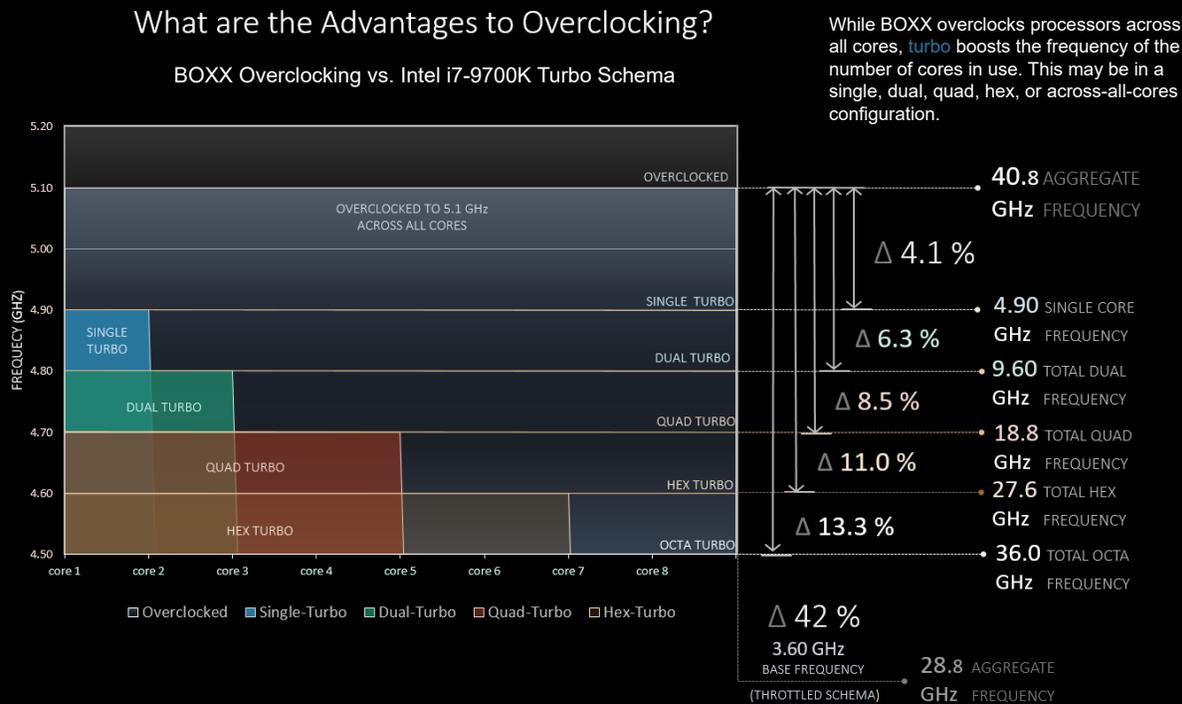


Professional Overclocking

The heart of any computer is the CPU, so it's natural to optimize its performance output. One method is to overclock the frequency, which involves tweaking the firmware via the BIOS/UEFI or (OEM GUI), thereby increasing the maximum frequency at which the CPU runs. At BOXX, we overclock our CPUs in order to sustain a higher frequency under load than the default schema.

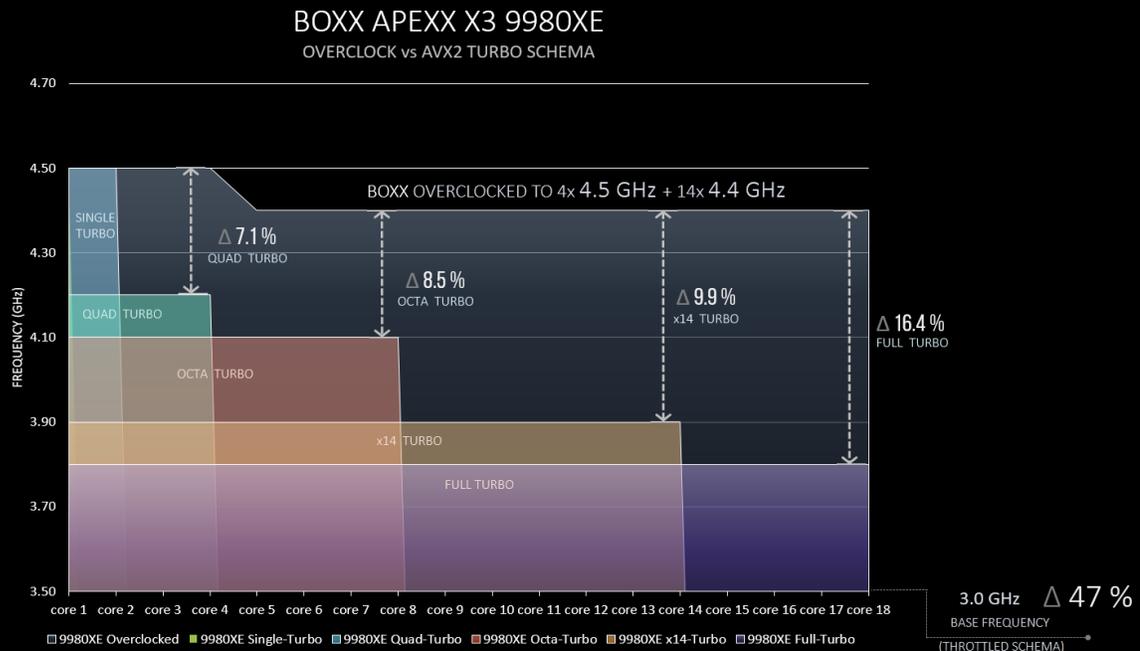
The impetus behind overclocking is that many applications crucial to architecture, engineering & construction (AEC), manufacturing & product design (MPD) and media & entertainment (M&E) perform better at higher frequencies. Applications dependent on serialized operations will see meaningful gains in performance due to overclocking as shown below:



While BOXX overclocks processors across all cores, turbo boosts the frequency of the number of cores in use. This may be in a single, dual, quad, hex, or across-all-cores configuration.

Note that Turbo or Boost schemas tend to follow a step-down trend as the number of cores are utilized. BOXX systems, however, are overclocked to a set frequency across all cores. The differences in clock speed are based on the differences of the sum of active cores under turbo/boost and the sum of the same number of cores at the overclocked frequency.

In the above figure, we looked at an eight core/eight thread CPU. Below is the same analysis for an 18 core/36 thread CPU.

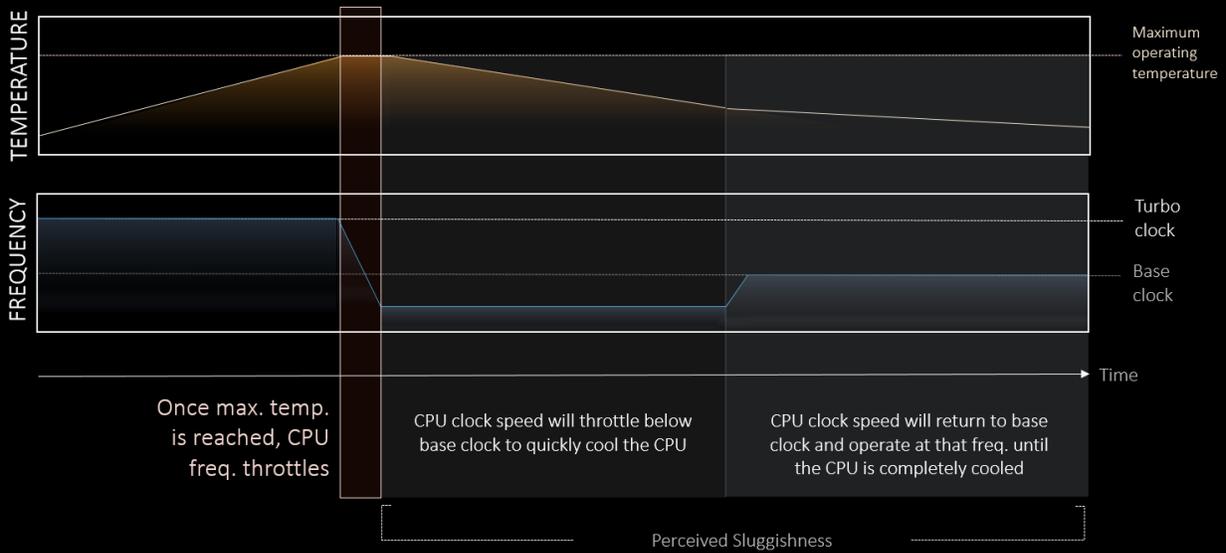


The engineering that goes into overclocking the CPU involves optimizing a number of settings like the voltages delivered to the CPU and the timing of signals of the RAM and PCIe to and from the CPU.

As you have likely noticed from the above figure, the 18-core CPU is clocked to 4.5 GHz across four cores while the remaining 14 are set at 4.4 GHz. This is deliberate, as four of the cores will generally be the workhorses for the majority of the customer's applications. This schema was dialed in from the results of many man-hours involving benchmarking while monitoring for sustained stability crucial to professional workloads.

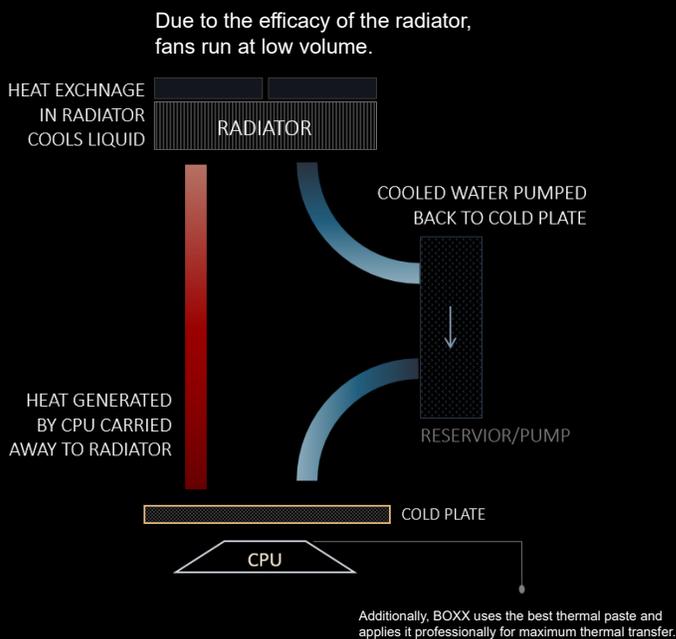
Another advantage of liquid cooling is the thermal management that helps mitigate thermal throttling. Thermal throttling occurs when the CPU heats up to an unstable temperature which prompts the system to lower the clock speed in order to reduce the thermal output of the silicon. As we see in the below figure, temperatures rise steadily while the CPU is under load. Once the maximum operational temperature is reached, the frequency drops. Consequently, the CPU begins to cool down until the temperature reaches an acceptable level.

CPU Throttle: What is it and how does it affect your work?



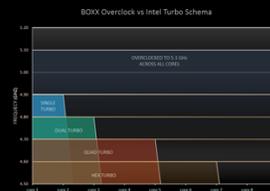
The closed-loop liquid cooling manages the thermal output of the CPU, thereby sustaining that level of performance during a long, compute intensive, multi-thread render or throughout the user's workday. Thus, the BOXX Advantage shines when comparing the 40%-50% performance difference from a throttled CPU to the sustained, professionally overclocked CPU inside a BOXX workstation.

BOXX Liquid Cooling: Sustained Overclocked Performance

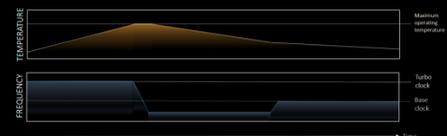


Liquid cooling keeps thermals down, allowing us to:

1. KEEP FAN NOISE DOWN



2. OVERCLOCK ACROSS ALL CORES



3. MITIGATE THROTTLE SUSTAINING BOOSTED PERFORMANCE

Our liquid cooling solution is not only built with performance in mind, but also for peace of mind. The closed looped system is rated for enterprise level applications, therefore it has been engineered to minimize leakage risks and catastrophic failures.

All in all, the parameters surrounding the performance of any given chip is tuned and optimized for efficiency. From logical parameters to the physical, BOXX has refined the art and science of producing the world's most powerful workstations for AEC, MPD, M&E, and other professional workflows, so you'll get the most from your technology investment. ■



About the Author

John Kim is a sales engineer at BOXX. A graduate of the University of Texas with degrees in mathematics and physics, he lives in Austin, Texas.