



## **Obituary**

**Prof. em. Dr.-Ing. Horst Wettstein**

**15.9.1933 - 2.9.2006**

Professor Dr.-Ing. Horst Wettstein, emeritus professor for the Department of Computer Science and for many years head of the Institute for Operating and Dialogue Systems, was born in Pforzheim on 15 September 1933. He started his studies of electrical engineering in winter term 1954/55 at the University of Karlsruhe (TH) and completed after ten terms with the diploma degree.

By arrangement of Professor Karl Steinbuch, Mr. Wettstein obtained the opportunity for a thirteen-month research visit at IBM in Yorktown Heights. He used this opportunity to work in the research group of computer science pioneer Herman H. Goldstine, at that time developing structured system software. During this stay a very fruitful and impressive phase began for Professor Wettstein. He learned to program on one of the most modern machines at that time, an IBM 7090, and he cooperated in the development of system software. His focus was on the topic "Automatic Storage Allocation" for external devices, especially concerning the dominating magnetic tape units. One could easily notice the rich potential of Professor Wettstein by the fact that he successfully implemented a FORTRAN II compiler for the IBM 7090. At that time (end of 1960) this was another innovative step, and thus Professor Wettstein must also be ranked among the pioneers of compiler engineers in Germany.

Equipped with impressive basic knowledge, Professor Wettstein returned from the USA and accepted the challenge at the institute of Professor Steinbuch to equip the computer ER-56 with an assembler language and an operating system to support batch processing. In addition, and following the newest trend of programming, he also developed an ALGOL compiler. He then began his PhD (supervised by Prof. Schüßler), on the topic "Topological Sensitivity Analysis of Linear Networks", at that time a classical research problem in electrical engineering. The complexity of these nets required new tree-oriented probing algorithms. His prior work on the ER-56 supported a lot his PhD work. He successfully completed his PhD in 1966 as a Dr.-Ing. Now he was looking for new challenges.

He found this opportunity in the common project of the professors Karl Nickel and Ulrich Kulisch. Their research goal was to develop a time sharing system upon an Electrológica X8. Together with his study companion Dr. Manfred Brockhaus (later professor for computer science in Vienna) responsible for the compilers, Professor Wettstein accepted this challenge to develop this innovative complex software system. System HYDRA was developed and completed in the late sixties, a system respected and admired by the professional world. The entire system architecture of the Karlsruher HYDRA was the work of Professor Wettstein. System HYDRA had a highly sophisticated process concept. For each of up to thirty terminals (based on teleprinters) spread all over the university campus there was one active controlling process at the highest system layer, with which each user could communicate. Such a controlling process activated -if necessary- input processes (e.g. for reading from paper tapes) and output processes, compiler runs and finally also the execution of a user program. With full load the system mastered over hundred processes at the same time, thus during a single day often over thousand jobs could be completed. Apart from this new interactive mode on the same machine the usual batch processing mode could also be done in closed shop. At that time no other German university had developed a comparable system environment.

These innovative developments headed by Professor Wettstein contributed substantially to the fact that in Karlsruhe a euphoria for computer science started and spread. The senate of the University of Karlsruhe established the first examination order for diploma computer scientists in Germany in late 1969. During the supra-regional promotion of computer science the University of Karlsruhe was considered particularly well for funding. The University of Karlsruhe was also courageous enough to establish the first department for the new subject computer science in Germany. Surely, Professor Wettstein's pioneer work in the sixties has contributed a lot to this fruitful development of the computer science in Karlsruhe.

Since 1971, Mr. Wettstein was appointed full professor and head of the chair "Operating Systems". Together with his research group he could go on and work systematically on the topics system programming and operating systems. His

scientific work was dominated by the intention to structure software as systematically as possibly. By his own experiences with large software systems it was clear to him that already small inconsistent structures can lead to large instabilities and system crashes. Apart from system structure principles his favored research areas covered particularly hardware near system components, whereby he had supplied important contributions to the topics process-switching, process synchronization and inter-process communication. His way of thinking can be reread in his text books "System Programming" (1972, 1980), "Assembler and Linker" (1979), "Architecture of Operating Systems" (1978, 1984, 1987) and "System Architecture" (1993).

The following numbers express his extraordinary software productivity. He developed seven language translators personally, among them the already mentioned FORTRAN compiler and three ALGOL compiler (one for the computing centre of the University of Graz). He also implemented nine operating systems, among them in more recent time the system for the CAN bus. In co-operation with industry he also contributed solutions to difficult control-system problems for the airbag. Thus he contributed also a highly stable mini operating system for the ABS system built in most modern cars. Among the many additional research projects funded from outside the university only the most important are mentioned here: the project "Prozesslenkung with DV-Systems" (PDV) of the Federal Government of Germany and the heterogeneous network infrastructure HECTOR (forerunner of the DACNOS network operating system) in co-operation with IBM Germany.

Among his professional colleagues Professor Wettstein was always highly esteemed, e.g. he was elected in 1979 as the system consultant for the German research society DFG. Various calls from operating system chairs at other German universities, e.g. Hamburg, Darmstadt and Stuttgart show how gladly one would have appointed him as full professor elsewhere. However, he remained faithful to his home university, a fact for which we have been and still are very grateful.

As in research he was as engaged with the development of the young department of computer science. From 1973 to 1975 he was the dean of the Department of Computer Science and also served in various other functions. He also lead different projects concerning the department as a whole, e.g. he headed the computing centre group of the department in its start up time and he supervised and promoted the installation of new computing technology (work stations) in all research groups of the department. He was also responsible when the department developed a new integrated software system for all its internal administrative procedures; the system I3V is still in use today. He was driven by the firm conviction that the Department of Computer Science should be the best user of its own products. Also after having retired he remained faithful for his appointment of scientist and university teacher. Thus he consulted to a couple of renowned industrial enterprises (e.g. developing a traffic control system), and he also accomplished further training courses for system related topics.

We all did not only esteem Professor Wettstein as a deliberate and reliable colleague and head of his research group, but also as a very engaged human. He often succeeded in bringing together the various and sometimes conflicting interests of the department members. His prudent and mediating manner became esteemed both by his students, as well as his group members and his colleagues. For all who had to do with him, it was his calm and deliberate manner that was especially appealing. Professor Wettstein was an engineer in the best sense of the word. Theoretical thinking and practical applying were close to his heart.

Professor Wettstein passed away suddenly and unexpectedly on 2.9.2006, briefly before his 73rd birthday. We will always retain an honoured memory of him.