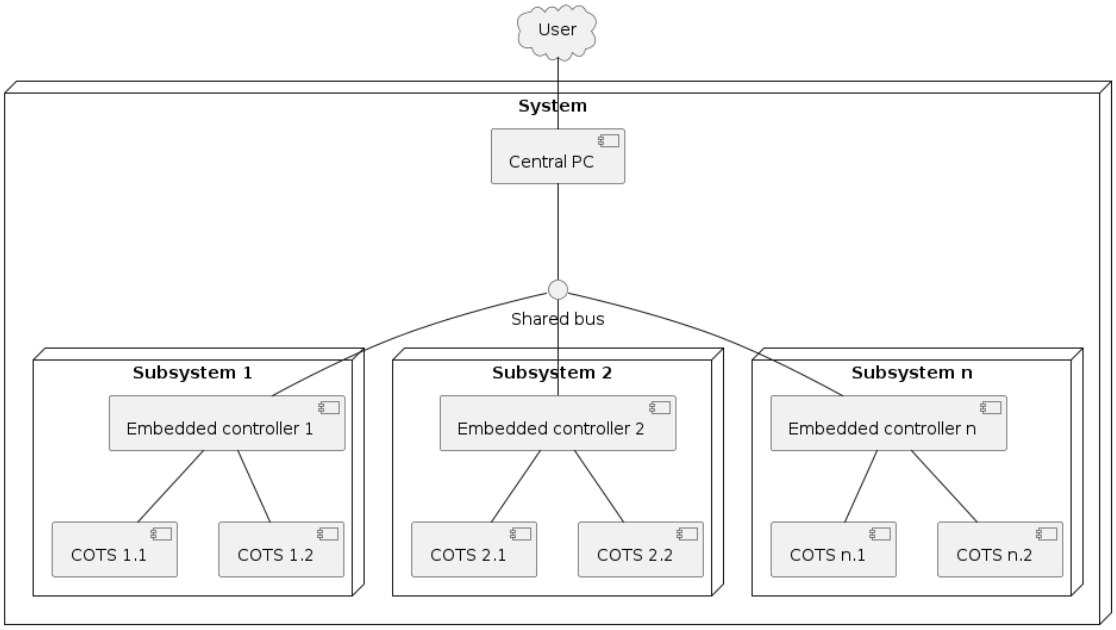
Homework (C)

Theoretical part



Propose an error handling software architecture for following system

System description

- The system has n embedded controllers, where each controls a subsystem.
- Embedded controllers control several COTS (commercial off-the-self) devices, where each device may have its own error conditions
- Embedded controller will have a state machine, which can detect error conditions using state from one or more COTS devices and other embedded controller statuses.
- Error conditions will have two categories:
    - a function in a subsystem is unavailable (level 1)
    - whole subsystem is not working (level 2)
- Embedded controllers are connected on a shared bus, where they can exchange information when needed.
- On the same bus there is a central computer which runs the system's central state machine.
- Central computer is connecting system to the outside world

Requirements

- Level 1 errors should not disable the entire system
- Level 1 errors should have automatic recovery and/or retries with timeout
- Level 2 errors can disable the entire system
- User can control three levels of restarts
    - function (in embedded controller)
    - subsystem (whole embedded controller)
    - system (entire system)

Practical part

In the system there are three controllers: drive, cooling and powerpack. Each controller will run its own binary and there are also shared libraries between controllers. Controllers will communicate over UDP with each other.

- Propose and implement extendable project structure for these controllers, describe why you chose this structure
    - Libraries may be added in the future
    - Controllers may be added in the future
    - Controllers may be changed in the future
- You must use C and CMake
- In addition to project structure, implement simple ping-pong over UDP
    - Drive will send out ping, cooling and powerpack will respond
    - Drive will write to standard output
        - On receiving pong (source and measure ping time)
        - On communication error or timeout
    - Cooling and powerpack will write to standard output
        - On receiving ping