LIVERPOOL JOHN MOORES UNIVERSITY

Parallel Algorithms

Module Information

2022.01, Approved

Summary Information

Module Code	6121COMP
Formal Module Title	Parallel Algorithms
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours
Lecture	33
Seminar	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	The aim of this module is to introduce the computational aspects of parallel and distributed computing and apply new techniques, methods and results from the rapidly-developing field of algorithms.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Justify a variety of advanced algorithmic techniques to solve problems
MLO2	2	Construct algorithms for execution in parallel and distributed settings.
MLO3	3	Analyse parallel algorithms for correctness and performance.
MLO4	4	Apply appropriate distributed and/or parallel algorithms to practical situations by taking into account tractable and intractable problems.

Module Content

Outline Syllabus	• Models of Parallel & Distributed computation: PRAM, BSP, Distributed Objects, Message Passing• Amdahl's Law and Gustafson's Law• Parallel Decomposition techniques (Task-based decomposition, Data-parallel decomposition)• Basic techniques: Prefix sums and doubling• Graph algorithms: Parallel computation on trees, paths, spanning trees and connected components.• Theoretical and physical topologies for parallel and distributed computing• Communication and coordination / synchronisation• P-complete, NC problems.• Distributed models and algorithms: termination, failure tolerance and distributed search.• Parallelism vs Concurrency.• Shared resource access; synchronisation, mutual exclusion, atomicity• Races and Deadlocks
Module Overview	
Additional Information	The module combines many of the concepts taught over the course of the Computer Science Programme such as complexity theory and algorithm design, and provides important skills for work with large applications since these usually must be implemented on a parallel or distributed system, due to their memory space and speed requirements.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Algorithm Analysis	40	0	MLO2, MLO3
Centralised Exam	Exam	60	2	MLO1, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Somasundaram Ravindran	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings