

MEEM 5408 Design Automation: Theory and Implementation  
ASSIGNMENT 3 - FALL 2004  
“Aircraft Taxonomy”

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Write, compile and document a C++ program that uses object-oriented programming to encapsulate the behavior of several different vehicle types. There must be a correct hierarchy of classes for:

Aircraft, Commercial Aircraft, Military Aircraft, Private Aircraft, FighterAttack, Bomber, Passenger, Cargo, B-17, B-2, Cessna 512, Cessna 514, F-16, F-18, F-117, C-17, C-5, Boeing 747-passenger, Boeing 777-passenger, DC-10-cargo.

You must be able to assign a serial number to any aircraft (use the `std::string` class). For military aircraft only, you must also be able to request whether the aircraft has stealth capabilities. Each aircraft object must be able to respond to the following commands:

Get aircraft type.  
Get type of propulsion (jet engine, propeller).  
Get maximum speed.  
Can carry more than 15 passengers and crew.  
Carries armament?  
Set serial number <string>.  
Get serial number.  
Has stealth capabilities? (military aircraft only)

These commands are each to be implemented as member functions. Redefine functions in sub-classes only as required.

The program must have two parts. The first part will ask the user what type of aircraft to create (as an object) and get the serial number. The second part will allow the user to perform queries on the object.

For the first part use the following prompts:

```
Input aircraft type (1 - B-17; 2 - B-2; 3 - Cessna 512;  
4 - Cessna 514; 5 - F-16; 6 - F-18; 7 - F-117; 8 - C-  
17; 9 - C-5; 10 - 747-passenger; 11 - 777-passenger;  
12 - DC-10-cargo) :  
  
Input the serial number for the <aircraft_type>:
```

For the second part use the following prompt:

Input your query

- 1-Get aircraft type.
- 2-Get serial number.
- 3-Get type of propulsion.
- 4-Get maximum speed.
- 5-Can carry more than 15 passengers and crew?
- 6-Carries armament?
- 7-Has stealth capabilities?
- 8-New aircraft
- 9-Quit

:

Query 7 should only be answered for military aircraft. Use `dynamic_cast` to test if the aircraft is a military aircraft.

If the user chooses 8 then loop back to the first part. If the user chooses 9 then quit. Otherwise repeat the second part.

The program and documentation must be developed individually. You may discuss how to do something with others, but you may not look at source code or reports from others, and they may not look at yours.

Write up a report with the same sections as in the first assignment. The source code must be fully documented, including the same header information specified in the first assignment. **The source code will be evaluated for style, neatness, correctness and efficiency.**

Email the source code to me at [bettig@mtu.edu](mailto:bettig@mtu.edu). The report must be handed-in in class. The report and source code are due Tuesday, October 5.