ECGR 4101
5101
State Machines

App of the day
Sanitary Device
CDMA cell phone communications
1.024 seconds → phone listens
for a "page" from base station

Timer needs:
Clock Counter/"alarm clock setting"

Event counter:
24 MHz Clock \( \frac{PCLK}{8192} \)

New Frequency? \( \frac{24000\,000\,000\,Hz}{8192} = 2929.6875\,Hz \)

\[0.0003413\,\text{seconds} \]

\[100\,\mu\text{s} = \text{how many "ticks"} \]

\[\frac{0.100\,\text{seconds}}{0.0003413\,\text{seconds}} = 292,968.75\]

\[\frac{293\times}{2929.6875} = 0.1000106 \]

Running at \( \frac{PCLK}{8192} \) →

Count out 293 "ticks" to equal 0.100 seconds

Register 293

\[ \frac{242}{2} \]

Count down

How big is register?

Need 8 bits

Use 2 - eight bit
Timers
6 bits
16 bits

(4 available)
(2 available)
Work →
I want 1 ms →
PCLK?
Value in 16-bit register

\[
\frac{1}{24 \text{ MHz}} \times \frac{n \text{ (clock\,\,\,\,\,\,\,hertz) \times m \text{ (counts)}}}{1} = .001
\]

\[
m \times n = 0.001 \text{ sec} \times 24 \text{ MHz} = 24000.000
\]

\[
\begin{array}{c|c|c}
N & m & n \\
1 & 24000 & 12 \,000 \\
2 & 12000 & 3000 \\
4 & 6000 & 750 \\
8 & 3000 & 375 \\
64 & 375 & \end{array}
\]
Period = \frac{1}{f}

f = \frac{1}{\text{period}} = \frac{1}{500,000,000 \text{ seconds}} = 500 \text{ Hz}

PCLK = \frac{\text{PCLK}}{8}

TMRO.TCORA = 0x55; // Freq
TMRO.TCORB = 0x20; // Duty Cycle

TCORA = 0x55 = 85, m = 8
TCORB = 0x20 = 32, \quad m = 32

mn = 24000
m = 3000
\frac{85}{3000} = 28.3 \text{ ms}
\frac{32}{3000} = 10.6 \text{ ms}

10.6 \quad 17.7
\text{Cycle}

37.4\% \text{ duty}

Freq = \frac{1}{28.3 \text{ ms}} = 35.3 \text{ Hz}