1. Processors :

    a. According to a tenet of Moore's Law, the growth of microprocessors is exponential. Hence, the previous evolution of number cores in microprocessors indicates that in 5 years, a commodity microprocessor will have more than 100 cores.

    b. As our current processors are made of transistors of about 10nm, reducing the size of the transistors is becoming a challenge due to manufacturing process. The tiniest transistor in a processor has 7nm, and the limit for silicon transistor is 3nm. To keep satisfying the Moore's Law, future processors will have to find an alternative to the size of the transistors. A solution to that might be the "specialized processors". Our computer will not be made of one processor, but many "hybrid processors" that could handle specific tasks. For instance, Intel is planning to adopt a new design called Foveros design. In this 3-D hybrid CPU, the parts of the CPU will be manufactures separately and then assemble together one layer on top of another. The first 2 layers will be the DRAMs, follow by a chiplet with CPU and GPU (10nm), and a lower Die with cache and I/O.

    c. The big challenges they will need to overcome are:
        - The scale of the chips. The current chips are made by the process of photolithography. With the reduction of the scale of transistors, we will have to see if this process is still sustainable.

        - The power leakage due to the size of the transistor. A reduction of the scale of the transistor, increase the risk of power leakage.

        - The heat problem. With smaller transistors, we could think of a higher gate voltage to deal with leakage, this might cause a heating effect that can compromise the integrity of the whole chip.

        - The Power consumption. The way the power will be handling in those processors.

        - The speed of the whole.

    e. Hardware thread are trying to improve performance for the workloads that do not fit their memory into the register. In that case, the time needed to access the data of the workload is non negligible. As a solution to that, the hardware thread (pipeline) are used to hide that latency.

    f. CPUs are made to handle many different tasks, while GPUs are made for specific tasks. Hence, a GPU is more performant than a CPU if we look at what the GPU was meant for. However, CPUs are more versatile than GPU because they have a larger instruction set. Generally, a CPU is less power consuming than GPU.