Computer Graphics
Raster Scan Display System

A. Simple Raster Display System

Single ported frame buffer
Passes video information over system bus
Simple and flexible
Problems with bus congestion
Raster Scan Display System

A. Simple Raster Display System

Dual ported frame buffer

Frame buffer in special, dual ported Video RAM
Fast, More expensive
Less flexible
Coordinate between memory accesses and sweeping the CRT beam with memory access: 200 ns RAM cycle time.

**Cycle time** is the time, usually measured in nanoseconds, between the start of one random access memory (RAM) access to the time when the next access can be started.

- Must fetch multiple pixels per access
- Can eat up a lot of memory bandwidth
- Can eat up a lot of main bus bandwidth
Video controller often uses a Look-up table to allow indirection of display values in frame buffer
Allows flexible use of colors without lots of frame-buffer memory
Allows change of display without remapping underlying data (double buffering)
A lookup table is an array that replaces runtime computation with a simpler array indexing operation.

The savings in terms of processing time can be significant, since retrieving a value from memory is often faster than undergoing an "expensive" computation or input/output operation.

The tables may be pre calculated and stored in static program storage, calculated (or "pre-fetched") as part of a program's initialization phase (memorization), or even stored in hardware in application-specific platforms.

Lookup tables are also used extensively to validate input values by matching against a list of valid (or invalid) items in an array and, in some programming languages, may include pointer functions (or offsets to labels) to process the matching input.
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B. Systems with Video Processor
Raster Scan Display System

B. Systems with Video Processor

![Diagram of Raster Scan Display System with components such as CPU, Display Processor, Peripheral Devices, System Bus, System Memory, Frame Buffer, Video Controller, and Monitor.]
Thank you