

## John (Janos Lajos) von Neumann (1903-1957)



Hungarian-American Scientist who pioneered the modern computer architecture, game theory, mathematics (set theory, group theory, ergodic theory, operator theory), physics (hydrodynamics), cellular automata....

The son of Max Neumann (lawyer and financier) who acquired a noble title in 1913 and subsequently his son used the German honorific form von.

*Man of warm personality: courteous, charming and jovial.*

*Born in Budapest (1903), naturalized citizen of the United States in 1937, died of cancer at the age of 53 in Washington (1957)*

### Education

chemistry, mathematics: universities (Budapest, Berlin, Swiss Federal Institute of Technology).

1926 doctorate in mathematics from Budapest Univ.

1927-1930 lecturer in Berlin Univ. and Hamburg Univ.

1930-invited to lecture on quantum theory at Princeton University,

one year later - youngest professor at the Institute for Advanced Study,

### **Computer Science achievements**

John von Neumann. was the main (along with A. Turing<sup>1</sup>) conceptual inventor of the stored-program digital computer. His computer architecture was described in 1945 "First Draft of a Report on the EDVAC": computer consists of 6 parts: arithmetic (dealing with binary digits), central control, memory (delay line & iconoscope tube), input, output, external memory (punched cards, tape, magnetic wire, steel tape). Instructions (called "orders") and data should be stored in the memory and both are subject of processing. Circuits are to be synchronous with a master system clock derived from a vacuum tube oscillator, possibly crystal controlled. Memory will be the largest subdivision of the system and he proposes 8,192 minor cycles (words) of 32-bits as a design goal, with 2,048 minor cycles still being useful. He estimates a few hundred words will suffice for storing the program.

His work at the Institute for Advanced Study led to the building of the IAS binary stored-program computer in 1952. The IAS machine served as the model for IBM's first all-electronic stored-program computer (IBM 701). and many others ILLIAC, JOHNNIAC, Maniac, Oracle..)

### **Works:**

Theory of Parlor Games

Theory of Games and Economic Behavior (O. Morgenstern-coauthor).

[The Mathematical Foundations of Quantum Mechanics](#)

First Draft of a Report on the EDVAC.

Theory of Self-Reproducing Automata,

The Computer and the Brain.

150 papers.

**worked out by Zygmunt Ryznar**

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<sup>1</sup> Martin Davis asserted that Turing devised the "stored program concept" in his 1936 paper, implying that the invention of the computer was more than anything else an advance in mathematical thinking. This is clear in the title of his book: „Engines of Logic: Mathematicians and the Origin of the Computer". Von Neumann was indisputably aware of Turing, having written a reference in 1937 in support of the fellowship that allowed Turing to spend a year at Princeton University, in close proximity to von Neumann's own base at the Institute for Advanced Study  
DOI:10.1145/3372920 Thomas Haigh and Mark Priestley Historical Reflections