Computing in the University of the Philippines: A Tribute to Professor Emeritus Evangel Quiwa

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1 INTRODUCTION

It has been forty years since the first batch of undergraduate Computer Science students started at the University of the Philippines (U.P.) Diliman. Professor Evangel Quiwa is one of the faculty pioneers who spearheaded the birth of the Department of Computer Science (DCS) at the U.P. Diliman College of Engineering. Early batches of students spoke of Prof. Quiwa with equal measures of respect and fear. His undergraduate courses in *CS 32 - Data Structures* and *CS 131 - Numerical Computing* were taken with trepidation, and you can hear mixed sighs of relief and dismay when exam results are released. Prof. Quiwa though, was not just a respected teacher at UP. He was likewise a key part of that initial group of computer engineers and scientists in the early days of computerization efforts at U.P. In those years, mainframe computers were few and far between and programmers skilled in handling such computers were even more rare. These computing pioneers at U.P. worked at the University Computer Center, and initiated efforts to digitize and optimize major systems in U.P., from the admissions systems, the tuition fee assistance program, to the registration system. Having started as one of Prof. Quiwa's students in both CS 32 and CS 131, and eventually joining the DCS faculty, I am honored to have been asked to write of Prof. Quiwa's contributions to Computer Science teaching and applied research at U.P.

2 PROF. QUIWA AND THE DEPARTMENT OF COMPUTER SCIENCE

The Department of Computer Science is one of the youngest departments of the College of Engineering. Its beginnings could be traced with the institution of the Master of Engineering in Computer Science (MEngg CS) program in the mid 1970s. The MEngg CS program was jointly administered via the cooperation of three departments at that time: the Department of Engineering Sciences (ES) and the Department of Electrical Engineering (EE) of the College of Engineering, and the Department of Mathematics of the College of Science. These three departments, led by the ES Department, continued the cooperation when the MEngg CS program was later suspended and replaced by a Bachelor in Computer Science (B CS) program, with the first batch of undergraduate students starting in the second semester of AY 1982-1983.

In August 1988, the Department of Engineering Sciences was renamed as the Department of Engineering and Computer Sciences (ECS). Three years later, this was later split into the Department of Engineering Sciences and the Department of Computer Science (CS). The new Department of Computer Science continued to administer the B CS program, which was later renamed to Bachelor of Science in Computer Science. In 1995, the Board of Regents approved the institution of the Master of Science in Computer Science (MS CS) graduate program and the PhD in Computer Science (PhD CS) was instituted in 2011.

Prof. Evangel Quiwa is an alumnus of the UP College of Engineering, having earned his undergraduate degree in Civil Engineering. He later joined the faculty at the Engineering Sciences Department and was one of the first students of the MEngg CS program. Later on, Prof. Quiwa, together with other DCS faculty pioneers such as Prof. Angel Caringal and Prof. Veronica Tayag, spearheaded the early days of the young CS department. He later on became the chairman of DCS in 1991.

As part of his teaching duties, Prof. Quiwa was also one of the first faculty members to develop computerized modules to aid in the instruction of Engineering subjects such as ES 13, CS 32, CS 131, and Math 180.1. He not only developed programs to illustrate concepts in these subjects but in some cases, also developed programming languages that students can use to understand the subjects better. For the Math 180.1, he developed the Linear Programming Language (LPL) and an interpreter for that language. Students can use LPL to specify variables, constraints, and other details of a linear programming problem. They would then run the interpreter to come up with the solution to the problem [1].

3 COMPUTERIZATION OF VARIOUS UP INFORMATION SYSTEMS

It is worthwhile to review the systems we had at UP Diliman then vis-a-vis the systems we have now to appreciate the effort it took the University to bridge the gap from manual processing to computerization, given the unique constraints present in the UP System. To our knowledge, Prof. Quiwa was part of several crucial information systems at UP, from admissions, to fees, and registration.

3.1 The Challenges of the University's Admissions System

The main entry point for new students into the University of the Philippines is via the University of the Philippines College Admission Test (UPCAT). Prior to the COVID-19 pandemic, the UP system administers this geographically-dispersed nationwide exam at various test centers in the Philippines. Before computerization, the

(a) Prof. Quiwa (standing, 2nd from right)

(b) Prof. Quiwa (seated, 2nd from left)

Figure 1: Prof. Evangel Quiwa with colleagues from the Engineering Sciences (ES) Department

manual system for administering the UPCAT was slow and tedious. This was brought about by the sheer number of examinees taking the test. Although the University of the Philippines was one of the universities to administer their entrance exam early in the school year (typically every first week of August), the manual processing would typically cause the UPCAT results to be one of the latest to be announced. Obviously computerization held the promise of improving UPCAT administration and processing.

3.2 Challenges Beyond UPCAT

The intensive student data record processing in UP does not stop with the UPCAT. Once accepted in UP, all students then fall under the Socialized Tuition Fee Assistance Program (STFAP), with brackets determining the fees paid by the students. The processing of data to determine a student's STFAP bracket is another computerization challenge for UP. Additionally, the infamous manual class registration system in UP that led to the monicker *University of Pila*

Figure 2: Dept of Computer Science faculty, 1991

was also a problem that was waiting for a computerized solution. Prof. Evangel Quiwa was likewise both involved in the STFAP and the Computerized Registration System (CRS).

4 PROF. QUIWA AND UPCAT, STFAP, AND CRS

Throughout the years, Prof. Evangel Quiwa was actively and deeply involved in the computerization efforts of these three systems: UPCAT, STFAP, and CRS. He was not only involved in the programming and implementation of these systems but, more importantly, in the more difficult task of **envisioning** the computerized solutions. As a computer scientist, the burden of implementation is lightened if the specifications are clearly spelled out. In the case of these three systems, however, the most challenging task was threshing out the existing policies at the beginning to come up with systematic processes that would lend themselves well to computerized solutions. Prof. Quiwa's involvement included the clarification of policies and sometimes policy gaps, in the then existing systems in order to produce the clarified algorithms that we have implemented today.

4.1 UPCAT

The UPCAT at that time, had three distinct phases: Phase 1 involves the encoding of each UP applicant's data, e.g., high school grades and UPCAT scores, Phase 2 involves the determination of qualified candidates, and Phase 3 is report generation [1].

Prof. Quiwa's work lies in the important phase of determining the qualified candidates (or Phase 2). Initially, he had to determine the applicable admission policies (often spelled out in various Board of Regents decisions) and computerized them. In the early 1980s, he was part of a committee that formed the Excellence and Equity Admissions System (EEAS). That committee was tasked by then UP President Emil Javier to study the democratization of admissions into the UP System. As part of the team, Prof. Quiwa was involved in determining the rules by which an applicant may or may not be admitted into the UP System. Given the additional and unique constraints of several UP campuses from which an applicant can choose

[1] Since then, the UPCAT has undergone significant modifications from what is described here.

two as well as the variety of courses in each campus, the committee had to accommodate these input choices into the admissions process. There were also the issues of equity with respect to socio-economic levels as well as geographic representations. All these constraints had to be threshed out to come up with an efficient and elegant solution that would be accepted by all UP System campuses. Prof. Quiwa was involved in the policy discussions, the simulation runs, the algorithm determination and the eventual implementation of this important phase.

4.2 STFAP

Under UP President Jose Abueva, Prof. Quiwa was once again recruited to be part of the team to implement the computerization of the rules and implementation guidelines for the then Socialized Tuition Fee Assistance Program (STFAP). As with the UPCAT, the STFAP's policies involved a complex mix of requirements and weights in order to determine a student's income bracket [2].

4.3 CRS

The current Computerized Registration System (CRS) can trace its roots to efforts from the Department of Computer Science. As one of the senior members of that department, Prof. Quiwa played an advisory role to the pioneer CRS team of then faculty members Arnold Putong and Paolo Paje, as well as the student assistants who helped develop the first CRS version. It was determined by that team that, given the resource constraints of the UP system, batch processing was the most efficient and optimized implementation for the registration system. They developed a computerized queuing system (also known as the *virtual pila*) as an improvement over the physical long lines typically seen during UP registration periods. The *virtual pila* could take into account your priority subjects and your preferred sections in the pre-enlistment stages and would utilize this input to put a student in a virtual queue for the subjects and sections indicated.

4.4 College of Engineering Computerization Efforts

Later on, Prof. Quiwa served as College Secretary of the College of Engineering. Here, he also initiated efforts for computerization of various information systems in the College. He helped supervise the Automated Grades Administration (AGaD) system and the SARS (Student Records System) of the College. These systems are in anticipation for eventual connection to the Computerized Registration System (CRS).

4.5 Systems Programming

As part of the pioneering group who handled the early UP machines (and IBM 360 and later an IBM 370), Prof. Quiwa was also what we would now call a system administrator for the UP Computer Center. Unlike present machines that could be easily upgraded with new peripherals, the University's mainframes had to be re-initialized (essentially a re-installation of the entire operating system), every time a new device was to be attached (e.g., a new tape drive, a new printer). Prof. Quiwa had the thankless task of conducting this system generation for UP's early mainframes. Even when he served as DCS chairman, he continued to be involved not only in software programming but even in the hardware setup of DCS laboratories. I remember being part of several DCS instructors helping out Prof. Quiwa in laying out coaxial cables for one of the early computer laboratories inside the National Hydraulic Research Center. Prof. Q, as we called him, did not hesitate to work alongside his junior colleagues in making sure the computer laboratory was wired and ready for classes.

5 PROF. QUIWA'S CONTRIBUTIONS

Prof. Evangel Quiwa's direct contributions to the computerization efforts of the University's data-intensive systems are listed below. It is important to emphasize that it is now easier to map and plan further computerization efforts given the legacy of the systematized and efficient programs that Prof. Quiwa helped develop.

(1) Implementation of the UPCAT Campus Level Processing, prior to EEAS
(2) Development[3] of the Excellence and Equity Admission System (EEAS)
(3) Development of peripheral programs for UPCAT, such as Item Level Analysis
(4) Development of UPCAT Degree Program Processing
(5) Development of STFAP
(6) Advising on the CRS (from the first version up to the present)
(7) Initiation and development of modules beyond CRS and their initial adoption at the College of Engineering (AGaD, SARS)
(8) Systems Programming for UP Computer Center Mainframes
(9) Development of instructional materials for various Engineering subjects

It is equally important to stress out the equally valuable, although sometimes overlooked fact, that Prof. Quiwa's work has also helped pave the way for current computerization efforts in the University. His contributions are beyond the quantifiable enumeration of his achievements - his body of work on the computerization of the University's systems was pioneering and inspiring and should be assessed in context of the obstacles and constraints presented during the time these efforts were initiated. His continuous involvement in these systems until his retirement is a testament to the quality and longevity of his work.

REFERENCES

[1] Evangel P. Quiwa. 1982. LPL: A Problem Oriented Language for Linear Programming. *Philippine Engineering Journal* 3, 1 (1982).

[2] The STFAP is no longer in place at U.P.

[3] By development we mean both design and implementation or programming.