Troubleshooting PCs

and other electronics problems

Troubleshooting Theory

1. Identify the problem
2. Create theory of probable cause
3. Test theory
4. Establish plan of action
5. Verify full system functionality
6. Preventative measures
7. Document actions and outcomes.

Identify the Problem

Has anything recently changed on the computer that might have made this problem appear?

What to Think About

A. Is it a *physical* or *digital* problem?
B. Is it caused by the *user*, *program* in use, or something not in your control?
C. Does the problem seem to cause immediate complications?
D. Could there be something be going on behind the scenes?

Before doing anything if possible backup and save work progress before working on the problem.

Establish a theory of probable cause.

Occam's Razor: The simplest of competing theories be preferred to the more complex or that explanations of unknown phenomenon be sought first.

WHAT DO YOU ENCOUNTER?

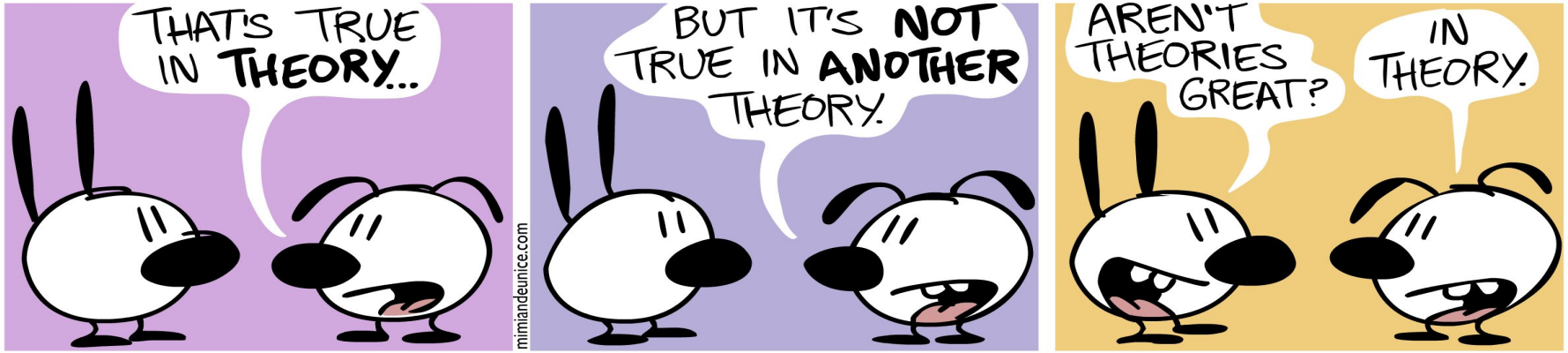
- Does the PC look normal?
- Check the outside of the PC
- What's on the screen?
- Is the PC case hot or vibrating?
- What was on screen before?
- When was the PC last used before this?
- Did any pop-ups or sounds come from the PC?
- Can the problem be duplicated?

Test theory to to determine cause

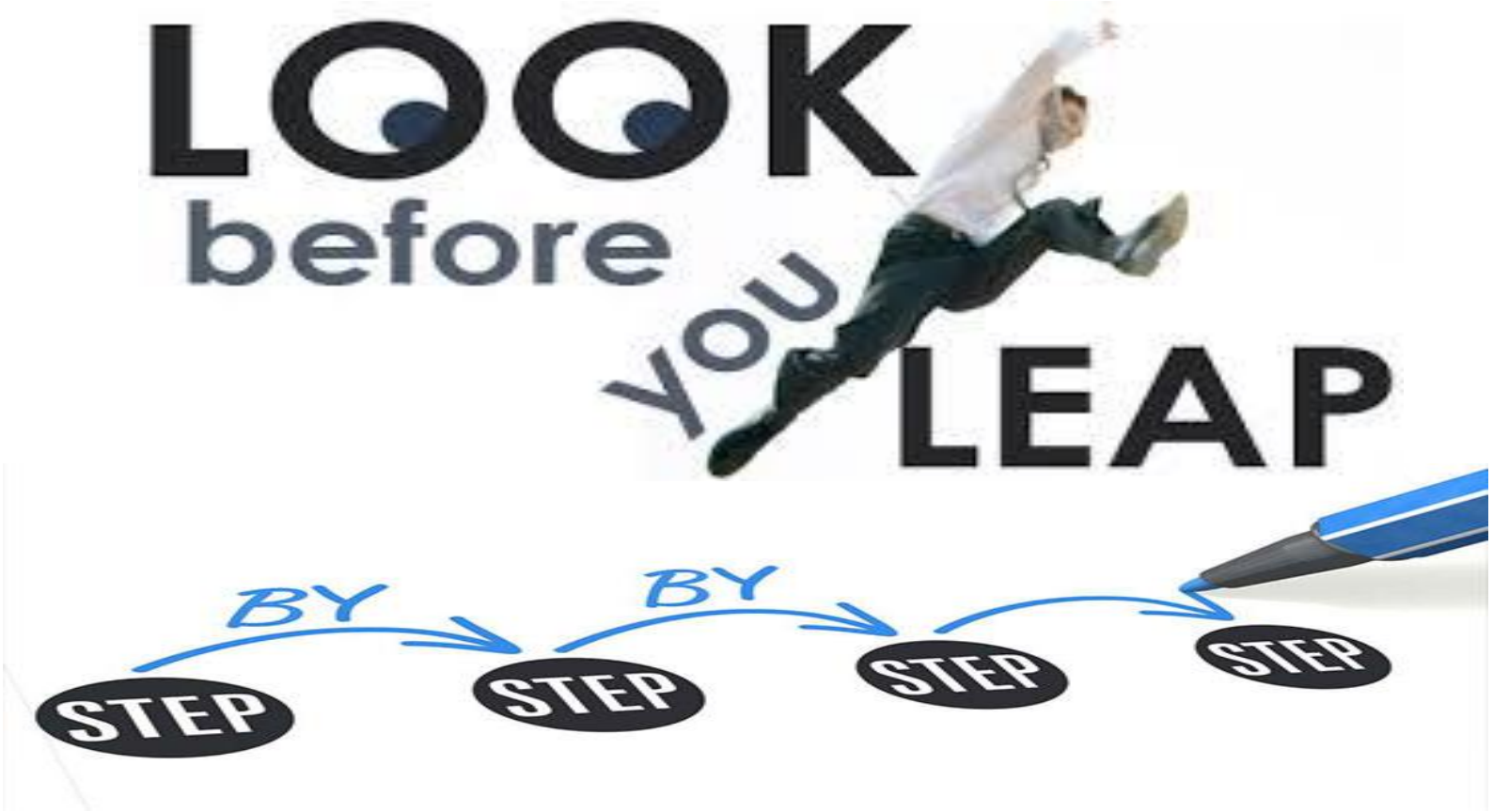
Not all tests will work. If one type of test doesn't solve the problem then try another.

Gather an understanding of the core problem and possible solutions.

If your first test doesn't work. Make sure that your first test doesn't make the second not work.



Establish a plan of action to resolve the problem



Verify and Prevent

Full system functionality is the key to success.

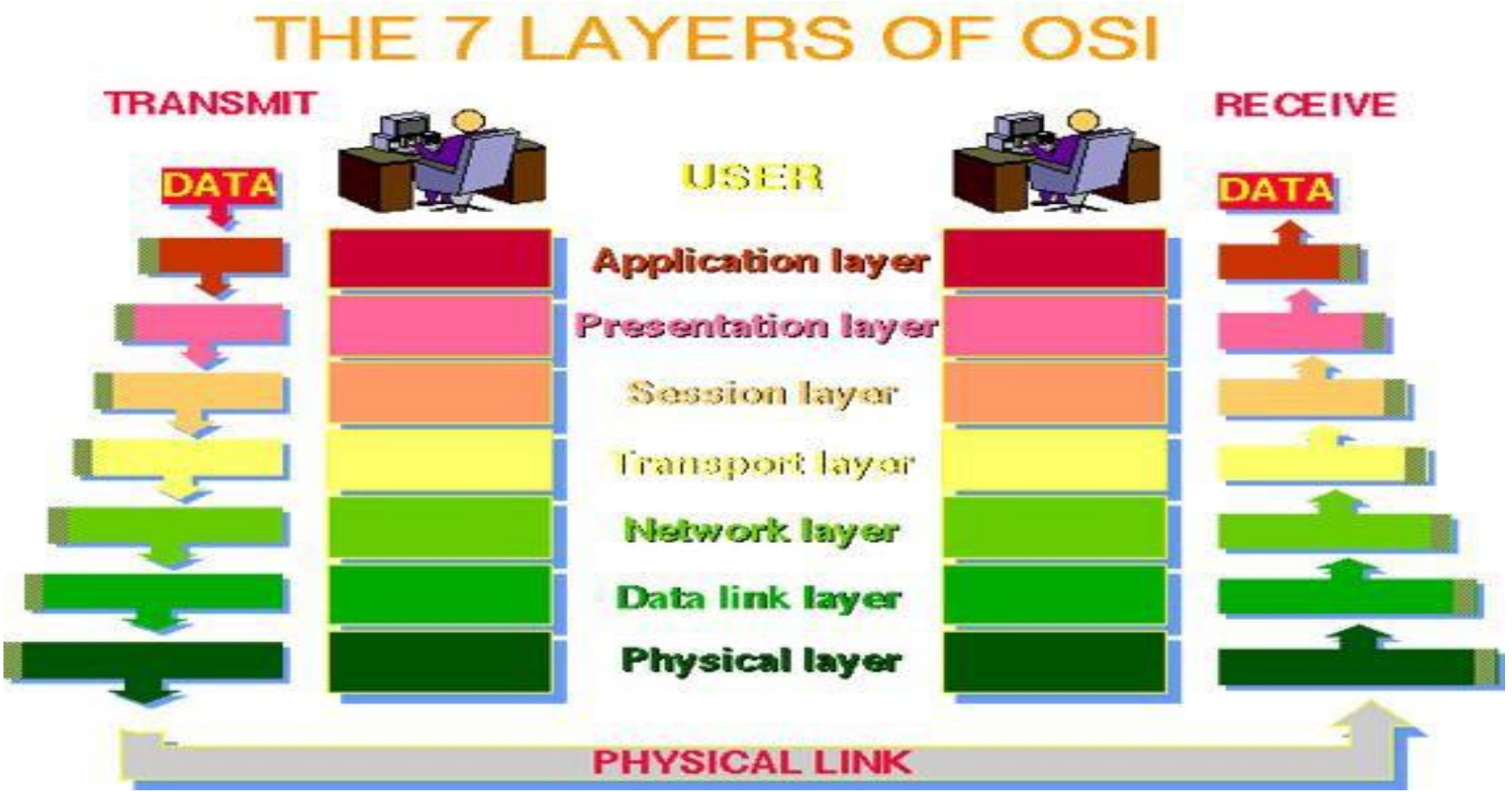
Make sure the PC works the way intend it to work before celebrating a success.

Check for minor errors such as incorrect default settings, text size, mouse and keyboard function, and PC heat and sounds.

Education = Prevention

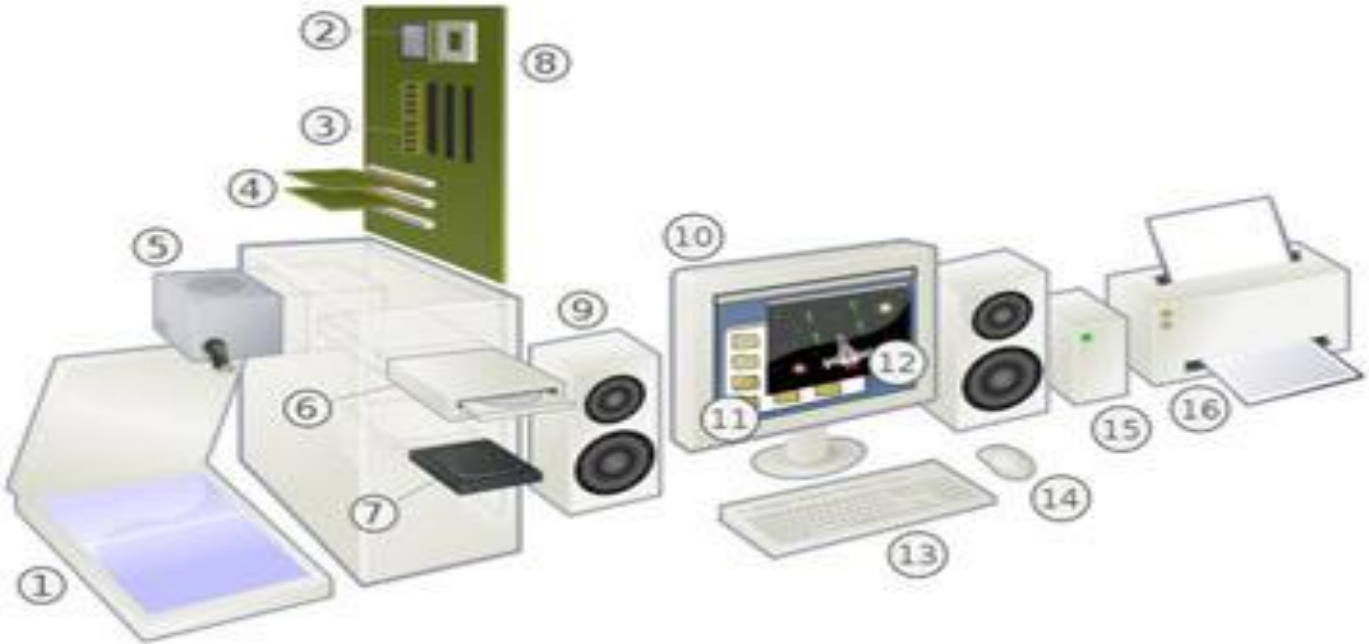
Find the time to tell anyone else about the problem and how it was fixed. Write down the problem, what caused it, and how it was solved in a legible and understanding way.

Open Systems Interconnection (OSI) Model



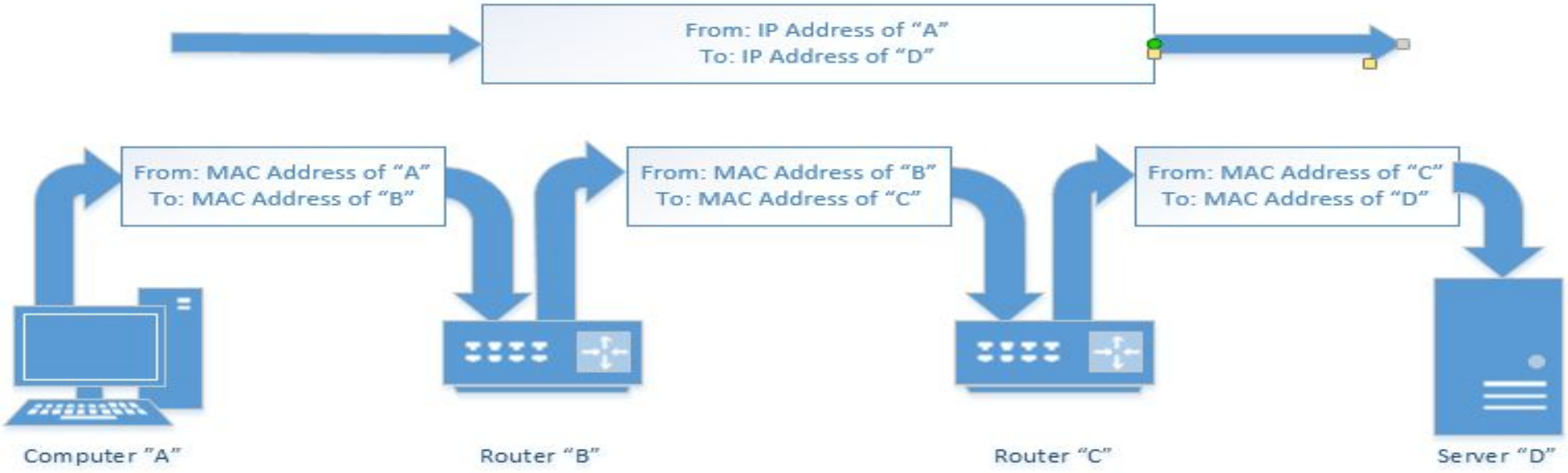
Physical

This is the layer on which the real transmission of data bits takes place through a medium. This layer is, as the name suggests, all the physical stuff that connects the computers together.



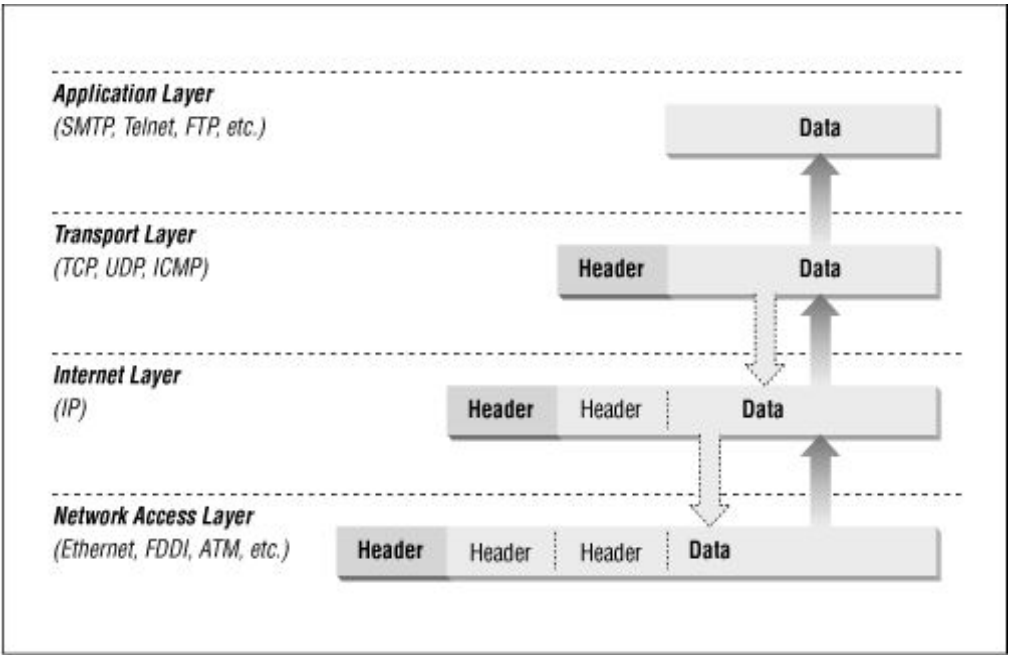
Data Link

This layer is responsible for organising bits into frames and ensuring hop to hop delivery. This is the layer on which the Switches operate on. Since routers operate at the network level, hence we can say that the MAC address resides at the data link layer. All the computers in a specific network get plugged into a switch so that they can communicate with each other.



Network

The main job of this layer is to move packets from source to destination and provide inter-networking. This is the layer that the routers operate on. Since routers operate at the network level, hence we can say that the IP address is at the network level.

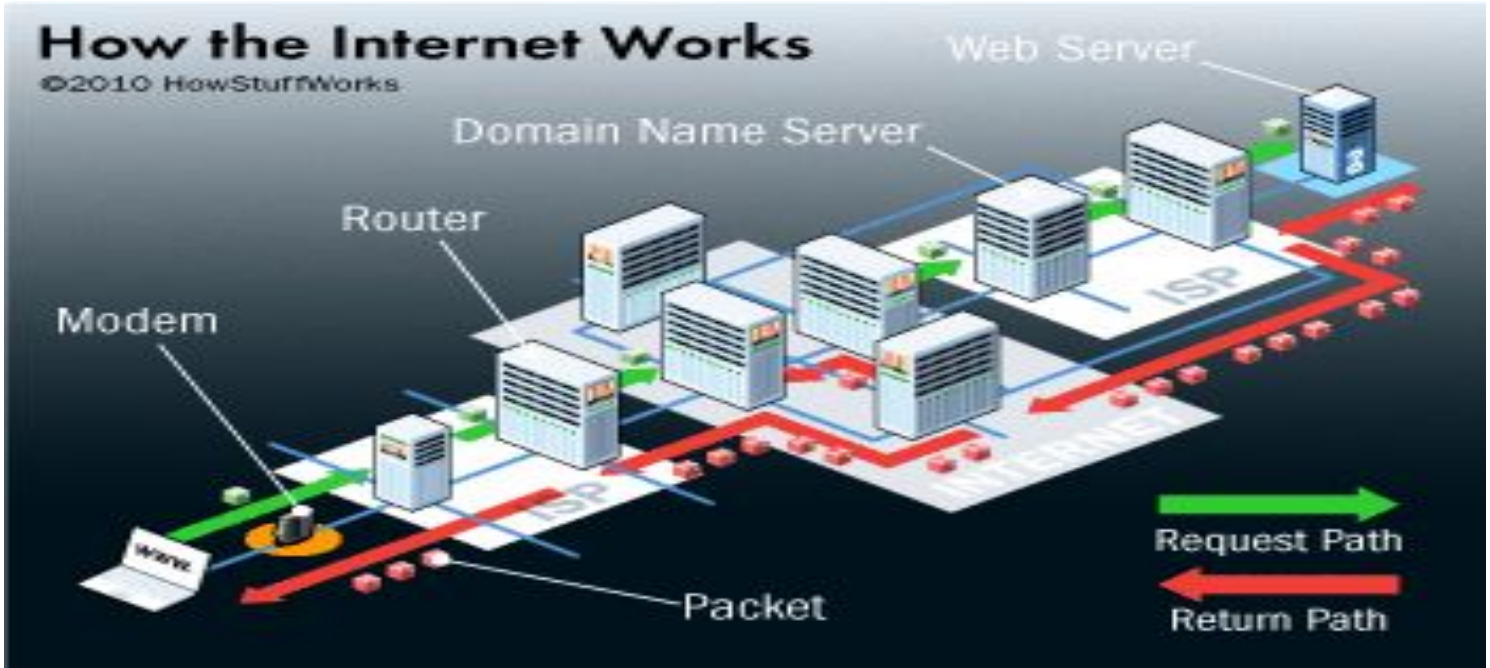


Packet - E-mail Example

Header	Sender's IP address Receiver's IP address Protocol Packet number	96 bits
Payload	Data	896 bits
Trailer	Data to show end of packet Error correction	32 bits

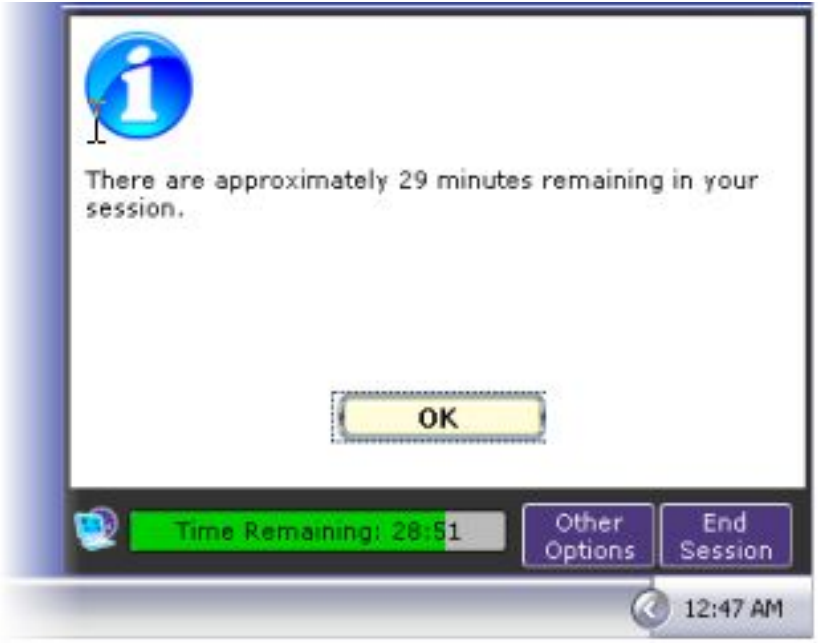
Transport

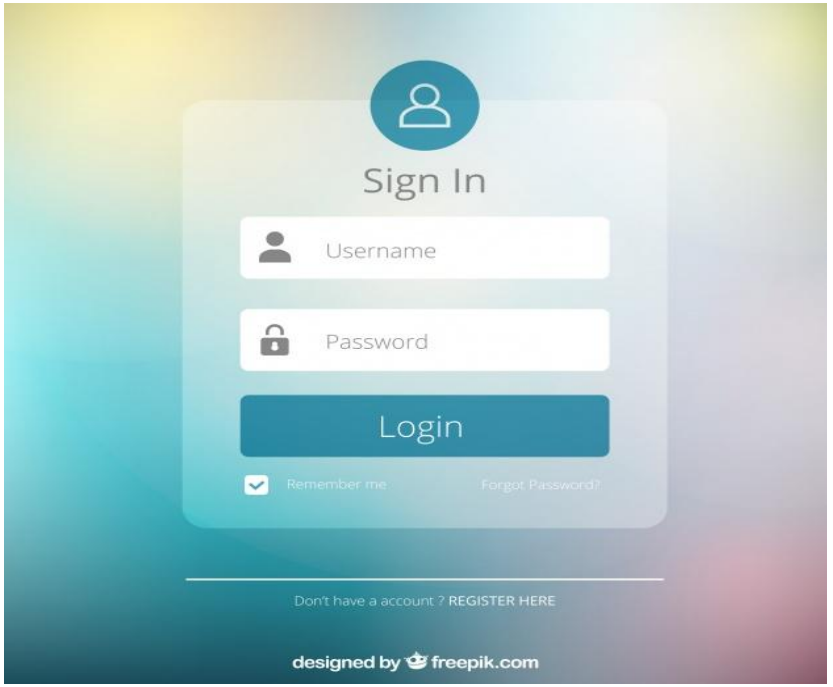
This layer has a very important job. It decides how much information should be sent at a time. So, when you are communicating with a website, this layer will decide how much data you can transfer and receive at a given point of time. Also, this layer provides reliable process to process message delivery and error recovery.



Session

This layer has the job of maintaining proper communication by establishing, managing and terminating sessions between two computers. For example, whenever we visit any website, our computer has to create a session with the web server of that website.



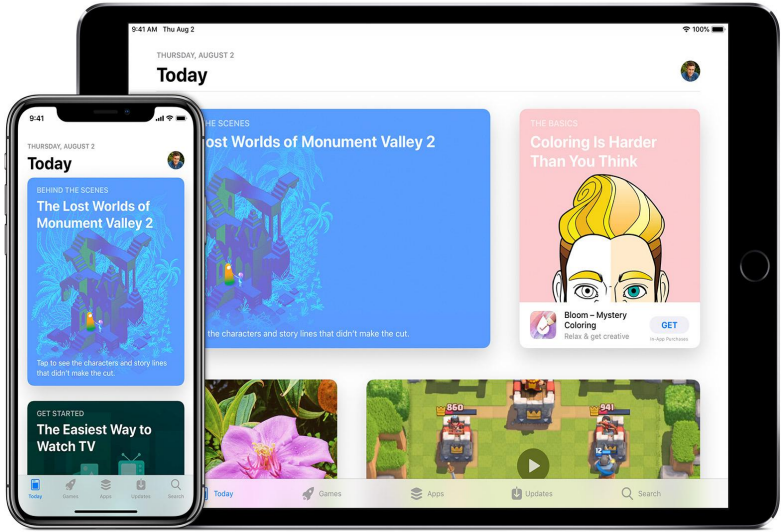


Presentation

This is the layer in which the operating system operates with the data. Main functions of this layers includes translation, encryption and compression of data. Basically User interacts with Application layer, which sends the data down to Presentation layer.

Application

This is the topmost layer in the seven OSI Layers. This is the layer that the end-user (can be a computer programmer, or a regular PC user) is actually interacting with. This layer allows access to network resources.



Tech Tool Kit

1. Anti-static strap, mat, bag
2. Multimeter
3. Torx Screwdrivers
4. Needle-nose pliers
5. Cutters
6. 3 prong parts grabber
7. Voltage detector
8. Voltage Meter
9. Adapters
10. USB Flash Drive
12. Paper Clip
13. Compressed Air
14. Electronics Wipes
15. Spare peripherals and cables
16. Batteries
17. Blank DVDs / CDs
18. Velcro / rubber bands
19. Magnetic Pickup
20. RJ45 Crimping Tool

Software Toolkit Utilities

- Malware Cleaner
  - SUPERAntiSpyware
- Anti-Malware
  - Malwarebytes
- Boot Tools
  - Puppy Linux
  - Ubuntu Live CD
- Password Clearer
  - Magical Jelly Bean Passwdfinder
- ZIP File Tool
  - 7- ZIP
- Backup
- Portable Antivirus
  - Avast
- Offline software installs
  - Firefox and Chrome
- Bootable Operating System
  - Windows and Linux
- System Recovery
  - Carbonite
- Password Recover
  - Online 2FA enabled
- Hard Drive Formatter
  - BleachBit