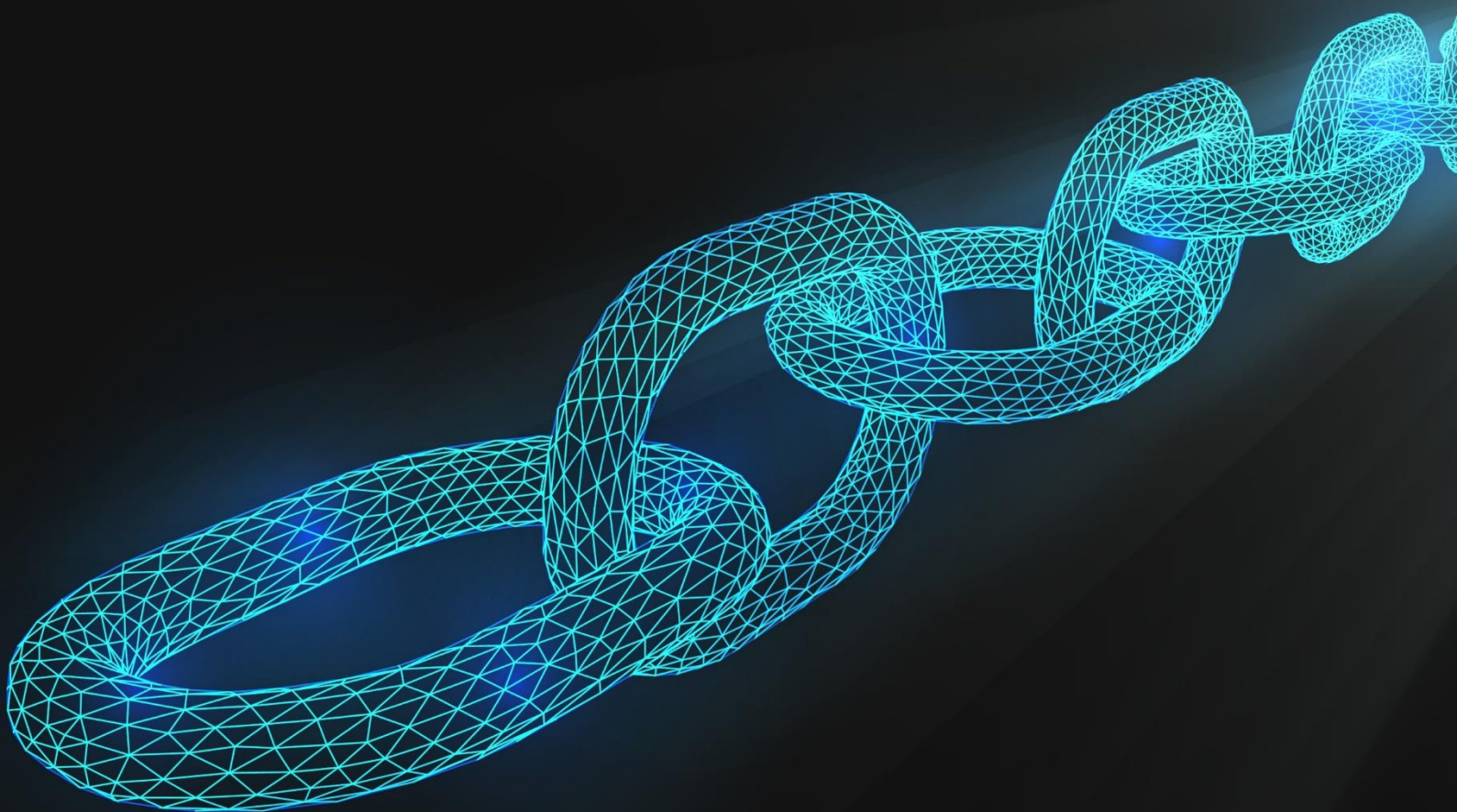




DL NGL
**NEXT
GENERATION
LABS**



DL NGL-BLOCK

Module for the study of the blockchain

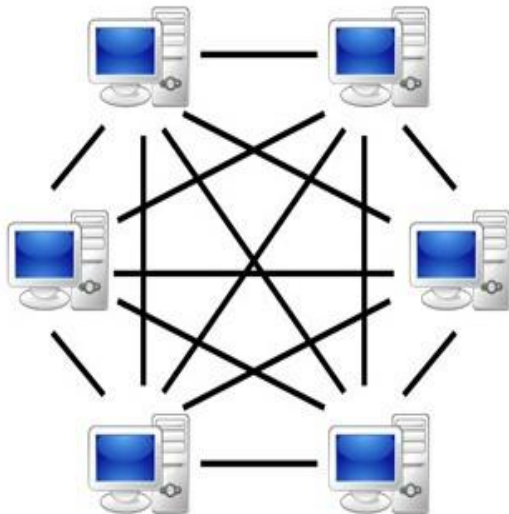
The 'Blockchain' module contains the tools to analyse the Distributed Ledger technologies in general and the Blockchain in particular at an educational level.

The Blockchain technology exploits the characteristics of a computer network of peer-to-peer nodes for the distributed management of a register containing data and information, in a unique and secure way, using a shared method that does not require a central entity for control and verification.

This new approach completely revolutionizes the current system with which, for example, companies exchange goods. In fact, each maintains its own register of assets, while information on transactions is exchanged with each other.

Instead, the Blockchain allows using a single shared register, formed by a 'Chain of Blocks', where transactions are stored, secure, decentralized and modified with everyone's consent.

In the financial sector, this technology potentially makes it possible to do without banks, notaries, financial institutions and so on.



The virtual currency Bitcoin, born in 2008, is an example of the application of Blockchain to the cryptocurrency sector, i.e. decentralized digital currencies that use cryptographic techniques to ensure the security of exchanges between users.

This module is equipped with a proprietary Blockchain Platform, specially developed to analyse this type of applications at an educational level.

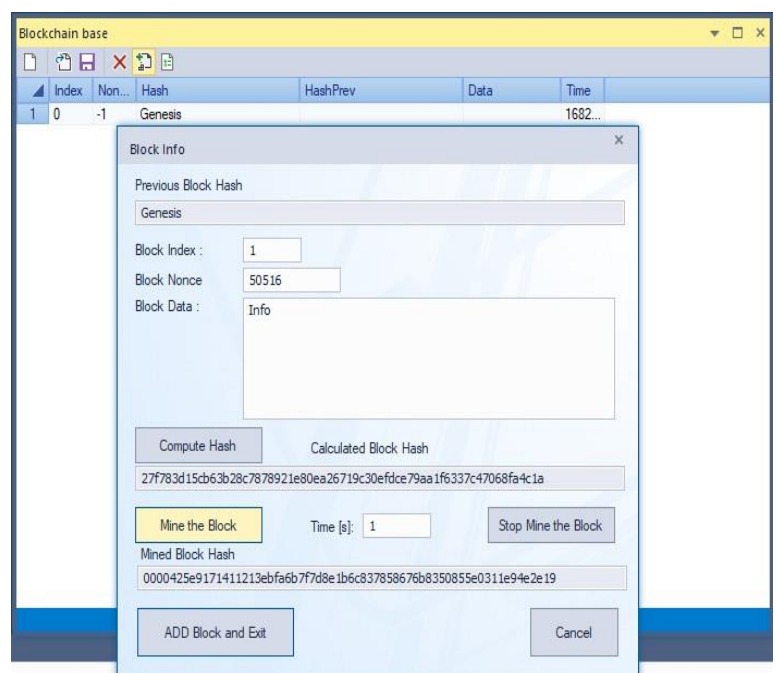
The DL WORKSPACE contains tools for experimenting with this technology.

The figure to the side shows the tool available for creating the Blocks in the chain.

With it, you can analyse all the IT security issues of the system, which lead to the use of the Proof-of-Work method as a validation tool to avoid hacker attacks of the Distributed Denial-of-Service type.

This method requires many validation calculations by the network 'miners' and, therefore, determines the high energy consumption of a Blockchain.

Bitcoin, for example, requires about 10 minutes of calculation to validate a block and consumes the same energy in a year as a country such as Argentina.



The screenshot shows a software interface titled 'Blockchain base'. A 'Block Info' dialog box is open, displaying the following information:

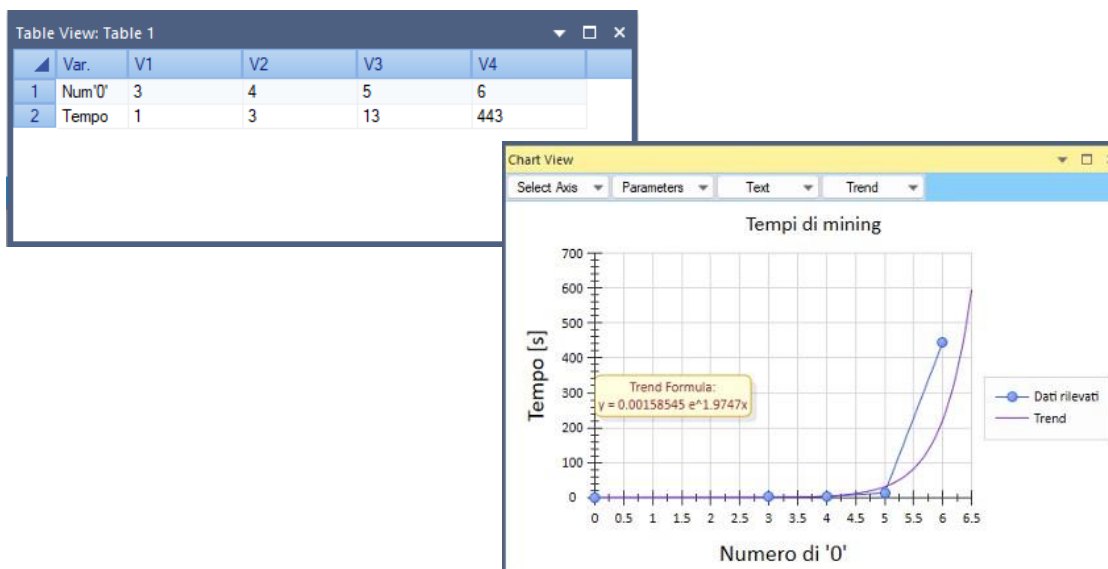
- Previous Block Hash: Genesis
- Block Index: 1
- Block Nonce: 50516
- Block Data: Info

Below the input fields, there are buttons for 'Compute Hash' and 'Calculated Block Hash'. The calculated hash is displayed as: 27f783d15cb63b28c7878921e80ea26719c30efdce79aa1f6337c47068fa4c1a.

At the bottom of the dialog, there is a 'Mine the Block' button, a 'Time [s]: 1' field, and a 'Stop Mine the Block' button. Below these, the 'Mined Block Hash' is shown as: 0000425e9171411213ebfa6b7f7d8e1b6c837858676b8350855e0311e94e2e19.

Finally, there are 'ADD Block and Exit' and 'Cancel' buttons at the very bottom of the dialog.

The following figures show the experimentation included in the Training Software that leads the student to the experimental analysis of this problem, with data collection, entry into a table and subsequent graphic processing.



Similarly, the other issues are addressed with specific DL WORKSPACE tools that help to understand the complex issues that underlie this technology, allowing the student to work autonomously on his workstation and proceed at his own learning speed.

Lessons and tools of the DL WORKSPACE allow covering all the topics of interest of the Blockchain technology:

- block chain,
- security issues,
- energy consumption,
- distributed and decentralized ledger,
- authorized network (blockchain permissioned),
- traceability of transfers,
- transaction encryption,
- immutability of the register and transparency and verifiability.

Educational experience

- Distributed Ledger Technologies.
- Introduction to Blockchain.
- Features: decentralization, disintermediation, traceability, transparency, immutability of the register.
- Basic components: node, transaction, block, ledger, hash.
- Transaction encryption.
- Blockchain with and without permissions.
- Cryptocurrencies (Bitcoin).
- Examples and applications.

NEXT GENERATION LABS

The DL NGL-BLOCK module can be integrated in the NEXT GENERATION LAB - DL NGL laboratory through the minimum purchase of the following modules:

- **Teacher Station - DL NGL-BASE**
Necessary for the proper functioning of the laboratory. Quantity: 1.
- **Student Station - DL NGL-STUDENT**
To be multiplied by the number of "student stations" to be created.

