Calculating FLOPS, TFLOPS, and PFLOPS

Formula:

- **FLOPS (Floating Point Operations Per Second)** = Total Floating Point Operations ÷ Total Execution Time (in seconds)
- **TFLOPS (TeraFLOPS)** = FLOPS ÷ 1e12
- **PFLOPS (PetaFLOPS)** = FLOPS ÷ 1e15

Steps:

1. **Determine the Total Floating Point Operations (FLO):**
   - This is the total number of floating-point calculations your model performs. It depends on the architecture and the operations used.
2. **Measure the Total Execution Time:**
   - The total time taken to perform all the floating-point operations (in seconds).
3. **Calculate FLOPS:**
   - Use the formula above to compute FLOPS.
4. **Convert FLOPS to TFLOPS or PFLOPS:**
   - Divide FLOPS by 1e12 for TFLOPS.
   - Divide FLOPS by 1e15 for PFLOPS.

Example Calculation:

Suppose you have:

- Total Floating Point Operations (FLO) = **9×10^{14}**
- Total Execution Time = **300 seconds**

Compute FLOPS:

- FLOPS = FLO ÷ Time
- FLOPS = $(9 \times 10^{14}) \div 300$
- FLOPS = **3×10^{12} FLOPS**

Convert to TFLOPS:

- TFLOPS = FLOPS ÷ 1e12
- TFLOPS = $(3 \times 10^{12}) \div 1e12$
- TFLOPS = **3 TFLOPS**

Convert to PFLOPS:

- PFLOPS = FLOPS ÷ 1e15
- PFLOPS = $(3 \times 10^{12}) \div 1e15$
- PFLOPS = **0.003 PFLOPS**

Summary:

- **FLOPS:** 3×10^{12} FLOPS
- **TFLOPS:** 3 TFLOPS
- **PFLOPS:** 0.003 PFLOPS

Note on Prefixes:

- **Kilo (K)** = 1e3
- **Mega (M)** = 1e6
- **Giga (G)** = 1e9
- **Tera (T)** = 1e12
- **Peta (P)** = 1e15

Prefix	Symbol	Power of 10	Decimal Multiplier	Power of 2	
Kilo	k	10^3	1,000	2^10	1,024
Mega	M	10^6	1,000,000	2^20	1,048,57
Giga	G	10^9	1,000,000,000	2^30	1,073,74
Tera	T	10^12	1,000,000,000,000	2^40	1,099,51
Peta	P	10^15	1,000,000,000,000,000	2^50	1,125,89
Exa	E	10^18	1,000,000,000,000,000,000	2^60	1,152,92

Prefix	Symbol	Power of 10	Decimal Multiplier	Power of 2	
Zetta	Z	10^21	1,000,000,000,000,000,000,000	2^70	1,180,59
Yotta	Y	10^24	1,000,000,000,000,000,000,000,000	2^80	1,208,92

Key Notes

- **Power of 10**: Used in SI units (e.g., 1 km = 1,000 meters) and decimal-based storage (e.g., hard drives, where 1 GB = 10^9 bytes).
- **Power of 2**: Used in computing for binary storage/memory (e.g., 1 GiB = 2^30 bytes). Binary prefixes (kibi, mebi, etc.) were introduced by the IEC to distinguish from decimal.
- **Formula**:
  - Decimal: `Value = Base × 10^n` (e.g., 1k = 1 × 10^3 = 1,000).
  - Binary: `Value = Base × 2^n` (e.g., 1Ki = 1 × 2^10 = 1,024).
- In practice, "k", "M", etc., may be used for binary values (e.g., 1 MB = 2^20 bytes in some contexts), which can cause confusion. Always check the context (e.g., storage vs. RAM).