



推廣開源系統軟體 培育智慧創新關鍵人才

文／翁健棋

身為國內規模最大之資訊學院與資訊科系，本院向來以邁向國際頂尖系所，培育下一代精英資訊人才為目標，希望能藉由豐沛的師資與設備，持續追求教學及研究之卓越成果，延續並提升台灣 IT 產業的榮景。以著重人才培育著稱的本院資工系，在易志偉教授、張立平教授積極爭取下，於近期榮獲為教育部「智慧創新關鍵人才躍升計畫」擔任示範系所資格，將在未來國家數位發展、數位轉型過程中，扮演關鍵的智慧創新人才產出角色，為厚植資通訊領域發展基礎盡一份心力。

由易志偉教授所主持的計畫類別屬 B 類計畫，目標在於培育跨域軟體服務實踐人才，計畫名稱為「基於微服務的智慧軟體開發與教學平台」。考量到 B 類計畫對 CS+X 人才培育模式的教學需求，包含提供資訊領域學生「傳統程式設計環境」與跨域學生「簡便應用程式開發環境」兩大面向，計畫執行團隊嘗試開發一個雲端微服務平台，讓程式導向的學生皆可在該平台上實作各種微服務。利用 Kubernetes 建構微服務管理系統，提供應用程式使用 RESTful API 呼叫各項微服務來完成任務，使應用開發者只需專注在如何串連各項微服務來完成預定功能，無需花費大量時間在各項功能開發的程式撰寫，讓欲開發之概念得以迅速得到驗證，正是該平台最大的特色。

該計畫目前預計以「影像處理在羽球運動上的應用」為雛形系統進行設計，透過建構攝影系統所需的影像處理設計開發微服務 API，搭配影片內容分析處理、對戰重要事件識別等技術，開發出場館經營者及使用者所需的服務。待概念可行性經過驗證，系統趨於穩定成熟，計畫團隊規劃將該系統延伸應用於其他領域，同時將平台導入教學環境。如與高中資訊社團及資訊科教師合作，透過提供高中生共同協作的平台，讓相關智慧軟體與微服務開源核心技術進入高中校園，成為資訊基礎教育一環；另一方面，將平台開發與平台的應用置入大學、研究所及在職班的教學中，結合多元教學推廣、產學合作，達成吸引跨領域人才成效，落實 CS+X 人才培育之精神。

而由張立平教授所主持的「開源系統軟體教育與實踐計畫」屬 C 類開源軟體創作前瞻人才培育範疇。有鑑於系統軟體的開發與設計之學習曲線過於陡峭，大幅提升相關領域人才培育難度，該計畫預計設計一個主題式課群，內含包括「編譯器設計概論」、「高等 UNIX 程式設計」、「計算機系統管理」、「計算機網路管理」、「作業系統總整與實作」等五個課程，透過循序漸進之學習歷程，提升學生的學習意願與對開源軟體概念、應用之了解。以系統軟體為主題，開源軟體精神為核心，該計畫預計達成的目標任務包括：

- (1) 確保特色課程具有長期固定開設的能力
- (2) 協調課群內所有課程以開源軟體精神前後貫穿
- (3) 傳授開源社群運作與生態文化，消除學生參與貢獻的門檻
- (4) 對開源軟體專案產生具體貢獻並能持續追蹤統計相關產出
- (5) 增加學生對於開源社群會議的參與度
- (6) 確保同學完修特色課群的比例

由於該計畫的重點包含將課程植入「推廣開源系統軟體」的精神，如何常態化、有系統性的統整本院資工系學生豐富卻分散的開源軟體貢獻便是計畫的積極目標之一。透過有策略性地協調各課程主軸，強調開源系統軟體使用，同時以「營造環境」的思維讓修課同學主動成為貢獻者，輔以本院系計中之開發環境及其助教群、丁組碩士生與過去培育之系友等支援管道，相信對於實踐三大計畫目標：落實課群之課程完修的學生數、提升學生參與開源社群活動的人數、執行產出開源軟體專案有著極大助益，從而達到開源系統軟體創作前瞻人才培育之目的。

作為教育部智慧創新關鍵人才躍升計畫之人才培育示範系所，本院將不遺餘力投入、整合各項資源，協助計畫目標加以實踐，滿足產學研各界對軟體專業人才之需求，協助國家資通訊領域打下厚實基礎，提升產業競爭力。

Promoting Open Source System Software and Cultivating Innovative Talent

As one of the largest departments of Computer Science in the country, we aim to become a top international department and cultivate professional elites in computer science for the next generation. With excellent guidance from faculty members and state-of-the-art equipment, our goal is to achieve outstanding results in teaching and research, and enhance the glory of Taiwan's IT industry. With great efforts by Dr. Chih-Wei Yi and Dr. Li-Pin Chang, the Department of Computer Science has recently been honored with the model example of the "Smart Innovation Key Talent Development Program" by the Ministry of Education. In the future digital development, our department will play a crucial role in cultivating innovative talents. In addition, a category B project, led by Dr. Chih-Wei Yi, aims to cultivate interdisciplinary software service practitioners. The project is titled "Intelligent Software Development and Teaching Platform based on Microservices". It focuses on two main aspects of talent cultivation using the CS+X mode. First, it provides students with traditional programming training. Second, it offers a user-friendly application development environment for students in interdisciplinary fields.

Furthermore, the project team aims to develop a cloud-based microservices platform that enables students with a programming background to implement various microservices. By utilizing Kubernetes to construct a microservices management system, the platform allows application developers to focus on connecting and integrating microservices to achieve the desired functionality without spending a significant amount of time in programming individual features. This allows concepts to be rapidly validated and developed, which is the platform's greatest feature.

Dr. Yi's project is currently planning to design a prototype system based on the application of image processing in badminton. The project aims to develop microservice APIs for image processing required by the camera system, along with technologies such as video content analysis and identification of significant game events. By doing so, it seeks to provide the services needed by venue operators and users. Once the feasibility of the concept is validated and the system becomes stable and mature, the project team plans to extend the application of the system to other domains and introduce the platform into different teaching environments. For example, through collaboration with high school computer clubs and computer science teachers, the platform aims to bring software and open-source core technologies into high school campuses as part of fundamental computer education. Additionally, to attract interdisciplinary talent and implement the spirit of CS+X talent cultivation, the platform will be integrated into universities, research institutes, and professional training programs to promote teaching and industry-academia cooperation.

Another project led by Dr. Li-Pin Chang, titled "Open Source System Software Education and Practice Program," belongs to Category C. It focuses on cultivating future talents in open-source software creation. The project plans to design a theme-based curriculum consisting of five courses: "Introduction to Compiler Design," "Advanced UNIX Programming," "Computer System Management," "Computer Network Management," and "Operating System Integration and Implementation." The project aims to enhance students' willingness to learn and their understanding of the applications of open-source software. With a focus

on system software and the core principles of open-source software, the project aims to achieve the following objectives:

1. Ensure that the featured courses can be offered on a long-term basis.
2. Coordinate all courses within the curriculum to consistently focus on open-source software principles.
3. Teach students about open-source community operations and culture with an appropriate standard for student involvement.
4. Generate tangible contributions to open-source software projects and maintain ongoing tracking and statistics of relevant outputs.
5. Increase students' participation in open-source community conferences.
6. Ensure a completion rate for students enrolled in the curriculum.

The focus of this project is to promote open-source system software into the designed curriculum. Thus, one of the main objectives of the project is to normalize and consolidate the computer science students' work to open-source software. By strategically coordinating the use of open-source system software, students actively become contributors through this environment. In addition, this learning journey is supported by the assistance of teaching assistants, graduate students, and alumni who have been cultivated in our department. It is believed that this approach will greatly contribute to achieving the three main goals of the project: increasing the number of students completing the curriculum, enhancing student participation in open-source community activities, and producing tangible outcomes in open-source software projects. Ultimately, the aim is to cultivate forward-thinking talents in the creation of open-source system software.

The focus of this project is to promote the integration of open-source system software into the designed curriculum. Therefore, one of the main objectives of the project is to standardize and consolidate the contributions of computer science students to open-source software. By strategically coordinating the main themes of each course and emphasizing the utilization of open-source system software, students actively engage as contributors with the mindset of "creating an environment."

This is facilitated by the development environment and the assistance provided by teaching assistants, graduate students, and alumni who have been nurtured in our department. It is believed that this approach will significantly contribute to achieving the project's three main goals: increasing the number of students who successfully complete the curriculum, enhancing student participation in open-source community activities, and yielding tangible outcomes in open-source software projects. Ultimately, the objective is to cultivate forward-thinking talents in the creation of open-source system software.

Our department serves as a model example for the Ministry of Education's Smart Innovation Key Talent Development Program. We are dedicated to assisting in the realization of project goals, addressing the needs of industry, academia, and research in terms of software professionals, and establishing a strong foundation in the field of information and communication technologies to enhance industrial competitiveness.