

Employee Scheduling for Small Businesses

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Project Goals:

This program will be a solution for most medium sized businesses looking to schedule employees into a generic weekly shift structure. There are many ways to attempt to solve the problem, but this program will produce a quantifiably optimal solution to each specific user defined circumstance.

One of the problems with Employer/employee scheduling is that the process can often be incomplete or inconclusive. By formulating the problem as a constraint satisfaction problem, the scheduling will not exclude certain parameters from being satisfied. By being able to guarantee all weighted parameters are satisfied, the solution will be easy to compare to other non optimal solutions.

Each schedule will be generated per inputs provided by the user. The two key sets of inputs required will include employee information as well as employer specifications. Creating a set of inputs that is both structured and malleable will help be satisfactory and applicable to other circumstances.

Another problem the program will address is to individuate all outputs to every relevant party. This can best be described as solutions being formatted to only provide a limited scope of information customized to the viewer. In some instances this may be the entire solution, in others only a specific time period, or a single employee. Since all of this information may be valuable, but also important to keep narrowly defined, flexibility of the output is extremely important.

Along with the standard output, another set of statistics will be generated along with the solution. This set of information will be the specifics for each individual constraint, in relation to the overall output. Displaying this information in an easily readable format such as a plot or graph will allow future adjustments to an existing solution's constraints to become more accurate.

The presentation for the program will have a few key components. Firstly, the input must be accessible in multiple different forms, including a manual entry as well as reading from a formatted flat file. Next the program will easily allow users to compare multiple outputs. Finally, the program must be able to easily export the solution into multiple output types for simple digesting of information.

Motivations:

Scheduling problems are interesting within the computer science world. They present a simple problem with many solutions, with potentially many workable results. The most intriguing problem is being able to find optimal solutions, proving their accuracy, all while maintaining flexibility and usefulness.

On top of the challenges the problem presents, I have a personal interest in the program. I have been required to create schedules by hand many times and have always been interested in properly solving the problem algorithmically.

Technical Challenges:

First technical problem is familiarizing myself with CSP's and formulating the problem properly. Without a proper formula to apply the constraints, the solution will not be accurate or efficient. Learning and understanding the CSP will be the first main priority and hurdle required to complete the program.

Implementing the algorithm will pose another large technical challenge. This also will include the algorithm's accuracy and overall correctness in comparison to real test data.

Learning and maintaining a GUI based program in a windows based platform. GUI's pose a unique problem from a design aspect which will be completely different from all other technical problems in the program.

Milestone 1(September 29th)

- Research tools to be used in the project
 - Visual Basic
 - C# and Microsoft Visual Studio
 - Input/output formats and file types
- Create small “Hello World!” type programs in applicable environments
- Requirement Document
- Design Document
- Test Plan

Milestone 2 (October 27th)

- Create working input integration with project
- Working formula for the CSP
- Gathered real test data

Milestone 3 (November 24th)

- Implement algorithm into the existing program
- Define Structure of the data
- Define Structure of output
- Create initial sample output for testing

Approval

“I have discussed with the team and approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones.”

Signature: _____ Date: _____