

BOOK REVIEW

司宏伟. 神机妙算会“银河”——中国第一台巨型计算机“银河-I”的研制、创新、影响 [Si Hongwei. *The Development, Innovation and Impact of the First Supercomputer YH-1 in China*]. Beijing: Chinese Industry and Information Technology Publishing Group, Posts & Telecom Press, 2024, 240 pp.

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In 1983, the American futurist Alvin Toffler underscored the advent of a “third wave,” the era of the information revolution, lamenting its implications. As the past recedes, the future unfolds. The computer has become the most efficient information processing tool for human beings, epitomizing the realization of Babbage’s dream. In the explosive development of electronic computers for more than seventy years, supercomputers are one of the main trends, known as the crown jewel of the computer industry. They play an extremely important role in international high-tech competition and strategic games, being the status symbol of the world’s powers to seize scientific and technological heights.

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In 1976, the American computer scientist, Seymour R. Cray developed the Cray-1 supercomputer, which is the world's inaugural supercomputer, with a processing capacity of 100 million calculations per second. Subsequently, from 1978 to 1982, the National University of Defense Technology (NUDT) in China independently developed the nation's first supercomputer, YH-1. General Zhang Aiping, the Vice Premier of the State Council, named it Yin He (银河, i.e. Galaxy). Its successful development immediately captured widespread attention from China's science and technology world and was publicized constantly. However, due to national defense secrecy, in-depth and systematic research on the topic has been lacking over the past four decades. A series of questions about YH-1 have always haunted the academic community: What was the development process? How were the technical and engineering innovations realized? What are the advantages or disadvantages of YH-1 compared with the Cray-1? What are the applications and impacts? What are the thoughts and insights?

The author of the book under review, Si Hongwei, from the Institute of Natural Sciences of the Chinese Academy of Sciences (CAS) is a good friend of the present reviewer. He graduated from the NUDT (the development institute of YH-1) with a major in computer science. His early career at NUDT allowed him access to original archives and firsthand accounts from individuals involved in the YH-1 project. Additionally, his contribution extended to the development of the subsequent supercomputer Tian He (天河) series. Afterwards, he was engaged in research on the history of science and technology at Tsinghua University and the Institute of the History of Natural Sciences of CAS.

In the book under review, published in Chinese, Si Hongwei melds his expertise in computer science with scholarly pursuits in the history of computer science and technology. Through the analysis of original archives, interviews with developers, and comparative studies, he reveals the development process, innovations, and impacts of the first Chinese supercomputer in this insightful work.

The first chapter comprehensively and systematically analyzes the overview of international and domestic supercomputers. It reveals the status and significance of supercomputers in the fields of scientific research, national defense, military, and national economy. The second chapter reveals little-known historical details for the first time, such as why China wanted to develop a supercomputer and why the NUDT was to develop China's first supercomputer with hundreds of millions of calculations per second. The third chapter provides a complete description of YH-1's development process across six phases. It is the first time that the whole process of the YH-1 development is presented in complete detail. Chapter 4 outlines the team leader Ci Yungui's pivotal role in YH-1 and draws the YH-1 Technical Command Line for the first time. Chapter 5 unveils the technological innovations of YH-1 based on the original technological archives, covering supercomputer architecture, hardware systems, software systems, among other elements. Chapter 6 discusses YH-1's innovations in engineering management and

engineering technology and how to frame them from the perspective of the history of science and technology, and corrects and improves YH-1's engineering command system mapping. Chapter 7 compares YH-1 with Cray-1, the first supercomputer in America, evaluating their respective advantages and disadvantages. Chapter 8 explores the application and popularization results of YH-1, its influence on subsequent series of supercomputers Yin He and Tian He, as well as the "Galaxy Spirit" it embodies. Finally, Chapter 9 synthesizes the historical experience of YH-1's development, offering insights into China's scientific and technological modernization and the pursuit of high-level scientific and technological self-reliance.

This book examines original archives and literature on the YH-1 supercomputer's development, aiming to provide a comprehensive historical overview. The oral history interviews with key developers offer insights into the lived experiences during YH-1's creation. Comparative analysis with the Cray-1 enhances understanding of YH-1's technological and engineering innovations. The roles of Ci Yungui and the development team are objectively evaluated, highlighting the project's material and spiritual influences on subsequent supercomputing endeavors. This systematic approach encapsulates the YH-1 project's scientific research paradigm and experiential knowledge within a concise framework.

The study of China's rapid advancement in computer science and technology from the 1970s to the 1980s offers valuable insights into its engineering model. This period highlights a paradigm marked by the strategic pursuit of large-scale scientific projects, which served as pivotal catalysts for innovation. Furthermore, international competition played a significant role in driving China's swift development in science and technology. This combination of factors underscores the dynamic and effective framework guiding China's technological evolution during this era.

Over the past couple of decades publications in history of science and technology in Chinese language have proliferated. However, they concern mostly the ancient history of science and techniques due to the way HST disciplines developed in higher education in China in the past six decades. Therefore, the history of technology has hardly come into focus. Yet, a new generation of Chinese scholars is eager to research on the contemporary history of technology and to contribute to international historiography, showcasing the fast speed of development which many Chinese feel proud of. We may expect more publications in the vein of Si Hongwei's YH-1 book soon.