In Search of Cyber Defenders

Cyber space provides the freedoms and limitless possibilities for information sharing, communications and productivity. Unfortunately, this freedom comes with risks, risks that are dealt with by cyber defenders every day. The United States needs more cyber defenders, …thousands more. One of the challenges of Priority III of the National Strategy to Secure Cyberspace is to “foster adequate training and education programs to support the Nation’s cybersecurity needs.” The National Initiative for Cybersecurity Education (NICE) aims to enhance U.S. cybersecurity posture and improve cyber behavior, skills, and knowledge of every segment of the population through education and training.

Attracting students to a computer science program is only part of the challenge we face in creating cyber defenders. To be effective, students need to obtain practical real-world experience with not only current technologies, but emerging technologies as well. Cybersecurity competitions are focusing on the shortage of technically skilled people required to operate and support systems already deployed but also educating young individuals who can design secure systems, create and deploy sophisticated tools needed to prevent malicious acts.

High School and College

DHS S&T has been involved with developing students’ skills in both high schools as well as in college. This is achieved through funding the development and execution of the Collegiate Cyber Defense Challenge (CCDC), Sandia National Labs’ Center for Cyber Defenders (CCD), Security and Software Engineering Research Center (SERC), and the US Cyber Challenge (USCC).

The CCDC is a tournament of capture the flag style competitions. The nation is divided into nine regions with an additional at-large region where teams of eight students compete against each other to defend their networks and associated services. The winners of each region are advanced to the National CCDC where each of the ten teams competes for a national champion. In 2011, over 1,300 students from 109 colleges and universities participated in CCDC events. CCDC was recognized for its efforts to promote cybersecurity curriculum in institutions of higher learning by the 11th Congress (H.R. 1244) and is mentioned as a model program in the White House’s 2009 Cyberspace Policy Review. The CCDC program was also honored with the Visa Leadership in Security Award.

CCD is a student internship program allowing students to work side-by-side with experienced research staff, and provided the opportunity to perform various experiments analyzing, protecting and defending hardware. The CCD program directly connects to additional Sandia career development resources, allowing the interns the opportunity to compete for acceptance into Graduate Fellowship Programs or full-time research positions.

SERC was established in 1976 by the National Science Foundation (NSF) to encourage more collaborative endeavors between academia and industry. The goal of the program is to establish self-sufficient research centers of excellence in areas of critical technology. S’ERC researchers are faculty and students from Computer Science, Industrial Engineering, Management, and Systems Engineering programs at 13 universities. Researchers work with non-academic practitioners at affiliate industry and government sites, who provide guidance, feedback and funding.

The USCC organizes multiple events for high school students throughout the year including Cyber Foundations workshops as well as summer cyber camps. In Spring 2011, registration for USCC Cyber Foundations included 26 states and almost 1,000 students. Fall 2011 registration closed on October 14th, and student registration numbers have almost doubled from the previous year. USCC has also conducted six summer cyber camps in MD, CA, DE, VA and MO with 210 students in participation.

New Technologies

One of the exciting aspects of the competitions for both students as well as DHS is the ability to introduce new tools or methodology into the competitions. The students get an opportunity to experiment and investigate novel tools coming out of government cyber security R&D programs, while the government development teams have an opportunity to obtain a rich data set that includes a high density of a variety of attacks with real-time defense with different approaches. This approach also develops a new cyber security workforce that is already familiar with not only current technology for cyber defense, but also the novel and emerging technologies as well that they can apply from their first day on the job.

Competitions Impact

The competitions run by CCDC, Sandia, SERC, and USCC have proven successful in delivering skilled workers to the workforce. Each year at the NCCDC, many of the top students leave the competition with job offers from corporate sponsors of the competition.

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