

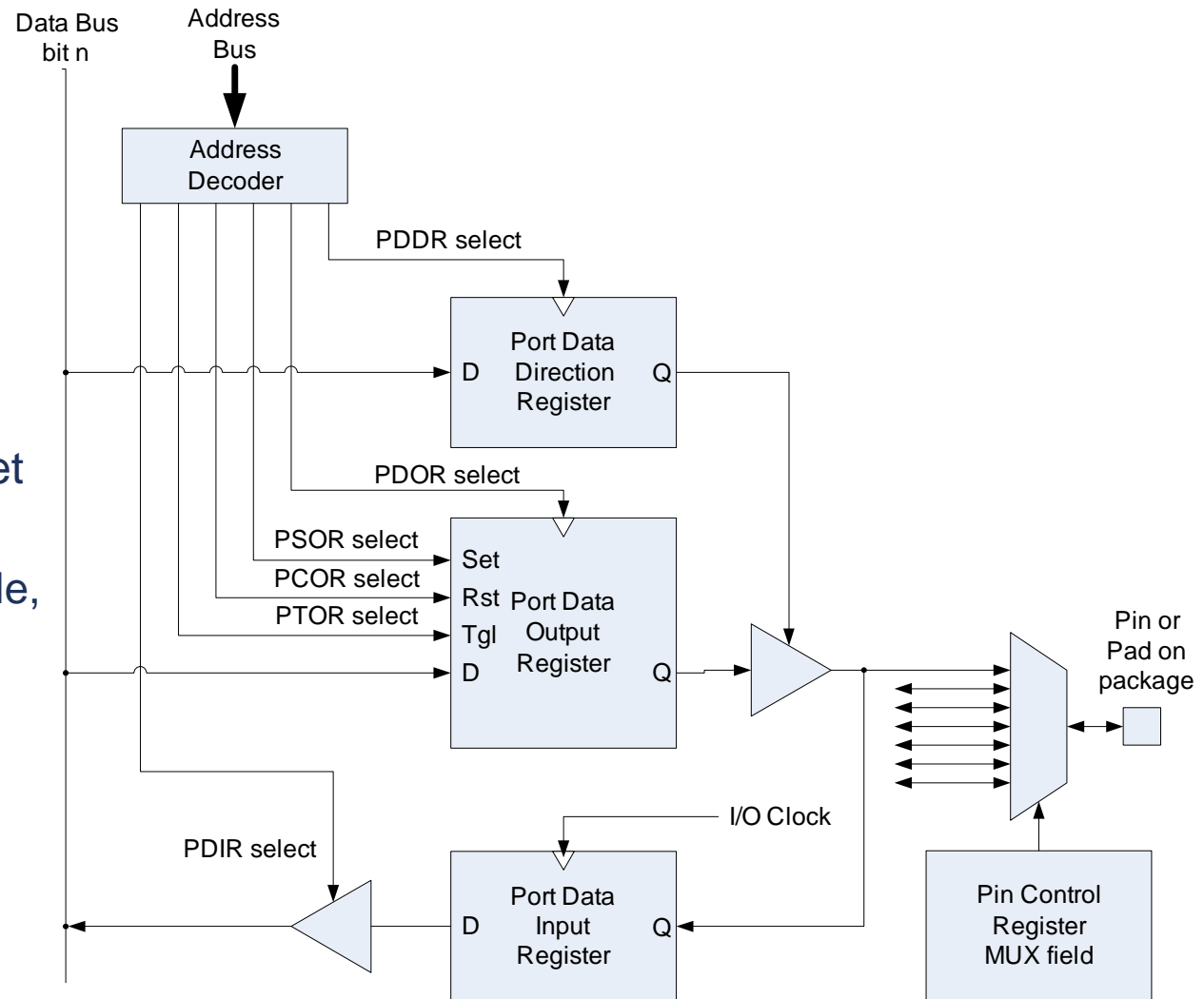
GPIO Port Bit Circuitry in MCU

- **Configuration**

- Direction
- MUX
- Pull resistor control

- **Data**

- Different ways to set output data:
 - set, reset, toggle, data
- Input



CMSIS - Accessing Hardware Registers in C

- **CMSIS - Cortex Microcontroller Software Interface Standard**
- **Header file MKL25Z4.h defines C data structure types to represent hardware registers in MCU**

```
#define __I volatile const
#define __O volatile
#define __IO volatile

/** GPIO - Register Layout Typedef */
typedef struct {
    __IO uint32_t PDOR; /**< Data Output, offset: 0x0 */
    __O uint32_t PSOR; /**< Set Output, offset: 0x4 */
    __O uint32_t PCOR; /**< Clear Output, offset: 0x8 */
    __O uint32_t PTOR; /**< Toggle Output, offset: 0xc */
    __I uint32_t PDIR; /**< Data Input, offset: 0x10 */
    __IO uint32_t PDDR; /**< Data Direction, offset: 0x14 */
} GPIO_Type;
```

Accessing Hardware Registers in C (2)

- Header file MKL25Z4.h defines pointers to the registers

```
/* GPIO - Peripheral instance base addresses */  
/** Peripheral PTA base address */  
#define PTA_BASE (0x400FF000u)  
/** Peripheral PTA base pointer */  
#define PTA      ((GPIO_Type *)PTA_BASE)
```

```
PTA->PDOR = ...
```