Example of Scheduling and Allocation

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#define m1 ...
#define m2 ...
#define m3 ...
#define m4 ...

main()
{
  float t, i1, o1, d1=0.0, d2=0.0;
  while (1) {
    in(i1);
    t = i1 + m3*d2 + m1*d1;
    o1 = t + m4*d2 + m2*d1;
    d2 = d1; d1 = t;
    out(o1);
  }
}

Specification in C
Original dataflow graph
ASAP (4)
ALAP (4)
1 Adder, 1 multiplier (6)
1 Adder, 1 multiplier (6)

C1, C2 moved down
1 Adder, 1 multiplier (4) loop pipeline
9 Registers included
<table>
<thead>
<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>V2</td>
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Lifetimes of registers
Lifetime compatibility graph
(+ x := is source of data)
Clique partitioning
Corresponding non-optimised data path

Numbers are time steps

Numbers are time steps
Multiplexers optimised by commutative property
Size of multiplexers reduced

1,3 2,4 1,2 2,3 4
1,2 3 4
1,4 2,3

M1  M2  M3  M4
Controller-1

- All six registers have an enable input, \textit{ena}:
  $Rx.\text{ena}$
- M1 and M4 have 1 control input, $s$:
  $Mx.s$
- M2 and M3 have 2 control inputs, $s1$ and $s0$:
  $Mx.s1$ and $Mx.s0$
- Controller has four states:
  State1, State2, State3, State4
Controller-2

<table>
<thead>
<tr>
<th>State</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
<th>R6</th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
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</tbody>
</table>

R1.ena = M1.s = M3.s0 = State2 + State4
R2.ena = R3.ena = State1 + State3
R4.ena = R5.ena = State2
R6.ena = M2.s1 = State4
M2.s0 = M4.s = State2 + State3
M3.s1 = State3 + State4