Solving Operating System Concepts with SYCL

A Hands-on Workshop

Description

SYCL provides a powerful way to leverage the capabilities of CPUs and GPUs to drive simulations in a parallel and efficient manner. By utilizing SYCL's parallel processing capabilities, we can accelerate the simulation of complex problems that would otherwise be computationally expensive or infeasible to solve. We will see it in a demo.

The Dining Philosophers Problem is a classic synchronization problem where a group of philosophers sits at a circular table and alternates between thinking and eating. The challenge is to prevent deadlocks and starvation while ensuring that each philosopher gets to eat. solving the Dining Philosopher's Problem using SYCL is an excellent way to showcase the power of parallelisation and synchronisation in modern computing. By leveraging the capabilities of CPUs and GPUs, we can simulate complex problems more efficiently, leading to better performance and more accurate results

Agenda

- Solving the Dining Philosophers Problem using SYCL
- Using the capabilities of CPU/GPU to drive simulations in SYCL
- Hands-on exercise.

Key Takeaways

- Participants will gain hands-on experience with parallel programming concepts such as task-based parallelism, data parallelism, and pipeline parallelism, using SYCL to accelerate the computation of simulations on both CPUs and GPUs.
- SYCL can be used to accelerate the simulation of complex problems, leading to faster and more accurate results that can be used to drive scientific research, engineering design, and other applications.
- Participants will learn how to optimize their SYCL-based simulation implementations using techniques such as memory management, data caching, loop unrolling, and performance profiling to achieve the best possible performance on different hardware platforms.
- Parallelisation and synchronisation: Workshop participants will gain hands-on experience with the concepts of parallelisation and synchronisation, including how to assign each philosopher and fork to a separate thread and use semaphores to prevent deadlocks.
- Optimization techniques: Participants will learn how to optimize their implementation of the Dining Philosophers Problem using SYCL, including techniques such as thread and memory affinity, cache tuning, and loop unrolling.

Pre-Requisites

- Intel® oneAPI DevCloud Access: Please find the Intel® oneAPI DevCloud URL
- Click here to Join us for Live Conversation and QnA on Discord Link
- Basic knowledge of C++

Note: Create your free Intel® oneAPI DevCloud account. This is a mandatory requirement to participate in the hands-on sessions.

The session will be immensely useful for :

AI Developers, HPC Engineers, AI/ML Enthusiasts, Research scholars, Tech leads, Computer Science Professors, Data Scientists, programmers, Developers, and Developers who are very new to oneAPI & DevCloud.

Speaker - Abhishek Nandy

Co-Founder @ Dynopii

Abhishek Nandy is a co-founder of Dynopii an AI Voice-based startup and is currently a part of it. Abhishek is also an Intel Certified trainer with oneAPI SYCL specialization.

Abhishek brings a mixture of experience research aptitude and large industry exposure. He is an entrepreneur, teacher, author, researcher and dreamcatcher. He has worked in various domains such as pharmaceutical, manufacturing and retail and has led several teams in research and product development.

In the past, Abhishek has worked as Principal Engineer at P360 where he established both the AI and IoT product teams from scratch. He has a B.Tech degree and a curious mind. He is also an Intel Black Belt Developer - a coveted open-source Intel award given to people who have contributed to Intel Open Source Contribution. He presented his research work on Reinforcement Learning at ACM SIGGRAPH 2018. He has been an invited educator at several leading premier education institutes in India. Abhishek has also authored books on Reinforcement learning, Unity ML, Leap Motion and Game engines. He was also among the top 50 innovators at the first edition of the Make in India initiative. He received training for his product lifecycle to practice from IIMA and MHRD IT Dept of the Government of India there.

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Date of Webinar: 26th April 2023

Timings: 5 PM to 7 PM IST

DevCloud Link: https://devcloud.intel.com/oneapi/

Discord Link: https://discord.gg/ycwqTP6