Dynamic memory re-allocation for swift mode changes
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Abstract
The aim of this assignment is to develop a generic buffer supporting swift mode changes by means of dynamic in-buffer memory management. Hence, apart from providing a regular functional interface for a buffer, such as functions supporting a FIFO or LIFO buffer, we want the buffer to provide additional interfaces allowing (i) in-buffer data-processing, (ii) an increase or decrease of the buffer-size and (iii) a re-location of the buffer in physical memory.

Description
Within SAN, we perform research in the area of reservation-based resource management for networked embedded real-time systems, amongst others. Although our long term objective is multi-resource management, we currently focus on single resources and specific combinations of single resources [1]. A current research topic addressed within the ITEA2 project CANTATA concerns swift mode changes [2] for memory constrained systems without a memory management unit that support Quality of Service (QoS). For QoS, we assume applications that can run in different modes, trading resources for quality, such as a (layered) MPEG-decoder and a video-scaler. The intended application domain is surveillance and the platform is a camera with µC/OS-II. We are currently defining a prototype to illustrate feasibility of our novel concepts. This assignment provides a contribution to that prototype.

The aim of this assignment is to develop a generic buffer that supports swift mode changes. In particular, it should be possible to re-allocate memory of an application dynamically, i.e. during its execution. The assignment involves the investigation, design and realization of a buffer with in-buffer memory management. Hence, apart from providing a regular functional interface for a buffer, such as functions supporting a FIFO or LIFO buffer, we want the buffer to provide additional interfaces allowing (i) in-buffer data-processing, e.g. to prepare a decrease in buffer-size, (ii) an increase or decrease of the buffer-size and (iii) a re-location of the buffer in physical memory. For an example application consisting of an MPEG-decoder and a scaler, it should be possible to delete enhancement layers or entire frames from the input-buffer and to reduce the window-size of frames in the output-buffer. The interface of the buffer should facilitate such manipulations without having the (semantic) knowledge of its contents.

This assignment should also result in a white-paper, which may be submitted to a workshop (such as OSPERT).

References

Further information
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