## **⚡ 1. Response Time**

* **Definition**: Time taken from **start to finish** of a specific task.
* Also called **execution time**.
* Includes **all delays**, such as:  
  + CPU processing time
  + Memory access time
  + Disk I/O
  + Operating system overhead
* ✅ Useful for evaluating **how fast** a system completes **individual tasks**.

## **📈 2. Throughput**

* **Definition**: The **number of tasks** completed in a given time.
* Think of it as **work done per second**, like:  
  + “Jobs per hour”
  + “Requests per second”
* ✅ Useful for evaluating **overall system productivity**, especially in **servers or multitasking systems**.

## **🔁 Relation Between Response Time and Throughput**

* Generally:  
  + **Decreasing response time** (faster individual tasks)
  + ⇒ **Increases throughput** (more tasks completed in same time)
* But not always strictly linear—depends on the workload and resource management.

## **🧠 3. Performance and Execution Time**

### **Formula:**

* Meaning: **Shorter execution time = better performance**
* Inverse relationship: Faster computers have **lower execution time**, so **higher performance**.

## **🔄 4. Comparing Two Computers (X and Y)**

If:

Then:

So, X completes tasks faster than Y.

## **🔟 5. Speedup (n times faster)**

If computer X is **n times faster** than computer Y:

### **Example:**

If:

* Y takes **10 seconds**
* X is **2 times faster** Then:
* X takes only **5 seconds**

## **✅ Summary**

| **Term** | **Definition** | **Goal** |
| --- | --- | --- |
| Response Time | Time to finish one task | Minimize |
| Throughput | Number of tasks completed per unit time | Maximize |
| Performance | Inversely related to execution time | Higher is better |
| Speedup (n×) | One system is n times faster than another | Indicates performance gap |