.00Mbit) (s2, s4) (30.00Mbit) (30.00Mbit) (s2, s5) (30.00Mbit) (30.00Mbit) (s2, s6) (30.00Mbit) (30.00Mbit) (s2, s7) (30.00Mbit) (30.00Mbit) (s3, h1) (30.00Mbit) (s3, h2) (30.00Mbit) (s3, h3) (30.00Mbit) (30.00Mbit) (s3, h4) (30.00Mbit) (30.00Mbit) (s3, h5) (30.00Mbit) (30.00Mbit) (s4, h6) (30.00Mbit) (30.00Mbit) (s4, h7) (30.00Mbit) (s4, h8) (30.00Mbit) (s4, h9) (30.00Mbit) (s4, h10) (30.00Mbit) (s4, h11) (30.00Mbit) (s4, h12) (30.00Mbit) (s5, h13) (30.00Mbit) (30.00Mbit) (s5, h14) (30.00Mbit) (30.00Mbit) (s5, h15) (30.00Mbit) (30.00Mbit) (s6, h16) (30.00Mbit) (30.00Mbit) (s6, h17) (30.00Mbit) (30.00Mbit) (s6, h18) (30.00Mbit) (30.00Mbit) (s6, h19) (30.00Mbit) (30.00Mbit) (s6, h20) (30.00Mbit) (30.00Mbit) (s6, h21) (30.00Mbit) (30.00Mbit) (s7, h22) (30.00Mbit) (30.00Mbit) (s7, h23) (30.00Mbit) (30.00Mbit) (s7, h24) (30.00Mbit) (30.00Mbit) (s7, h25) (30.00Mbit) (30.00Mbit) (s8, s9) (30.00Mbit) (30.00Mbit) (s8, s10) (30.00Mbit) (30.00Mbit) (s8, s11) (30.00Mbit) (30.00Mbit) (s8, s12) (30.00Mbit) (30.00Mbit) (s8, s13) (30.00Mbit) (s8, s26) (30.00Mbit) (s8, s27) (30.00Mbit) (s8, s28) (30.00Mbit) (s8, s29) (30.00Mbit) (s8, s30) (30.00Mbit) (s8, s31) (30.00Mbit) (s9, h26) (30.00Mbit) (30.00Mbit) (s9, h27) (30.00Mbit) (30.00Mbit) (s9, h28) (30.00Mbit) (30.00Mbit) (s9, h29) (30.00Mbit) (30.00Mbit) (s9, h30) (30.00Mbit) (30.00Mbit) (s9, h31) (30.00Mbit) (30.00Mbit) (s10, h32) (30.00Mbit) (30.00Mbit) (s10, h33) (30.00Mbit) (30.00Mbit) (s10, h34) (30.00Mbit) (30.00Mbit) (s10, h35) (30.00Mbit) (30.00Mbit) (s11, h36) (30.00Mbit) (30.00Mbit) (s11, h37) (30.00Mbit) (30.00Mbit) (s11, h38) (30.00Mbit) (30.00Mbit) (s11, h39) (30.00Mbit) (30.00Mbit) (s11, h40) (30.00Mbit) (30.00Mbit) (s12, h41) (30.00Mbit) (30.00Mbit) (s12, h42) (30.00Mbit) (30.00Mbit) (s12, h43) (30.00Mbit) (30.00Mbit) (s12, h44) (30.00Mbit) (30.00Mbit) (s12, h45) (30.00Mbit) (30.00Mbit) (s13, h46) (30.00Mbit) (30.00Mbit) (s13, h47) (30.00Mbit) (30.00Mbit) (s13, h48) (30.00Mbit) (30.00Mbit) (s13, h49) (30.00Mbit) (30.00Mbit) (s13, h50) (30.00Mbit) (30.00Mbit) (s14, s15) (30.00Mbit) (30.00Mbit) (s14, s16) (30.00Mbit) (30.00Mbit) (s14, s17) (30.00Mbit) (30.00Mbit) (s14, s18) (30.00Mbit) (30.00Mbit) (s14, s19) (30.00Mbit) (30.00Mbit) (s14, s20) (30.00Mbit) (30.00Mbit) (s15, h51) (30.00Mbit) (30.00Mbit) (s15, h52) (30.00Mbit) (30.00Mbit) (s15, h53) (30.00Mbit) (30.00Mbit) (s15, h54) (30.00Mbit) (30.00Mbit) (s15, h55) (30.00Mbit) (30.00Mbit) (s16, h56) (30.00Mbit) (30.00Mbit) (s16, h57) (30.00Mbit) (30.00Mbit) (s16, h58) (30.00Mbit) (30.00Mbit) (s16, h59) (30.00Mbit) (30.00Mbit) (s16, h60) (30.00Mbit) (30.00Mbit) (s17, h61) (30.00Mbit) (30.00Mbit) (s17, h62) (30.00Mbit) (30.00Mbit) (s17, h63) (30.00Mbit) (30.00Mbit) (s17, h64) (30.00Mbit) (30.00Mbit) (s17, h65) (30.00Mbit) (30.00Mbit) (s18, h66) (30.00Mbit) (30.00Mbit) (s18, h67) (30.00Mbit) (30.00Mbit) (s18, h68) (30.00Mbit) (30.00Mbit) (s18, h69) (30.00Mbit) (30.00Mbit) (s18, h70) (30.00Mbit) (30.00Mbit) (s19, h71) (30.00Mbit) (30.00Mbit) (s19, h72) (30.00Mbit) (30.00Mbit) (s19, h73) (30.00Mbit) (30.00Mbit) (s19, h74) (30.00Mbit) (30.00Mbit) (s20, h75) (30.00Mbit) (30.00Mbit) (s20, h76) (30.00Mbit) (30.00Mbit) (s20, h77) (30.00Mbit) (30.00Mbit) (s20, h78) (30.00Mbit) (30.00Mbit) (s20, h79) (30.00Mbit) (30.00Mbit) (s20, h80) (30.00Mbit) (30.00Mbit) (s21, h81) (30.00Mbit) (30.00Mbit) (s21, h82) (30.00Mbit) (30.00Mbit) (s21, h83) (30.00Mbit) (30.00Mbit) (s21, h84) (30.00Mbit) (30.00Mbit) (s21, h85) (30.00Mbit) (30.00Mbit) (s21, h86) (30.00Mbit) (30.00Mbit) (s21, h87) (30.00Mbit) (30.00Mbit) (s21, h88) (30.00Mbit) (30.00Mbit) (s21, h89) (30.00Mbit) (30.00Mbit) (s21, h90) (30.00Mbit) (30.00Mbit) (s22, h91) (30.00Mbit) (30.00Mbit) (s22, h92) (30.00Mbit) (30.00Mbit) (s22, h93) (30.00Mbit) (30.00Mbit) (s22, h94) (30.00Mbit) (30.00Mbit) (s22, h95) (30.00Mbit) (30.00Mbit) (s22, h96) (30.00Mbit) (30.00Mbit) (s22, h97) (30.00Mbit) (30.00Mbit) (s22, h98) (30.00Mbit) (30.00Mbit) (s22, h99) (30.00Mbit) (30.00Mbit) (s22, h100) (30.00Mbit) (30.00Mbit) (s23, h101) (30.00Mbit) (30.00Mbit) (s23, h102) (30.00Mbit) (30.00Mbit) (s23, h103) (30.00Mbit) (30.00Mbit) (s23, h104) (30.00Mbit) (30.00Mbit) (s23, h105) (30.00Mbit) (30.00Mbit) (s23, h106) (30.00Mbit) (30.00Mbit) (s23, h107) (30.00Mbit) (30.00Mbit) (s23, h108) (30.00Mbit) (30.00Mbit) (s23, h109) (30.00Mbit) (30.00Mbit) (s23, h110) (30.00Mbit) (30.00Mbit) (s23, h111) (30.00Mbit) (30.00Mbit) (s23, h112) (30.00Mbit) (30.00Mbit) (s23, h113) (30.00Mbit) (30.00Mbit) (s23, h114) (30.00Mbit) (30.00Mbit) (s23, h115) (30.00Mbit) (30.00Mbit) (s23, h116) (30.00Mbit) (30.00Mbit) (s23, h117) (30.00Mbit) (30.00Mbit) (s23, h118) (30.00Mbit) (30.00Mbit) (s23, h119) (30.00Mbit) (30.00Mbit) (s23, h120) (30.00Mbit) (30.00Mbit) (s23, h121) (30.00Mbit) (30.00Mbit) (s23, h122) (30.00Mbit) (30.00Mbit) (s23, h123) (30.00Mbit) (30.00Mbit) (s23, h124) (30.00Mbit) (30.00Mbit) (s31, h125) (30.00Mbit) (30.00Mbit) (s31, h126) (30.00Mbit) (30.00Mbit) (s31, h127) (30.00Mbit)
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[illegible]

Inspecione informações das interfaces, endereços MAC, IP e portas através de linhas de comando;

Comando: net

PRINT:

```
mininet@mininet-vm: ~$ net
h1 h1-eth0:s3-eth1
h2 h2-eth0:s3-eth2
h3 h3-eth0:s3-eth3
h4 h4-eth0:s3-eth4
h5 h5-eth0:s3-eth5
h6 h6-eth0:s4-eth1
h7 h7-eth0:s4-eth2
h8 h8-eth0:s4-eth3
h9 h9-eth0:s4-eth4
h10 h10-eth0:s4-eth5
h11 h11-eth0:s5-eth1
h12 h12-eth0:s5-eth2
h13 h13-eth0:s5-eth3
h14 h14-eth0:s5-eth4
h15 h15-eth0:s5-eth5
h16 h16-eth0:s6-eth1
h17 h17-eth0:s6-eth2
h18 h18-eth0:s6-eth3
h19 h19-eth0:s6-eth4
h20 h20-eth0:s6-eth5
h21 h21-eth0:s7-eth1
h22 h22-eth0:s7-eth2
h23 h23-eth0:s7-eth3
h24 h24-eth0:s7-eth4
h25 h25-eth0:s7-eth5
h26 h26-eth0:s9-eth1
h27 h27-eth0:s9-eth2
h28 h28-eth0:s9-eth3
h29 h29-eth0:s9-eth4
h30 h30-eth0:s9-eth5
h31 h31-eth0:s10-eth1
h32 h32-eth0:s10-eth2
h33 h33-eth0:s10-eth3
h34 h34-eth0:s10-eth4
h35 h35-eth0:s10-eth5
h36 h36-eth0:s11-eth1
h37 h37-eth0:s11-eth2
h38 h38-eth0:s11-eth3
h39 h39-eth0:s11-eth4
h40 h40-eth0:s11-eth5
h41 h41-eth0:s12-eth1
h42 h42-eth0:s12-eth2
h43 h43-eth0:s12-eth3
h44 h44-eth0:s12-eth4
h45 h45-eth0:s12-eth5
h46 h46-eth0:s13-eth1
h47 h47-eth0:s13-eth2
h48 h48-eth0:s13-eth3
h49 h49-eth0:s13-eth4
h50 h50-eth0:s13-eth5
h51 h51-eth0:s15-eth1
h52 h52-eth0:s15-eth2
h53 h53-eth0:s15-eth3
h54 h54-eth0:s15-eth4
h55 h55-eth0:s15-eth5
h56 h56-eth0:s16-eth1
h57 h57-eth0:s16-eth2
h58 h58-eth0:s16-eth3
h59 h59-eth0:s16-eth4
h60 h60-eth0:s16-eth5
h61 h61-eth0:s17-eth1
h62 h62-eth0:s17-eth2
h63 h63-eth0:s17-eth3
h64 h64-eth0:s17-eth4
h65 h65-eth0:s17-eth5
h66 h66-eth0:s18-eth1
h67 h67-eth0:s18-eth2
h68 h68-eth0:s18-eth3
h69 h69-eth0:s18-eth4
h70 h70-eth0:s18-eth5
h71 h71-eth0:s19-eth1
h72 h72-eth0:s19-eth2
h73 h73-eth0:s19-eth3
h74 h74-eth0:s19-eth4
h75 h75-eth0:s19-eth5
h76 h76-eth0:s21-eth1
h77 h77-eth0:s21-eth2
h78 h78-eth0:s21-eth3
h79 h79-eth0:s21-eth4
h80 h80-eth0:s21-eth5
h81 h81-eth0:s22-eth1
h82 h82-eth0:s22-eth2
h83 h83-eth0:s22-eth3
h84 h84-eth0:s22-eth4
h85 h85-eth0:s22-eth5
h86 h86-eth0:s23-eth1
h87 h87-eth0:s23-eth2
h88 h88-eth0:s23-eth3
h89 h89-eth0:s23-eth4
h90 h90-eth0:s23-eth5
h91 h91-eth0:s24-eth1
h92 h92-eth0:s24-eth2
h93 h93-eth0:s24-eth3
h94 h94-eth0:s24-eth4
h95 h95-eth0:s24-eth5
h96 h96-eth0:s25-eth1
h97 h97-eth0:s25-eth2
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mininet@mininet-vmc -

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h97 h97-eth0:s25-eth2
h98 h98-eth0:s25-eth3
h99 h99-eth0:s25-eth4
h100 h100-eth0:s25-eth5
h101 h101-eth0:s27-eth1
h102 h102-eth0:s27-eth2
h103 h103-eth0:s27-eth3
h104 h104-eth0:s27-eth4
h105 h105-eth0:s27-eth5
h106 h106-eth0:s28-eth1
h107 h107-eth0:s28-eth2
h108 h108-eth0:s28-eth3
h109 h109-eth0:s28-eth4
h110 h110-eth0:s28-eth5
h111 h111-eth0:s29-eth1
h112 h112-eth0:s29-eth2
h113 h113-eth0:s29-eth3
h114 h114-eth0:s29-eth4
h115 h115-eth0:s29-eth5
h116 h116-eth0:s30-eth1
h117 h117-eth0:s30-eth2
h118 h118-eth0:s30-eth3
h119 h119-eth0:s30-eth4
h120 h120-eth0:s30-eth5
h121 h121-eth0:s31-eth1
h122 h122-eth0:s31-eth2
h123 h123-eth0:s31-eth3
h124 h124-eth0:s31-eth4
h125 h125-eth0:s31-eth5
s1 lo: s1-eth1:s2-eth6 s1-eth2:s8-eth6 s1-eth3:s14-eth6 s1-eth4:s20-eth6 s1-eth5:s26-eth6
s2 lo: s2-eth1:s3-eth6 s2-eth2:s4-eth6 s2-eth3:s5-eth6 s2-eth4:s6-eth6 s2-eth5:s7-eth6 s2-eth6:s1-eth1
s3 lo: s3-eth1:h1-eth0 s3-eth2:h2-eth0 s3-eth3:h3-eth0 s3-eth4:h4-eth0 s3-eth5:h5-eth0 s3-eth6:s2-eth1
s4 lo: s4-eth1:h6-eth0 s4-eth2:h7-eth0 s4-eth3:h8-eth0 s4-eth4:h9-eth0 s4-eth5:h10-eth0 s4-eth6:s2-eth2
s5 lo: s5-eth1:h11-eth0 s5-eth2:h12-eth0 s5-eth3:h13-eth0 s5-eth4:h14-eth0 s5-eth5:h15-eth0 s5-eth6:s2-eth3
s6 lo: s6-eth1:h16-eth0 s6-eth2:h17-eth0 s6-eth3:h18-eth0 s6-eth4:h19-eth0 s6-eth5:h20-eth0 s6-eth6:s2-eth4
s7 lo: s7-eth1:h21-eth0 s7-eth2:h22-eth0 s7-eth3:h23-eth0 s7-eth4:h24-eth0 s7-eth5:h25-eth0 s7-eth6:s2-eth5
s8 lo: s8-eth1:s9-eth6 s8-eth2:s10-eth6 s8-eth3:s11-eth6 s8-eth4:s12-eth6 s8-eth5:s13-eth6 s8-eth6:s1-eth2
s9 lo: s9-eth1:h26-eth0 s9-eth2:h27-eth0 s9-eth3:h28-eth0 s9-eth4:h29-eth0 s9-eth5:h30-eth0 s9-eth6:s8-eth1
s10 lo: s10-eth1:h31-eth0 s10-eth2:h32-eth0 s10-eth3:h33-eth0 s10-eth4:h34-eth0 s10-eth5:h35-eth0 s10-eth6:s8-eth2
s11 lo: s11-eth1:h36-eth0 s11-eth2:h37-eth0 s11-eth3:h38-eth0 s11-eth4:h39-eth0 s11-eth5:h40-eth0 s11-eth6:s8-eth3
s12 lo: s12-eth1:h41-eth0 s12-eth2:h42-eth0 s12-eth3:h43-eth0 s12-eth4:h44-eth0 s12-eth5:h45-eth0 s12-eth6:s8-eth4
s13 lo: s13-eth1:h46-eth0 s13-eth2:h47-eth0 s13-eth3:h48-eth0 s13-eth4:h49-eth0 s13-eth5:h50-eth0 s13-eth6:s8-eth5
s14 lo: s14-eth1:s15-eth6 s14-eth2:s16-eth6 s14-eth3:s17-eth6 s14-eth4:s18-eth6 s14-eth5:s19-eth6 s14-eth6:s1-eth3
s15 lo: s15-eth1:h51-eth0 s15-eth2:h52-eth0 s15-eth3:h53-eth0 s15-eth4:h54-eth0 s15-eth5:h55-eth0 s15-eth6:s14-eth1
s16 lo: s16-eth1:h56-eth0 s16-eth2:h57-eth0 s16-eth3:h58-eth0 s16-eth4:h59-eth0 s16-eth5:h60-eth0 s16-eth6:s14-eth2
s17 lo: s17-eth1:h61-eth0 s17-eth2:h62-eth0 s17-eth3:h63-eth0 s17-eth4:h64-eth0 s17-eth5:h65-eth0 s17-eth6:s14-eth3
s18 lo: s18-eth1:h66-eth0 s18-eth2:h67-eth0 s18-eth3:h68-eth0 s18-eth4:h69-eth0 s18-eth5:h70-eth0 s18-eth6:s14-eth4
s19 lo: s19-eth1:h71-eth0 s19-eth2:h72-eth0 s19-eth3:h73-eth0 s19-eth4:h74-eth0 s19-eth5:h75-eth0 s19-eth6:s14-eth5
s20 lo: s20-eth1:s21-eth6 s20-eth2:s22-eth6 s20-eth3:s23-eth6 s20-eth4:s24-eth6 s20-eth5:s25-eth6 s20-eth6:s1-eth4
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s20 lo: s20-eth1:s21-eth6 s20-eth2:s22-eth6 s20-eth3:s23-eth6 s20-eth4:s24-eth6 s20-eth5:s25-eth6 s20-eth6:s1-eth4
s21 lo: s21-eth1:h76-eth0 s21-eth2:h77-eth0 s21-eth3:h78-eth0 s21-eth4:h79-eth0 s21-eth5:h80-eth0 s21-eth6:s20-eth1
s22 lo: s22-eth1:h81-eth0 s22-eth2:h82-eth0 s22-eth3:h83-eth0 s22-eth4:h84-eth0 s22-eth5:h85-eth0 s22-eth6:s20-eth2
s23 lo: s23-eth1:h86-eth0 s23-eth2:h87-eth0 s23-eth3:h88-eth0 s23-eth4:h89-eth0 s23-eth5:h90-eth0 s23-eth6:s20-eth3
s24 lo: s24-eth1:h91-eth0 s24-eth2:h92-eth0 s24-eth3:h93-eth0 s24-eth4:h94-eth0 s24-eth5:h95-eth0 s24-eth6:s20-eth4
s25 lo: s25-eth1:h96-eth0 s25-eth2:h97-eth0 s25-eth3:h98-eth0 s25-eth4:h99-eth0 s25-eth5:h100-eth0 s25-eth6:s20-eth5
s26 lo: s26-eth1:s27-eth6 s26-eth2:s28-eth6 s26-eth3:s29-eth6 s26-eth4:s30-eth6 s26-eth5:s31-eth6 s26-eth6:s1-eth5
s27 lo: s27-eth1:h101-eth0 s27-eth2:h102-eth0 s27-eth3:h103-eth0 s27-eth4:h104-eth0 s27-eth5:h105-eth0 s27-eth6:s26-eth1
s28 lo: s28-eth1:h106-eth0 s28-eth2:h107-eth0 s28-eth3:h108-eth0 s28-eth4:h109-eth0 s28-eth5:h110-eth0 s28-eth6:s26-eth2
s29 lo: s29-eth1:h111-eth0 s29-eth2:h112-eth0 s29-eth3:h113-eth0 s29-eth4:h114-eth0 s29-eth5:h115-eth0 s29-eth6:s26-eth3
s30 lo: s30-eth1:h116-eth0 s30-eth2:h117-eth0 s30-eth3:h118-eth0 s30-eth4:h119-eth0 s30-eth5:h120-eth0 s30-eth6:s26-eth4
s31 lo: s31-eth1:h121-eth0 s31-eth2:h122-eth0 s31-eth3:h123-eth0 s31-eth4:h124-eth0 s31-eth5:h125-eth0 s31-eth6:s26-eth5
c0
```

mininet>

Comando: dump PRINT:

mininet@mininet-vm: ~

```
mininet> dump
```

```
<Host h1: h1-eth0:10.0.0.1 pid=13028>
<Host h2: h2-eth0:10.0.0.2 pid=13030>
<Host h3: h3-eth0:10.0.0.3 pid=13032>
<Host h4: h4-eth0:10.0.0.4 pid=13034>
<Host h5: h5-eth0:10.0.0.5 pid=13036>
<Host h6: h6-eth0:10.0.0.6 pid=13038>
<Host h7: h7-eth0:10.0.0.7 pid=13040>
<Host h8: h8-eth0:10.0.0.8 pid=13042>
<Host h9: h9-eth0:10.0.0.9 pid=13044>
<Host h10: h10-eth0:10.0.0.10 pid=13046>
<Host h11: h11-eth0:10.0.0.11 pid=13048>
<Host h12: h12-eth0:10.0.0.12 pid=13050>
<Host h13: h13-eth0:10.0.0.13 pid=13052>
<Host h14: h14-eth0:10.0.0.14 pid=13054>
<Host h15: h15-eth0:10.0.0.15 pid=13056>
<Host h16: h16-eth0:10.0.0.16 pid=13058>
<Host h17: h17-eth0:10.0.0.17 pid=13060>
<Host h18: h18-eth0:10.0.0.18 pid=13062>
<Host h19: h19-eth0:10.0.0.19 pid=13064>
<Host h20: h20-eth0:10.0.0.20 pid=13066>
<Host h21: h21-eth0:10.0.0.21 pid=13068>
<Host h22: h22-eth0:10.0.0.22 pid=13070>
<Host h23: h23-eth0:10.0.0.23 pid=13072>
<Host h24: h24-eth0:10.0.0.24 pid=13074>
<Host h25: h25-eth0:10.0.0.25 pid=13076>
<Host h26: h26-eth0:10.0.0.26 pid=13078>
<Host h27: h27-eth0:10.0.0.27 pid=13080>
<Host h28: h28-eth0:10.0.0.28 pid=13082>
<Host h29: h29-eth0:10.0.0.29 pid=13084>
<Host h30: h30-eth0:10.0.0.30 pid=13086>
<Host h31: h31-eth0:10.0.0.31 pid=13088>
<Host h32: h32-eth0:10.0.0.32 pid=13090>
<Host h33: h33-eth0:10.0.0.33 pid=13092>
<Host h34: h34-eth0:10.0.0.34 pid=13094>
<Host h35: h35-eth0:10.0.0.35 pid=13096>
<Host h36: h36-eth0:10.0.0.36 pid=13098>
<Host h37: h37-eth0:10.0.0.37 pid=13100>
<Host h38: h38-eth0:10.0.0.38 pid=13102>
<Host h39: h39-eth0:10.0.0.39 pid=13104>
<Host h40: h40-eth0:10.0.0.40 pid=13106>
<Host h41: h41-eth0:10.0.0.41 pid=13108>
<Host h42: h42-eth0:10.0.0.42 pid=13110>
<Host h43: h43-eth0:10.0.0.43 pid=13112>
<Host h44: h44-eth0:10.0.0.44 pid=13114>
<Host h45: h45-eth0:10.0.0.45 pid=13116>
<Host h46: h46-eth0:10.0.0.46 pid=13118>
<Host h47: h47-eth0:10.0.0.47 pid=13120>
<Host h48: h48-eth0:10.0.0.48 pid=13122>
<Host h49: h49-eth0:10.0.0.49 pid=13124>
<Host h50: h50-eth0:10.0.0.50 pid=13126>
<Host h51: h51-eth0:10.0.0.51 pid=13128>
<Host h52: h52-eth0:10.0.0.52 pid=13130>
<Host h53: h53-eth0:10.0.0.53 pid=13132>
<Host h54: h54-eth0:10.0.0.54 pid=13134>
<Host h55: h55-eth0:10.0.0.55 pid=13136>
<Host h56: h56-eth0:10.0.0.56 pid=13138>
<Host h57: h57-eth0:10.0.0.57 pid=13140>
<Host h58: h58-eth0:10.0.0.58 pid=13142>
<Host h59: h59-eth0:10.0.0.59 pid=13144>
<Host h60: h60-eth0:10.0.0.60 pid=13146>
<Host h61: h61-eth0:10.0.0.61 pid=13148>
```

```
<OVSSwitch s1: 10:127.0.0.1,s1-eth1:None,s1-eth2:None,s1-eth3:None,s1-eth4:None,s1-eth5:None pid=13281>
<OVSSwitch s2: 10:127.0.0.1,s2-eth1:None,s2-eth2:None,s2-eth3:None,s2-eth4:None,s2-eth5:None,s2-eth6:None pid=13284>
<OVSSwitch s3: 10:127.0.0.1,s3-eth1:None,s3-eth2:None,s3-eth3:None,s3-eth4:None,s3-eth5:None,s3-eth6:None pid=13287>
<OVSSwitch s4: 10:127.0.0.1,s4-eth1:None,s4-eth2:None,s4-eth3:None,s4-eth4:None,s4-eth5:None,s4-eth6:None pid=13290>
<OVSSwitch s5: 10:127.0.0.1,s5-eth1:None,s5-eth2:None,s5-eth3:None,s5-eth4:None,s5-eth5:None,s5-eth6:None pid=13293>
<OVSSwitch s6: 10:127.0.0.1,s6-eth1:None,s6-eth2:None,s6-eth3:None,s6-eth4:None,s6-eth5:None,s6-eth6:None pid=13296>
<OVSSwitch s7: 10:127.0.0.1,s7-eth1:None,s7-eth2:None,s7-eth3:None,s7-eth4:None,s7-eth5:None,s7-eth6:None pid=13299>
<OVSSwitch s8: 10:127.0.0.1,s8-eth1:None,s8-eth2:None,s8-eth3:None,s8-eth4:None,s8-eth5:None,s8-eth6:None pid=13302>
<OVSSwitch s9: 10:127.0.0.1,s9-eth1:None,s9-eth2:None,s9-eth3:None,s9-eth4:None,s9-eth5:None,s9-eth6:None pid=13305>
<OVSSwitch s10: 10:127.0.0.1,s10-eth1:None,s10-eth2:None,s10-eth3:None,s10-eth4:None,s10-eth5:None,s10-eth6:None pid=13308>
<OVSSwitch s11: 10:127.0.0.1,s11-eth1:None,s11-eth2:None,s11-eth3:None,s11-eth4:None,s11-eth5:None,s11-eth6:None pid=13311>
<OVSSwitch s12: 10:127.0.0.1,s12-eth1:None,s12-eth2:None,s12-eth3:None,s12-eth4:None,s12-eth5:None,s12-eth6:None pid=13314>
<OVSSwitch s13: 10:127.0.0.1,s13-eth1:None,s13-eth2:None,s13-eth3:None,s13-eth4:None,s13-eth5:None,s13-eth6:None pid=13317>
<OVSSwitch s14: 10:127.0.0.1,s14-eth1:None,s14-eth2:None,s14-eth3:None,s14-eth4:None,s14-eth5:None,s14-eth6:None pid=13320>
<OVSSwitch s15: 10:127.0.0.1,s15-eth1:None,s15-eth2:None,s15-eth3:None,s15-eth4:None,s15-eth5:None,s15-eth6:None pid=13323>
<OVSSwitch s16: 10:127.0.0.1,s16-eth1:None,s16-eth2:None,s16-eth3:None,s16-eth4:None,s16-eth5:None,s16-eth6:None pid=13326>
<OVSSwitch s17: 10:127.0.0.1,s17-eth1:None,s17-eth2:None,s17-eth3:None,s17-eth4:None,s17-eth5:None,s17-eth6:None pid=13329>
<OVSSwitch s18: 10:127.0.0.1,s18-eth1:None,s18-eth2:None,s18-eth3:None,s18-eth4:None,s18-eth5:None,s18-eth6:None pid=13332>
<OVSSwitch s19: 10:127.0.0.1,s19-eth1:None,s19-eth2:None,s19-eth3:None,s19-eth4:None,s19-eth5:None,s19-eth6:None pid=13335>
<OVSSwitch s20: 10:127.0.0.1,s20-eth1:None,s20-eth2:None,s20-eth3:None,s20-eth4:None,s20-eth5:None,s20-eth6:None pid=13338>
<OVSSwitch s21: 10:127.0.0.1,s21-eth1:None,s21-eth2:None,s21-eth3:None,s21-eth4:None,s21-eth5:None,s21-eth6:None pid=13341>
<OVSSwitch s22: 10:127.0.0.1,s22-eth1:None,s22-eth2:None,s22-eth3:None,s22-eth4:None,s22-eth5:None,s22-eth6:None pid=13344>
<OVSSwitch s23: 10:127.0.0.1,s23-eth1:None,s23-eth2:None,s23-eth3:None,s23-eth4:None,s23-eth5:None,s23-eth6:None pid=13347>
<OVSSwitch s24: 10:127.0.0.1,s24-eth1:None,s24-eth2:None,s24-eth3:None,s24-eth4:None,s24-eth5:None,s24-eth6:None pid=13350>
<OVSSwitch s25: 10:127.0.0.1,s25-eth1:None,s25-eth2:None,s25-eth3:None,s25-eth4:None,s25-eth5:None,s25-eth6:None pid=13353>
<OVSSwitch s26: 10:127.0.0.1,s26-eth1:None,s26-eth2:None,s26-eth3:None,s26-eth4:None,s26-eth5:None,s26-eth6:None pid=13356>
<OVSSwitch s27: 10:127.0.0.1,s27-eth1:None,s27-eth2:None,s27-eth3:None,s27-eth4:None,s27-eth5:None,s27-eth6:None pid=13359>
<OVSSwitch s28: 10:127.0.0.1,s28-eth1:None,s28-eth2:None,s28-eth3:None,s28-eth4:None,s28-eth5:None,s28-eth6:None pid=13362>
<OVSSwitch s29: 10:127.0.0.1,s29-eth1:None,s29-eth2:None,s29-eth3:None,s29-eth4:None,s29-eth5:None,s29-eth6:None pid=13365>
<OVSSwitch s30: 10:127.0.0.1,s30-eth1:None,s30-eth2:None,s30-eth3:None,s30-eth4:None,s30-eth5:None,s30-eth6:None pid=13368>
<OVSSwitch s31: 10:127.0.0.1,s31-eth1:None,s31-eth2:None,s31-eth3:None,s31-eth4:None,s31-eth5:None,s31-eth6:None pid=13371>
<Controller c0: 127.0.0.1:6653 pid=13021>
```

Comando: h1 ifconfig

PRINT:

```
mininet> h1 ifconfig
h1-eth0  Link encap:Ethernet  HWaddr 00:00:00:00:00:01
         inet addr:10.0.0.1  Bcast:10.255.255.255  Mask:255.0.0.0
         UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo       Link encap:Local Loopback
         inet addr:127.0.0.1  Mask:255.0.0.0
         UP LOOPBACK RUNNING  MTU:65536  Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> █
```

Comando: h2 ifconfig

PRINT:

```
mininet> h2 ifconfig
h2-eth0  Link encap:Ethernet  HWaddr 00:00:00:00:00:02
         inet addr:10.0.0.2  Bcast:10.255.255.255  Mask:255.0.0.0
         UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo       Link encap:Local Loopback
         inet addr:127.0.0.1  Mask:255.0.0.0
         UP LOOPBACK RUNNING  MTU:65536  Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> █
```

Comando: h124 ifconfig

PRINT:

```
mininet> h124 ifconfig
h124-eth0 Link encap:Ethernet  HWaddr 00:00:00:00:00:7c
          inet addr:10.0.0.124  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> █
```

Comando: h15 ifconfig

PRINT:

```
mininet> h125 ifconfig
h125-eth0 Link encap:Ethernet  HWaddr 00:00:00:00:00:7d
          inet addr:10.0.0.125  Bcast:10.255.255.255  Mask:255.0.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)


lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

mininet> █
```


Comando: s1 ifconfig

PRINT:

OBS: Devido a resposta ser muito grande, printei apenas algumas partes, porém com os comandos que descrevi, conseguimos visualizar todos os itens solicitados.

 mininet@mininet-vm: ~

```
mininet> s1 ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:7e:0f:24
          inet addr:192.168.56.104  Bcast:192.168.56.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1452 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2462 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:105005 (105.0 KB)  TX bytes:326473 (326.4 KB)

eth1      Link encap:Ethernet  HWaddr 08:00:27:a7:c9:40
          inet addr:10.0.2.15  Bcast:10.0.2.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:436 errors:0 dropped:0 overruns:0 frame:0
          TX packets:435 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:47827 (47.8 KB)  TX bytes:38639 (38.6 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:24029 errors:0 dropped:0 overruns:0 frame:0
          TX packets:24029 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1363864 (1.3 MB)  TX bytes:1363864 (1.3 MB)

s1        Link encap:Ethernet  HWaddr 22:7d:c3:c8:a5:4c
          UP BROADCAST RUNNING  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s2        Link encap:Ethernet  HWaddr 42:88:89:75:23:45
          UP BROADCAST RUNNING  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s3        Link encap:Ethernet  HWaddr 1a:78:31:c6:83:45
          UP BROADCAST RUNNING  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s4        Link encap:Ethernet  HWaddr b2:89:d0:20:8c:4e
          UP BROADCAST RUNNING  MTU:1500  Metric:1
```

```
s5      Link encap:Ethernet  HWaddr 42:d7:57:22:c5:4e
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s6      Link encap:Ethernet  HWaddr 1a:84:97:94:0a:44
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s7      Link encap:Ethernet  HWaddr 6e:a4:fd:4f:24:44
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s8      Link encap:Ethernet  HWaddr 1a:ba:83:ee:76:4c
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s9      Link encap:Ethernet  HWaddr d2:0f:2d:3b:6e:4d
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s10     Link encap:Ethernet  HWaddr ce:fa:bb:6f:69:47
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s11     Link encap:Ethernet  HWaddr b2:7e:5f:00:af:4b
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```



```
s12      Link encap:Ethernet  HWaddr 8a:bf:2a:a7:bc:41
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s13      Link encap:Ethernet  HWaddr 6e:4f:db:ad:e8:47
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s14      Link encap:Ethernet  HWaddr 5a:85:19:d8:20:40
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s15      Link encap:Ethernet  HWaddr de:9e:08:33:9f:43
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s16      Link encap:Ethernet  HWaddr b6:6d:a5:0a:84:43
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s17      Link encap:Ethernet  HWaddr b6:8d:55:9e:0c:4a
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s18      Link encap:Ethernet  HWaddr 7a:b7:d6:14:36:48
        UP BROADCAST RUNNING MTU:1500 Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```
s19      Link encap:Ethernet  HWaddr de:be:c8:45:e1:4b
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s20      Link encap:Ethernet  HWaddr 3a:7a:98:23:c1:4b
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s21      Link encap:Ethernet  HWaddr ea:45:36:64:fb:47
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s22      Link encap:Ethernet  HWaddr ce:5b:4a:77:98:4f
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s23      Link encap:Ethernet  HWaddr 4e:0f:0c:d5:17:4a
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s24      Link encap:Ethernet  HWaddr e2:f0:9d:6f:89:48
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s25      Link encap:Ethernet  HWaddr 02:f4:6a:c6:2b:4f
         UP BROADCAST RUNNING MTU:1500 Metric:1
         RX packets:0 errors:0 dropped:0 overruns:0 frame:0
         TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

mininet@mininet-vm: ~

```
s26      Link encap:Ethernet  HWaddr aa:3c:79:ec:01:48
UP BROADCAST RUNNING MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s27      Link encap:Ethernet  HWaddr 42:e7:eb:f5:20:43
UP BROADCAST RUNNING MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s28      Link encap:Ethernet  HWaddr 7a:d4:51:e1:0b:41
UP BROADCAST RUNNING MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s29      Link encap:Ethernet  HWaddr da:25:41:29:0b:4a
UP BROADCAST RUNNING MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s30      Link encap:Ethernet  HWaddr d2:4a:5a:c7:d2:48
UP BROADCAST RUNNING MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s31      Link encap:Ethernet  HWaddr 0a:66:12:da:3e:42
UP BROADCAST RUNNING MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

mininet@mininet-vm: ~

```
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s1-eth2  Link encap:Ethernet  HWaddr 0a:e0:c5:90:0d:cd
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s1-eth3  Link encap:Ethernet  HWaddr 46:dd:69:98:6c:b7
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s1-eth4  Link encap:Ethernet  HWaddr 66:f4:46:f8:44:8f
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

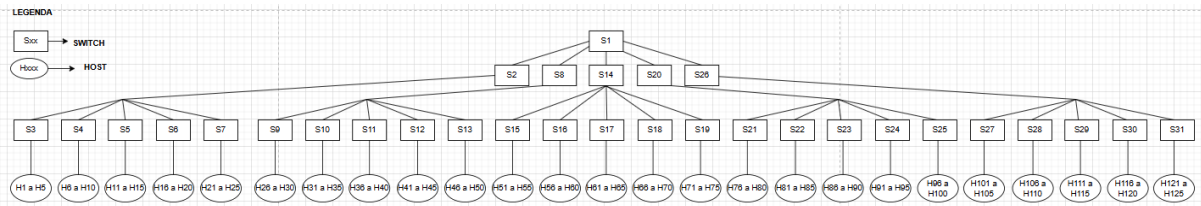
s1-eth5  Link encap:Ethernet  HWaddr 76:5d:9f:bf:6f:1a
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s10-eth1 Link encap:Ethernet  HWaddr 4a:b8:35:56:e8:10
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s10-eth2 Link encap:Ethernet  HWaddr 66:cd:86:8f:ef:6c
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

s10-eth3 Link encap:Ethernet  HWaddr 86:a4:64:83:f0:0e
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
```

- Crie um desenho ilustrativo da topologia com todas as informações obtidas no item anterior;



HOSTs:

- Devido a grande quantidade de hosts, resumi os mesmos em blocos de 5 hosts que se conectam ao switch correspondente;
- IP: Os endereços IPs dos hosts são sequenciais, de forma que: h1 - 10.0.0.1 até h125 - 10.0.0.125;
- MAC: Na criação da topologia, padronizamos os endereços MAC de forma que os mesmos ficaram: h1 - 00:00:00:00:00:01 até 00:00:00:00:00:7d (alterando o final dos 125 hosts conforme a representação em hexadecimal);
- Cada host tem uma única interface para se conectar ao switch de base que está conectado. O padrão de identificação é hx-eth0 (x varia para cada host a partir de sua identificação. Ex: h1 - h1-eth0).

SWITCHs:

- Todos os 31 Switchs da topologia foram representados;
- O S1 possui 5 portas para conexão com os switchs intermediários. São identificadas por padrão com a sigla s1-eth1 até s1-eth5;
- Switchs intermediários(s2, s8, s14, s20 e s26) possuem 6 portas (1 porta para o switch pai e 5 para os seus filhos). Possuem um padrão de identificação indicado pela sigla sx-eth1 a sx-eth6 (x será a identificação de cada switch, no caso, 2, 8, 14, 20 e 26);
- Switchs base(mais inferiores) se conectam com a rede de hosts e seguem o mesmo padrão dito anteriormente.

OBS: O print do desenho em maior qualidade está no gitHub

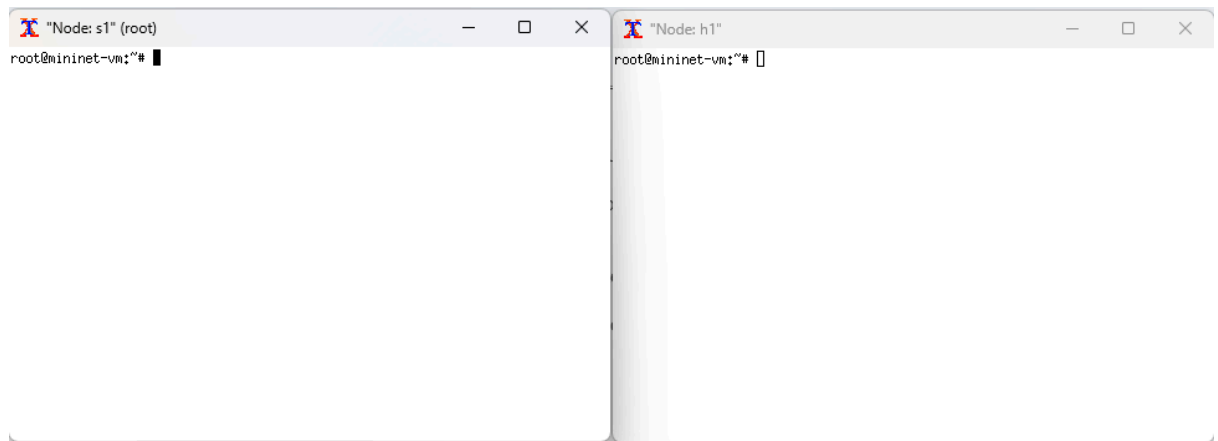
- Execute testes de ping entre os diferentes nós, mostre os pacotes chegando nos nós com uso do comando tcpdump.

Comando: xterm s1 - Abrindo um terminal paralelo referente do switch 1 ("pai da topologia)

xterm h1 - Abrindo o terminal do host 1 para executar o ping em outro host da topologia

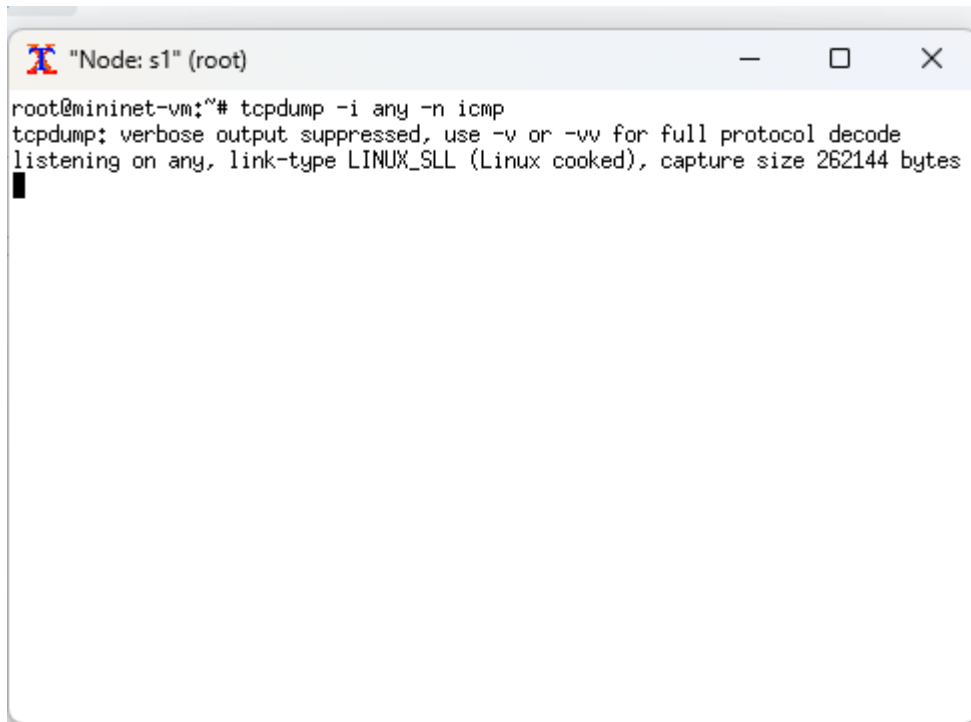
PRINT:

```
mininet> xterm h1
mininet> xterm s1
mininet> █
```



Comando: tcpdump -i any -n icmp (Em S1)

PRINT:



Comando: ping 10.0.0.125 (h1 ping h125)

PRINT:

```
"Node: h1"
root@mininet-vm:~# ping 10.0.0.125
PING 10.0.0.125 (10.0.0.125) 56(84) bytes of data.
64 bytes from 10.0.0.125: icmp_seq=1 ttl=64 time=32.8 ms
64 bytes from 10.0.0.125: icmp_seq=2 ttl=64 time=25.6 ms
64 bytes from 10.0.0.125: icmp_seq=3 ttl=64 time=3.58 ms
64 bytes from 10.0.0.125: icmp_seq=4 ttl=64 time=0.178 ms
64 bytes from 10.0.0.125: icmp_seq=5 ttl=64 time=0.096 ms
64 bytes from 10.0.0.125: icmp_seq=6 ttl=64 time=0.059 ms
64 bytes from 10.0.0.125: icmp_seq=7 ttl=64 time=1.90 ms
64 bytes from 10.0.0.125: icmp_seq=8 ttl=64 time=0.104 ms
64 bytes from 10.0.0.125: icmp_seq=9 ttl=64 time=0.062 ms
64 bytes from 10.0.0.125: icmp_seq=10 ttl=64 time=0.062 ms
64 bytes from 10.0.0.125: icmp_seq=11 ttl=64 time=0.062 ms
```

```
"Node: s1" (root)
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
18:05:23.043022 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.043032 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.043036 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.043041 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.043046 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.043038 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.043048 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.044821 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.044829 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.044832 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
18:05:23.044836 IP 10.0.0.1 > 10.0.0.125: ICMP echo request, id 24848, seq 1, length 64
```

Comando: ping 10.0.0.5 (h1 ping h5)

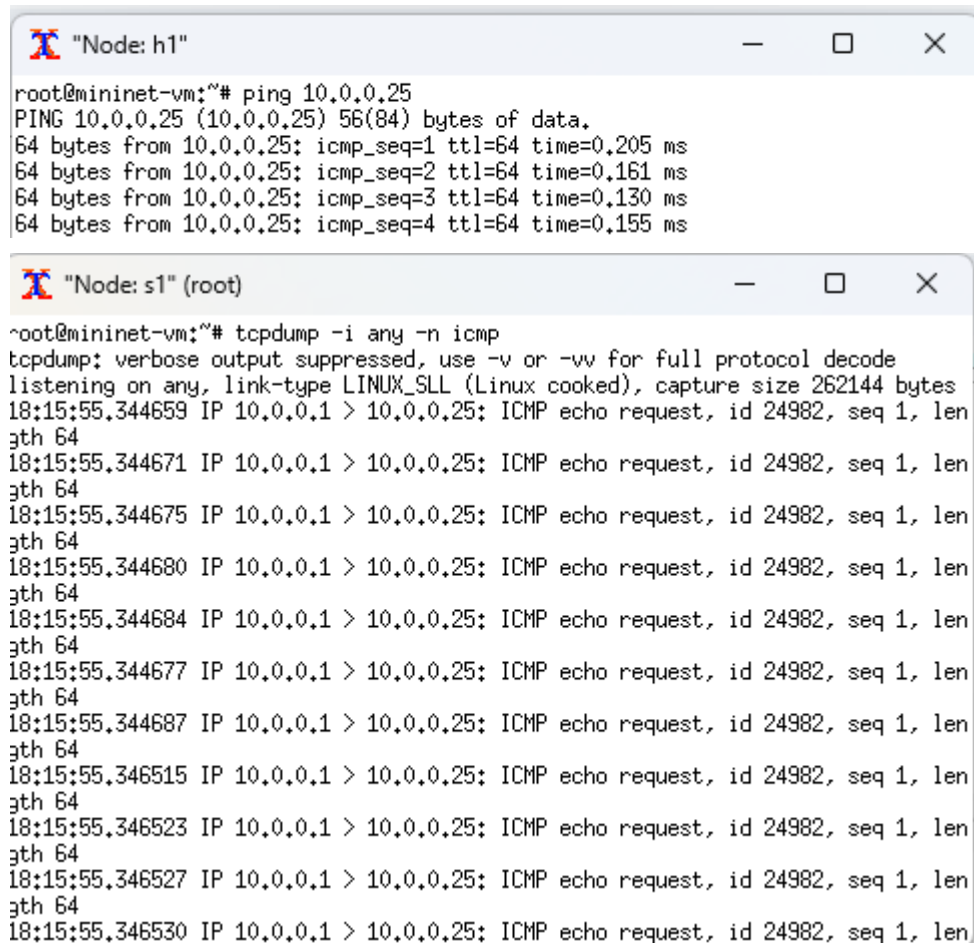
PRINT:


```
"Node: h1"
root@mininet-vm:~# ping 10.0.0.5
PING 10.0.0.5 (10.0.0.5) 56(84) bytes of data.
64 bytes from 10.0.0.5: icmp_seq=1 ttl=64 time=7.77 ms
64 bytes from 10.0.0.5: icmp_seq=2 ttl=64 time=3.13 ms
64 bytes from 10.0.0.5: icmp_seq=3 ttl=64 time=2.55 ms
64 bytes from 10.0.0.5: icmp_seq=4 ttl=64 time=0.132 ms
64 bytes from 10.0.0.5: icmp_seq=5 ttl=64 time=0.120 ms
64 bytes from 10.0.0.5: icmp_seq=6 ttl=64 time=0.131 ms
64 bytes from 10.0.0.5: icmp_seq=7 ttl=64 time=1.11 ms
64 bytes from 10.0.0.5: icmp_seq=8 ttl=64 time=0.117 ms
64 bytes from 10.0.0.5: icmp_seq=9 ttl=64 time=0.123 ms
```

```
"Node: s1" (root)
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
l8:12:29.992439 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.992452 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.992457 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.992462 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.992467 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.992458 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.992470 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.995698 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.995708 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.995711 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.995715 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
:h 64
l8:12:29.995719 IP 10.0.0.1 > 10.0.0.5: ICMP echo request, id 24936, seq 1, leng
```

Comando: ping 10.0.0.25 (h1 ping h25)

PRINT:



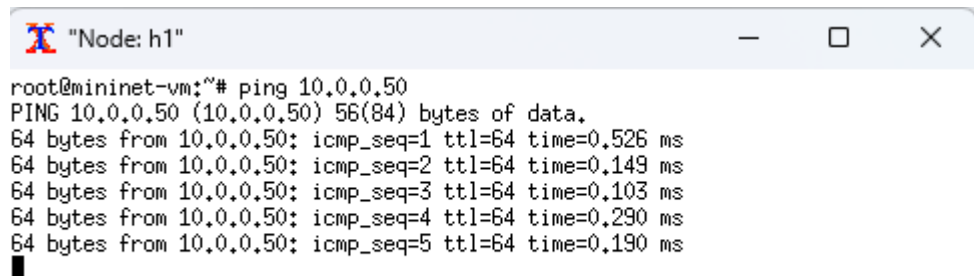
The image shows two terminal window screenshots. The first window, titled '"Node: h1"', shows the output of a ping command to 10.0.0.25. The second window, titled '"Node: s1" (root)', shows the output of a tcpdump command capturing ICMP echo requests to 10.0.0.25.

```
root@mininet-vm:~# ping 10.0.0.25
PING 10.0.0.25 (10.0.0.25) 56(84) bytes of data.
64 bytes from 10.0.0.25: icmp_seq=1 ttl=64 time=0.205 ms
64 bytes from 10.0.0.25: icmp_seq=2 ttl=64 time=0.161 ms
64 bytes from 10.0.0.25: icmp_seq=3 ttl=64 time=0.130 ms
64 bytes from 10.0.0.25: icmp_seq=4 ttl=64 time=0.155 ms

root@mininet-vm:~# tcpdump -i any -n icmp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
18:15:55.344659 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.344671 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.344675 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.344680 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.344684 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.344677 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.344687 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.346515 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.346523 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.346527 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
32h 64
18:15:55.346530 IP 10.0.0.1 > 10.0.0.25: ICMP echo request, id 24982, seq 1, len
```

Comando: ping 10.0.0.50 (h1 ping h50)

PRINT:



The image shows a terminal window titled '"Node: h1"' displaying the output of a ping command to 10.0.0.50.

```
root@mininet-vm:~# ping 10.0.0.50
PING 10.0.0.50 (10.0.0.50) 56(84) bytes of data.
64 bytes from 10.0.0.50: icmp_seq=1 ttl=64 time=0.526 ms
64 bytes from 10.0.0.50: icmp_seq=2 ttl=64 time=0.149 ms
64 bytes from 10.0.0.50: icmp_seq=3 ttl=64 time=0.103 ms
64 bytes from 10.0.0.50: icmp_seq=4 ttl=64 time=0.290 ms
64 bytes from 10.0.0.50: icmp_seq=5 ttl=64 time=0.190 ms
```

```

"Node: s1" (root)
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
18:18:36.240698 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.240709 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.240713 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.240718 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.240723 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.240715 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.240725 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.243932 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.243942 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.243946 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.243950 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len
gth 64
18:18:36.243954 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25022, seq 1, len

```

Comando: ping 10.0.0.75 (h1 ping h75)

PRINT:

```

"Node: h1"
root@mininet-vm:~# ping 10.0.0.75
PING 10.0.0.75 (10.0.0.75) 56(84) bytes of data.
64 bytes from 10.0.0.75: icmp_seq=1 ttl=64 time=25.2 ms
64 bytes from 10.0.0.75: icmp_seq=2 ttl=64 time=20.6 ms
64 bytes from 10.0.0.75: icmp_seq=3 ttl=64 time=6.61 ms
64 bytes from 10.0.0.75: icmp_seq=4 ttl=64 time=0.086 ms
64 bytes from 10.0.0.75: icmp_seq=5 ttl=64 time=0.083 ms

```

```

"Node: s1" (root)
18:19:01.463534 IP 10.0.0.1 > 10.0.0.50: ICMP echo request, id 25030, seq 8, len
root@mininet-vm:~# tcpdump -i any -n icmp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
18:20:39.429836 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.429847 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.429850 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.429854 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.429859 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.429851 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.429861 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.433061 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.433071 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64
18:20:39.433074 IP 10.0.0.1 > 10.0.0.75: ICMP echo request, id 25052, seq 1, len
gth 64

```

Comando: ping 10.0.0.100 (h1 ping h100)

PRINT:

```
"Node: h1"
root@mininet-vn:~# ping 10.0.0.100
PING 10.0.0.100 (10.0.0.100) 56(84) bytes of data.
64 bytes from 10.0.0.100: icmp_seq=1 ttl=64 time=29.5 ms
64 bytes from 10.0.0.100: icmp_seq=2 ttl=64 time=26.0 ms
64 bytes from 10.0.0.100: icmp_seq=3 ttl=64 time=10.3 ms
64 bytes from 10.0.0.100: icmp_seq=4 ttl=64 time=0.188 ms
^C
--- 10.0.0.100 ping statistics ---
```

```
"Node: s1" (root)
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
18:25:32.618653 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.618661 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.618663 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.618666 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.618669 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.618664 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.618670 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.621751 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.621758 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.621761 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
18:25:32.621763 IP 10.0.0.1 > 10.0.0.100: ICMP echo request, id 25114, seq 1, length 64
```

Comando: xterm h26 - Abrindo um host aleatório

PRINT:

```
"Node: h26"
root@mininet-vn:~#
```

Comando: ping 10.0.0.101 (h1 ping h101) - Ping aleatório
PRINT:

```
root@mininet-vm:~# ping 10.0.0.101
PING 10.0.0.101 (10.0.0.101) 56(84) bytes of data:
64 bytes from 10.0.0.101: icmp_seq=1 ttl=64 time=39.5 ms
64 bytes from 10.0.0.101: icmp_seq=2 ttl=64 time=2.94 ms
64 bytes from 10.0.0.101: icmp_seq=3 ttl=64 time=0.165 ms
64 bytes from 10.0.0.101: icmp_seq=4 ttl=64 time=0.180 ms
```

```
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
18:28:19.117339 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.117343 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.120805 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.120811 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.124663 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.124666 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.127274 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.127278 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.128531 IP 10.0.0.26 > 10.0.0.101: ICMP echo request, id 25174, seq 1, length 64
18:28:19.128547 IP 10.0.0.101 > 10.0.0.26: ICMP echo reply, id 25174, seq 1, length 64
18:28:19.130333 IP 10.0.0.101 > 10.0.0.26: ICMP echo reply, id 25174, seq 1, length 64
18:28:19.130336 IP 10.0.0.101 > 10.0.0.26: ICMP echo reply, id 25174, seq 1, length 64
```

- Especifique que o host 1 na porta 5555 vai ser um servidor TCP e o host 2 um cliente e execute testes de iperf, considere um relatório por segundo com teste de 20 segundos. Faça os testes para larguras de banda bw de 30 e 40 Mbps (Necessário reconstruir a topologia para os outros valores).

TESTE BW = 30Mbps

Comando: h1 iperf -s -p 5555 & (rodando em segundo plano)

PRINT:

```
mininet@mininet-vm: ~
mininet> h1 iperf -s -p 5555 &
mininet> h1 iperf -s -p 5555 &
-----
Server listening on TCP port 5555
TCP window size: 85.3 KByte (default)
-----
```

Comando: h2 iperf -c 10.0.0.1 -p 5555 -t 20 -i 1

PRINT:

```
mininet@mininet-vm: ~
mininet> h2 iperf -c 10.0.0.1 -p 5555 -t 20 -i 1
-----
Client connecting to 10.0.0.1, TCP port 5555
TCP window size: 85.3 KByte (default)
-----
[ 3] local 10.0.0.2 port 54846 connected with 10.0.0.1 port 5555
[ ID] Interval      Transfer    Bandwidth
[ 3] 0.0- 1.0 sec  3.38 MBytes 28.3 Mbits/sec
[ 3] 1.0- 2.0 sec  3.25 MBytes 27.3 Mbits/sec
[ 3] 2.0- 3.0 sec  3.25 MBytes 27.3 Mbits/sec
[ 3] 3.0- 4.0 sec  3.12 MBytes 26.2 Mbits/sec
[ 3] 4.0- 5.0 sec  3.12 MBytes 26.2 Mbits/sec
[ 3] 5.0- 6.0 sec  3.38 MBytes 28.3 Mbits/sec
[ 3] 6.0- 7.0 sec  3.25 MBytes 27.3 Mbits/sec
[ 3] 7.0- 8.0 sec  3.25 MBytes 27.3 Mbits/sec
[ 3] 8.0- 9.0 sec  3.25 MBytes 27.3 Mbits/sec
[ 3] 9.0-10.0 sec  3.38 MBytes 28.3 Mbits/sec
[ 3] 10.0-11.0 sec 3.25 MBytes 27.3 Mbits/sec
[ 3] 11.0-12.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 12.0-13.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 13.0-14.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 14.0-15.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 15.0-16.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 16.0-17.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 17.0-18.0 sec 3.12 MBytes 26.2 Mbits/sec
[ 3] 18.0-19.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 19.0-20.0 sec 3.38 MBytes 28.3 Mbits/sec
[ 3] 0.0-20.1 sec 66.1 MBytes 27.6 Mbits/sec
mininet> █
```


TESTE BW = 40Mbps

Comando: `sudo mn --topo=tree,depth=3,fanout=5 --mac --link=tc,bw=40` (nova topologia)

Comando: `h1 iperf -s -p 5555 &` (rodando em segundo plano)

PRINT:

```
mininet@mininet-vm: ~  
mininet> h1 iperf -s -p 5555 &  
-----  
Server listening on TCP port 5555  
TCP window size: 85.3 KByte (default)  
-----  
mininet> █
```

Comando: `h2 iperf -c 10.0.0.1 -p 5555 -t 20 -i 1`

PRINT:

```
mininet> h2 iperf -c 10.0.0.1 -p 5555 -t 20 -i 1  
-----  
Client connecting to 10.0.0.1, TCP port 5555  
TCP window size: 85.3 KByte (default)  
-----  
[  3] local 10.0.0.2 port 55082 connected with 10.0.0.1 port 5555  
[ ID] Interval          Transfer          Bandwidth  
[  3] 0.0- 1.0 sec      4.88 MBytes      40.9 Mbits/sec  
[  3] 1.0- 2.0 sec      4.25 MBytes      35.7 Mbits/sec  
[  3] 2.0- 3.0 sec      4.38 MBytes      36.7 Mbits/sec  
[  3] 3.0- 4.0 sec      4.25 MBytes      35.7 Mbits/sec  
[  3] 4.0- 5.0 sec      4.25 MBytes      35.7 Mbits/sec  
[  3] 5.0- 6.0 sec      4.25 MBytes      35.7 Mbits/sec  
[  3] 6.0- 7.0 sec      4.50 MBytes      37.7 Mbits/sec  
[  3] 7.0- 8.0 sec      4.12 MBytes      34.6 Mbits/sec  
[  3] 8.0- 9.0 sec      4.50 MBytes      37.7 Mbits/sec  
[  3] 9.0-10.0 sec      4.25 MBytes      35.7 Mbits/sec  
[  3] 10.0-11.0 sec     4.75 MBytes      39.8 Mbits/sec  
[  3] 11.0-12.0 sec     4.12 MBytes      34.6 Mbits/sec  
[  3] 12.0-13.0 sec     4.38 MBytes      36.7 Mbits/sec  
[  3] 13.0-14.0 sec     4.12 MBytes      34.6 Mbits/sec  
[  3] 14.0-15.0 sec     4.12 MBytes      34.6 Mbits/sec  
[  3] 15.0-16.0 sec     4.50 MBytes      37.7 Mbits/sec  
[  3] 16.0-17.0 sec     4.12 MBytes      34.6 Mbits/sec  
[  3] 17.0-18.0 sec     4.38 MBytes      36.7 Mbits/sec  
[  3] 18.0-19.0 sec     4.12 MBytes      34.6 Mbits/sec  
[  3] 19.0-20.0 sec     4.12 MBytes      34.6 Mbits/sec  
[  3] 0.0-20.0 sec     86.5 MBytes      36.3 Mbits/sec  
mininet> █
```