Google Colaboratry

Introduction:

Google Colab is an online notebook-like coding environment that is well-suited for machine learning and data analysis.

It comes equipped with many Machine Learning libraries and offers GPU usage. It is mainly used by data scientists and ML engineers.

Why to use Google Colab?

- Google Colab is Free
- Easy to get started
- Allows access to GPUs/TPUs
- Easy to share code with others
- Easy graphical visualizations in Notebooks

Why not to use Google Colab?

- GPU/TPU usage is limited
- Not the most powerful GPU/TPU setups available
- Not the best de-bugging environment
- It is hard to work with big data
- Have to re-install extra dependencies every new runtime

Google Colab for machine Learning.

With Colab you can import an image dataset, train an image classifier on it, and evaluate the model, all in just a few lines of code. Colab notebooks execute code on Google's cloud servers, meaning you can leverage the power of Google hardware, including GPUs and TPUs, regardless of the power of your machine. Allyou need is a browser.

Colab is used extensively in the **machine learning** community with applicationsincluding:

- Getting started with TensorFlow
- Developing and training neural networks
- Experimenting with TPUs
- Disseminating AI research
- Creating tutorials

Feasibility of Colab

- Accessing GitHub from Google Colab
- Clone a GitHub repository
- Load individual files directly from GitHub
- Accessing Local File System to Google Colab
- Accessing local file system using Python code

NGN Geforce (GPU)

- **PC Configuration:**

  - Processor: Intel® Core™ i7-8700K CPU @ 3.70 GHz it's 64 bit operating system
  - RAM: 32 GB
  - HDD : 2 TB HDD
  - Graphics Card: 1x NVIDIA GP 100 Accelerator card
  - Monitor: LG 22mp48hq LED
  - K/B & MOUSE: Logitech USB

- **Additional Feature**

NVIDIA GPU TITAN X Graphics Card of 12 GB TITAN X is crafted to offer superior heat dissipation using vapor chamber cooling technology in a die cast aluminum body. It's a powerful combination of brilliant efficiency, stunning design, and industry-leading performance.

Super micro computer

- Scientific Virtualization
- High Performance Computing
- Rendering
- AI/Deep Learning Training

- Barebone GPU Full-Tower SuperServer Dual Intel Xeon Scalable, Intel C621A chipset, Up to 4TB in 16 DIMM Slots, SATA3, NVMe, 8x 3.5in drive bays, 2x 10GbE BaseT LAN Ports, 2000W Redundant Power Supply (CSE-747BTS-R2K20BP + X12DPG-QT)
  - Cost of computer : $ 3,509.00
  - Feature of super micro computer' Dual Socket P+ (LGA-4189) 3rd Gen Intel®
  - Xeon® Scalable Processors
  - Intel® C621A Chipset
  - 16 DIMM Slots; Up to 4TB DRAM; Up to 4TB Intel® Optane™ Persistent Memory (up to 6TB with DRAM) ;

- Processor
  - CPU 3rd Gen Intel® Xeon® Scalable processors
  - Support CPU TDP 270W
  - Dual Socket P+ (LGA-4189)
  - Cores Up to 40C/80T; Up to 60MB Cache
  - Motherboard Super X12DPG-QT6

- System memory
  - Memory Capacity: 16 DIMM slots
  - Memory Type: 3200/2933/2666MHz ECC DDR4 RDIMM/LRDIMM
  - Intel® Optane™ persistent memory 200 series
  - Up to 4TB: 16x 256 GB DRAM
  - Up to 6TB: 8x 512 GB PMem
  - Memory Voltage 1.2 V
  - Error Detection ECC

- Support gpu
  - NVIDIA A100,A40, and RTX A6000
  - CPU-GPU Interconnect PCI-E 4.0 x16 CPU-to-GPU Interconnect
  - GPU-GPU Interconnect PCI-E

- Management
  - Watch Dog
  - NMI
  - KVM with dedicated LAN
  - Redfish API
  - SuperDoctor® 5

- Intel® Node Manager
- IPMI 2.0
- SUM, SSM, SPM,
- OOB Management Package (SFT-OOB-LIC)

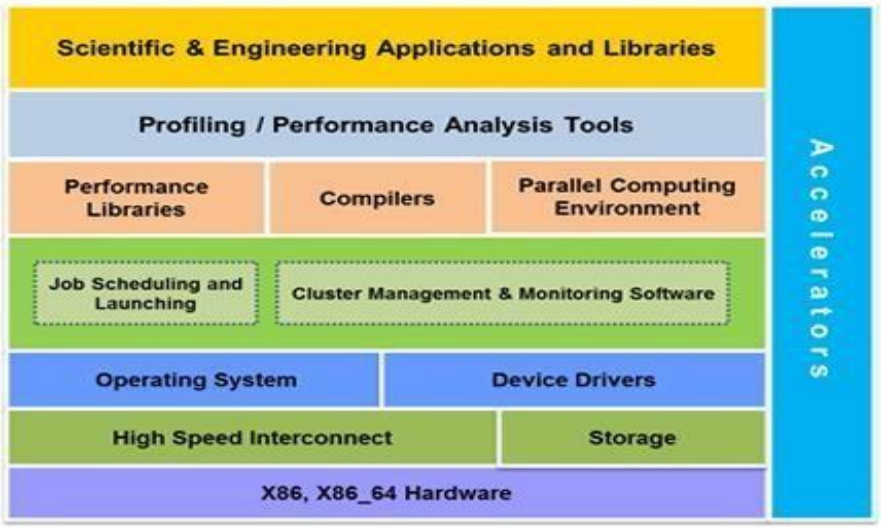
Power Configurations Power-on mode for AC power recovery ACPI Power Management

SUPER COMPUTER - PARAM SHAVAK

CONFIGURATION

Architecture:

The system consists of 2 multicore CPUs each with minimum 12 cores along with two number ofaccelerator cards. The entire configuration is available in a single server in a table top model. Regardless of the traditional HPC systems/supercomputers, this system does not require specificsupport infrastructure like precision air-conditioned environment, controlled humidity etc. Also,the accepted sound level is very less when compared to the traditional servers. This brings downthe infrastructure cost of the system



Architecture Block Diagram

Software Details:

OS	CentOS 6.5
Drivers	MPSS/CUDA
Tools	ONAMA, CHReME
Libraries	mpich2, Intel®
Compilers	GCC, Intel®
SDK	Netbeans
Job Scheduler	Torque
Monitoring Tool	Ganglia

Salient Features:

- Supercomputer in a Box system in a table top model
- Powered with 2 multicore CPUs each with minimum 12 cores
- 2 numbers of accelerator cards
- 3 Tera-Flops peak computing power with 8 TB of storage
- Easy to deploy solution with no additional data center infrastructure
- Pre-loaded with parallel programming development tools and libraries
- Pre-Installed tools for scheduling and resource management
- Video Tutorials, learning materials and user manuals etc.
- Indigenous HPC portal- CHReME
- Indigenous applications interface – Onama

APPLICATIONS

Bio-informatics	mpiBLAST
Molecular Dynamics	GROMACS
Weather Forecasting and Oceanography	WRF, MOM
Quantum Chemistry	Abinit, NWChem
Materials Science	Quantum Espresso
CFD	OpenFOAM
Visualization Tools	GrADS, Ferret
Intel Xeon Phi	Mdynamics, Clustalw

ACCESSIBILITY

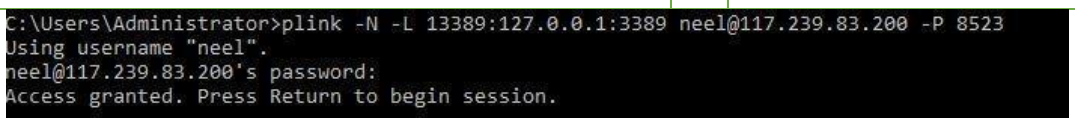
1	Install PUTTY :
	https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html
	Package files You probably want one of these. They include versions of all the PuTTY utilities. (Not sure whether you want the 32-bit or the 64-bit version? Read the FAQ entry.) **MSI ('Windows Installer')** 32-bit: putty-0.74-installer.msi (or by FTP) (signature) 64-bit: putty-64bit-0.74-installer.msi (or by FTP) (signature)
2	Perform SSH Tunneling:

1. Open command prompt
2. Type the following command without quotation andreplace username with your username:
   "plink -N -L 13389:127.0.0.1:3389
   username@117.239.83.200 -P 8523 "

   8523 – Supermicro

   8522- Paramshavak

3. Enter your password and press Enter
4. Again press Enter to begin the session.
5. **Do not close the command prompt.**



Enter your username Here

Do not forget to press enter tobegin session!!

Do not close the command prompt !!!

3	Open Remote Desktop Connection and Enter: "http://127.0.0.1:13389" 
	You will be presented with following screen. Select xvnc insession and Enter your login credentials.

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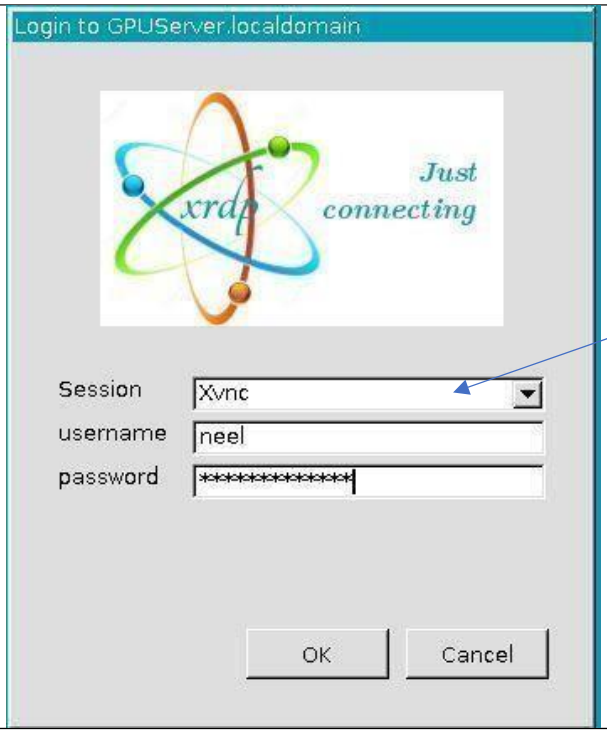
Accredited with Grade A by NAAC



NVIDIA DGX Server

❖ What is NVIDIA DGX Server?

- DGX is a line of servers and workstations built by NVIDIA.
- Provides a massive amount of computing power between 1-5 Petaflops.
- DGX systems come out of the box with an optimized operating system and a complete pre-integrated environment for running deep learning projects.
- Software architecture that lets data scientists easily deploy the deep learning frameworks and management tools they need with minimal setup or configuration.

❖ NVIDIA DGX-1 First Generation DGX Server

GPUs	8x NVIDIA Tesla V100
GPU MEMORY	Total of 256 GB
CPU	Dual 20 Core Intel Xeon E5-2698 v4 2.2GHz
CUDA Cores	40,960
Tensor Cores	5,120
Power	3500W
System RAM	512 GB 2133 MHz DDR4 RDIMM
Networking	Dual 10 GB Ethernet

❖ NVIDIA DGX-2 First Generation DGX Server

GPUs	16x NVIDIA Tesla V100
GPU Memory	Total of 512 GB
CPU	Dual Intel Xeon Platinum 8168, 2.7GHz, 24 cores
CUDA Cores	81,920
Tensor Cores	10,240
Power	10,000W
System RAM	1.5 GB
Networking	8x 100 GB Ethernet

❖ NVIDIA DGX A100 Third Generation DGX Server

- First and only workstation with 4 way NVIDIA A100 NVLink and MIG(Multi Instance GPU).
- Four A100 Tensor core GPUs, 320GB total HBM2E(High bandwidth Memory).
- 200GB/s bi-directional bandwidth between any GPU pair, almost 3x compare to PCIe Gen4.
- New Maintenance free refrigerant Cooling system.

○ CPU and Memory :

- 64-core AMD EPYC CPU, PCIe Gen4
- Up to 512GB System Memory.

○ Internal Storage :

- 1.92TB NVME M.2 SSD for OS, up to 7.68 TB NVME U.2.

○ Connectivity :

- 2x 10GbE(RJ45)
- 4x Mini Display Port for Display out
- Remote management 1GbE LAN port(RJ45)

❖ How to Access It?

- SSH is used to access DGX server and uploading it on docker.
- **Location:**
  - Building A5 – Depstar
  - Room No – 118