ECE 2700 Final Project

2x2 Matrix Multiplier

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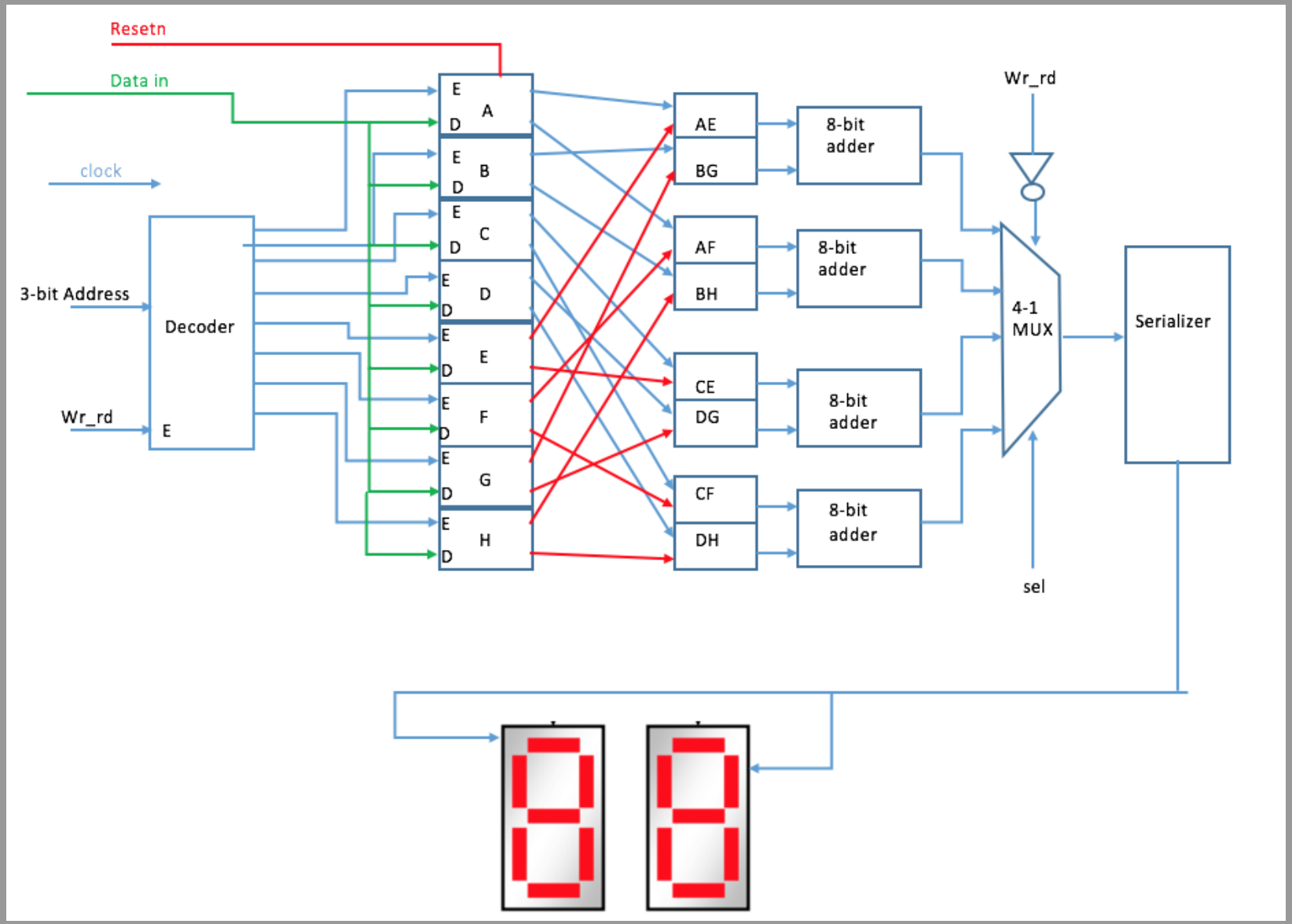
Introduction

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \times \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE+BG & AF+BH \\ CE+DG & CF+DH \end{pmatrix}$$

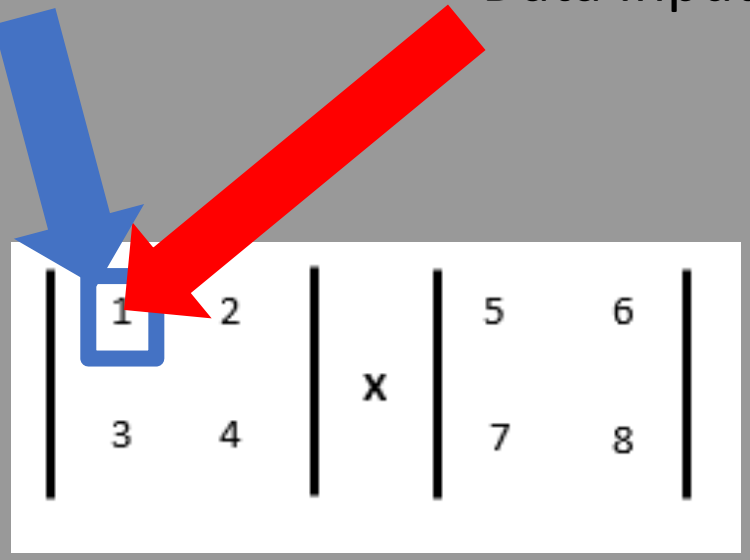
Matrix Multiplier Block Diagram

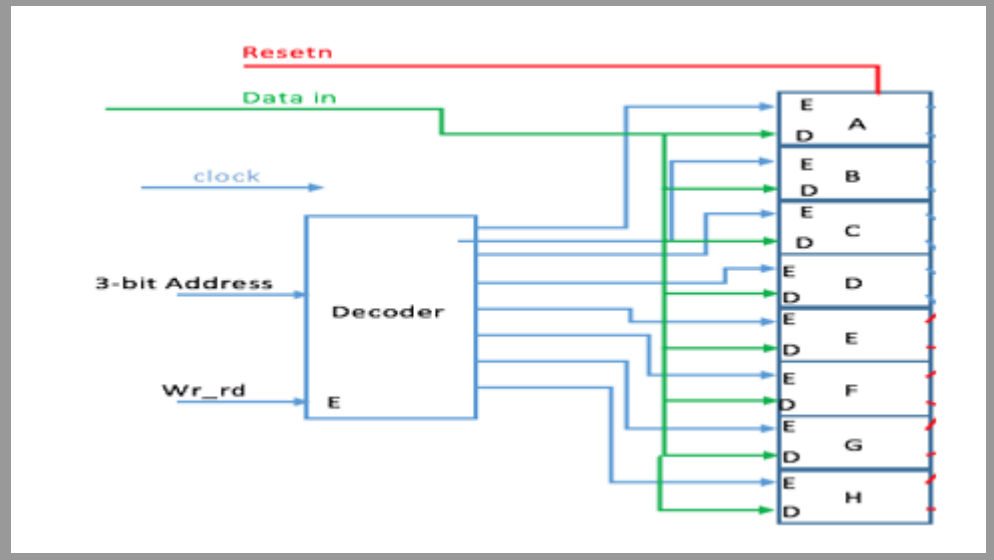


Inputting the values

Address position

Data Input Value





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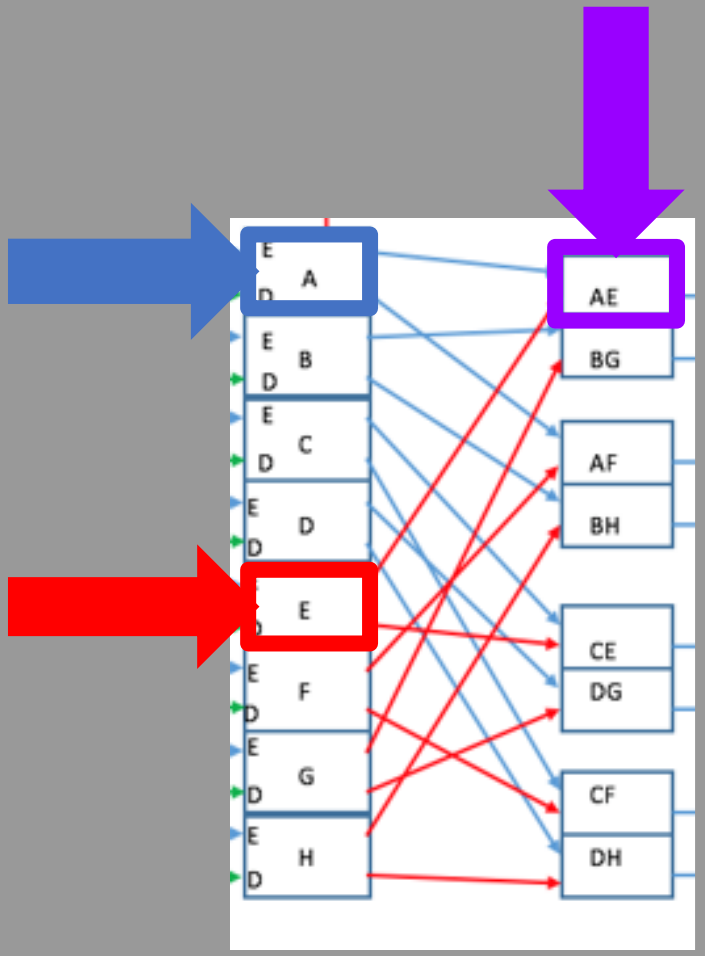
Multiplying the inputs

$$\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} \times \begin{vmatrix} 5 & 6 \\ 7 & 8 \end{vmatrix}$$

Address value 000
with a Data input 1

Address value 100
with a Data input 5



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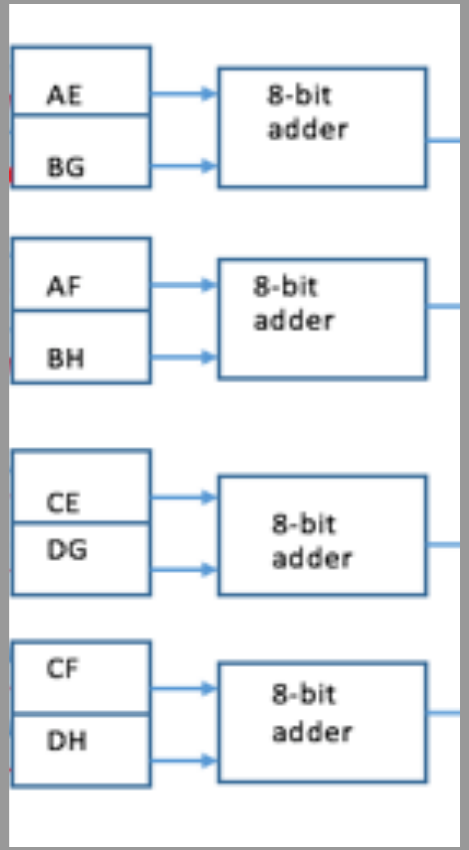
Getting the solutions for the Matrices

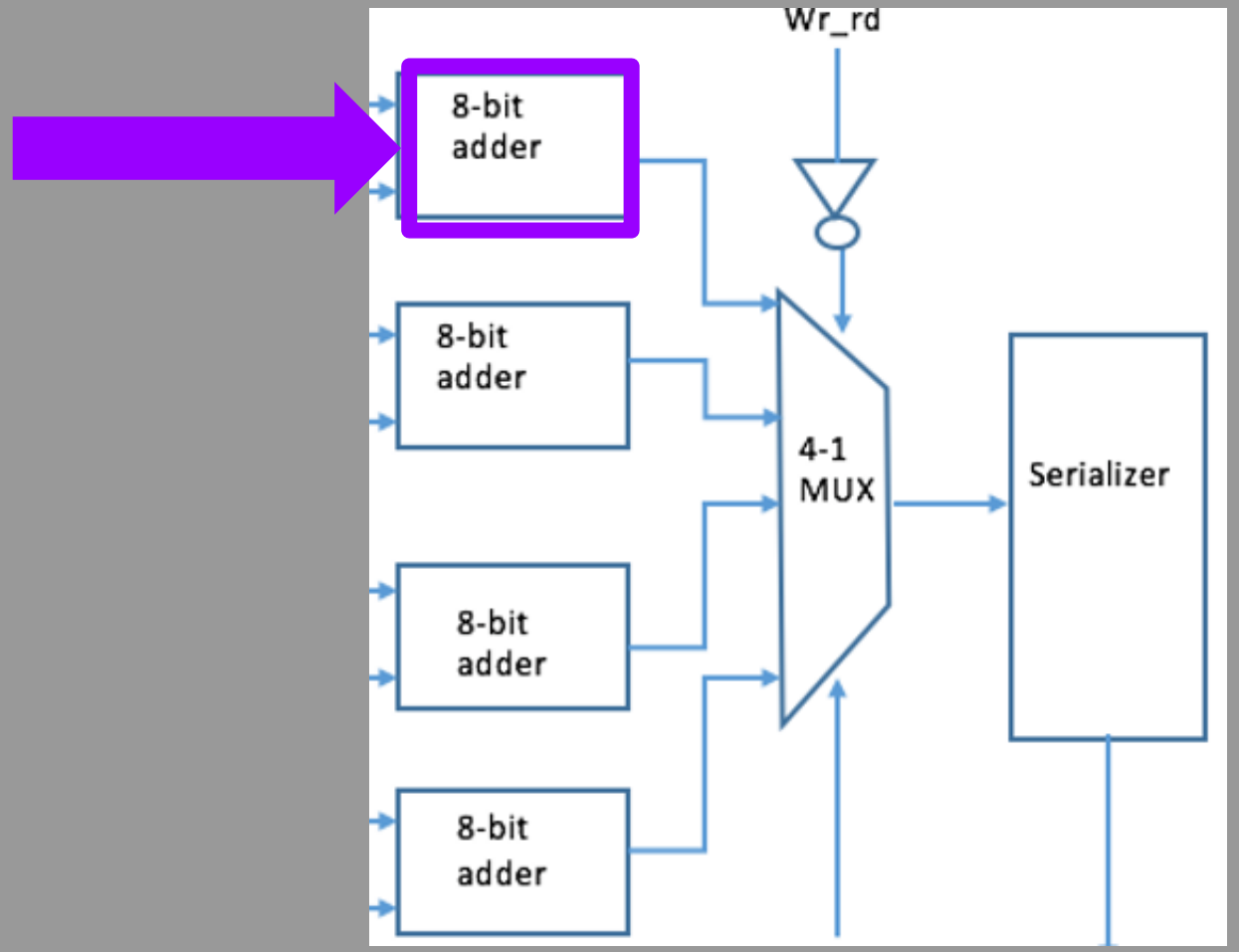
$$= \begin{vmatrix} 1x5 + 2x7 & 1x6 + 2x8 \\ 3x5 + 4x7 & 3x6 + 4x8 \end{vmatrix}$$

$$= \begin{vmatrix} 19 & 22 \\ 43 & 50 \end{vmatrix}$$

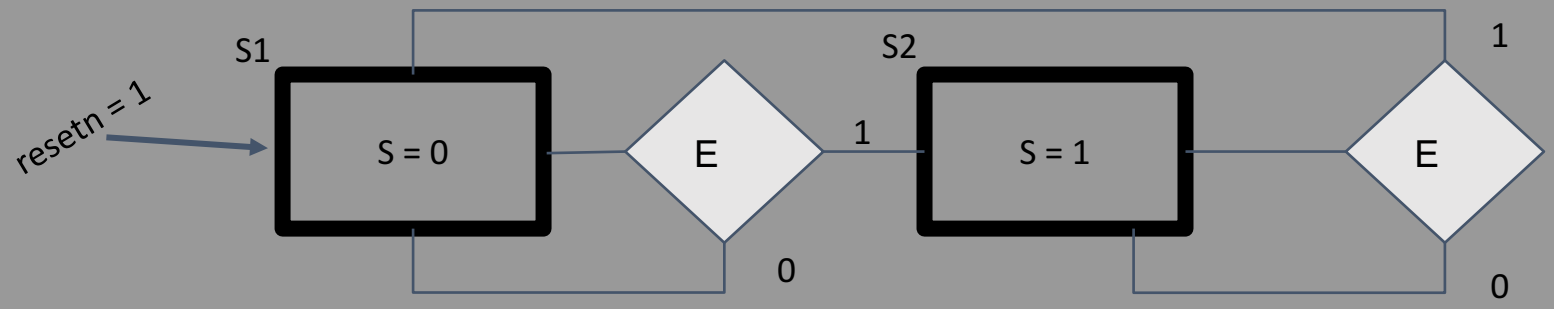
$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \times \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE+BG & AF+BH \\ CE+DG & CF+DH \end{pmatrix}$$



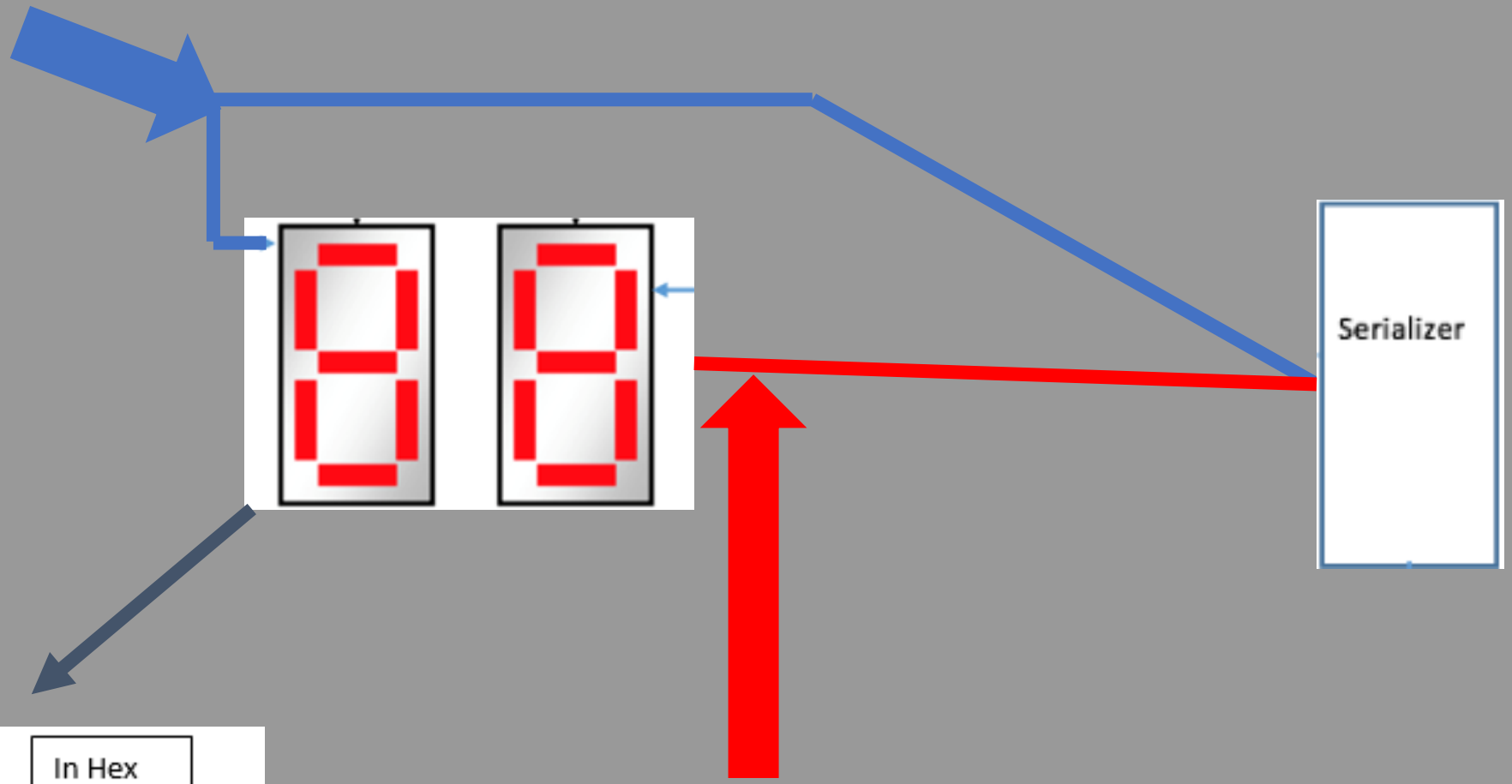
Address value “00” with a Data input of the 1st 8-bit adder is then sent to the serializer



FSM diagram



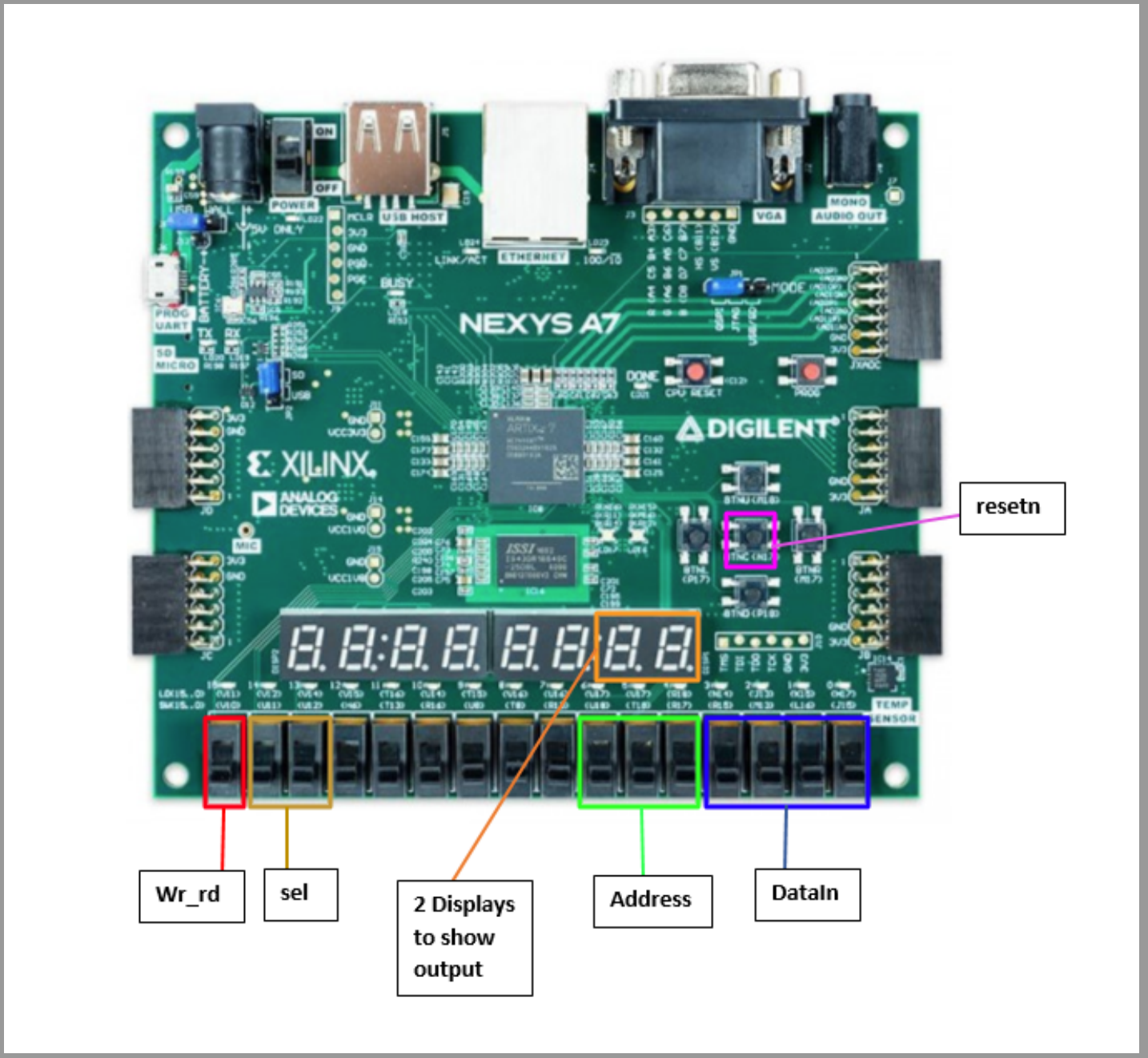
4 bit address being sent (XXXX, ----)



4 bit address being sent (----,XXXX)

					In Hex	
=	19	22	=	13	16
	43	50		2b	32

Layout of the Nexys a7-50t board



Time to Demonstrate