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 * Project 3: Graphing Data
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 * Graph life expectancy verus age based on gender.
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 *************************************************************/
//Includes
#include "Simple_window.h"
#include "Graph.h"
#include <iostream>

//Struct for information held in the text file
struct Ages{
    //Variables for holding information from text file
    int current_age;
    double average_expectancy;
    double male_expectancy;
    double female_expectancy;
};

//Class for scaling data
class Scale {
    //Scaling data member for each line
    int cbase;
    int vbase;
    double scale;
public:
    Scale(int b, int vb, double s) : cbase(b), vbase(vb), scale(s){}
    int operator() (int v) const {return cbase + (v-vbase)*scale;}
};

//Overload >> operator to use with data from txt file
ifstream& operator>> (ifstream& is, Ages& a);

int main(){
    //Name of file from which to read data
    string file_name = "life-expectancy.txt";
    //Open file for reading
    ifstream ifs(file_name.c_str());
    if (!ifs) error ("cant open", file_name);

    //Age and terminal years
    Ages a;
    int base_year = 0;
    int end_year = 100;

    //Scaling constants
    const int xmax = 600;
    const int ymax = 400;

    const int xoffset = 60;
    const int yoffset = 60;

    const int xspace = 40;
    const int yspace = 40;

    const int xlength = xmax - xoffset - xspace;
    const int ylength = ymax - yoffset - yspace;

    const int xrange = 100;
    const int yrange = 80;

    const double xscale = double(xlength)/xrange;
    const double yscale = double(ylength)/yrange;
```



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    //Scale x and y
    Scale xs(xoffset,base_year,xscale);
    Scale ys(ymax-yoffset,0,-yscale);

    //Window start point
    Point start_point(100,100);
    //Axes starting points
    Point x_axis_point(xoffset, ymax-yoffset);
    Point y_axis_point(xoffset, ymax-yoffset);
    //Scaled starting points

    //Define window
    Simple_window win(start_point, xmax, ymax, "U.S. Life Expectancy");

    Axis x(Axis::x, x_axis_point,
           xlength, (end_year-base_year)/10,
           "Age    0     10     20     30     40     "
           "50     60     70     80     90     100");

    const int xlabel_movex = -160;
    x.label.move(xlabel_movex,0);

    const int ynoches = 8;
    Axis y(Axis::y, y_axis_point, ylength, ynoches, "Life expectancy");
    const int ylabel_movey = -45;
    y.label.move(ylabel_movey,0);

    //Lines for data
    Open_polyline all;
    Open_polyline male;
    Open_polyline female;

    //Read in data
    while(ifs>>a){
        if(a.current_age < base_year || end_year < a.current_age)
            error("year out of range");
        int x = xs(a.current_age);
        all.add(Point(x, ys(a.average_expectancy)));
        male.add(Point (x, ys(a.male_expectancy)));
        female.add(Point (x, ys(a.female_expectancy)));
    }

    //Attach objects to window
    win.attach(all);
    win.attach(male);
    win.attach(female);

    //Lable points
    Point all_label_point(40,58);
    Point male_label_point(120,130);
    Point female_label_point(120,70);

    //Style and place lables and lines
    Text all_label(all_label_point, "all");
    all.set_color(Color::magenta);
    all_label.set_color(Color::magenta);
    Text male_label(male_label_point, "male");
    male.set_color(Color::red);
    male_label.set_color(Color::red);
    Text female_label(female_label_point, "female");
    female.set_color(Color::blue);
    female_label.set_color(Color::blue);

    //Attach lables
    win.attach(all_label);
    win.attach(male_label);
    win.attach(female_label);

    //Attach lines
```

```
    win.attach(x);
    win.attach(y);
    win.wait_for_button();
}

//Overload >>
ifstream& operator>> (ifstream& is, Ages& a){
    //Chars for format check
    char ch1 ;
    char ch2 ;
    char ch3 ;
    //New object to take data from file
    Ages aa;

    //Read in data and check format
    if(is >> aa.current_age >> ch1 >> aa.average_expectancy
       >> ch2 >> aa.male_expectancy >> ch3 >> aa.female_expectancy){
        if(ch1 != '|' || ch2 != '|' || ch3 != '|'){
            is.clear(ios_base::failbit);
            return is;
        }
    }
    else
        return is;
    a = aa;
    return is;
}
```