

MCS 360 Project Five : map pacebus trips due Tuesday 7 December at 8AM

The goal of this project is to use STL maps to search the schedules of the pacebus.

Download the file <http://www.pacebus.com/gtfs/gtfs.zip> as the first step in the project. The zip file contains six tables of GTFS data (GTFS = General Transit Feed Specification) which are comma separated values (csv) files. Information about the tables is at http://www.pacebus.com/sub/about/data_services.asp and a format description is at http://code.google.com/transit/spec/transit_feed_specification.html.

The goal of the project is to use STL maps to check whether two given stops are on the same trip. An extra credit extension (worth another project or 40 points) applies backtracking to find a complete trajectory between any two given stops.

Two sessions of the program are shown below:

```
$ /tmp/pacetrrip
Opening file "stops.txt" ... counted 33986 stops.
Opening file "stop_times.txt" ... counted 859897 lines on file.
reading departure stop ...
-> give a stop identification number : 99
stop 99 has name Dempster Evanston Plaza
reading destination stop ...
-> give a stop identification number : 999
stop 999 has name Lake / Canterbury
stops 99 and 999 are not on a common trip
$

$ /tmp/pacetrrip
Opening file "stops.txt" ... counted 33986 stops.
Opening file "stop_times.txt" ... counted 859897 lines on file.
reading departure stop ...
-> give a stop identification number : 23404
stop 23404 has name Higgins/Devon
reading destination stop ...
-> give a stop identification number : 9509
stop 9509 has name Golf/Traffic Signal/Wal-Mart
stop 23404 occurs in trip 1678861
stops 23404 and 9509 are on the trip 1678861
$
```

If an invalid stop identification number is entered, the user is prompted to try again.

The file `stops.txt` contains a unique stop identification number at the first position on each line and the name of the stop occurs at the fourth position. As a modification of our first project, you could read in the data on file and use an STL map to query the names of the stops given the identification number. The key of the STL map will be the unique stop identification number and the corresponding value is the name of the stop.

To connect the stops with the trips, we use the file `stop_times.txt`. In `stop_times.txt`, every line starts with a unique trip identification number and the identification number of the stop occurs at the next to last position of each line. Reading the data from `stop_times.txt`, we build another STL map with as keys the unique identification number of every trip and as value the list of stops on the trip.

Some important points:

1. You may develop your solution with any C++ compiler, but your solution will be tested with the `g++` compiler. It is recommended that before submission, you check your program on a computer in lab SEL 2263 on campus.
2. Please avoid spelling mistakes in the dialogue with the user.
3. You must use STL maps. Correct programs without the use of STL maps will receive at most 20 out of 40 points.
4. While the extra credit part is worth another project (40 points), please keep in mind that the final exam is worth much more and may thus still in many cases determine your course grade.
5. Every function in your program must have appropriate documentation. In particular, the documentation describes the purpose of every parameter.
6. Submit only one C++ file.
7. Handing in an incomplete but working program is better than handing in a program that crashes or does not run at all.
8. The first line of all your C++ code must be

```
// MCS 360 Project Five by <Author>
```

where you replace the `<Author>` by your name.
9. Collaborations are not allowed. You must solve the project on your own.
10. Email your solution to the project to `jan@math.uic.edu` before 8AM on Tuesday 7 December so the date of the email is proof of an on time submission. As a backup, bring also a printed version of your solution to class.
11. The deadline is the start of the final exam and will not be extended.

If you have questions or difficulties with the project, feel free to come to my office for help.