Cap 4- completare

4.1 Structura funcţională a unui SC (completare)

DP I/ - Disp Periferic de Intrare- introduce datele în vederea prelucrării;

DP /E- Disp Periferic de Ieşire – redă rezultatele prelucrării;

CANALE I/E- dirijează fluxul de date de la DP I/ către DP/E şi MEM EXT;

UAL- Unitatea Aritmetico-Logică- execută operaţiile aritmetice şi logice cu datele furnizate din memorie, unde va şi depune rezultatul după execţia operaţiilor;

MEM- memoria interna (principal)- păstrează datele şi instrucţiunile programelor pe parcursul execuţiei;

MEM EXT- memoria externă – este solicitată atunci când se depăşeşte capacitatea mem interne sau pt arhivarea datelor şi programelor;

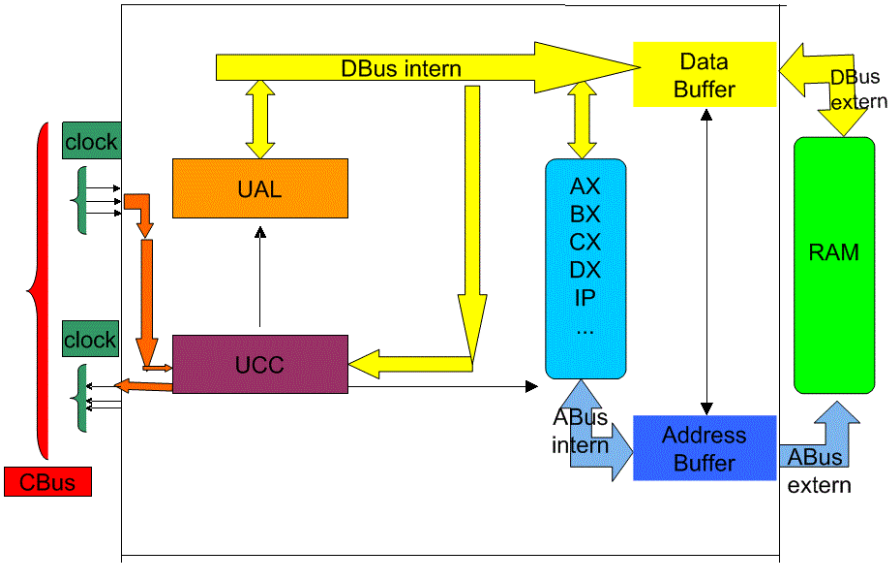
UCC- Unitatea de Comandă şi Control –

1. primeşte instrucţiunile din memorie,
2. le interpretează, şi corespunzător interpretării lor:
3. emite comenzi către DP I/E, prin CANALE I/E
4. emite comenzi de execuţie către UAL;
5. emite adrese către MEM

UCC+UAL=UCP (Unitatea Centrală de Prelucrare)

UCP+ MEM= UC (Unitatea Centrală)

4.3. Structura funcţională a micropr



(http://carment.ase.ro/bti/curs/micropr.gif)

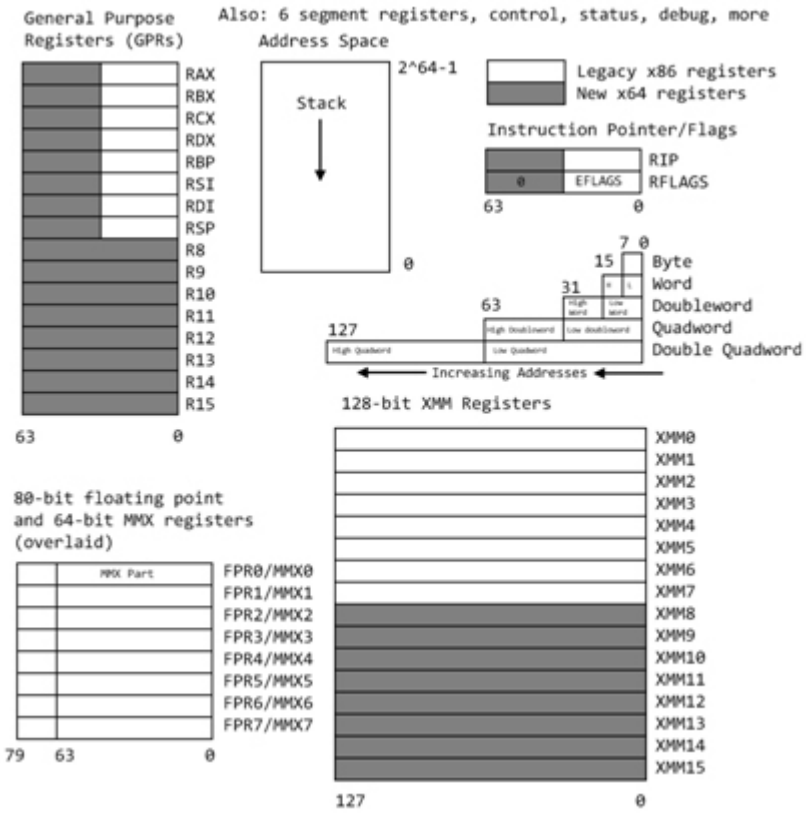
+ http://carment.ase.ro/bti/curs/micropr.ppsx

4.4 Arh interna de bază

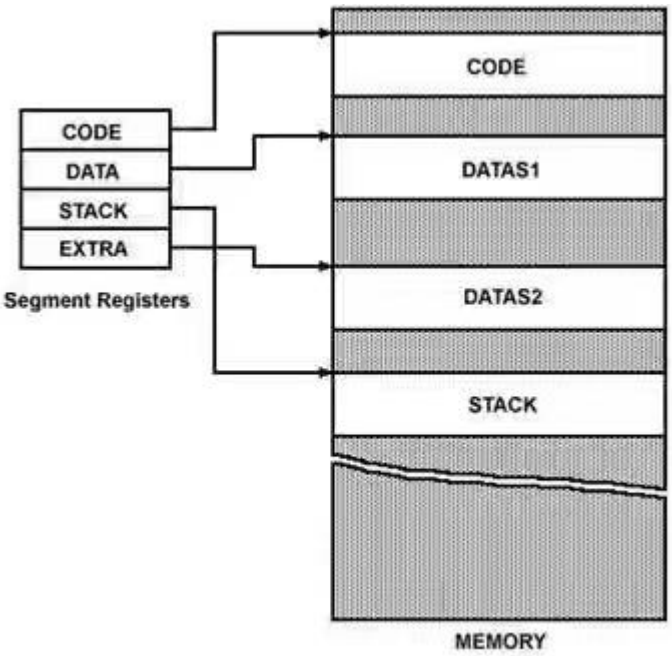
- micropr:
  https://en.wikipedia.org/wiki/X86
  https://upload.wikimedia.org/wikipedia/commons/1/15/Table_of_x86_Registers_svg.svg
  (8,16, 32, 64b ...)
  https://en.wikipedia.org/wiki/X86-64 (64b)

  https://en.wikibooks.org/wiki/X86_Assembly/X86_Architecture

Register	Accumulator	Counter	Data	Base	Stack Pointer	Stack Base Pointer	Source	Destination
64-bit	RAX	RCX	RDX	RBX	RSP	RBP	RSI	RDI
32-bit	EAX	ECX	EDX	EBX	ESP	EBP	ESI	EDI
16-bit	AX	CX	DX	BX	SP	BP	SI	DI
8-bit	AH AL	CH CL	DH DL	BH BL				



(**https://jerry153fish.github.io/2016/01/01/8086-Registers.html**)



(https://steemit.com/steemstem/@setapart/the-8086-microprocessor-structure-and-operations)

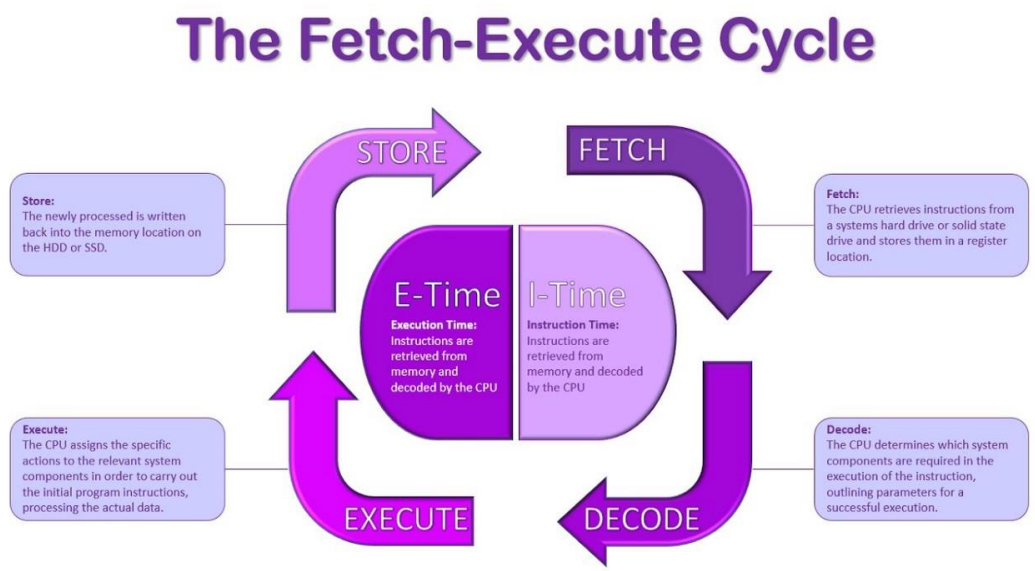
- Fetch-Decode-Execute (citeste-decodifică- execută)

Ciclul de executie a unei instrucţiuni: **Fetch-Decode-Execute** (citeste-decodifică- execută)

Operaţia de bază a unui procesor -pe scurt, Fetch-Execute- pentru a executa o instrucţiune, procesorul:

- citeşte o instrucţiune de program din memorie,
- o decodifică şi
- apoi o execută.

http://80.96.11.40/web_curs/Asm/procesor/fetch.html



(https://medium.com/@gabedbatista/cpu-how-it-works-787ba07b9982)

https://en.wikipedia.org/wiki/Instruction_cycle

http://theteacher.info/index.php/fundamentals-of-cs/1-hardware-and-communication/topics/2599-registers-and-the-fetch-decode-execute-cycle

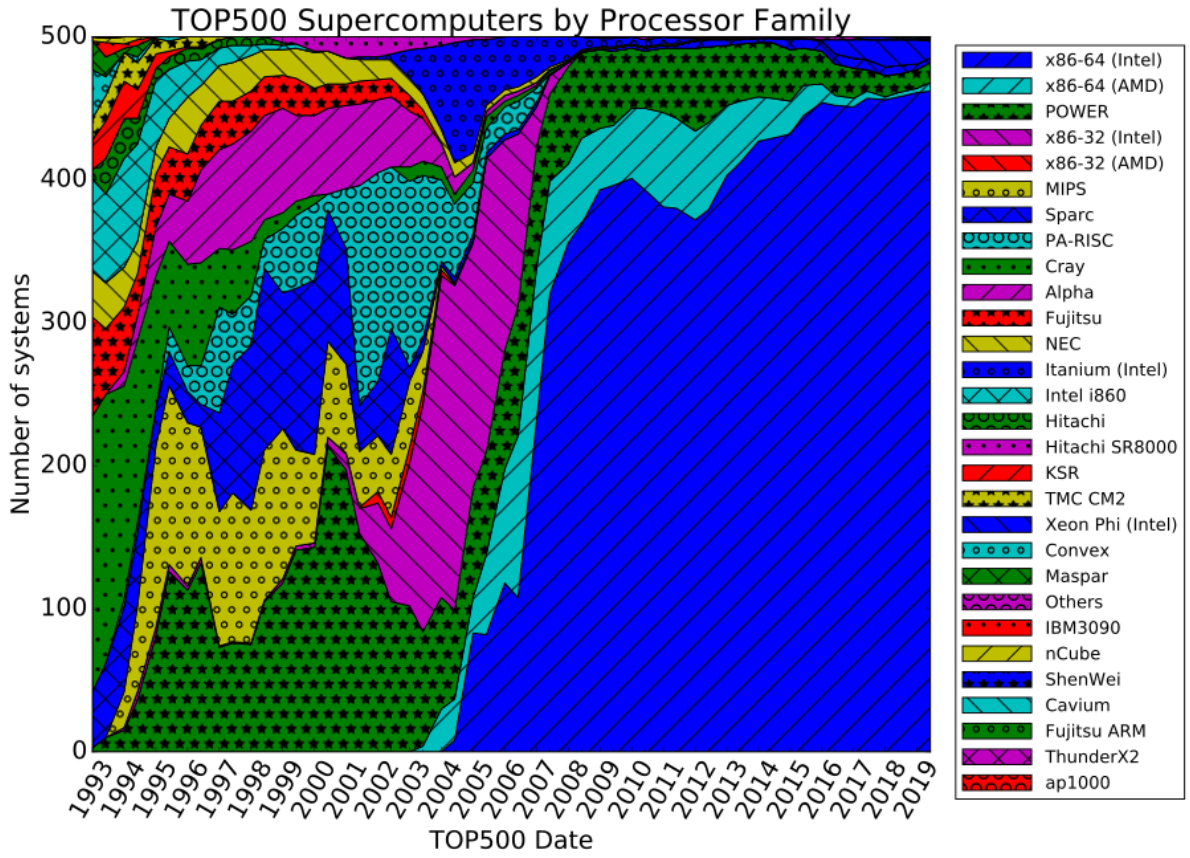
4.6. Micropr Intel si compatibile Intel

- https://en.wikipedia.org/wiki/X86-64 :

In supercomputers tracked by TOP500, the appearance of 64-bit extensions for the x86 architecture enabled 64-bit x86 processors by AMD and Intel to replace most RISC processor architectures previously used in such systems (including PA-RISC, SPARC, Alpha and others), as well as 32-bit x86, even though Intel itself initially tried unsuccessfully to replace x86 with a new incompatible 64-bit architecture in the Itanium processor.

As of 2020, a Fujitsu A64FX-based supercomputer called Fugaku is number one. The first ARM-based supercomputer appeared on the list in 2018[52] and, in recent years, non-CPU architecture co-processors (GPGPU) have also played a big role in performance. Intel's Xeon Phi "Knights Corner" coprocessors, which implement a subset of x86-64 with some vector extensions,[53] are also used, along with x86-64 processors, in the Tianhe-2 supercomputer.[54]

- https://en.wikipedia.org/wiki/Supercomputer :



A **supercomputer** is a computer with a high level of performance as compared to a general-purpose computer. The performance of a supercomputer is commonly measured in floating-point operations per second (FLOPS) instead of million instructions per second (MIPS). Since 2017, there are supercomputers which can perform over 10^{17} FLOPS (a hundred quadrillion FLOPS, 100 petaFLOPS or 100 PFLOPS).[3] Since November 2017, all of the world's fastest 500 supercomputers run Linux-based operating systems.[4] Additional research is being conducted in the United States, the European Union, Taiwan, Japan, and China to build faster, more powerful and technologically superior exascale supercomputers.[5]

Supercomputers play an important role in the field of computational science, and are used for a wide range of computationally intensive tasks in various fields, including quantum mechanics, weather forecasting, climate research, oil and gas exploration, molecular modeling (computing the structures and properties of chemical compounds, biological macromolecules, polymers, and crystals), and physical simulations (such as simulations of the early moments of the universe, airplane and spacecraft aerodynamics, the detonation of nuclear weapons, and nuclear fusion). They have been essential in the field of cryptanalysis.[6]

Supercomputers were introduced in the 1960s, and for several decades the fastest were made by Seymour Cray at Control Data Corporation (CDC), Cray Research and subsequent companies bearing his name or monogram. The first such machines were highly tuned conventional designs that ran faster than their more general-purpose contemporaries. Through the decade, increasing amounts of parallelism were added, with one to four processors being typical. In the 1970s, vector processors operating on large arrays of data came to dominate. A notable example is the highly successful Cray-1 of 1976. Vector computers remained the dominant design into the 1990s. From then until today, massively parallel supercomputers with tens of thousands of off-the-shelf processors became the norm.[7][8]

The US has long been the leader in the supercomputer field, first through Cray's almost uninterrupted dominance of the field, and later through a variety of technology companies. Japan made major strides in the field in the 1980s and 90s, with China becoming increasingly active in the field. As of June 2020, the fastest supercomputer on the TOP500 supercomputer list is Fugaku, in Japan, with a LINPACK benchmark score of 415 PFLOPS, followed by Summit, by around 266.7 PFLOPS.[9] The US has four of the top 10; China and Italy have two each, Switzerland has one.[9] In June 2018, all combined supercomputers on the list broke the 1 exaFLOPS mark.

- https://www.top500.org/lists/top500/ :

Rank	System	Cores	Rmax (TFlop/s)	Rpeak (TFlop/s)	Power (kW)
1	**Supercomputer Fugaku** - Supercomputer Fugaku, A64FX 48C 2.2GHz, Tofu interconnect D, Fujitsu RIKEN Center for Computational Science Japan	7,630,848	442,010.0	537,212.0	29,899