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COMPUTER SCIENCE AT PURDUE UNIVERSITY**

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Abstract

The origins of computing and computer science at Purdue University are traced from their beginnings in the late 1940's until the early 1960s. This period includes the establishment of the nation's, perhaps the world's, first academic Department of Computer Sciences in the Fall of 1962. The evolution of the computing facilities is traced from the installation of an IBM card programmed calculator (CPC) in 1952 to the acquisition of an IBM 7090 in 1963 which was later upgraded to an IBM 7094. The Computer Sciences Center was established in 1961 as the provider of computing services. It is the forerunner of the Purdue University Computing Center which is still the principal provider of campus wide computing services.

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1. The Early Years: 1950–1961

In 1947 Dr. Carl F. Kossack joined the Mathematics Department at Purdue University. He brought with him several research projects that required extensive computation. He had friends at IBM who offered to donate some IBM punch card equipment, and Kossack set up a statistical laboratory in one of the temporary buildings at Purdue. By 1952 the activities of the statistical laboratory had grown considerably, and a decision was made to install an IBM card programmed calculator (CPC). The CPC was not a stored program computer, but it was a general purpose programmed computer, and the laboratory needed someone who was skilled in the art of computing. Kossack was authorized to hire an Assistant Professor who would be part time in the Mathematics Department and who would also be in charge of the computational division of the statistical laboratory.

On a trip to MIT he tried to recruit Alex Orden for this position. Orden was not interested in coming to Purdue, but he recommended a recent Mathematics Ph.D. named Alan Perlis who was working with Project Whirlwind at MIT. Project Whirlwind was one of the major early computer projects, and the source of many important developments in computer hardware and software. Perlis came to Purdue, and he was probably as good a person as could have been found anywhere to take charge of the new computing activity at Purdue.

Within a short time Perlis suggested that Purdue needed and should have a more powerful computer. Large computers with magnetic core memory then cost millions of dollars, but a number of companies were introducing medium size, medium priced computers based on magnetic drum storage. A study of what might be available at a reasonable price convinced Perlis that the best computer available for Purdue would be a Datatron computer built by Consolidated Engineering Corporation of Pasadena. Perlis and Kossack went to President Hovde with their proposal that the university spend \$135,000 to purchase such a computer. Hovde was very receptive to their proposal and brought in R.B. Stewart, who was then Vice President and Treasurer of Purdue and also head of the Purdue Research Foundation. Kossack and Perlis were surprised at how quickly a decision was reached to buy the computer and how easily the financing was arranged through the Purdue Research Foundation. A Datatron computer was ordered in the fall of 1953 and delivered in October 1954. Some other universities had much larger computers, but those were usually being run at the university for a major sponsoring agency. The Datatron 204 was then the most powerful computer in its class. Perlis taught a course in Numerical Analysis and students learned how to program the new computer in his course. Others learned to program in short courses offered by Stat Lab personnel. At the laboratory Perlis began the design and implementation of the

Purdue Compiler, one of the first algebraic language compilers. One of the graduate students involved was Thomas E. Cheatham Jr. Cheatham has since had a distinguished career in the computer industry and as a Professor of Computer Science at Harvard University. There were no courses for credit in programming or computer software development in those days. There certainly was nothing like a Computer Science Department, but Purdue was on its way to a position of eminence in the computer field. There were plans being made to obtain a much more powerful computer than the Datatron, and a tentative arrangement had been made with the University of Illinois to obtain a copy of the Illiac II system that was going to be built at Illinois. Unfortunately for the development of the program at Purdue, Alan Perlis decided to leave Purdue in 1956 and to accept a position at the Carnegie Institute of Technology (now Carnegie-Mellon University). At Carnegie Perlis rapidly completed the compiler he had started at Purdue and installed it on an IBM 650. The compiler on the 650 called IT (Internal Translator) is remembered as one of the precursors of the international algorithmic language, Algol. Perlis became very well known as one of the authors of Algol and as one of the leading figures in Computer Science. first at Carnegie and later at Yale University. In 1973 Purdue University conferred an honorary degree on Alan Perlis for his achievements in the area of Computer Science. At Purdue the work on the compiler languished, but it was eventually finished and used at a number of Datatron installations. Silvia Orgel, Richard Kenyon and JoAnn Chippis were the principal programmers involved. The Purdue Compiler was an important early step in the development of programming languages.

Dr. Paul Brock who had been working for Electrodata Corporation and who knew the Datatron computer well, was hired as a replacement for Perlis. Brock did not stay very long. He was not happy with his position at Purdue and must have expected something quite different from the situation that he found. Within the year he asked for and was granted leave of absence. While on leave his position remained unfilled as it was not clear for some time whether he would return or not. In 1958 The Statistical Laboratory was renamed the Statistical and Computing Laboratory and Duane Pyle, a full time employee who was still a graduate student in Mathematics, was made acting head of the Computational Division. Later, in 1960 when he obtained his Ph.D in Mathematics, Pyle became head of the Computational Division. Richard E. Kenyon, who had worked in the Computational Division for a number of years, received his Ph.D. in EE at about the same time and served as Assistant Head.

Kossack became head of the Department of Mathematics and Statistics in 1956 and Virgil Anderson became head of the Statistical and Computing Laboratory. Anderson was not, himself, interested in the computing area, and after Brock left he relied almost totally on Pyle to handle that part of the activity. Pyle was then a relatively junior person, first a graduate student and then a young Ph. D. in a position in which he had to deal with department heads and deans and vice presidents. His efforts and those of Kenyon in maintaining computing services at Purdue may reasonably be described as heroic, but Pyle and Kenyon were not then in a position to provide the kind of leadership that was needed at Purdue in the area of computing and computer science.

Appropriate leadership was lacking, and so a major initiative in computing came from an inappropriate source. R. B. Stewart, who was the chief financial officer of Purdue, was a friend of Dawes Bibby, the president of Remington Rand corporation, whose

Univac division was a major computer manufacturer. Stewart knew that Purdue needed to upgrade its computer equipment, and that any adequate upgrade would be very expensive. He and his contacts at Univac developed a plan that would upgrade computing at Purdue at little or no cost to the university. Univac would set up a training school for its technical personnel on the Purdue campus. Purdue would provide space and other services (e.g. meals) which would be paid for by the training facility, and Univac would install a Solid State 80 computer at Purdue in the summer of 1960. At least one full shift of time on the SS 80 computer would be available for Purdue use at no cost to Purdue.

In a letter to Executive dean D.R. Mallet dated November 18, 1959 the head of training at Univac stated that "You will be assured of having the most advanced equipment at all times because such equipment would be vital to the successful operation of the . . . training center." He points out that as new equipment would be developed by Univac that equipment would be installed at Purdue, and Purdue would have the use of it free for one shift. In addition the older equipment that was replaced would be offered to Purdue at a "nominal fee".

On October 9, 1959 President Hovde set up an ad hoc committee on computing. John W. Hicks, Assistant to the President, was chairman. It was a high level committee that included the head of the Agricultural Experiment Station and the heads of several engineering departments. It included Virgil Anderson and, after its first meeting, also Duane Pyle. It included the Business Manager, Lytle Freehafer, and department heads in the area of business computing, the dean of the Graduate School and heads or other representatives of Mathematics, Agricultural Economics, and Psychology. Its charter was to study and make recommendations concerning the computer needs of the university in academic and research areas and also in areas of student scheduling and business office operations. The first meeting was on October 19, and the committee met frequently and was very active.

In an interview in the fall of 1989 Dr. Hicks stated that President Hovde formed the ad hoc computer committee in the fall of 1959 because of the preliminary negotiations that were then going on between R.B. Stewart and Univac, and because an agreement of the type suggested by Univac required technical as well as administrative approval. The minutes of the first few meetings and recollections of Duane Pyle suggest that the members of the committee were not aware of the projected deal with Univac until the letter from Univac to Dean Mallet was received. The committee did then consider that letter, and along with a memo on December 9, 1959 calling for a 4th meeting of the committee, Dr. Hicks included his suggestions for a set of tentative recommendations by the committee. One of them is the recommendation that "the proposal put forth by Remington Rand (i.e. Univac) should be accepted."

The Univac proposal was indeed accepted, and a Univac Solid State 80 system, along with a large complement of Remington Rand 90 column punch card equipment was installed in the Engineering Administration Building. On the surface it seemed to be a good deal for Purdue, but it was not so. The Solid State 80 was more powerful than the four year old Datatron system, but it was still the same class of equipment and did not represent an advance to a new generation of computers. It was not the right kind of equipment for a major university to be installing in 1960.

A number of documents produced in connection with the activities of the ad hoc committee on computing indicate that members of the committee were aware of the increasing importance that computing and computer science would have for the university in the 1960's. The documents quoted here were provided to the authors by Duane Pyle.

Dr. Harold DeGroff, head of Aeronautical Engineering volunteered to write concerning university needs in the computing area from the point of view of engineering. In a document dated Nov. 3, 1959 addressed to Dean of Engineering George Hawkins, he stated that "the staff problem in the computing laboratory is deemed to be a critical item." He stated that as a minimum requirement the statistical laboratory should employ a full professor with a background in the general field of numerical analysis, "at least two associate professors, three assistant professors, eight to ten instructors and graduate assistants and five to ten coders. . . . The central idea here, of course, is to establish a computer research center with an emphasis on graduate work in this field."

It is clear that what is being suggested here is a graduate Department of Computer Science. Faculty costs were estimated at about \$100,000 annually. Faculty salaries were lower then.

After the committee had met a number of times during 1960. Stanley Reiter, a professor of Industrial Management who had a strong interest in computing, offered to write a report for the committee for presentation to the university administration. A meeting was held on February 16, 1961 "to discuss professor Reiter's proposal on the reorganization of the Computing Laboratory." This quotation is from a memo by John Hicks announcing the meeting to the members of the committee. As a result of suggestions by members of the committee at that meeting and subsequent to it, some minor modifications were made to the Reiter document. It was forwarded to President Hovde by John Hicks on March 28, 1961 with the title "Proposal of ad hoc Committee on Computers to President Hovde". Duane Pyle states that even though the report was written by Stanley Reiter, the report was based on discussions by the committee and that it did indeed represent the views of the committee.

The report recommends the establishment of a Computer Sciences Center that would be responsible for research computing services and computer education. Reference is made to the need for a strong faculty group that would do research in and establish a graduate curriculum in Computer Science. There would be:

- "A. A strong professional group in Numerical Analysis and Applied Mathematics.
- B. A similar group in Mathematical Logic and Advanced Computer Programming.
- C. Adequate access to large scale modern computing equipment.
- D. A graduate program in Computer Science."

It "recommends that steps be taken immediately to find a director for a computer science center reorganized along the lines set forth above"

It recommends that the Computer Science Center be a separate administrative unit with a separate budget. It suggests that other universities have such a center report directly to the president or to a vice president or a committee of deans. It is implied that that type of organization would be appropriate for Purdue.

In his covering letter to President Hovde that went along with the report of the Ad Hoc Committee on Computing, John Hicks informed him of the formation of a "hardware" subcommittee that was later called the ad hoc Computing Center Facilities Committee. Thomas F. Jones, Head of the School of Electrical Engineering, was chairman of the Facilities Committee. Its charter was to study and make recommendations concerning the computer space and equipment needs of the university.

2. Computing and Mathematical Sciences: 1960-62

The five years or more prior to 1961 was a period of serious conflict between the Mathematics Department and William L. Ayres, the Dean of the School of Science, Education and Humanities (SEH) in which the Mathematics Department was located. Carl Kossack was head of the Mathematics Department between 1956 and 1959. Kossack states that during that period he drew up plans and submitted proposals to President Hovde for the establishment of a School or Division of Mathematical Sciences that would be separate from and independent of the school of SEH. He changed the name of the Mathematics Department to the Department of Mathematics and Statistics and states that he administered the department as a number of subdepartments. Computer Science was not then sufficiently well developed to qualify as one of the subdepartments. However, Kossack was very much interested in the future development of instruction about computing at Purdue. In a memo dated March 9, 1959 written by Kossack to President Hovde and to a number of department heads and senior faculty at the university he invited them to a meeting on March 24 to discuss the development of "a long range and comprehensive plan . . . looking toward the introduction of computing science into the several curricula of the university." No record remains of the meeting if it did indeed take place on March 24, 1959. Kossack left Purdue at the end of that semester. He states that a major reason for his leaving Purdue was the fact that President Hovde had promised to move Mathematics out of the school headed by Dean Ayres and had not done so. Kossack's memo of March 9, 1959, was addressed to many of the people whom Hovde invited to join the ad hoc committee on computing on the following October 9. It may have had some effect on Hovde's decision to form such a committee. All of Kossack's statements quoted here are from a telephone interview in the fall of 1989.

Serious dissension between Dean Ayres and the Mathematics Department continued through 1960 and led to a crisis in early 1961. President Hovde then finally took the drastic steps that were needed to resolve the situation. The budget of the Mathematics Department was dramatically increased and the Department was removed from the School of Science, Education, and Humanities and placed in the Schools of Engineering. The major components of the schools of Engineering, e.g. Electrical Engineering, Mechanical Engineering, etc. were called schools, not departments. Hovde would not accept a School of Mathematics and calling Mathematics a department in a school in which other departments were called schools seemed inappropriate. A Division of Mathematical Sciences was apparently satisfactory to everyone.

From the point of view of many of the pure mathematicians at Purdue, the Division of Mathematical Sciences was simply the old Department of Mathematics and Statistics with a new name. From the beginning some of the others in the Department thought that the division would provide an organizational structure within which

subspecialties such as Statistics, Applied Mathematics, and Computer Science might be able to achieve autonomy and growth.

A document entitled "Proposed Organization of the Division of Mathematical Sciences" dated March 31, 1961 by Virgil L. Anderson, Director of the Statistical and Computing Laboratory, suggests that the Division of Mathematical Sciences should be organized into four departments: Mathematics, Statistics, Computer Science, and Mathematics Education.

Anderson's document points out that there had been much discussion "concerning a separate school for computer science directly under the President" and he argues that the establishment of an autonomous Department of Computer Science in the Division of Mathematical Sciences would be better for its own development. "There certainly would be strength gained from numerical analysts and other applied mathematicians if it is located in this division . . ."

He suggests that the Computer Science Department would develop graduate and undergraduate courses, and would evolve a complete curriculum for advanced degrees. The document points out that the possibility for research projects is almost unlimited, and it also suggests that the Department would maintain a computing laboratory which would serve the whole university.

Even though he had been a member of the ad hoc committee on computing, Anderson did not consider the recommendation for a completely independent computer science center to be practical. He felt that his memo described the type of organization that would be acceptable to the very conservative Purdue administration. These thoughts were expressed by Virgil Anderson in a conversation with Saul Rosen on Sept 15, 1989. Anderson did not remember whether there were other members of the committee who felt as he did.

Paul Chenea was made temporary head of the new Division of Mathematical Sciences in the spring of 1961. Chenea had served George Hawkins in a number of roles in the Schools of Engineering and had established a reputation as an administrator and a troubleshooter, so much so that in the summer of 1961 President Hovde appointed Chenea to the newly established position of Academic Vice President. Dean Hawkins then served temporarily as the head of the Division of Mathematical Sciences.

The Statistical and Computing Laboratory was moved into the Schools of Engineering along with the Department of Mathematics and Statistics. Hawkins separated the Computing Laboratory from the Statistical Laboratory and it was renamed the Computer Sciences Center in 1961. That was the name that had been used in the recommendation of the ad hoc committee on computing to President Hovde. For the next six months or so Duane Pyle reported directly to George Hawkins. Pyle remembers that Hawkins took great interest in computing and was disturbed by the lack of adequate computing facilities at Purdue, especially when compared with other Big Ten universities. Hawkins felt that something had to be done to improve the situation, and offered his support to efforts to improve it. Efforts were made to find a senior person in the computer field to be director of the Computer Sciences Center, and correspondence between Pyle and T.F. Jones mentions Louis Fein and Bernard Galler as possibilities, but the search was not pressed very vigorously until Felix Haas took charge early in 1962 (see below).

The Univac SS 80 which was installed in December 1960 did not have the kind of software that would make it useful for instruction and research. The student scheduling application was reprogrammed for the SS 80 but the Datatron remained the computer used for instruction, along with a number of smaller computers in Engineering Departments. In order to provide for research users, Pyle and Kenyon negotiated an agreement with the Allison Division of General Motors in Indianapolis for some use of their IBM 7090 computer. From June 1961 Allison donated 2.5 hours of 7090 time per month to Purdue. Those 2.5 hours soon turned out to be insufficient to satisfy the needs of Fortran users at Purdue, and Hawkins provided funds for the purchase of additional time. By the end of 1961 usage had increased to 5 hours per month and Duane Pyle wrote a memo to Dean Hawkins (dated December 27, 1961) in which he recommended the acquisition of an IBM 1401 system. The 1401 would permit input tapes to be prepared and output tapes to be printed locally for jobs to be run on the 7090 at Allison. In that same memo Pyle recommended that Purdue should acquire an IBM 7044 system to satisfy its increasing need for large scale scientific computing. The 7044 was a newly announced IBM computer quite similar to the 7090 but at a lower price and not quite as powerful as the 7090. Both of these recommendations were approved by Dean Hawkins and by President Hovde. A 1401 was ordered almost immediately and was installed in March of 1962. A 7044 system was ordered on January 31, 1962 "for delivery in May 1963 at a net lease cost to Purdue of \$13,774.00 per month." The list price of the system was \$34,435 per month. The very much lower price to Purdue reflected the generous 60% educational discount that IBM was then offering. Since the 7044 would not be available until May, 1963, IBM would install an interim 7072 system on or about Sept. 1, 1962. That never happened, and it now seems to have been a strange idea since the 7072 was very different from the 7044, and it would have been very difficult to install it and use it effectively for such a short time. The order for the 7044 contained a clause that gave Purdue the right to cancel it up to Dec. 31, 1962.

During the spring and summer of 1961 there was an active search for a permanent head of the Division of Mathematical Sciences. There were negotiations with Dr. F. Joachim Weyl who was director of the Naval Analysis Group in the Office of Naval Research. Weyl withdrew his name from consideration and the position was offered to Felix Haas who was head of the Mathematics Department at Wayne State University. Haas accepted the position during the summer, with the understanding that he would start at Purdue in January, 1962.

During the fall semester in 1961 Haas remained at Wayne State but made frequent trips to Purdue. He describes the situation relative to the recently formed division as chaotic. His primary responsibility was going to be to rebuild and expand the Mathematics Department at Purdue, but he had become aware of the importance of computing while at Wayne State, and even before that when he was at MIT. He states that the fact that computing and Computer Science were to be among his responsibilities at Purdue had made the position as head of the division more attractive to him.

Dean Hawkins officially turned control of the Computer Sciences Center over to Felix Haas on Feb 1, 1962. Duane Pyle continued to act as director of the Center until the arrival of Sam Conte on July 1, 1962 (see below). By the beginning of 1962 many universities, including most Big Ten universities, had requested, and some had already

received, grants from the National Science Foundation under a program initiated in 1956 in support of institutional computer facilities at universities. That NSF program which lasted through 1970 was a major factor in expanding the use of computers in research and education. The most important effort of the Computer Sciences Center under Haas and Pyle in the spring of 1962 was to produce an NSF proposal that requested \$920,000 to help finance the acquisition of the IBM 7044 and to support related programs in computer service, research and instruction.

The ad hoc committee report discussed above is included as an appendix of the proposal. It is interesting to note that the NSF proposal still talks of the Computer Sciences Center as both a service organization and as a center for research and instruction in Computer Science. Haas' signature appears on the proposal, but there seems to be no doubt that by the May 1962 date on the proposal Haas was committed to the separation of the service operation from the instruction and research function.

It is not clear to what extent the report of the ad hoc committee on computing or Virgil Anderson's memo influenced his thinking about the future status of computing and computer science at Purdue. Haas recalls a meeting with Hawkins and Hovde, probably before he officially started at Purdue, in which they agreed that the Division of Mathematical Sciences would be organized internally into three academic departments, Mathematics, Statistics, and Computer Science, plus a Computer Sciences Center that would provide computing services for the whole university. It was considered only natural then that the head of the Department of Computer Sciences would also be the director of the Computer Sciences Center.

3. The Computer Sciences Center and Department of Computer Sciences: 1962-64

Having decided that there was going to be a Computer Sciences Department, Haas moved rapidly to recruit a department head. Bill Miller, who was then head of the Division of Applied Mathematics at Argonne, was approached, but when he removed himself from consideration the position was offered to Sam Conte. Conte had been an Associate Professor in the Mathematics Department at Wayne State University up to 1956, before Felix Haas came to Wayne State. Since 1956 Conte had worked for five years at Space Technology Laboratories and then at Aerospace Corporation in California, where he was Manager of the Department of Programming and Analysis in the Computing Laboratory. At a meeting of the University Executive Council on March 12, 1962 Felix Haas announced that "Samuel Conte, a distinguished scientist currently with Aerospace Corporation, will join the Purdue staff on July 1 to become Director of the Computer Sciences Center." It is interesting to note that July 1, 1962 was also the date on which the old Datatron computer that had been installed in October of 1954 was finally turned off and retired from service.

On October 24, 1962 President Hovde asked for and received approval from the Board of Trustees to change ". . . the internal administrative organization of the Division of Mathematical Sciences, . . . effective October 1, 1962." The Department of Computer Sciences and the Computer Sciences Center were listed as components of the division, along with Departments of Mathematics and Statistics, and a Statistical Laboratory. Professor S. D. Conte was listed as chairman of the Department of

Computer Sciences and as Director of the Computer Sciences Center. The October 24 entry on the minutes of the board of trustees makes it very clear that a Department of Computer Sciences was officially established in the fall of 1962, and provides a firm basis for the claim that the first Computer Science Department at an American university was established at Purdue.

When Sam Conte arrived at Purdue in the summer of 1962, he faced two major challenges. One was to improve the computing services at Purdue to a level that would be appropriate for a major research university. The other was to organize a new Computer Sciences Department, for which no model then existed anywhere.

At the time that Conte was hired, a commitment existed for the installation of a UNIVAC 1107 computer at Purdue. Duane Pyle was very unhappy with that commitment and recommended the installation of an IBM 7044 computer instead, and, as mentioned above, a 7044 system had been ordered from IBM. The agreement with UNIVAC had been initiated by R.B. Stewart and he pushed very vigorously for the consummation of that agreement. For a while there existed plans to install both the UNIVAC 1107 and the IBM 7044. This made no sense at all, since the Computer Sciences Center did not have adequate personnel to support even one of these large scale computers, let alone two of them. Presumably the idea was to phase out the 7044 if and when the 1107 proved to be capable of handling the scientific computing load at Purdue.

The major argument in favor of the UNIVAC equipment was that it was going to be free for the university. Then it turned out that it wasn't going to be free after all, but was going to cost the university about \$20,000 a month. Support for the 1107 eroded and the decision was made to install only the IBM 7044. That was the computer for which support had been requested in the proposal to the NSF.

Conte had had considerable experience with the IBM 7090, and he would feel more comfortable with it than with the 7044. He felt that the 7090 was worth the additional cost, and that the growth of computer use at Purdue would soon warrant the installation of the more powerful system. There was a High Energy Physics research group at the university under the late Professor George Tauffest that was in need of large amounts of computation, and that had some research money to support such computation. An agreement was made between Tauffest and Conte whereby the Computer Sciences Center would provide a shift of computer time for the use of the high energy physicists, and the more powerful IBM 7090 computer was ordered in place of the 7044.

The proposal to the NSF was modified accordingly, and the NSF gave the Computer Sciences Center \$500,000 over the three year period starting January 16, 1964. With the aid of this grant from the NSF an IBM 7090 was installed at Purdue in the spring of 1963. Prior to the installation of the 7090 an arrangement had been made with the University of Chicago for the use of significant amounts of time on their 7090. A driver was hired who was trained to operate the 7090, and he would drive up to Chicago every evening with a load of magnetic tapes that had been produced on the 1401 and that represented programs and data for the 7090. He would run these programs on the 7090 during the night shift for as many hours as were needed and would then collect the output tapes and drive them back to Purdue where they would be listed on the

1401. This was a very effective and economical system, even though the turnaround time left something to be desired.

The only change that was made when the 7090 was installed in the Engineering Administration Building at Purdue was that the 7090 processing was done locally. During the main day shift the computer was turned over to the High Energy Physics group who used it as a large personal work station. The Computer Sciences Center staff was horrified by the inefficient and wasteful use of precious computer time by the High Energy physicists. Tautfest was horrified by the fact that the Center staff would use precious computer time to run trivial student problems while serious research workers were kept waiting. Within a year or so the High Energy Physics group got their own computer and moved out of the Computer Sciences Center. Actually the computer they obtained was the 7044 that had originally been ordered for the Computer Sciences Center, and that was still available at the price that had been negotiated at that time. Both the 7090 and the 7044 were obtained at the 60% discount that IBM then offered to university installations. By the time the physics computer was ordered those terms would no longer have been available except for the fact that the 7044 had been ordered earlier.

After Sam Conte, the first faculty member hired for the new Computer Sciences Department was Saul Rosen. Conte had known Rosen at Wayne State University before they both left that university in 1956. Rosen then worked in the software area for Burroughs and Philco corporation and then as an independent consultant. He inquired of Conte about possible consulting work on the west coast and Conte suggested that he join the new Computer Sciences Department which he was forming at Purdue. Another member of the Computer Sciences Department when it began in the Fall of 1962 was Robert Korfhage. Korfhage was a young Ph.D. from the Information Sciences program at the University of Michigan. Duane Pyle and Richard Kenyon were the other original members of the Computer Sciences Department. They devoted a major part of their time to the Computer Sciences Center. Half of Rosen's salary was also paid by the Computer Sciences Center and he was always significantly involved in its activities. A major joint activity between the Department and the Center in those early years was the development of PUFFT, the Purdue University Fast Fortran Translator. PUFFT was a system especially designed for fast and efficient compilation and execution of short programs, typically student assignments, on the IBM 7094. It made it possible to run at first hundreds, and ultimately thousands, of student Fortran jobs each day.

The Computer Sciences Department started out with a number of graduate students, several of whom had come to Purdue from Aerospace Corporation along with Sam Conte. From the beginning the Department recognized three major areas, Numerical Analysis, Systems, and Theory. Conte taught the first course in Numerical Analysis, Rosen taught the first course in Computing and Programming Systems, and Korfhage taught the first course in Algorithms and Automata. Within the next two years several senior faculty members were added. There was Richard Buchi in Automata Theory and Walter Gautschi and then John Rice in Numerical Analysis. The skeleton of a Masters Degree program and a Ph.D. program were in place.

The Computer Sciences Department struggled to establish its identity during those first few years. The Division of Mathematical Sciences controlled the requirements for

the Ph.D. degree and the mathematicians in the division felt that no one should have a Ph.D. from the division without having shown mastery of important parts of the mathematics curriculum. The qualifying examination for the Mathematics Ph.D. were designed to eliminate students who did not show promise as researchers in Mathematics. Computer Science Ph.D. candidates were expected to pass some of these same qualifying exams. One might argue for or against the merits of such policies, but the net result was that a number of promising students, especially in the Systems area, were discouraged from trying to obtain the Ph.D. degree in Computer Science. It took a number of years before the Computer Sciences Department was able to control its own requirements for advanced degrees.

Our thanks to Professor Duane Pyle of the Computer Science department of the University of Houston who was an important participant in the development of computing and computer science at Purdue. Many documents concerning the history of computing at Purdue before the Computer Science Department was established in 1962 were provided to us by Professor Pyle who had saved them in his personal files. We believe that in most cases these are the only copies of the documents that still survive. Some of the material presented here is based on personal interviews with participants, including Duane Pyle, Myer Jerison, Felix Haas, Vergil Anderson, John Hicks, Betty Bain, and others. Telephone interviews, especially those with Carl Kossack and with Alan Perlis provided another important source of information.