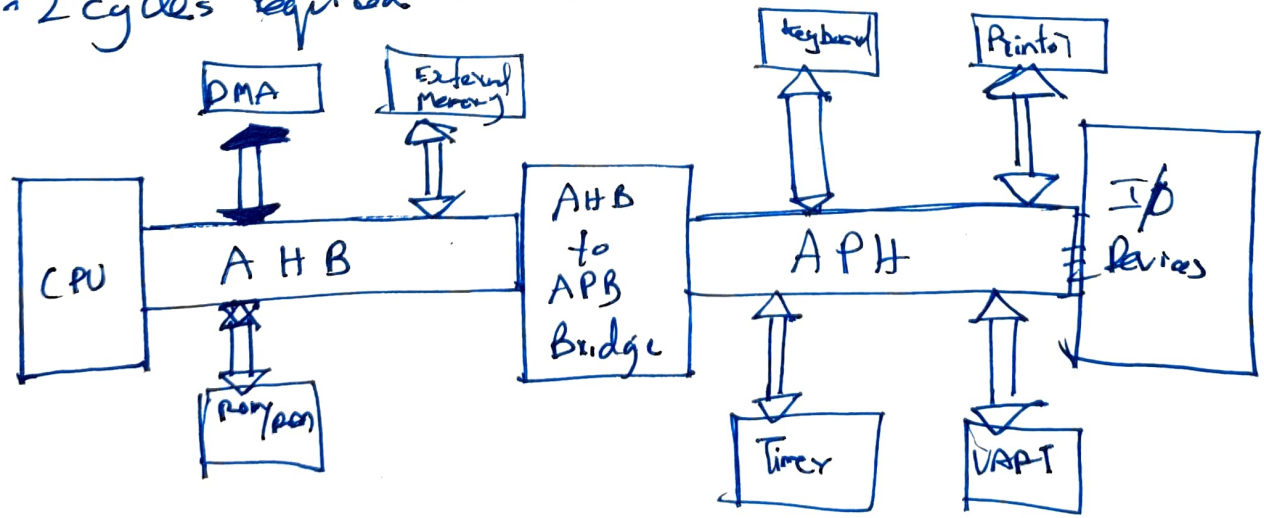
AMBA: [Advance Microcontroller Bus Architecture]

- APB: [Advance Peripheral Bus]
  - Simple, Low power
  - Light-weight
  - Commonly used for low-bandwidth peripherals like
    - UART, Timers, GPIO etc
- APB interface is not pipelined, synchronous.
- 2 cycles required for one transfer.

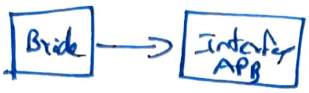


- Signals associated with APB Interface:

- PCLK – Clk source
- PRESETN – Active Low reset
- PADDR – Address bus (Max – 32 bits) [From M → S]
- PPROT – Protection type
- PSELx – Corresponding Slave select [M → S]
- PENABLE – Enables a transfer [M → S]
- PWRITE – Direction of the data [1 → Write, 0 → Read] [M → S]
- PWDATA – Write Data Bus [8, 16 or 32 bits] [M → S]
- PSTRB – Strobe signal → Indicates whether the bridge can transfer data to particular byte lane or not.
  - Each bit for byte of data
  - [32-bit → 4 Strobe signal bits]
- PREADY – Output signal (Status – Ready for transfer) [S → M]
- PRDATA – Output data (Read data bus) [S → M]
- PSLVERR – Optional signal – Error signal [S → M]
- PWAKEUP – Indicates any activity associated with APB interface by Input signal.

- PAUSER –
- PWUSER – } User Attribute signal.
- PBUSER –

- Transfer in APB Interface:

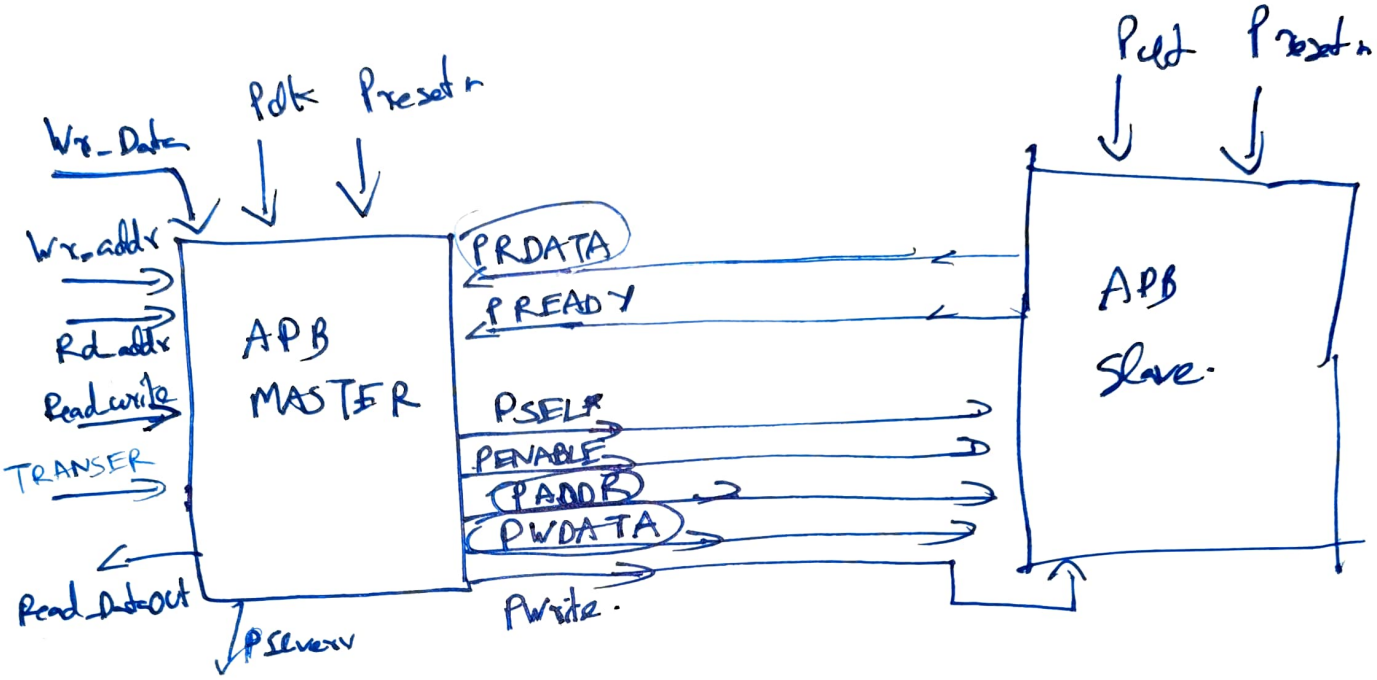


- For
  1) Check Read write
  2) Then the address
  3) From it, get the slave number.

- Write Transfer:
- Idle phase (PSel = 0)
- Setup phase (PSel = 1) ⇒ PADDR, PWRITE, PWDATA { Must be valid }
  - ↳ If PSEL is X or Z ⇒ PSLVERR = 1
- Access phase (PENABLE = 1, PREADY = 1)
  - ↓ Read for transfer of data from bridge to interface.

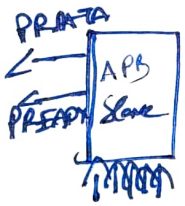
These values must remain the same during the transition from setup to Access phase.

- Write Transfer with WAIT State:
  - ↳ Same as the earlier phase.
  - ↳ Occurs when PENABLE = 1 & PREADY = 0 in the access phase, it waits till PREADY = 1, then the data is transferred.
- Read Transfer with No WAIT:
  - Same idle phase,
    - ↳ Setup phase → PSELECT = 1
      - ↳ PWRITE = 0 (Read transfer) [From APB to Bridge]
  - Access phase [PENABLE = 1, PREADY = 1, if not wait]
    - ↳ PRDATA will be the output

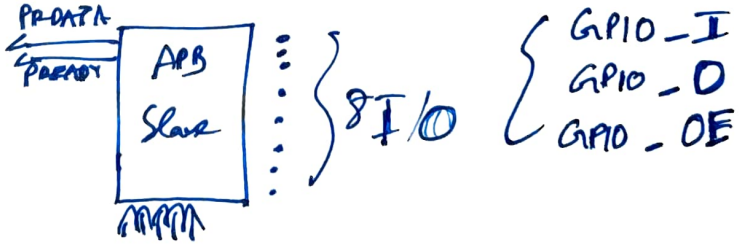


Slaves:

- Memory Unit



- GPIO Pins



- UART