

Computational Resources

Computer Laboratory

Located in the Harry Reid Center, the NIPM computer research laboratory occupies approximately 1300 ft². This area is access controlled providing a secure work environment. In Harry Reid Center building, room 183 (HRC 183). The room has 18 computer workstations equipped with 16 Dell Optiplex 720 MT computers, two laptops, and an HP 605 laser printer. It has space for 24 total workstations. The core research computers have 10G connections to the internet, NIPM compute cluster, and Switch HPC clusters.

COBRE faculty occupy the adjacent six offices. Staff occupies the in lab offices providing them direct access to computational resources. The in lab rooms can accumulate up to 6 staff member or graduate students, and postdoctoral research associates.

Infocus - 55IN video conferencing smart board system

Computer Cluster

Thomas T. Beam Engineering Complex Data Center(TBE) is a state of the art professional managed data center. Multiple backup systems including UPS, diesel generators and additional redundant computer to prevent power loss. The TBE data center is monitored 24-7, including, power, cooling, access, network, and environmental sensors.

The NIPM high-density 12-node computer cluster is located at the UNLV Data Center in the Thomas T. Beam Engineering (TBE) Complex. The cluster runs the latest version of Bright Computing advance HPC management software. This software will allow the cluster to adapt to different computer requirements. Additionally, Bright Cluster HPC management software can scale to Amazon to allow burstable jobs and can deploy a Docker container. Bright cluster allows for machine learning, open stack, and other advance configurations

1. Intel HPC cluster head node. Mercury RM110 1U; Xeon E5-2650 v4 2.40 GHz 14-Core 125W Processors, 128GB of RAM and 240GB if SSD storage, 2x3.2TB NVMe 2.5 Inch Solid State Drives for Ultra Fast Scratch Space, and 4.8TB of

RAID SATA SSD storage. The cluster operates with a Bright Cluster manager software on a Centos OS

2. Storage server. Dual E5-2650 v3 2.30 GHz 10-Core 105W Processors, 1 TB of RAM and 0.5 PB of storage in 20 8TB SAS 7200RPM Disk Drives and 59 6TB SAS Disk Drives. The hardware is setup with RAID backup using LSI MegaRAID 9361-8i SAS 12Gb/s RAID Controllers. The Storage server is connected with 10Gbps Dual Port SFP+ to the cluster.
3. Computational worker nodes (8). Each node RM212Q 2U node has: dual Intel Xeon E5-2699 v4 2.20 GHz 22-Core 125W Processors, 128GB of RAM, a 200GB SSD drive, and 10Gbps Dual Port SFP+ and 1Gbe connection to the cluster. Each CPU is the top of line Intel processor able to operate at over 500 GFLOPS per CPU
4. Development/download server: Mercury SuperMicro RM208 2U; Intel Xeon E5-2603 v3 1.6 GHz 85W Processors, 64GB of RA, and 16TB of SATA storage, and one Intel Ethernet 10Gbps Dual Port SFP+ Network Adapter with SR Optics. The server has a 10 GB/s connection to the Internet is located in the UNLV Data Center and used to rapidly download genomes for transfer to the NIPM Mercury cluster. These are connected through a high performance fiber network.
5. Virtual Machine and Database server. Mercury RM224 2U; Intel Xeon E5-1660 v4 3.40 GHz 8-Core 140W Processors, 256GB of RAM and 240GB if SSD storage, and 8TB of SATA SSD storage.
6. Cisco switch. The Cisco Nexus 2000 Fabric Extender which will allow us to keep certain computers on a private VLAN and other allowed to communicate openly with other machines. The CISCO Nexus allows us to mix 1 GB, 10 GB, and 40 GB Ethernet using bidirectional optics. It has redundant power supplies, redundant and hot-swappable fan - 48 port that use SFP+ with an additional 6 ports that are 6 QSFP+. The switch can switch at 480 GB/s in full duplex and can forward packets at over 700 GB/s.

Additional Laboratories

NIPM occupies three non-computational laboratories in Harry Reid Center(HRC) HRC-181 (585 ft²), HRC-422 (290 ft²), HRC-410 (~630 ft²), each with sinks, benches, and storage.

HRC-422. Library preparation and genome sequencing is conducted in this room. It houses an Illumina NextSeq 500 and equipment for library production and analysis:

Blue Pippin size selection system (Sage Science Inc.), BiorupterPico sonicator (Diagenode); Bioanalyzer 2100 (Agilent Technologies), Master Cycler Nexus S1 PCR machine (Eppendorf), ST16R centrifuge with microplate rotors (Sorvall), Nanodrop. These instruments will be the major pipeline to conduct NGS library preparation and analysis for the COBRE investigators and other labs. Drs. Han's project, J. Chen's project, and likely several pilot projects will use this equipment to generate DNA/RNA/methylation sequencing data. The laboratory also has small equipment typical of a molecular biology / genetics laboratory and a refrigerator.

HRC-410 is a joint NIPM laboratory currently occupied by Dr. Xiangning Chen, Co-PI. The lab is equipped with HRC410, is equipped for regular molecular biological studies, which includes refrigerators, a -80°C freezer, microfuges, several agarose and protein gel boxes, a Biorad preparative electrophoresis cell, platform shakers, balances, 384-well plate reader, sonicator, vortex mixers, pipettors, a pH meter, and related equipment.

HRC-181 is a joint NIPM laboratory Class II Biosafety Cabinet, two Thermo Forma series II CO₂ incubator, a Leica inverted scope, an Eppendorf 5810R refrigerated centrifuge, a refrigerator, ultrapure water system, ice-maker, autoclave, a small oven, and several VWR water baths. This will be used by RP3 to culture induced microglia-like cells from monocytes RP1, RP3 and pilot awardees will use different instruments in this facility.