Application Note: AN10049

How to control port output data rates with timers

This application note is a short how-to on programming/using the xTIMEcomposer tools. It shows how to control port output data rates with timers.

Required tools and libraries

This application note is based on the following components:

- xTIMEcomposer Tools - Version 14.0.0

Required hardware

Programming how-tos are generally not specific to any particular hardware and can usually run on all XMOS devices. See the contents of the note for full details.

1 How to control port output data rates with timers

The rate at which data is output to a port can be controlled by using one of the xCORE's pool of timer resources. This example uses a timer to toggle the output of port `toggle_port` every 500ms.

```
#define DELAY 50000000 //(50,000,000 * 10ns = 0.5s)
unsigned state = 1, time;
timer t;
t :> time;

while(1) {
  // Output the value of variable 'state' to port 'toggle_port'
  toggle_port <: state;
  // Increment the variable 'time' by the value 'DELAY'
  time += DELAY;
  // Use the timer 't' to wait until this time delay is reached.
  t when timerafter(time) :> void;
  // Toggle the value of variable 'state' and repeat the process again.
  state = !state;
}
```

The ability to control output on a port can also be achieved using the ports time operator @. Note however that the ports time operator is 16-bit whereas the processor timer resource is 32-bit. See example "How to perform timed output on a port" for further information

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