ПОЛИТЕХ

Consciousness is everything you experience

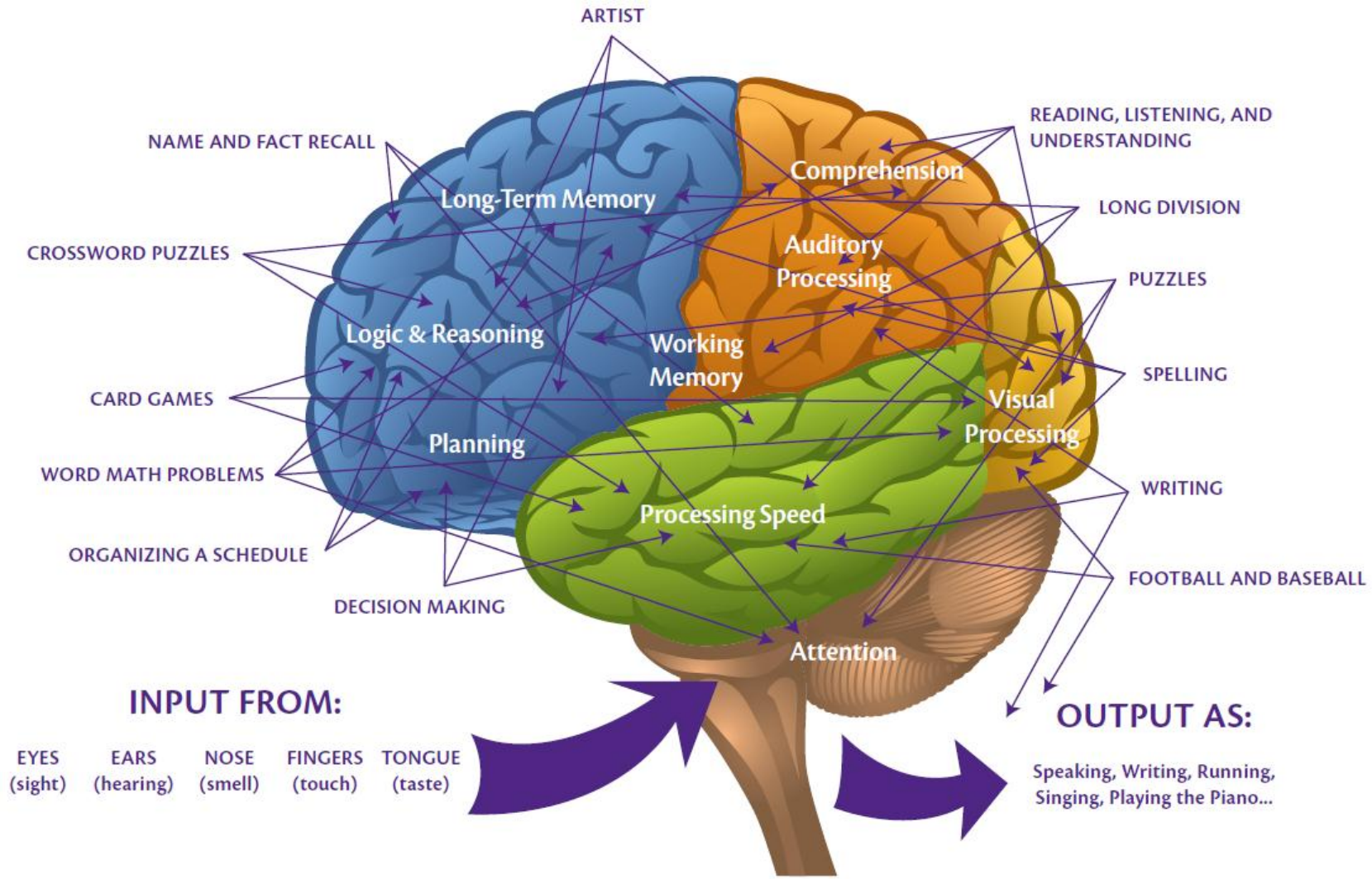
Семинар по специальности на английском языке

ЛЕКЦИЯ 13. I AM NOT A PRODUCT OF MY CIRCUMSTANCES. I AM A PRODUCT OF MY DECISIONS.

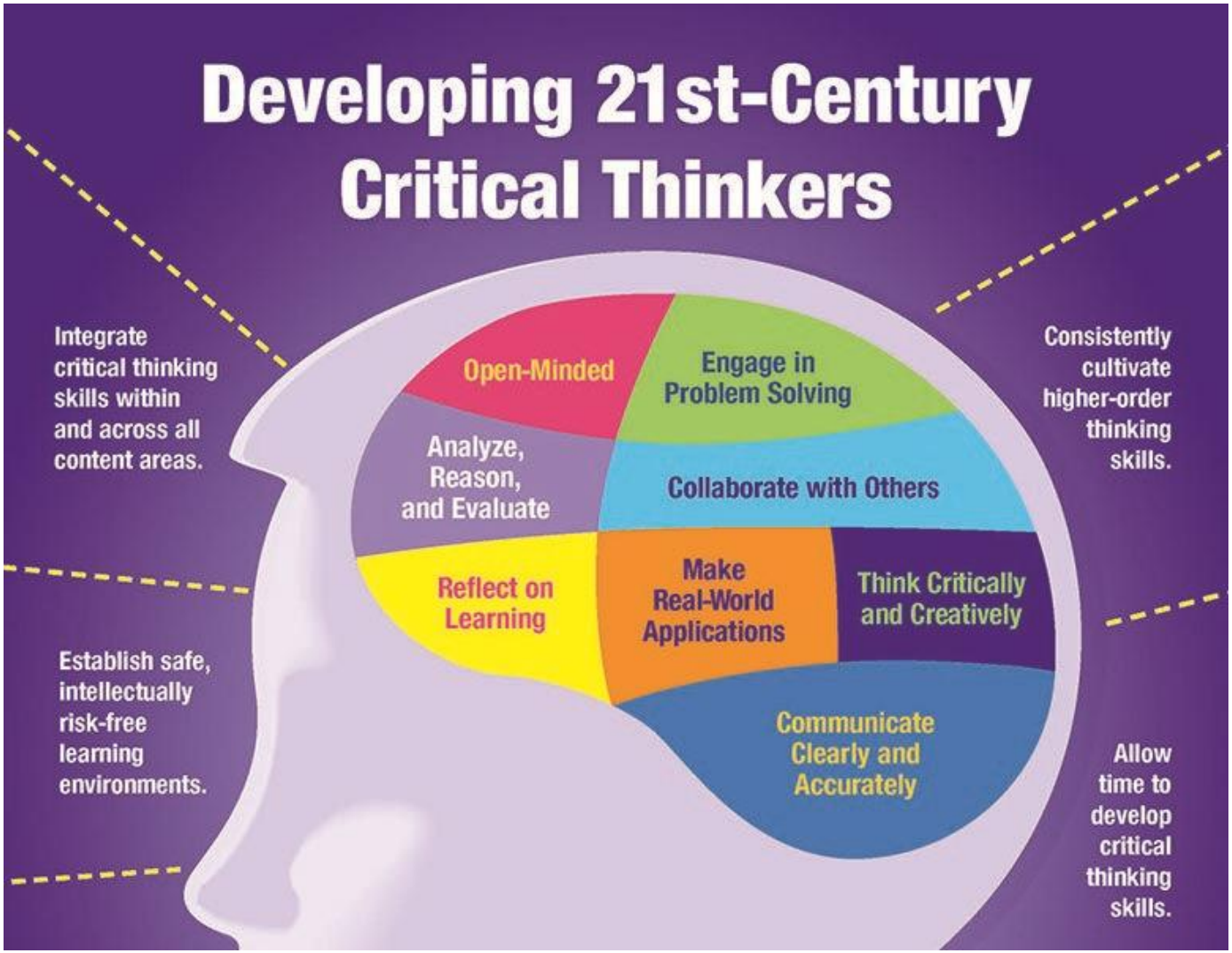
13 may 2021

Paradigm - how to look at the world

COGNITIVE VS STATE MACHINE - RELATIONSHIP BETWEEN **INFORMATION** AND ITS PHYSICAL **CARRIER**



FUNDAMENTAL CHARGE : TRANSFER BRAIN "PROGRAMMING"



Subjective reality (SR)

How do we transfer from this individual subjective **Experience (facts)** to intersubjective, generally valid statements and to the substantiation of **true knowledge**?

ПОЛИТЕХ

DANGERS TO HUMAN CIVILIZATION FROM EMERGING TECHNOLOGIES

We are being propelled into this new century with no plan, no control, no brakes....The only realistic alternative I see is relinquishment: to limit development of the technologies that are too dangerous, by limiting our pursuit of certain kinds of knowledge.

—Bill Joy, "Why The Future Doesn't Need US "

ПОЛИТЕХ

Суть проблемы: dangers to human civilization from emerging technologies

We are being propelled into this new century with no plan, no control, no brakes....The only realistic alternative I see is : to limit development of the technologies that are too dangerous, by limiting our pursuit of certain kinds of knowledge.

—Bill Joy, "Why The Future Doesn't Need US "

ПОЛИТЕХ

… SHOULD WE PURSUE MORE.

So are we in danger? The answer is clearly yes. How much danger, and what to do about it ?

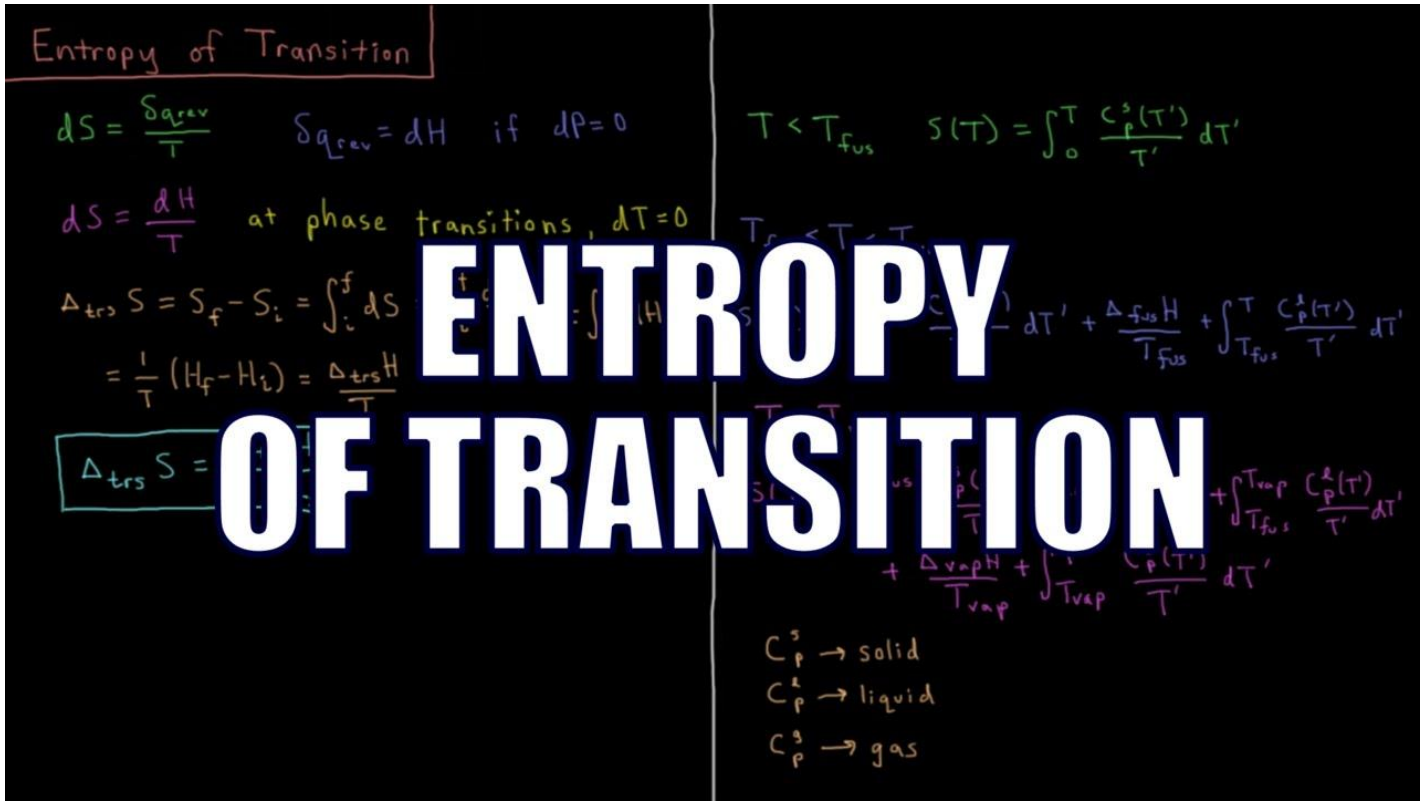
…. genetics, nanotechnology, and robotics….

ALL technology empowers both our creative and destructive natures.

A Panoply of Existential Risks

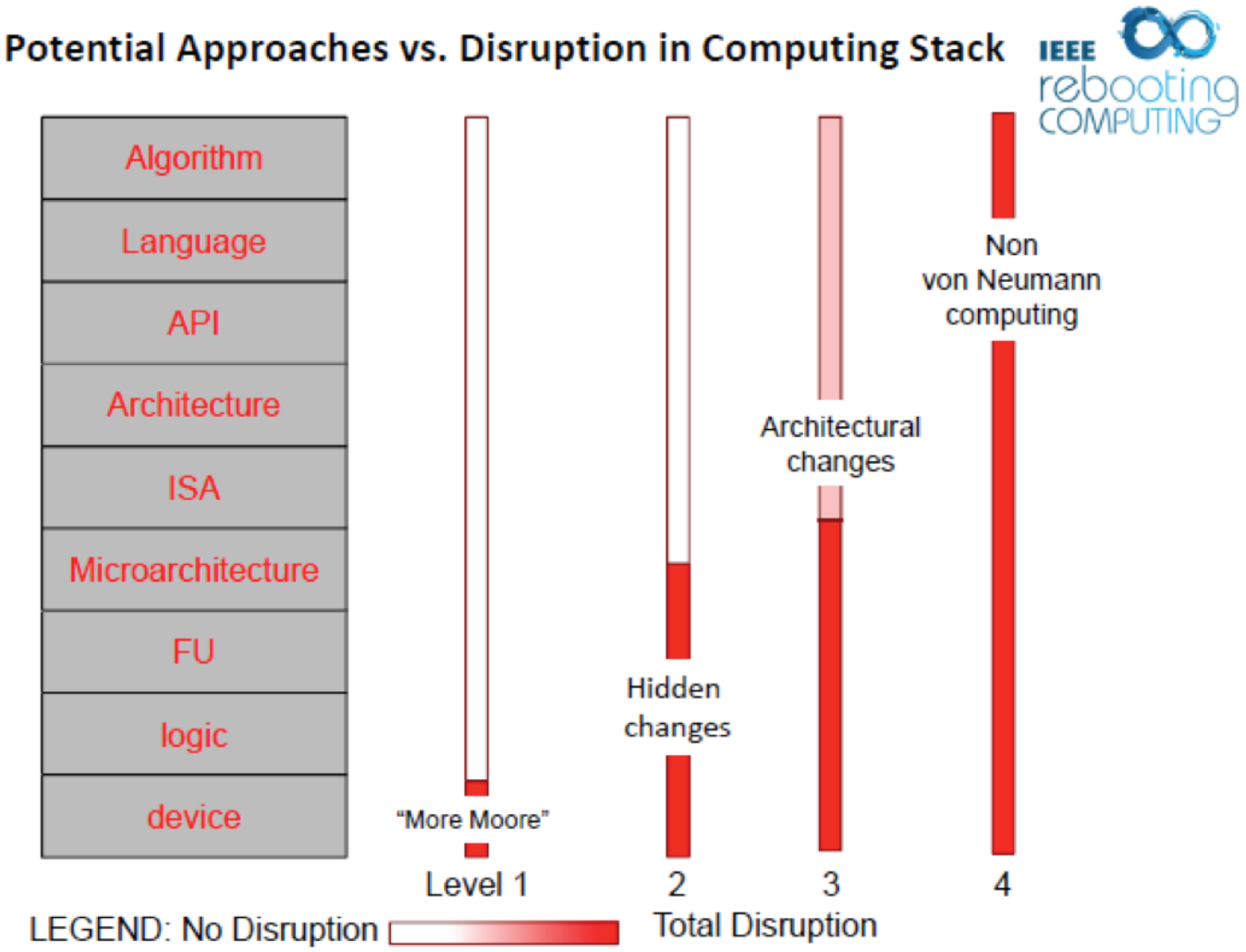
- How much knowledge we need to be out of danger?
  - Never shut down simulation…. And remember - future will be Inevitability Transformed

MAIN OBSTACLE OF CALCULATION



Entropy is a characteristic of how much information the observer does not know about the system. How is observer of ….. Computer or C The quantitative measure of entropy (physical system C) namely S is the number of symbols required to record the number of microstates of the considered distinguished by the observer.

The different approaches to future computing and their relative required disruption in the computing stack

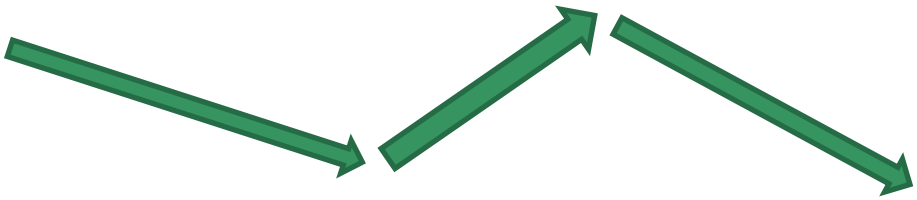


ПОЛИТЕХ

… WAITING CONCEPTUAL REVOLUTION IN COMPUTATIONAL THEORY AND TECHNOLOGY

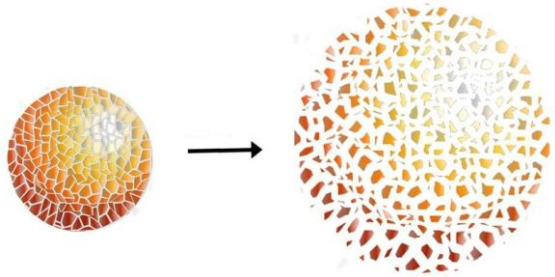
Wind direction

oblique sail – silver sailing bullet



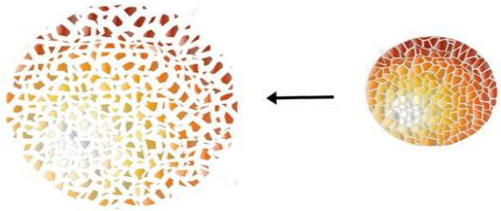
"big bang" of pure Turing's approach novo days has lost its constructive power. Not all mathematical concepts in a form of algorithm can become physical efficient of even possible

LAW OF CONSERVATION … IN COMPUTER SCIENCE - THERMODYNAMIC COMPUTER (TC) SYSTEM ?



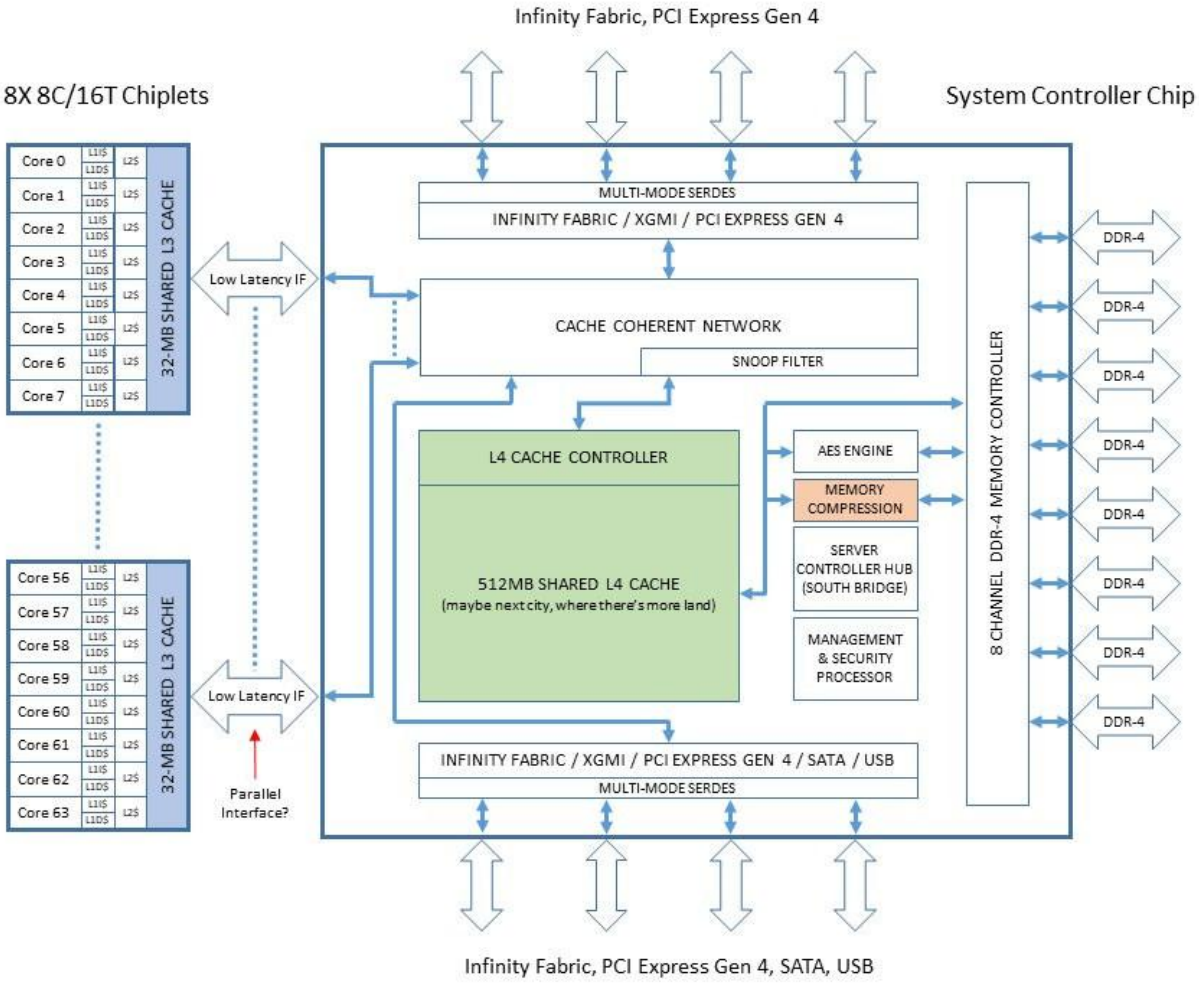
Now we lost information about micro states

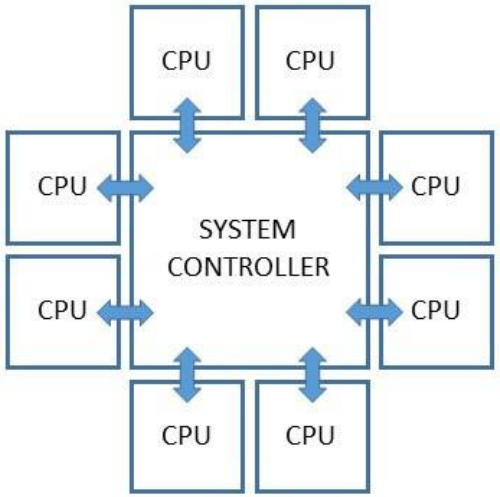
Have we chance to organize reversible transformation process ?



Entropy or "transformation", is viewed as a function of the space state of a thermodynamic system, denoting the measure of irreversible dissipation of energy

How many… microstates and how often they are changing ?





ПОЛИТЕХ

PROCESSOR IS IN NOT EQUILIBRATES WITH ITS ENVIRONMENT

THERMODYNAMICS – "SILVER BULLET" OF COMPUTER SCIENCE

In current computing we think of computers as state machines that implement mathematical operations, but it comes with large costs because it ignores the underlying thermodynamics.

All processes in the physical world are driven by the dissipation of free energy. Computing is also a physical process, but the current paradigm views computation as a kind of mathematical or state transition process. The reality, however, is that computation is a carefully engineered, deterministic sequence of state transitions that dissipate free energy

ПОЛИТЕХ

Thermodynamic Computing and its environment.

A TC can be thought of as fabric of thermodynamically evolvable elements embedded in a network of reconfigurable connections.

Energy dissipation in the TC creates fluctuations in the system state.

Fluctuations that decrease dissipation are spontaneously stabilized.

TC evolves to move current through the network with minimal loss as it equilibrates with its environment.

ПОЛИТЕХ

Recasting Computing in Thermodynamic Terms

Lets thinking about computing in terms of…Thermodynamics.

At each level of hierarchical representation all small-scale details are coarse-grained or modulated to present higher-level features to superior levels.

All "modules" are engineered such that their small-scale dynamics are isolated from one another. For example, electronic circuit components interact through coarse-grained electrical signals and the small-scale dynamics in different circuit components are disconnected.

ПОЛИТЕХ

COARSE-GRAINED ELECTRONIC GATES AS COMPONENTS

We can think about gates as components needed to engineer higher-level computing elements like Arithmetic Logic Units.

These same ideas apply to software systems in which software levels comprised of various modules present abstract interfaces to higher software levels and protect the internal details of their modules. This allows us to think of software in terms of “drivers,” “libraries,” “operating systems,” “applications,” etc.

ПОЛИТЕХ

We need to separating the scales of "computation" from "fluctuation"

Computation – is intentional essence (focus on mind)
Fluctuation – is extensional essence (focus on mater)

The need to average over many physical degrees of freedom in order construct fluctuation free state variables is one reason that classical computing systems cannot approach the thermodynamic limits of efficiency.

Therefore we are able to define macroscopic thermodynamic state descriptions with concepts of temperature, pressure, entropy and computer itself as "state machine"
The sate what ?

ПОЛИТЕХ

CURRENT PARADIGM ^ PRO AND CONTRO,

Now thermodynamics is viewed only as an engineering constraint motivating energy efficient hardware designs and effective heat removal.

The limitations of today's paradigm are evident:

- there are many different ways a computer can be organized in order to implement a particular function
- each of these ways has different thermodynamic properties
- thermodynamic cost of computation will depend on the distribution of the states on its inputs, since that determines its initial entropy

So, there are thermodynamic implications that are not yet captured in the current computing paradigm.

KNOWLEDGE MOVES US TOWARDS…EXTENDING OUR ABILITY TO RELATE TO OUR ENVIRONMENT.

- We will be able to redesign all of the systems in our bodies and brains to be far more capable and durable.
- Most significant will be the merger of biological and artificial intelligence ….and reaches clear understanding what it means to be human