The Origins and Development of Airline Control Program/TPF

(Adapted from a website at http://www.blackbeard.com/tpf/tpfhist.htm
which is formatted in a very strange manner with very small type,
making it too difficult to read directly –JJ)

To really understand the origins and development of the system we now call TPF we must take a trip back in time to circa 1940. We will visit a main ticket office of American Airlines in Little Rock, Arkansas, a growing company with growing ambitions. Here the basic control of flight reservation was a large card index file around which eight or so clerks would sort through the cards for the flight being requested. They each knew the number of seats for the type of aircraft being used and by counting tally marks on the flight card they could tell if any seats were left and give you your "yes" or "no" on a reservation over the telephone. If your reservation was being made through another office it might take 2 or 3 hours to reach the revolving card index via a teletypewriter network and clerical personnel. In some of the medium-sized offices it was necessary to use binoculars to view critical information posted on large availability status boards in the ticket agent's area. The absence of a red tag indicated that at least one seat was available on that flight. If more than one seat was needed a phone call to the back room might give you the availability which was again kept on three-by-five index cards according to flight number. Quite a system! Air travel was growing and it was obvious that this type of manual system was not going to be able to handle the business!

By 1955 some automation had begun to creep into larger offices and American Airline's first automated equipment, the Magnetronic Reserves, provided remote controls so that the agents could search a memory drum and determine whether or not seats were available on a requested flight. Now within a few seconds agents could check availabilities, but the posting of the passenger name, telephone number and other information created a terrific paperwork headache. It was still necessary to record the passenger data on the ever present three-by-five cards. A constant river of paper then wound its way on conveyor belts to find its place in the back room. Something better was needed.

For every agent on the telephone another employee was required in the back to do the records-keeping. It was a system and it worked but as it grew, adding more clerk could no longer be the answer. American's management was constantly aware of the need for a complete change in the concept to handle an ever-increasing volume of flights and passengers. New incrementally better solutions were found but never a total system capable of keeping pace with the service that was speeding up transportation time and reducing journey days to hours and hours to minutes.

If ever there was a problem crying out for a computer solution it was this one. But it took one of those strange quirks of fate to get the whole thing off the ground (no pun intended). The story goes that in 1956 American Airlines' then President, C.R. Smith, a giant in North American commercial aviation history, had the occasion to be seated next to an IBM Sales and Marketing Representative called, coincidentally, Blair Smith. It is

not clear whether the two people were actually on an airplane at the time but it makes the story better if we assume they were. Anyway the two fell into conversation after learning of their matching names. Common interest brought the talk around to some way of solving American's reservation and record's keeping problems. C.R. Smith outlined the airline's needs and Blair Smith went his way promising to follow up. It was a mere 30 days later that IBM responded to American with a formal proposal to make a study of the airline's problems. It was 1957 by the time the direction was firmed up and a formal agreement reached.

American Airlines appointed technical and functional representatives to work with an IBM staff of 75 and the SABER (Semi Automatic Business Environment Research) project was born. In March of 1959 the initial program was proposed and one AA executive commented years later "It was the best damn research and development effort on the part of any company I've ever seen." It was much more than a survey of one company's or even an industry's needs; it was an entirely new concept which, it is said, spawned IBM's 360 computer systems.

The SABER name was later changed to the name more familiar to us today: SABRE. The system was actually implemented in 1962 and reportedly cost $30 million. Initially the hardware it ran on was an IBM 7090 processor, a second generation computer using disk files and specialized terminals developed for the airline reservation function. Also developed during this project were some innovations in communications technology, including the concepts of line concentration and of medium and low speed data sets, the use of a front-end-processor, development and improvement of large capacity rotating storage media (disk drives), fast direct access techniques for data stored on disk drives and the techniques of writing relocatable and reentrant code. The need for a fast computer system for the specific problems that faced the airline industry also contributed to the development of many of the features we take for granted in our computers today.

Two other systems which built on the experience gained in the SABER project were also developed in conjunction with IBM. One was the Deltamatic system for Delta Airlines using IBM 7074 processors when it was implemented and the other was Panamac, developed with Pan-American Airlines using IBM 7080 processors. Both of these systems were implemented in 1963 and the only fundamental differences were in their respective sizes. This was important because since much of the system code at the time had to be hardware-specific. This meant that although the systems were based on the same design there were some significant differences in the computer code within them.

In 1964 IBM made two important announcements. One, which is probably more widely regarded as important, was the introduction of the System/360 (S/360) line of computers and the other was the start of the development of PARS (Programmed Airline Reservation System). Based on their experiences with the three airline systems and the development of System/360 concepts IBM endeavored to design and develop a separate operating system that could function on any of the System/360 machines. This operating system would be similar to the systems developed for the airlines but would separate the "application" processing (booking seats, checking seat availability, and so forth) from the

"system" functions like accessing the database and restarting the system. By 1968 IBM had developed PARS and released it as a product. At this stage there was still no separation of function between applications and systems software but now a general package was available to all the other airlines to use on whatever member of IBM System/360 family they chose.

It was not until 1969 that IBM managed to pry apart the previously interwoven systems and applications portions of the PARS system. The applications portion of the new package was christened APPS and the systems portion became ACP (Airline Control Program), the forerunner of Transaction Processing Faciliyt, TPF. In keeping with the somewhat mysterious and arcane numbering schemes prevalent at IBM this first release of the ACP product was called Version 4 . Various other intermediate releases were brought out by IBM until the last numbered release of ACP, version 9.2.1, in February 1979. In December 1979 IBM changed the name of the product to ACP/TPF (IBM Program Product number 5748-T11) and quickly began to eradicate the initials "ACP" from all documentation.

This marked another turning point for the software. It was now IBM"s "official" belief that applications other than the airlines could and would benefit from its use. It was actually more a fact of recognition since many other businesses were actually using ACP/TPF. Already such companies with heavy transaction processing volumes such as American Express, New York City Police, AVIS, GMAC, Federal Express, Western Bank Corporation, Bank of America and several consumer lending companies were ACP/TPF customers alongside the major airlines of the world.

The development of TPF occurred with an extraordinary amount of cooperation between the users of the software among themselves and the users together with IBM. The three pioneering systems at American Airlines, Delta and Pan-Am were the product of a close working relationship with IBM and this relationship continued throughout the lifetime of TPF. People who have been introduced to computers only after the advent of the personal computer will probably have little appreciation for the industry as it existed when those first high-volume transaction processing systems were created. Computer engineers then were still struggling with operating system code that was too closely associated with the hardware that it was running on to be easily moved to different machines. The quest for a solution to this problem was one of the driving forces behind the System/360 concept. With this pioneering line of commercial computers time software that operated on one machine in the "family" would work, largely unmodified, on any other machine in the same "family." The effect of this simple standardization on the industry is hard to overemphasize. With experienced computer engineers then free to spend their time developing better systems rather than trying to rewrite existing ones to work new machines, progress could be much more rapid, and it was.