

NIOS Character Intro

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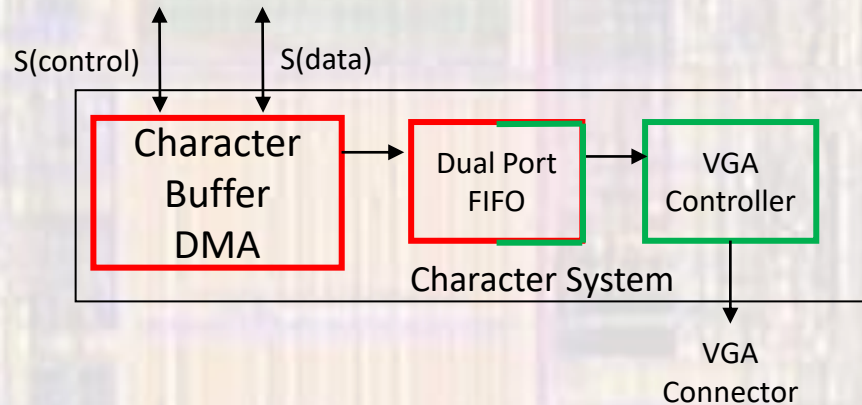
NIOS II Character Display - Intro

These slides describe the Character Buffer IP

Upon completion: You should be able to describe
and use the Character Buffer IP

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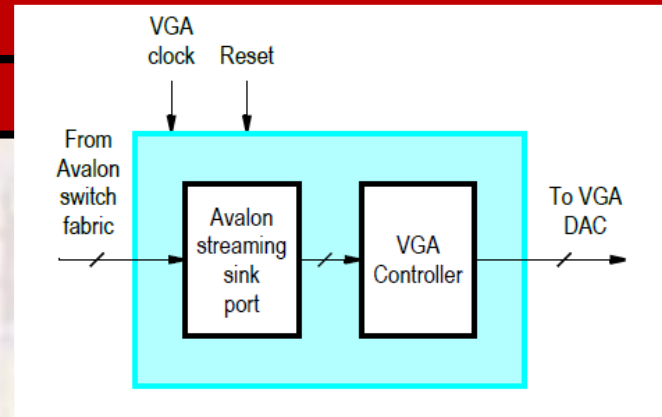
- Character Buffer System
 - Display characters (letters) on a VGA display



NIOS II Character Display -

- VGA Controller Block

- Receives VGA data to be displayed
- Adds the required VGA timing signals
- Transmits the new data to the VGA block (DAC) on the DE10 Lite board
- Supports various screen resolutions from VGA 640×480 pixels to WSXGA 1680x1050, including HDTV 1280x720
 - Note - different resolutions require different clock frequencies
- Input: Requires 3 planes (RGB) of 10bits each
 - Note – The DE10 DAC outputs 4 bit data
 - It's not clear how the 10bit to 4bit conversion is mapped



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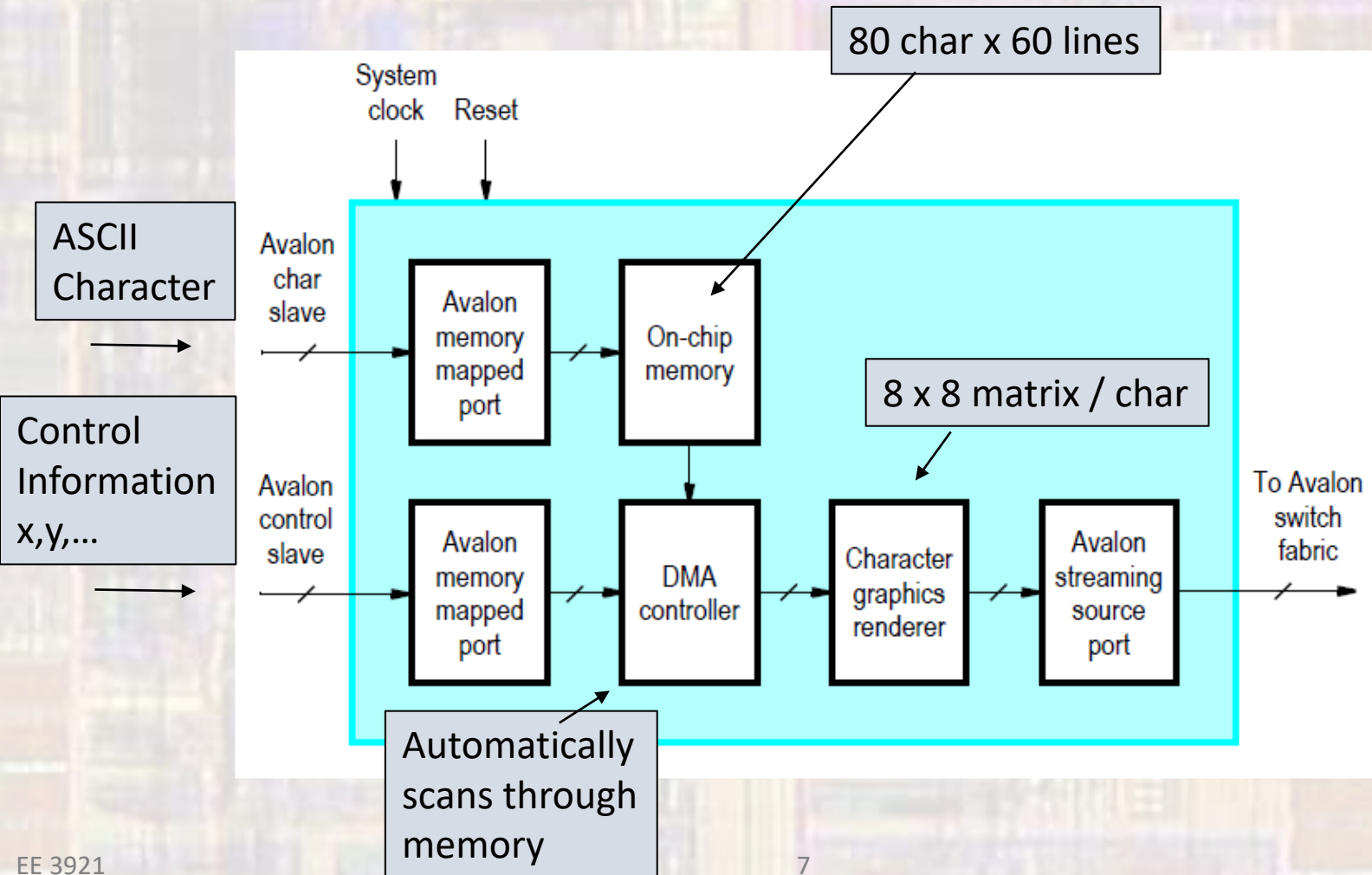
- Character Buffer Block
 - Converts ASCII character code to a graphical representation suitable for use with a VGA display
 - Processor (code) sends ASCII character codes to the Character Buffer block
 - The block stores the characters in its on-chip memory
 - A DMA controller reads the ASCII characters from the on-chip memory and sends them to the character renderer
 - The renderer converts the ASCII characters to their graphical representation and sends them out

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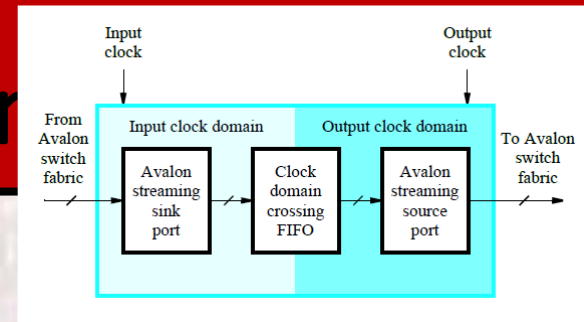
- Character Buffer Block
 - Supports 80 characters x 60 lines
 - Standard VGA
 - Size of internal memory
 - Outputs only 1 color (white)
 - Uses 10bits/color, 3 color planes in normal mode (still only white)
 - Uses 10bits/color, 4 color planes in transparent mode for use with the pixel buffer (still only white)
 - Separate control and ASCII data inputs

NIOS II Character Display - Intro

- Character Buffer Block



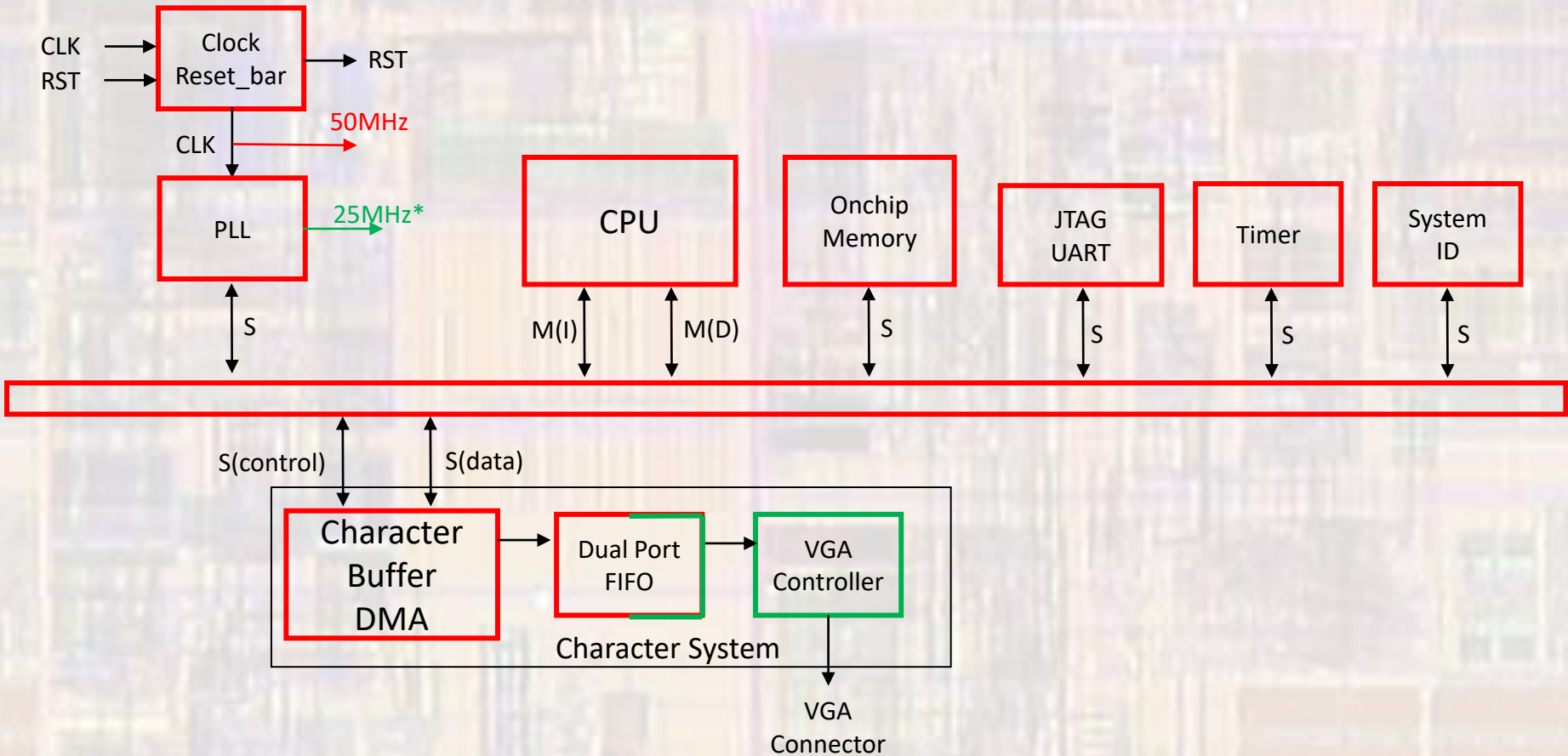
NIOS II Character Display - In



- Dual Clock FIFO
 - Transfers data across two different clock domains
 - Output clock is set by the output resolution
 - VGA 640x480 clock is 25MHz
 - Input clock is determined by system design requirements
 - We will typically use 50MHz
 - Data format is programmable
 - Symbol: a complete piece of data
 - Beat: a unit of transmission – one complete set of data
 - The VGA driver requires:
 - 10bits/color 3 colors per pixel location
 -
 - 10bit symbols 3 symbols / beat

NIOS II Character Display - Intro

- Character Buffer Block Diagram



25MHz** - VGA clk