Parallel Programming Principle and Practice

Lab Syllabus

Objective and Requirement

- Understand the purpose, ideas, and methods of parallel programming, familiar with parallel computing analysis and problem solving skills
  - use the common tools and program models, such as pthread, OpenMP, MPI, MapReduce, and CUDA, to parallelize existing algorithms and develop new parallel algorithms
  - analysis of parallel processes and results, let the students understand the purpose of the parallelization and reasons of performance improvement on a deeper level of the theories of parallelization, fundamentals of compiling and operating system

Syllabus

- **Lab**
  - **Lab1 Be Familiar with the parallel programming environment (Required)**
  - **Lab2 Parallel computation of Fibonacci sequence (pthread, OpenMP, MPI, CUDA) (Required)**
  - **Lab3 PageRank algorithm implementation based on MapReduce (Elective)**

- **Project**
  - **Project Solve Akari problem using parallelizing backtracking (Required)**

Labs

- **Lab1 Be Familiar with the parallel programming environment (Required)**
  - become familiar with the parallel development environments, and the basic principles and methods of parallel programming and performance optimization by using tools and frameworks like pthread, OpenMP, MPI under Linux system

Labs

- **Lab2 Parallel computation of Fibonacci sequence using pthread (Required)**
  - master the basic principles and methods of parallel programming design and performance optimization using pthread
  - understand the basic method for data partition and task decomposition in parallel programming
  - implement the parallel computing of Fibonacci sequence using pthread
  - carry on the simple analysis and summary of the program execution results

Labs

- **Lab2 Parallel computation of Fibonacci sequence using OpenMP (Required)**
  - master the basic principles and methods of parallel programming design and performance optimization using OpenMP
  - implement the parallel computing of Fibonacci sequence using OpenMP
  - carry on the simple analysis and summary of the program execution results

Labs

- **Lab2 Parallel computation of Fibonacci sequence using MPI (Required)**
  - master the basic principles and methods of parallel programming design and performance optimization using MPI
  - implement the parallel computing of Fibonacci sequence using MPI
  - carry on the simple analysis and summary of the program execution results

Labs

- **Lab2 Parallel computation of Fibonacci sequence using CUDA (Required)**
  - understand deeply the architecture of GPGPU and master the CUDA programming model
  - implement the parallel computing of Fibonacci sequence using CUDA
  - carry on the simple analysis and summary of the program execution results
  - propose optimization solution based on the execution results and hardware environment

Labs

- **Lab3 PageRank algorithm implementation based on MapReduce (Elective)**
  - realize of the PageRank algorithm based on MapReduce
  - master the MapReduce programming model
  - understand the distributed programming methods in cloud computing environments

Project

- **Project Solve Akari problem using parallelizing backtracking (Required)**
  - master the methods to parallelize and improve a program
  - understand the relationship between parallel granularity and performance
  - master how to partition data and decompose tasks of a complex algorithm

实验时间和方式

- 在EduCoder平台上完成实验作业及报告，具体步骤如下：
  - 注册登录：进入网站https://www.educoder.net/，注册后登陆
  - 加入课堂：点击平台右上角“+”，加入课堂，填入邀请码，以学生身份加入课堂
  - 开始实训：通过个人主页“我的课堂”进入本课堂，点击左侧“实训作业”查看实训列表，选择某个实训点击“实训详情”进入该实训，点击“开始实战”完成该实训（详见操作手册）
  - 撰写提交实验报告：点击课堂左侧“普通作业”查看实验报告撰写要求和模板，撰写实验报告并提交

- 于7月20日之前在平台上完成实验，提交word版实验报告和项目报告

扫码入群
实时答疑

各班邀请码

序号	所在班级	邀请码
1	计科（ACM）1601	53VDCG
2	计科（卓越）1601	4HFTOR
3	计科1601	ZPWSHU
4	计科1602	ETWJU3
5	计科1603	TWGSYV
6	计科1604	74HRXN
7	计科1503	R28ECK

各班邀请码

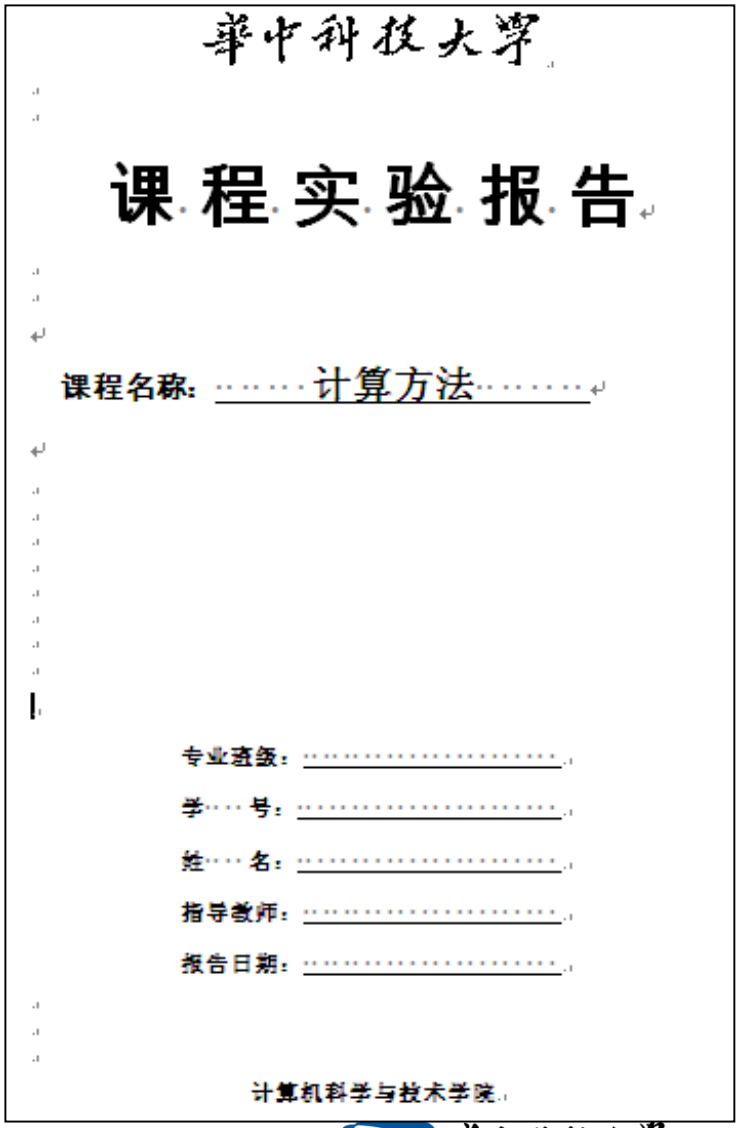
序号	所在班级	邀请码
8	计科1505	VKWYZ2
9	计科1506	TH72QU
10	计科1510	LPMV6O
11	计科1605	KM2LJX
12	计科1606	89BKPE
13	计科1607	ZS2ETG
14	计科1608	J4WFP9

各班邀请码

序号	所在班级	邀请码
15	计科1609	2Q9MJW
16	计科1610	JHF7VG
17	校交1601	PTJCVD
18	物联网工程1601	V8G4RE
19	信安1501	Z3DVGC
20	信安1601	XABU8F
21	信安1602	U7G9PL
22	信安1603	Q7LO3M

实验报告

- 实验一
  - 实验目的与要求
  - 实验内容
  - 实验结果
- 实验二/三
  - 实验目的与要求
  - 算法描述
  - 实验方案（含开发与运行环境描述）
  - 实验结果与分析
- 实验小结



华中科技大学

课程实验报告

课程名称：计算方法

专业班级：

学　　号：

姓　　名：

指导教师：

报告日期：

计算机科学与技术学院

项目报告

- 锻炼分析与解决问题的能力
  - 我的目的是什么？
  - 分析问题，做出假设
  - 我准备用什么方法？
  - 设计与实现
  - 结果比较与分析
  - 思考与总结

Project Name

(Your Name, Class, & ID)

AIM

What are the purposes of this project?

HYPOTHESIS

Do you have any hypothesis you are going to test in this project?

METHODS

Detailed description of models, algorithms, experimental scheme, and program design et al.

RESULTS

Results and necessary explanation

DISCUSSION & CONCLUSION