Cypress Academy PSoC-101

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Agenda

Preparation

Install the required software.

Schedule

Time	Day 1	Binder Section
8:00	Introduction to Cypress Academy Brief Introduction to PSoC ®	1
9:00	Example 1 Walkthrough - Voltmeter LAB: Voltmeter Example	6, example L1
10:00	C Programming Primer	2
11:00	LAB: Hands-On-Example Projects	6
12:00	Working Lunch	6
1:00	LAB: Hands-On-Example Projects	6
2:00		
3:00		
4:00		
5:00	Wrap-Up and Introduction to Team Projects	

Time	Day 2	
8:00	Team Project	
9:00		
10:00		
11:00		
12:00	Working Lunch	
1:00	Team Project	
2:00	Present Team Project	
3:00		
4:00	Wrap Up	

= Hands-on Activities

Course Completion Requirements

1. Present your team project to the group.

   Show and explain the project schematics and firmware using PSoC Creator (no PowerPoint)

2. Submit CDTs for all issues found with Cypress kits, documentation, software, etc. For non-Cypress employees, report all issues to one of the course facilitators and they will submit a CDT, if appropriate.

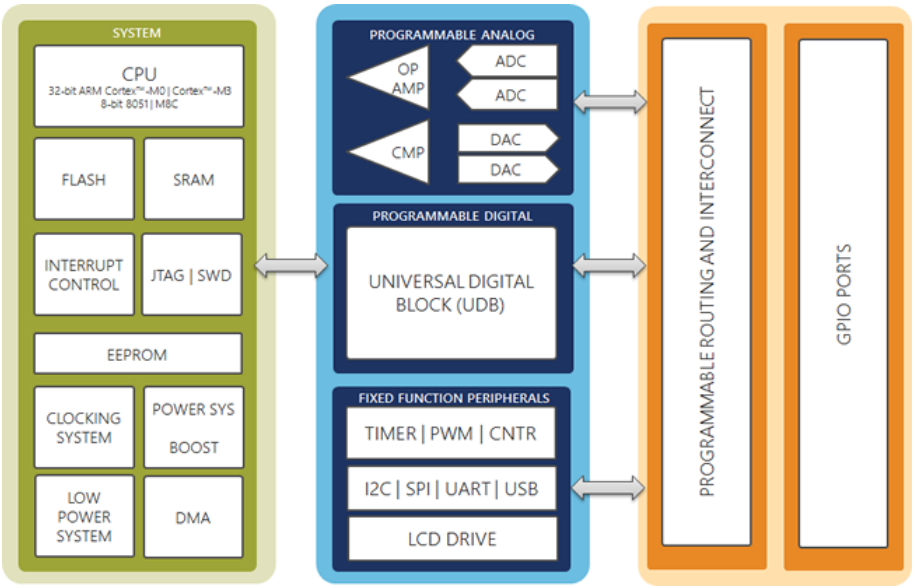
   Use the following Categories:

Type	**Division**	**Sub-division**	**Project**
Class	NPD	Other	Cypress Academy
Creator	Software	PSoC Tools	PSoC Creator
Creator Component	Software	PSoC Tools	PSoC Creator Content
Component Datasheet	Software	PSoC Tools	PSoC Creator Content Datasheet
App note	PSD	Documentation	Documentation-PSoC3 Documentation-PSoC4 Doucumentation-PSoC5
Kits	PSD PSD	PSoC Kits	CY8CKIT-xxx CY8CKIT-xxx
Installer	Software	PSoC Tools	CyInstaller

3. Fill out a survey at the end of the course. We review all of the surveys and continually improve not only this course but also our chips and tools based on your feedback so it is critical that you tell us what you think.

PSoC Introduction

PSoC Stands for “Programmable System on a Chip”. Each PSoC contains a CPU system, programmable analog peripherals, programmable digital peripherals, fixed function peripherals, and routing.



The PSoC families are classified by their CPU:

- PSoC 1 – Proprietary M8
- PSoC 3 - 8051
- PSoC 4 – ARM Cortex M0
- PSoC 5LP – ARM Cortex M3

The PSoC Designer IDE is used for PSoC 1. The PSoC Creator IDE is used for all other devices.

The programmable digital in PSoC consists of Universal Digital Blocks (UDBs). These are fundamental building blocks inside PSoC. These are described in more detail on the next page.

Many of the pre-built components are implemented using UDBs. You can use these by just dragging and dropping from the component catalog onto your schematic. Each of these is fully characterized and contains a datasheet. New components are added to the catalog in PSoC Creator all the time.

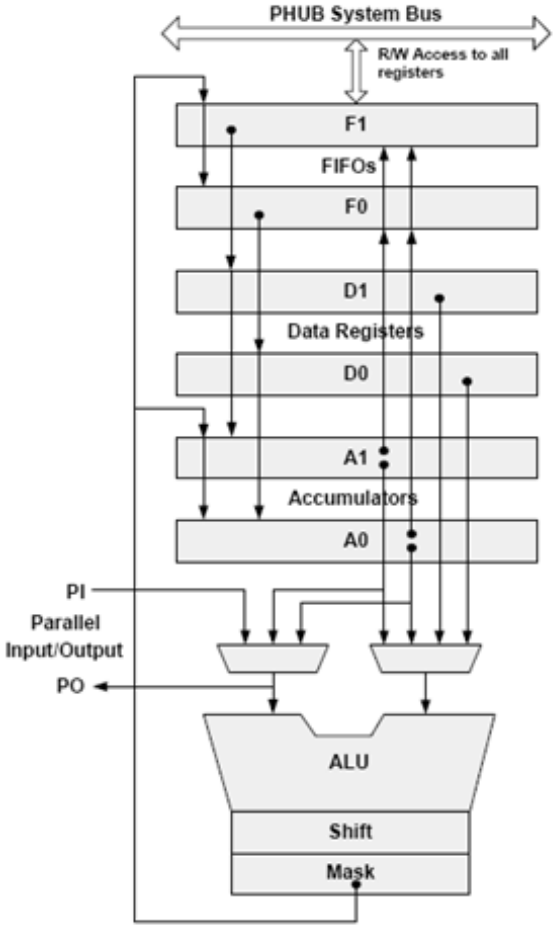
You can create your own custom components or use components created by other users and published as community components. These can be imported individually or they can be supplied as full libraries of components.

UDB Introduction

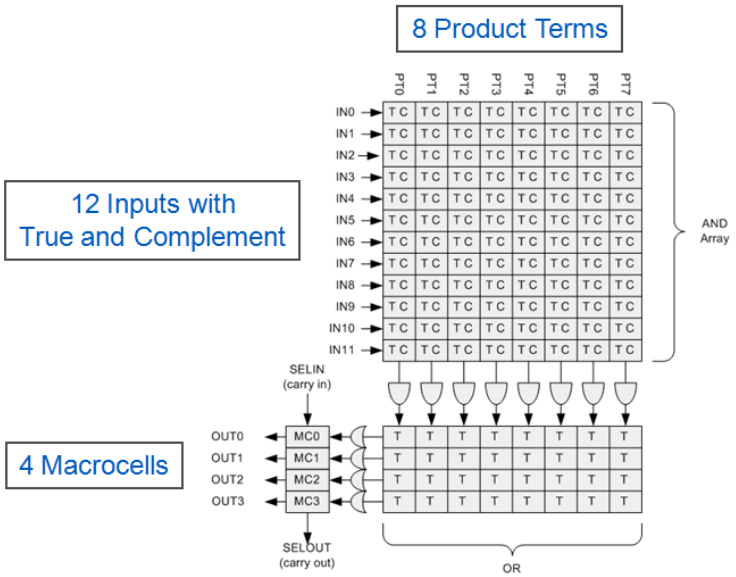
Each UDB has five major elements:

1. A Datapath (DP), with:
   a. An 8-bit Arithmetic Logic Unit (ALU), that implements the following functions: Add, Subtract, Increment, Decrement, AND, OR, Exclusive-OR (XOR).
      Shift and mask functions can be applied to the ALU output.
   b. Two 8-bit accumulator registers (A0, A1)
   c. Two 8-bit data registers (D0, D1)
   d. Two 8-bit by 4 deep FIFOs (F0, F1)
   e. “Less than” and “equal to” compare functions which can operate on the A0, A1, D0, and D1 registers

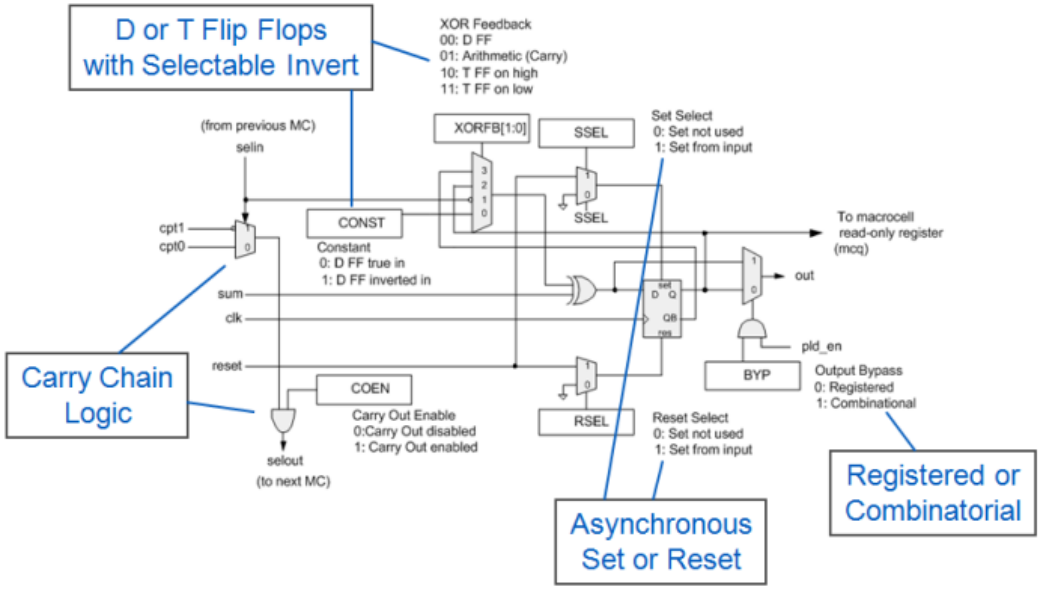
   The Datapath is used to do calculations, data processing and data transfer.



2. Two 12C4 PLDs with fully featured output Macrocells. A PLD is used to implement Combinational Logic as well as State Machines. The State Machines and Datapath can interact such that one can control the operation of the other.



UDB PLD Macrocell Detail:



3. A 7-bit down counter, to implement basic counting functions (uses the Control Register resource).
4. An 8-bit Control Register. Typically firmware writes to the control register to control the Component.
5. An 8-bit Status Register. Typically firmware reads the status register to determine Component status. The status register can generate CPU interrupts.

Kit Introduction

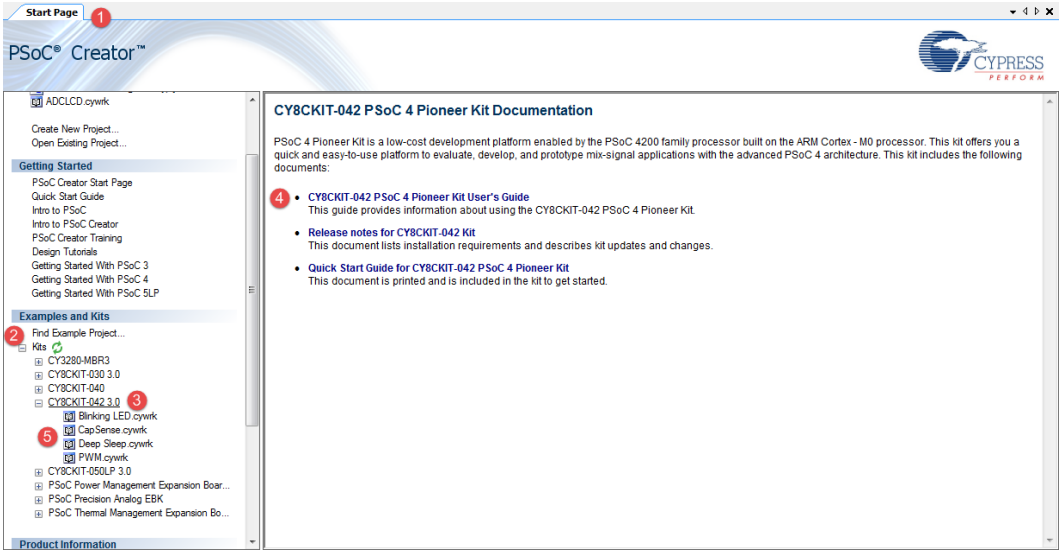
In order to support the key Cypress Customers, System Design Engineers (including Hardware, Software, Analog, etc), we provide an ecosystem of complete boards and documentation that enable them to learn to use our chips and tools, or demonstrate the differentiated functionality of Cypress chips. These boards include:

- Development Kits (a.k.a. Devkits) which are the boards that we will use in this class, e.g. CY8CKIT-042 PSoC 4 Pioneer
- Evaluation Boards (EVBs) which are boards that connect to a Devkit to demonstrate a specific functionality or capabilities of PSoC e.g. CY8CKIT-025 PSoC Precision Analog Temperature Sensing
- Reference Design Kits (RDKs) which are boards that are a complete design that show a customer exactly how to make an end user device e.g. CY4672 PRoC LP Reference Design Kit

In this class we will use one of our platform Development kits, CY8CKIT-042 PSoC 4 Pioneer, and a specially made shield board for the 2nd day PSoC 4 project.

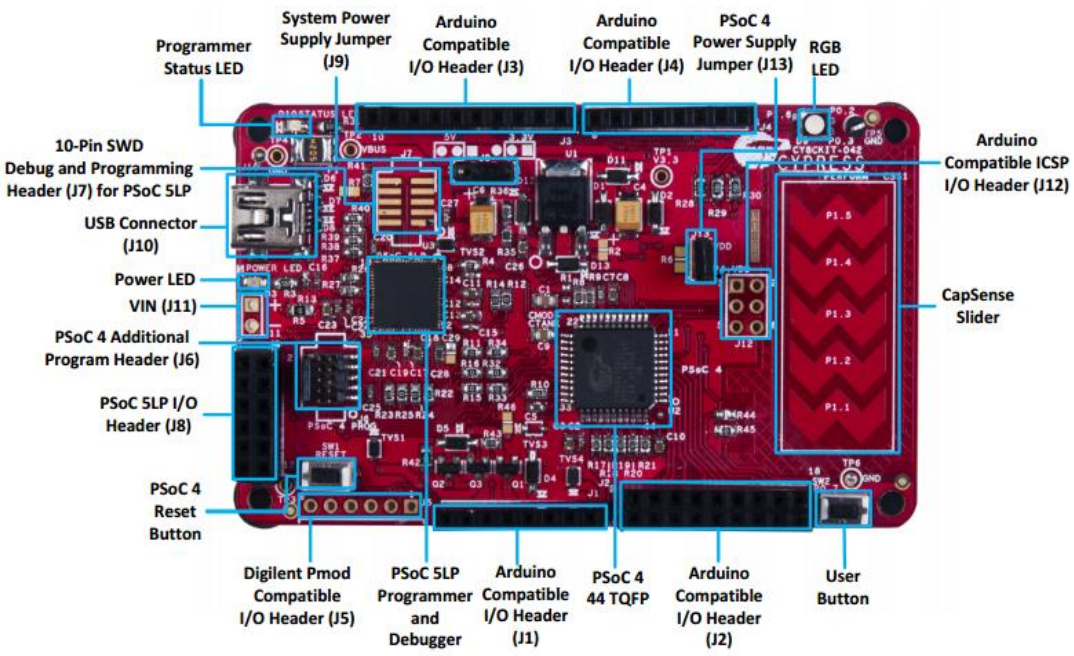
When you purchase a Devkit from Cypress, we provide a Windows installer that puts all of the documentation, sample code, drivers etc on your PC in such as way as to make the kit usable. You can download the installer from www.cypress.com by searching for your kit.

Once you have the kit installed on your PC you can access all of the information for that kit from the start page (1) by expanding the "Kits" button (2) and then clicking on the kit name (3). The right panel will provide links to the kit documentation (4). If you expand the kit name, you will see all of the available example projects for that kit (5).



The default installation directory for all Cypress kits is "C:\Program Files\Cypress\" or "C:\Program Files (x86)\Cypress." In that directory you will find all files pertaining to a given kit including all documentation, example projects, schematics, and board design files.

CY8CKIT-042 PSoC 4 Pioneer Kit



Useful Features:

- CY8C4245AXI-483 (PSoC 4)
- User push-button switch
- 3 Color LED
- Capsense slider
- Built in PSoC 5LP programmer, I2C to USB bridge, and UART to USB bridge