Program Design

Lab 1

Before you start with your lab work, please do the following:

1. Open a word document
2. Save it on your U drive
3. Name it: DT282-1-FirstnameSurnameStudentNumber, e.g. DT282-1-JohnMurphyC01953456

PART 1

Write up the details about yourself based on the following questions:

1. **Have you have done any programming before? and if so, in what language and what did you build?**

2. **Why are you doing computer science, what is your interest in programming?**

3. **What is your favourite Website, App and software – Why?**

4. **What piece of software, app or website do you wish you had created or would like to create?**

5. **Your hobbies and interests.**

6. **An interesting fact about you.**

Also add a photo of you, with your name beneath, into the word doc.

PART 2

- The solution to the problem in the next few slides has been solved and the solution illustrated using a grid which helps you think about the problem and step wise present a solution.

- Find two other problems, out in the wilds of the internet or from other resources, that are similar in nature to this one and create a solution grid or structure for them similar to the one provided in the example here (or use another diagramming approach to define the problem and walk the solution).

- The problem should be similar, NOT LIKE this one e.g. Not Four goats walking across a bridge, or different walk times.

- You are looking for problems that require a number of steps in order for them to be solved.

EXAMPLE: Four Men Crossing a Bridge

This is an example of the type of problem you are looking for:
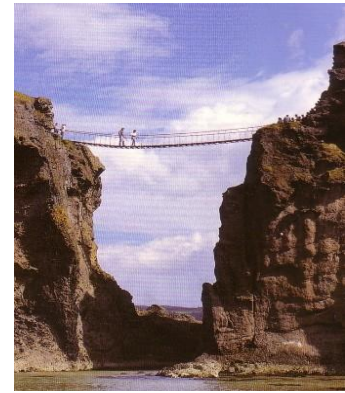
There are four men who would all like to cross a rickety old rope bridge.

The old bridge will only support 2 men at a time, and it is night time, so every crossing must use the one flashlight that they all share.

The four men each have different walking speeds; the fastest each of them can cross is

- **A: 1 minute,**
- **B: 2 minutes,**
- **C: 5 minutes, and**
- **D: 8 minutes.**
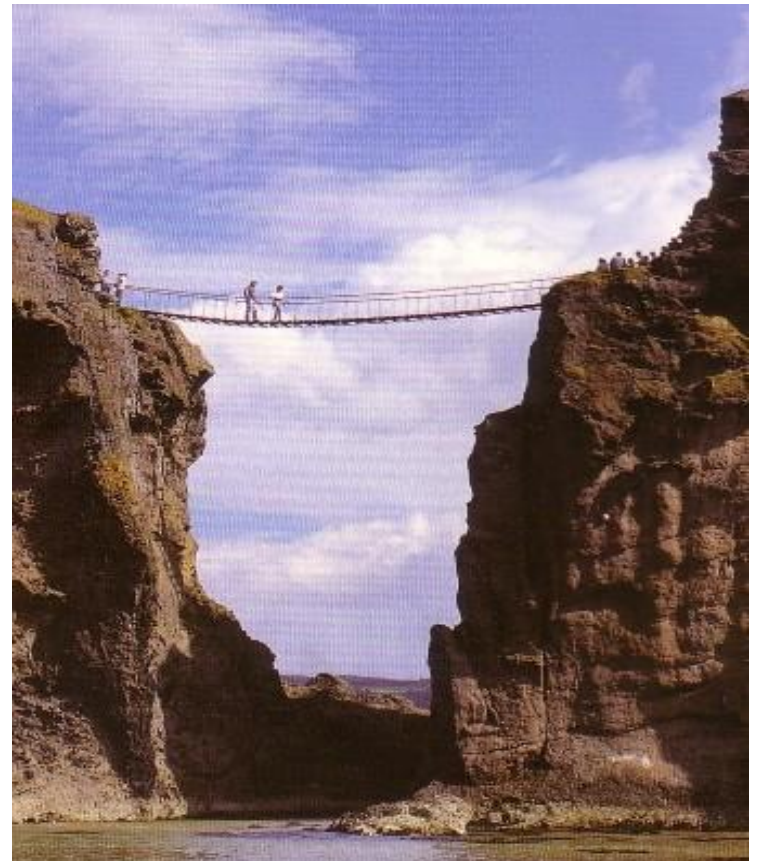
If they pair up, since they must share the flashlight, they can only cross in the time that it would take the slower of the two.

Given that the time to get them all across is 17 minutes total, how should they all cross?

Please try to solve the problem yourself/or with your colleagues before looking at the solution given next!!

An Example Solution Approach

- An obvious first idea is that the cost of returning the torch to the people waiting to crossing is an unavoidable expense which should be minimized. This strategy makes A the torch bearer, shuttling each person across the bridge.

Elapsed Time	Starting Side	Action	Ending Side
0 minutes	A B C D		
2 minutes	C D	A and B cross forward, taking 2 minutes	A B
3 minutes	A C D	A returns, taking 1 minute	B
8 minutes	D	A and C cross forward, taking 5 minutes	A B C
9 minutes	A D	A returns, taking 1 minute	B C
17 minutes		A and D cross forward, taking 8 minutes	A B C D

Deliverable

- In your word document you should present:

1. The information about yourself as required in PART 1.

2. Your two examples of similar problem with an illustration of their solution in PART 2.

3. Please make sure to save your work, you will be continuing use this word document to store all your future lab works, so make sure this document is stored safely, your lab marks will be given base on the work showing in your word document.

References

- http://justpuzzles.wordpress.com/2011/02/16/river-crossing-1/

- http://justpuzzles.wordpress.com/2011/04/08/river-crossings2/

- http://justpuzzles.wordpress.com/2011/08/18/river-crossing-3-couples/

- http://justpuzzles.wordpress.com/2011/10/16/river-crossings-4-bigamists/

- http://en.wikipedia.org/wiki/River_crossing_puzzle

- http://en.wikipedia.org/wiki/Jealous_husbands_problem

- http://en.wikipedia.org/wiki/Fox,_goose_and_bag_of_beans_puzzle

- http://en.wikipedia.org/wiki/Transport_puzzle

- http://brainden.com/crossing-river.htm

- http://www.transum.org/software/River_Crossing/

- http://www.mathfair.com/rvrcrossing.html

- http://layton.wikia.com/wiki/Puzzle:River_Crossing

- http://demonstrations.wolfram.com/RiverCrossingPuzzle/

- http://musemath.blogspot.ie/2007/06/tricky-crossings.html

- http://www.maa.org/mathland/mathtrek_12_15_03.html

- http://chaowchaow.blogspot.ie/2008/03/constraint-programming-part-vi-river.html