

## CS 300 In Class Reusability Lab

Get your following projects out of Subversion and building together:  
DynamicList, PriorityQueue, Queue, Airport

On the lab machines.

- 1) Build your Airport using your Dynamic List.
  1. Update Makefile in PriorityQueue
    1. edit references to list.h and list.o
    2. clean and build
  2. Update Makefile in Queue
    1. edit references to list.h and list.o
    2. clean and build
  3. Update Makefile in Airport
    1. edit references to list.h and list.o
    2. clean and build
- 2) Test and run Airport with the testcase on the assignment handout.
  1. It is possible that airport will crash because of a buggy dynamic list.
- 3) Download DynamicList.tar.gz  
Open a terminal

**cd Downloads**

**wget http://zeus/chadd/cs300f11/DynamicList.tar.gz**

**tar xzf DynamicList.tar.gz**

**ls -al objects**

**cp objects/??list.o ~/workspace/CS300...DynamicList/bin/list.o**

**touch ~/workspace/CS300...DynamicList/bin/list.o**

**touch** updates the timestamp on the file so list.o looks newer than list.h and list.c

- 4) Rebuild Airport
- 5) Re-run Airport.
  1. Does it work?
  2. I believe 29list.o is implemented well and should work.

6) Build shared library from Dynamic List:

1. Edit Makefile in dynamic list

2. add -fPIC to the bin/list.o gcc line

```
{CC} {CFLAGS} -c src/list.c -o bin/list.o -fPIC
```

-fPIC means: position independent code. This means it does not matter what address in memory the library is loaded into.

3. Add a shared library target. Make sure to add this to **all**:

```
bin/libdynamiclist.so: bin/list.o
{CC} {CFLAGS} -shared -o bin/libdynamiclist.so bin/list.o
```

**-shared** means build a shared library

4. Add an executable that uses the shared library

```
listDriverWLib: bin/listDriver.o bin/libdynamiclist.so
{CC} {CFLAGS} -o listDriverWLib bin/listDriver.o -ldynamiclist -L bin
```

Note that bin/list.o is not used!

-ldynamiclist means look for libdynamiclist.so

-L bin means look in the bin directory for shared libraries.

2. Try to Run as...

fails because the executable cannot find the shared library.

3. Edit Run Config | Environment | Select |LD\_LIBRARY\_PATH | OK | Edit  
Add to end: /home/chadd/workspace\_EE\_indigo/CS300DynamicList/bin  
Make sure Append is selected.

4. Try to run again. Success!

To run from the command line:

```
chadd@barney:~> export LD_LIBRARY_PATH=
LD_LIBRARY_PATH:/home/chadd/workspace_EE_indigo/CS300DynamicList/bin
chadd@barney:~> ./listDriverWLib
```

### Let's use this shared library in Airport!

Open Airport Makefile

```
airportDriverWLib: bin/airport.o bin/airportDriver.o \
../CS300StaticPriorityQueue/bin/pQueue.o \
../CS300StaticQueue/bin/queue.o ../CS300DynamicList/libdynamiclist.so
{CC} {CFLAGS} -o airportDriverWLib bin/airport.o \
bin/airportDriver.o ../CS300StaticPriorityQueue/bin/pQueue.o \
../CS300StaticQueue/bin/queue.o \
-L ../CS300DynamicList/bin -ldynamiclist
```

Setup LD\_LIBRARY\_PATH in Run Configuration as above!

You can put the LD\_LIBRARY\_PATH definition in ~/.profile to make it permanent.