HW
K-maps
project
UAKT

Non-overlapping clock

\[ \begin{align*}
\phi_1 & \quad \text{---}\quad \text{---} \\
\phi_2 & \quad \text{---}\quad \text{---} \\
\phi_3 & \quad \text{---}\quad \text{---} \\
\phi_4 & \quad \text{---}\quad \text{---} \\
\end{align*} \]

K-maps - minimal SOP & POS implementations of f(x)
on-set - all the "ones"
implicant - any circled part of the on-set \( n=0,1,2 \)
minisum is smallest, always \( 2^n \) element
prime implicant - can be covered by circly
essential prime implicant - contains 1 or more one
which and in no other prime implicant
minimal cover - all essentials, smallest prime

\[ f = \Sigma m(3, 4, 6, 7) \]

<table>
<thead>
<tr>
<th>ABC</th>
<th>000</th>
<th>001</th>
<th>010</th>
<th>011</th>
<th>100</th>
<th>101</th>
<th>110</th>
<th>111</th>
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</thead>
<tbody>
<tr>
<td>A</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

ABC is an implicant
AB is a prime implicant
BC is an essential prime implicant
\[ f = \Sigma m(7, 8, 12, 13, 15) \]

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>0</td>
<td>0</td>
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<tr>
<td>11</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

\[ c = \Sigma m(8, 10, 12, 14) \]

\[ 8 A B C D \quad A B D \quad A D \]

\[ 10 A B C D \quad A B D \quad A D \]

\[ 12 A B C D \quad A B D \quad A D \]

\[ 14 A B C D \quad A B D \quad A D \]

\[ f = \overline{B + D + \overline{A}C} \]

\[ \overline{f} = \overline{F} = \overline{A B D + B \overline{C} D} \]

\[ f = F = \overline{A B D + B \overline{C} D} \]

\[ = (A B D)(B \overline{C} D) = (A + \overline{B} + \overline{D})(\overline{B} + C + D) \]
Project MIPS system elements (Fig. 71, 8.28)

PC
Instruction mem
Mem
Data mem
Mem
I/O
I/O
Register interface to I/O

Lab 4 gets of UART

2 concepts
- async serial
- ready/valid

If ready & valid @ pace of CK, both sides know that transmission was successful.
Asynchronous - no clock
shared sense of time

RX side

Start bit

$\frac{1}{1.5} \to \frac{1}{1} \to \ldots \to \frac{1}{9}$

Start counting

$\frac{1}{2}$ symbol in 10 (9?)

$\approx 5\%$

Odd, even
mark space

Band rate = symbol rate

Bit rate $\frac{8}{10} \text{ baud rate}$

Max

Lab 4

MEM

FFFF0000

control

data

control

data

UART RX

UART TX

data

valid

ready

ready