Deeds:

E-Learning Environment for Digital Design

Deeds is the acronym of

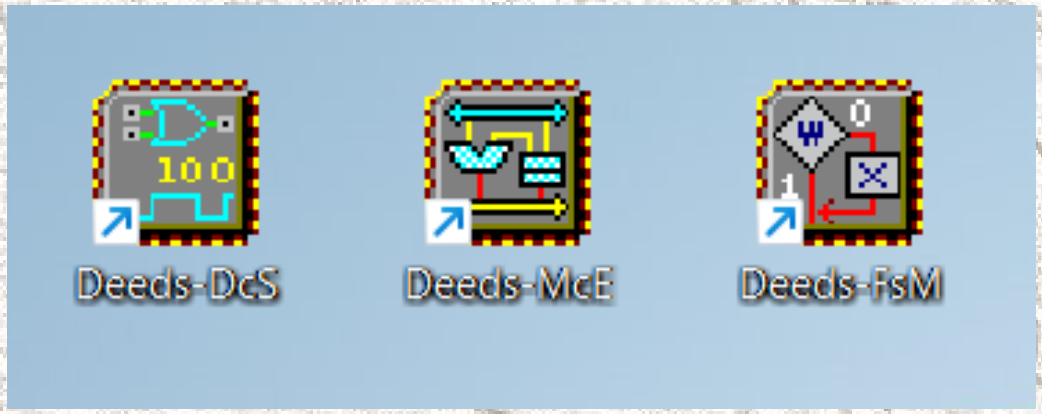
Digital Electronics Education and Design Suite

What is *Deeds*?

- ***Deeds*** is a set of educational tools for Digital Electronics, characterised by a "learn-by-doing" approach.
- ***Deeds*** covers the following areas:
  - combinational and sequential logic
  - finite state machines
  - microcomputers

What is *Deeds*?

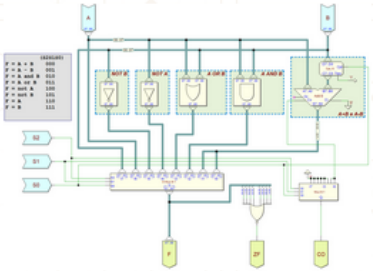
- ***Deeds*** includes three design tools:
  - **Deeds-DcS** (Digital Circuit Simulator)
  - **Deeds-FsM** (Finite State Machine Simulator)
  - **Deeds-McE** (Micro Computer Emulator)



What is ***Deeds***?

- ***Deeds*** tools are available to the community of Digital Design teachers and students.
- ***Deeds*** learning materials can be shared within the community.
- ***Deeds*** website ……..

Deeds website



- Home
- Deeds Simulator
- Downloads
- Version Notes
- Learning Materials
- Discussion Group
- Books & Digital Contents

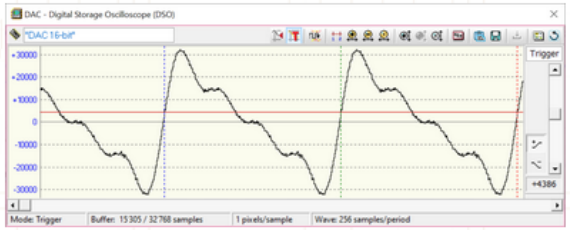
Welcome to Digital Electronics Deeds

(by Giuliano Donzellini)

In this web site you'll find ***digital circuits***, ***ideas***, ***projects***, ***tools for simulation*** and ***testing on FPGA***, and more. A complete learning path to understanding and designing digital systems, supported step-by-step by Deeds simulator. We tried to do our best but... is up to you to judge if our *"deeds"* (literal meaning of the word!) are good or bad...

News

New Deeds version published (2.50.200)



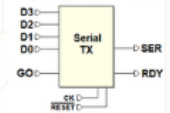
The new version introduces the *Digital Storage Oscilloscope (DSO)* (associated with the virtual DAC component) and the new *Attenuator components*... *(read more)*

Introduction to Microprocessor-based Systems Design

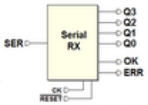
Ideas & Projects

Synchronous Serial Transmitter (4 bits)

In this example, we'll design a simplified 4-bits synchronous serial transmitter... *(read more)*



Synchronous Serial Receiver (4 bits)



Let's design a 4-bits synchronous serial receiver. The unit will receive serial sequences on... *(read more)*

Synchronous Serial Communication System (4 bits)

In this example, starting from the

What *Deeds* includes? (1)

- The Main Program and the Official Deeds website, to navigate among lessons, exercises and laboratory assignements
- A Digital Circuit Simulator, that includes:
  - A schematic Editor
  - An interactive circuit Animator
  - An interactive Timing Simulator

What ***Deeds*** includes? (2)

- A Finite State Machine designer
- A Microcomputer Board Emulator (include a *code editor*, an *assembler* and an *interactive debugger*)
- A Student Report Builder

Interaction among the tools

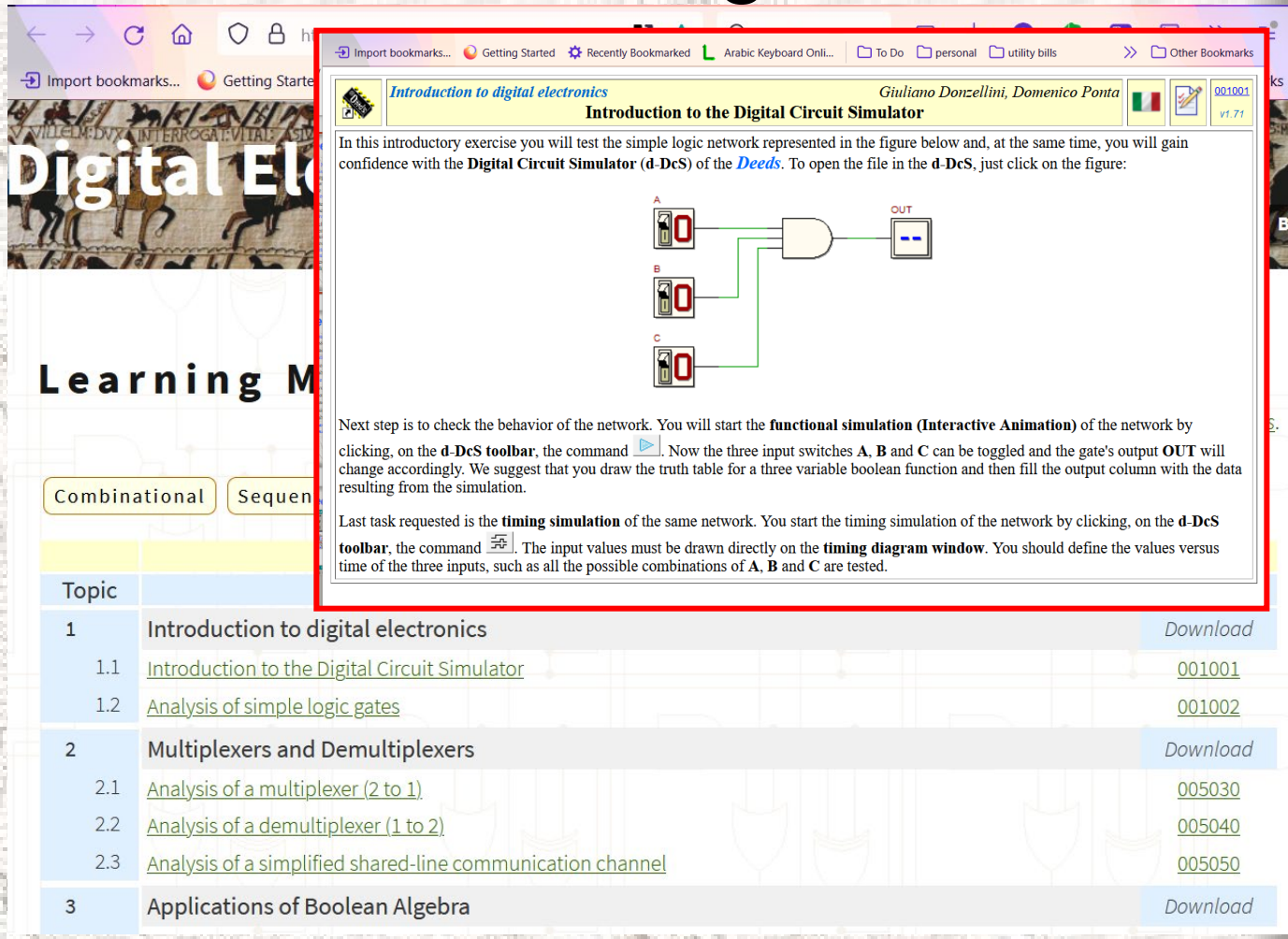
- The Main Program and the Official Deeds website can launch the other tools
- The web browsers interact with editors and simulators, providing a true interaction between internet content and experiments
- Simulators interact with each other

Deeds as Learning Environment

- A collection of tools and text material that help students acquiring:
  - Theoretical foundations of the subject
  - Analysis capabilities
  - Ability to solve problems
  - Practical synthesis and design skills

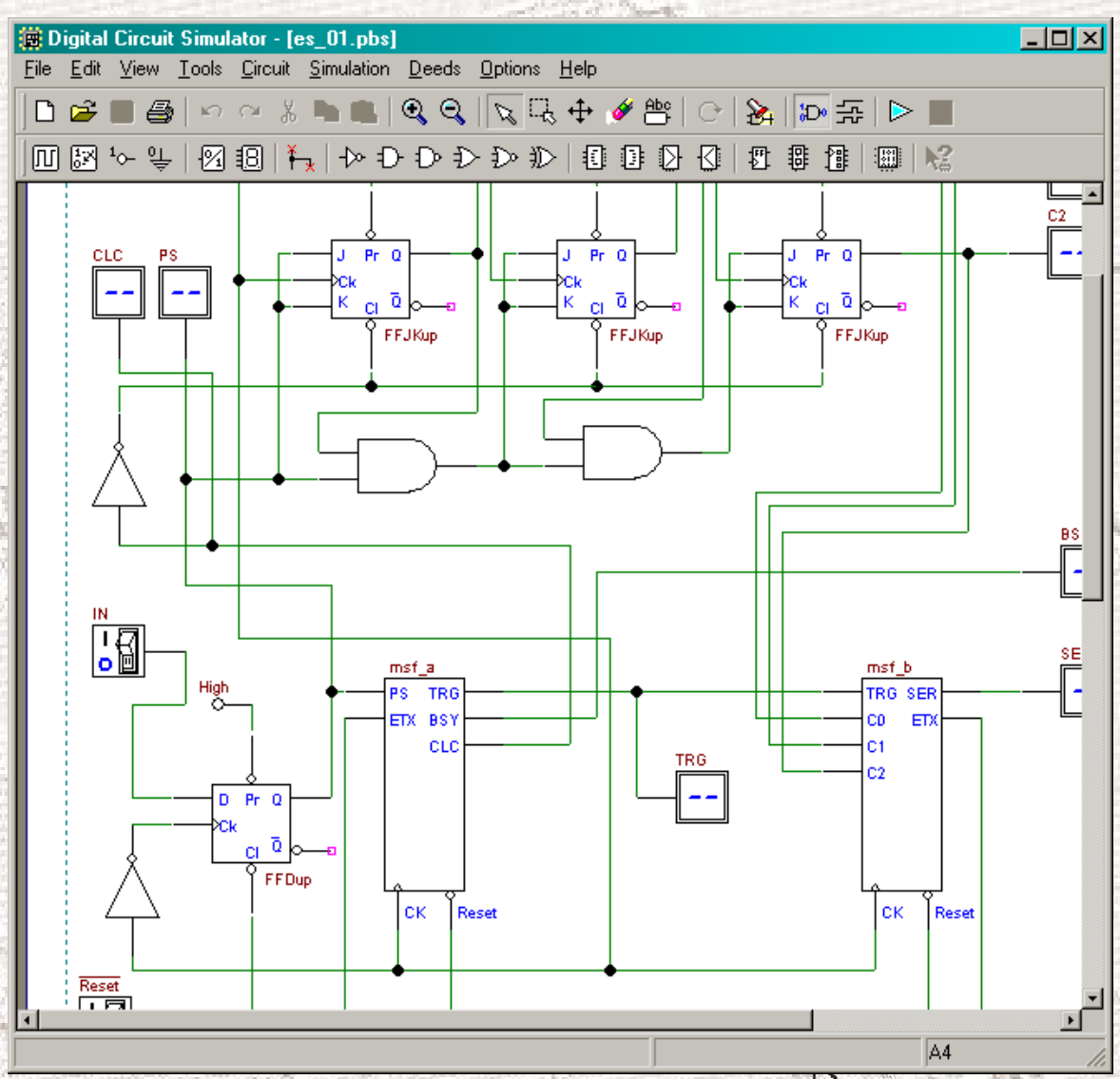
Deeds - The online Learning Materials

- The page showing an index with aside a lab exercises
- All text and objects in the page can be Active.
- By clicking on the schematics, the circuit shown will be loaded in the Digital Circuit Simulator, ready to be tested or modified

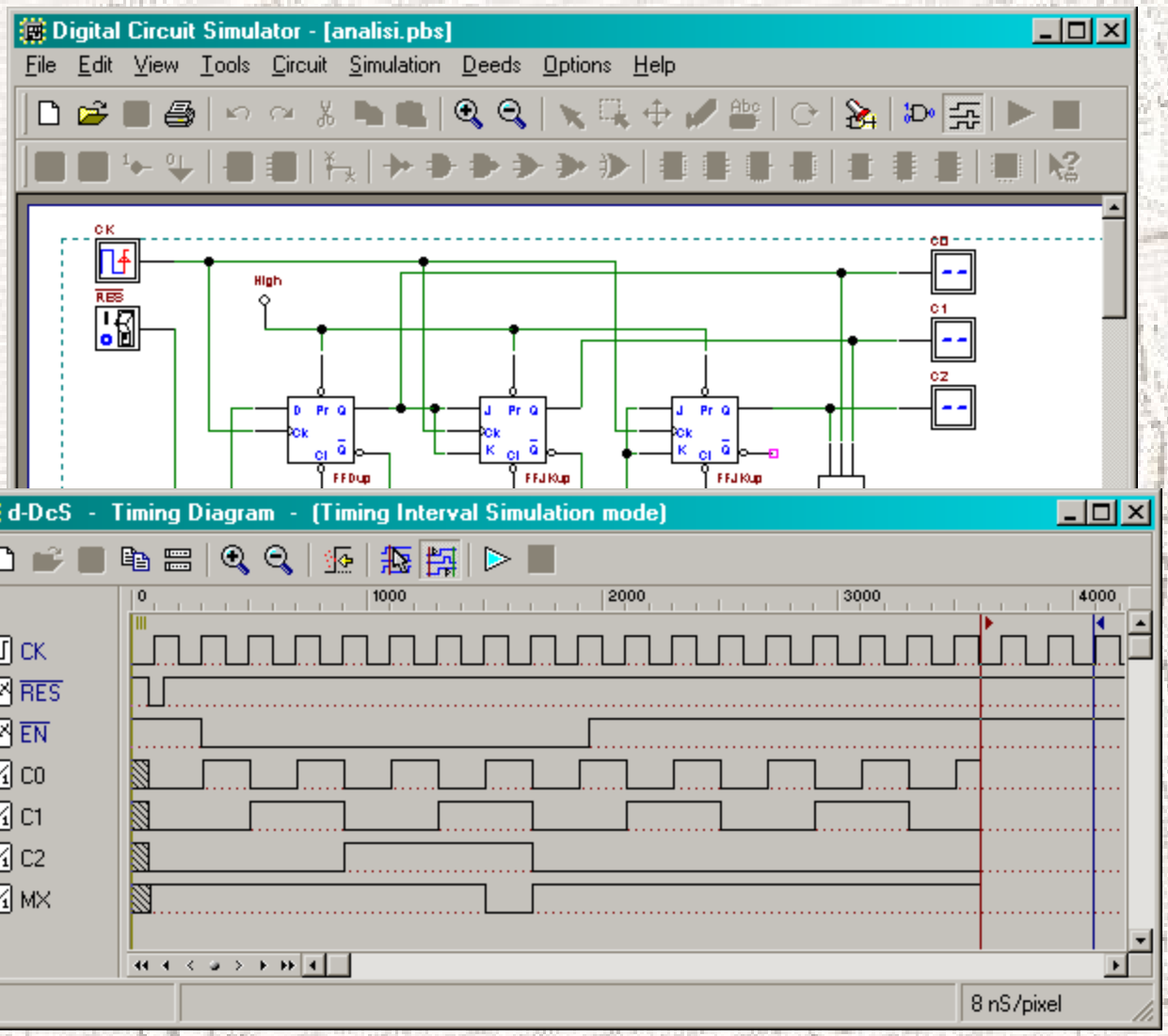


Deeds - The d-DcS Digital Circuit Simulator

- The basic operations of professional tools have been adapted to the educational needs
- The components available on the bin are simple to understand
- We avoided complex real components, that could confuse the beginner
- Two simulation mode are available:
  a) *Interactive Animation*
  b) *Timing diagram*

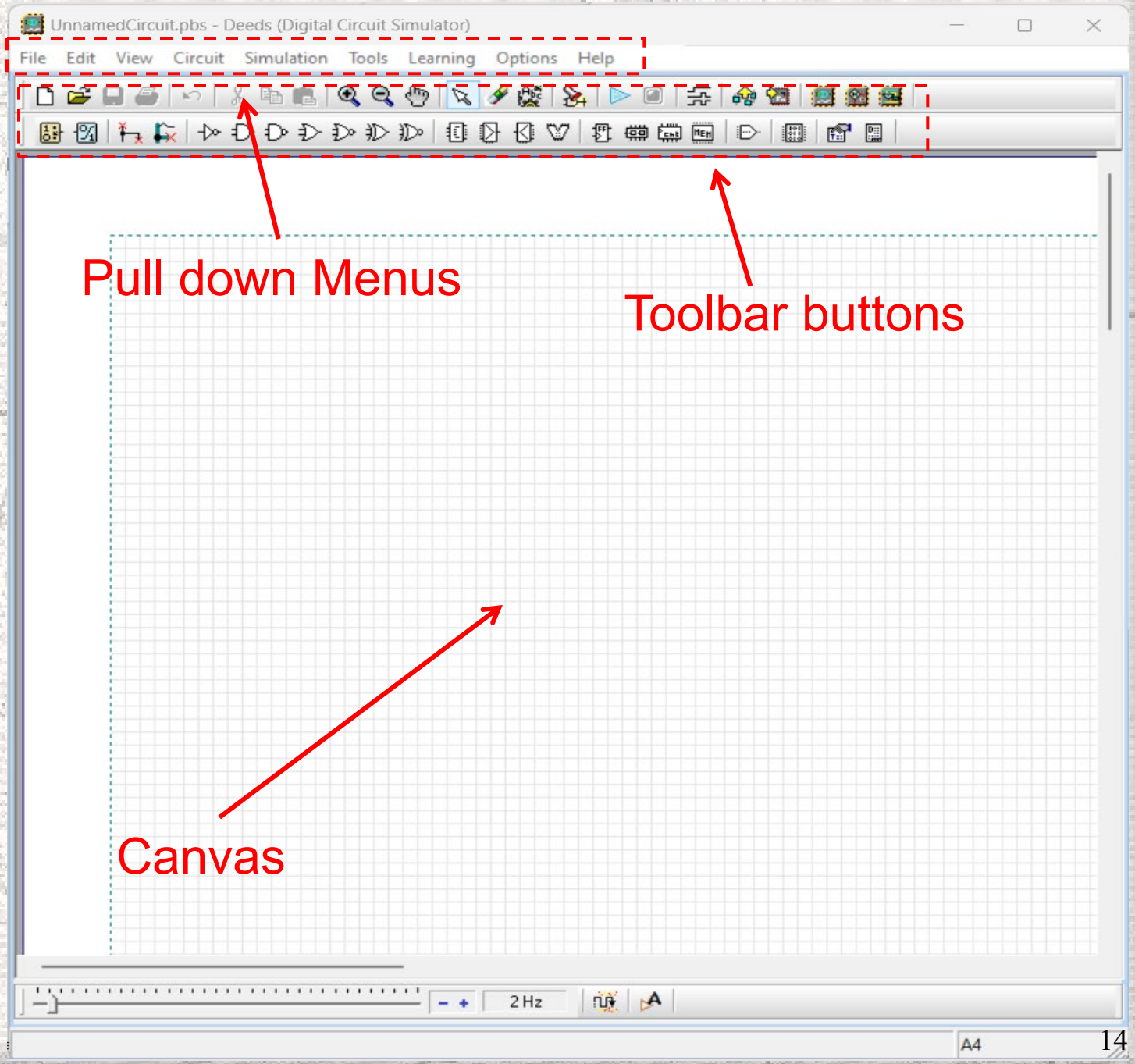


Deeds - The d-DcS Timing Simulator



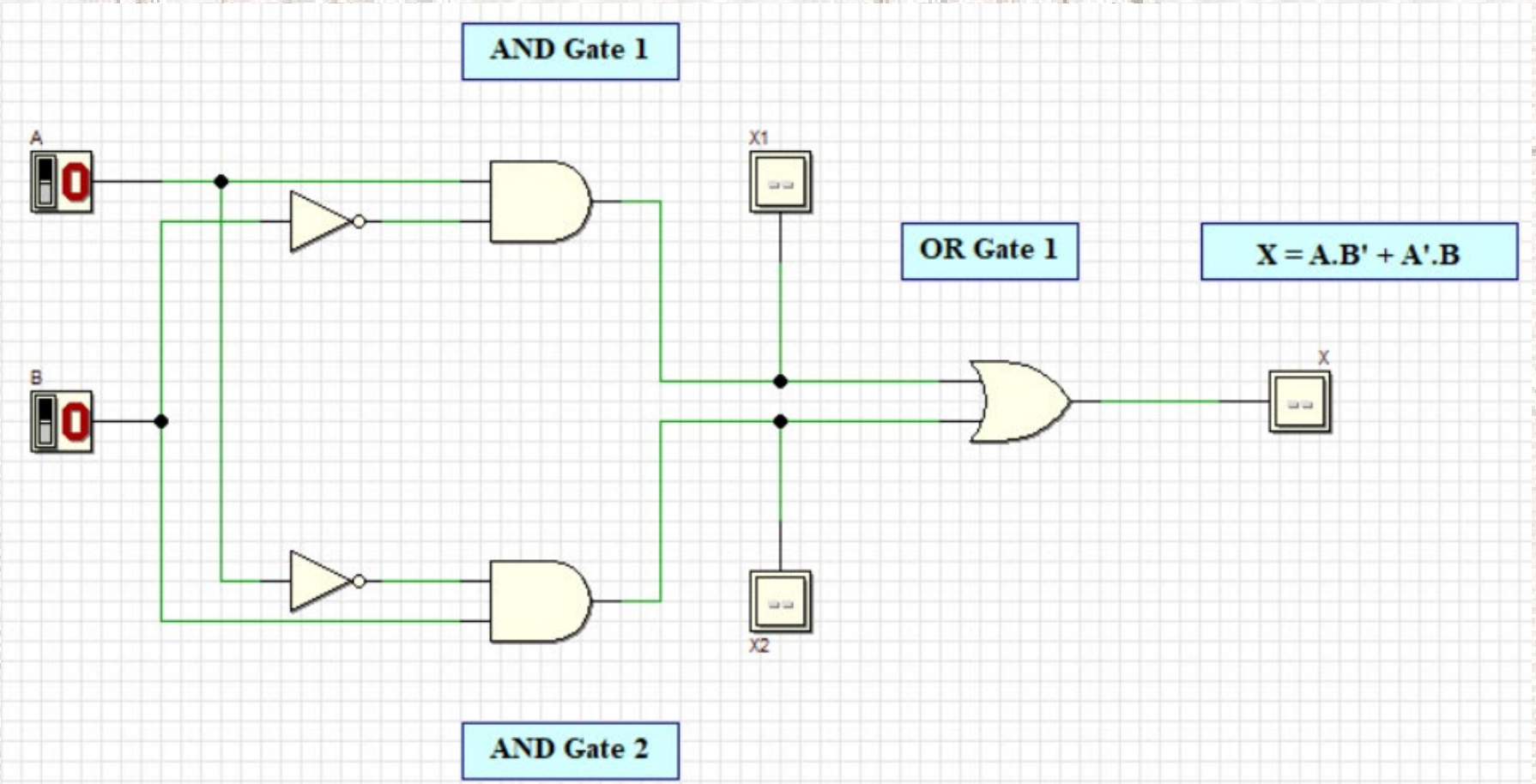
- Timing simulation can be executed in various operation modes
- Clock and input signals can be easily edited
- Timing simulation can be interactive, for the beginners, with a event-by-event approach, or can be launched defining a time interval, as in professional tools

Deeds - The interface

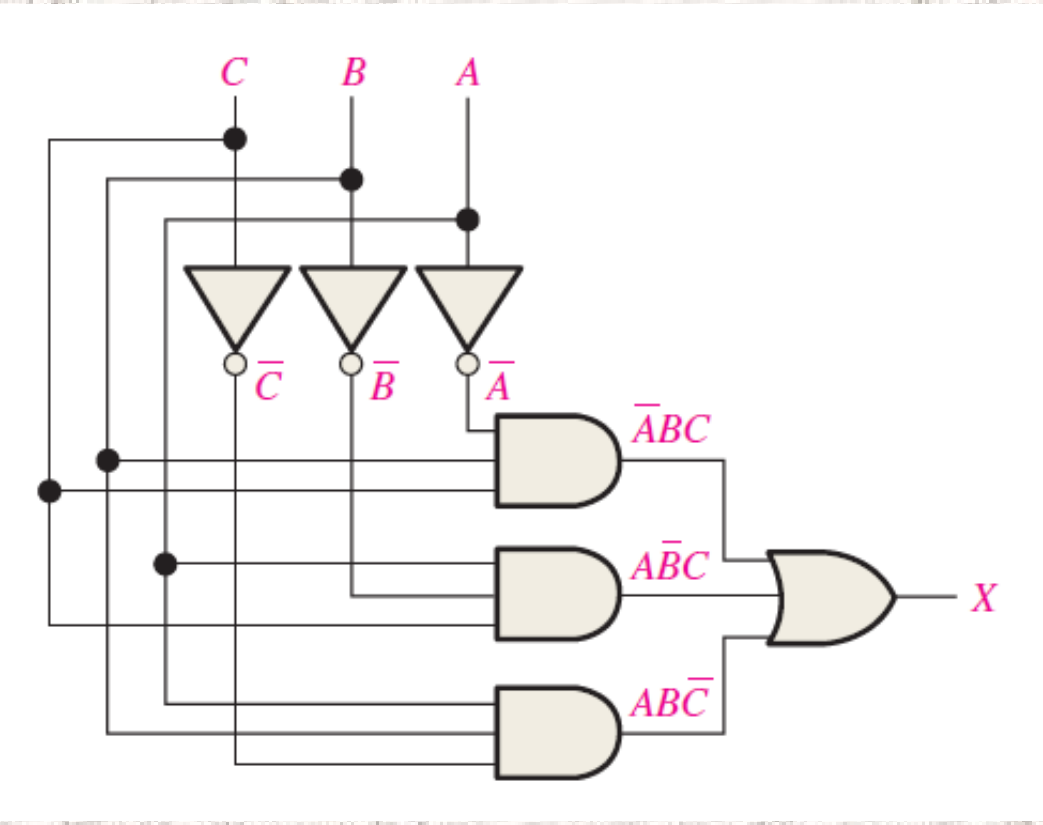



Demo session

Demo: XOR circuit



Exercise: Create this circuit



Exercise:

- Verify your circuit with this Truth Table

TABLE 5–4

Inputs			Output	
A	*B*	*C*	*X*	Product Term
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	1	$\overline{A}BC$
1	0	0	0	
1	0	1	1	$A\overline{B}C$
1	1	0	1	$AB\overline{C}$
1	1	1	0	