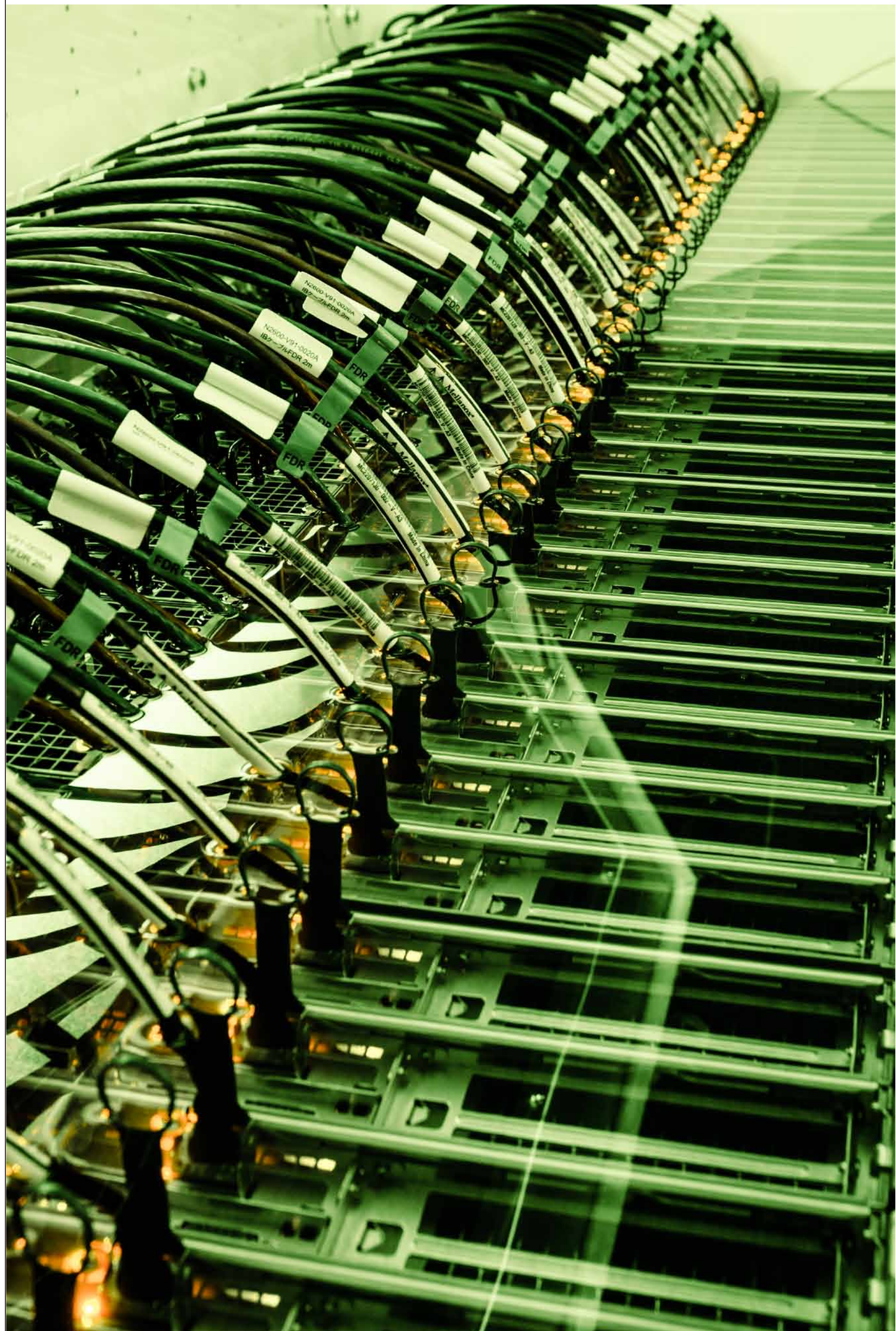




TSUBAME-KFC

a challenge for green cooling



TSUBAME-KFC is a prototype system for next-generation supercomputers such as TSUBAME 3.0 and later. It is well known that future supercomputer systems need much higher power efficiency. PUE (Power Usage Effectiveness) of TSUBAME 2.0 is around 1.3, which means additional 30% power is used for cooling system.

TSUBAME-KFC employs latest cooling technologies: warm water cooling and Green Revolution Cooling's oil-submersion cooling. The compute nodes are submerged in insulated oil. The oil absorbs the heat from compute nodes, then transfers them into water loops via heat exchangers. The warm water finally releases its heat into the air by cooling tower.



Green Revolution Cooling's CarnotJet system 42U Rack

- TSUBAME-KFC System
40 compute nodes (NEC LX 1U-4GPU Server, 104Re-1G)
- two Intel Ivy Bridge-EP Processors
 - four NVIDIA Tesla K20X GPUs
 - one Mellanox FDR InfiniBand HCA
 - 64GB DDR3-1600 SDRAM



New container-based research facility for TSUBAME-KFC located next to our computing center building.

Monitoring System

TSUBAME-KFC system integrates high-resolution power monitoring system which logs power consumption of each compute node and network switch.

Compared to the standard air-cooled systems, temperatures of processors are much lower in oil-submerged system. The power consumption is also reduced due to lack of cooling fans.



Power sensors



Control systems for cooling tower.

