Optimizing IT Infrastructure and Cybersecurity with Virtual Environments at the Institute for Defense Analyses

A Professional Readiness Experiential Program (PREP) Project Effort

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Interested in being an Industry Participant and or PREP Sponsor? Please reach out to bngac@gmu.edu, Thanks!

Introduction
Interning at the Institute for Defense Analyses (IDA) provided a unique opportunity to bridge academic learning with practical application. Over the course of 12 weeks, the interns were tasked with creating and optimizing Windows Server 2022 virtual environments. This project was essential not only for strengthening IDA's IT infrastructure but also for allowing the interns to gain hands-on experience. The experience offered valuable insights into modern IT system challenges, the importance of cybersecurity, and the collaborative efforts required to meet organizational goals.

Business Challenge
The interns' primary challenge was to develop a strong foundational understanding of Windows servers and their role in IDA's IT ecosystem. They needed to build and secure Windows Server 2022 virtual machines, ensuring they were scalable and reliable for IDA's research operations. The project required learning how servers manage heavy workloads, distribute resources across over 2,000 employees, and maintain computational efficiency.

The second challenge was ensuring the security of the deployed virtual machines. This required vulnerability scanning using Tenable to detect and mitigate security threats. The interns had to understand and apply cybersecurity principles to safeguard IDA's infrastructure against potential attacks.

Activities Done to Address the Business Challenge
For the first project (Windows Server 2022 Deployment), the interns used vCenter to create and configure Windows Server 2022 virtual machines. They then integrated virtual machines into IDA's network, ensuring proper configuration and functionality. They also learned about server capabilities such as redundancy, scalability, and large process handling.

For the second project (Cybersecurity & Vulnerability Management), the interns conducted vulnerability scans using Tenable to identify security risks. They then analyzed and mitigated potential vulnerabilities to strengthen system security. These activities helped them gain hands-on experience with network security configurations and firewalls.

Results & The Positive Impact
Emmanuel's and Kavya's work resulted in four major positive impacts for IDA:
- Enhanced IT Infrastructure: The deployment of Windows Server 2022 improved computational efficiency, allowing for better data processing and analysis.
- Stronger Cybersecurity Measures: The use of Tenable to identify vulnerabilities helped mitigate potential threats, protecting sensitive IDA data.
- Improved Scalability & Resource Management: Virtualized servers allowed IDA to optimize resources, reducing operational costs while increasing efficiency.
- Long-Term IT Sustainability: The modernized infrastructure positioned IDA to leverage new technologies and methodologies for future growth.

Conclusion

The internship at IDA was a transformative experience, equipping the interns with practical knowledge that reinforced their academic studies. It bridged the gap between theory and application, strengthened problem-solving and communication skills, and deepened their understanding of cybersecurity best practices. The hands-on work prepared them for future careers in IT and cybersecurity.

PREP Student Reflection

The interns initially hesitated to take on an internship during the academic semester, fearing it would negatively impact their coursework. However, they quickly realized the experience complemented their studies, reinforcing topics they were learning in class. The internship also provided valuable networking opportunities with IT and cybersecurity professionals, helping them gain career insights. Key takeaways included:

- Gaining real-world experience in server management and security.
- Learning the importance of teamwork and effective communication.
- Improving problem-solving skills through practical challenges.
- Developing confidence in cybersecurity tools like Tenable and vCenter.

While the internship was highly beneficial, they noted areas for improvement, such as enhanced project planning, broader exposure to IT infrastructure, and more structured feedback sessions to track progress.