



VTI1E2 – APLIKASI MIKROKONTROLER dan ANTARMUKA[©] SEMESTER GANJIL – KURIKULUM 2020

Denny Darlis S.Si., M.T. - 13770026

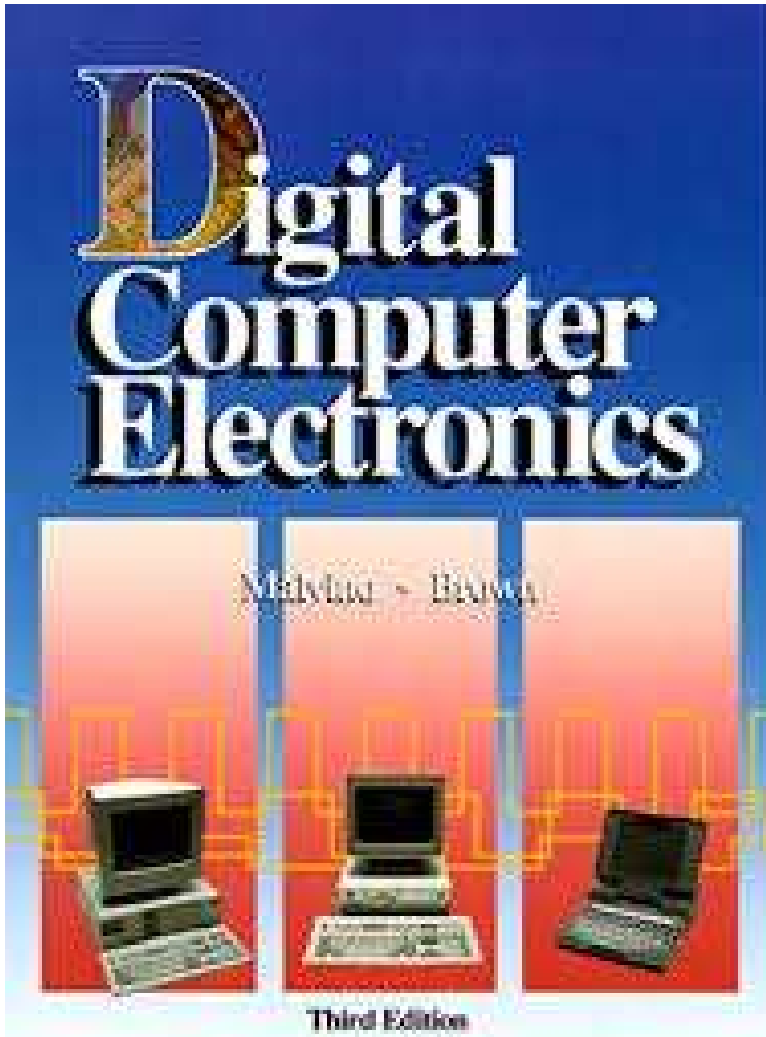
Program Studi D3 Teknologi Telekomunikasi

Fakultas Ilmu Terapan - Universitas Telkom

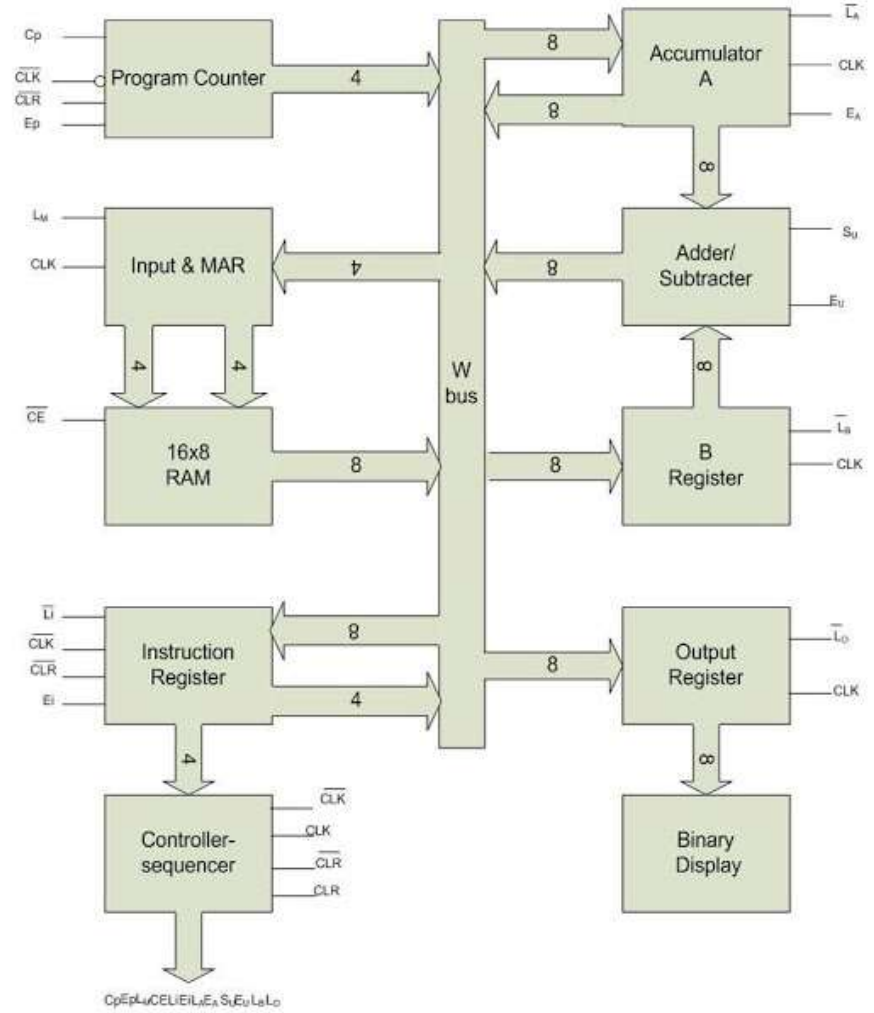
Materi 1 - Pengenalan Mikroprosesor, Sistem Mikroprosesor dan Mikrokontroler

- ▶ Review Sistem Digital
- ▶ Mikroprosesor
- ▶ Sistem Mikroprosesor
- ▶ Mikrokontroler
- ▶ Pembuat Mikrokontroler
- ▶ Jenis Mikrokontroler

Review Sistem Digital



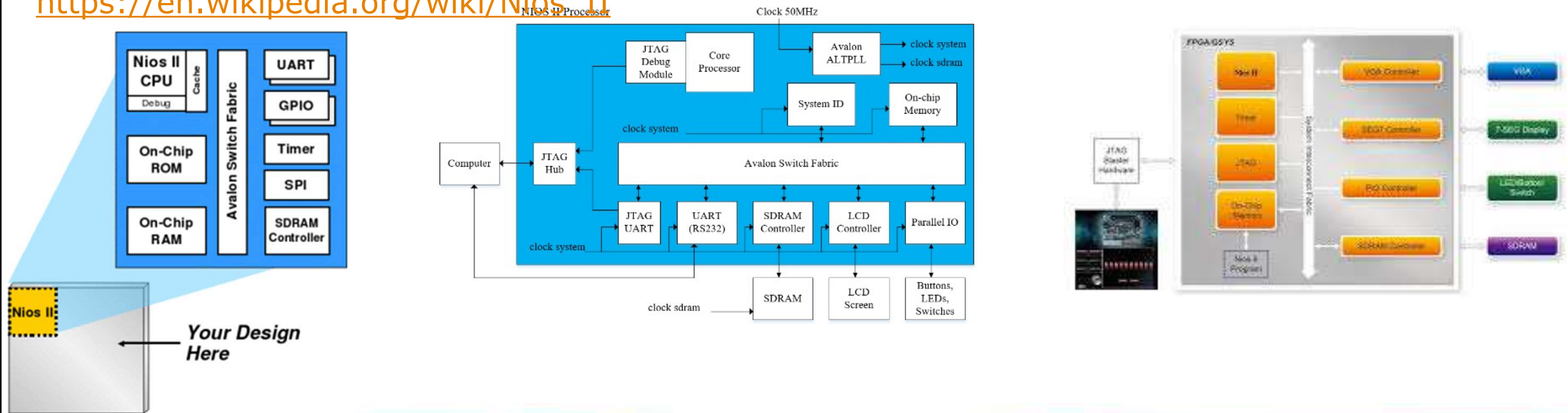
Block Diagram of SAP-1



Nios II adalah arsitektur prosesor tertanam 32-bit yang dirancang khusus untuk keluarga Altera dari sirkuit terintegrasi field-programmable gate array (FPGA). Nios II menggabungkan banyak peningkatan dibandingkan arsitektur Nios asli, membuatnya lebih cocok untuk berbagai aplikasi komputasi tertanam yang lebih luas, dari pemrosesan sinyal digital (DSP) hingga kontrol sistem.

Nios II adalah penerus prosesor tertanam 16-bit pertama Altera yang dapat dikonfigurasi Nios, yang diperkenalkan pada tahun 2000. [1]

https://en.wikipedia.org/wiki/Nios_II



PicoRV32 - A Size-Optimized RISC-V CPU

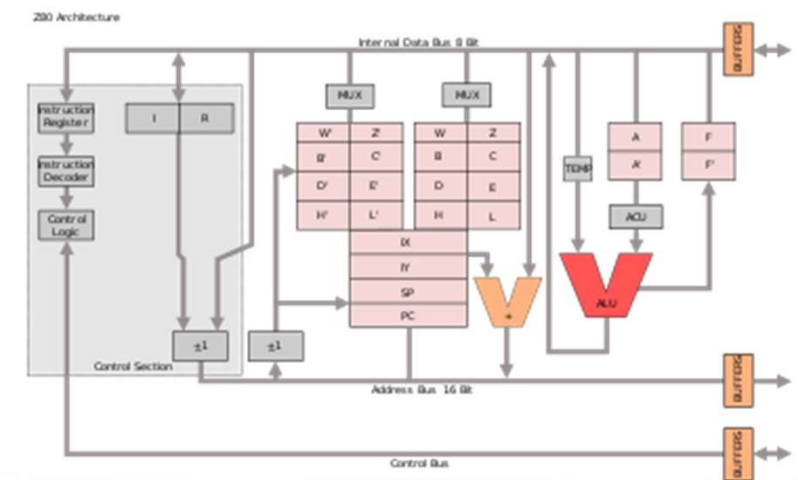
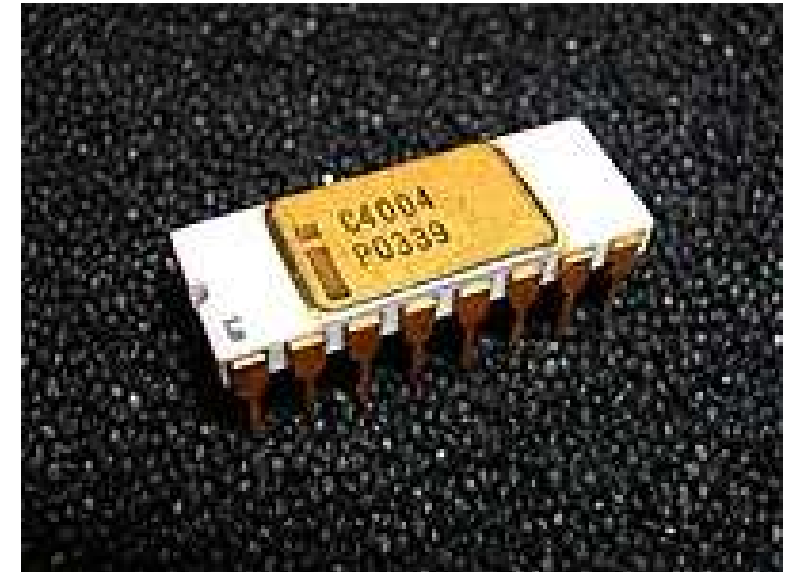
- PicoRV32 is a CPU core that implements the RISC-V RV32IMC Instruction Set. It can be configured as RV32E, RV32I, RV32IC, RV32IM, or RV32IMC core, and optionally contains a built-in interrupt controller.
- PicoRV32 is free and open hardware licensed under the ISC license (a license that is similar in terms to the MIT license or the 2-clause BSD license).

Pico RISC-V32 for the DE10-Lite (MAX10 based)

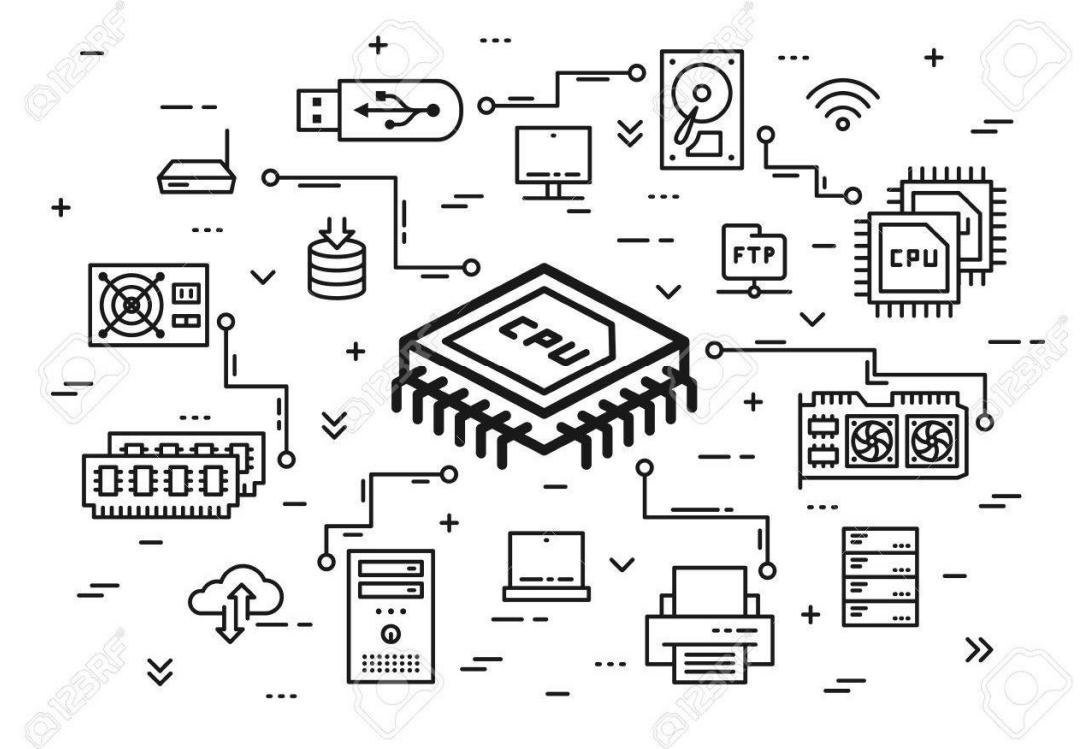
- CPU @ 64 MHz, according to the summary report it should go up to 105 MHz
- UART: Pin 4 is TX (Output), Pin 6 is RX (Input)
- 2 Resettable Timers
- Minimal GPIO
- 64 k RAM with bootloader (serial loading)
- KEY0 acts as reset button.

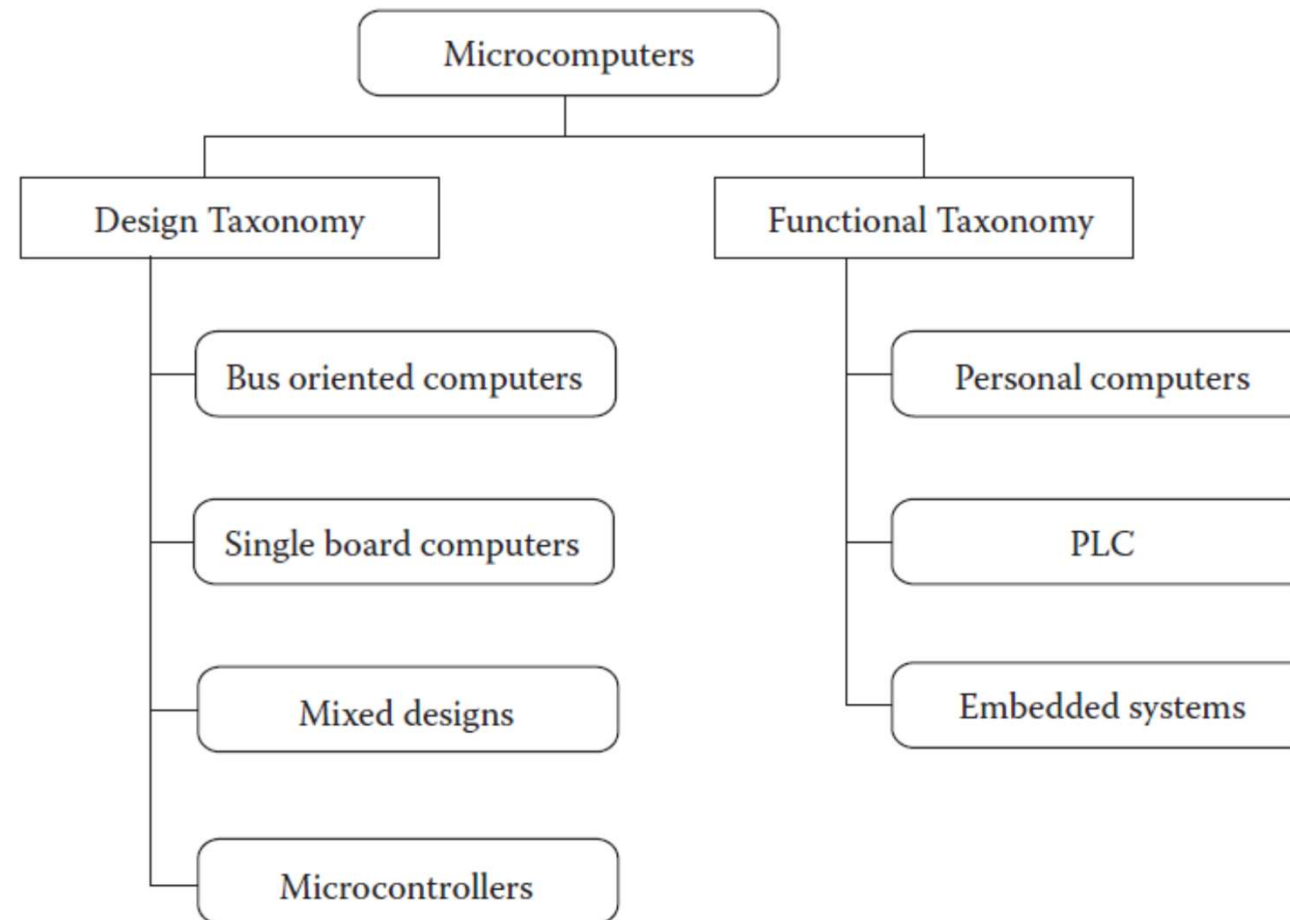
| Configuration \ Resources | LUTs | Registers | BSRAMs | DSP Macros |
|--|------|-----------|--------|------------|
| PicoRV32 CORE Minimum and No Peripherals | 2764 | 1833 | 8 | 0 |
| PicoRV32 CORE Maximum and No Peripherals | 6210 | 3477 | 32 | 2 |
| PicoRV32 CORE Default and No Peripherals | 5321 | 3173 | 32 | 2 |
| PicoRV32 CORE Default and Peripherals(UART/GPIO/I2C) | 6804 | 4228 | 32 | 2 |
| PicoRV32 CORE Default and All Peripherals Default | 8330 | 5070 | 32 | 2 |
| PicoRV32 CORE Maximum and All Peripherals Maximum | 8594 | 5278 | 32 | 2 |

- Mikroprosesor adalah prosesor komputer yang menggabungkan fungsi unit pemrosesan pusat pada satu sirkuit terpadu (IC) (atau lebih) dari konstruksi MOSFET.
- Mikroprosesor adalah sirkuit terintegrasi digital multiguna, berbasis clock (pewaktu), berbasis register, yang menerima data biner sebagai input, memprosesnya sesuai dengan instruksi yang disimpan dalam memorinya dan memberikan hasil (juga dalam bentuk biner) sebagai output.
- Mikroprosesor mengandung logika kombinasional dan logika digital sekuensial (berurutan). Mikroprosesor beroperasi pada angka dan simbol yang diwakili dalam sistem bilangan biner.

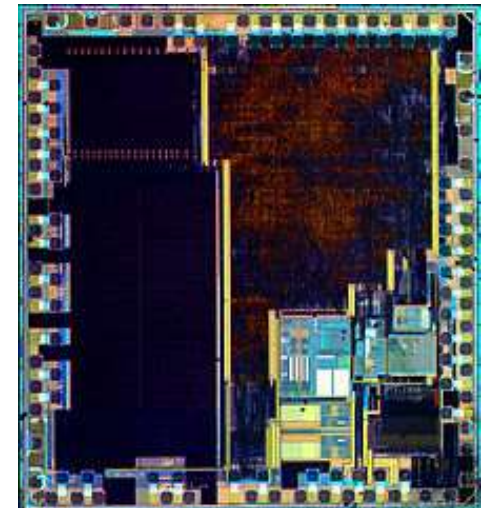
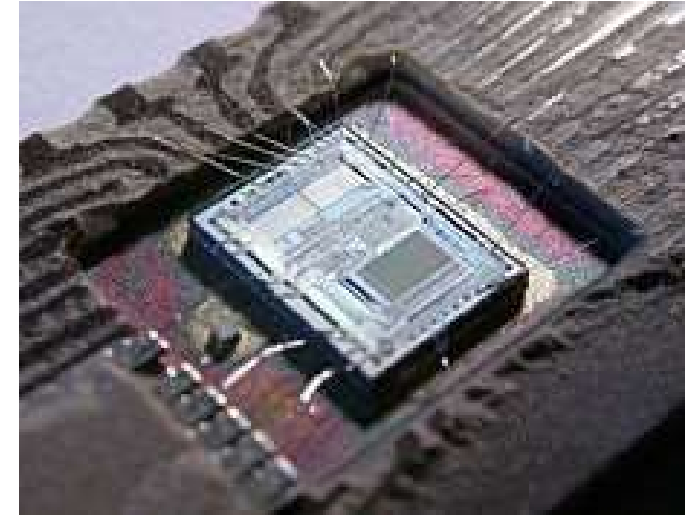


- ▶ A microprocessor is a general-purpose entity.
- A digital signal processor (DSP) is specialized for signal processing.
- Graphics processing units (GPUs) are processors designed primarily for realtime rendering of images.
- Other specialized units exist for video processing and machine vision.
- Microcontrollers integrate a microprocessor with peripheral devices in embedded systems.
- Systems on chip (SoCs) often integrate one or more microprocessor or microcontroller cores.





- ▶ A **microcontroller (MCU** for *microcontroller unit*) is a small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC) chip.
- ▶ In modern terminology, it is similar to, but less sophisticated than, a system on a chip (SoC); a SoC may include a microcontroller as one of its components.
- ▶ A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals. Program memory in the form of ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM.
- ▶ Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips.



ATmega328P pin mapping

Arduino function

- reset
- digital pin 0
- digital pin 1
- digital pin 2
- digital pin 3
- digital pin 4
- VCC
- GND
- crystal
- crystal
- digital pin 5
- digital pin 6
- digital pin 7
- digital pin 8



Arduino function

- PC5 analog input 5
- PC4 analog input 4
- PC3 analog input 3
- PC2 analog input 2
- PC1 analog input 1
- PC0 analog input 0
- GND
- AREF analog reference
- AVCC
- PB5 digital pin 13
- PB4 digital pin 12
- PB3 digital pin 11
- PB2 digital pin 10
- PB1 digital pin 9

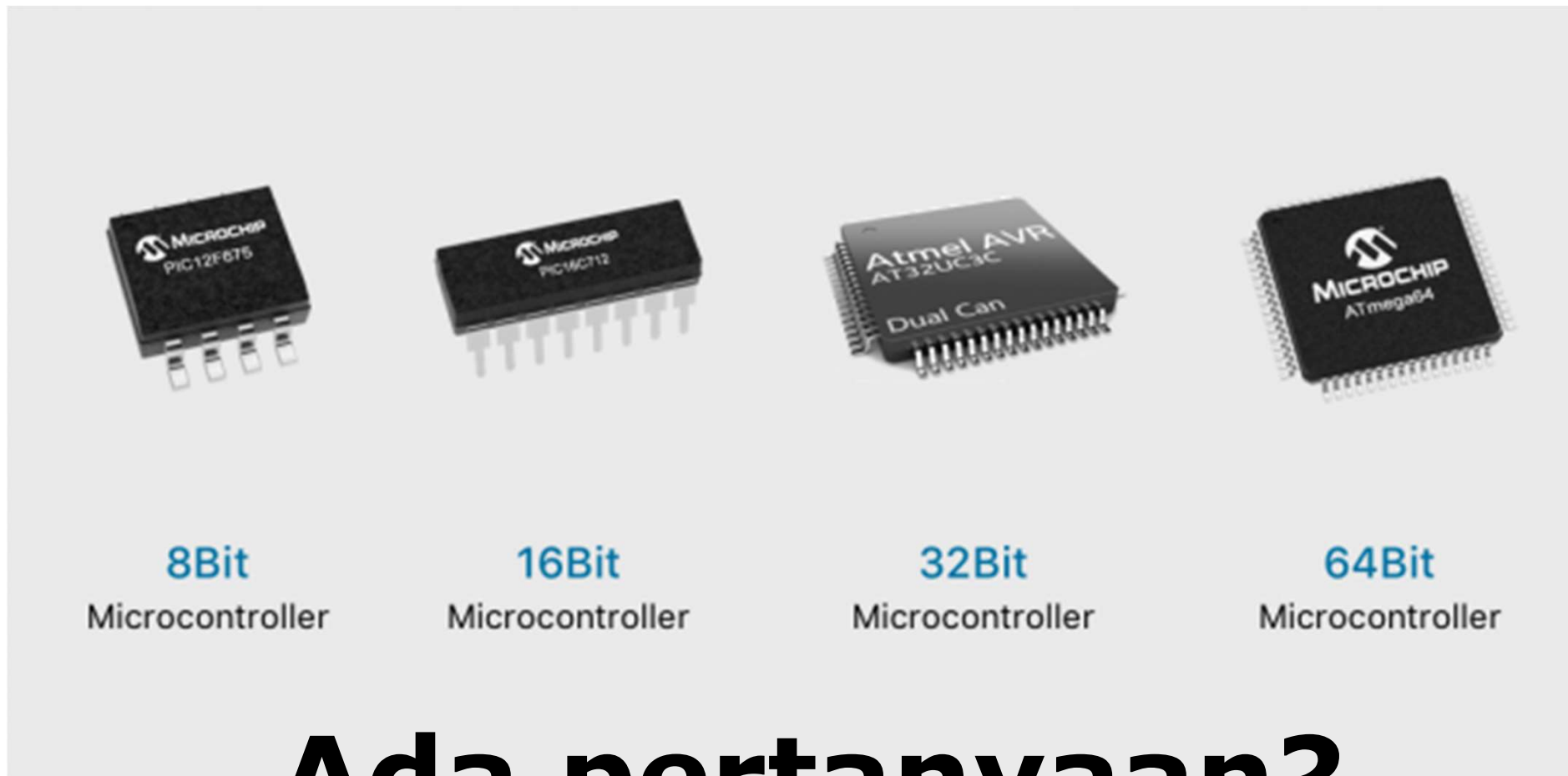
When using ISP to program the chip

A micro-controller is a single integrated circuit, commonly with the following features:

- central processing unit – ranging from small and simple 4-bit processors to complex 32-bit or 64-bit processors
- volatile memory (RAM) for data storage
- ROM, EPROM, EEPROM or Flash memory for program and operating parameter storage
- discrete input and output bits, allowing control or detection of the logic state of an individual package pin
- serial input/output such as serial ports (UARTs)
- other serial communications interfaces like I²C, Serial Peripheral Interface and Controller Area Network for system interconnect
- peripherals such as timers, event counters, PWM generators, and watchdog
- clock generator – often an oscillator for a quartz timing crystal, resonator or RC circuit
- many include analog-to-digital converters, some include digital-to-analog converters
- in-circuit programming and in-circuit debugging support

PEMBUAT MIKROKONTROLER





Ada pertanyaan?

- ▶ Carilah Datasheet mikrokontroler untuk masing-masing kelompok dan buatlah slide presentasi untuk menerangkannya!

Terima Kasih atas Perhatiannya