CPSC 327

Project 5

Teams: None, please work individually on this project

References:

1. Building and linking to a Static Library lectures and projects
2. Pointers Memory lectures and projects
3. Classes, Objects lectures and projects

Sample Code:
See 2 starter projects on course website

Topics covered by this project;

- Creating and using a static library
- Using pointers to manipulate objects
- Using vectors to hold objects and pointers
- Class Heiarchies
- Abstract Base Classes
- Polymorphism
- Composition

Class Heiarchy
You are developing a class hierarchy for this project. An Abstract Base Class (ABC), 'Smalltalk' defines the hierarchy behavior. Most of your work in this class structure will take place in Smalltalk.

Classes derived from Smalltalk must implement populatePhrases(). A function that initializes the baseclass vector with phrases that are unique to that class type. For instance, Smalltalk_American will populate its internal vector of strings with the american phrases found in constants.h.

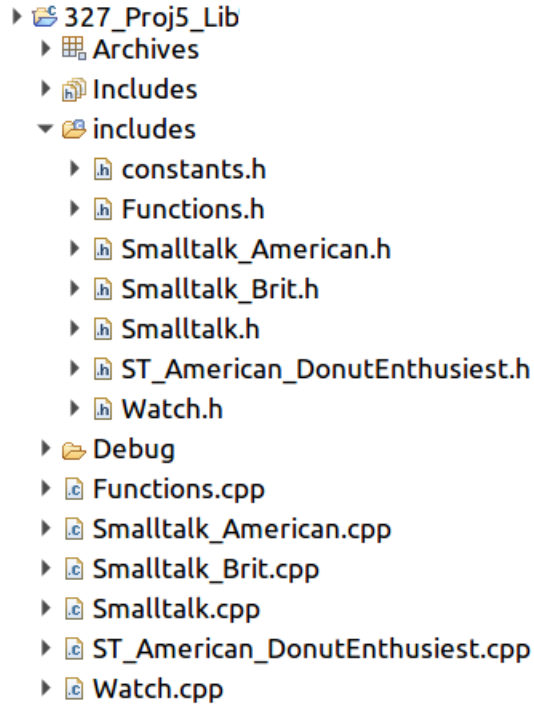
Additionally you are given a complete watch object. You may give or take a watch from any instance of Smalltalk_American, ST_American_DonutEnthusiest or Smalltalk_Brit. Note that watches cannot be created out of thin air, if you give one to an instance you no longer have that watch, the instance does. So this is one case where a shallow pointer copy is appropriate. See Smalltalk.h for further guidance.

Please also provide a function (as specifies in Functions.h and outlined in Functions.cpp) that generates a vector of unique pointers to objects derived from smalltalk. Please pay attention to the hints I've left you in the implementation.

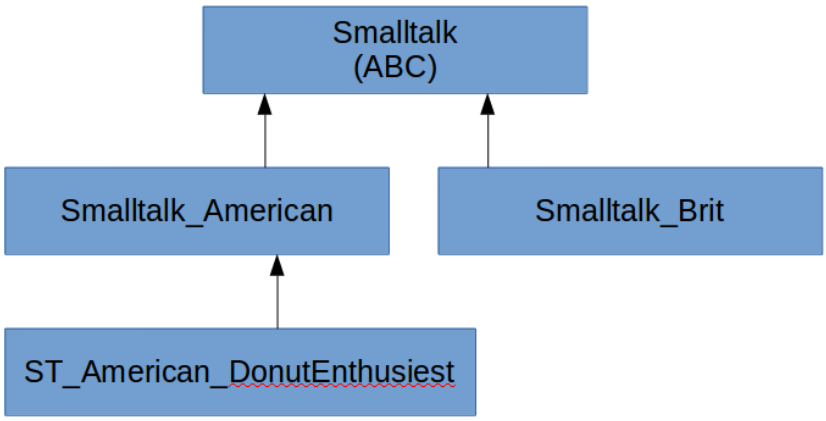
Please compile both projects using the C++11 language standard.

Library

I would like you to develop a static library with the following name and file structure.

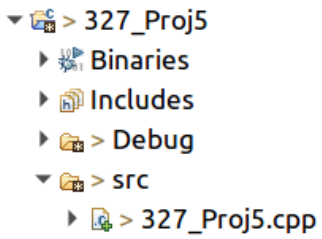


All classes inherit publicly. The class hierarchy is as follows;

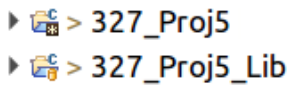


I have given you the header files and some of the implementation.

Testing
Please develop a test application that has the following name and file structure:



This application should link statically to the above library. The projects as they appear in the eclipse workspace.



Please be sure to test your library throughly. I will use my own test harness.

Submission:
Only the following 6 files. Please do not zip them together, or embed them in a directory structure. Just the 6 files.
327_Proj5.cpp
Functions.cpp
Smalltalk_American.cpp
Smalltalk_Brit.cpp
Smalltalk.cpp
ST_American_DonutEnthusiest.cpp

Grading:
For each concrete class remember to push as much common functionality as possible into base classes! This cuts down on repetitive code in derived classes.

5% Submission instructions followed
25% getPeople populated correctly with unique pointers
25% populatePhrases implemented correctly
saySomething cycles correctly through available phrases
25% takeWatch, giveWatch, getTime correct
10% valgrind returns no errors
10% Code style (refactor repetitive code into functions, no magic numbers, no large blocks of empty space, no large chunks of commented out code, pushing as much functionality in base class as possible, appropriate comments, your name at the top of each file, etc.)

Helpful Bits
If it helps here is what the main of my tester looks like, it should give you an idea of how I will test.

```
//enum nationality{ST_A,ST_A_DE,ST_B};
int main() {
    //test getPeople
    test_getPeople(0,0);    //test with 0  people 0 watches
    test_getPeople(4,1);    //3*4 =     12 people 1  watches
    test_getPeople(4,10);   //3*4 =     12 people 12 watches
    test_getPeople(4,20);   //3*4 =     12 people 20 watches
    total_points +=1;       //free point

    //test order of phrasing
    Smalltalk_American sta;
    testPhrasing(ST_A,&sta);    //run through utterances, make sure they
                                //iterate in the right order and correctly
                                //restart at beginning once all phrases uttered

    ST_American_DonutEnthusiest stade;
    testPhrasing(ST_A_DE,&stade);   //same as above but will go through both
                                    //ST_A then ST_DE utterances
                                    //before it restarts at beginning
    Smalltalk_Brit stb;
    testPhrasing(ST_B,&stb);

    //testWatchMove with just 1 watch, giving and taking it from all 3 derived
    //classes.Verify correct pointer movement, verify derived class responds
    //appropriately when given a watch and when watch is taken, (and when watch taken twice)
    testWatchMove();
}
```