Ex 1:

Learn to use commands like tcp dump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine. give correct code and ouput run in eclipse java

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Program:

```
package computernetworks;
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
public class NetworkComandExecuter {
   // Method to execute command and print output
   public static void runCommand(String command) {
      try {
         // Run command using ProcessBuilder
         ProcessBuilder builder = new ProcessBuilder()
         // For Windows, use "cmd.exe /c"
         builder.command("cmd.exe", "/c", command);
         builder.redirectErrorStream(true);
         Process process = builder.start();
         // Read and print command output
         BufferedReader reader = new BufferedReader(new
InputStreamReader(process.getInputStream()));
         String line;
         System.out.println("\n--- Output of: " + command + " ---");
         while ((line = reader.readLine()) != null) {
            System.out.println(line);
         }
         // Wait until process exits
         int exitCode = process.waitFor();
         System.out.println("\nExited with code: " + exitCode);
```

```
        } catch (IOException | InterruptedException e) {
            e.printStackTrace();
        }
    }
    // Main method
    public static void main(String[] args) {
        // You can change these commands based on your OS
        runCommand("ipconfig");       // Similar to ifconfig (Windows)
        runCommand("ping www.google.com");
        runCommand("tracert www.google.com"); // Use tracert for Windows, traceroute for
Linux
        runCommand("nslookup www.google.com");
        runCommand("netstat -an");
    }
}
```

Output:

```
--- Output of: ipconfig ---
Windows IP Configuration
Wireless LAN adapter Local Area Connection* 1:
   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
Wireless LAN adapter Local Area Connection* 2:
   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
Wireless LAN adapter Wi-Fi:
   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::c408:a2c5:a2a:8d54%3
   IPv4 Address. . . . . . . . . . . : 10.10.5.40
   Subnet Mask . . . . . . . . . . . : 255.255.224.0
   Default Gateway . . . . . . . . . : 10.10.1.1
Exited with code: 0
```

--- Output of: ping www.google.com ---

Pinging www.google.com [172.217.24.4] with 32 bytes of data:

Reply from 172.217.24.4: bytes=32 time=4ms TTL=120

Reply from 172.217.24.4: bytes=32 time=3ms TTL=120

Reply from 172.217.24.4: bytes=32 time=8ms TTL=120

Reply from 172.217.24.4: bytes=32 time=12ms TTL=120

Ping statistics for 172.217.24.4:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 3ms, Maximum = 12ms, Average = 6ms

Exited with code: 0

--- Output of: tracert www.google.com ---

Tracing route to www.google.com [172.217.24.4]

over a maximum of 30 hops:

1	2 ms	1 ms	2 ms	10.10.1.1
2	68 ms	5 ms	3 ms	static-181.25.194.14-tataidc.co.in [14.194.25.181]
3	8 ms	7 ms	7 ms	142.250.171.162
4	4 ms	6 ms	4 ms	216.239.43.135
5	3 ms	5 ms	4 ms	108.170.231.129
6	3 ms	3 ms	8 ms	lcmaaa-an-in-f4.1e100.net [172.217.24.4]

Trace complete.

Exited with code: 0

--- Output of: nslookup www.google.com ---

Non-authoritative answer:

Server: dns.google

Address: 8.8.8.8

Name: www.google.com

Addresses: 2404:6800:4007:816::2004

172.217.24.4

Exited with code: 0

--- Output of: netstat -an ---

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	0.0.0.0:0	LISTENING
TCP	0.0.0.0:445	0.0.0.0:0	LISTENING
TCP	0.0.0.0:3306	0.0.0.0:0	LISTENING
TCP	0.0.0.0:5040	0.0.0.0:0	LISTENING
TCP	0.0.0.0:33060	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49664	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49665	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49668	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49669	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49670	0.0.0.0:0	LISTENING
TCP	0.0.0.0:49680	0.0.0.0:0	LISTENING
TCP	10.10.5.40:139	0.0.0.0:0	LISTENING
TCP	10.10.5.40:49522	4.213.25.242:443	ESTABLISHED
TCP	10.10.5.40:49790	3.219.171.133:443	TIME_WAIT
TCP	10.10.5.40:49821	52.98.87.242:443	TIME_WAIT
TCP	10.10.5.40:49921	4.213.25.241:443	ESTABLISHED
TCP	10.10.5.40:49960	20.189.173.4:443	TIME_WAIT
TCP	10.10.5.40:49972	20.43.150.84:443	TIME_WAIT
TCP	10.10.5.40:49973	20.247.162.75:443	TIME_WAIT
TCP	10.10.5.40:49974	52.230.59.222:443	TIME_WAIT
TCP	10.10.5.40:50062	140.82.113.25:443	ESTABLISHED
TCP	10.10.5.40:50070	20.195.84.23:443	ESTABLISHED
TCP	10.10.5.40:50074	20.195.84.23:443	ESTABLISHED
TCP	10.10.5.40:50096	20.42.73.27:443	TIME_WAIT
TCP	10.10.5.40:50097	20.42.73.27:443	TIME_WAIT
TCP	10.10.5.40:50122	172.217.194.188:5228	ESTABLISHED
TCP	10.10.5.40:50127	40.99.71.210:443	TIME_WAIT

TCP	10.10.5.40:50128	40.99.71.210:443	TIME_WAIT
TCP	10.10.5.40:50129	20.249.168.239:443	ESTABLISHED
TCP	10.10.5.40:50135	8.8.4.4:443	ESTABLISHED
TCP	10.10.5.40:50136	8.8.8.8:443	ESTABLISHED
TCP	10.10.5.40:50137	8.8.8.8:443	ESTABLISHED
TCP	10.10.5.40:50138	18.161.229.17:443	TIME_WAIT
TCP	10.10.5.40:50139	142.251.221.110:443	TIME_WAIT
TCP	10.10.5.40:50140	142.251.221.110:443	TIME_WAIT
TCP	10.10.5.40:50151	150.171.28.11:443	ESTABLISHED
TCP	10.10.5.40:50152	199.232.214.172:80	TIME_WAIT
TCP	10.10.5.40:50154	142.251.43.238:443	ESTABLISHED
TCP	10.10.5.40:50155	142.250.67.35:443	ESTABLISHED
TCP	10.10.5.40:50160	142.251.220.99:443	TIME_WAIT
TCP	10.10.5.40:50161	142.250.183.163:443	TIME_WAIT
TCP	10.10.5.40:50163	34.104.35.123:80	TIME_WAIT
TCP	10.10.5.40:50164	142.250.207.78:443	TIME_WAIT
TCP	10.10.5.40:50165	216.58.206.163:443	TIME_WAIT
TCP	10.10.5.40:50167	8.8.4.4:443	ESTABLISHED
TCP	10.10.5.40:50174	23.62.17.172:443	ESTABLISHED
TCP	10.10.5.40:50175	23.62.16.150:443	ESTABLISHED
TCP	10.10.5.40:50176	23.62.16.150:443	ESTABLISHED
TCP	10.10.5.40:50177	23.62.16.150:443	ESTABLISHED
TCP	10.10.5.40:50178	23.34.81.11:80	ESTABLISHED
TCP	10.10.5.40:50179	23.34.81.11:80	ESTABLISHED
TCP	10.10.5.40:50180	23.34.81.11:80	ESTABLISHED
TCP	10.10.5.40:50181	163.181.160.176:80	TIME_WAIT
TCP	10.10.5.40:50182	163.181.164.170:80	TIME_WAIT
TCP	10.10.5.40:50183	23.199.69.121:80	TIME_WAIT
TCP	10.10.5.40:50184	23.199.69.73:80	TIME_WAIT
TCP	10.10.5.40:50185	199.232.210.172:80	ESTABLISHED

TCP	10.10.5.40:50186	199.232.214.172:80	ESTABLISHED
TCP	10.10.5.40:50187	23.202.229.5:443	ESTABLISHED
TCP	10.10.5.40:50191	198.41.30.198:443	ESTABLISHED
TCP	10.10.5.40:50192	150.171.27.11:443	ESTABLISHED
TCP	10.10.5.40:50196	23.202.229.5:443	ESTABLISHED
TCP	10.10.5.40:50197	20.42.65.93:443	ESTABLISHED
TCP	10.10.5.40:50198	52.98.87.242:443	ESTABLISHED
TCP	10.10.5.40:50199	52.123.129.14:443	ESTABLISHED
TCP	10.10.5.40:50200	20.190.146.34:443	ESTABLISHED
TCP	10.10.5.40:50201	52.109.124.29:443	TIME_WAIT
TCP	10.10.5.40:50202	52.109.56.126:443	ESTABLISHED
TCP	10.10.5.40:50203	52.111.231.8:443	ESTABLISHED
TCP	10.10.5.40:50204	52.109.56.126:443	ESTABLISHED
TCP	10.10.5.40:50205	52.109.56.126:443	ESTABLISHED
TCP	10.10.5.40:50206	52.109.56.126:443	ESTABLISHED
TCP	10.10.5.40:50207	140.82.114.22:443	ESTABLISHED
TCP	10.10.5.40:50208	23.211.60.132:443	ESTABLISHED
TCP	10.10.5.40:50209	23.211.60.132:443	ESTABLISHED
TCP	10.10.5.40:50210	20.207.73.85:443	ESTABLISHED
TCP	10.10.5.40:50211	23.211.60.132:443	ESTABLISHED
TCP	10.10.5.40:50212	52.98.56.210:443	TIME_WAIT
TCP	10.10.5.40:50213	52.98.56.210:443	ESTABLISHED
TCP	10.10.5.40:50214	52.98.56.210:443	TIME_WAIT
TCP	10.10.5.40:50216	52.98.56.210:443	ESTABLISHED
TCP	10.10.5.40:50217	52.98.56.210:443	ESTABLISHED
TCP	10.10.5.40:50218	150.171.27.254:443	ESTABLISHED
TCP	10.10.5.40:50220	13.107.213.254:443	ESTABLISHED
TCP	10.10.5.40:50221	204.79.197.222:443	ESTABLISHED
TCP	10.10.5.40:50222	20.189.173.18:443	ESTABLISHED
TCP	10.10.5.40:50223	52.203.13.17:443	CLOSE_WAIT

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TCP    10.10.5.40:50224       52.203.13.17:443       CLOSE_WAIT
TCP    10.10.5.40:50225       52.2.76.21:443         ESTABLISHED
TCP    10.10.5.40:50226       3.230.217.178:443      ESTABLISHED
TCP    10.10.5.40:50227       35.170.4.174:443       ESTABLISHED
TCP    10.10.5.40:50228       18.161.229.94:443      ESTABLISHED
TCP    10.10.5.40:50229       4.213.133.124:443      ESTABLISHED
TCP    10.10.5.40:50230       54.160.47.90:443       ESTABLISHED
TCP    127.0.0.1:27017        0.0.0.0:0              LISTENING
TCP    127.0.0.1:49676        127.0.0.1:49677        ESTABLISHED
TCP    127.0.0.1:49677        127.0.0.1:49676        ESTABLISHED
TCP    127.0.0.1:49704        127.0.0.1:49705        ESTABLISHED
TCP    127.0.0.1:49705        127.0.0.1:49704        ESTABLISHED
TCP    127.0.0.1:49706        127.0.0.1:49707        ESTABLISHED
TCP    127.0.0.1:49707        127.0.0.1:49706        ESTABLISHED
TCP    127.0.0.1:49708        127.0.0.1:49709        ESTABLISHED
TCP    127.0.0.1:49709        127.0.0.1:49708        ESTABLISHED
TCP    [::]:135               [::]:0                 LISTENING
TCP    [::]:445               [::]:0                 LISTENING
TCP    [::]:3306              [::]:0                 LISTENING
TCP    [::]:33060             [::]:0                 LISTENING
TCP    [::]:49664             [::]:0                 LISTENING
TCP    [::]:49665             [::]:0                 LISTENING
TCP    [::]:49668             [::]:0                 LISTENING
TCP    [::]:49669             [::]:0                 LISTENING
TCP    [::]:49670             [::]:0                 LISTENING
TCP    [::]:49680             [::]:0                 LISTENING
TCP    [::1]:49673            [::]:0                 LISTENING
UDP    0.0.0.0:5050           *:*
UDP    0.0.0.0:5353           *:*
UDP    0.0.0.0:5353           *:*
```

```
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5355           *:*
  UDP    0.0.0.0:54590          *:*
  UDP    0.0.0.0:57450          8.8.8.8:443
  UDP    0.0.0.0:65138          8.8.8.8:443
  UDP    10.10.5.40:137         *:*
  UDP    10.10.5.40:138         *:*
  UDP    10.10.5.40:1900        *:*
  UDP    10.10.5.40:58142       *:*
  UDP    127.0.0.1:1900         *:*
  UDP    127.0.0.1:49664        127.0.0.1:49664
  UDP    127.0.0.1:58143        *:*
  UDP    [::]:5353              *:*
  UDP    [::]:5353              *:*
  UDP    [::]:5355              *:*
  UDP    [::]:54590             *:*
  UDP    [::1]:1900             *:*
  UDP    [::1]:58141            *:*
  UDP    [fe80::c408:a2c5:a2a:8d54%3]:1900  *:*
  UDP    [fe80::c408:a2c5:a2a:8d54%3]:58140  *:*
Exited with code: 0
```