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## **Thème**

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**ML Based Web Application Dual-Layer Firewall Using  
Supervised Learning**

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# Abstract

Web Application Firewalls (WAFs) are critical in safeguarding web applications from an array of cyber threats. However, a prominent challenge in web security lies in effectively integrating network-level security with application-level protection. This thesis addresses this challenge by proposing a novel approach for a Web Application Firewall that combines port and network scanning with web application vulnerability detection. The central objective of this research is to implement a WAF based on supervised learning, enabling the unified, intelligent defense of web applications. Through supervised learning, the system can recognize and mitigate threats, achieving a dual-layer security architecture. This thesis explores fundamental concepts in web security and machine learning, followed by the design and deployment of the ML-based WAF. An in-depth evaluation of its performance is conducted, illustrating its effectiveness in providing comprehensive protection and fostering resilience in the face of evolving cyber threats. This research contributes to advancing the field of web application security by offering an innovative and integrated security solution that demonstrates the potential of supervised learning in enhancing web application protection.