

# Experiment Flow2

## Data Flow Control

### Description

#### 15.7.1 Data Transfer with Flow Control

Task-to-task communication commonly involves data transfer. One task is a producer, and the other is a data consumer. Data processing takes time, and the consumer task might not be able to consume the data as fast as the producer can produce it. The producer can potentially overflow the communication channel if a higher priority task preempts the consumer task. Therefore, the consumer task might need to control the rate at which the producer task generates the data. This process is accomplished through a counting semaphore, as shown in Figure 15.17. In this case, the counting semaphore is a permission to produce data.

The data buffer in this design pattern is different from an RTOS-supplied message queue. Typically, a message queue has a built-in flow control mechanism. Assume that this message buffer is a custom data transfer mechanism that is not supplied by the RTOS.

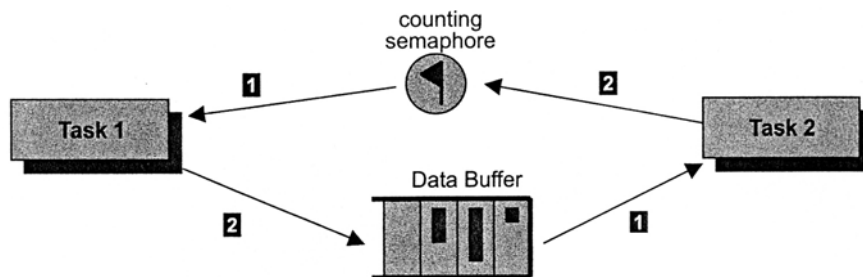


Figure 15.17 Using counting semaphores for flow control.

As shown in Figure 15.17, task #1 is the data producer, while task #2 is the consumer. Task #1 can introduce data into the buffer as long as the task can successfully acquire the counting semaphore. The counting semaphore may be initialized to a value less than the maximum allowable token value. Task #2 can increase the token value with the give operation and may decrease the token value by the take operation depending on how fast the task can consume data. Listing 15.2 shows the pseudo code for this design pattern.

#### Listing 15.2 Pseudo code for data transfer with flow control.

Acquire(Counting_Semaphore)	Consume data from MsgQueue
Produce data into msgQueue	Give(Counting_Semaphore)
<b>data producing task</b>	<b>data consuming task</b>

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## Experiment

Experiment 1. Repeat Experiment 3 (cosine.c) of Experiment TCP using data buffer instead of message queue. Use global variables of 4 bytes for data buffer. Devise flow control mechanism using semaphore.

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## Additional Information

Refer to VxWorks User's Manual and Reference Manual.

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