Satisfiability Example

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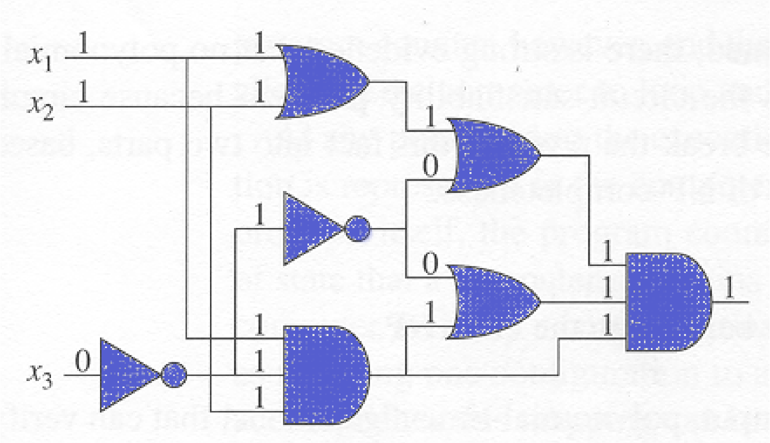
Configuration



This logical formula $y = f(x_1, x_2, x_3)$ is **satisfied** by input values such as (TRUE,TRUE,FALSE) which produce a result of TRUE.

Model Problem

Our model formula uses 31 clauses in 23 variables, and begins:

$$y = (x_1 \vee x_2) \wedge (-x_2 \vee -x_4) \wedge (x_3 \vee x_4) \wedge \ldots$$

There are 2^{23} different choices for the X values.
Just 15 of these choices result in a value of TRUE.

Finding all such inputs is the **satisfiability problem**.

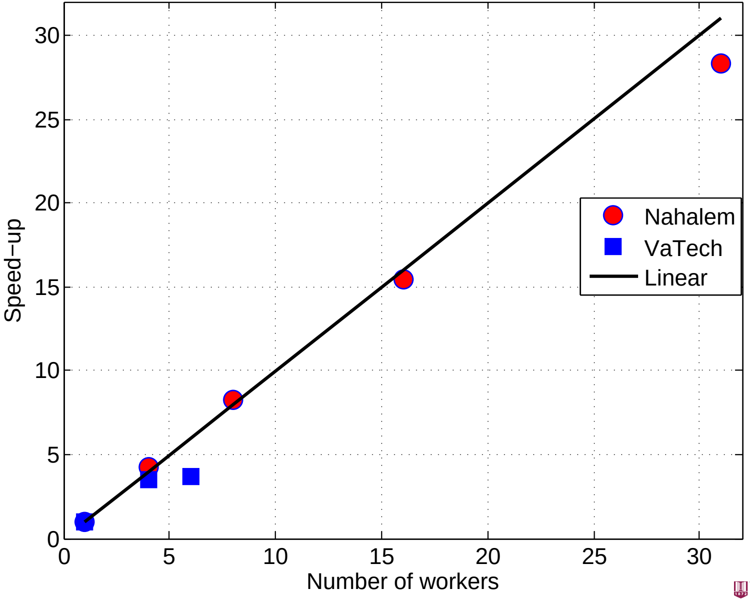
Our solution method is an exhaustive search:
generate and test every possible input.

If multiple workers are available, they can search in parallel.

Code Fragment

```
n = 23;
solution_num = 0;

parfor i = 0 : 2^n - 1

  % Binary value of I yields logical input X;
  x = i4_to_bvec ( i, n );

  value = circuit_value ( n, x );

  if ( value == 1 )
    solution_num = solution_num + 1;
    print_bvec ( x );
  end

end
```

Timing Results: Intel Nehalem



References

Report:

- Burkardt, Cliff, Snow,
  MATLAB Parallel Programming:
  Some Timing Results on an Intel Nehalem Cluster,
  http://people.sc.fsu.edu/∼burkardt/pdf/nehalem_matlab.pdf.

Source code:

- http://people.sc.fsu.edu/∼burkardt/m_src/
  md_parallel/md_parallel.html
- http://people.sc.fsu.edu/∼burkardt/m_src/
  satisfiability_parallel/satisfiability_parallel.html.