

Intel® Developer Cloud (IDC)

Soner Steiner

CSC WS Helsinki
Februar 2024



Agenda

- Public Intel Developer Cloud

Jupyter Nbs on Devcloud

- (IDC) slurm usage

cloud.intel.com

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← → ↻ https://www.intel.com/content/www/us/en/developer/tools/devcloud/services.html 150%

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Accelerate AI development using Intel®-optimized software on the latest Intel® Xeon® processors and GPU compute.


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Console Home

Quick Start

- Hardware Catalog
- Software Catalog
- Training and Workshops
- Cloud Credits

Learning and Support



Getting started

Learn the fundamentals to get the Most out of the Intel developer cloud



Tutorials

Browse how to create better solutions using Intel developer cloud



What's new?

Learn the fundamentals to get the Most out of the Intel developer cloud

Jupyter NBs

Training and Workshops

 [Launch JupyterLab](#)

AI

AI Kit XGBoost Predictive Modeling

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Heterogeneous Programming Using Data Parallel Extension for Numba® for AI and HPC

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Machine Learning Using oneAPI

Intel® AI Analytics Toolkit accelerates data science and analytics with Python®

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C++ SYCL

Essentials of SYCL

Learn to write performant and portable code using oneAPI and SYCL C++

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Performance, Portability and Productivity

Learn to write performant and portable HPC code for multiple platforms with oneAPI and SYCL C++

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Introduction to GPU Optimization

Learn GPU optimization techniques using SYCL.

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Optimize apps from traditional CUDA environments

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Notebook

Python 3 (ipykernel)

base

modin

pytorch

pytorch-gpu

tensorflow

tensorflow-2.13.0

tensorflow-gpu

Console

Python 3 (ipykernel)

base

modin

pytorch

pytorch-gpu

tensorflow

tensorflow-2.13.0

tensorflow-gpu

← → ↻ https://idcbetabatch.eglb.intel.com/user/u77ed21c370a7bf05ff0e681198e1b9b/lab/tree/Training/HPC/sycl-performance-portability-training/00_Introduction.ipynb 170% ☆

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/ ... / HPC / sycl-performance-portability-training /

Name	Last Modified
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src	2 months ago
• 00_Introd...	2 months ago
01_Math_...	2 months ago
02_ND_Ra...	2 months ago
03_LocalM...	2 months ago
04_Perfor...	2 months ago
accelerato...	2 months ago
exec_all.sh	2 months ago
license.txt	2 months ago

Terminal 1 Launcher 00_Introduction.ipynb +

Markdown Notebook Python 3 (ipykernel)


Performance, Portability and Productivity






Sections


- [Introduction to Performance, Portability and Productivity](#)
- [Introduction to oneAPI](#)
- [Test Application for Performance Portability](#)
- [Analysis for Performance Portability](#)




Learning Objectives

- Explain how the oneAPI programming model can solve the challenges of programming in a heterogeneous world.
- Understand the importance of writing Performance Portable code in heterogeneous world.
- Use tools like Intel VTune Profiler and Intel Advisor Roofline to performance analysis

File Edit View Run Kernel Tabs Settings Help



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Name	Last Modified
 Big_Data	20 days ago
 Training	last month
 Readme.md	20 days ago


Terminal 1 ×

Launcher × +

u77ed21c370a7bf05ff0e681198e1b9b@idc-beta-batch-pvc-node-13:~\$

(IDC) slurm usage

- You need an instance on IDC
- The virtual machine is free of charge

 Developer Cloud us-region-1 ▾

Hardware Catalog

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☐ Bare Metal

PROCESSOR

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☐ GPU

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RECOMMENDED USE CASE

☐ Core compute


☐ GPU

☐ AI


Core compute

 **4th Generation Intel® Xeon® Scalable processors**
Virtual machines and Bare Metal servers available
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GPU

 **Intel® Max Series G16**
4th Gen CPU, 2 sockets, 256 GB memory, 2 TB disk
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AI

 **Gaudi2® Deep Learning Server**
8 Gaudi2® HL-225H mezzanine cards with 3rd Gen Xeon® processors, 1 TB RAM, 30 TB disk
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virtual machine

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Core compute

intel xeon

4th Generation Intel® Xeon® Scalable processors

Virtual machines and Bare Metal servers available

Select

Released

intel

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Launch a compute instance

Instance configuration

Instance family: *

4th Generation Intel® Xeon® Scalable processors

For a Xeon® processor overview see the [Technical Overview page](#). For detailed processor information see the [Intel product documentation catalog](#), [Intel Accelerator Engine page](#), and the [Accelerator e-guide](#).

Instance type: *

[Compare instance types](#)

Small VM - Intel® Xeon® 4th Gen Scalable processor
8 cores, 16 GB memory, 20 GB disk

\$0.45 / hour

Machine image: *

ubuntu-2204-jammy-v20230122
Architecture: X86_64 (VM only)

Image equipped with: [Ubuntu 22.04 LTS \(OS\)](#) ⓘ and [OneAPI base kit \(Software kit\)](#) ⓘ

Instance name: *

Instance name

Name must be 63 characters or less, and can include letters, numbers, and '-' only.
It should start and end with an alphanumeric character.

Public Keys

Select keys *

☐ id-intel-devclud-rsa

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Developer Cloud

us-region-1

Help

Account keys

My Keys

Upload key

Name	Type	Actions
id-intel-devclud-rsa	rsa	Delete

5/5Page

Previous

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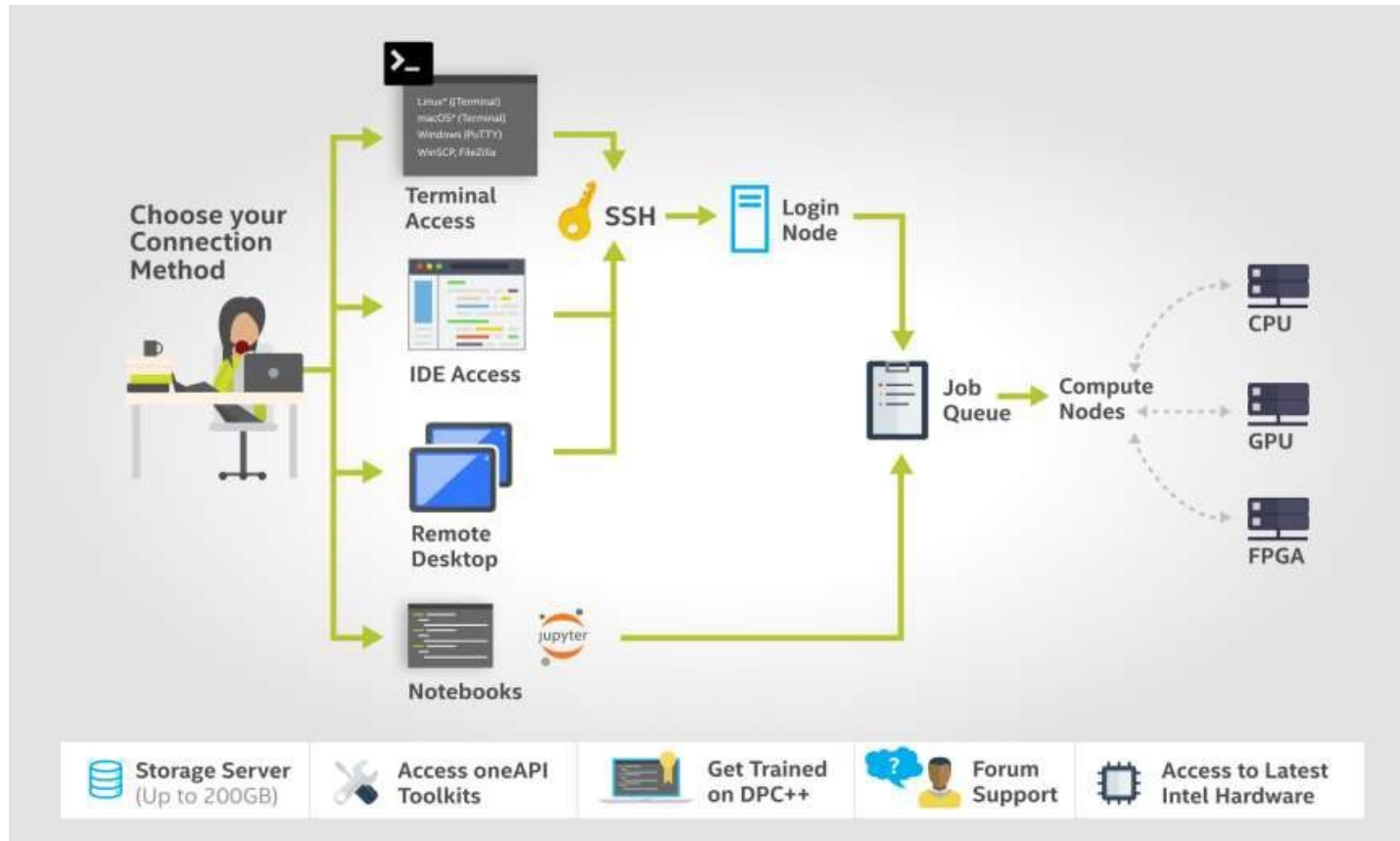
Next

Voucher for the IDC, PREMIUM voucher

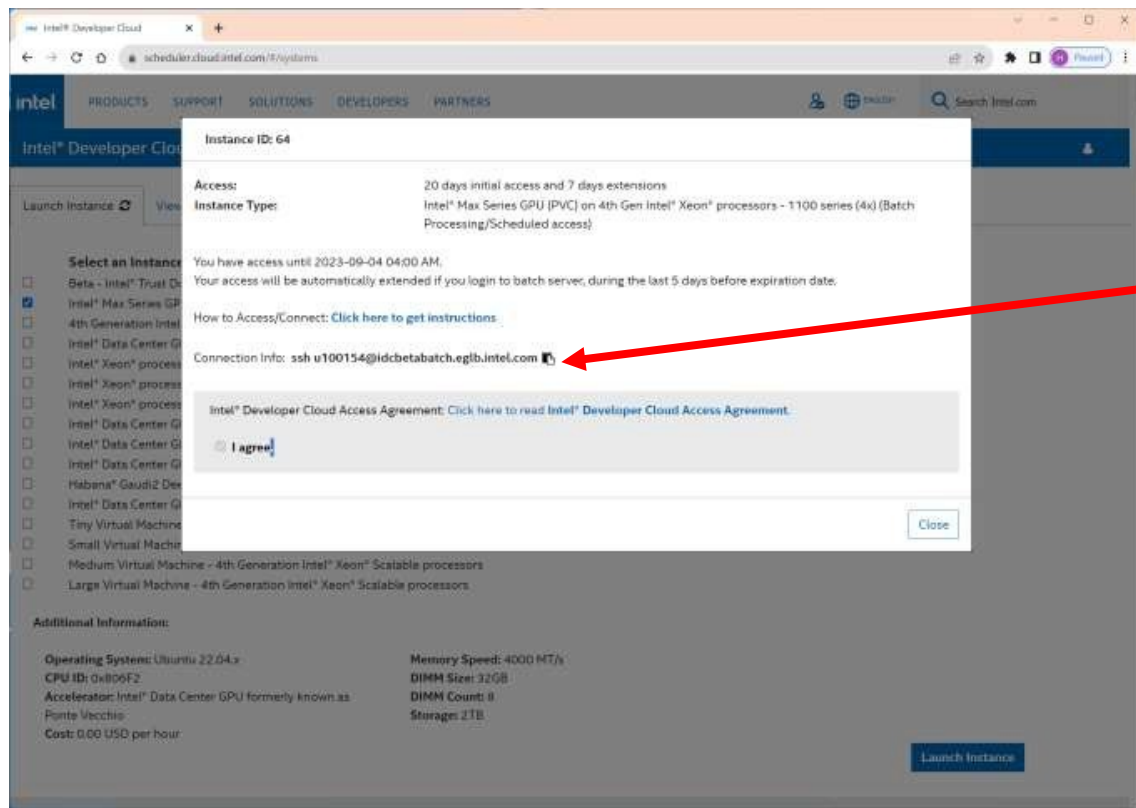
<https://www.intel.com/content/www/us/en/developer/tools/devcloud/services.html>

- You need to register and get an IDC ID
 - CODE: will come
- Be aware, that the IDC is very busy
- Close the instance when you are done

Connection Methods



Copy ssh line



The screenshot shows the Intel Developer Cloud scheduler interface. A modal window is open displaying details for Instance ID: 64. The modal includes the following information:

- Access:** 20 days initial access and 7 days extensions
- Instance Type:** Intel® Max Series GPU (PVC) on 4th Gen Intel® Xeon® processors - 1100 series (4x) (Batch Processing/Scheduled access)
- Access Duration:** You have access until 2023-09-04 04:00 AM. Your access will be automatically extended if you login to batch server, during the last 5 days before expiration date.
- How to Access/Connect:** [Click here to get instructions](#)
- Connection Info:** `ssh u100154@idcbetabatch.eglb.intel.com` (indicated by a red arrow)
- Agreement:** Intel® Developer Cloud Access Agreement: [Click here to read Intel® Developer Cloud Access Agreement](#). There is an "I agree" checkbox.
- Close** button

Below the modal, the "Select an Instance" list is visible, showing various instance types like "Data - Intel® Trust D...", "Intel® Max Series GP...", "4th Generation Intel...", "Intel® Data Center G...", "Intel® Xeon® process...", "Intel® Xeon® process...", "Intel® Xeon® process...", "Intel® Data Center G...", "Intel® Data Center G...", "Intel® Data Center G...", "Habana® Gaudi2 Dev...", "Intel® Data Center G...", "Tiny Virtual Machine", "Small Virtual Machi...", "Medium Virtual Machine - 4th Generation Intel® Xeon® Scalable processors", and "Large Virtual Machine - 4th Generation Intel® Xeon® Scalable processors".

At the bottom, there is a section for "Additional Information:" with details on Operating System (Ubuntu 22.04.x), CPU ID (0x806F2), Accelerator (Intel® Data Center GPU formerly known as Ponte Vecchio), Cost (0.00 USD per hour), Memory Speed (4000 MT/s), DIMM Size (32GB), DIMM Count (8), and Storage (2TB). A "Launch Instance" button is located at the bottom right.

Copy ssh line


```
hbockhor@hbockhor-mobl: ~ - x + v
Last login: Tue Sep 12 02:12:48 2023 from 134.191.221.84

=====
Quick Start Guide: https://slurm.schedmd.com/quickstart.html
=====

=====
Frequently used commands:
=====

sinfo -al
squeue -al
srun --pty bash
sbatch -p {PARTITION-NAME} {SCRIPT-NAME}
scancel {JOB-ID}

=====
Available Intel Pre-Production Platforms to schedule jobs
=====
Tue Sep 12 02:21:25 2023
PARTITION AVAIL TIMELIMIT JOB_SIZE ROOT OVERSUBS GROUPS NODES STATE NODELIST
pvc-shared* up 4:00:00 1 no FORCE:50 all 12 allocated idc-beta-batch-pvc-node-[01-02,04-10,13,15-16]
pvc-shared* up 4:00:00 1 no FORCE:50 all 9 idle idc-beta-batch-pvc-node-[03,11-12,14,17-21]

By default, only one GPU device is selected, run unset $ONEAPI_DEVICE_SELECTOR to use specific device(s).

=====
Support: https://www.intel.com/content/www/us/en/support/contact-intel.html#support-intel-products\_67709:59441:231482
=====

Your User Account expires on : Oct 02, 2023

WARNING: Before your account expires, please download your data. To auto extend, login here in the last 5 days.
Avoid storing any files in the /tmp folder to prevent other users from accessing them or removed on reboots.

=====
If you DO NOT agree with terms and conditions at
https://scheduler.cloud.intel.com/public/intel\_developer\_cloud\_access\_agreement.html DISCONNECT IMMEDIATELY!
```

IDC oneapi commands

- Interactive usage:

```
$ srun --pty bash
```

- Show jobs

```
$ squeue -l
```

identify my job by looking at node name and timestamp

- Source oneAPI

```
$ source /opt/intel/oneapi/setvars.sh
```

Get Started (ssh)

https://devcloud.intel.com/oneapi/get_started/baseToolkitSamples

1 Connect to DevCloud ▾

Connect to the DevCloud using SSH Clients.

2 Hello World! Get Started by running a simple sample on DevCloud. ▲

Use this simple sample to confirm that you are connected to oneAPI DevCloud

2.1. CPU/GPU Vector-Add sample walkthrough

1. Connect to the DevCloud.

```
[myname@myhomecomputer] $ ssh devcloud
```

[Bash](#) [Copy](#)

2. Download the samples.

```
[u115975@login-2] $ git clone https://github.com/oneapi-src/oneAPI-samples.git
```

[Bash](#) [Copy](#)

3. Go to the vector-add sample.

```
[u115975@login-2] $ cd oneAPI-samples/DirectProgramming/DPC++/DenseLinearAlgebra/vector-add/
```

[Bash](#) [Copy](#)

Build and run the sample in batch mode

PBS Batch System

- DevCloud uses the PBS Batch System for node access
- Interactive jobs are possible (6 hours default)
- <https://devcloud.intel.com/oneapi/documentation/job-submission>

How to submit a batch job

```
[u115975@login-2] $ qsub -l nodes=1:gpu:ppn=2 -d . job.sh
```

Note: `-l nodes=1:gpu:ppn=2` (lower case l) is used to assign one full GPU node to the job.

Note: The `-d .` is used to configure the current folder as the working directory for the task.

Note: `job.sh` is the script that gets executed on the compute node.

How to request interactive mode

```
[u115975@login-2] $ qsub -I -l nodes=1:gpu:ppn=2 -d .
```

Note: `-I` (upper case i) is the argument used to request an interactive session.

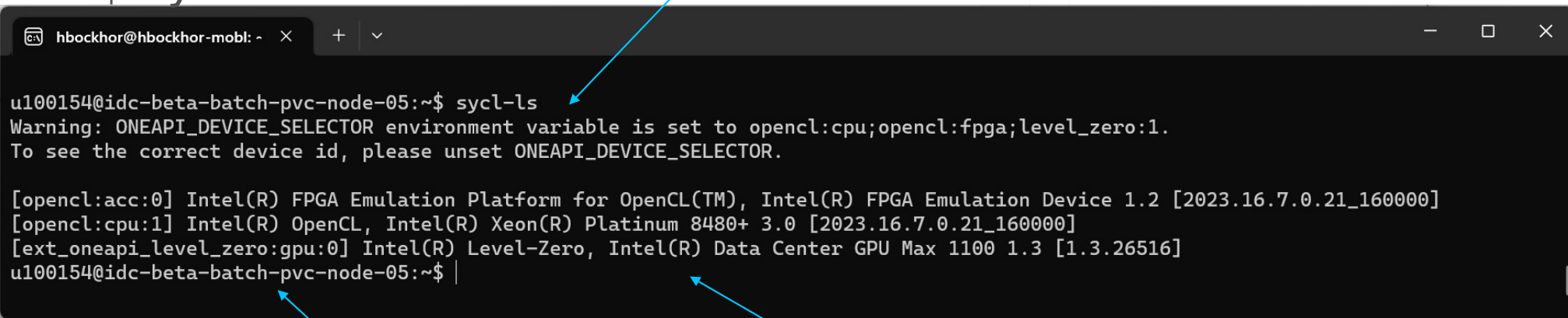
IDC commands II

■ Test

SYCL:

\$ sycl-ls

Just single card visible

A terminal window titled 'hbockhor@hbockhor-mobl: ~' showing the output of the 'sycl-ls' command. The output lists three devices: an FPGA emulation device, an OpenCL CPU device, and a Level-Zero GPU device. Three blue arrows point from external text boxes to specific parts of the terminal output: one to the command 'sycl-ls', one to the node name 'u100154@idc-beta-batch-pvc-node-05:~\$', and one to the Level-Zero device entry.

```
hbockhor@hbockhor-mobl: ~  
u100154@idc-beta-batch-pvc-node-05:~$ sycl-ls  
Warning: ONEAPI_DEVICE_SELECTOR environment variable is set to opencl:cpu;opencl:fpga;level_zero:1.  
To see the correct device id, please unset ONEAPI_DEVICE_SELECTOR.  
  
[opencl:acc:0] Intel(R) FPGA Emulation Platform for OpenCL(TM), Intel(R) FPGA Emulation Device 1.2 [2023.16.7.0.21_160000]  
[opencl:cpu:1] Intel(R) OpenCL, Intel(R) Xeon(R) Platinum 8480+ 3.0 [2023.16.7.0.21_160000]  
[ext_oneapi_level_zero:gpu:0] Intel(R) Level-Zero, Intel(R) Data Center GPU Max 1100 1.3 [1.3.26516]  
u100154@idc-beta-batch-pvc-node-05:~$
```

Node name

Level zero device