AMS 550.400 HW SET 1 Due Date: Oct 8

Last Compiled on October 10, 2012

General Instruction: To complete the homework set, you are required to do the followings. Your solutions must be typed in LaTeX using the course homework template. The progression of your homework solution is to be "recorded" by making a git folder specifically for this homework set. The burden of proof is on you, and if your git commit history is sparse, then you may be liable for a penalty. A paper copy of the PDF output of your LaTeX file is to be submitted to your instructor in class on the due date. *After* submitting the paper copy, but *before* the end of the due date, you will upload your work to your github by making a remote repository specifically for the homework, and post the link to the repository at the designated *Discussion* forum in Blackboard by making a thread just for you. The repository name in your github should be `550400.homeworkset.1` and the discussion forum thread should be named `YourFirstNameMiddleInitialLastName`, e.g., `BaracHObama` and `WillardMRommey`. You have till the end of the due date to finalize your github repository. However, any commit made after the class time of the due date will be inadmissible. *Your attention to details in following this instruction will be critical, and if not followed exactly at the time of collection, the homework set may be graded at* 90% *of the full score.*

Problem 3 (40 pts): Consider a team of four students, say, A, B, C and D, who just started working on writing a `latex/beamer` file, say `main.tex`, for a class presentation of their work statement. Assume that they do not wish to coordinate their schedules for a concurrent group meeting (both virtually and physically). Assume that:

- A is in charge of *Introduction*,
- B is of *Problem Statement*,
- C is of *Timeline*,
- D is of *Deliverable* part of the presentation.

In other words, their contributions to `main.tex` do not overlap. Then,

- first, devise a work flow strategy for the team so that they can collaborate asynchronously using `git`,
- next, devise yet another `git` strategy different from your earlier proposal.

Finally,

- discuss the strength and weakness of each of your proposed strategies in terms of merge conflicts resolution,
- make the final recommendation.

In order to answer this question, *build* a mathematical model, *following* the guideline from IMM. Use Section 1.4 and Section 1.5 of IMM as *role models*. For example, you are to identify which variables are exogenous and which are endogenous. More specifically, among other things, in your model, is the preamble part of `main.tex` an endogenous or exogenous variable? Note also that in addition to this issue, there are other issues that you are to consider. So, *be sure to consult IMM.*

Problem 3 Solution:

Mathematical Model:

Step 1: Formulate the Problem

Assumption:

1. Each perosnal assignment is equal amount, quater of the project.

2. Each person's performance is on the same level (theri efficiency is same per unit time, P)

3. Each time merging the main.txt will slow their performance. Assume this affect the performance linearly correlated(coefficient I, D less then 1) with amount of contents on the main.txt.

4. Each time pull from the main.txt, the amount of content on the main,txt will improve the performance. Assume this improvement is also linearly correlated(coefficient I, I bigger then 1) with amount of content on the main.txt.

5. Each person begin his/her work by pulling from the main.txt and finishing up by pushing to the main.txt and do the merge. Find the ideal number of merges N to improve the performance of the project.

Step 2: Formulate the Problem

So, here the amount of content in the main.txt(experssed in term of percentage of the total project) is the endogenous variable. The initial efficient of each person P,coefficient I and D are constant.

Number of Merge times N is exdogeous variable. So for example: when 37percent of the project is finished, the current efficiency of the tesm as expressed as 37percent*I*D.

The equation for total time needed to resolve the project in terms of N is: T=0.125(N+1)/P*I*D Thus the less the N is(less the merge time is , the higher the efficiency)

So, according to the model, the first propose for the stradegy in term of the merging conflicts is that use as less time of merging as possible. That is each personal finish his/her part in one time and push and merge.

The model also idealized that 4 person each pulls and pushes the same amount of times. Thus the second strdegy will be 4 perosnal doing different number of times of pull and push. Person doing the more pulls/pushes wll assign higher amout of work, and personl works "along", for example pulls and push only once will assign lesst amount of project load. For example 3 peroson is doing same numebr of pulls and push, one person is only doing one push and pulls.

Step 3: Is it useful?

Without knowing specifically how does the pulls and push slow down the efficiency and how helpful it is seeing more content of the finished project improve the efficiency. It is difficluty to make suggestion on the second stardegy.

Step 4:Model Testing Analysis of the 2 stradegy

The advantage of the first one is that carrying out the stradegy will be very straight forward. Share of the workload is very equally distuibuted. Very little chance of getting dispute within the team. Everyoen is in the same pace of the project cycle. But the efficiency may not be the ideal one.

Assume the correct value for I and D is obtainable, stradegy will have a better performance in term of the completition time required. But obviously some one is doing more workload, also not all team member are in the same pace within the project.Also the carry out the stradegy 2 would be diffculty to apply the stradegy 2.