- The OSI Model
- The TCP/IP Model
- How these models look in practice
- An introduction to basic networking tools

Answer the questions below

Let's get started!

No answer needed

✓ Correct Answer

Task 2 ✓ The OSI Model: An Overview

Task 3 ○ Encapsulation

Answer the questions below

Which layer would choose to send data over TCP or UDP?

4 ✓ Correct Answer

Which layer checks received information to make sure that it hasn't been corrupted?

2 ✓ Correct Answer

In which layer would data be formatted in preparation for transmission?

2 ✓ Correct Answer

Which layer transmits and receives data?

1 ✓ Correct Answer

Which layer encrypts, compresses, or otherwise transforms the initial data to give it a standardised format?

6 ✓ Correct Answer

Which layer tracks communications between the host and receiving computers?

5 ✓ Correct Answer

Which layer accepts communication requests from applications?

7 ✓ Correct Answer

Which layer handles logical addressing?

3 ✓ Correct Answer

When sending data over TCP, what would you call the "bite-sized" pieces of data?

Segments ✓ Correct Answer

[Research] Which layer would the FTP protocol communicate with?

7 ✓ Correct Answer Hint

Which transport layer protocol would be best suited to transmit a live video?

UDP ✓ Correct Answer

Task 3 Encapsulation

Task 4 The TCP/IP Model

Task 5 Networking Tools Ping

Task 6 Networking Tools Traceroute

Task 7 Networking Tools WHOIS

Task 8 Networking Tools Dig

Task 9 Further Reading

Answer the questions below

Which model was introduced first, OSI or TCP/IP?

TCP/IP ✓ Correct Answer

Which layer of the TCP/IP model covers the functionality of the Transport layer of the OSI model **(Full Name)**?

Transport ✓ Correct Answer

Which layer of the TCP/IP model covers the functionality of the Session layer of the OSI model **(Full Name)**?

Application ✓ Correct Answer

The Network Interface layer of the TCP/IP model covers the functionality of two layers in the OSI model. These layers are Data Link, and?.. **(Full Name)**?

Physical ✓ Correct Answer

Which layer of the TCP/IP model handles the functionality of the OSI network layer?

Internet ✓ Correct Answer

What kind of protocol is TCP?

Connection-based ✓ Correct Answer Hint

What is SYN short for?

Synchronise ✓ Correct Answer Hint

What is the second step of the three way handshake?

SYN/ACK ✓ Correct Answer

What is the short name for the "Acknowledgement" segment in the three-way handshake?

ACK ✓ Correct Answer

Task 5 Networking Tools Ping

Task 6 Networking Tools Traceroute

Task 7 Networking Tools WHOIS

of these tools do work on other operating systems, but for the sake of simplicity, I'm going to assume that you're running Linux for the rest of this room. The first tool that we're going to look at will be the `ping` command.

The ping command is used when we want to test whether a connection to a remote resource is possible. Usually this will be a website on the internet, but it could also be for a computer on your home network if you want to check if it's configured correctly. Ping works using the ICMP protocol, which is one of the slightly less well-known TCP/IP protocols that were mentioned earlier. The ICMP protocol works on the Network layer of the OSI Model, and thus the Internet layer of the TCP/IP model. The basic syntax for ping is `ping <target>`. In this example we are using ping to test whether a network connection to Google is possible:

```
                    ~$ ping google.com
PING google.com (216.58.198.174) 56(84) bytes of data.
```

Notice that the ping command actually returned the IP address for the Google server that it connected to, rather than the URL that was requested. This is a handy secondary application for ping, as it can be used to determine the IP address of the server hosting a website. One of the big advantages of ping is that it's pretty much ubiquitous to any network enabled device. All operating systems support it out of the box, and even most embedded devices can use ping!

Have a go at the following questions. Any questions about syntax can be answered using the man page for ping (`man ping` on Linux).

Answer the questions below

What command would you use to ping the bbc.co.uk website?

ping bbc.co.uk — ✓ Correct Answer

Ping *muirlandoracle.co.uk*
What is the IPv4 address?

217.160.0.152 — ✓ Correct Answer — Hint

What switch lets you change the interval of sent ping requests?

-i — ✓ Correct Answer — Hint

What switch would allow you to restrict requests to IPv4?

-4 — ✓ Correct Answer

What switch would give you a more verbose output?

-v — ✓ Correct Answer

Task 6 · Networking Tools · Traceroute

Task 7 · Networking Tools · WHOIS

Task 8 · Networking Tools · Dig

Task 9 · Further Reading

Task 6 · Networking Tools · Traceroute

The logical follow-up to the ping command is 'traceroute'. Traceroute can be used to map the path your request takes as it heads to the target machine.

The internet is made up of many, many different servers and end-points, all networked up to each other. This means that, in order to get to the content you actually want, you first need to go through a bunch of other servers. Traceroute allows you to see each of these connections -- it allows you to see every intermediate step between your computer and the resource that you requested. The basic syntax for traceroute on Linux is this: `traceroute <destination>`

By default, the Windows traceroute utility (`tracert`) operates using the same ICMP protocol that ping utilises, and the Unix equivalent operates over UDP. This can be altered with switches in both instances.

```
                ~$ traceroute google.com
traceroute to google.com (216.58.205.46), 30 hops max, 60 byte packets
 1  _gateway (172.16.255.254)  14.883 ms  15.401 ms  15.551 ms
 2  193.60.160.253 (193.60.160.253)  1.464 ms  1.872 ms  2.026 ms
 3  193.60.168.92 (193.60.168.92)  3.084 ms  4.093 ms  4.814 ms
 4  ge-0-3-2.dund-ban1.ja.net (146.97.128.85)  4.768 ms  4.253 ms  4.715 ms
 5  ae1.dund-ban3.ja.net (146.97.64.97)  10.320 ms  5.114 ms  10.589 ms
 6  ae24.leedaq-sbr2.ja.net (146.97.37.181)  11.160 ms  10.855 ms  10.766 ms
 7  ae29.lowdss-sbr1.ja.net (146.97.33.50)  11.992 ms  11.048 ms  10.746 ms
 8  ae31.londtw-sbr2.ja.net (146.97.33.30)  13.558 ms  13.245 ms  13.561 ms
 9  ae28.londtt-sbr1.ja.net (146.97.33.61)  13.541 ms  13.229 ms  11.410 ms
10  72.14.205.74 (72.14.205.74)  15.143 ms  14.607 ms  13.865 ms
11  74.125.242.97 (74.125.242.97)  13.263 ms 74.125.242.65 (74.125.242.65)  12.553 ms  12.904 ms
12  172.253.71.191 (172.253.71.191)  13.943 ms  12.833 ms 172.253.71.189 (172.253.71.189)  12.631 ms
13  lhr48s23-in-f14.1e100.net (216.58.205.46)  13.227 ms  12.258 ms  12.482 ms
```

You can see that it took 13 hops to get from my router (`_gateway`) to the Google server at 216.58.205.46

Now it's your turn. As with before, all questions about switches can be answered with the man page for traceroute (`man traceroute`).

Answer the questions below

Use traceroute on tryhackme.com
Can you see the path your request has taken?

No answer needed — ✓ Correct Answer

What switch would you use to specify an interface when using Traceroute?

-i — ✓ Correct Answer — Hint

What switch would you use if you wanted to use TCP SYN requests when tracing the route?

-T — ✓ Correct Answer

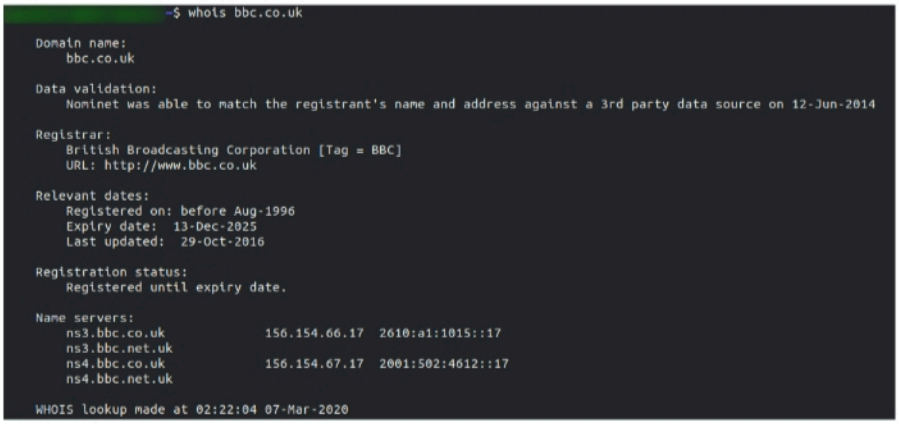
[Lateral Thinking] Which layer of the *TCP/IP* model will traceroute run on by default (Windows)?

Internet — ✓ Correct Answer

Task 7 · Networking Tools · WHOIS

Task 8 · Networking Tools · Dig

Task 9 · Further Reading



This is comparatively a very small amount of information as can often be found. Notice that we've got the domain name, the company that registered the domain, the last renewal, and when it's next due, and a bunch of information about nameservers (which we'll look at in the next task).

Your Turn

Answer the questions below

Perform a whois search on `facebook.com`

No answer needed — ✓ Correct Answer

What is the registrant postal code for facebook.com?

94025 — ✓ Correct Answer

When was the facebook.com domain first registered (Format: DD/MM/YYYY)?

29/03/1997 — ✓ Correct Answer

Perform a whois search on `microsoft.com`

(Note: Please ensure you have read the task above before attempting the next questions.)

No answer needed — ✓ Correct Answer

Which city is the registrant based in?

Redmond — ✓ Correct Answer

[OSINT] What is the name of the golf course that is near the registrant address for microsoft.com?

Bellevue Golf Course — ✓ Correct Answer

What is the registered Tech Email for microsoft.com?

msnhst@microsoft.com — ✓ Correct Answer

Task 8 Networking Tools Dig

Task 9 Further Reading

a great resource to work from. There may be a more up to date version available; however, this edition is cheap, readily available, and most importantly, still very relevant. Whilst it is designed to as a study guide for the CCNA exam, that book serves equally well as a very rounded introduction to networking principles.

Answer the questions below

Read the final thoughts

No answer needed

✓ Correct Answer