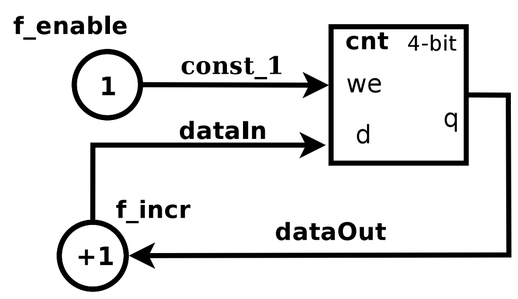
An Interactive Simulator for Data-flow graphs

*A **support tool** for s of microprocessor designs.*
*To **decrease time** and **increase quality** of the verification process.*

Input Data-flow Graph

- New input languages can be added



An example of 4-bit counter model.

Internal Simulation Model

- Representation of the input graph
- Basic elements:
  - **Storages** (register or memory)
  - **Functional circuits**
  - **Signals**
- Easy to observe and manage
- Independent of input language

Simulation Core

- An **efficient simulation algorithm**
- Unecessary evaluations are **eliminated**
- Can be controlled **interactively**
- Independent of data presentation
- New output interfaces can be added
  - Each can satisfy specific needs

Simulation Output Presentation

```
$scope module signals $end
$var wire 1 const_1 const_1 $end
$var wire 4 dataOut dataOut $end
$var wire 4 dataIn dataIn $end
$upscope  $end
$scope module registers $end
$var reg 4 cnt cnt $end
$upscope  $end
$enddefinitions  $end
```

```
#0
b0000 cnt
b1 const_1
b0000 dataOut
b0001 dataIn
#1
b0001 cnt
b0001 dataOut
b0010 dataIn
```

Value Change Dump (VCD) format

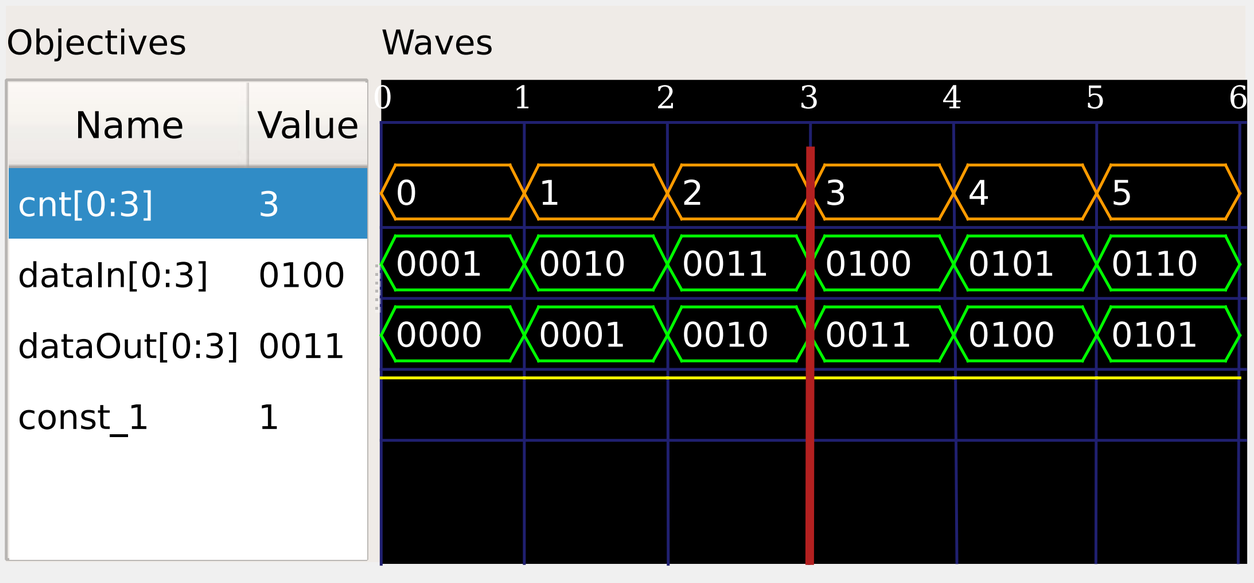
Textual Output Interface

- Provides direct simulation results in VCD format
- Does not provide interactive tools
- Results can be visualized/analysed by other tools
- Gives a user a simple command-line usage

Interactive Textual Output Interface

- Also purely textual output interface
- Provides console to enter commands
- Commands can:
  - **control simulation** process
  - **modify/observe state** of a simulated model
- Commands written to a file can be executed repeatedly
- Designed to allow **execution of automated tests** (scripts)

```
>>> init counter.init /* initialize from a file */
>>> step /* perform single simulation step */
>>> dumpreg cnt bin /* Get binary value of register cnt */
0b0000
>>> step
>>> dumpreg cnt bin
0b0001
>>> run 5 /* perform five simulation steps */
>>> dumpreg cnt dec
6
>>> setreg cnt 10 /* Set value of register cnt to 10 */
>>> dumpreg cnt dec
10
```



Interactive Graphical Interface

- **Visualizes** simulation results and progress
- Helps with **understand** of model's behavior
- Forms robust graphical interface
- Provides the **interactive console**

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