Real Time Group

Building a UART Driver for STM32F746ZG

Objective

In this exercise, you will create a basic UART driver for the STM32F746ZG microcontroller. The driver will include functions to initialize UART, send data, and receive data using UART registers directly.

Requirements

1. **Initialize UART**: Configure the UART peripheral with specified parameters (baud rate, word length, stop bits, etc.).
2. **Write Data**: Send data through the UART.
3. **Read Data**: Receive data from the UART.

Constraints

- Do not use the HAL library.
- Interact with the UART peripheral using direct register access.

Provided Document

Refer to the provided STM32F746ZG datasheet for detailed information on UART registers and their configurations.

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Task Details

1. Initialize UART

Create a function `UART_Init` to initialize the UART peripheral with the following prototype:

```
void UART_Init(uint32_t baudrate);
```

Parameters:

- `baudrate`: The desired baud rate for UART communication.

2. Write Data

Create a function `UART_Write` to send data through UART with the following prototype:

```
void UART_Write(uint8_t data);
```

Parameters:

- `data`: The byte of data to be sent.

3. Read Data

Create a function `UART_Read` to receive data from UART with the following prototype:

```
uint8_t UART_Read(void);
```

Return:

- The byte of data received.

Helper Functions

You may create helper functions as needed to manage UART settings and operations.

Steps to Implement

1. **UART_Init Function**:
    - Enable the UART clock.
    - Configure the UART baud rate.
    - Configure the word length, stop bits, and parity.
    - Enable the UART peripheral.
2. **UART_Write Function**:
    - Wait for the transmit data register to be empty.
    - Write the data to the transmit data register.
3. **UART_Read Function**:
    - Wait for the receive data register to have data.
    - Read the data from the receive data register.