

PC server chassis temperature stability

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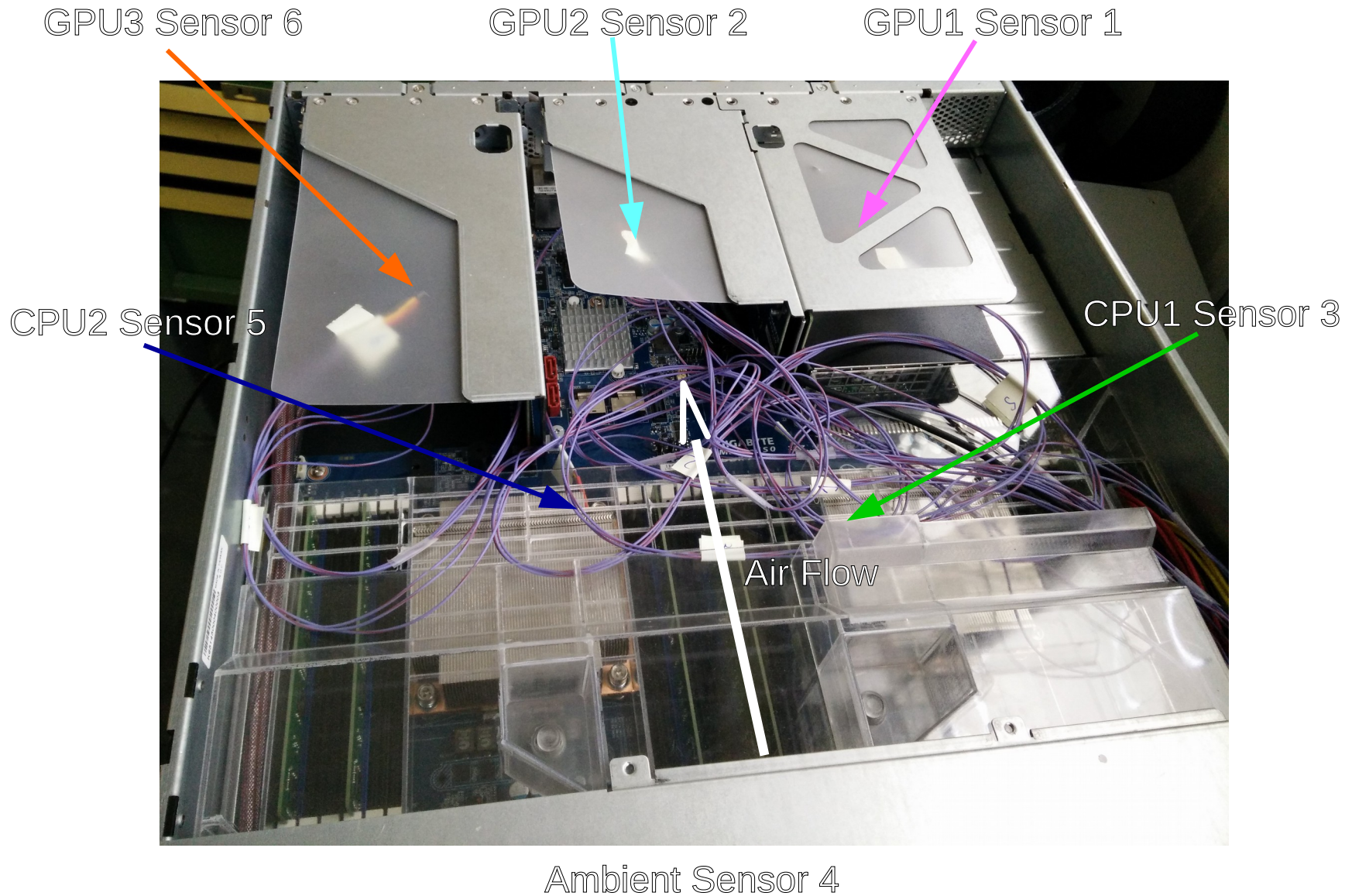
Measurements setup

- 6 MCP9701A active thermistors. Nominal accuracy ($\pm 2^{\circ}\text{C}$) after recalibration ($\pm 0.5^{\circ}\text{C}$)
- Arduino uno Rev 3 for analog to digital conversion and transmission to the PC through serial port.
- Python script for reading the data from the Arduino.

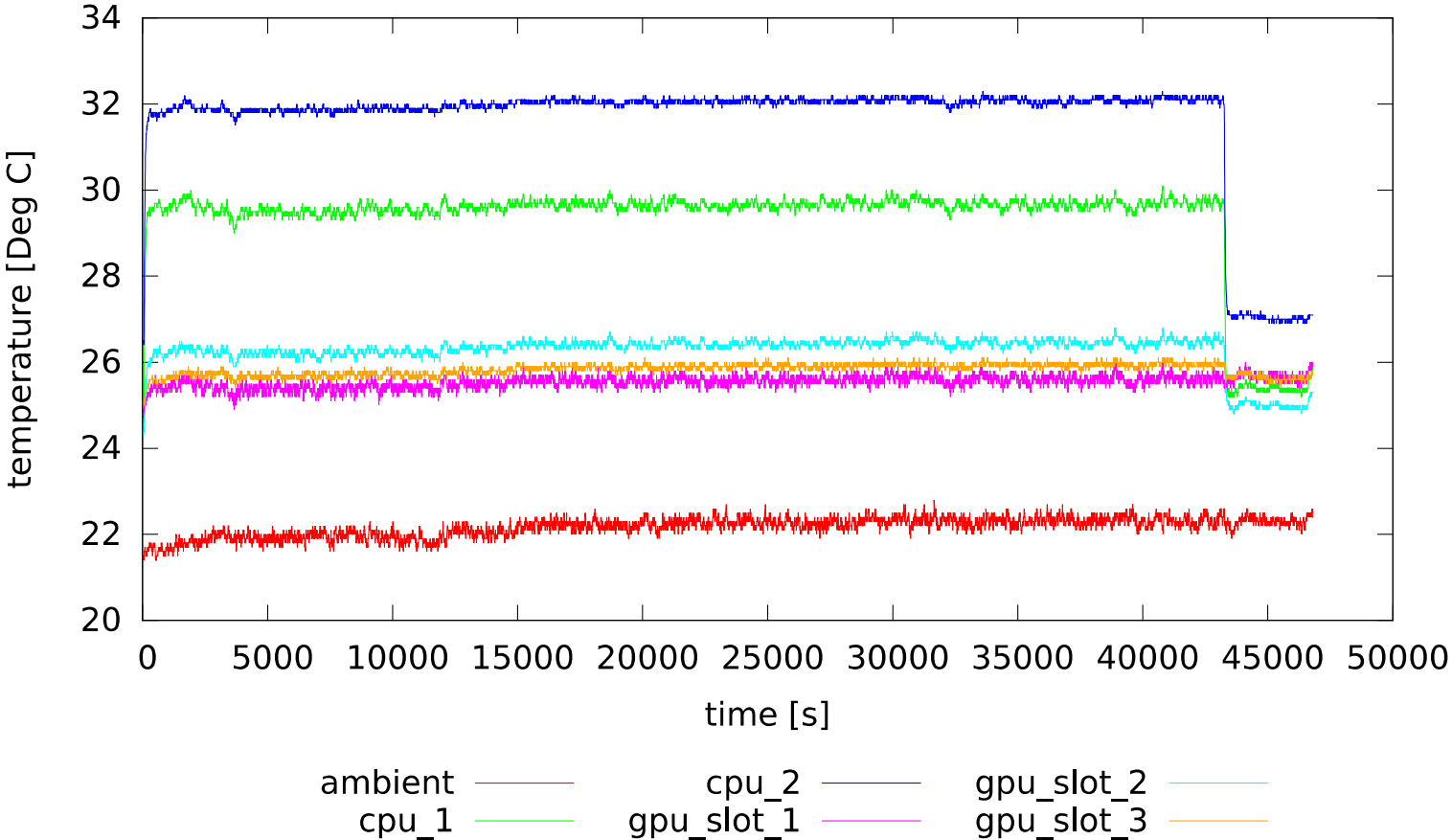
System configuration Gigabyte server

- CPU: 2 x Intel(R) Xeon(R) E5-2620 v3 @ 2.40GHz (85 W TDP)
- RAM: 32 GB DDR4
- OS: slc6.6
- Stress test used: phoronix-test-suite stresscpu2

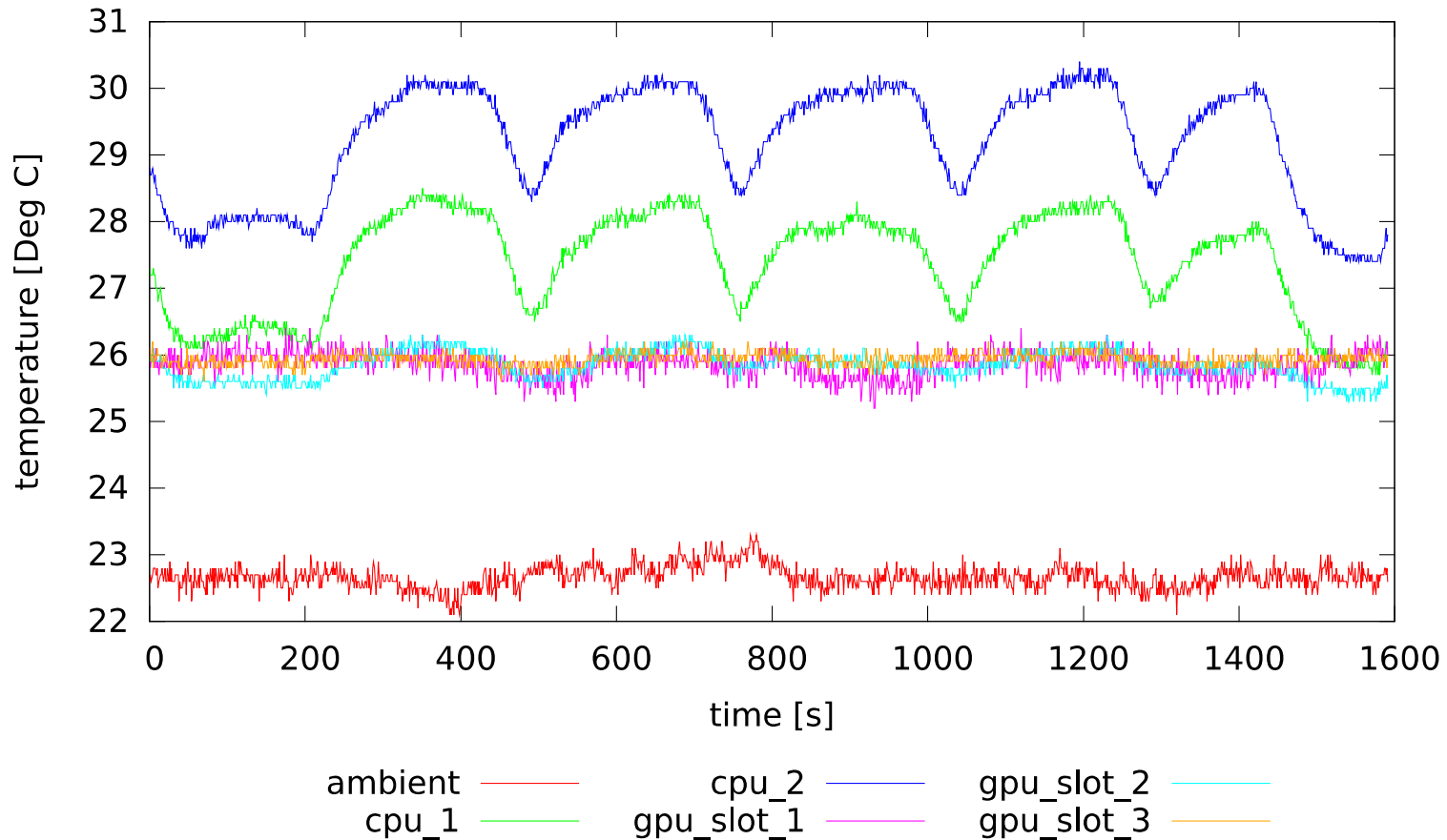
Sensors layout



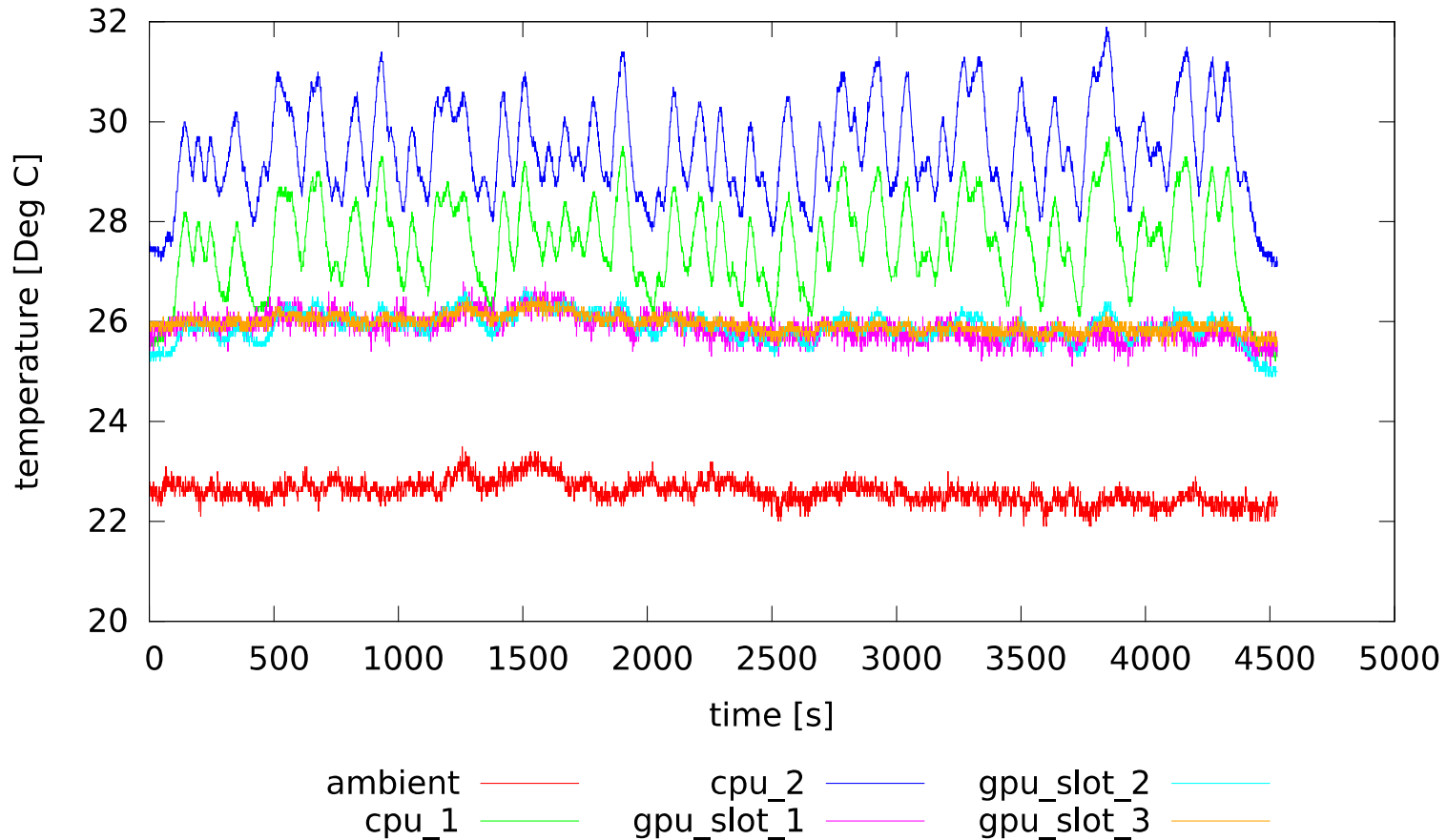
Full load CPU stress test



Linux kernel compilation



Randomized CPU load



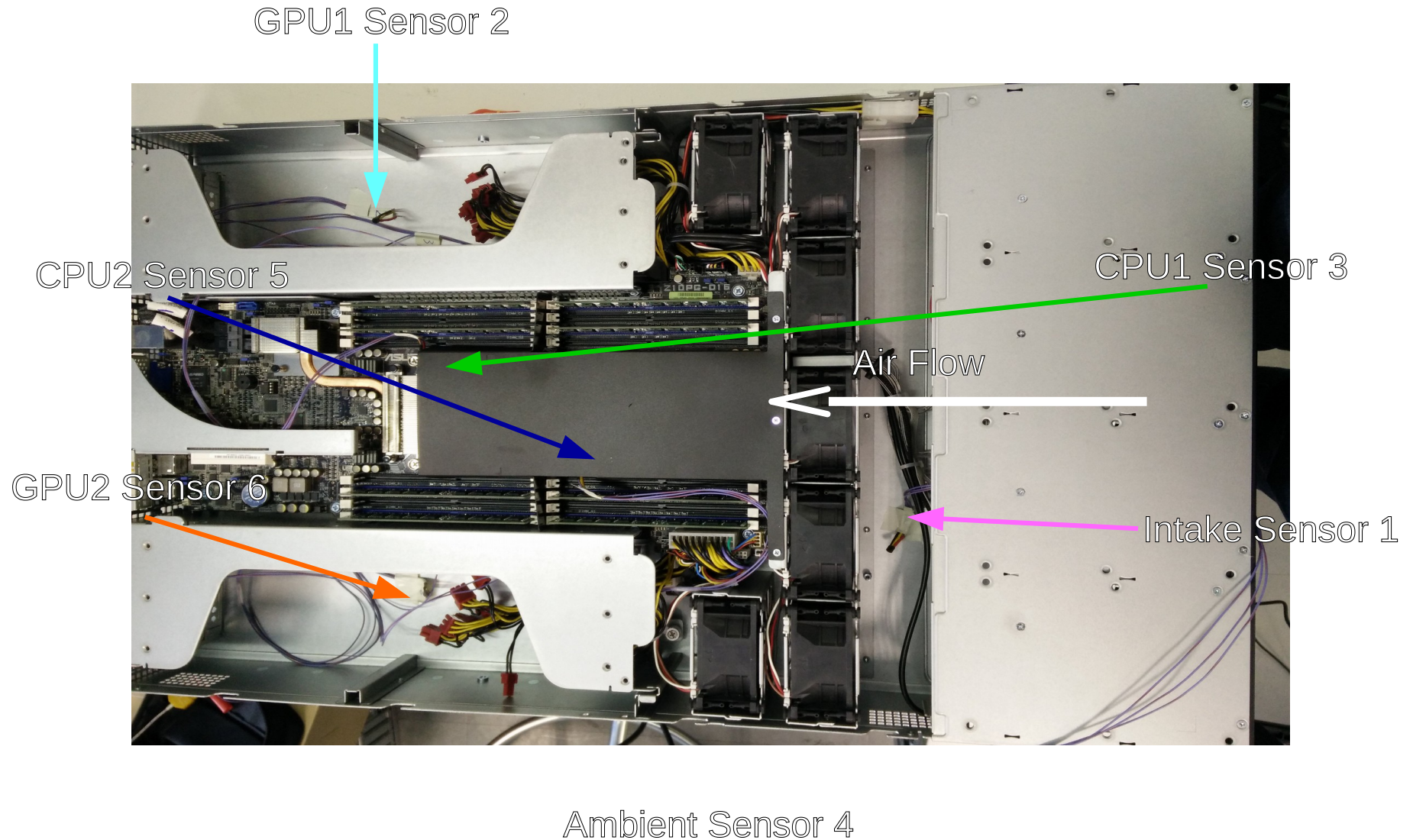
Average and Standard deviation

	Full Load		Linux kernel		Random load	
	Average	SD	Average	SD	Average	SD
Ambient	22.2	0.2	22.7	0.2	22.6	0.2
CPU1	29.3	1.1	27.4	0.8	27.6	0.9
CPU2	31.6	1.3	29.2	0.8	29.4	0.9
GPU1	25.5	0.1	25.9	0.2	25.9	0.3
GPU2	26.3	0.4	25.8	0.2	25.9	0.3
GPU3	25.8	0.1	25.9	0.1	25.9	0.2

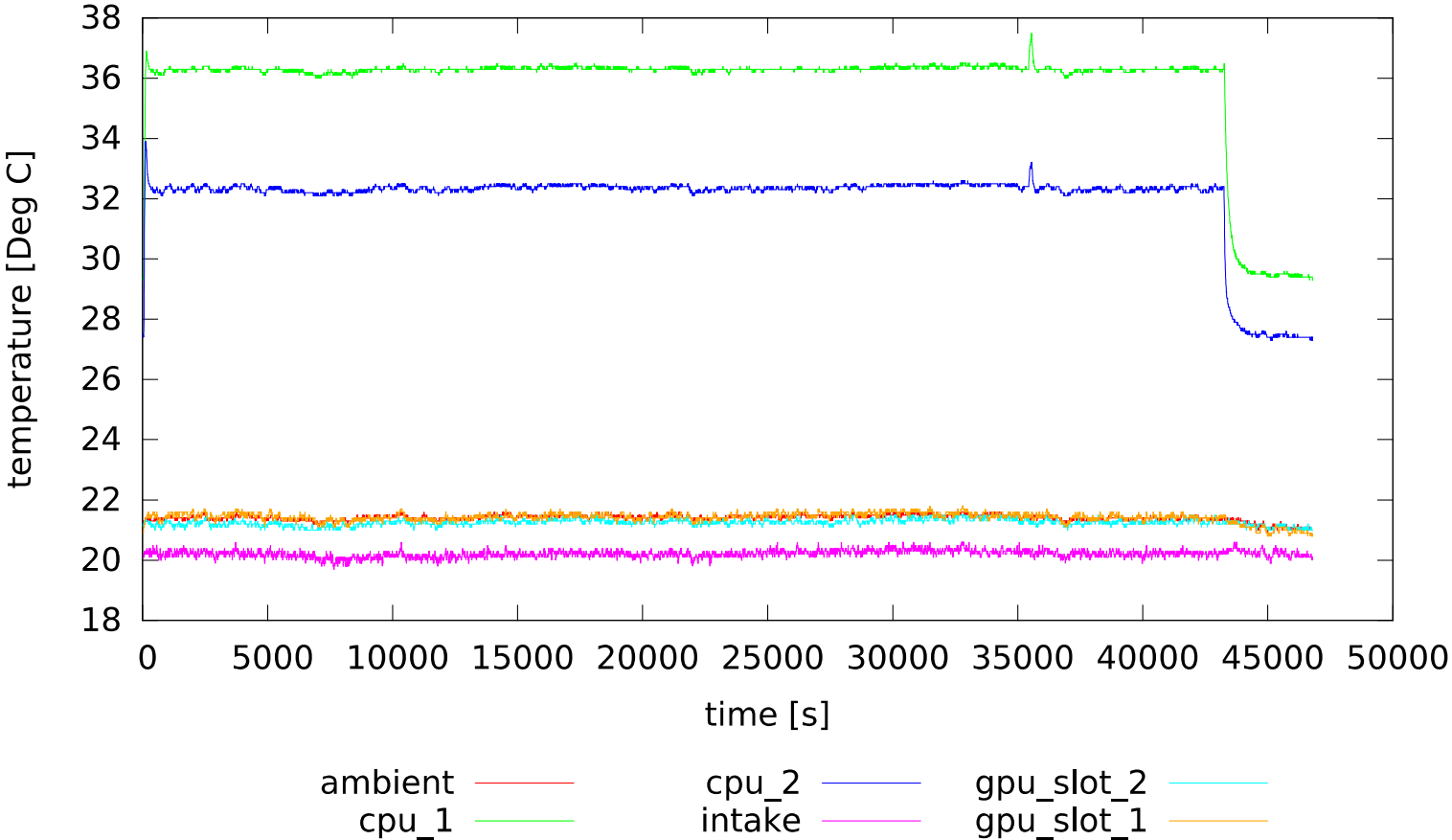
System configuration Asus server

- CPU: 2 x Intel(R) Xeon(R) CPU E5-2623 v3 @ 3.00GHz (105 W TDP)
- RAM: 64 GB DDR4
- OS: slc6.6
- Stress test used: phoronix-test-suite stresscpu2

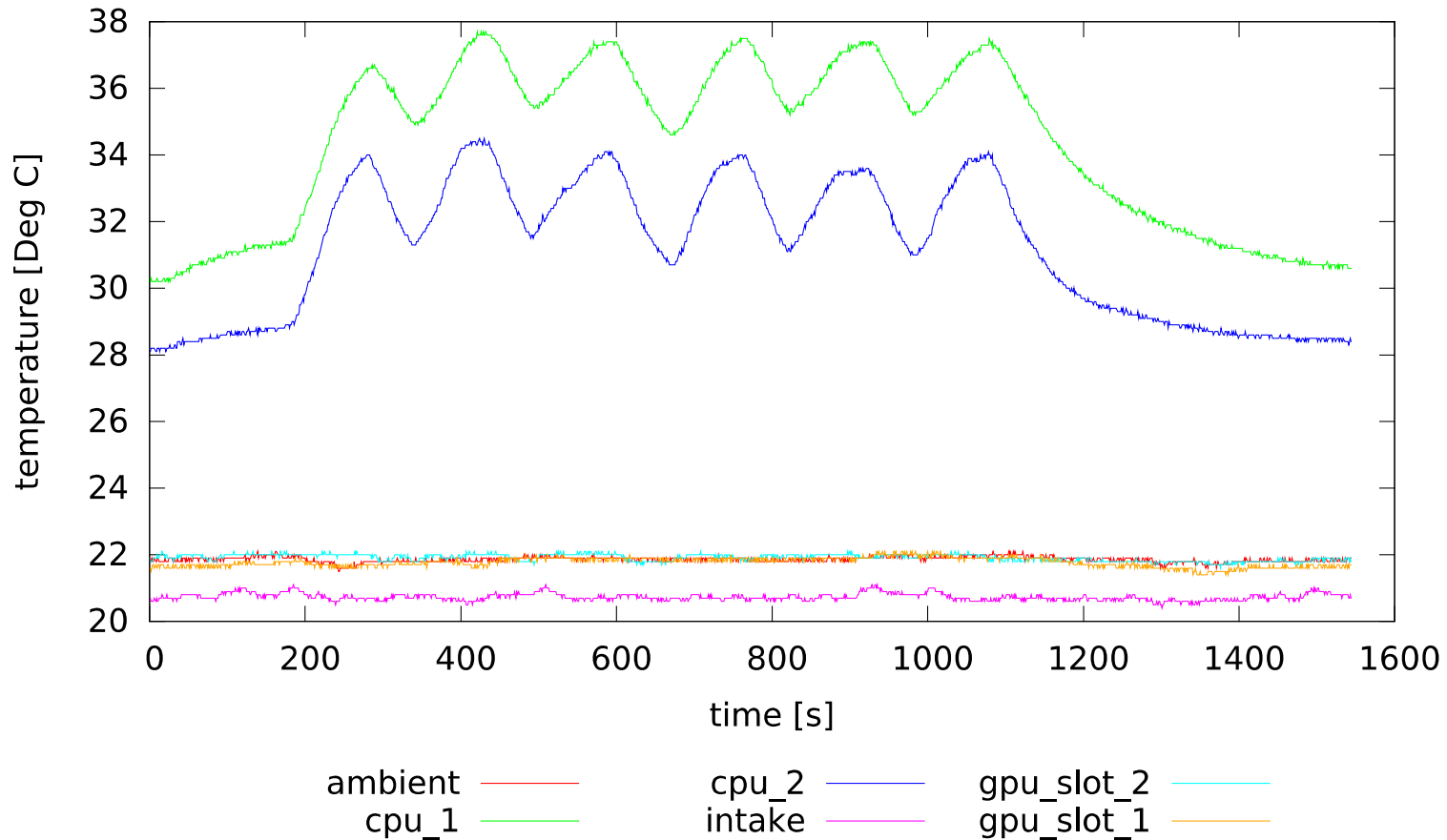
Sensors layout



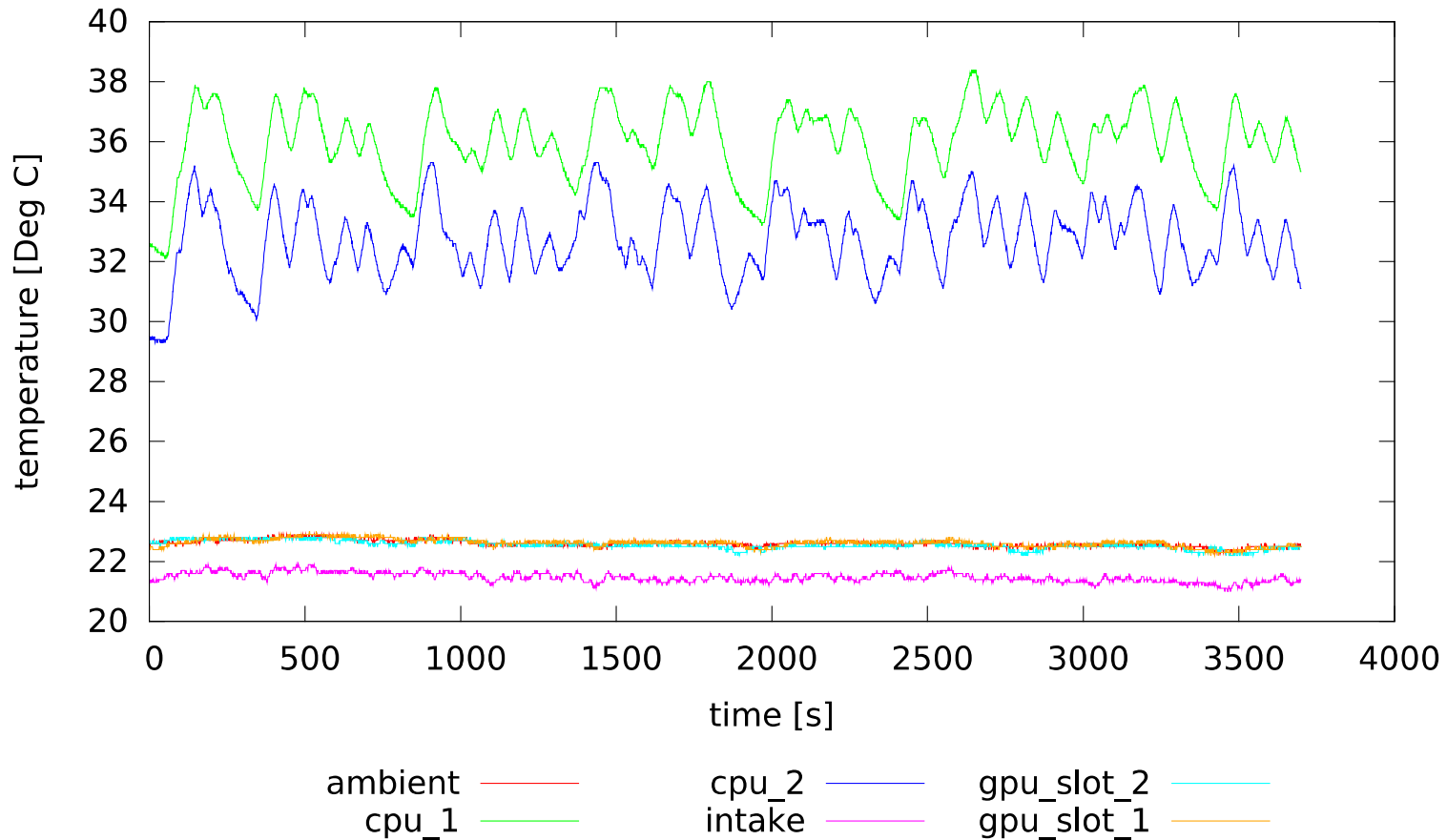
Full load CPU stress test



Linux kernel compilation



Randomized CPU load



Average and Standard deviation

	Full Load		Linux kernel		Random load	
	Average	SD	Average	SD	Average	SD
Ambient	21.4	0.1	21.9	0.1	22.6	0.1
Intake	20.2	0.1	20.7	0.1	21.5	0.2
CPU1	35.8	1.8	35.7	1.5	36.0	1.2
CPU2	32.0	1.3	32.2	1.5	32.7	1.2
GPU1	21.4	0.2	21.8	0.1	22.6	0.1
GPU2	21.3	0.1	21.9	0.1	22.6	0.1

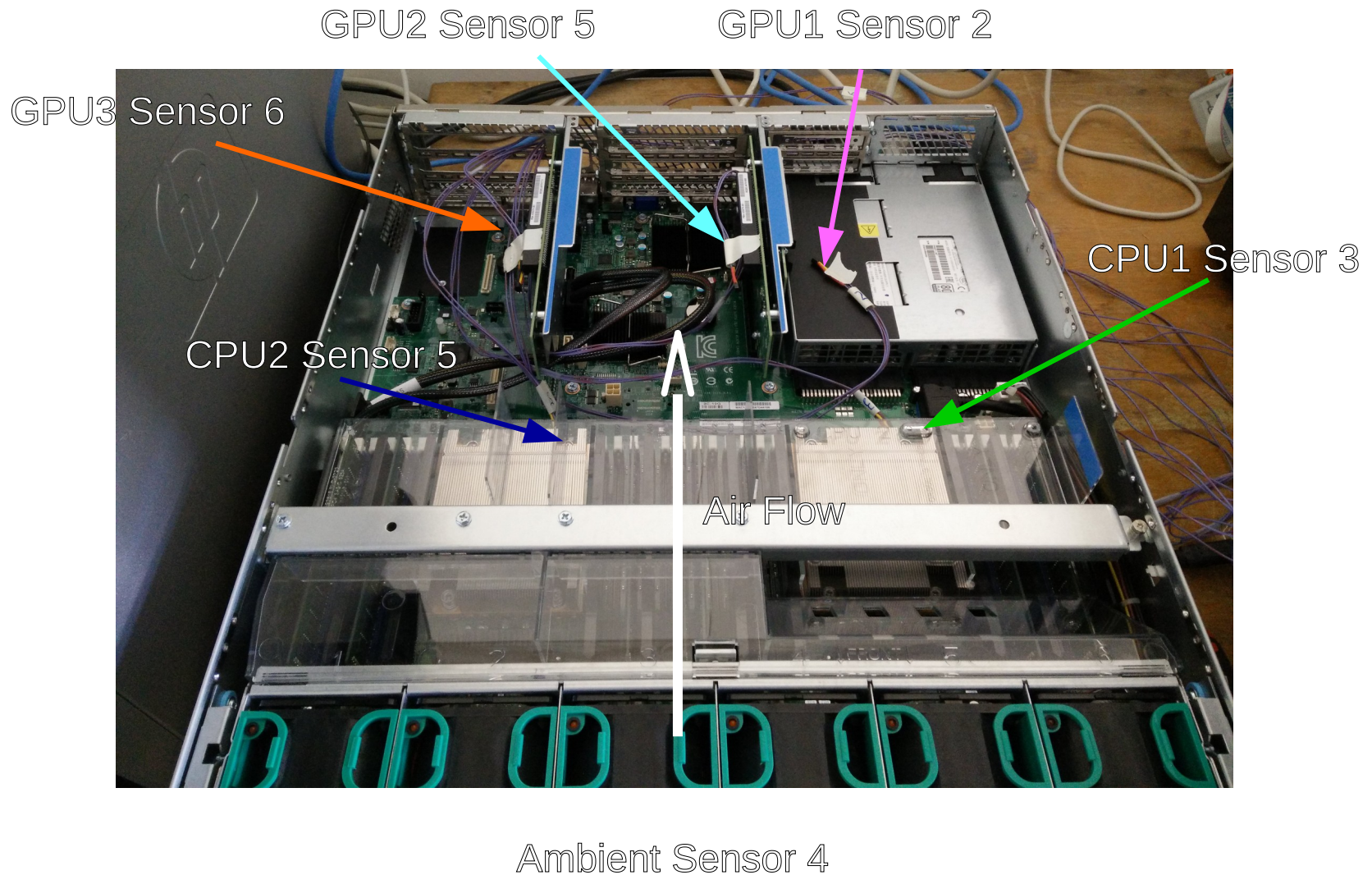
System configuration Intel server

- CPU: 2 x Intel(R) Xeon(R) E5-2690 v3 @ 2.60GHz (135 W TDP)
- RAM: 64 GB DDR4
- OS: Centos 7.0
- Stress test used: phoronix-test-suite stresscpu2

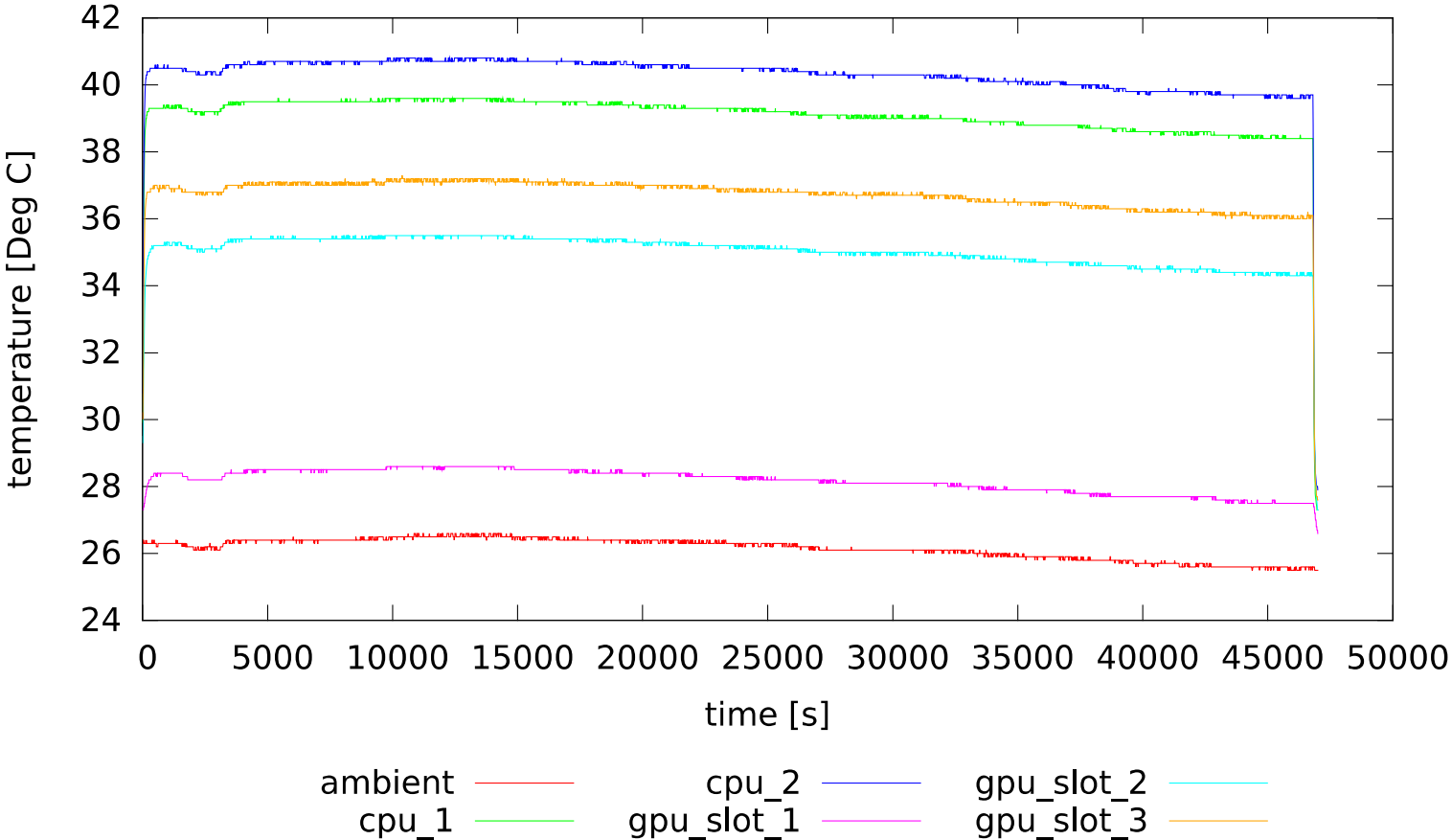
Issues related to the Intel server

- Incompatibility between the network driver and slc6.6
- Chassis's fans are not scaling properly with the temperature (Partly fixed by a BIOS update)
- The airflow guide is designed for actively cooled card in the default configuration

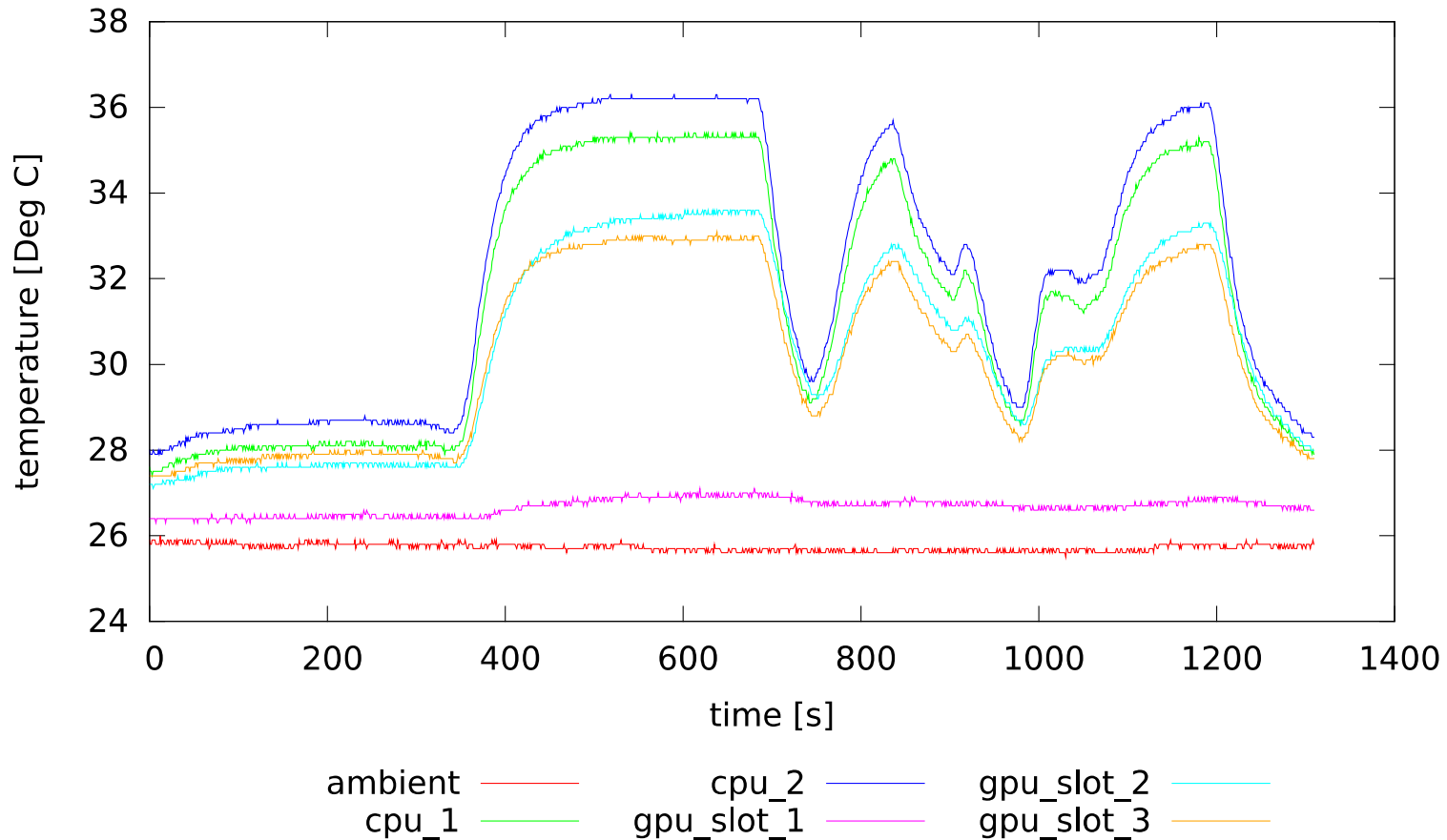
Sensors layout



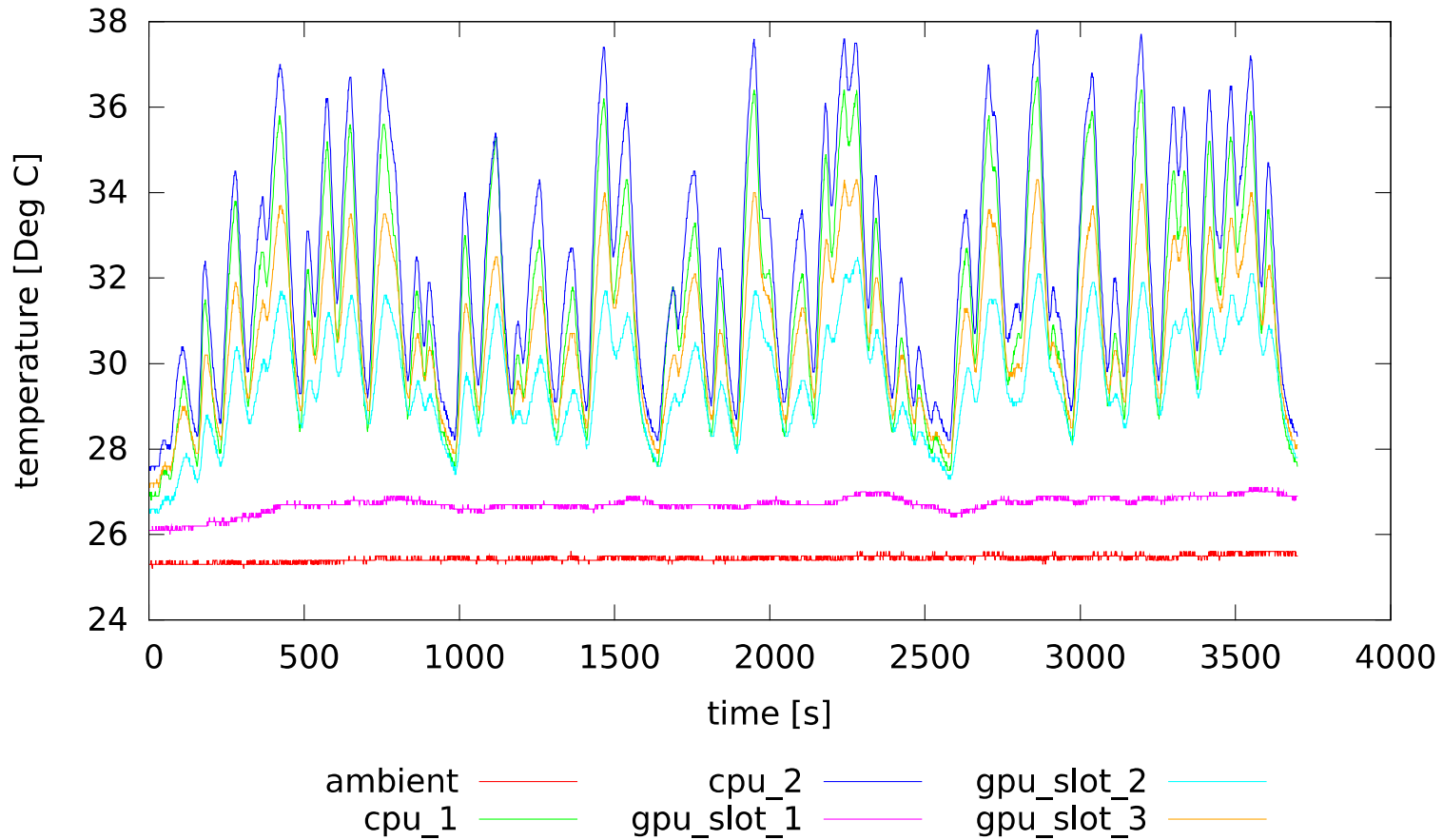
Full load CPU stress test



Linux kernel compilation



Randomized CPU load



Average and Standard deviation

	Full Load		Linux kernel		Random load	
	Average	SD	Average	SD	Average	SD
Ambient	26.1	0.3	25.7	0.1	25.4	0.1
CPU1	39.0	0.8	32.4	2.6	31.3	2.4
CPU2	40.3	0.8	33.1	2.7	32.2	2.4
GPU1	35.0	0.6	31.2	1.9	29.6	1.3
GPU2	28.2	0.3	26.7	0.2	26.7	0.2
GPU3	36.7	0.6	31.2	1.9	30.7	1.7

Conclusions

- The Asus chassis has a better thermal stability, in the GPU slots, than the others.
- The Gigabyte chassis has a good thermal stability but may have issues with open cooler solutions.
- The Intel chassis has issues with the airflow guide and the fan speed control. Because of its layout we should expect performances close to the Gigabyte one.