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SUBJECT: Pre-lab 01 (Intro/GPIO)

1. **How much memory and FLASH storage does the STM32F072R8 have?**

According to Fig. 2 of Lab 1 – Manual, the STM32F072R8 has a FLASH size of 128 Kbytes, and 16 Kbytes of static RAM.

2. **What does the acronym "HAL" stand for?**

Hardware abstraction library: Provides a C/C++ API for controlling these peripherals.

3. **What is the STM32CubeMX program used for?**

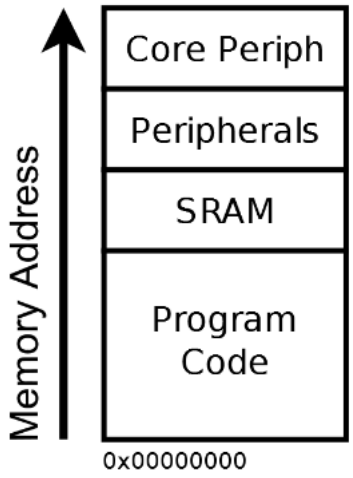
STM32CubeMX is a graphical tool that allows a very easy configuration of STM32 microcontrollers and microprocessors, as well as the generation of the corresponding initialization C code for the Arm® Cortex®-M core or a partial Linux® Device Tree for Arm® Cortex®-A core, through a step-by-step process.

For our purposes, STM32CubeMX is a utility to graphically configure the project parameters and generate a ready-to-use µVision project.

4. **Why can't a "bare-metal" embedded application return from the main function?**

Many embedded applications execute directly on the processor core, and no operating system exists to launch or clean up after applications exit. After device initialization, the startup code calls the main() function within the user's application; embedded programs generally begin by configuring hardware peripherals that they require and subsequently enter into an infinite loop where the majority of the application resides. This endless loop is necessary since the main function of an embedded program should never return. Unlike a machine with an operating system, nothing catches the processor's execution after the main program exits; this means that the behavior of the processor after returning is undefined which could range from resetting the device to executing random data.

5. **In the system's memory table, are the peripheral registers higher or lower in address than the SRAM?**



The peripheral registers are higher in address than the SRAM.

6. **What information does each of the four main datasheets/manuals used in the labs provide?**

DM00031936 (Periph Ref Manual): It provides complete information on how to use the STM32F0x1/STM32F0x2/STM32F0x8 microcontroller memory and peripherals.

DM00051352 (Core Manual): This programming manual provides information for application and system-level software developers. It gives a full description of the STM32 Cortex®-M0 processor programming model, instruction set and core peripherals.

DM00090510 (Chip Datasheet): This datasheet provides characteristics and ordering information of the STM32F072x8/xB microcontrollers.

DM00099401 (Discovery User Manual): STM32F072 Discovery kit user manual.

7. **Why do STM32F0 devices not recognize inputs/outputs on a chip by physical pin numbering?**

This is due to different chip packages with differing numbers of pins, and the pin ordering between these is inconsistent; GPIO pins are instead labeled with a port name (PA0 for example) which describes where to go to configure it. Within the chip datasheet, we see a table mapping GPIO pin names to physical pin numbers on the specific chip package.

8. **What is the name of ST's header file that defines names for the peripheral registers?**

The stm32f072xb.h file.

9. **What bitwise operator would you use to set a bit in a register?**

To set bits in a register, bitwise-OR its value with a bitmask. Any bits set in the bitmask will set the corresponding bit in the register. The bitwise-OR operator is a single vertical-pipe character '|'.

10. **What peripheral enables the system clock to other peripherals?**

The STM32F0 family has a dedicated peripheral called the Reset and Clock Control (RCC) which enables or disables clock signals around the chip. To enable a clock for a peripheral, we'll need the proper RCC enable register.

11. **What peripheral do the HAL library delay functions use?**

The SysTick timer peripheral is a device which raises a system signal at a configurable periodic rate; since the duration between these signals is a known quantity, the SysTick is useful as an application heartbeat. The HAL library uses the SysTick to trigger periodic tasks such as updating a global system time variable.

12. **Why should you avoid floating-point values on an STM32F0?**

Any embedded devices do not have hardware support for floating-point mathematics and must emulate it with large and slow code libraries. Higher-end devices such as the STM32F4 family of chips have a hardware floating-point unit (FPU).