

Vježba 13: Napredno korištenje naredbe ping i tracert

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PRIPREMA

1. Koja je uloga protokola ICMP?

- ICMP, standardiziran standardom RFC 792, komunikacijski je protokol koji je ugrađen u svaki IP modul kako bi usmjerinicima ili računalima omogućio slanje kontrolnih poruka o greškama. Ulog ICMP je prijavljivanje grešaka, u komunikaciji, bez njihovog ispravljanja.

2. Koja je uloga TTL polja u paketu?

- TTL ili „Time to Live“ je brojač koji označava vrijeme postojanja paketa u mreži; mjeri se u sekundama, čvor koji obrađuje paket umanjuje vrijednost brojača za najmanje 1, a kad vrijednost polja dosegne nulu paket se odbacuje, uklanja s mreže. Time se sprječavaju beskonačne petlje paketa do kojih može doći uslijed poremećaja u tablicama usmjeravanja

3. Na koji način se naredba ping koristi u dijagnostici mreže?

- Ping je osnovni mrežni alat koji služi za provjeru dostupnosti određenog hosta povezanog u IP mrežu. To se postiže slanjem paketa sa ICMP porukom prema odredišnom računalu. Šalje se paket echo request, a iščekuje ICMP echo response(odgovor).

IZVOĐENJE VJEŽBE

1. Naredba ping

a) U komandnoj liniji računala, isprobajte naredbu ping. U bilježnicu ispišite sadržaj ekrana.

```
C:\Users\učenik>ping 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\učenik>
```

b) Koja je veličina paketa koji se šalje?

- Šalje se paket veličine 32 bajta.

c) Koliko je upita poslano? Sadrže li svi iste podatke? Ako ne, koji je razlog?

- Poslano je 4 upita. Svaki upit sadrži iste podatke

d) Koja je vrijednost TTL u odgovorima na ping request? Što ona predstavlja?

- Vrijednost TTL je **128**. TTL, tj. „Time to Live“, a odnosi se na količinu vremena ili "skokova" za koje je paket postavljen da postoji unutar mreže prije nego što ga usmjerivač odbaci.

e) Uz pomoć naredbe `-?`, proučite i zapišite opcije.

```
C:\Users\učenik>ping -?

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
           [-r count] [-s count] [[-j host-list] | [-k host-list]]
           [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
           [-4] [-6] target_name

Options:
  -t             Ping the specified host until stopped.
                  To see statistics and continue - type Control-Break;
                  To stop - type Control-C.
  -a             Resolve addresses to hostnames.
  -n count       Number of echo requests to send.
  -l size        Send buffer size.
  -f             Set Don't Fragment flag in packet (IPv4-only).
  -i TTL         Time To Live.
  -v TOS         Type Of Service (IPv4-only. This setting has been deprecated
                  and has no effect on the type of service field in the IP
                  Header).
  -r count       Record route for count hops (IPv4-only).
  -s count       Timestamp for count hops (IPv4-only).
  -j host-list   Loose source route along host-list (IPv4-only).
  -k host-list   Strict source route along host-list (IPv4-only).
  -w timeout     Timeout in milliseconds to wait for each reply.
  -R            Use routing header to test reverse route also (IPv6-only).
                  Per RFC 5095 the use of this routing header has been
                  deprecated. Some systems may drop echo requests if
                  this header is used.
  -S srcaddr     Source address to use.
  -c compartment Routing compartment identifier.
  -p            Ping a Hyper-V Network Virtualization provider address.
  -4            Force using IPv4.
  -6            Force using IPv6.

C:\Users\učenik>
```

f) Utvrdite i objasnite što se događa pri slanju paketa kojem je TTL polje postavljeno na 3, a odredišno računalo je udaljeno više od 3 skoka.

- Kada je odredišno računalo udaljeno više od 3 skoka, a TTL je postavljen na 3 - paket neće doći do odredišta. Zato što će TTL doći do 0 prije nego što dođe do odredišta

```
C:\Users\učenik>ping -i 3 google.com

Pinging google.com [216.58.205.46] with 32 bytes of data:
Reply from 82.132.1.225: TTL expired in transit.
Reply from 82.132.1.225: TTL expired in transit.
Reply from 82.132.1.225: TTL expired in transit.
Reply from 82.132.1.225: TTL expired in transit.

Ping statistics for 216.58.205.46:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\učenik>
```

a) Isprobajte naredbu dodavanjem parametra -t. Kako sada radi ping?

```
C:\Users\učenik>ping -t 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 7, Received = 7, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\Users\učenik>
```

- Ping sada radi tako da šalje „beskonačno mnogo“ paketa do našeg zaustavljanja (pritiskom tipki Ctrl+C)

b) Isprobajte naredbu dodavanjem parametra -a. Kako sada radi ping?

```
C:\Users\učenik>ping -a 127.0.0.1

Pinging WS5_LAB_2_3 [127.0.0.1] with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- Ping sada radi tako da uz normalno slanje paketa, ispisuje i „hostname“ računala kojem šaljemo pakete

c) Isprobajte naredbu dodavanjem parametra -n. Kako sada radi ping?

```
C:\Users\učenik>ping -n 1 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\učenik>
```

- Ping sada radi tako da sada šalje određen broj paketa umjesto standardnih četiri

d) Isprobajte naredbu dodavanjem parametra -l (npr. 10000). Kako sada radi ping?

```
C:\Users\učenik>ping -l 10000 127.0.0.1

Pinging 127.0.0.1 with 10000 bytes of data:
Reply from 127.0.0.1: bytes=10000 time<1ms TTL=128
Reply from 127.0.0.1: bytes=10000 time<1ms TTL=128
Reply from 127.0.0.1: bytes=10000 time<1ms TTL=128
Reply from 127.0.0.1: bytes=10000 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\učenik>
```

- Ping sada radi tako da šalje pakete veličine od 10 000 bajta umjesto standardnih 32 bajta

e) Isprobajte naredbu dodavanjem parametra -i. Kako sada radi ping? Pomoću ove naredbe pokušajte otkriti koliko je skokova potrebno za dohvatiti www.google.hr?

```
C:\Users\učenik>ping -i 3 google.com

Pinging google.com [216.58.205.46] with 32 bytes of data:
Reply from 82.132.1.225: TTL expired in transit.
Reply from 82.132.1.225: TTL expired in transit.
Reply from 82.132.1.225: TTL expired in transit.
Reply from 82.132.1.225: TTL expired in transit.

Ping statistics for 216.58.205.46:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\učenik>
```

- „ping -i 3 google.com“ naredba mijenja broj TTL upućen adresi: google.com (postoji mogućnost da neće doći do odredišta, ako nije dovoljno velik)

```

C:\Users\učenik>ping -i 7 google.com

Pinging google.com [216.58.205.46] with 32 bytes of data:
Reply from 216.58.205.46: bytes=32 time=9ms TTL=111
Reply from 216.58.205.46: bytes=32 time=9ms TTL=111
Reply from 216.58.205.46: bytes=32 time=9ms TTL=111
Reply from 216.58.205.46: bytes=32 time=9ms TTL=111

Ping statistics for 216.58.205.46:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 9ms, Maximum = 9ms, Average = 9ms

C:\Users\učenik>ping -i 6 google.com

Pinging google.com [216.58.205.46] with 32 bytes of data:
Reply from 172.17.254.33: TTL expired in transit.
Reply from 172.17.254.33: TTL expired in transit.
Reply from 172.17.254.33: TTL expired in transit.
Reply from 172.17.254.33: TTL expired in transit.

Ping statistics for 216.58.205.46:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

```

- Vidimo kako je potreban broj koraka, broj 7, jer s TTL 6 paket je uništen

f) Postoji li način da se iz primljenog paketa očita put kojim je paket prošao kroz mrežu?

- Možemo koristiti dijagnostički alat Traceroute za prikaz rute (put) i kašnjenje prilikom prijenosa paketa preko mreže baziranoj na protokolu IP

2. Naredba tracert

```

C:\Users\učenik>tracert google.com

Tracing route to google.com [216.58.205.46]
over a maximum of 30 hops:

  0  <1 ms    <1 ms    <1 ms    192.168.50.5
  1  <1 ms    <1 ms    <1 ms    82.132.1.1
  2  <1 ms    <1 ms    <1 ms    82.132.1.225
  3  1 ms     1 ms     <1 ms    172.16.200.49
  4  <1 ms    <1 ms    <1 ms    172.17.254.54
  5  1 ms     <1 ms    <1 ms    172.17.254.33
  6  9 ms     9 ms     9 ms     mil04s24-in-f46.1e100.net [216.58.205.46]

Trace complete.

C:\Users\učenik>

```

- Vidimo kako je potreban broj skokova 7, kao što smo i dobili kao rezultat u 1.e zadatku