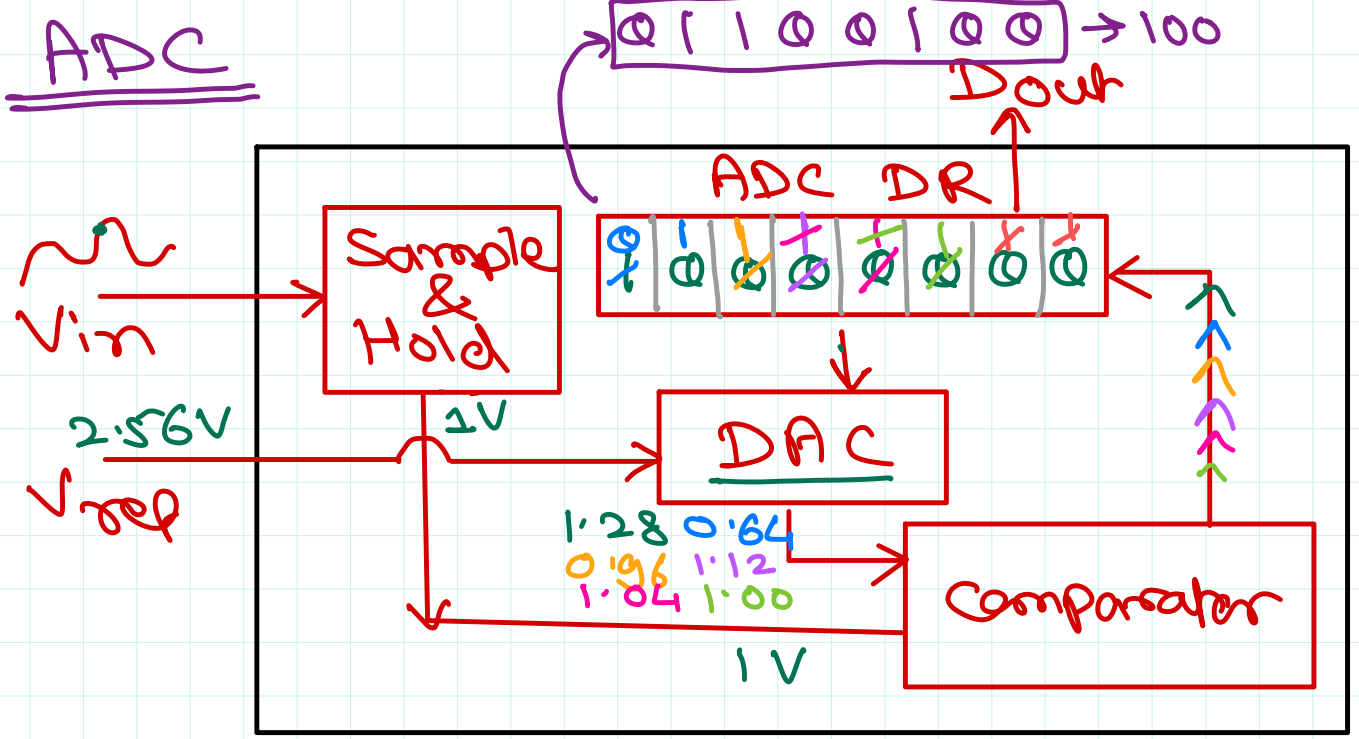
Advanced Micro-controllers - ARM

DESD @ Sunbeam Infotech

ADC



Successive Approx ADC

ADC resolution: n-bits.
e.g. 8-bit ADC.

Number of steps: 2^n
e.g. $2^8 = 256$

Reference voltage: Vref
external / internal voltage required for ADC conversion.
e.g. 2.56 V.

Step size: Smallest change in Vin (input analog voltage) which will cause o/p to change.

$$\text{Step size} = \frac{V_{ref}}{\text{Step cnt}}$$

e.g. $\frac{2.56}{28} = 0.01V = 10mV.$

Digital Output formula:

$$D_{out} = \frac{V_{in}}{V_{ref}} \times 2^n$$

e.g. Vin = 1V

$$= \frac{1}{2.56} \times 256$$

$$= 100$$

Num of cycles (ADC clock) = min num of bit + 1
e.g. 9-11 cycle.

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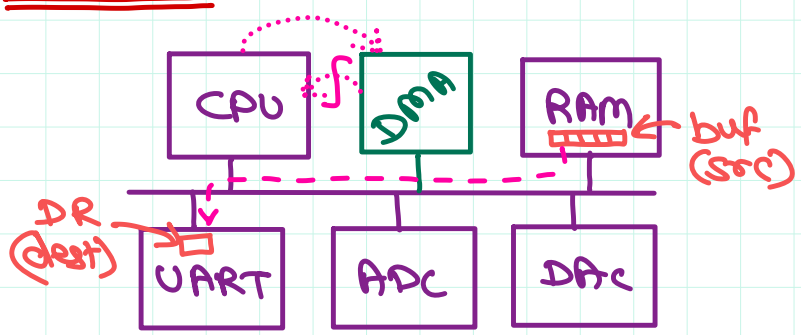
DMA



UART Tx - DMA

① Init: CPU will init DMA Controller.
   ⓐ source addr ⓑ dest addr ⓒ size
   ⓓ enable DMA & its intr.
② DMA will now transfer data from src to dest without intervention of CPU.
③ when transfer completes, DMA controller inform to CPU via interrupt.

UART Tx Polling

① CPU get first char from RAM buffer (buffer → data to tx).
② CPU write it to UART DR.
③ CPU will wait for data tx.
④ repeat steps 1-3 for next char.

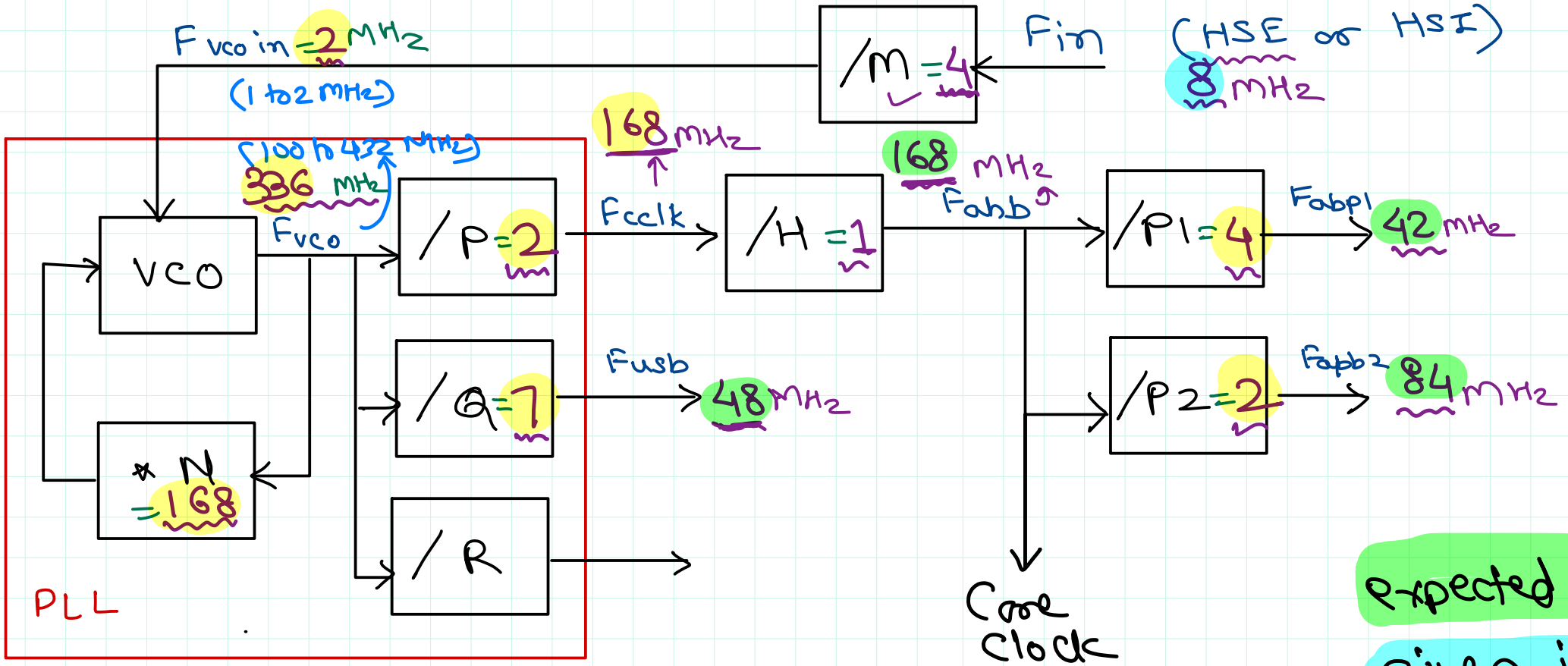
UART Tx Interrupt

① Init: UART will generate intr after Tx of each byte.
② CPU will execute intr handler.
   ⓐ get next char from RAM buffer
   ⓑ write it to UART DR.
③ when CPU not executing intr handler, it can be used for some other task

DMA transfers

① M2M → Memory to Memory (buffer copy).
② P2M → Peripheral to Memory (e.g. UART Rx, ADC, ...)
③ M2P → Memory to Peripheral (e.g. UART Tx, DAC, ...)

STM32 PLL 168 MHz Config



expected output

given input

Thank You!

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