Assignment 1: Solution to the Santa Claus Problem

CS 751: Principles of Concurrent and Parallel Programming

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This solution to the Santa Claus problem is coded in go programming language or golang.

If you do not have go in your system:

Steps to set up go in your linux machine

- http://ask.xmodulo.com/install-go-language-linux.html
  - **sudo apt-get update**
  - **sudo apt-get install golang**
  - **mkdir $HOME/go_codes**
  - **echo 'export GOPATH="$HOME/go_codes"' >> ~/.bashrc**
  - **echo 'export PATH="$PATH:$GOPATH/bin"' >> ~/.bashrc**
  - **mkdir $HOME/go_codes/src**
  - **tar -xvzf 143050093_pa1.tar.gz**
  - **mv 143050093_pa1/santa_claus go_codes/src/**
  - **source ~/.bashrc**

Once go is installed & setup in your machine,

- NOTE:

  The source file is now available in:

  $HOME/go_codes/src/santa_claus/santa_main.go

Steps to build

- **go install santa_claus**

Steps to run the go executable

- **santa_claus**

Working

- The following are the default values for important parameters of the program
  - **Number of elves:** 12
  - **Number of runs:** 100

    NOTE:

    - These values can be changed during the beginning of execution. There is provision for the user to input values. If the user wants to retain default values enter 0 when prompted.

- The number of runs is the number of times the Santa keeps looking out for returning rein-deers or elves needing help. It can basically be thought of as the duration for which you would like to run this simulation.

- Every time a group of 9 rein-deers return from the tropics they are reset and if there are runs left the rein-deers from 1 to 9 spawn again and call upon Santa.

- Every time **'# elves'** are exhausted they are reset and if there are runs left the elves from 1 to **'# elves'** spawn again and call upon Santa. But in accordance to the problem the elves will be serviced in groups of 3 and that too only if the group of 9 rein-deers are not knocking on Santa's doors.

- If the number of runs are exhausted and:
  - If there are unserviced rein-deers left?
    They are terminated without being serviced.

  - If there are unserviced elves left?
    All those unserviced elves who can be put into a group of 3 are served and terminated. The rest are terminated unserviced.

Output

- Every time a rein-deer comes back from holidays, the following is printed:
  - Deer '**x**' is back from holiday . x: 1 to 9

- Every time an elf comes looking for help, the following is printed:
  - Help !!! Elf '**y**' needs some help. y: 1 to # elves

- Once all 9 rein-deers are back from the tropics, the follwing is printed:
  - ===>>> ALL REINDEERS ARE BACK FROM HOLIDAY <<<===

- When the rein-deers are tethered to sleigh and are delivering presents, the following is printed:
  - Deer 1 is delivering presents
    Deer 2 is delivering presents
    -
    -
    Deer 9 is delivering presents

- When 3 elves want help and the group of 9 rein-deers are not yet back, the following is printed:
  - <<<=== SERVICE 3 NEEDY ELVES ===>>>

- When the 3 elves are getting helped by Santa, the following is printed:
  - Phew !!! Elf **'(y % # elves) + 1'** is getting helped by Santa
  - Phew !!! Elf **'((y+1) % # elves) + 1'** is getting helped by Santa
  - Phew !!! Elf **'((y+2) % # elves) + 1'** is getting helped by Santa

  y: 0 to (# elves - 1)

- When each run is over, the following is printed right justified:
  - RUNS #: **z**. Where z: 1 to # Runs

- When all runs are over, the following is printed:
  - **********'**# Runs**' RUNS OVER **********

- If there are unserviced elves after all the runs are over, the following is printed:
  - <<<=== SERVICING REMAINING ELVES IN NEEDY GROUPS OF 3 ===>>>

- When all remaining elves who can be put into groups of 3 are serviced, the following is printed:
  - ========== Stopping all Elves ==========

- When terminating an elf who was serviced by Santa, the following is printed:
  - Elf '**y**' terminating, got helped by Santa. Serviced = true...

- When terminating a rein-deer who was serviced by Santa, the following is printed:
  - Deer '**x**' terminating, pulled the sleigh. Delivered presents = true...

- When terminating an elf who was not serviced by Santa, the following is printed:
  - Elf '**y**' getting terminated without getting helped by Santa. Serviced = false...

- When terminating a rein-deer who was not serviced by Santa, the following is printed:
  - Deer '**x**' getting terminated without pulling the sleigh. Delivered presents = false...

- When the main is done, the following is printed:
  - ********** END OF MAIN **********