

2. The number 2 shows up repeatedly in Information Technology.

The fundamental state of duality present in nature (1-0, particle-wave) is reflected in the binary number system and IT hardware architecture. Modern IT hardware typically **doubles in capacity or performance with each generation** (e.g. **256, 512, 1024**). Modern RAM, Wi-Fi, and hardware interface standards (PCIe, SATA, USB, Lighting, Thunderbolt etc.) usually increase in **multiples of 2** beginning with 8bits (16 bits, 32 bits, 64 bits etc.)

This reflects the nature of the physical world: the wave particle duality of matter and charge expressed in the behavior of electricity itself. Information technology is ultimately material science - the manipulation of material properties to convey information. To understand information technology is to understand physics at its most fundamental level.

Notice the pattern of doubling in the study tables below:

Octet Order & Subnetting

| Octet                | 1   | 2   | 3   | 4   | 5   | 6   | 7                    | 8                    |
|----------------------|-----|-----|-----|-----|-----|-----|----------------------|----------------------|
| Addresses Per Subnet | 128 | 64  | 32  | 16  | 8   | 4   | 2                    | 1                    |
| Subnet Mask          | 128 | 192 | 224 | 240 | 248 | 252 | 254                  | 255                  |
| Subnets              | 2   | 4   | 8   | 16  | 32  | 64  | 128 (Point-to-Point) | 255 (Single Address) |
| CIDR                 | /25 | /26 | /27 | /28 | /29 | /30 | /31                  | /32                  |

Note: Subtract 2 from Addresses Per Subnet - **Network/Broadcast**

PCIe STANDARDS - SLOT WIDTHS

| PCIe Version | PCIe x1<br> | PCIe x4<br> | PCIe x8<br> | PCIe x16<br> |
|--------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| PCIe 1.0     | 250 MB/s                                                                                       | 1 GB/s                                                                                         | 2 GB/s                                                                                         | 4 GB/s                                                                                           |
| PCIe 2.0     | 500 MB/s                                                                                       | 2 GB/s                                                                                         | 4 GB/s                                                                                         | 8 GB/s                                                                                           |
| PCIe 3.0     | 1 GB/s                                                                                         | 4 GB/s                                                                                         | 8 GB/s                                                                                         | 16 GB/s                                                                                          |
| PCIe 4.0     | 2 GB/s                                                                                         | 8 GB/s                                                                                         | 16 GB/s                                                                                        | 32 GB/s                                                                                          |
| PCIe 5.0     | 4 GB/s                                                                                         | 16 GB/s                                                                                        | 32 GB/s                                                                                        | 64 GB/s                                                                                          |
| PCIe 6.0     | 8 GB/s                                                                                         | 32 GB/s                                                                                        | 64 GB/s                                                                                        | 128 GB/s                                                                                         |

Note: Motherboard must support ‘up-plugging’ otherwise cards will default to 1x speeds

Windows Minimum Install Requirements

| OS                  | Processor            | RAM  | Storage | TPM          | Display                    |
|---------------------|----------------------|------|---------|--------------|----------------------------|
| Windows 10 (32-bit) | 1 GHz or faster      | 1 GB | 16 GB   | Not required | 800x600 minimum            |
| Windows 10 (64-bit) | 1 GHz or faster      | 2 GB | 20 GB   | Not required | 800x600 minimum            |
| Windows 11 (64-bit) | 1 GHz+ with 2+ cores | 4 GB | 64 GB   | TPM 2.0      | 720p, 9" or larger display |

# 3. The number 3 represents unity and the balance of two.

In physics an example of balance is found in the relationship between the proton (positive), electron (negative) and neutron (neutral). In Information Science, with information being anything that has the capacity to inform (data, speech etc.), there are three stages required for efficient/effective information transmission.

## Three-stage model of efficient/effective information transmission

- 1. Transmission:** This is the act of sending the information. It involves encoding the information into a suitable format, selecting a channel for delivery, and initiating the transfer.
  - In computing (stdin): This is where data is fed into a program or process. It's the "transmission" of input to the system.
  - Speaking, writing, broadcasting, emailing, hand gestures – anything that conveys data from a sender to a receiver.
- 2. Reception:** This is the act of the intended recipient receiving the transmitted information. It involves decoding the information from the channel and making it accessible.
  - In computing (stdout): This is where a program's primary output is directed. It's the "reception" of the program's results by the user or another process.
  - Listening, reading, observing, acknowledging receipt of an email or package.
- 3. Verification:** This is the crucial stage where the recipient confirms that the received information is accurate, complete, and understood as intended by the sender.
  - In computing (stderr): This stream is specifically for error messages and diagnostic output. It's a built-in mechanism for a program to "verify" or report issues with its operation or the input it received.
  - Error Correction/Feedback: If verification reveals a discrepancy, this stage also includes the process of providing feedback to the sender for correction or re-transmission.

## Examples of 3 in Cyber Security & Computing



### CIA Triad - Cybersecurity

The CIA triad (**Confidentiality, Integrity, and Availability**) is a fundamental model in information security. It serves as a guiding framework for organizations to develop and evaluate their security policies, procedures, and controls to protect sensitive information and systems.

### The Three Standard Data Streams:

In computer programming, particularly in the context of operating systems like Linux, **stdin**, **stdout**, and **stderr** are the three standard streams used for communication between a program and its environment.

| 0                                          | 1                            | 2                                        |
|--------------------------------------------|------------------------------|------------------------------------------|
| stdin                                      | stdout                       | stderr                                   |
| Input from terminal, sensor, keyboard etc. | Output to screen or console. | Error messages & diagnostic information. |

4. The number 4 is found at the center of the fundamental interactions governing both matter and electricity.

Fundamental Forces & Electricity

|   | Physics          | Electricity          | Classical Element | Symbolic/Functional Link                                                              |
|---|------------------|----------------------|-------------------|---------------------------------------------------------------------------------------|
| 1 | Electromagnetism | Voltage (V)          | Fire              | Voltage ignites/pushes flow — like fire’s energy                                      |
| 2 | Gravity          | Current (I)          | Water             | Current flows — dynamic and fluid like water                                          |
| 3 | Strong Nuclear   | Resistance (R)       | Earth             | Material resistance: stable, grounding                                                |
| 4 | Weak Nuclear     | Impedance/Admittance | Air               | Time-varying electromagnetic field radiating outward from the conductor (radio wave). |

Note: The chart is not meant to be a 1-to-1 correlation of forces to electrical characteristics. It is meant to bring attention to the similarities of expression of natural phenomena.

Electrical Behavior

Current, voltage, resistance, and impedance/admittance are indeed the four fundamental aspects hat describe the behavior of electricity in a circuit. Here's a concise breakdown:

1. **Voltage (V)** – Electric potential difference, the "push" behind current.
2. **Current (I)** – Flow of electric charge, driven by voltage.
3. **Resistance (R)** – Opposition to current in DC circuits; dissipates energy.
4. **Impedance (Z) / Admittance (Y)** – Frequency-dependent analogs of resistance:
  - Impedance (Z): Opposition to AC (includes resistance and reactance).
  - Admittance (Y): Inverse of impedance; ease of AC flow.

Together, they describe how electricity **moves**, how it's **driven**, and how it is **resisted** or **allowed** in both static (DC) and dynamic (AC) circuits.

# 7

• The number 7 can be seen at higher levels of information science: logic, information theory and networking.

|   | Logic Gates | OSI Layers   | Linux Run Levels           | ITIL Principles                    | LaserJet Print Process Stages |
|---|-------------|--------------|----------------------------|------------------------------------|-------------------------------|
| 7 | XNOR        | Application  | 6 – Reboot                 | Focus on value                     | Cleaning                      |
| 6 | XOR         | Presentation | 5 – Multi-user (GUI)       | Start where you are                | Fusing                        |
| 5 | OR          | Session      | 4 – Multi-user (no GUI)    | Progress iteratively with feedback | Transferring                  |
| 4 | NOR         | Transport    | 3 – Multi-user (text)      | Collaborate and promote visibility | Developing                    |
| 3 | AND         | Network      | 2 – Multi-user (custom)    | Think and work holistically        | Exposing                      |
| 2 | NAND        | Data Link    | 1 – Single-user (recovery) | Keep it simple and practical       | Charging                      |
| 1 | NOT         | Physical     | 0 – Halt                   | Optimize and automate              | Processing                    |

8. The number 4 is found at the crux of natural interactions between forces governing both matter and electricity.

The octet rule states that atoms tend to prefer having 8 electrons in their valence (outermost) shell.

[Subnetting by Hand](#)

| 8 BIT Subnet Mask    |     |     |     |     |     |     |                      |                      |
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| Subnets              | 2   | 4   | 8   | 16  | 32  | 64  | 128 (Point-to-Point) | 255 (Single Address) |
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| 8 Syslog Severity Levels |               |                         |                                                                                     |
|--------------------------|---------------|-------------------------|-------------------------------------------------------------------------------------|
| Level                    | Name          | Severity                |                                                                                     |
| 7                        | Debugging     | Least severe            |    |
| 6                        | Informational | Normal operation        |    |
| 5                        | Notice        | Normal but significant  |   |
| 4                        | Warning       | Warning condition       |  |
| 3                        | Error         | Recoverable error       |  |
| 2                        | Critical      | Critical condition      |  |
| 1                        | Alert         | Immediate action needed |  |
| 0                        | Emergency     | System unusable         |  |