Team/Group Programming Projects

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CSE 4081 Analysis of Algorithms

CSE 5211 Analysis of Algorithms

Spring 2022 (Today: January 23, 2022)

Due Dates may change as the class flows!!

The purpose of this assignment is for you to have the opportunity to exercise your ability to:

- Work on a team with other students.
- Reason about problems.
- Write algorithms that show your problem solving skills.
- Explain your work to other.
- Provide a theoretical analysis of an algorithm's complexity.
- Empirically test and profile the performance of your program that implements your algorithm solving the problem.
- Compare empirical data and theoretical results.

Each project requires your team to deliver a report [1] containing

[1] Your report must be submitted in Portable Data Format (pdf)

- A description of a problem.
- A description of least one algorithm that solves the problem.
- Mathematical analysis of the best, average, and worst case run time of the selected algorithm(s).
- At least one well-commented program that implements an algorithm for your problem.
- A description of the steps necessary to compile and execute your program to collect run time and space usage data.
- Visualization of your collected run time data over sample inputs.
- Comparison of your empirical results with theoretical formulas.

You may use any computing system for which you have access rights.d You may write in any programming language you choose. Whichever programming language you choose, you must be able to collect profile data from executing your code on input data of varying size.

What to do

- By Monday of week 4 form a team with one or two other students. Select a team leader and have them inform the instructor who is on the team.

  All team members should collaborate on these tasks, decide who will be the Select a team-leader who will report to me on these items.

  - Selection of a problem to study
  - Who will be lead programmer?
  - Who will be the code tester?
  - Who will be in charge of collecting and organizing input data?
  - Who will providing an analysis of the algorithms's complexity?
  - Who will collect profile data on the code's execution on input of varying sizes?
  - As a team, write a report detailing your efforts & prepare a presentation for the class.
  - Provide a task matrix showing who took primary responsibility for these tasks and include it in the team's report.

  By Monday of week 8: inform your instructor of the project your team proposes to complete. Here is a sampling of possible project topics. Consult the textbook (Corman et al., 2009) and Wikipedia's list of algorithms and other sources to help you decide on a topic,

  - Artificial Intelligence Algorithms
  - B-Trees
  - Block-chain algorithms
  - Computational geometry
  - Computer Security
  - Cryptography
  - Dijkstra's algorithm with Fibonacci heaps for priority queues.
  - Fast Fourier Transform
  - Four Color Theorem
  - Floyd-Warshall Algorithm
  - Fractals and Choas
  - Graph algorithms
  - Huffman Coding
  - Machine Learning Algorithms
  - Medical applications
  - Network flow
  - Numerical analysis
  - Neural Nets
  - Random Number Generation
  - Parsing and Lexical Analysis
  - RSA Public Key and other Encryption Algorithms

If you have another project in mind, check for your instructor's approval before proceeding. Projects will be accepted on a first-come-first-served basis and I may veto any choice.

Algorithmics Spring 2022

This is a call for participation in Algorithmics Spring 2022. Participation in Algorithmics Spring 2022required.

it is a workshop on algorithms that runs from Monday of about week 14 through the end of the term.

Teams submit a research report and make a presentation to the class. (described below and posted under Modules on the Canvas Learning Management System ,

A schedule of steps in this assignment are listed above

Rubrics

A rubric is a scoring guide used to evaluate the quality of work. Rubrics can help you understand how you will be evaluated, and this can improve your work. Below is a rubric for teamwork

Submit your completed rubric by the due date listed in the on the Canvas Learning Management System .

Team Project Rubric

Use the following rubric to evaluate your teammates.

Teammate Name:_____ **Your Name:** _____

Category	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Conflict	Participated in conflict that interfered with group progress.	Was minimally involved in solving conflicts.	Worked to minimize conflict.	as effective at solving conflict issues. within the group.	
Assistance	Contributions were insignificant.	Contributed some toward the project.	Other members contributed more.	Completed an equal share of work.	
Effectiveness	Work was ineffective and mostly useless.	Work was incomplete.	Work was useful.	Work contributed significantly.	
Attitude	Rarely had a positive attitude.	Usually had a positive attitude.	Often had a positive attitude.	Always had a positive attitude.	
Attendance & Readiness	Rarely attended group meetings.	Sometimes attended group meetings.	Almost always attended group meetings.	Always attended group meetings and was ready to work.	
Task Focus	Rarely focused on the task and what needed to be done. Let others do the work.	Other group members had to nag to keep this member on task.	Focused on the task most of the time.	Consistently stayed focused on the task.toward the group and the project.	
Teammate Average of Scores					

References

Corman, T. H., Leiserson, C. E., Rivest, R. L., and Stein, C. (2009). Introduction to Algorithms. MIT Press, third edition.