Living Encoding Engine v17.1 — Unified Information Bound

Core Equation

$I_{real} = \min(I_{ops}, I_{cap})$

$I_{ops} = E / (k_B \, T_{eff} \, \ln 2)$
$I_{cap} = (2\pi / \blacksquare c \, \ln 2) \times E \times R$

Parameters

Symbol	Definition	Typical Unit
E	Energy of the system	J
R	System radius or spatial boundary	m
T_eff	Effective thermodynamic temperature	K
k_B	Boltzmann constant	$1.38 \times 10^{\blacksquare 23}$ J/K
■	Reduced Planck constant	$1.055 \times 10^{\blacksquare 3\blacksquare}$ J·s
c	Speed of light	$3 \times 10^{\blacksquare}$ m/s

Information Bottleneck Principle

Information flow is limited by the most restrictive of the two bounds — the operational (Landauer) or the geometric (Bekenstein) limit.

Example

For a 1 kg system at 300 K with R = 0.1 m:
I_ops ≈ $3.48 \times 10^{\blacksquare\blacksquare}$ bits, I_cap ≈ $2.72 \times 10^{\blacksquare 3}$ bits → I_real = $2.72 \times 10^{\blacksquare 3}$ bits (geometric bottleneck).

Quote

"Information flows only as fast as its narrowest gate."