Design representations

Control/Data-Flow Models

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Elevator Example Revisited

- FSM grows with the number of floors.
- No possibility to specify computations.
- ...

FSMD Example

- simple extension to add data computations to FSM

\[
\text{S}_1 \quad \text{S}_2 \quad \text{S}_3 \quad \text{S}_4 \quad \text{S}_5 \quad \text{S}_6
\]
\[
\text{C}_1 \quad \text{¬C}_1
\]

Control/Data-Flow Graphs

If \( \text{diff} > 0 \) then
\[
y := y + 1;
\text{diff} := \text{diff} - \text{end}_x;
\]
else
\[
x := x + 1;
\text{diff} := \text{diff} + \text{end}_y;
\end{if}

Problems with CDFG

- Represents explicitly control structures of the program.
- No good semantics which can be used to build new control structures (message send/receive, wait, etc.).
- Each new construct need to be defined to be able to use it in the representation.

Extended Timed Petri Nets (ETPN)

Design Representation

References:
ETPN Example

PROGRAM ETPN;
  VAR
    Acc, B, C, Max, N: integer;
    Ip1, Ip2, Ip3, Op1, Op2: port of integer;
  BEGIN
    COBEGIN
      Read(Ip1, N);
      Acc := 0;
      Max := 0;
    COEND;
    REPEAT
      COBEGIN
        N := N - 1;
        BEGIN
          COBEGIN
            Read(Ip2, B);
            Read(Ip3, C);
          COEND;
          Acc := Acc + B * C;
          IF B > Max THEN Max := B;
        COEND;
      END
    UNTIL N <= 0;
    COBEGIN
      Write(Op1, Max);
      Write(Op2, Acc);
    COEND;
  END.

Hierarchical Conditional Dependency Graphs

The jian be n ch mark a n d its HCD G.