Embedded C-Programming

Introduction to Embedded Systems

- **What is an embedded system ?**

  An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, sometimes with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts.

  Simply, it is application-specific systems which contain hardware and software tailored for a particular task and are generally part of a larger system.

Introduction to Embedded Systems

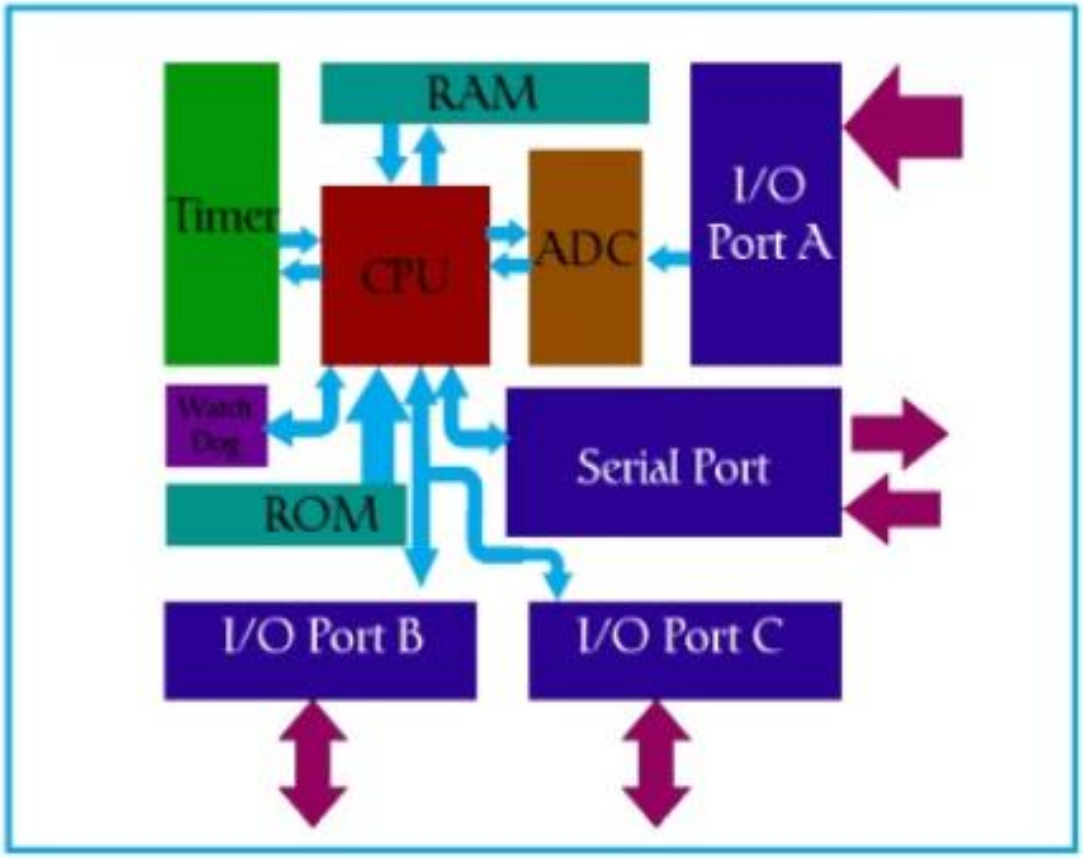
- **Embedded systems in our life**

Introduction to Embedded Systems

- **Embedded systems characteristics**
  - Cost of hardware and software.
  - Memory.
  - Power consumption.
  - Operator interface.
  - Reliability.
  - Maintainability.
  - Security.
  - Safety.
  - Real time critical.
  - Interface to environment through sensors and actuators.

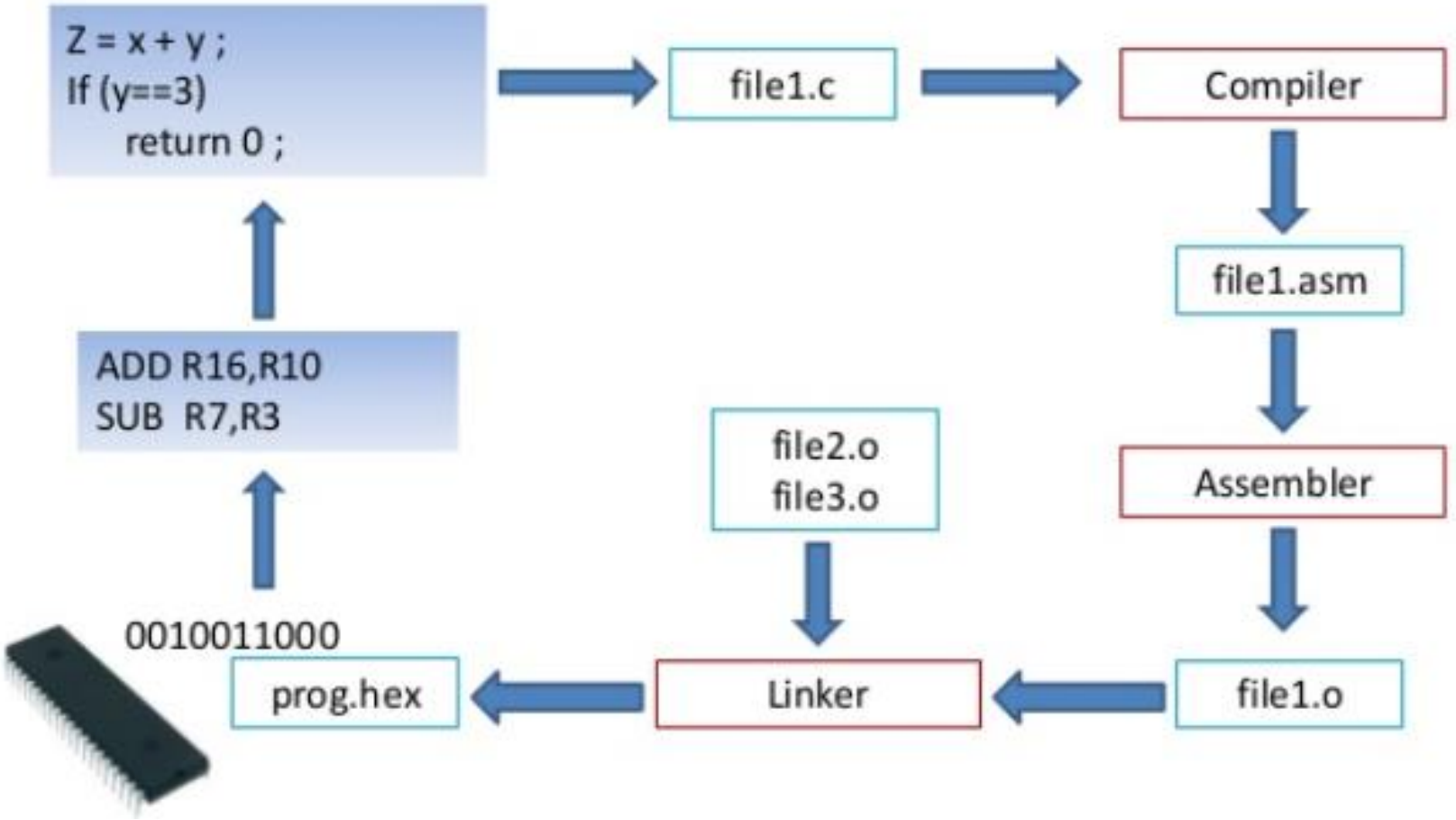
Introduction to Embedded Systems

- **Micro-Controller concepts**



Introduction to Embedded Systems

- **Micro-Controller concepts**



Introduction to Embedded Systems

- **Embedded systems market in Egypt**

C for Embedded Systems vs. Embedded C

➢ C for Embedded Systems

- It is using the standard C language (mainly as described in ISO/IEC 9899 standard) but with a lot of customization and optimization to meet the Embedded System requirements.
- C is generally used for desktop computers and can use the resources of a desktop PC like memory, OS, etc. While C for Embedded Systems is for microcontroller based applications so it has to deal with the limited resources, such as RAM, ROM, I/O on an embedded processor.

➢ Embedded C

- It is an extension to the C standard (Under the ISO/IEC TR 18037 standard) to support specific complex topics in Embedded Systems (Fixed point types, multiple memory areas, and I/O register mapping).
- Because Embedded C is an extension to the C standard, it uses the same C language syntax.