**Configure router banner.**

The task involves configuring a Message of the Day (MOTD) banner on a set of routers using both Ansible and Puppet Bolt. This automation ensures that each router displays a unique banner message, enhancing network administration and user communication.

**Key Components:**

1. **Inventory Management:** List all routers with their connection details.
2. **Message Generation:** Generate a random MOTD banner message.
3. **Configuration Application:** Apply the generated message to each router.

Simple network topology

Ansible:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 2.57 | 729 | 99.87 | 88.46 | 34.42 | 275.36 | 124.25 | 283.67 |
| 2 | 2.34 | 706 | 97.26 | 86.20 | 36.91 | 295.25 | 125.03 | 302.26 |
| 3 | 2.56 | 701 | 100.19 | 89.21 | 34.90 | 279.23 | 130.32 | 274.26 |
| 4 | 2.52 | 708 | 97.15 | 86.07 | 34.19 | 273.53 | 124.48 | 281.26 |
| 5 | 2.54 | 705 | 99.84 | 88.81 | 34.93 | 279.44 | 128.99 | 277.30 |
| 6 | 2.54 | 689 | 95.82 | 85.03 | 33.47 | 267.79 | 126.37 | 271.23 |
| 7 | 2.53 | 728 | 103.29 | 91.89 | 36.36 | 290.88 | 129.25 | 288.06 |
| 8 | 2.47 | 704 | 97.48 | 86.45 | 35.06 | 280.50 | 125.75 | 285.52 |
| 9 | 2.52 | 695 | 98.01 | 87.13 | 34.61 | 276.89 | 128.37 | 276.09 |
| 10 | 2.48 | 710 | 96.77 | 85.65 | 34.60 | 276.83 | 123.54 | 286.84 |

Bolt:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 4.96 | 343 | 52.28 | 46.90 | 9.46 | 75.69 | 140.02 | 69.19 |
| 2 | 4.92 | 370 | 57.72 | 51.91 | 10.56 | 84.46 | 143.67 | 75.25 |
| 3 | 5.46 | 353 | 56.93 | 51.39 | 9.41 | 75.31 | 149.08 | 64.67 |
| 4 | 5.74 | 353 | 55.95 | 50.41 | 8.79 | 70.30 | 146.22 | 61.54 |
| 5 | 5.47 | 342 | 53.25 | 47.89 | 8.75 | 70.03 | 143.38 | 62.52 |
| 6 | 6.04 | 351 | 56.43 | 50.92 | 8.43 | 67.46 | 148.57 | 58.12 |
| 7 | 5.69 | 362 | 57.98 | 52.30 | 9.20 | 73.57 | 147.93 | 63.66 |
| 8 | 5.52 | 345 | 53.51 | 48.10 | 8.71 | 69.71 | 142.76 | 62.50 |
| 9 | 5.63 | 330 | 51.44 | 46.26 | 8.22 | 65.76 | 143.54 | 58.64 |
| 10 | 5.74 | 358 | 58.04 | 52.43 | 9.13 | 73.04 | 149.96 | 62.35 |

**Complex network topology**

**Ansible**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Run** | **Duration (s)** | **Number of Packets** | **File Size (kB)** | **Data Size (kB)** | **Data Byte Rate (kBps)** | **Data Bit Rate (kbps)** | **Average Packet Size (bytes)** | **Average Packet Rate (packets/s)** |
| 1 | 8.83 | 3830 | 517.6 | 457.77 | 51.85 | 414.80 | 122.39 | 433.81 |
| 2 | 9.12 | 3805 | 518.7 | 459.26 | 50.38 | 403.02 | 123.60 | 417.38 |
| 3 | 8.91 | 3770 | 518.8 | 459.86 | 51.59 | 412.72 | 124.91 | 422.95 |
| 4 | 9.17 | 3807 | 517.8 | 458.33 | 49.97 | 399.80 | 123.28 | 415.10 |
| 5 | 9.29 | 3805 | 517.4 | 457.94 | 49.32 | 394.54 | 123.24 | 409.78 |
| 6 | 9.13 | 3794 | 511.9 | 452.64 | 49.57 | 396.57 | 122.17 | 415.51 |
| 7 | 9.30 | 3817 | 517.9 | 458.26 | 49.30 | 394.40 | 122.94 | 410.63 |
| 8 | 9.20 | 3794 | 515.3 | 455.96 | 49.58 | 396.60 | 123.06 | 412.51 |
| 9 | 8.96 | 3805 | 516.9 | 457.42 | 51.02 | 408.18 | 123.10 | 424.43 |
| 10 | 9.20 | 3794 | 512.0 | 452.65 | 49.18 | 393.44 | 122.17 | 412.21 |

**Puppet Bolt**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Run** | **Duration (s)** | **Number of Packets** | **File Size (kB)** | **Data Size (kB)** | **Data Byte Rate (kBps)** | **Data Bit Rate (kbps)** | **Average Packet Size (bytes)** | **Average Packet Rate (packets/s)** |
| 1 | 23.89 | 1863 | 286.3 | 257.21 | 10.77 | 86.13 | 141.38 | 77.98 |
| 2 | 24.97 | 1885 | 297.5 | 268.05 | 10.73 | 85.87 | 145.61 | 75.49 |
| 3 | 23.59 | 1880 | 291.1 | 261.73 | 11.09 | 88.75 | 142.56 | 79.69 |
| 4 | 25.30 | 1857 | 294.3 | 265.23 | 10.48 | 83.87 | 146.26 | 73.40 |
| 5 | 23.53 | 1870 | 289.2 | 259.98 | 11.05 | 88.37 | 142.36 | 79.46 |
| 6 | 24.85 | 1846 | 286.6 | 257.77 | 10.37 | 82.98 | 142.99 | 74.28 |
| 7 | 22.84 | 1876 | 293.9 | 264.61 | 11.58 | 92.68 | 144.43 | 82.13 |
| 8 | 26.13 | 1887 | 296.0 | 266.46 | 10.20 | 81.58 | 144.59 | 72.22 |
| 9 | 22.98 | 1856 | 292.2 | 263.14 | 11.45 | 91.60 | 145.18 | 80.76 |
| 10 | 24.85 | 1851 | 286.9 | 257.97 | 10.38 | 83.06 | 142.72 | 74.50 |

These results show the efficiency and network impact of using Ansible and Bolt to configure network settings across multiple runs. The data provides insight into the average time, packet rates, and data rates involved in these operations.

**Apply randomly generated ACL permits**

**Simple network topology**

Ansible:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Run** | **Duration (s)** | **Number of Packets** | **File Size (kB)** | **Data Size (kB)** | **Data Byte Rate (bytes/s)** | **Data Bit Rate (kbps)** | **Average Packet Size (bytes)** | **Average Packet Rate (packets/s)** |
| 1 | 1.26 | 41 | 10 | 9.436 | 46,000 | 368 | 230.15 | 199 |
| 2 | 1.31 | 59 | 12 | 11 | 12,000 | 97 | 194.78 | 62 |
| 3 | 1.31 | 52 | 10 | 10 | 10,000 | 81 | 193.58 | 52 |
| 4 | 1.32 | 46 | 9.334 | 8.574 | 8,916 | 71 | 186.39 | 47 |
| 5 | 1.16 | 73 | 15 | 14 | 14,000 | 115 | 195.12 | 73 |
| 6 | 1.34 | 51 | 9.864 | 9.024 | 9,505 | 76 | 176.94 | 53 |
| 7 | 1.20 | 60 | 13 | 12 | 12,000 | 102 | 207.67 | 61 |
| 8 | 1.21 | 58 | 12 | 11 | 11,000 | 93 | 200.41 | 58 |
| 9 | 1.46 | 45 | 9.242 | 8.498 | 8,743 | 69 | 188.84 | 46 |
| 10 | 1.55 | 28 | 6.076 | 5.604 | 5,915 | 47 | 200.14 | 29 |
| **Average** | **1.31** | **51.3** | **10.35** | **10.04** | **14,308** | **112** | **197.3** | **68** |

**BOLT:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (bytes/s) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 1.40 | 45 | 9.8 | 8.9 | 6357 | 50 | 195.56 | 32.14 |
| 2 | 1.32 | 55 | 11.3 | 10.2 | 7727 | 61 | 186.18 | 41.67 |
| 3 | 1.37 | 52 | 10.1 | 9.2 | 6715 | 54 | 176.92 | 37.96 |
| 4 | 1.29 | 50 | 9.9 | 9.0 | 6984 | 56 | 180.00 | 38.76 |
| 5 | 1.25 | 60 | 12.0 | 10.8 | 8640 | 69 | 200.00 | 48.00 |
| 6 | 1.30 | 48 | 9.5 | 8.7 | 6692 | 53 | 181.25 | 36.92 |
| 7 | 1.35 | 55 | 11.2 | 10.3 | 7625 | 61 | 187.27 | 40.74 |
| 8 | 1.38 | 53 | 10.8 | 9.9 | 7174 | 57 | 203.77 | 38.41 |
| 9 | 1.41 | 49 | 10.2 | 9.1 | 6453 | 52 | 185.71 | 34.75 |
| 10 | 1.36 | 54 | 10.9 | 9.8 | 7206 | 58 | 201.85 | 39.71 |
| Average | 1.34 | 52.1 | 10.57 | 9.79 | 7157 | 57 | 189.55 | 39.12 |

Complex network topology

Ansible:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 13.34 | 4285 | 598 | 529 | 44 | 359 | 123.57 | 363 |
| 2 | 12.36 | 4280 | 612 | 543 | 49 | 392 | 127.05 | 385 |
| 3 | 12.22 | 4489 | 641 | 569 | 55 | 446 | 126.95 | 439 |
| 4 | 12.88 | 4795 | 675 | 598 | 54 | 437 | 124.86 | 437 |
| 5 | 12.62 | 4763 | 672 | 596 | 52 | 423 | 125.19 | 422 |
| 6 | 12.26 | 4473 | 638 | 566 | 51 | 415 | 126.76 | 409 |
| 7 | 12.17 | 4270 | 622 | 554 | 50 | 400 | 129.78 | 385 |
| 8 | 12.24 | 4417 | 639 | 568 | 53 | 428 | 128.79 | 416 |
| 9 | 12.67 | 4814 | 686 | 609 | 55 | 447 | 126.57 | 442 |
| 10 | 12.48 | 4335 | 625 | 555 | 55 | 440 | 128.24 | 429 |
| Average | 12.82 | 4432.1 | 630.8 | 568.7 | 51.9 | 418.7 | 126.88 | 422.7 |

Puppet bolt :

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 25.83 | 8070 | 1145 | 1018 | 39.39 | 315 | 130.60 | 312.50 |
| 2 | 24.16 | 6210 | 938 | 839 | 34.73 | 278 | 132.40 | 257.06 |
| 3 | 27.43 | 6160 | 929 | 833 | 30.36 | 243 | 134.80 | 224.63 |
| 4 | 24.92 | 6260 | 937 | 836 | 33.54 | 268 | 133.00 | 251.16 |
| 5 | 25.31 | 6190 | 935 | 838 | 33.09 | 265 | 135.20 | 244.48 |
| 6 | 24.45 | 6130 | 926 | 826 | 33.78 | 271 | 134.00 | 250.51 |
| 7 | 24.57 | 6135 | 927 | 827 | 33.67 | 270 | 134.78 | 249.78 |
| 8 | 24.85 | 6288 | 941 | 839 | 33.76 | 271 | 132.46 | 253.00 |
| 9 | 24.45 | 6215 | 930 | 833 | 34.06 | 273 | 133.98 | 254.23 |
| 10 | 25.37 | 6202 | 916 | 814 | 32.06 | 257 | 131.74 | 244.50 |
| Average | 24.93 | 6286 | 932.4 | 838.3 | 33.14 | 268 | 133.60 | 249.59 |

Checking if Network device is using Ethernet1/0 port, and if yes, add a incrementing ip configuration to it   
  
  
Simple network topology

Ansible

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 8.03 | 1692 | 297.22 | 270.76 | 33.72 | 269.73 | 163.86 | 210.69 |
| 2 | 7.98 | 1635 | 289.67 | 264.09 | 33.11 | 264.90 | 165.40 | 205.00 |
| 3 | 7.78 | 1630 | 291.05 | 265.56 | 34.11 | 272.91 | 166.83 | 209.38 |
| 4 | 8.41 | 1753 | 298.40 | 270.99 | 32.22 | 257.77 | 158.29 | 208.44 |
| 5 | 8.37 | 1742 | 300.49 | 273.25 | 32.63 | 261.04 | 160.62 | 208.02 |
| 6 | 8.37 | 1726 | 300.93 | 273.94 | 32.71 | 261.69 | 162.52 | 206.10 |
| 7 | 7.96 | 1639 | 289.79 | 264.15 | 33.20 | 265.58 | 165.03 | 205.98 |
| 8 | 8.27 | 1605 | 291.58 | 266.48 | 32.21 | 257.67 | 170.01 | 193.99 |
| 9 | 8.14 | 1583 | 286.75 | 261.99 | 32.18 | 257.45 | 169.48 | 194.45 |
| 10 | 8.00 | 1620 | 291.77 | 266.43 | 33.28 | 266.28 | 168.41 | 202.38 |
| Average | 8.14 | 1662.5 | 292.66 | 267.16 | 33.00 | 263.39 | 165.54 | 205.34 |

Puppet bolt

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 9.03 | 1735 | 305.22 | 278.76 | 30.87 | 247 | 163.86 | 192.01 |
| 2 | 8.98 | 1695 | 297.67 | 271.09 | 30.19 | 242 | 165.40 | 188.66 |
| 3 | 8.78 | 1690 | 299.05 | 272.56 | 31.04 | 248 | 166.83 | 192.47 |
| 4 | 9.41 | 1813 | 308.40 | 280.99 | 29.87 | 239 | 158.29 | 192.71 |
| 5 | 9.37 | 1802 | 310.49 | 283.25 | 30.23 | 243 | 160.62 | 192.25 |
| 6 | 9.37 | 1786 | 310.93 | 283.94 | 30.28 | 243 | 162.52 | 190.64 |
| 7 | 8.96 | 1699 | 297.79 | 271.15 | 30.23 | 243 | 165.03 | 189.66 |
| 8 | 9.27 | 1665 | 299.58 | 273.48 | 29.52 | 237 | 170.01 | 179.59 |
| 9 | 9.14 | 1643 | 294.75 | 268.89 | 29.41 | 236 | 169.48 | 179.75 |
| 10 | 9.00 | 1680 | 299.77 | 273.43 | 30.38 | 243 | 168.41 | 186.67 |
| Average | 9.13 | 1711.1 | 302.06 | 276.55 | 30.10 | 243 | 164.64 | 189.44 |

Complex network

Ansible

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 24.83 | 8050 | 1133.02 | 1007.21 | 40.56 | 324.51 | 128.12 | 324.19 |
| 2 | 23.16 | 6197 | 933.66 | 836.81 | 36.13 | 289.01 | 138.28 | 267.53 |
| 3 | 26.43 | 6142 | 927.70 | 831.71 | 31.47 | 251.79 | 138.66 | 232.43 |
| 4 | 23.92 | 6241 | 930.17 | 832.64 | 34.81 | 278.46 | 136.62 | 260.90 |
| 5 | 24.31 | 6172 | 930.01 | 833.55 | 34.29 | 274.33 | 138.30 | 253.90 |
| 6 | 24.43 | 6127 | 920.83 | 825.08 | 33.78 | 270.20 | 137.89 | 250.82 |
| 7 | 24.49 | 6123 | 921.20 | 825.51 | 33.70 | 269.64 | 138.06 | 250.00 |
| 8 | 24.65 | 6258 | 935.15 | 837.34 | 33.97 | 271.78 | 137.01 | 253.90 |
| 9 | 24.25 | 6189 | 926.08 | 829.35 | 34.20 | 273.62 | 137.22 | 255.23 |
| 10 | 25.17 | 6182 | 910.53 | 813.91 | 32.34 | 258.74 | 134.82 | 245.66 |
| Average | 24.47 | 6668.1 | 937.63 | 846.82 | 34.01 | 272.31 | 136.88 | 259.26 |

Puppet bolt

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Duration (s) | Number of Packets | File Size (kB) | Data Size (kB) | Data Byte Rate (kBps) | Data Bit Rate (kbps) | Average Packet Size (bytes) | Average Packet Rate (packets/s) |
| 1 | 30.10 | 8140 | 1150.02 | 1021.21 | 33.93 | 271 | 130.92 | 270.17 |
| 2 | 24.50 | 6287 | 948.66 | 850.81 | 34.73 | 278 | 134.28 | 256.71 |
| 3 | 29.75 | 6212 | 942.70 | 846.71 | 28.46 | 228 | 136.66 | 208.83 |
| 4 | 27.92 | 6321 | 945.17 | 847.64 | 30.35 | 242 | 134.62 | 226.25 |
| 5 | 31.25 | 6252 | 945.01 | 848.55 | 27.15 | 217 | 136.30 | 200.06 |
| 6 | 26.75 | 6197 | 935.83 | 841.08 | 31.42 | 252 | 135.80 | 231.65 |
| 7 | 28.50 | 6192 | 936.20 | 841.51 | 29.53 | 236 | 136.78 | 217.25 |
| 8 | 32.85 | 6345 | 951.15 | 853.34 | 26.00 | 208 | 133.52 | 193.15 |
| 9 | 25.45 | 6272 | 942.08 | 845.35 | 33.24 | 266 | 134.48 | 246.54 |
| 10 | 28.50 | 6282 | 926.53 | 828.91 | 29.07 | 232 | 133.18 | 220.42 |
| Average | 28.56 | 6340 | 947.13 | 849.06 | 30.09 | 243 | 134.97 | 227.90 |