Introduction to multiprocessor architecture

Summary
Multiprocessors are a core component in all types of computing infrastructure, from phones to datacenters. This course will build on the prerequisites of processor design and concurrency to introduce the essential technologies required to combine multiple processing elements into a single computer.

Content
- Forms of parallelism
- Parallel programming models
- Cache coherence
- Memory consistency
- Synchronization
- Interconnection networks
- Software efficiency & optimization
- GPU architecture & programming

Keywords
Multiprocessors, multicores, manycores, cache coherence, memory consistency models, memory ordering, manycore cache hierarchies, interconnection networks, synchronization, parallelism, GPU

Learning Prerequisites

Required courses
CS-206 Parallelism and concurrency
CS-208 Computer architecture / Architecture des ordinateurs

Important concepts to start the course
Introductory understanding of computer architecture & organization
Basic C/C++ systems programming

Learning Outcomes
By the end of the course, the student must be able to:
- Detect and address inefficiencies in parallel software
- Design and evaluate software for multiple parallel platforms
- Design and evaluate hardware for shared memory
- Compare and contrast hardware design choices in parallel platforms
• Demonstrate and describe the operation of snooping and directory coherence protocols

Teaching methods
Lectures, homework and project

Assessment methods
mid-term and final

Supervision
Office hours Yes
Assistants Yes

Resources
Websites
• http://parsa.epfl.ch/courses/cs307/