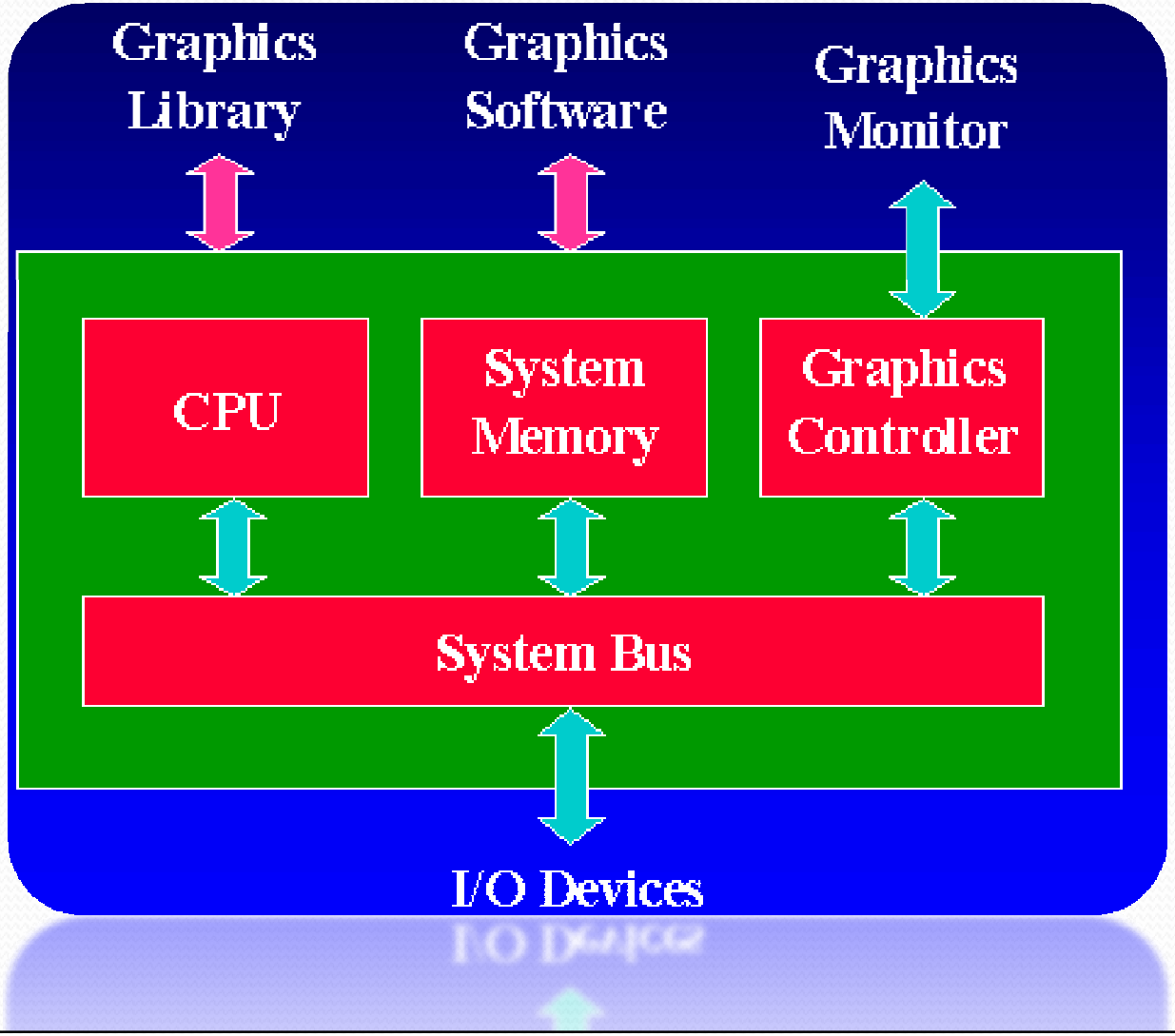
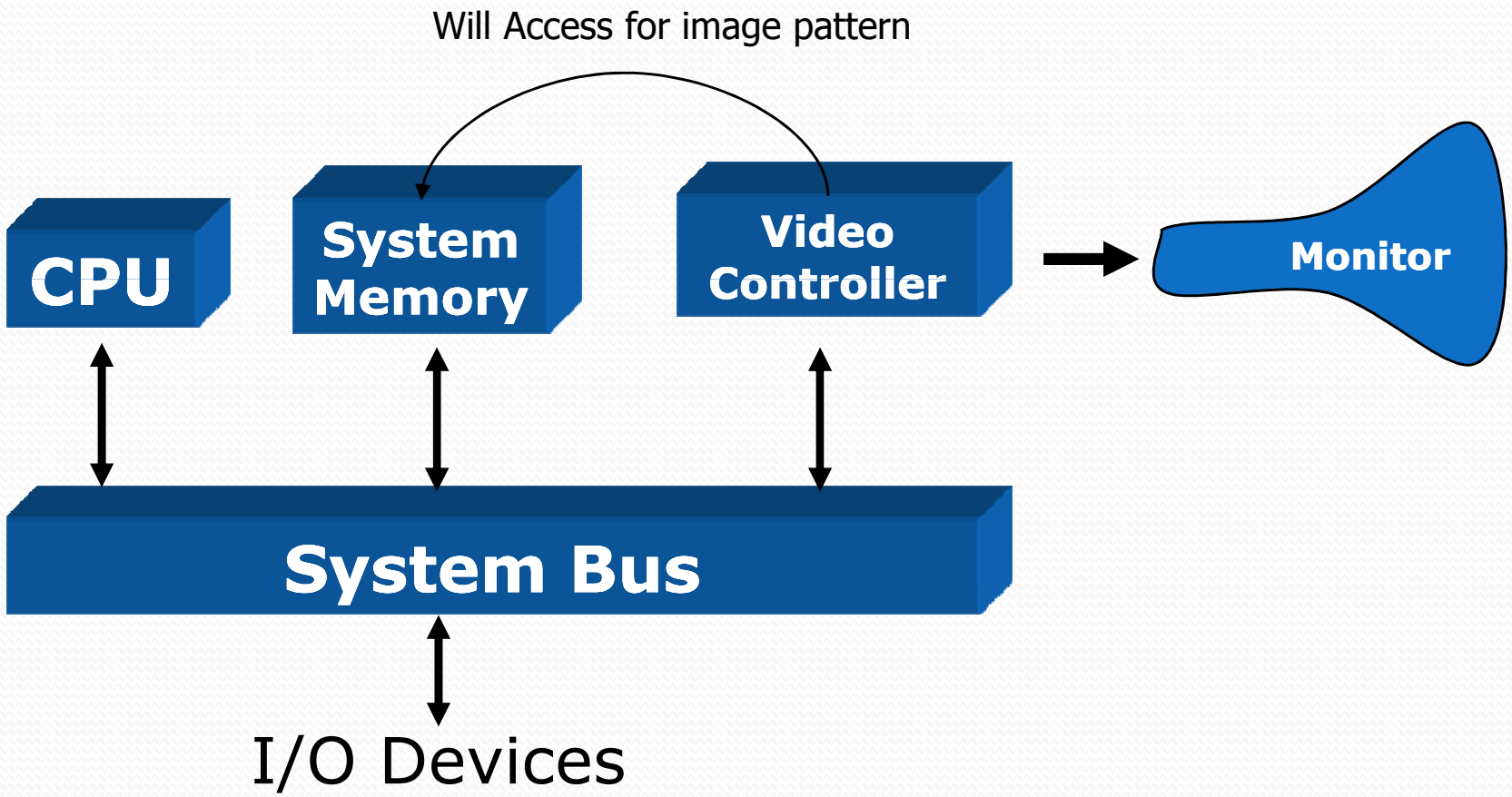
Overview of graphics system

Basic Graphics System

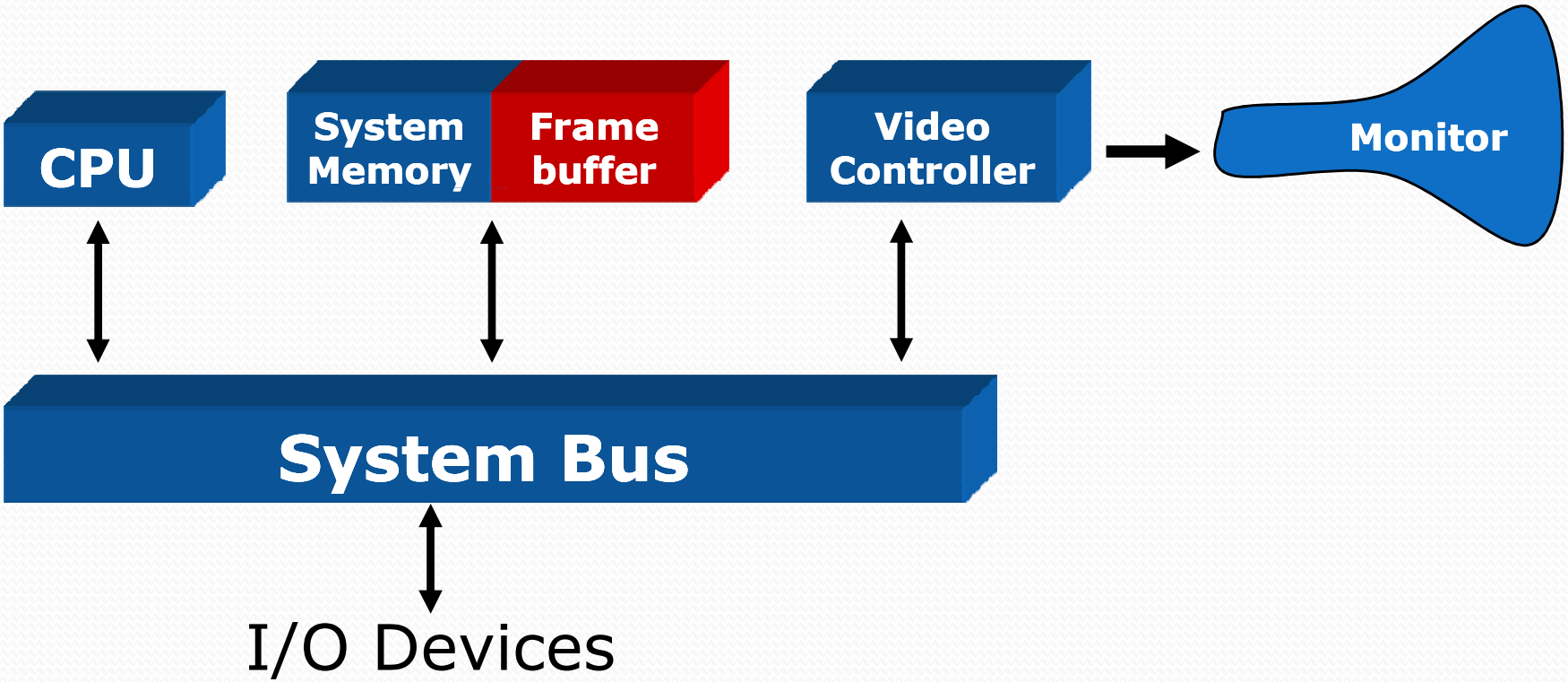


Raster-Scan Systems



Architecture Of Simple Raster System

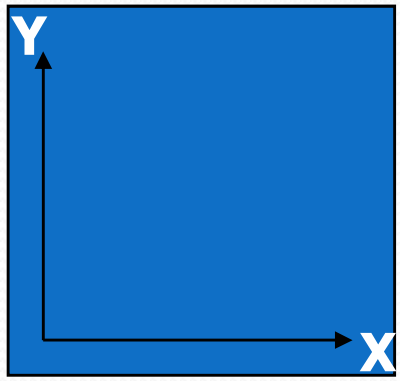
Raster-Scan Systems



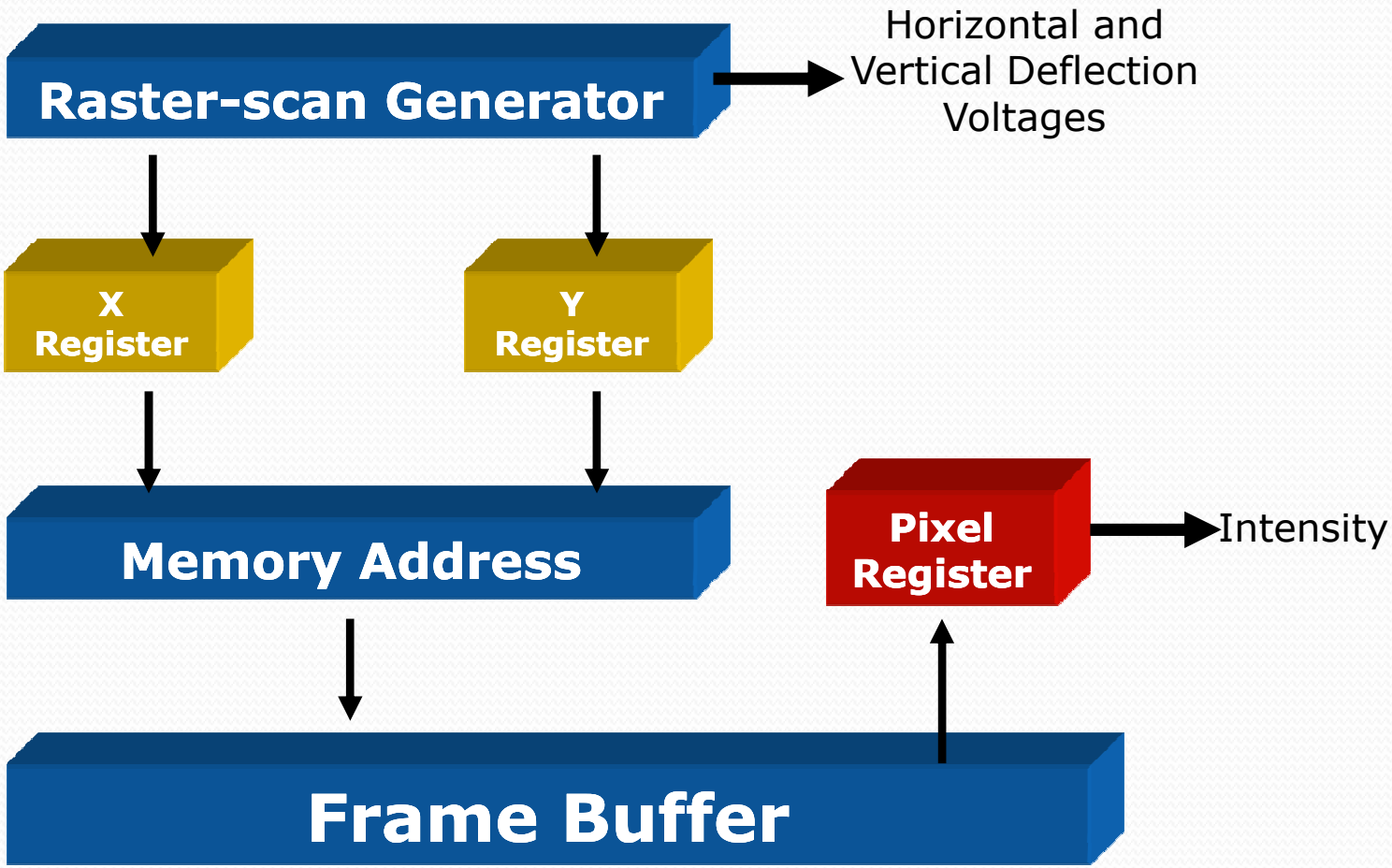
Architecture Of Raster System with fixed portion of the system memory reserved for frame buffer

Video Controller

- **Coordinate system**
  - Frame-buffer locations are referenced in Cartesian coordinates.
  - Coordinate origin
    - Lower left screen corner
    - Upper left screen corner
- **Refresh operations of video controller**
  - Top-to-bottom, left-to right
  - x register (initial value = 0)
  - y register (initial value = ymax)



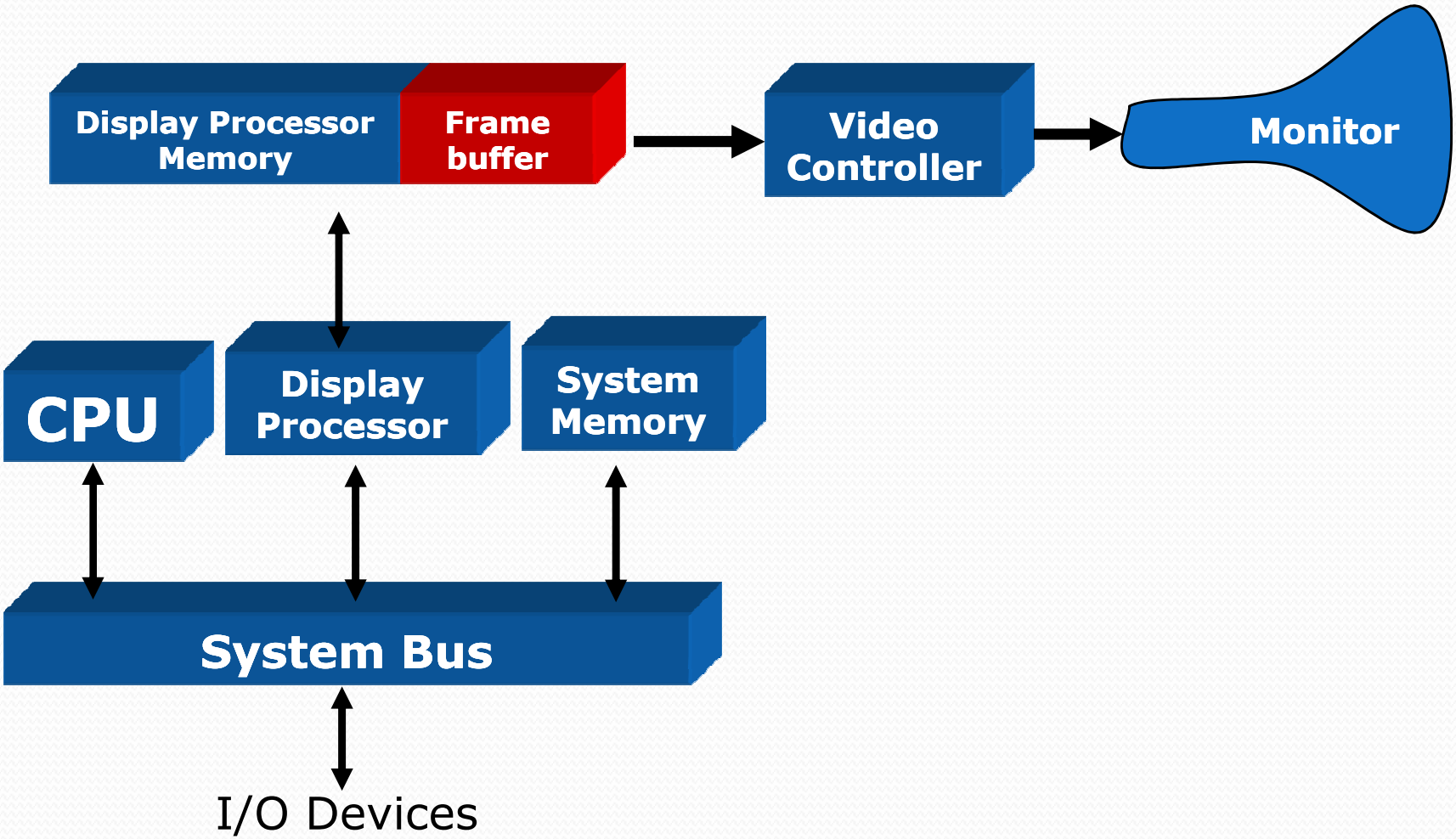
Video Controller



Raster-Scan Display Processor

- **Display processor (graphics controller, display coprocessor)**
  - To free the CPU from the graphics chores
  - Digitize a picture definition into a set of pixel-intensity values
- **Scan conversion: The digitization process is called.**
  - Straight-line segments (locate closest path to line)
  - Curved lines and polygon outlines
  - Characters

Raster-Scan Display Processor



Raster-Scan Display Processor

- **Display processor functions**
  - Generating various line styles
  - Displaying color areas
  - Performing certain transformations
  - Manipulations on display objects
- **Run-length encoding**
  - Reduce memory requirements (if most part contains same color)
  - Organizing the frame buffer as a linked list
  - Store a scan line as a set of integer pairs
    - An intensity value
    - The number of adjacent pixels with the same intensity

Raster-Scan Display Processor

- E.g.

  WWWWWWWWWWWWBWWWWWWWWWWWWBBBWWWWWWW
  WWWWWWWWWWWWWWWWWWWWBWWWWWWWWWWWWW

  If we apply the run-length encoding (RLE) data compression algorithm to the above hypothetical scan line, we get the following:

- 12W1B12W3B24W1B14W Interpret this as twelve W's, one B, twelve W's, three B's, etc.

Random-Scan Systems