

CA3 EXERCISE

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Video Decoder (Without using any form of pre-emptive multitasking):

As per the main objective of CA3 exercise the video decoder has been designed without any pre-emptive multitasking. Considering the implementation of the system implemented in CA1, this exercise was challenging in implementation of proper buffering techniques to improve the output obtained in CA1.

Assumptions:

1. Decoding is done in a separate decoding circuit.
2. Processor is **not** capable of multiple threads.

Implementation Details:

In this video decoding system, **circular buffers** are used for better results without using pre-emption.

1. Two circular buffers has been implemented. One buffer is for buffering the packets that are coming in and the other buffer is for buffering the decoded frames before displaying.
2. For proper buffering into the 'Packet buffer', the system stores the correct packets of the same frame into a temporary buffer and then transfers them to the 'Packet Buffer'.
3. Once there are enough packets in the buffer for decoding, each packet is taken from the 'Packet Buffer' and decoded step wise.
4. At the step of 4 the decoded frame is buffered into the 'Frame Buffer'.
5. If there are enough frames to be displayed in the 'Frame Buffer', it is displayed simultaneously. This is the pre-buffer that has been implemented to store the frames initially before starting to display.
6. Initially if there are more than the required decoded frames to display in the 'Frame Buffer' the system starts displaying it from that point continually.
7. Buffer size for both the buffers is set to 1000. 'Packet Buffer' and 'Frame Buffer' are circular buffers with producer and consumer roles for each of them respectively.
8. Interval for displaying the frame is formulated and specified as 42ms for a good performance statistics.
9. An activity diagram is provided along with the report for easy understanding on the system.

Learning from the previous version of the system in CA1:

In the previous version, though with multithreading there was a few frame rate violations which is because of the unavailability of the pre-buffer before the display. So

in this version it has been rectified and a pre-buffer has been implemented in an effective way using circular buffering concept.

Because of the use of pre-buffering the frame rate violations has been consistently zero in majority runs with required average frame rate.

Note: This video decoding system is developed on an Ubuntu 12.04 LTS (Virtual Environment). The video is made to run for 30 seconds and terminates with the output stats. This video can be increased or decreased in the source code accordingly.

This system produces a required average frame rate and zero frame rate violation in majority runs in the test system (developer platform).

Activity Diagram is present below for better understanding of the system design.

ACTIVITY DIAGRAM:

