Embedded systems

Lecture two

Layered Architecture

Software Architecture

Imagine having a source code file contains 10 thousands lines of code. If you have a ***bug*** in this code, how complex is finding the ***bug*** … ?

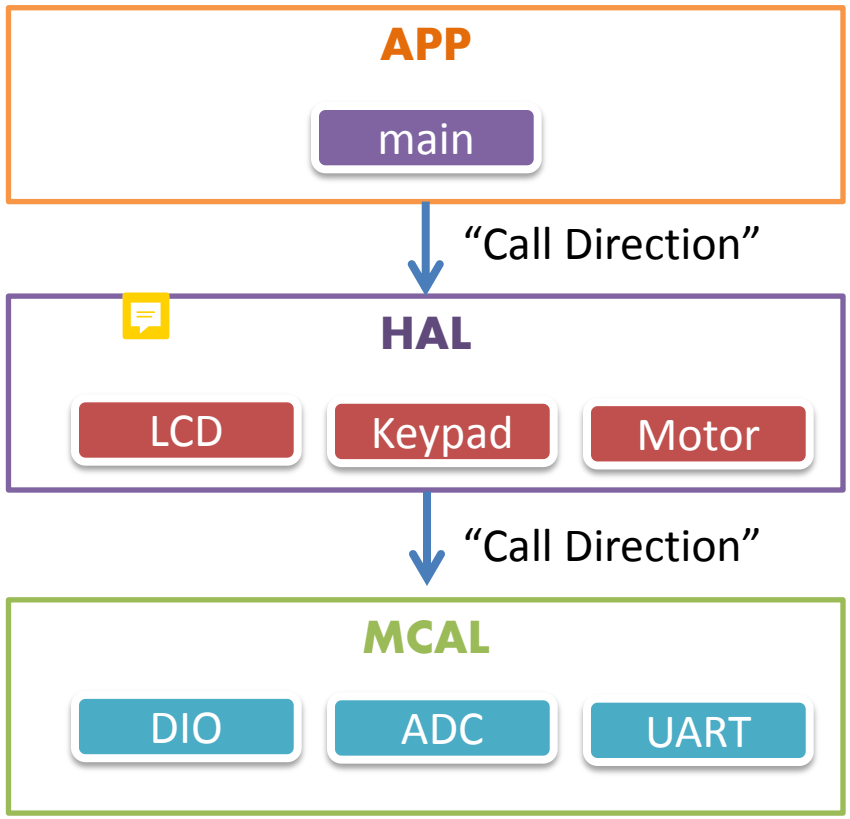
This is what's called the **Spaghetti Code**, which is the code that ***unstructured*** and ***difficult to maintain***.

Software Architecture Definition

The software architecture is a structuring way used to define software elements and relationships between them. In Embedded Systems we use a major type of software architecture called Layered Architecture.

In the layered architecture the software is divided into small parts called ***software components*** (SWC). Software components related to each other are organized in a horizontal layer. Each layer is performing a specific role

Embedded Systems Layered Architecture



Application Layer

System application

Hardware Abstraction Layer

Software related to any on board hardware element

Micro Controller Abstraction Layer

Software related to any peripheral inside the microcontroller

Advantages of Layered Architecture

1- Modularity

In a Layered architecture we separate the user application from the hardware drivers from the microcontroller specific drivers.

2- Portability

Changing any part of the software part would change its layer only. For example, if we need the same application with a new microcontroller, we shall only change the MCAL.

3- Reusability

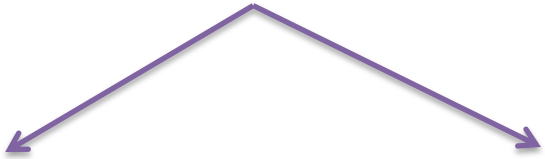
Code could be easily ***reused*** in different applications and systems.

4- Maintainability

Debugging and ***Testing*** is now much easier in small parts of the software instead of having a very long and complex one.

Building DIO Driver

The Simplest driver consists of only 2 files



Program File

C file contains the implementations of the functions provided by the driver
ex: DIO_prg.c

Interface File

Header file contains the prototypes of the functions provided by the driver to be used by other SWCs that need to use this driver
ex: DIO_int.h

Let’s Create the DIO driver for our Microcontroller ***Atmel AVR Atmega32***

Time To Code

The End …

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