

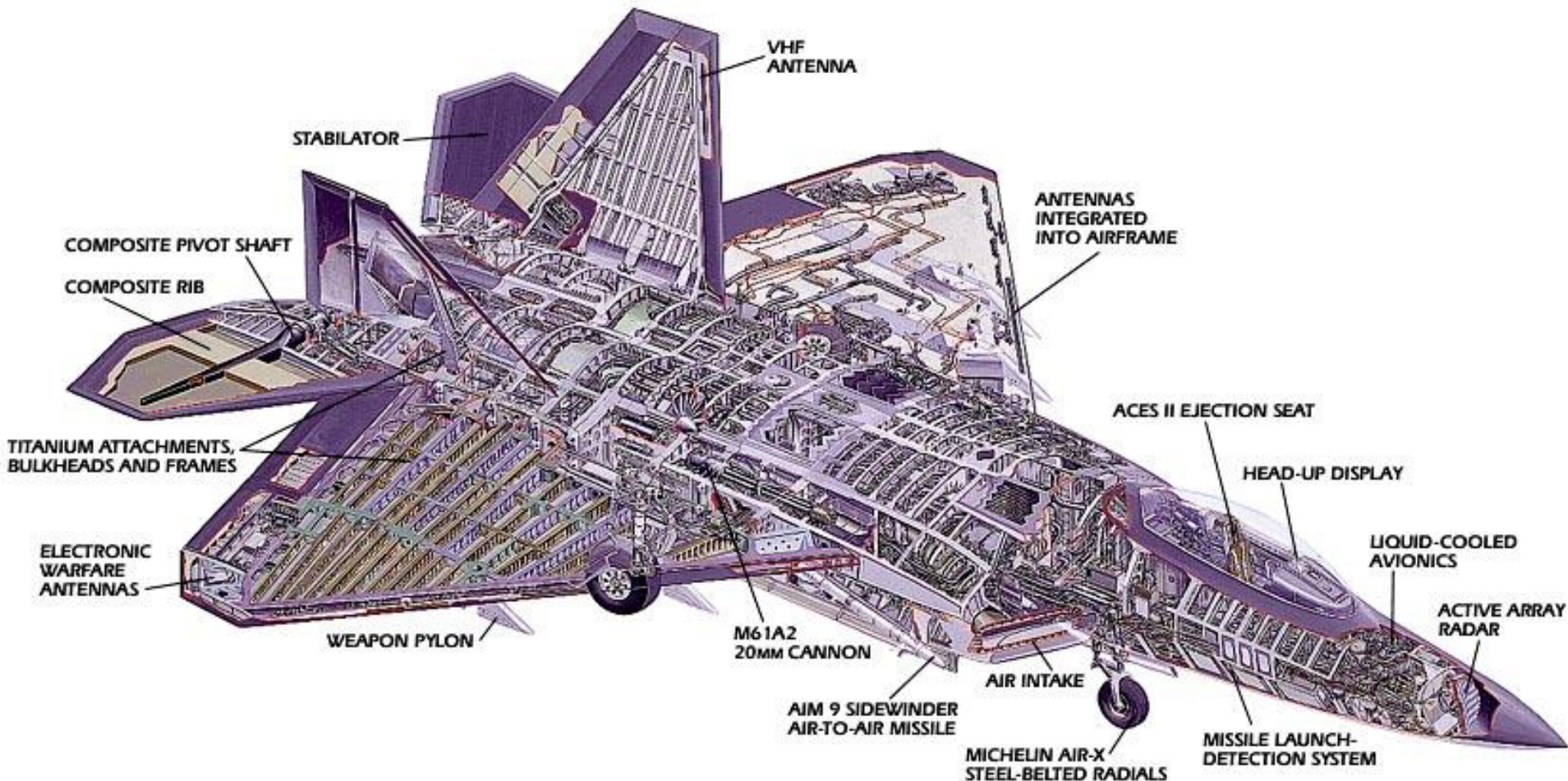
Unit Testing

F-22 Raptor Fighter



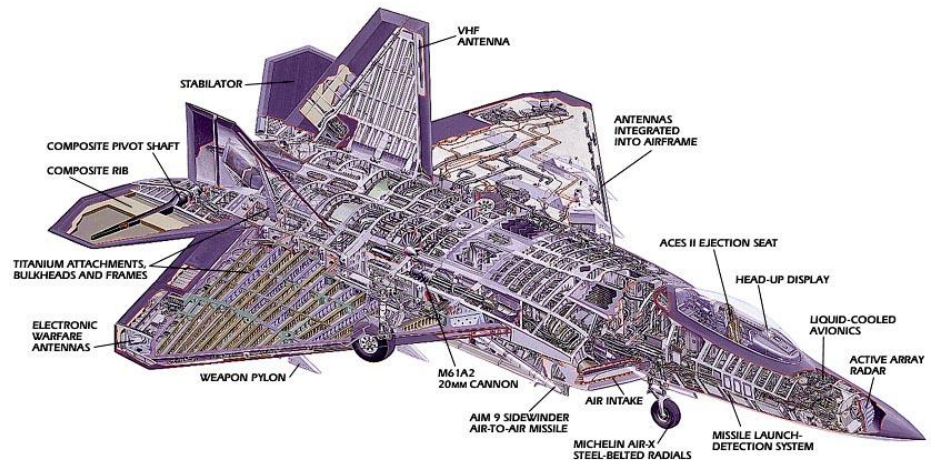
F-22 Raptor Fighter

- Manufactured by Lockheed Martin & Boeing
- How many parts does the F-22 have?



F-22 Raptor Fighter

- What would happen if Lockheed assembled an F-22 with "untested" parts (i.e., parts that were built but never verified)?
- It wouldn't work, and in all likelihood you would never be able to make it work
 - Cheaper and easier to just start over



Managing implementation complexity

- Individual parts should be verified before being integrated with other parts
- Integrated subsystems should also be verified
- If adding a new part breaks the system, the problem must be related to the recently added part
- Track down the problem and fix it
- This ultimately leads to a complete system that works

2 approaches to programming

- Approach #1
 - "I wrote ALL of the code, but when I tried to compile and run it, nothing seemed to work!"
- Approach #2
 - Write a little code (e.g., a method or small class)
 - Test it
 - Write a little more code
 - Test it
 - Integrate the two verified pieces of code
 - Test it
 - ...

Unit testing

- Large programs consist of many smaller pieces
 - Classes, methods, packages, etc.
- "Unit" is a generic term for these smaller pieces
- Three important types of software testing are:
 - Unit Testing (test units in isolation)
 - Integration Testing (test integrated units)
 - System Testing (test entire system that is fully integrated)
- Unit Testing is done to test the smaller pieces in isolation before they are combined with other pieces
 - Usually done by the developers who write the code

What unit tests do

- Unit tests create objects, call methods, and verify that the returned results are correct
- Actual results vs. Expected results
- Unit tests should be automated so that they can be run frequently (many times a day) to ensure that changes, additions, bug fixes, etc. have not broken the code
 - Regression testing
- Notifies you when changes have introduced bugs, and helps to avoid destabilizing the system

Test driver program

- The tests are run by a "test driver", which is a program that just runs all of the unit test cases
- It must be easy to add new tests to the test driver
- After running the test cases, the test driver either tells you that everything worked, or gives you a list of tests that failed
- Little or no manual labor required to run tests and check the results