OAK RIDGE National Laboratory

Summit Architecture Overview

Tom Papatheodore

Oak Ridge Leadership Computing Facility (OLCF)

SC19 Hands-On with Summit

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ORNL Summit System Overview

System Performance

- Peak of 200 Petaflops (FP_{64}) for modeling & simulation
- Peak of 3.3 ExaOps (FP_{16}) for data analytics and artificial intelligence

The system includes

- 4,608 nodes
- Dual-port Mellanox EDR InfiniBand network
- 250 PB IBM file system transferring data at 2.5 TB/s

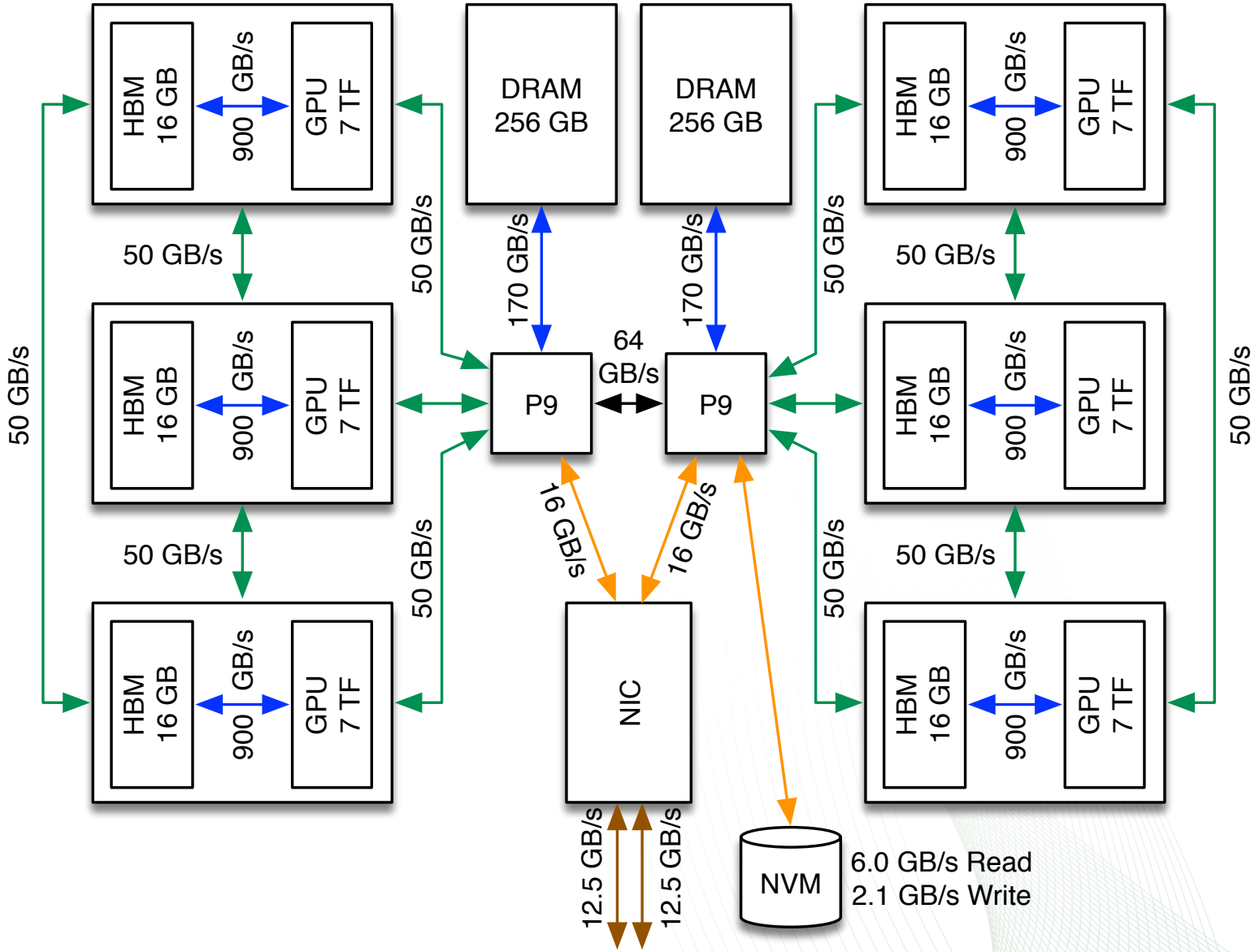
Each node has

- 2 IBM POWER9 processors
- 6 NVIDIA Tesla V100 GPUs
- 608 GB of fast memory (96 GB HBM2 + 512 GB DDR4)
- 1.6 TB of NV memory

149 PF HPL
#1 raw performance

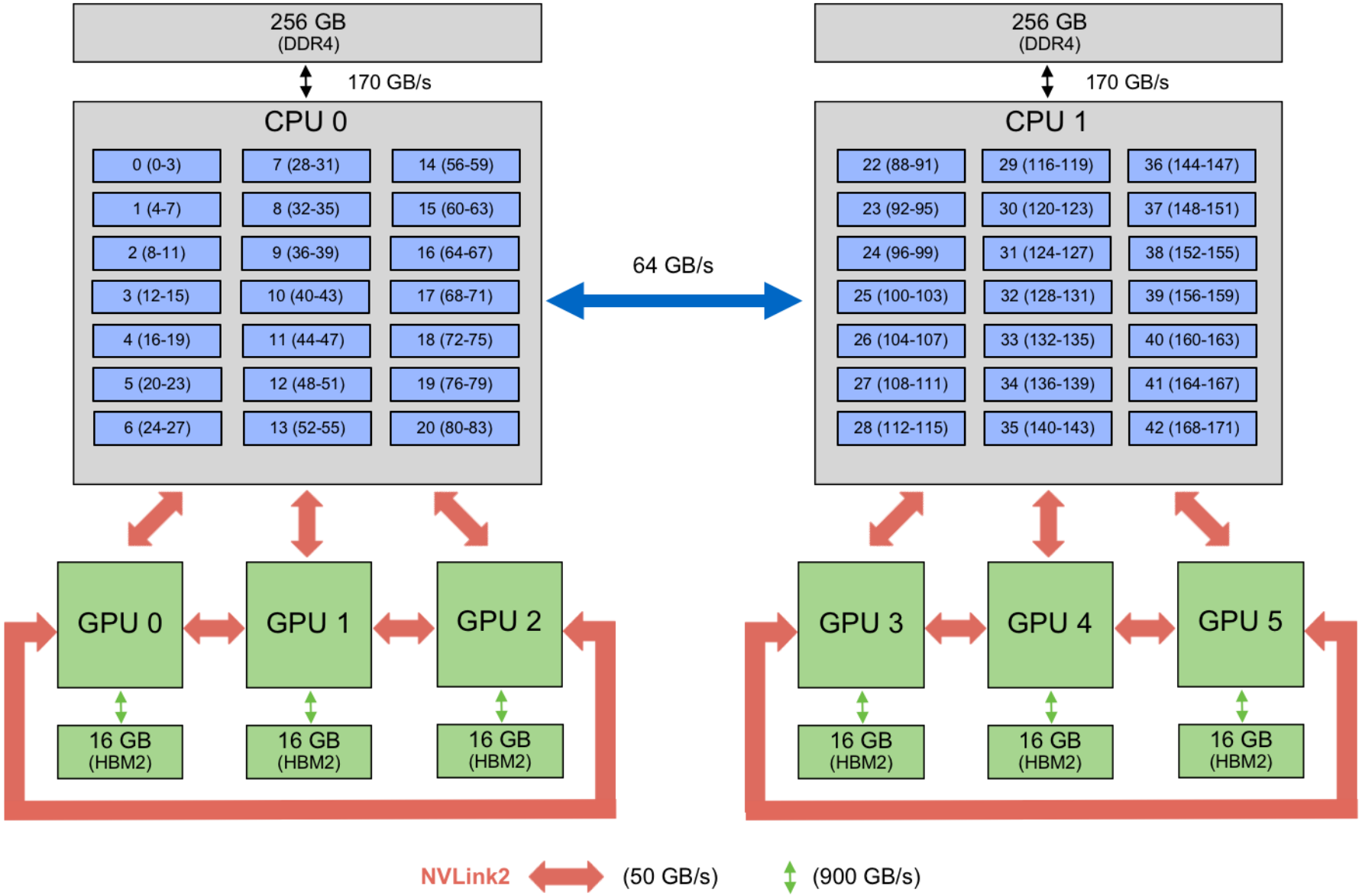
Summit Node Schematic

- Coherent memory across entire node
- NVLink v2 fully interconnects three GPUs and one CPU on each side of node
- PCIe Gen 4 connects NVM and NIC
- Single shared NIC with dual EDR ports
- 21 CPU cores on each P9 (each with 4 hw threads)



Summit Node

(2) IBM Power9 + (6) NVIDIA Volta V100



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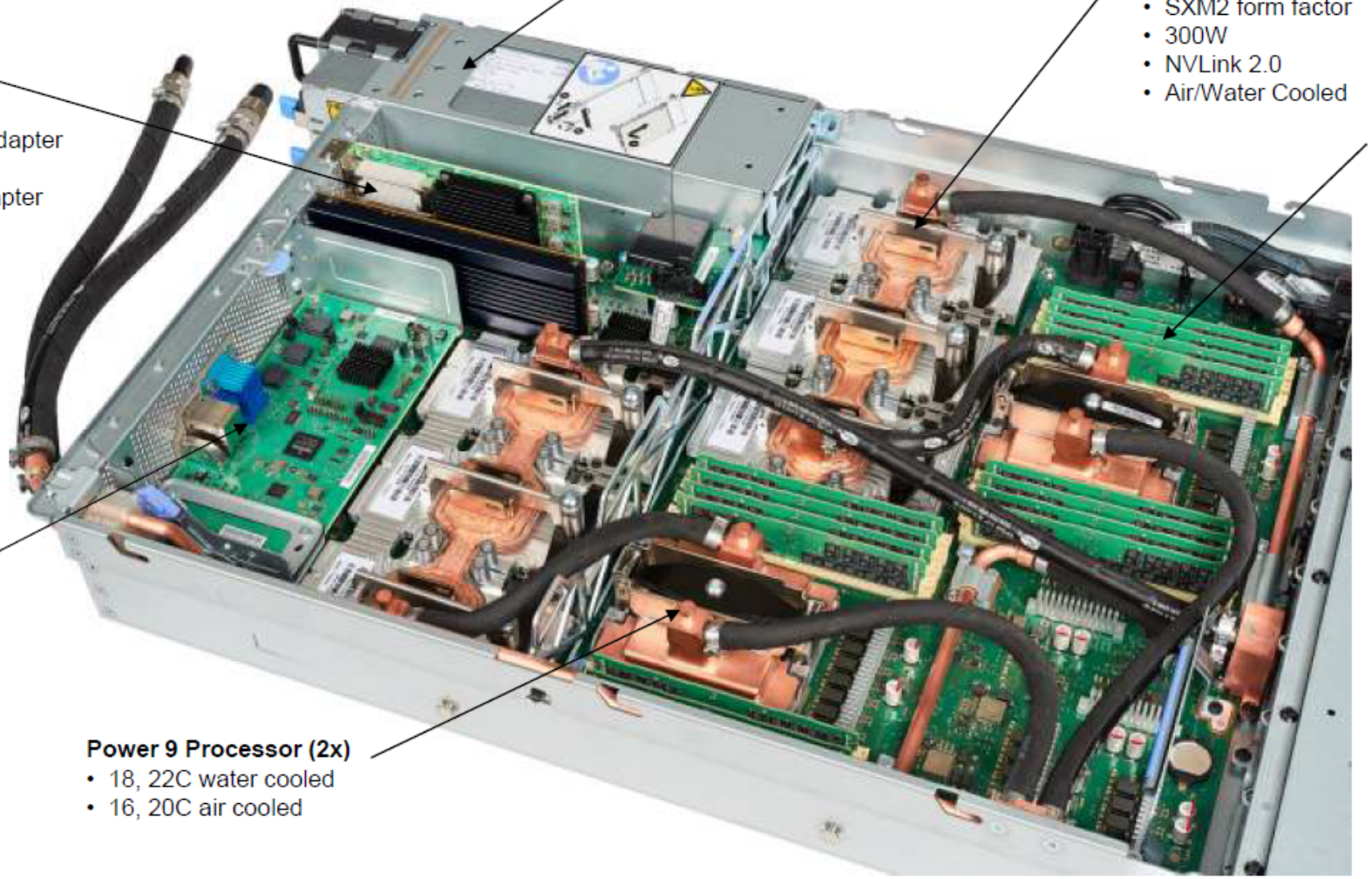
Summit Board (1 node) showing the Water Cooling



Power Supplies (2x)
- 2200W
- 200VAC, 277VAC, 400VDC input

NVidia Volta GPU
- 3 per socket
- SXM2 form factor
- 300W
- NVLink 2.0
- Air/Water Cooled

PCIe slot (4x)
- Gen4 PCIe
- 2, x16 HHHL Adapter
- 1, Shared slot
- 1 x8 HHHL Adapter

Memory DIMM's (16x)
- 8 DDR4 IS DIMMs per socket
- 8, 16, 32,64, 128GB DIMMs

BMC Card
- IPMI
- 1 Gb Ethernet
- VGA
- 1 USB 3.0

Power 9 Processor (2x)
- 18, 22C water cooled
- 16, 20C air cooled

Available File Systems / Storage Areas on Summit

NFS Directories – This is where you would keep source code and build your application.

NOTE: These directories are read-only from the compute nodes!

`/ccs/home/userid`

- Your personal home directory

`/ccs/proj/trn001`

- Can be accessed by all participants of this event
- This area is shared with all members of the project (source code, scripts, etc.)

GPFS Directories (parallel file system) – This is where you should write data when running on Summit's compute nodes.

`/gpfs/alpine/trn001/scratch/userid (or $MEMBERWORK/trn001)`

- Your personal GPFS scratch directory

`/gpfs/alpine/trn001/proj-shared (or $PROJWORK/trn001)`

- Can be accessed by all participants of the event
- This area is shared with all members of the project (data written from compute nodes)

Must use `jsrun` to run on compute nodes

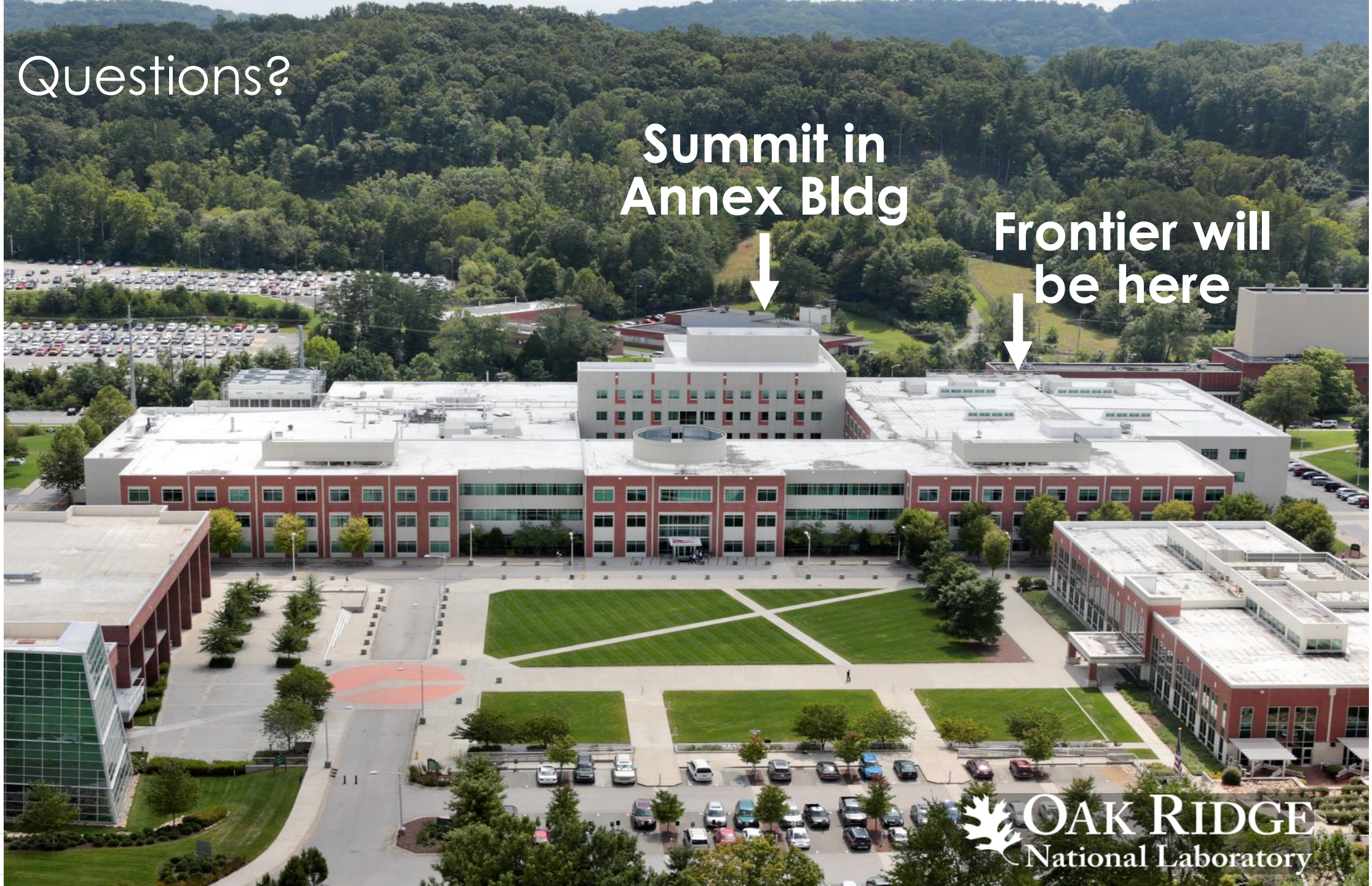
```
[tpapathe@login1: ~]$ hostname
login1

[tpapathe@login1: ~]$ bsub -P TRN001 -nnodes 1 -W 10 -Is /bin/bash
Job <15167> is submitted to default queue <batch>.
<<Waiting for dispatch ...>>
<<Starting on batch1>>

[tpapathe@batch1: ~]$ hostname
batch1

[tpapathe@batch1: ~]$ jsrun -n1 hostname
h49n16
```

Questions?


Summit in Annex Bldg
Frontier will be here
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