**Fun Day**

**Programming Contest**

Tools and Technologies: ICOM4015 Materials such as Java, Threads, GUI, OOP, and I/O

Once upon a time, the earth was covered all with water. There was only one small habitable area known as the Island. People living in the Island called Islanders.

The objective of this project is to simulate the life of Islanders based on the following specifications. Notice that the project is required to be fully parametric and read all configurations from a text file with the specified format.

The Island area can vary from 1,000 m2 to 10,000 m2 (area) due to tides and other natural environment changes. Initially the number of islanders is 25 male and 25 females (male#, female#) and it can grow or shrink due to reproduction and death rates. If the population of the Islanders grows so big such that they cannot clearly be shown visually on the screen, the island will sink in the water and life ends. [Note: for clear animation, an Islander needs **minimum** 30 pixels to be visualized; it normally needs between 150-200 pixels though; and, if the Island is big enough and the population is small enough, an Islander may be shown with maximum 350 pixels.] However, the project can run in Animation Mode OFF (animationMode) too in which the island will never sink. When the animation mode is OFF, the project does not show the activities on the screen, it only runs the simulation and will stop when either there are no more Islanders alive or it has passed the ending year (endingYear).

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Islanders’ life expectancy is normally 90 years (lifeLength). Their life has 3 stages: Childhood; Adulthood, and Old-hood. The childhood stage is the first 25 years (childhoodLength), the adulthood is 40 years (adulthoodLength), and the old-hood is 25 years (oldhoodLength).

==== Reproduction Rates =============

A female and a male islander can mate and produce children.

80% of Islanders will produce 0 children in their childhood (childhoodReproduction, producedChildren). 10% of Islanders will produce 1 child in their childhood (childhoodReproduction, producedChildren). 5% of Islanders will produce 2 children in their childhood (childhoodReproduction, producedChildren). 5% of Islanders will produce 3 children in their childhood (childhoodReproduction, producedChildren).

Similarly, 70% of Islanders will produce 2 children in their adulthood (adulthoodReproduction, producedChildren). 10% of Islanders will produce 2 children in their adulthood (adulthoodReproduction, producedChildren). 20% of Islanders will produce 0 children in their adulthood (adulthoodReproduction, producedChildren).

And, 20% of Islanders will produce 1 child in their old-hood (oldhoodReproduction, producedChildren). 80% of Islanders will produce 0 children in their old-hood (oldhoodReproduction, producedChildren).

==== Death Rates ====================

Some islanders may have a sudden death any time in their life, due to accidents, diseases, crimes, etc. The assumption is that sudden deaths will always occur after reproduction.

Note that 10% (childrenDeathRate) of the Islanders will have a sudden death in their childhood. 5% (adultsDeathRate) of the Islanders will have a sudden death in their adulthood; and, 10% (elderlyDeathRate) of the Islanders will have a sudden death in their old-hood.

In addition, every 40 to 50 years (minimumYearFatalDisaster-maximumYearFatalDisaster), with a 50% possibility (FatalDisasterPossibility) there is a fatal disaster that kills 20% (FatalDisasterChildDeathRate) of children, 10% (FatalDisasterAdultDeathRate) of adults, and 20% (FatalDisasterOldDeathRate) of elderly.

Also, every 5 to 10 years (minimumYearMildDisaster-maximumYearMildDisaster), with a possibility of 40% (MildDisasterPossibility) there is a mild disaster that kills 0.5% (MildDisasterChildDeathRate) of children, 0% (MildDisasterOldDeathRate) of adults, and 1% (MildDisasterOldDeathRate) of elderly.

==== Daily Life ====================

Islanders are normally in one of the following 4 places/states:

* House

There are 4 types of house (Apartment, Bungalow, Residence, Townhouse)

* Work

There are 4 types of work (OfficeWork, LaborWork, Training, OtherWork)

* Play

There are 4 types of entertainment (Sports, Nature, Eating, OtherFun)

* SomewhereElse

There are 4 different other places (SW1, SW2, SW3, SW4)

80% (dayWorkingChildren) of children, 50% (dayWorkingAdults) of adults, and 10% (dayWorkingElderly) of elderly go to work every morning and go home every evening.

0% (nightWorkingChildren) of children, 20% (nightWorkingAdults) of adults, and 5% (nightWorkingElderly) of elderly go to work every evening, and go home every morning.

Other children [20%=100%-(80%+0%)], other adults [30%=100%-(50%+20%)], and other elderly [85%=100%-(10%+5%)] may stay home, go to Play, or Somewhere else with 30% (nonWorkersAtHome), 35% (nonWorkersAtPlay), and 35% (nonWorkersAtSWE), respectively, during the days. During the nights, all of these groups (non-workers) stay at home.

40% (playingAfterWork) of everybody who works goes to Play after work and 50% (SWEafterPlay) of them go Somewhere else before going home.

30% (SWEafterWork) of everybody who works goes to Somewhere else after work and 50% (PlayAfterSWE) of them go to Play before going home.

==== Daily Life ====================

We assume the night time lasts 8 hours and the day time lasts 16 hours. We also assume work time is 8 hours, play time is 4 and doing something else is 4 too. (All of these parameters should read from the text file as well.)

You should show above activities in a Life animation. Initially, a day lasts 16 seconds, and a night lasts 8 seconds. Every 24 seconds represent 24 years in Islanders life. The animation (as well s the simulation) can speed up such that a day can last as short as 8 seconds and a night as short as 4 seconds (in such a case, every 12 seconds represent 24 years); also, the animation speed can slow down such that a day can last as long as 32 seconds and a night as long as 16 seconds (in such a case, every 48 seconds represent 24 years).

==== Suggestions ====================

Girls have 3 hair colors (Red, Yellow, and Black).

Boys have two hair color (Blue, or nothing (bald)).

Faces have 3 states: Happy, Sad/Angry, Neutral. You will decide when day will have which face state.

Kids’ border is Green.

Adults’ border is Brown.

Elderly border is White (perhaps with White hair).

First name of Islanders should be unique and should be chosen from an input file. Last names of Islanders should be last names of their parents.

Suggested area of an Islander is 150-200 pixels, depending on the population and size of the Island, it can be as small as 30 pixels and as big as 350 pixels.

Consider part of the screen as Event Announcer. Event Announcer may only show big events such as Disasters, Deaths, and Births, or can be as detailed as who is doing what. Rest of the screen should locate the 16 icons of (work, home, play, and SWE) and the animation should show Islanders moving around according to the above statistics. The number of Islanders in each place must be shown on the place (See the figure below).

Every event (detailed and big) must be logged in an output file such that can be studied offline too. The animation stops if the Island sinks, or if there is no more Islanders, or if passing the desire year (endYear).

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*event announcer*

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A Sample of the Input Text File:

Animation Mode: ON [OFF-ON]

Area: 10000 [1,000-10,000]

Initial Female#: 25 [1-100]

Initial Male#: 25 [1-100]

Life Length: 90 [40-100]

Childhood Length: 25 [10-30]

Adulthood Length: 40 [20-50]

Old-hood Length: 25 [10-30]

Total Childhood Reproduction Rate: 0.35

Childhood Reproduction1: 0.8 0

Childhood Reproduction 2: 0.1 1

Childhood Reproduction 3: 0.05 2

Childhood Reproduction 4: 0.05 3

[Prerequisite 1: R1+R2+ …+RN=1]

[Prerequisite 2: Total= R1 \* num1 + R2 \* num2 + …+RN\*numN]

Total Adulthood Reproduction Rate: 1.6

Adulthood Reproduction1: 0.7 2

Adulthood Reproduction 2: 0.1 3

Adulthood Reproduction 3: 0.2 0

[Prerequisite 1: R1+R2+ …+RN=1]

[Prerequisite 2: Total= R1 \* num1 + R2 \* num2 + …+RN\*numN]

Total Oldhood Reproduction Rate: 0.2

Oldhood Reproduction1: 0.2 1

Oldhood Reproduction 2: 0.8 0

[Prerequisite 1: R1+R2+ …+RN=1]

[Prerequisite 2: Total= R1 \* num1 + R2 \* num2 + …+RN\*numN]

Childhood Death Rate: 0.10

Adulthood Death Rate: 0.05

Oldhood Death Rate: 0.10

Fatal Disaster Possibility: 0.5

Fatal Disaster minimum every: 40

Fatal Disaster maximum every: 50

Fatal Disaster Children Death Rate: 0.20

Fatal Disaster Adults Death Rate: 0.10

Fatal Disaster Elderly Death Rate: 0.20

Mild Disaster Possibility: 0.4

Mild Disaster minimum every: 5

Mild Disaster maximum every: 10

Mild Disaster Children Death Rate: 0.05

Mild Disaster Adult Death Rate: 0.0

Mild Disaster Elderly Death Rate: 0.10

Day Working Children: 0.8

Day Working Adults: 0.5

Day Working Elderly: 0.1

Night Working Children: 0.0

Night Working Adults: 0.2

Night Working Elderly: 0.05

Prerequisite 1: DayWorkingChildren+NightWorkingChildren <= 1

Prerequisite 2: DayWorkingAdults+NightWorkingAdults <= 1

Prerequisite 3: DayWorkingEldelry+NightWorkingElderly <= 1

Non Workers at Home: 0.3

Non Workers at Play: 0.35

Non Workers at Somewhere Else: 0.35

Prerequisite: nonWorkersAtHome+ nonWorkersAtPlay+ nonWorkersAtSWE=1

Playing After Working: 0.4

Somewhere else after Playing: 0.5

Somewhere else after Working: 0.3

Playing after Somewhere else: 0.5

Night Time: 8 hours

Day Time: 16 hours

Some of these should add up to 24

Working Time: 8 hours

SWE Time: 4 hours

Playing: 4 hours

Night duration: 8 seconds [4-16]

Day duration: 16 seconds [8-32]

Starting Year: 1900

Ending Year: 2900