

Binary logic and arithmetic

Operating System
Lab№3

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What we will learn and discuss today

If you have questions make it comfortable
to ask

01

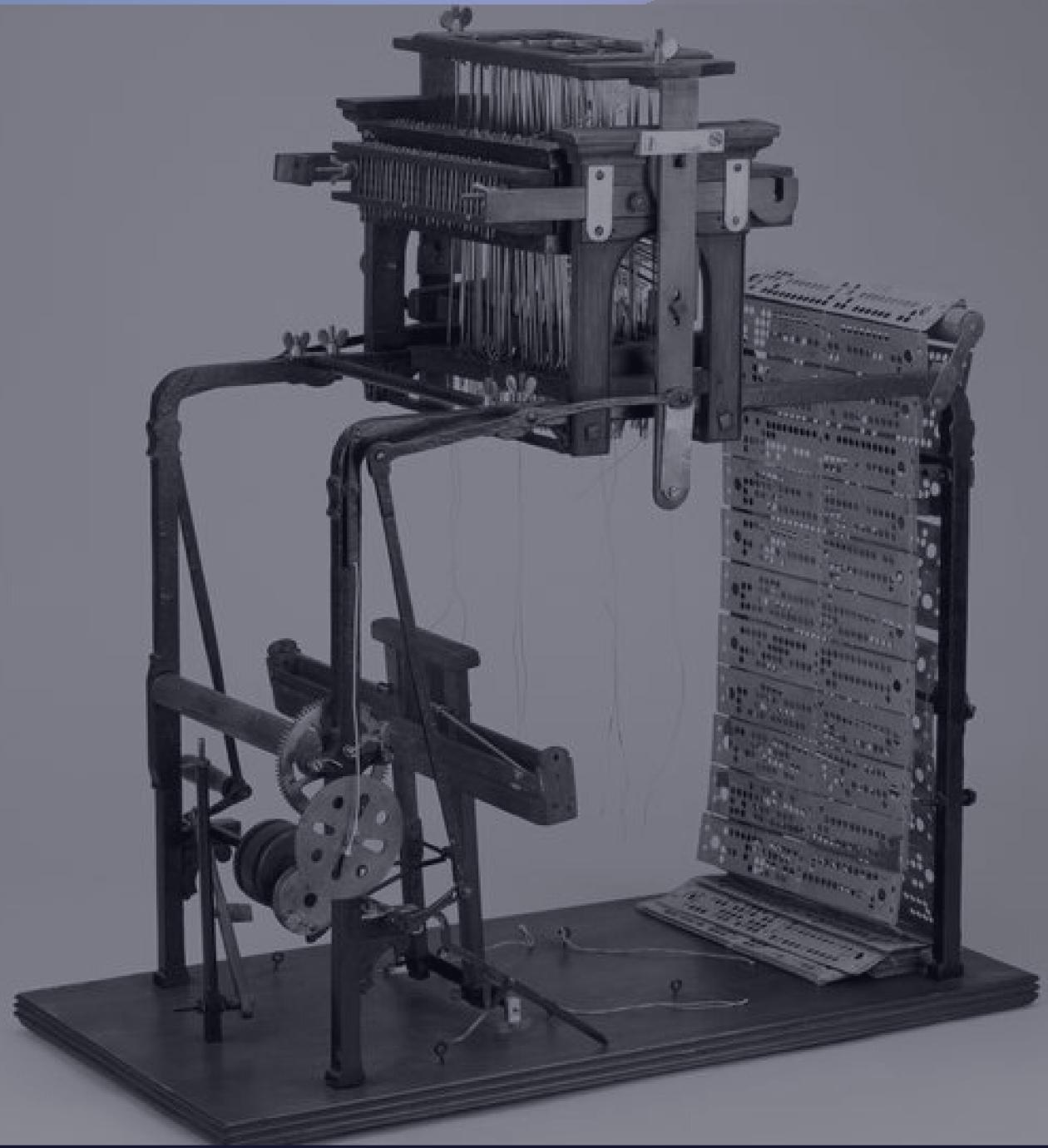
Basic information

02

**Operations and order which can be
performed**

03

**Features that are common to all
digital computers**



Jacquard loom

works on Boolean algebra

Main info

Computer engineers quickly found that a simpler system less intuitive to humans proved much easier to implement with electronics. This is the binary system, based on only two digits: one and zero. The Jacquard loom was such a binary system, with a hole in a card representing a 1 (one) and the lack of a hole representing 0 (zero). In other applications, turning on a switch might represent a 1, and turning it off might represent a 0. The logic and mathematics of this system were developed mainly by the British mathematician George Boole (1815–64), whose contributions were so important that the concept is often referred to as Boolean algebra.

Types of operations

AND

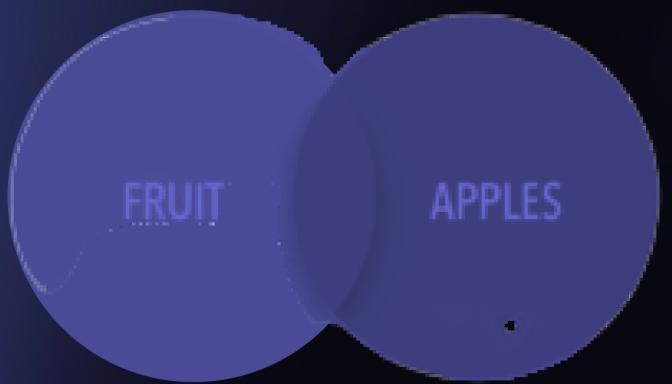
AND(sometimes called “intersection” and indicated by the symbol \cdot or $*$) means that, given two statements X and Y , if both are true, then $X \cdot Y = 1$. If either one is false, then $X \cdot Y = 0$. For example, the statement “It is raining (X) and the sun is out (Y)” is true only if both it is raining and the sun is out.

OR

OR(sometimes called “union” and indicated by the symbol $+$) the inclusive “or” means that, given two statements X and Y , if either one or both are true, then $X + Y = 1$, while only if both are false is $X + Y = 0$. For example, the statement “It is raining (X) or the sun is out (Y)” is true in all cases except when both are not true.

NOT

NOT (sometimes called “negation” and indicated here by the postsymbol $'$ as in X' , but sometimes indicated in other texts with an overbar as in \bar{X}) is an operation performed on a single statement. If X is the variable representing that single statement, then $X' = 0$ if $X = 1$, and $X' = 1$ if $X = 0$.



NOT



AND



OR

Order and graphical representation

Order is defined as follows:

- 1** All NOT operators must be evaluated first

- 2** all AND operators (starting from the right if there is more than one) second, and

- 3** all OR operators (starting from the right if there is more than one) are evaluated third.

Features

There are certain features which are common to all digital computers:

Construction from circuits that have two stable states, forming binary logic elements

Some form of binary storage of data

Capability to receive and act on data from the outside world (input) and to transmit data to the outside world (output);